Late-Successional Reserve 261 Density Management Environmental Assessment

Bureau of Land Management
Roseburg District Office
South River Field Office
Environmental Assessment No. OR-105-05-08

U.S. Department of the Interior, Bureau of Land Management
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Table of Contents

Chapter 4

Environmental Consequences

Chapter 5

Appendices

Chapter 1
PURPOSE AND NEED FOR ACTION

This chapter provides a brief description of the purpose and need for the proposed action being analyzed in this environmental assessment (EA).

I. Proposed Action

The proposed action is density management in the Late-Successional Reserve (LSR) land use allocation, commercial thinning in the General Forest Management Area (GFMA), and density management in Riparian Reserves (RR) associated with the GFMA stands. Approximately 900 acres were initially identified as candidate stands for treatment through operational inventories, stand examinations, and field verification by silviculture and wildlife staff. For reasons addressed in Chapter 2 (p. 13), approximately 115 acres were dropped from analysis in this EA.

Density management would be applied to approximately 665 acres of forest stands within the LSR in the Middle Fork Coquille River, East Fork Coquille River, and Olalla Creek-Lookingglass Creek fifth-field watersheds. Approximately 80 acres of GFMA would be commercially thinned and density management would be applied on 40 acres in RR in the Middle Fork Coquille River fifth-field watershed.

The Roseburg District *Record of Decision and Resource Management Plan* ((ROD/RMP, p. 29) USDI, BLM 1995a) directs that activities beneficial to the creation of late-successional habitat be planned and implemented in the LSRs. Thinning operations are to be conducted in forest stands up to 80 years old, if needed to create and maintain late-successional forest conditions.

The *South Coast-Northern Klamath Late-Successional Reserve Assessment* (LSRA) provides guidance for determining what forest stand conditions warrant silvicultural treatment and the types of treatments that would be appropriate to achieve desired forest stand conditions. The LSRA listed LSR 261, which encompasses the analysis area, as a high priority for management actions based on its large size, key links to the LSR network, and its land ownership pattern. Management priorities identified in the LSRA for LSR 261 include enlarging existing interior late-successional habitat blocks, maintaining and improving habitat connections between LSRs and within the LSR, and creating late-successional habitat where absent (LSRA, pp. 63-66 and Map #6).

II. Purpose

The purpose of the proposed action would be to reduce the relative density of stands and maintain stand vigor, consistent with stand and landscape objectives described in Appendix E of the Roseburg District ROD/RMP (pp. 150 and 152).

The proposed treatments are based on the recommendations of watershed analysis (USDI, BLM 1998, USDI, BLM 1999a, and USDI, BLM 1999b), silvicultural staff, the *South Coast-Northern Klamath Late-Successional Reserve Assessment*, and management direction to develop

vegetation characteristics needed to attain objectives of the Aquatic Conservation Strategy (ROD/RMP, pp. 153-154).

The timber volume from the GFMA Land Use Allocation (LUA) would contribute to the annual ASQ for the Roseburg District, in support of the socio-economic benefits envisioned in the PRMP/EIS (Vol. 1, p. xii). The PRMP/EIS estimated that BLM management programs (including timber sales) would support 544 jobs and provide $9.333 million in personal income, annually.

Density management in the LSR would meet the LSRA objective to protect and enhance conditions of late-successional and old-growth forest ecosystems, create late-successional habitat, and enlarge existing interior late-successional habitat blocks.

Thinning in the GFMA would meet the ROD/RMP (pp. 150-151) objective of assuring a high level of volume productivity.

Applying density management in Riparian Reserves would help to maintain or restore plant species composition and structure, riparian habitats and connectivity, water quality, and sediment regimes.

The density management treatments are anticipated to yield about eight million board feet (MMBF) of timber in support of local and regional manufacturers and economies. Volume (about one million board feet) derived from treatments in the GFMA land use allocation would contribute toward the declared objective of an annual allowable sale quantity (ASQ) of 45 million board feet for the Roseburg District. Volume derived from density management in Late-Successional and Riparian Reserves would not be chargeable against this objective.

This Environmental Assessment (EA) would consider the environmental consequences of the alternatives in order to provide sufficient evidence and analysis for determining whether there would be impacts exceeding those considered in the Roseburg District *Proposed Resource Management Plan/Environmental Impact Statement* (PRMP/EIS) that would require preparation of a Supplemental Environmental Impact Statement (SEIS). This analysis is tiered to and incorporates by reference the assumptions and analysis of consequences provided by:

- The Roseburg District *Proposed Resource Management Plan/Environmental Impact Statement* (USDI, BLM 1994 (PRMP/EIS));

- The *Final Supplemental Environmental Impact Statement* (FSEIS) *on Management of Habitat for Late-Successional and Old-Growth Related Species Within the Range of the Northern Spotted Owl* (USDA and USDI 1994a);

- The FSEIS *for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (USDA and USDI 2001a);

- The FSEIS *to Clarify Provisions Relating to the Aquatic Conservation Strategy* (USDA and USDI 2004a).

- The FSEIS *for Management of Port-Orford-Cedar in Southwest Oregon* (USDA and USDI 2004b).

Implementation of the proposed action would conform to requirements of the ROD/RMP. The ROD/RMP incorporates as management direction the standards and guidelines of the *Record of Decision for Amendments* (ROD) *to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (USDA and USDI 1994b), as amended by the *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (USDA and USDI 2001b), the *Record of Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy* (USDA and USDI 2004c), and the *Record of Decision and Resource Management Plan Amendment for Management of Port-Orford-Cedar in Southwest Oregon, Coos Bay, Medford, and Roseburg Districts* (USDI, BLM 2004).

III. Need

Density Management and commercial thinning are needed to reduce stand densities in order to:

- Meet LSRA objectives by protecting and enhancing conditions of late-successional forest ecosystems, which serve as habitat for late-successional and old-growth forest related species (ROD/RMP p. 153);
- Promote the development of old-growth characteristics;
- Maintain the health and vigor of the stands, and promote the growth of the remaining trees;
- Retain hardwoods as stand components;
- Maintain native species diversity and structural composition of the forest stands (LSRA, pp. 62);
- Maintain and improve late-successional habitat connections within and between LSRs (LSRA, pp. 65-66);
- Decrease the risk of large scale catastrophic loss from fire and insects;
- Provide a high level of quality wood and sustainable timber production from the GFMA (ROD/RMP p. 151); and
- Recover the commodity value of trees in GFMA that would be lost to suppression mortality and contribute to the declared annual ASQ for the Roseburg District.

IV. Decision Factors

Factors to be considered when selecting among alternatives would include:

- The degree to which the objectives previously described would be achieved, including: the manner in which timber harvest would be conducted with respect to the type(s) of equipment and method of yarding; season(s) of operations; and the manner in which

access would be provided, including road renovation, and the types and locations of road construction;

- The nature and intensity of environmental impacts that would result from implementing the alternative and the nature and effectiveness of measures to mitigate impacts to resources including, but not limited to wildlife and wildlife habitat, soil productivity, and water quality;

- Compliance with management direction from the ROD/RMP;

- Achievement of LSRA objectives; and

- Compliance with applicable laws including, but not limited to, the Clean Water Act and the Endangered Species Act.

Chapter 2
DISCUSSION OF ALTERNATIVES

This chapter describes the basic features of the alternatives being analyzed.

I. Alternative One – No Action

Under this alternative, density management and commercial thinning would not be conducted in the proposed units. The stands would remain in their present condition as dense, closed-canopy forests and continue to develop along current trajectories leading to increased stand densities, increased suppression mortality, and potential stand stagnation, unless altered by a natural disturbance.

Road construction, decommissioning, or renovation would not be undertaken at this time. Road maintenance would continue to be conducted to provide resource protection, accommodation of users, and protect the government's investment.

II. Alternative Two – Proposed Action

Under this alternative, density management and commercial thinning treatments would be implemented on approximately 785 acres of mid-seral forest stands in LSR 261, Riparian Reserves, and GFMA. The acreage would be divided among 27 units comprising four timber sales, to be authorized individually, and designated as Bogey Gap (BG), Camas Heights (CH), Power Wagon (PW), and Sherlock's Denn (SD), as indicated on the project proposal maps in Appendix A.

Relative densities in the proposed units are presently above 0.55. Relative density is used to describe the stand stocking level relative to a theoretical maximum. At a relative density above 0.55, competition among trees results in suppression mortality and reduced vigor (Drew and Flewelling 1979). Treatments in the LSR would be designed to mimic natural disturbances to reduce stand density and move stand development toward late-successional conditions as described in the *South Coast-Northern Klamath Late-Successional Reserve Assessment* (p. 28). Similar treatments in the Riparian Reserves would control stocking, manage stands and desired non-conifer vegetation, and acquire desired vegetation characteristics to attain Aquatic Conservation Strategy objectives.

In the GFMA, thinning to a relative density between 0.30 and 0.40 would maintain high levels of volume productivity. Thinning to a lower relative density in the GFMA would maximize individual tree growth while maintaining a high level of resource production. Treatments in the GFMA would also maintain site productivity, biological legacies, and a biologically diverse forest matrix.

A. Density Management Treatments

Light, moderate, and heavy thinning densities would be interspersed with openings up to one-quarter acre in size and unthinned areas. Densities would be varied within individual units and across the project area to accentuate landscape diversity and break up the current stand homogeneity. Density management would be accomplished using the following variable spacing prescriptions:

- **Light Thinning** would retain approximately 140 square feet of basal area (approximately 80 to 90 trees per acre). The relative density would be reduced to approximately 0.38. Trees would be spaced to create a variable density across the stands. Rather than spacing retention trees evenly, clumps of trees would be retained and gaps and openings would be created. Trees removed would generally come from the intermediate and suppressed crown classes.
- **Moderate Thinning** would retain approximately 120 square feet of basal area (approximately 60 to 70 trees per acre). The relative density would be reduced to approximately 0.32. As with the light thinning, trees would be primarily removed from the intermediate and suppressed crown classes, while the co-dominant and dominant trees would be favored for retention.
- **Heavy Thinning** would reduce the density to approximately 90 square feet of basal area (approximately 50 trees per acre) and would comprise less than 10 percent of the stand. The relative density would be reduced to approximately 0.23. Depending on the establishment of natural seedlings, underplanting with a mixture of Douglas-fir, incense-cedar, Port-Orford cedar, or western hemlock may be necessary to promote the establishment of a secondary canopy.
- **No Thinning Areas** would comprise approximately 10 percent of the stand. This would include unthinned areas within 90 feet of trees considered to be suitable marbled murrelet nest trees, within 90 feet of suitable marbled murrelet habitat, riparian areas, and designed to protect Special Status Plant Species, coarse woody debris, and snags in the units. Trees would be felled away from the unthinned areas.

Table 1. Approximate Acres by Treatment Type in the Proposed Units.

Project Name	Land Use Allocation	Total Acres	No Thinning Acres	Thinning Acres	Thinning Prescription (Acres)		
					Light Thin	Moderate Thin	Heavy Thin
Bogey Gap	LSR	215	30	185	63	101	21
Power Wagon	LSR	70	11	59	22	31	6
Sherlock's Denn	LSR	160	17	143	67	63	13
Camas Heights	LSR/GFMA/RR	220/80/40	64	276	117	127	32
Total		**785**	**122**	**663**	**269**	**322**	**72**

1. Late-Successional and Riparian Reserves

Generally, trees 20 inches in diameter at breast height (DBH) or larger would be retained. Any large remnant trees would be retained. However, this does not mean all trees larger than 20 inches in diameter would be retained. Trees larger than 20 inches may be cut to achieve LSRA in the LSR and stand density objectives in the RR. Spacing of leave trees would be variable to create openings and clumps. Openings would allow natural regeneration of conifers, hardwoods, and shrubs to develop a secondary conifer canopy and understory vegetation. Individual trees would be thinned around (cultured) to maintain or develop large limbs and canopies. The combination of openings and heavy thinning would be less than ten percent of the stand. Project areas would be evaluated for conifer underplanting after the density management treatment.

Trees selected for retention would generally be from the dominant and co-dominant crown classes. However, intermediate and suppressed trees would be marked in conjunction with dominant trees to maintain canopy diversity or retain less common species, such as cedars. Generally, the healthiest best-formed trees would be retained. However, some trees selected for retention would have defects, such as broken and deformed tops, which could develop roosting and nesting structure. Generally, hardwoods larger than ten inches in diameter and expected to survive after the density management treatment would be selected for retention. Minor conifer species would also be favored for retention to maintain them as stand components.

Interior habitat conditions in adjacent late-successional forests would be retained by placing unthinned areas within 90 feet of late-successional forest stands and feathering into light thinning areas. Openings would not be placed within 90 feet of the late-successional forest stand.

2. General Forest Management Area

Commercial thinning would be used to reduce the relative density in generally even-aged forest stands dominated by Douglas-fir. Trees would primarily be removed from the suppressed and intermediate canopy classes, although some co-dominant and dominant trees could be removed where necessary to meet specific density objectives. Generally, trees selected for retention would have at least 30 percent live crown ratios so that live crown expansion and accelerated diameter growth would be more likely following thinning (Daniel, et. al. 1979).

Older remnant trees may be present, but are not the numerically predominant stand components or the focus of commercial thinning. Large remnant trees would be retained to the greatest degree practical. Removal would generally be limited to situations where trees are located in a proposed road right-of-way where no suitable alternative access exists. Since treatments would focus on the removal of intermediate and suppressed canopy layers, it is possible suppressed trees designated for cutting may be older than the prevailing stand age.

B. Snags and Coarse Woody Debris

Snags larger than 16 inches DBH and 16 feet tall and expected to survive the density management treatment would be retained to the greatest degree practical in the LSR and RR. Snags would be protected by retaining the closest green trees around them in unthinned areas.

Circumstances where snags could be felled would include where they pose operational safety concerns subject to Oregon State laws and regulations or are in road rights-of-way. In the LSR and RR, felled snags would be retained to provide coarse woody debris.

Following completion of the density management, snags would be created, in the LSR, to meet the LSRA recommendation of at least three snags per acre on north slopes and one snag per acre on south slopes. Within five years following the density management, the LSRA recommendations of five snags per acre on north slopes and three snags per acre on south slopes would be met by girdling green trees, if needed. The desired snag size is at least 20 inches DBH, but if the size of available trees is smaller, snags would be created from the average size class trees in the stand.

Existing coarse woody debris would be reserved under contract provisions. In the LSR, the amount of coarse woody debris in the units would be reevaluated within one year following treatment. Units in the LSR with less than the LSRA recommended amounts would have additional coarse woody debris added within the appropriate site potential tree height of perennial or intermittent streams (see discussion in Chapter 3).

C. Riparian Treatments

Unthinned buffers consisting of widths varying from 20 feet (slope distance measured from the top of the stream bank) on non-fish bearing streams to 50 feet (also slope distance) on fish bearing streams would be established to protect stream bank integrity, maintain streamside shade, and provide a filtering strip for overland run-off. Actual widths of the unthinned buffer would be based on unique habitat features, streamside topography and vegetation, fish presence, susceptibility to solar heating, and whether the stream is intermittent or perennial (Figure 1).

Figure 1. Variable Unthinned Buffer and Light Thinning Treatment Widths in the Riparian Areas.

Light thinning would occur within selected distances from the unthinned buffers in the riparian areas (Figure 1). The width of the light thinning areas would be based on the same factors as those used to determine the unthinned buffers. The total width of the unthinned and light thinning buffers would be 50 feet on intermittent and 90 feet on perennial streams.

No equipment operations would be allowed within the unthinned buffers. Yarding corridors through unthinned riparian buffers between Camas Heights Units K and L, between Camas Heights Units J and K, and in Bogey Gap Unit A may be necessary. If necessary to fell trees within the unthinned stream buffers for operational purposes, the trees would be felled toward the channel and left in place to provide instream wood and stream bank protection. The need for any yarding corridors across streams would be clearly demonstrated by the purchaser. Corridors would be a maximum of 20 feet wide and laid out perpendicular to stream channels at pre-approved locations.

D. Operational Restrictions

Implementation of the proposed action would follow seasonal or daily restrictions to comply with project design features for felling; yarding operations; timber hauling; or road construction, decommissioning, and renovation. Table 2 provides a timeframe of the restriction periods.

Felling and yarding of timber, other than clearing rights-of-way, would generally be prohibited during the bark slip period, from April 15 to July 15 (Table 2). This is the time of year when active cambial growth can result in the bark being less firmly attached and young trees are more susceptible to mechanical damage. Circumstances may exist, however, where it would be practical to waive this restriction, such as in the use of harvesters and forwarders that are capable of severing trees, setting them aside, and transporting them to landings without damaging nearby trees.

Table 2. Operational Restriction Periods in the Proposed Units.

Restricted Times are Shaded																															
			JAN		FEB		MARCH	APRIL		MAY		JUNE		JULY		AUG			SEPT		OCT		NOV	DEC
Activity	**Restriction Type[4]**	**Units Affected[5]**						**1**	**15**	**1**	**15**	**1**	**15**	**1**	**15**	**1**	**5**	**15**	**1**	**15**	**1**	**15**		
Ground Based Yarding or Operations on Unsurfaced Roads[1]																															
Road Construction and Renovation[2]																															
Falling, Bucking and Yarding[3]	Bark slip period	All units																													
Northern Spotted Owl	Disturbance within 65 yards of unsurveyed habitat or known site	**BG**-all units except D; **CH**-A to F; **SD**-A,C,D,E																													
	Modifying Habitat within 0.25 Miles of unsurveyed habitat or known site	**BG**-G; **CH**-B to F; **PW**-A;																													
MAMU in Zone 1 or 1.3 Miles Corridor in Zone 2	Disturbance **within** 100 yards of unsurveyed habitat or known site	**BG**-all units except D; **CH**-B,C,D,F															**DOR**														
	Disturbance **outside** 100 yards of unsurveyed habitat or known site	**CH**-A,I,J,K,L						**(DOR) Daily Operation Restriction**																								
MAMU in Zone 2 Outside 1.3 Miles Corridor	Disturbance between 100-400 yards of unsurveyed habitat	**SD**-all units						**(DOR) Daily Operation Restriction**																								
	Disturbance within 100 yards of unsurveyed habitat	**SD** all units																													
MAMU	Modifying Habitat within 0.25 Miles of Occupied or Unsurveyed Habitat	**CH**-C,D,F																													

DOR= Daily Operating Restriction, work may occur between two hours after sunrise and two hours before sunset**; MAMU**=Marbled murrelet.

1- Some areas designated ground based could be cable harvested negating need for seasonal restriction

2-May be waived, depending on weather conditions

3-May be waived, depending on type of harvesting system used. Conditional waiver would allow for the use of harvesters and forwarders that are capable of severing trees and setting them aside without damaging nearby trees.

4-Seasonal restrictions may be waived by responsible official based on field information from project biologist about location, nesting, etc. of the species listed.

5- BG (Bogey Gap); CH (Camas Heights); PW (Power Wagon); SD (Sherlock's Denn).

1. Yarding Operations

Yarding would utilize a combination of ground-based and cable systems (Table 3). The use of ground-based equipment would be limited to the dry season. The dry season typically occurs from May 15 until October 15. If the weather is unusually wet during the dry season, ground-based operations would be delayed or stopped until soil moisture is low enough to resist compaction. If autumn weather conditions remain dry, the operating season could be extended through a provisional waiver.

Table 3. Harvest Methods and Treatment Acres in the Proposed Units[1].

Treatment Areas	Treatment Acres	Harvest Method	
		Acres Available for Ground Based Harvest	Acres Available for Cable Harvest
Bogey Gap	185	50	135
Power Wagon	59	20	39
Sherlock's Denn	143	80	63
Camas Heights	276	165	111
Totals	**663**	**315**	**348**

[1]All values are approximate.

Skid trails and forwarder trails, would be pre-designated and limited to slopes less than 35 percent, using existing trails to the greatest degree practical (ROD/RMP, p. 131). Skid trails would be spaced at an average of at least150 foot intervals whenever practicable. Harvester-Forwarder and shovel swing yarder trails would be spaced at an average of at least 50 feet. Primary ground-based yarding trails and landings would collectively affect no more than 10 percent of the ground-based harvest area. Primary trails are defined as trails with mineral soil exposed on more than 50 percent of the trail. Ground-based equipment would not operate within unthinned buffers to prevent soil disturbance near streams or in areas with high water tables. Landings, primary trails, and other areas identified by the soil scientist or contract administrator would be subsoiled upon completion of operations.

Cable yarding equipment would be capable of maintaining a minimum of one-end log suspension to minimize soil disturbance and compaction. Yarding corridors would be a maximum of 20 feet wide, pre-designated by the purchaser prior to the cutting of timber, and approved by the contract administrator. A minimum of 100 feet of lateral yarding capability would be required so yarding corridors could be spaced at 200 foot intervals, when practical, to reduce the number of yarding corridors and landings and limit the area of soil disturbance and compaction. Yarding corridors with soil disturbance and compaction capable of channeling water would be waterbarred, using hand tools, and covered with woody debris to minimize erosion and sediment problems. Where practical, trees cut to clear corridors within the units would be replaced by reserving trees otherwise intended for cutting.

In the selection of tailhold and guyline anchors, where possible, avoid selecting suitable northern spotted owl or marbled murrelet nest trees. If a suitable nest tree must be used, the following criteria would be considered.

- Protect tailhold and guyline anchors in adjacent late-successional forests by using protective straps, plates, or similar devices.
- Trees larger than 30 inches DBH used as guyline and tailhold anchors would not be felled, unless they are safety hazards.

2. Wildlife

Seasonal restrictions to reduce impacts to threatened species would be followed. Disruption and disturbance mitigation distances associated with different types of activity (such as commercial thinning or density management) are presented in Table 3 of the USFWS Biological Opinion for the Roseburg District BLM Programmatic Consultation 2005-2008 (BO # 1-15-05-F-0512, August 29, 2005).

a. Marbled Murrelet

Density management and commercial thinning in suitable habitat Zone 1, within the 1.3 mile seasonal restriction corridor in Zone 2, or within 100 yards of any known occupied site or unsurveyed habitat would not be implemented between April 1 and August 5. Daily operating restrictions (DOR) that limit operations to between the times of two hours after sunrise and two hours before sunset would be implemented from August 6 to September 30.

Project areas outside of the 1.3 mile seasonal restriction corridor in Zone 2 would follow a DOR within 100 yards of any known occupied site or unsurveyed habitat between the times of two hours after sunrise and two hours before sunset from April 1 to August 5.

b. Northern Spotted Owl

Density management would not occur within 65 yards of any unsurveyed suitable habitat or spotted owl site from March 1 until June 30, unless current calendar year surveys indicate spotted owls were not present; spotted owls were present but not attempting to nest; or spotted owls were present but the nesting attempt failed. Waiver of the seasonal restriction is valid until March 1 of the following year.

c. Northern Goshawk

If goshawk occupancy is observed, then seasonal restrictions to prevent disturbance would be applied within one-quarter mile of a nest site between March 1 and August 30 or until the young goshawks have dispersed.

3. Access

Existing permanent roads would provide the primary access for density management operations and timber hauling. Access to suitable landing areas would be provided by existing roads, new

road construction, and renovation of existing roads (Table 4). Road renovation could include grading; repairing; realigning; surfacing; or widening existing roadbeds, shoulders, and cut and fill slopes. It could also include cleaning and reshaping drainage ditches; cleaning, repairing, or adding drainage structures; and clearing vegetation and trees from cut and fill slopes.

New roads would be constructed on ridge tops or stable side slopes and outside of Riparian Reserves to the extent practical, as indicated on the project proposal maps in Appendix A. Approximately 0.3 miles of new temporary roads would be constructed within Riparian Reserves because the Riparian Reserve widths include the ridges where the roads would be constructed. New road construction would minimize road corridor clearing to allow the construction of roads with 12 feet running surface widths.

Table 4. Approximate Miles of New Road Construction, Renovation, and Decommissioning in the Proposed Units.

Treatment Area	Road Work/Treatment (Miles)[1]				
	New Permanent Construction	New Temporary Construction	Renovation	No Use Decommission	Total Decommission
Bogey Gap	0.1	0.4	0.5	0.0	0.9
Power Wagon	0.0	0.5	0.2	0.0	0.6
Sherlock's Denn	0.0	0.8	1.0	0.3	1.4
Camas Heights	0.0	1.3	1.2	0.5	2.9
Totals	0.1	3.0	2.9	0.8	5.8

[1]All values are approximate.

Temporary and unsurfaced renovated roads would be constructed, used, and decommissioned in the same operating season. If not utilized in that time frame because of events, such as extended fire closure, the BLM at its discretion would winterize the roads for use the following year. Winterizing would include applying mulch or other erosion control measures and blocking roads to vehicular access. In either event, temporary roads would be decommissioned after use.

Timber hauling from areas accessed by unsurfaced roads would be restricted to the dry season, generally between May 15 and October 15. Decommissioning of unsurfaced roads would generally consist of construction of water bars or drainage dips, subsoiling the road bed, removing culverts, blocking to vehicular use, covering with woody debris or slash, returning topsoil organic matter to the subsoiled road, or a combination thereof. Roads that are renovated or reconstructed, but not surfaced, would be decommissioned unless prohibited under third-party access rights, in which case the roads would be weatherized and blocked to prevent vehicular use, and reopened in the future if needed.

Roads needed for winter harvest operations would be surfaced with rock. Decommissioning of rocked roads would be by weatherizing and blocking roads to vehicular access after the completion of operations.

The following Project Design Features and Best Management Practices (USDI, BLM 1995a, Appendix D) would be implemented to minimize sediment delivery to streams along the haul route during wet weather harvest and haul operations. Sediment prevention measures would be implemented before wet weather haul begins and may include:

- Limiting road construction to the dry season (generally between May 15 and October 15). When conditions permit operations outside of the dry season, keep erosion control measures current with ground disturbance, to the extent that the affected area can be rapidly closed or blocked and weatherized if weather conditions warrant.
- Clearing drainage ditches and natural watercourses above culverts of woody material deposited by construction or logging prior to fall rains.
- Surfacing inadequately surfaced roads that are to be left open to traffic during wet weather.
- Containing sediment movement from the road or ditch flowing near streams with silt fences, sediment entrapping blankets, or other sediment control measures. Such control measures would allow for the free passage of water without detention or plugging.
- Keeping road inlet and outlet ditches, catchbasins, and culverts free of obstruction, particularly before and during prolonged winter rainfall. However, hold routine machine cleaning of ditches to a minimum during wet weather.
- Maintaining sediment traps and removing them at the completion of timber harvesting and hauling operations.

4. Port-Orford-cedar

Since roads are primary vectors by which *P. lateralis* is spread, the following road management actions would be implemented to minimize the likelihood of spreading the disease.

- Road construction, renovation, and decommissioning would be restricted to the dry season when the risk of spreading spores is least likely.
- Approximately 0.1 miles of permanent roads would be constructed and surfaced with rock.
- Approximately 3.0 miles of temporary roads would be constructed, used, and decommissioned or blocked in the same dry season to eliminate vehicular use during wet weather, when the risk of transporting spore infected soil is the greatest.
- Approximately 2.1 miles of existing road would be renovated, used, and decommissioned or blocked in the same dry season to eliminate vehicular use during wet weather, when the risk of transporting spore infected soil is greatest.
- All merchantable Port-Orford-cedar trees within 20 feet on the uphill side and 50 feet on the downhill side of roads bordering or passing through units would be cut under the sale contract to remove potential host trees that could become infected and spread the disease.
- All logging and road construction equipment, except log trucks which are restricted to roads, would be steam cleaned or pressure washed prior to being moved into the contract area or prior to return if moved off-site during the life of the contract. Cleaning would reduce the probability of spread (Goheen, et al. 2000).

- Water taken from sources in the project areas for use in road construction, road grading or dust abatement would be treated with a solution of Clorox bleach, to kill any *P. lateralis* spores that might be present.

Since there is infection present within the units, alongside the haul routes, and downstream, the units could be logged in any sequence. There is no risk of transporting the disease from an infected to an uninfected area because the disease is present in all of the areas with Port-Orford-cedar (POC).

E. Hazardous Fuels Reduction

The Camas Heights and Sherlock's Denn units are within the priority fuel reduction areas identified in the Camas Valley/Tenmile Community Wildfire Protection Plan. To reduce the risk of fire and damage to the thinned forest stands, slash piles at landings would be burned to reduce roadside fuel concentrations. In these areas thinning slash would be piled and burned within 50 feet of main roads (29-9-23.0, 29-9-23.2, 29-9-26.0, 30-9-2.0, and 30-9-2.1) bordering units to reduce the risk of ignition and to create fuel breaks. Approximately 70 acres would be hand piled and burned.

III. Considered but not Analyzed in Detail

The following alternatives to the proposed action were considered. These alternatives were previously considered by the Interdisciplinary Team or proposed by members of the public, but were found to be unacceptable as described below.

A. Units Dropped or Deferred

As noted on page 1, approximately 900 acres were identified for consideration in this analysis, but approximately 115 acres were eliminated upon further review. Four units were deemed unsuited based on stand stocking, average tree size, general stand condition, or the feasibility of access or logging.

B. Helicopter Yarding vs. Building or Reconstructing Roads

Prior to development of the proposed alternative, the BLM received comments that helicopter yarding should be consider as an alternative to construction of new roads or renovation of self-decommissioned roads.

Helicopter yarding was considered but determined not be a reasonable alternative for the following reasons.

- Primary roads already access all of the units proposed for treatment in this analysis. New construction would be minimal and on ridgetops or stable sideslopes for providing access to advantageous yarding locations or allowing landings to be moved off of main road systems to avoid impeding the regular flow of traffic.

- The amount of disturbance between the construction of roads and helicopter landings would be comparable. Roads would be constructed averaging 12 foot widths, which is less than the 20 to 30 foot spacing between trees after the density management. The construction of 3.1 miles of new roads would disturb about five acres. In order to be economical, helicopter service and log landings need to be located near units. There are few sites presently available that would accommodate helicopter operations. Construction of sufficiently large (0.5 acres) landing areas would require timber clearing, removal of stumps, and leveling. The construction of 12 landings approximately 0.5 acres in size would disturb about six acres. The use of helicopters would produce no environmental benefits when comparing the amount of disturbance anticipated from road and helicopter landing construction.

- Using representative appraisal criteria for a comparison of costs indicates that helicopter yarding would be more than two times more expensive than traditional cable yarding methods. To helicopter yard the proposed density management units would require a medium-size ship, such as a Sikorsky 61 or Boeing Vertol 107. Based on a distance of a half mile from unit to landing and a production rate of 12 truck loads per day, logging costs would be slightly more than $427 per thousand board feet (M) loaded on a truck. For the estimated eight million board feet of timber the proposed action would yield, helicopter yarding costs would be approximately $3,416,000 (8,000 M x $427/M). By comparison, using a 40-foot tower, an average yarding distance of 425 feet, and a production rate of four truck loads per day cable yarding yields a production cost of $162 per thousand board feet loaded on a truck. Cable yarding costs would be approximately $1,296,000 (8,000 M x $162/M). The difference of more than $2,000,000 is not economically reasonable.

- Savings on road construction and renovation would not offset the difference in yarding costs. For construction of temporary roads on gentle terrain with no culvert installation required, a cost of $200 per station (100 feet) would be reasonable and customary, with comparable costs for decommissioning. Average construction costs per station of permanent all-weather roads would be approximately $1,000. The cost of renovating decommissioned road beds would be comparable to temporary road construction. Construction and subsequent decommissioning of an estimated 159 stations (3 miles) of temporary spur roads would cost approximately $64,000. Cost for construction of approximately five stations (0.1 miles) of permanent road and surfacing 37 stations (0.7 miles) of dirt road would be approximately $44,500. Reconstruction of 100 stations (1.9 miles) of roads and subsequent decommissioning would be approximately $40,000. The total road construction costs would be approximately $148,500. The cost of constructing helicopter logging and service landings are estimated to be approximately $4,800. This is based on the construction of 12 landings taking six days at $800 a day. The potential savings comparing the cost of road construction to the construction of helicopter landings would be a savings of $143,700 if helicopter yarding were employed. This savings would not offset the additional logging costs of using a helicopter.

Comments also suggested that temporary roads gouge out mountainsides, leave clearcut strips, can spread disease if they are tilled, and that the soil compaction has a lasting effect. To the last

point, reference was made to a study[1] showing that "subsoiling, ripping or otherwise tilling the compacted road after use does not restore the soil to pre-road condition.

The effects of temporary road construction have been considered and are not of a magnitude comparable to those portrayed in the comments submitted.

- As noted on page 12, new roads would be mostly located on ridge tops or stable side slopes, greatly reducing the need for excavation and modification to the existing slopes, contours, and natural drainage patterns.

- The running surface of temporary roads is typically 12 to 13 feet wide within a narrow right-of-way. These would not leave clearcut strips because the narrow corridors would be largely indistinguishable from yarding corridors and the 20 to 30 foot spacing between trees that would be typical following thinning.

- Root diseases are endemic in forest soils and spread by root grafts between live trees. Subsoiling road surfaces would not affect this process in either an adverse or beneficial manner.

- The BLM is aware of the research cited regarding the effectiveness of ripping in restoring the infiltration capacity of road surfaces. The study acknowledged limits to the degree of restoration achievable, but concluded on page 269 "Ecological restoration of forest roads and watersheds requires improved vegetation cover and improved infiltration for forest road surfaces. These findings suggest that ripping can be a reasonably effective step in the restoration process."

IV. Resources that Would Remain Unaffected by the Alternatives

The following resources or critical elements of the human environment would not be affected under either alternative because they are not present in the project areas: Areas of Critical Environmental Concern (ACEC); prime or unique farmlands; floodplains; wilderness; waste, solid or hazardous; and Wild and Scenic Rivers.

The proposed action is consistent with Executive Order 12898 which addresses Environmental Justice in minority and low-income populations. The BLM has not identified any potential impacts to low-income or minority populations, either internally or through the public involvement process. No Native American religious concerns were identified by the team or through correspondence with local tribal governments.

No commercially usable energy sources are known to exist in the proposed units. A high-voltage transmission line and natural gas pipeline are adjacent to, but outside of, Power Wagon Units B and C. No adverse effect on energy resources would be anticipated because no commercially usable energy sources are known to exist in the proposed units, trees would be felled away from

[1] Effectiveness of Road Ripping in Restoring Infiltration Capacity of Forest Roads. Charles H. Luce, USDA Forest Service Intermountain Research Station, 1221 S. Main, Moscow, ID 83843. September 1996. Restoration Ecology, Vol. 5, No. 3. page 268.

the transmission lines, and ground-based equipment would not be allowed to operate within the transmission line and pipeline corridor, except on roads.

Chapter 3
AFFECTED ENVIRONMENT

This chapter summarizes the specific resources that are present or potentially present and could be affected by the proposed action. The description of the current conditions inherently includes and represents the cumulative effects of past and current land management activities undertaken by the BLM and private entities.

The proposed units are located in the East Fork Coquille River, Olalla Creek-Lookingglass Creek, and Middle Fork Coquille River fifth-field watersheds (Table 5).

Table 5. Proposed Units and Corresponding Watersheds.

Timber Sale	Units	7th Field	6th Field	5th Field
Camas Heights	A-L	Bingham Creek	Headwaters Middle Fork Coquille	Middle Fork Coquille River
Sherlock's Denn	A-D			
	E	Camas Valley		
Bogey Gap	A-F	Upper Upper Rock	Upper Rock	
	G,H,I	East Upper Rock		
Power Wagon	B,C, Part of A	Upper East Fork Coquille	Lost	East Fork Coquille River
	Part of A	Upper Tenmile	Tenmile	Olalla Creek-Lookingglass Creek

I. Vegetation

The stands proposed for treatment regenerated after timber harvesting and range from about 40 to 65 years old. They were established by planting, aerial seeding, or natural regeneration and have been managed for timber production. Nearly all units have received active management with silvicultural treatments, such as precommercial thinning and fertilization to enhance growth. The units are even-aged stands and precommercial thinning has made the spatial distribution of trees relatively uniform. Exceptions to this are Camas Heights units B through F where trees remained after the previous harvest and some portions of these units were not precommercially thinned.

Douglas-fir is the dominant conifer species in the proposed treatment units. Other conifers include western hemlock, western redcedar, incense-cedar, grand fir, and Port-Orford-cedar. Hardwoods include madrone and chinkapin on the drier slopes with bigleaf maple and red alder on moister slopes or north aspects. The primary shrub species are rhododendron, vine maple, Oregon grape, and salal.

These stands possess few large diameter trees, snags, and down logs, and lack multiple canopy and understory layers. At present, crown closure is estimated at 100 percent in all units. As a consequence, hardwoods are being overtopped and suppressed by conifers. Ground cover and shrub development is patchy but sparse. In areas that were precommercially thinned, the conifers generally have crown ratios above 30 percent, a level important for maintaining or

increasing stand health and vigor. The range of current stand conditions for the treatment areas are presented in Table 6.

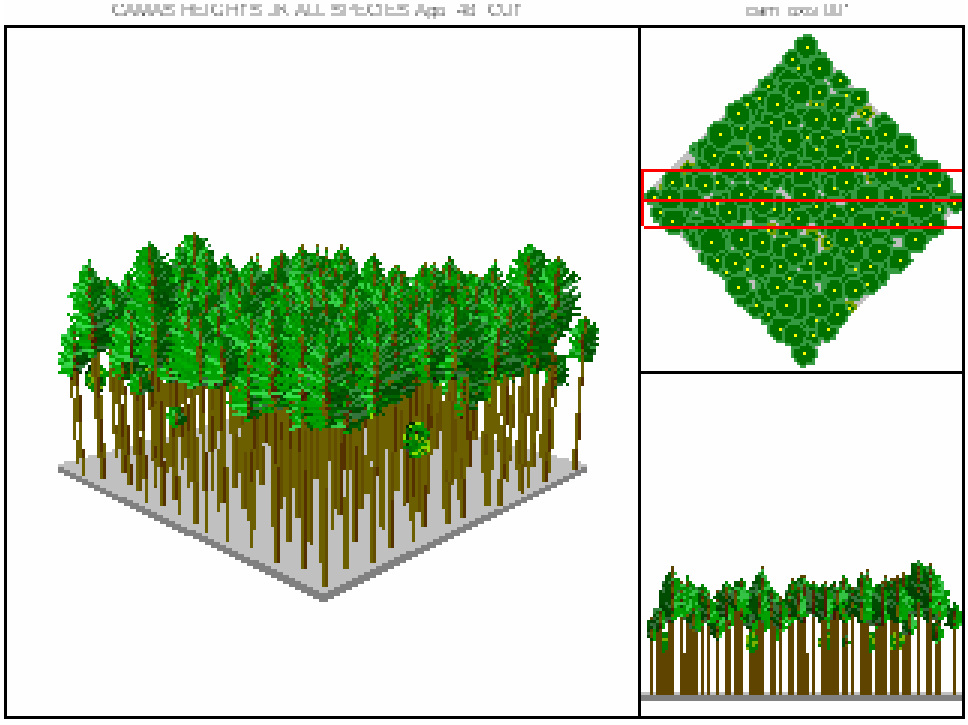
Table 6. Current Stand Conditions.

	Stand Age	Trees per Acre	Basal Area (square feet per acre)	Quadratic Mean Diameter (inches)	Relative Density	Crown Closure (percent)
Bogey Gap	40 – 46	170 – 290	180 – 270	12.4 – 15.9	0.58 – 0.84	100
Power Wagon	55	190	220	14.6	0.65	100
Sherlock's Denn	44 – 50	200 – 210	190-210	13.2 – 13.8	0.59 – 0.65	100
Camas Heights	48 – 57	160 – 330	220 – 290	12.8 – 17.3	0.67 – 0.92	100

Relative densities of the proposed stands are presently above 0.55. Relative density is used to describe the stand stocking level relative to a theoretical maximum. At a relative density above 0.55, competition among trees results in suppression mortality and reduced vigor (Drew and Flewelling 1979).

Data from Camas Heights Units I, J, K, and L were selected for visual representation of general stand conditions. Stand exam data was modeled using Organon version 8.0, for Southwest Oregon and depicted in Figure 2 using the Stand Visualization System version 3.36 (SVS).

Figure 2. Representation of Existing Stand Conditions.



In the LSR, the current numbers of snags do not meet the desired future condition (DFC) for density management treatment areas in the LSRA because most of these stands were managed by timber harvests and precommercial thinnings. The DFC in the LSR is for snags larger than 20 inches DBH to number at least five snags per acre on north slopes and at least three snags per acre on south slopes.

Surveys for Coarse Woody Debris (CWD) determined decay class 3, 4 and 5 logs on the forest floor were abundant in some units (Table 7). These are large older logs remaining from the previous timber harvest and are in various stages of decay from hard to soft and powdery. Decay class 1 and 2 logs are recent additions to the coarse woody debris component that still have the bark intact. These are represented in smaller amounts and have smaller diameters, reflecting the size of the current stands. For the Coast Range Province, the LSRA recommended 3,600 to 9,400 cubic feet per acre of CWD (minimum four inch diameter and three feet long) occur at stand age 80 within the first site potential tree height of any perennial stream. Within the second site potential tree height of perennial streams or the first site potential tree height of intermittent streams, the recommended range is 1,600 to 2,300 cubic feet per acre. The Power Wagon units and Sherlock's Denn unit E currently meet these criteria.

For the Klamath Province, the LSRA recommended 650 to 1,300 cubic feet per acre of CWD (minimum four inch diameter and three feet long) occur at stand age 80 within two site potential tree heights of any perennial stream and within the first site potential tree height of intermittent streams. All of the Camas Heights units have more than1,300 cubic feet per acre of CWD and the units in the LSR currently meet the LSRA recommendations.

Table 7. Existing Amounts of Coarse Woody Debris Per Acre Measured in Cubic Feet.

Area	Decay Class 1 and 2 (cubic feet per acre)	Decay Class 3, 4, and 5 (cubic feet per acre)	Total Coarse Woody Debris (cubic feet per acre)
Bogey Gap	0 – 53	527 – 3,298	527 – 3,307
Power Wagon	0	4,542	4,542
Sherlock's Denn	6 – 12	2,067 – 3,677	2,079 – 3,683
Camas Heights (Klamath Province)	31 - 153	3,303 - 3,706	3,334 – 3,859

Port-Orford-cedar and Port-Orford-cedar Root Disease

Port-Orford-cedar (POC) can be infected by an introduced pathogen (*Phytophthora lateralis*) that causes a root disease. *Phytophthora lateralis* is highly adapted for spread in water and soil. The pathogen is spread by the transportation of infected soil and overland flow of water, primarily in the fall, winter, and spring when the cool, moist conditions are most favorable for the pathogen. Vehicular traffic, particularly the use of unsurfaced roads in wet weather, and activities related to road construction, road maintenance, and logging can spread the disease by transporting infected soil into disease-free areas. The pathogen may also be spread by game animals and people, by transporting infected soil on hooves and feet.

High risk areas include stream courses, drainages, and low-lying areas down slope from infected areas, or below roads and trails where inoculum may be introduced. There is no definitive distance along roads or streams considered to be at high risk, however, Port-Orford-cedar are not usually infected at a distance greater than 40 feet down slope from roads except where streams, culverts, and wet areas are present to facilitate spore dispersal (Goheen, et al. 1986). Upslope spread of the disease depends on slope steepness and the location of Port-Orford-cedar in relation to roads, ditchlines, or streams. A more detailed discussion of Port-Orford-cedar and the root disease is presented in Appendix B.

Infected areas were initially identified using 1994 aerial photographs and verified on the ground. Spread of the disease was assessed by identifying infected areas on the 1997 Coos Bay District and 1999 Roseburg District aerial photographs and comparing those infected areas with the 1994 assessment of diseased areas. The analysis of these surveys indicated the rate of spread is about eight acres annually.

Port-Orford-cedar is present to varying degrees but generally occurs as individual or scattered groups of trees rather than as continuous stands in the proposed units. Port-Orford-cedar root disease is present in some of the units and along some of the haul routes (see Maps in Appendix B).

Port-Orford-cedar is scattered throughout the Bogey Gap units and is found on low risk sites away from roads and streams, as well as, in the higher risk riparian areas. Generally the POC in the units is seedling to sapling size. There is scattered disease along the roads, except the road at the top of units B and C even though POC was present. The main roads are rocked or paved, which present a lower risk for the spread of the disease.

Port-Orford-cedar has not been observed in Camas Heights Units A, D, F, H, I, J, K, or L. Units B and C contain scattered diseased and healthy POC. The roads in the vicinity also have scattered diseased and healthy POC along them.

Power Wagon Unit A contains scattered small POC. Two small trees were found dead near the ridgetop in the unit, away from roads and streams that would be an obvious source of infection. It is unknown if this mortality was caused by *P. lateralis*. Port-Orford-cedar was not found in Units B and C. There is no POC along the haul route, which includes a paved county road within one-half mile of the units.

Sherlock's Denn Units A and C contain POC in the upland areas (where the risk of infection is lower) and riparian areas in similar concentrations. The POC ranges in size from saplings to large diameter trees. There are a few residual POC larger than 20 inches in diameter. There is diseased POC in the main draw immediately upstream from these two units and along the road to the top of Unit C. Unit B contains healthy POC east of the road. The proposed haul route from the top of Unit B goes through diseased areas. Unit D contains healthy POC in the north half. No POC has been observed in Unit E or along the haul route from Unit E to Unit D.

The Camas Valley (within the Middle Fork Coquille River Watershed) and Upper Tenmile (within the Olalla Creek/Lookingglass Creek Watershed) seventh-field watersheds are uninfected

but they do not meet the criteria for uninfected watersheds defined in the *Record of Decision and Resource Management Plan Amendment for Management of Port-Orford-Cedar in Southwest Oregon, Coos Bay, Medford, and Roseburg Districts* (POC ROD) because there are either less than 100 acres of POC in the seventh-field watersheds or the BLM manages less than 50 percent of the fifth field watershed. Therefore, special POC management practices are not required in these seventh-field watersheds.

II. Wildlife

Based upon their geographic range, 24 Special Status Species are known or suspected to occur in the LSR 261 density management units. Special Status Species include species listed under the Endangered Species Act of 1973, as amended, and Bureau Sensitive or Bureau Assessment species designated under BLM Manual 6840 policy for Oregon/Washington. In addition, two species subject to protection under the Survey and Manage program are suspected to occur in the proposed units based on their ranges and the presence of suitable habitat.

The proposed density management would not affect 13 species because the project area is outside the species range or habitat for the species is not present within proposed units (see Appendix C). These 13 species will not be discussed further in this analysis. The 11 remaining species that may be affected are addressed below.

A. Threatened and Endangered

1. Northern Spotted Owl

The northern spotted owl *(Strix occidentalis caurina*) is known to nest in late-successional forests with characteristics that include large conifer trees with large diameter broken and unbroken limbs, deformities, large broken tops or cavities which provide nesting sites, moderate to high canopy closure (60-80 percent closure), and multi-layered and multi-species canopy with large overstory trees (Forsman et al.1984; Hershey et al. 1997; Forsman and Giese 1997, Thomas et al. 1990). Forest stands with these characteristics provide what is often called nesting-roosting-foraging and dispersal habitat (NRF) because they provide structure for nesting, structures for roosting, prey species that are eaten by the northern spotted owl, and provide for movement (dispersal) through the landscape. Forest stands that provide only roosting, foraging, and movement through the landscape are generally 30 to 80 years old and referred to as dispersal habitat (Table 8).

Effects to northern spotted owls from habitat modifications is assessed by evaluating the amount of suitable nesting or dispersal habitat modification or removal within a known home range and its proximity to a known spotted owl site. A northern spotted owl home range or area used during the breeding season (Johnsgard 1990) is represented by a 1.5 mile radius circle in the Coast Range Province and a 1.3 mile radius circle in the Klamath Province (Thomas et al. 1990). Northern spotted owl home ranges (Table 9) that overlap the proposed units are in the Coast Range Province while no known home ranges overlap the Camas Heights units in the Klamath Province.

One activity center (numbered 2186) is in the GFMA and meets the definition of a Known Spotted Owl Activity Center with concentrated activity of either a pair of northern spotted owls or a territorial single owl (USDA and USDI 1994b) designated for management under the Roseburg ROD/RMP (USDI, BLM 1995a) for northern spotted owl sites found prior to January 1994. This analysis uses the term spotted owl site to refer to areas northern spotted owls concentrate their activity.

Table 8. Acres of Late-Successional Forest Considered Suitable Habitat and Dispersal Habitat for the Northern Spotted Owl within the Sixth Field Watersheds Containing the Proposed Units.

Habitat Type	Sixth Field Watersheds			
	Headwaters Middle Fork Coquille River	Upper Rock Creek	Lost Creek	Tenmile Creek
Acres of Late Successional Habitat Suitable for the Spotted Owl (NRF)[1]	3,780	2,509	1,452	3,853
Spotted Owl Dispersal Habitat Acres (Forest Stands 30-80 Years Old)[2]	5,176	2,443	4,177	1,012

[1]NRF=forest stand that provides nesting, roosting, and foraging components; data from GIS and consists of stands at least 80 Years Old. Also provides suitable habitat for the marbled murrelet, northern goshawk, and other late-successional associated species.
[2]Forest of this age serve as dispersal habitat for the late-successional habitat associated species such as the northern spotted owl. The habitat includes forest stands generally greater than 40 years old with canopy closure greater or equal to 40 percent, and trees average 11 inches in diameter at breast height (DBH).

Table 9 presents the occupancy history, distance of the units to an a spotted owl site, amount of NRF, and amount of dispersal habitat within the northern spotted owl home ranges (1985-2005 Roseburg Spotted Owl Monitoring Data) that overlap the proposed units. Three separate home ranges overlap the Bogey Gap (BG) units. The amount of dispersal habitat acres within each home range varies from 21 to 204 acres (Table 9).

None of the proposed treatment units are within Critical Habitat Units (Federal Register 1992) designated for the survival and recovery of the spotted owl. Consequently, critical habitat will not be discussed further in this analysis.

Table 9. Acres of Habitat Types in Known Territories, Occupancy History, and Relative Distances of Units to Known Northern Spotted Owl Sites.

Spotted Owl Site ID[1]	Approximate Acres of Habitat in Home Range		Last Year Occupied	Last Year Survey Done	Miles From Units to Spotted Owl Site	Acres of Dispersal Habitat Proposed for Treatment within Home Ranges[2,3]
	NRF	Dispersal				
0513A	1606	102	2005	2005	1.5	2.5 B,C in part (PW)
2099 and 2099A	1700	1010	2005	2005	0.5	204 A-G (BG)
2186 and 2186A	340	1768	2005	2005	0.5-1.4	108 A,B,C,D (SD)
2188 and 2188A	1550	882	2002	2004	1.2	21 (BG)
4639	1124	522	2000	2003	0.7	130 A,B,C,D,E,F(BG)

[1]The letter "A" after the number designates an alternate nest location in the general vicinity of the original nest location.
[2]Represents the total amount of dispersal habitat in the units shown within a particular spotted owl territory. All home ranges are in the Coast Range Province.
[3]PW-Power Wagon, BG-Bogey Gap; SD-Sherlock's Denn.

Distances from specific units the spotted owl sites or unsurveyed NRF habitat are given in Table 10. These distances are important in the mitigation of effects and are closely tied to the project design features described in Chapter 2.

Table 10. Distance of Density Management Units in LSR 261 to Known Sites, Dispersal Habitat, or Unsurveyed Habitat for the Spotted Owl.

Area and (Province)	Units Within 0.25 Miles of Known Spotted Owl Site	Units Within 0.25 Miles of Unsurveyed Habitat NRF	Units Within 65 Yards of Spotted Owl Site	Units Within 65 Yards of Unsurveyed NRF Habitat	Units Considered Suitable NRF Habitat for the Spotted Owl	Units Considered Dispersal Habitat Only
Camas Heights (Klamath)	None	None	None	D,F	B,C,D,F	Part of A, J,K,L,M
Power Wagon (Coast Range)	None	A (west edge)	None	A (west edge)	None	A,B,C
Bogey Gap (Coast Range)	None	A,B,D,F,G,H, I	None	A,B,C,F,G,H	H	A,B,C,D,F,I,G
Sherlock's Denn (Coast Range)	None	A,B,C,D,E	None	A,B,D,E	None	A,B,C,D,E

2. Marbled Murrelet

The marbled murrelet (*Brachyramphus marmoratus*) is a small (9 ¾ inches in length) bird that feeds in the Pacific Ocean and uses late-successional forests for nesting (Mack et al. 2003; National Geographic Society 1987). Murrelet habitat is similar to that used by the northern spotted owl but the specific characteristics used for nesting are different. The marbled murrelet will generally nest on individual or clumpy branches covered with moss and/or lichens, or mistletoe clumps in well-protected areas in the tree canopy (Mack et al. 2003).

Camas Heights, Power Wagon, and Sherlock's Denn are within the 35-50 mile habitat Zone II while the Bogey Gap sale area is in the 35 mile habitat Zone I for the marbled murrelet. All the proposed units, except the Camas Heights units, are in designated critical habitat (Federal Register 1996; USDI, FWS 1997) for the marbled murrelet. Camas Heights is inside the 1.3 mile management corridor along the Middle Fork of the Coquille River (USDI, FWS 2005), which is subject to the same management restrictions that apply to habitat in Zone I. Camas Heights units B, C, D, F, H, and part of unit A are included as part of a designated occupied marbled murrelet site.

The amount of suitable habitat for murrelets in the watersheds is shown in Table 8. This shows that about 11,594 acres of the forest stands are considered suitable habitat for the murrelet in the sixth-field watersheds containing the proposed units.

Table 11 shows the proposed density management areas and the relative proximity to known occupied murrelet sites and forest stands suitable for the murrelet. All units were evaluated to determine presence of individual trees, groups of trees, or stand conditions that would meet suitable habitat characteristics described earlier. Most of the units were found to not have suitable murrelet habitat components, but individual trees or groups of trees were found in Bogey Gap unit H, and Camas Heights units B, C, D, and F that do provide suitable habitat.

Table 11. Distance of Proposed Units in LSR 261 to Known Murrelet Sites, Management Corridors, or Unsurveyed Habitat.

Area	Units Within 0.25 Miles of Known Murrelet Site	Units Within 100 Yards of Unsurveyed Murrelet Habitat	Units Within 100 Yards of Known Site	Units Within ¼ Mile of Unsurveyed Murrelet Habitat	Units Considered Suitable Habitat for the Marbled Murrelet	Units Considered Part of Occupied Murrelet Site
Camas Heights (in Management Corridor)	B,C,D,F,H	None	D,F	None	B,C,D,F	A (North ½), B,C,D,F,H
Power Wagon	None	None	None	None	None	None
Bogey Gap	None	A,B,C,D,I,G	None	A,B,C,F,G,H	H	None
Sherlock's Denn	None	A,B,C,D,E	None	A,B,D,E	None	None

Units with murrelet habitat and some adjacent suitable habitat were surveyed following standard protocols (Mack et al. 2003) and the results are presented in Table 12. Units lacking suitable habitat components were not surveyed. Ground and radar surveys (Roseburg Murrelet Survey Data 2002-2005; Hamer and Schuster 2003) documented murrelets flying through or above the forest stand (occupancy behavior) in portions of Camas Heights units C, D, F and old-growth stands northwest of unit F. The data indicates that murrelets are occupying the old-growth stand and using the younger adjacent stands with their patchy distribution of suitable habitat components. A portion of the Camas Heights area was designated as a murrelet site in 2005 following management direction in the Roseburg ROD/RMP (USDI, BLM 1995a, pg. 48).

Table 12. Results of Evaluations and Surveys for the Marbled Murrelet in the Proposed Units (2002-2005).

Area	Areas Evaluated for Murrelet Habitat[1]	Habitat Present	Year Surveyed	Occupancy Status[2,3]
Camas Heights	A,B,C,D,F,H	Yes	2002-2005	Occupied (see text)
	Old-Growth Northwest of F	Yes	2002-2005	Occupied
	I,J,K,L	No	Not Required	Not Occupied
Power Wagon	A,B,C	No	Not Required	Not Occupied
	Vicinity of Unit A	Yes	2004-2005	Not Occupied
Bogey Gap	Vicinity of G,I	Yes	2004-2005	Not Occupied
	Vicinity of A,B,C,D,F,E	Yes	No Surveys	Unknown
	A,B,C,D,F,I	No	Not Required	Not Occupied
Sherlock's Denn	A,B,C,D,E	No	Not Required	Not Occupied
	Vicinity of A,C,D,E	No	No Surveys	Unknown

[1]Includes the area inside the proposed unit boundaries and contiguous forest stands within 100 meters of the units.
[2]Detection of a murrelet circling above the forest canopy, flying or circling through the canopy (at or below tree height) is considered behavior that indicates occupancy of the stand by a murrelet (Mack et al. 2003; USDI, BLM 1995).
[3]Occupancy refers to murrelets using a forest stand for breeding (Mack et al. 2003).

B. Bureau Sensitive Species

1. Northern Goshawk

The Roseburg District is within the normal breeding range for the northern goshawk (*Accipiter gentilis*) in western North America. Goshawks typically nest and forage in mature to old-growth forests (Reynolds et al. 1982).with 60 to 90 percent canopy closure that provides a cool environment (Squires and Reynolds1997). Nest territories typically contain more than one nest site, most often in larger trees on north slopes, near water. Goshawks forage for food in forests with an open understory, open meadows, younger forest stands, and the edge of forest stands (Reynolds et al. 1982, Squires and Reynolds1997, Daw et al. 1998, Daw and DeStefano 2001).

Generally, the units are not considered suitable goshawk nesting habitat but areas identified as suitable nesting habitat for the spotted owl (Table 9) are also suitable for the goshawk because of the presence of large diameter trees with well developed branch structures and high canopy

cover. Some units in Bogey Gap, Camas Heights, and Sherlock's Denn have adjacent old-growth stands that are considered suitable for the goshawk. All the units are suitable foraging habitat for the goshawk.

2. Purple Martin

The purple martin (*Progne subis*) is the largest (8 inches in length) swallow in North America (National Geographic Society 1987). Purple martins do not excavate their own cavities and are known as secondary cavity nesters because they use old woodpecker holes or man-made structures (gourds or birdhouses) for nesting. Although purple martins have been found in areas burned by forest fires, urban areas, nest boxes, and near water bodies; they occur in other areas (Marshall et al. 1996).

Purple martins are known to use natural cavities occurring in trees (Copley et al. 1999). Williams (2001) found that purple martins select clusters of large snags where large tree canopy cover is less than 10 to 30 percent within 300 feet of nest sites. Some of the density management units have these conditions present in the following scenarios:

- Areas where tall dominant remnant live or dead trees tower over the adjacent treatment trees and are essentially open with little to no canopy cover above and parallel to the top of the forest canopy below and around the dominant tree.

- Areas where treatment age and size trees, patches of remnant trees, or a mix of the two have died and created snag patches where canopy closure is 10-30 percent so that the space around the trees is open.

Areas where trees or snags with cavities are similar in height to adjacent trees and where the canopy closure within 300 feet is more than 30 percent are unlikely to provide nesting habitat because of the canopy closure and lack of open areas around the trees or snags.

3. Townsend's Big-eared Bat

The Townsend's big-eared bat (*Corynorhinus townsendii*) forages in the forest canopy (Wunder and Carey 1996). The species is known to use caves, bridges, snag cavities, and crevices under the bark of large trees for roosting. Caves, mine shafts and adits, and buildings provide areas for raising young (maternity areas) and for overwintering (hibernaculum), as well as roosting areas (reviewed in Pierson et al. 1999; Fellers and Pierson 2002). Townsend's big-eared bats have been documented in abandoned mines in the South River Resource Area. The bats use the mines to for overwintering, maternity sites, or roost sites. Overall, there is a low probability that Townsend's big-eared bats use the proposed units for hibernating or for maternity sites because caves or mines are not present in the units. However, remnant trees, hollow trees and snags present in the proposed units could provide roosting opportunities for this species.

4. Chace Sideband Snail

The Chace sideband snail (*Monadenia chaceana*) has a range that includes the Klamath Physiographic Province and the adjacent southwestern portion of the Oregon Cascades Province (Duncan et al. 2003). The species utilizes talus, rocky soils, and cobble habitat in close association with late-successional forests. Camas Heights is in the Klamath Province and within the geographic range of this species. Habitat for the Chace sideband snail is present in the Camas Heights units.

5. Oregon Shoulderband

The Oregon shoulderband (*Helminthoglypta hertleini*) has been found at various locations throughout the Roseburg District in basalt talus, under rocks, and woody debris in moist conifer forests and shrubby riparian corridors (Weasma 1999). The species is not dependent on late-successional or old-growth forest. More than half of the documented sites are in forest stands less than 80 years old (Duncan et al. 2003). The proposed units are within the geographic range of the Oregon shoulderband but habitat for the Oregon shoulderband is only present in the Camas Heights units.

6. Spotted Taildropper and Green Sideband Snail

The geographic distribution of the spotted taildropper (*Prophysaon vanattae pardalis*) and the green sideband snail (*Monadenia fidelis beryllica*) includes the Bogey Gap, Sherlock's Denn, and Power Wagon treatment areas. The habitat components (leaf litter under bushes in conifer forests in the Coast Range, deciduous trees and brush forest floor litter, wet undisturbed low elevations riparian areas, seeps, and springs) (Duncan et al. 2003) are present in the proposed units.

Results from the evaluation and surveys for the Bureau Sensitive mollusk species suspected to occur in the proposed units are presented in Table 13.

Table 13. Results from Evaluations and Surveys to Locate Bureau Sensitive, Assessment, and Survey and Manage Mollusk Species in the Proposed Units.

Density Management Area	Units Surveyed	Habitat Present in Units	Number of Oregon Shoulderband, Spotted Taildropper, Chase Sideband, and Green Sideband Snails Found
Camas Heights	All Units	Yes	0
Power Wagon	All Units	Yes	0
Bogey Gap	All Units	Yes	0
Sherlock's Denn	All Units	Yes	0

C. Bureau Assessment Species

1. Fringed Myotis Bat

The fringed myotis (*Myotis thysanodes*) bat is generally found west of the Cascades in Oregon in forested or riparian areas (Csuti et al. 1997). The species is known to use tall snags in early stages of decay, and crevices beneath the loose bark of trees for single or multiple day roosts (Weller and Zabel 2001). Nursing colonies are only documented in caves, mines or buildings (Csuti et al. 1997). Radio telemetry studies in the South River Resource Area found specimens roosting under the bark of large snags and live trees, and in crevices in rock outcrops under forest canopy (Cross and Waldien 1995). Overall there is a low probability that fringed myotis bat colonies or hibernacula are present in the proposed units. However, Camas Height units A, D, and F and Bogey Gap unit H have large snags or trees that could provide roosting opportunities for the fringed myotis bat.

2. Pallid Bat

The pallid bat (*Antrozous pallidus pacificus*) is usually associated with the drier interior valleys west of the Cascade Range (Verts and Carraway 1998). It is known to roost in tree cavities, rock crevices, buildings, caves, and mines. The species can be found in brushy areas, rocky terrain, edges of conifer and deciduous forest and woodlands, and in open farmland (Verts and Carraway 1998). Hibernacula and roost sites are known to include caves, mines, rock crevices, bridges, buildings, and hollow trees or snags (Lewis 1994). The pallid bat feeds over bodies of water and has been located under bridges in the South River Resource Area. It has not been found in forest habitats adjacent to ponds in sampling conducted by Cross and Waldien (1995). Overall there is a low probability that pallid bat hibernacula are present in the proposed units. However, Camas Height units A, D, and F and Bogey Gap unit H have large snags or trees that could provide roosting opportunities for the pallid bat.

D. Survey and Manage Species

Three vertebrate and seven mollusk species, managed under the Survey and Manage standards and guidelines, were documented or suspected to occur on the Roseburg District when the 2001 *Record of Decision* (S&M ROD) *and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* was implemented.

Two vertebrate species, the Del Norte salamander (*Plethodon elongatus*) and Oregon red tree vole (*Arborimus longicaudus*), were removed from the Survey and Manage list by the 2001 and 2003 Annual Species Reviews (ASR), a process provided for in the 2001 S&M ROD.

The blue-grey taildropper (*Prophysaon coeruleum*) was removed by the 2001 S&M ROD. The Oregon shoulderband snail (*Helminthoglypta hertleini*) was removed in the 2002 ASR and the Oregon megomphix snail (*Megomphix hemphilli*) was removed in the 2003 ASR. In the 2003

Survey Protocol for S&M Terrestrial Mollusk Species v3.0, it was determined that the evening field slug (*Deroceras hesperium*) was not likely to occupy forest lands on the Roseburg District.

The three wildlife species remaining on the Roseburg District Survey and Manage list, as of December 29, 2003, were the Siskiyou or Chace sideband snail (*Monadenia chaceana*), the Crater Lake tightcoil snail (*Pristiloma arcticum crateris*), and the great gray owl (*Strix nebulosa*).

The habitat requirements of the Chace sideband snail are described in the discussion of Bureau Sensitive Species. As described in Appendix C, the proposed units are outside the range of the tightcoil snail. Evaluations of suitable habitat and survey results for these species are presented in Table 13.

Suitable nesting habitat for the great gray owl is characterized by: (1) large diameter nest trees, (2) forest canopy providing roosting cover, and (3) proximity [within 200 meters] to openings ten acres or larger in size that could be used as foraging areas (USDA and USDI 2004d). The Survey and Manage protocols (p. 14) states pre-disturbance surveys adjacent to man-made openings are not suggested. Although, forest stands with large diameter trees are present in the vicinity of the proposed units, there are no natural meadows or openings more than 10 acres in size within 200 meters. Consequently, the great gray owl is not expected in the proposed units and will not be discussed further in this analysis.

III. Soils

Soils in the project area formed over sandstones and siltstones of the Tyee Formation (Power Wagon and Bogey Gap) and Umpqua Group (Sherlock's Denn and Camas Heights). The terrain within the proposed units is predominately gentle to moderately sloping (five to 60 percent slope) and not deeply dissected with drainages. About 34 acres (five percent of the proposed unit acreage) have slopes greater than 70 percent (very steep slopes). A portion of these very steep slopes are potentially unstable, which means they may become unstable under changing site conditions (based on the personal experience of Dan Cressy, Swiftwater Soil Scientist and Timber Production Capability Classification data in GIS). About 26 acres of the very steep slopes occur in the Bogey Gap units. All of the very steep slopes, with the exception of north facing slope in Bogey Gap Unit H, are less than 200 feet in length or isolated from streams by gentle or moderate slopes.

A landslide inventory of the project area, using aerial photos from 1964, 1967, 1978, 1983, 1989, 1994, 1999 and 2004, identified the following failures inside proposed units. All of the identified landslides occurred after timber harvests in the 1960s.

- Two landslides, 0.07 and 0.14 acres in size, in Camas Heights Unit K were caught on a bench and did not reach streams.
- Three skid trail-related landslides (less than 0.1 acre) reached a first order stream along the northern boundary of Bogey Gap Unit H.
- Three landslides occurred in very steep sidecast, which extends 300 feet to a broad bench below the 29-9-36.0 road in Bogey Gap Unit G.

Ground-based harvesting (primarily tractor skid trails) occurred on about 70 percent of the area in the proposed units. Old skid trails and landing sites cover about 25 percent of these ground based harvested areas. Most of the skid trails are on slopes less than 40 percent but some are on the very steep slopes (slopes greater than 70 percent). Many skid trails displaced the topsoil, especially where they were cut into sloping ground, exposing the subsoil and sometimes bedrock. Heavy compaction commonly persists where the subsoil is exposed. The subsoils on the slopes less than 40 percent have clay contents ranging from 30 to 50 percent, making the soils sensitive to compaction. On average, the clay content is higher in the Umpqua Group soils, which means the soils in the Sherlock's Denn and Camas Heights units are more vulnerable to compaction than those of the Tyee formation (Power Wagon and Bogey Gap units).

Skidding from the previous timber harvest operations caused substantial erosion and sedimentation impacts (based on examination of 1964 and 1967 aerial photographs and field observations of similar ground by Dan Cressy, Swiftwater Soil Scientist; Dyrness 1965). Based on field observations by Cressy, currently, little trail erosion and the resultant sedimentation to streams is occurring. An exception is where skid trails and landings were established in ephemeral and intermittent stream channels. These streams are still establishing new channels through the compacted fill material.

IV. Water Resources

A. Stream Flow

The climate in the project area is characterized by cool, wet winters and warm, dry summers. Precipitation is primarily in the form of rain; however, some snow is likely at higher elevations in normal years. Stream flow volume closely parallels the precipitation pattern with peak flows occurring from November to March and low flows from July to October.

A small perennial stream is located between Units A and B of Sherlock's Denn. A perennial interrupted stream flows between Units B and C and perennial streams are located adjacent to the east side of Unit B and the northeast side of Unit D. The other streams located within or adjacent to Sherlock's Denn units are intermittent.

Units A and H of Bogey Gap each contain a small perennial stream. Another perennial stream is located adjacent to Units A, B, and C. The other streams located within or adjacent to the Bogey Gap units are intermittent.

A perennial stream flows between Units C and D of Camas Heights. Small tributaries to this stream are also perennial and are located adjacent to Unit H and within Unit D. Units I, J, K, and L are located adjacent to perennial streams and a perennial tributary is located within Unit K. The other streams located within or adjacent to Camas Heights units are intermittent.

Perennial streams are adjacent to the west and east boundaries of Power Wagon Unit A. The other streams located adjacent to the Power Wagon units are intermittent.

1. Peak Flows and Transient Snow Zone

Timber harvesting in the Transient Snow Zone can increase peak flows when large canopy openings are created. The openings allow more snow to accumulate, which can melt rapidly and create higher than normal flows when subjected to warm rain-on-snow events (Harr and Coffin 1992). These changes are most evident in the initial ten years after harvesting (Harr 1979 and Keppler and Ziemer 1990), when canopy closure is less than 30 percent.

Increases in peak or storm flows can alter channel morphology by flushing smaller substrate, causing the channel to downcut, and increasing stream bank failures. The largest effect is on smaller peak flows at recurrence intervals of less than one year (i.e. less than bankfull event), whereas larger flows are dominated by the rainfall component of a storm rather than the snowmelt (Harr 1976, Harr 1986, Zeimer 1998). There is no clear threshold when the percentage of an area harvested results in substantial peak flow increases, although research by Stednick (1996) suggests that flow changes become detectable when more than 25 percent of a basin is harvested.

The Transient Snow Zone (TSZ) is considered to be between 2,000 and 5,000 feet in elevation for the proposed project areas. Power Wagon and Bogey Gap are located entirely within the TSZ. Sherlock's Denn and Camas Heights are located below the TSZ, in the rain dominated zone. The percentage of the Watersheds (fifth field watershed) and Subwatersheds (sixth field watershed) located within the TSZ are presented in Table 14.

Table 14. Subwatershed and Watershed Size, Percent in Transient Snow Zone, and Percent of Transient Snow Zone in Openings.

Subwatershed or Watershed Name	Acres in the Watershed	Percent of Watershed in TSZ[1]	Percent of TSZ in Openings[2]
Lost Creek (sixth field watershed)	12,874	88	4
East Fork Coquille (fifth field watershed)	85,785	40	3
Tenmile (sixth field watershed)	25,536	7	6
Olalla/Lookingglass (fifth field watershed)	103,214	14	2
Headwaters Middle Fork Coquille (sixth field watershed)	31,643	15	6
Upper Rock Creek (sixth field watershed)	5,875	85	5
Upper Middle Fork Coquille Watershed Analysis Unit	67,207	33	7

[1]Data obtained from Watershed Analyses (USDI, BLM 1998, USDI, BLM 1999a, USDI, BLM 1999b).
[2]Openings are areas with less than 30 percent crown closure; determined by aerial photo interpretation and using GIS.

2. Peak Flows and Roads

Roads may be a contributor to peak flows because of their capacity to intercept surface and subsurface water and divert it rapidly into streams by the road drainage network (Beschta 1978, Wemple et al. 1996), having the effect of extending the channel network, reducing storage time in the watershed, and increasing peak flows. The proposed haul routes are predominantly located at or near ridge lines where little or no interception of subsurface water would occur. There are some segments, however, where ditch line and surface runoff drain directly into stream crossings, and may contribute minor and unquantifiable increases to peak flows that are localized and not detectable at the watershed scale.

Approximately 20 percent increased peak flows have been documented in the Oregon Coast Range when roads occupied greater than 12 percent of a watershed (Harr et al. 1975). The same study also found when roads occupied less than five percent of the watershed; peak flow changes were small and inconsistent. The Oregon Watershed Assessment Manual considers a watershed to have a low potential for increased peak flows when roads occupy less than four percent, a moderate potential when roads occupy four to eight percent, and a high potential when roads occupy greater than eight percent (Watershed Professionals Network, 1999). Using a 30 foot average road prism width, roads occupy less than four percent of the subwatersheds and watersheds in the project area (Table 15). Therefore, the potential for enhanced peak flows from roads is considered to be low in these watersheds.

Table 15. Acres and Percentage of Watersheds Occupied by Roads and the Potential for Peak Flows.

Subwatershed or Watershed Name	Acres Affected by Roads*	Percentage of Watershed Occupied by Roads	Potential for Peak Flows
Lost Creek (sixth field watershed)	413	3	Low
East Fork Coquille (fifth field watershed)	2,011	2	Low
Tenmile (sixth field watershed)	680	3	Low
Olalla/Lookingglass (fifth field watershed)	2,594	3	Low
Headwaters Middle Fork Coquille (sixth field watershed)	916	3	Low
Upper Rock Creek (sixth field watershed)	164	3	Low
Upper Middle Fork Coquille Watershed Analysis Unit	2,071	3	Low

*Using a 30 foot average road prism width.

B. Water Quality

Water quality standards are determined for each water body by the Oregon Department of Environmental Quality. Water bodies that do not meet water quality standards are placed on the

state's 303(d) list as Water Quality Limited (Oregon Department of Environmental Quality 2003).

The Middle Fork of the Coquille River, Olalla Creek, Bingham Creek, Twelvemile Creek, and the East Fork of the Coquille River are listed as water quality limited for exceeding state summer temperature standards. While these streams are within the analysis area, they are not located adjacent to any of the proposed density management units and for reasons discussed in Chapter 4 (p. 64) the proposed action would not contribute to an increase in stream temperatures. Therefore, these streams will not be discussed further in this analysis.

1. Sediment

No sediment data exists for the streams located in the project area. However, data presented in the Aquatic Habitat section of this document, on page 35, indicates that streams in the watersheds contain fine sediments. Studies by Reid (1981), and Reid and Dunne (1984) have shown that forest roads can be major contributors of fine sediment to streams. The additional fine sediment can reduce water quality for domestic use and can cause detrimental changes to streams and their inhabitants (Castro and Reckendorf 1995).

Roads may directly alter streams by increasing erosion and sedimentation, which in turn may alter stream channel morphology. Roads may also alter the natural drainage characteristics of channels and subsequently change the runoff characteristics of watersheds by reducing the period of time water is stored in the watershed (Furniss, et al. 1991). Roads can act as a link between sediment sources and streams, and often account for most of the sediment problems in a watershed. Water, sediment, and chemical runoff from roads can enter the natural stream channel network when roads are hydrologically connected to stream channels. Roads may be hydrologically connected to the stream channel and contribute sediment where they cross streams, discharge is sufficient to create a gully in the inboard ditch line, and the road fillslopes encroach on streams.

Currently, the proposed haul roads are considered to be in good condition. The rock surfaced roads have an adequate amount of rock to provide for hauling during the wet season. Road maintenance would be needed to provide resource protection, accommodation of users, and protect the government's investment.

2. Stream Temperature

Water temperature affects the growth and survival of aquatic organisms. The effect of stream temperature on fish, amphibians, and macroinvertebrates varies between species and within the life cycle of a given species (Lantz 1971 and Oregon Department of Environmental Quality 1995). Many factors influence water temperature, including elevation, slope aspect, local topography, solar potential, stream flow patterns, channel geometry, vegetation, stream shading, and distance from the headwaters.

Reducing the amount of stream shade can cause elevated stream temperatures because it can increase the amount of solar radiation reaching the stream surface (USDA and USDI 2004e). Streams within or adjacent to the proposed units are currently shaded by dense stands.

3. Water Rights

No surface water rights exist for domestic use within one mile downstream of the proposed units. No effects to downstream water users are anticipated and water rights will not be discussed further in this analysis.

V. Fisheries and Aquatic Resources

A. Special Status Species

Special status species in the East Fork Coquille River, Olalla Creek/Lookingglass Creek, and Middle Fork Coquille River fifth-field watersheds include Coastal cutthroat trout (*Oncorhynchus clarki clarki*), Oregon Coast coho salmon (*O. kisutch*), Oregon Coast steelhead trout (*O. mykiss*), Pacific lamprey (*Lampetra tridentata*) and Umpqua chub (*Oregonichthys kalawatseti*) (Table 16).

Table 16. Special Status Species Present in the Fifth Field Watersheds Containing Proposed Density Management Units.

Species	Status
Oregon Coast coho	Bureau Sensitive[1]
Oregon Coast steelhead	Federal Species of Concern[2]
Pacific Lamprey	Bureau Assessment
Umpqua Chub	Bureau Sensitive
Coastal cutthroat trout	Bureau Tracking

[1]Federal Register 2006 Vol. 71/No. 12.
[2]Federal Register 2005 Vol. 69/No. 73.

The National Marine Fisheries Service designated Oregon Coast coho salmon as a threatened species in 1998 (Federal Register 1998). In February 2004, the 9th Circuit Court of Appeals upheld a 2001 district court ruling removing the threatened status of Oregon Coast coho. The species was proposed for listing as a threatened species (Federal Register 2004), but on January 19, 2006, a decision was issued that the species did not warrant listing under the Endangered Species Act (Federal Register 2006). Coho salmon are presently considered a Bureau Sensitive species.

The Oregon Coast steelhead trout Evolutionary Significant Unit was proposed as a candidate for threatened species designation in 1998, but was changed by the National Marine Fisheries Service to a "species of concern" (Federal Register 2005). Distribution of steelhead trout closely resembles that of coho salmon.

The Umpqua chub is a Bureau Sensitive Species restricted to the main stem of the Umpqua River and some of its larger tributaries. The Pacific lamprey is a Bureau Assessment Species that may

be found in third order or larger tributaries of the Umpqua River. The Umpqua chub and Pacific lamprey would not be present in the project area.

B. Fish Distribution

The majority of streams in the project area consist of high gradient, non-fish bearing streams. Two small fish bearing streams, containing resident trout, are located in Sherlock's Denn units. The closest anadromous fish-bearing stream, containing coho salmon, is more than 1.4 miles downstream from Power Wagon Unit A in the Olalla Creek/Lookingglass Creek fifth field watershed (Table 17). Anadromous fish barriers are located downstream from the project area on the Middle Fork of the Coquille River and Upper Rock Creek blocking access to streams in the Camas Heights and Sherlock's Denn units. Stream channel habitat on the East Fork of the Coquille River is dominated by a high gradient, boulder cascade that blocks coho and chinook salmon and cutthroat trout passage although, as many as 50 steelhead may negotiate the gorge annually, depending upon stream flow and migration timing (USDI, BLM 2005).

Table 17. Coho Distribution in the Project Area.

Timber Sale	Distance to streams containing coho salmon (miles)
Camas Heights	1.8
Bogey Gap	5.5
Power Wagon (B, C, most of A)	11
Power Wagon (part of A)	1.4
Sherlock's Denn	4

C. Essential Fish Habitat

Essential Fish Habitat is designated for fish species of commercial importance by the Magnuson-Stevens Fishery Conservation and Management Act of 1996 (Federal Register 2002, Vol. 67/No. 12). Streams and habitat currently or historically accessible to chinook and coho salmon are designated as Essential Fish Habitat. Essential Fish Habitat is similar in extent to coho salmon distribution and is located more than 1.4 miles downstream from the proposed units.

D. Aquatic Habitat Conditions

The description of aquatic habitat conditions is based on aquatic habitat surveys by the Oregon Department of Fish and Wildlife (ODFW) in conjunction with field evaluation and the professional judgment of the project biologist. Aquatic habitat conditions are described for streams in close proximity to or downstream from the proposed units. Streams surveyed by ODFW and habitat components important for fish are presented in Table 18. The quality of spawning and rearing habitat conditions downstream from the project area are considered moderate based on the ODFW survey data.

Tributaries of the East Fork of the Coquille River drain most of unit A, and units B and C of Power Wagon. Tributaries of Reed Creek drain Unit E of Sherlock's Denn. Tributaries of Holmes Creek drain Units A, B, C, and D of Sherlock's Denn. Tributaries of Upper Rock Creek drain Units A, B, C, D, E, and I of Bogey Gap. Small headwater streams of Upper Rock Creek

tributary drain Units G and H of Bogey Gap. Tributaries of the Middle Fork of the Coquille River drain the Camas Heights units.

Table 18. Aquatic Habitat Condition Data for Streams near Proposed Units.

Stream	Percent Fines	Percent Gravel	Total LWD/100m	Volume LWD/100m	Percent Pools	Residual Pool Depth
East Fork of the Coquille River	fair	good	fair	poor	fair	good
Reed Creek	fair	fair	poor	poor	fair	good
Holmes Creek	good	poor	poor	poor	fair	poor
Upper Rock Creek	poor	good	excellent	excellent	excellent	excellent
Upper Rock Creek Tributary	poor	good	good	excellent	excellent	excellent
Middle Fork of the Coquille River	poor	fair	poor	poor	excellent	excellent

The Oregon Department of Fish and Wildlife has developed a set of benchmark values for aquatic habitat conditions based on reference streams surveyed throughout the state (Foster et al. 2001). Streams exceeding the benchmark conditions are considered in *good* condition and streams with less than the benchmark conditions are considered in *poor* condition. Those falling between the two values are in *fair* condition.

1. Spawning Substrate and Sediment

The availability of spawning substrate is an important factor in fish productivity. Spawning habitat can vary based on the amount and quality of substrate. Gravel and small cobble substrate 1.3 to 10.2 cm in diameter (Bell 1986) that is relatively free from embedded fine sediment is ideal spawning substrate for resident and anadromous salmonids. During incubation of eggs and alevins, fine sediment deposition can reduce survival and emergence rates when sediment exceeds 15 percent (Bjornn and Reiser 1991). The streams surveyed near the project area contain poor to good amounts of fines in riffles but have a fair to good amount of spawning gravel.

There is the potential for sediment transmission to affect spawning or rearing habitat downstream where portions of the haul route cross perennial or fish-bearing streams. Most sections of the haul routes are surfaced (paved or rocked) roads. Two natural surfaced roads accessing Sherlock's Denn and Bogey Gap cross perennial streams. The remaining crossings occur on surfaced roads (Table 19).

2. Large Woody Debris

Large woody debris (LWD) is important to the formation of deep scour pools and the retention of gravel substrate (Bilby and Ward 1989). These pool and off channel habitats provide refuge habitat for salmonids during high flow events and cool water sources during low flow months (Swanston 1991). The overall LWD rated just below desirable in the surveyed streams.

Table 19. Number of Road and Stream Crossings along the Haul Routes of the Proposed Density Management.

Project Area	Natural Surface	Aggregate Surface		
	Perennial/Non-Fish Bearing	Perennial/Fish Bearing	Perennial/Non-Fish Bearing	Intermittent/Non-Fish Bearing
Power Wagon			1	
Sherlock's Denn	1	6		
Camas Heights			16	9
Bogey Gap	1			

Note: There are no natural surfaced road crossings on Perennial/Fish Bearing or Intermittent/Non-Fish Bearing streams.

3. Pool quality

Pools are important habitat features for juvenile rearing, both during low flow months when high stream temperatures add to stress and during high flow events when off channel pools provide refuge habitat. Salmonids typically are found in greater number and larger size in deep pool habitats (Rosenfeld et al. 2000). All of the surveyed streams, except Holmes Creek, provide adequate deep pool habitat for salmonid rearing and holding water for adults.

VI. Botany

A. Vascular Plants

The proposed units were surveyed for Special Status Species and Survey and Manage Species that might be expected in the project area (see Appendix D). One Bureau assessment species, *Carex gynodynama,* was found in the project area. The site would be protected from disturbance by including it in an unthinned area.

B. Fungi

Bureau Sensitive fungi species documented in the South River Resource Area include *Dermocybe humboldtensis*, *Phaeocollybia californica*, *P. olivacea,* and *Ramaria spinulasa* var. *diminutiva*. Four other species (*Arcangeliella camphorata, P. gregaria*, *P. oregonensis,* and *Rhizopogon chamaleontinus*) are suspected based on the habitat and host species present.

There are two known occurrences of *Dermocybe humboldtensis* in the South River Resource Area. One is in the Irwin Rocks Research Natural Area/Area of Critical Environmental Concern, more than five miles east of the project area, the other in the Myrtle Creek watershed is more than 25 miles from any proposed unit.

Five occurrences of *Phaeocollybia olivacea* are documented on the Roseburg District. One site is documented in the South River Resource Area, in the Middle Fork Coquille watershed more than three miles from any of the proposed units.

Phaeocollybia californica is documented in the Upper North Myrtle Creek subwatershed more than 24 miles from any proposed unit.

There is a single documented occurrence of *Ramaria spinulasa* var. *diminutiva* in the North Myrtle Research Natural Area/Area of Critical Environmental Concern.

All these species are primarily associated with members of the *Pinaceae* family, principally Douglas-fir and western hemlock. Important habitat components include: dead, down wood; standing dead trees; live, mature trees; many shrub species; a broad range of microhabitats; and for many, a well-distributed network of late-successional forest with moist and shaded conditions (USDA and USDI 2004d p. 148).

Most Special Status fungi species are highly isolated in their occurrence. They produce short-lived, ephemeral sporocarps or fruiting bodies that are seasonally and annually variable in occurrence (USDA and USDI 2004d p. 148). Richardson (1970) estimated that sampling every two weeks would fail to detect about 50 percent of macrofungal species fruiting in any given season. In another study by O'Dell et al. (1999), less than ten percent of species were detected in each of two consecutive years at any one of eight sites.

VII. Noxious Weeds

There are scattered infestations of noxious weeds within the project area, particularly Himalayan blackberry and Scotch broom. These infestations also occur along the access roads.

Actions taken to contain, control and eradicate existing infestations are undertaken through implementation of the *Roseburg District Integrated Weed Control Plan and Environmental Assessment* (USDI, BLM 1995b). Activities include inventorying weed infestations, assessing risk for spread, and applying control measures in areas where management activities are planned. Control measures may include releasing biological agents, mowing, hand-pulling, and the use of approved herbicides. Noxious weed treatments would be undertaken regardless of whether or not the proposed action is implemented.

Herbicide application consists of the treatment of individual plants. No aerial application of herbicides for general brush eradication is authorized on lands managed by the Roseburg District BLM. Mitigation measures restrict the manner and conditions under which herbicides are applied. Application is limited to the use of truck-mounted sprayers, backpack and hand sprayers, and wick wipers. Other measures restrict application dependent on circumstances that include weather conditions, proximity to live water and riparian areas, and proximity to residences or other places of human occupation.

Management practices that would be implemented in conjunction with the proposed action would be focused on preventing the introduction of new infestations or the spread of existing ones. Prevention measures would include:

- steam cleaning or pressure washing of heavy equipment used in logging and road construction to remove soils and other materials that could transport weed seed or root fragments;
- scheduling work in uninfested areas prior to working in infested areas;

- using native seed when mulching and seeding; or
- revegetating with native plant species where natural regeneration is unlikely to prevent weed establishment.

As a consequence there would be negligible changes in noxious weed populations under either alternative, and no further discussion is necessary in this analysis.

VIII. Cultural/Historical Resources

Pedestrian transects were conducted, but did not identify any prehistoric or historic sites within any of the proposed units. A cabin was noted on General Land Office cruise plats dating from 1918 in the vicinity of Bogey Gap unit H. The cabin site was protected by excluding it from the proposed units. Consequently, there would be no anticipated effects on cultural/historical resources and no further discussion is necessary in this analysis.

Chapter 4
ENVIRONMENTAL CONSEQUENCES

This chapter discusses specific resource values that may be affected and the nature of the short-term and long-term effects, including those that are direct, indirect, and cumulative, which may result from implementation of the alternatives. The discussion is organized by individual resources. It addresses the interaction between the effects of the proposed density management with the current environment, describing effects that might be expected, how they might occur, and the incremental effects that could result. It does not address effects of a negligible or discountable nature, focusing instead on direct and indirect effects including those with a realistic potential for cumulative effects.

The Council on Environmental Quality (CEQ) provided guidance on June 24, 2005, as to the extent agencies of the Federal government are required to analyze the environmental effects of past actions when describing the cumulative environmental effect of a proposed action in accordance with Section 102 of the National Environmental Policy Act (NEPA). The CEQ noted the environmental analysis required under NEPA is forward-looking and review of past actions is only required to the extent that this review informs agency decision making regarding the proposed action. This is because a description of the current state of the environment inherently includes effects of past actions. Generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historic details of individual past actions.

The cumulative effects of the BLM timber management program in western Oregon have been described and analyzed in the PRMP/EIS and FSEIS, incorporated herein by reference.

I. Vegetation

A. Alternative One - No Action

In the absence of density management, the stands would continue to develop as even-aged, single-storied, conifer-dominated stands. Crown closure would remain at close to100 percent, preventing the establishment and growth of an understory. Competition would reduce resources available for individual tree diameter growth and crown expansion. Live crown ratios of overstory trees would decrease from between 35 and 50 percent to approximately 20 percent. This would decrease the ability of the overstory trees to respond to future thinning treatments. Closely spaced trees with small crowns have a reduced photosynthetic capacity resulting in decreased diameter growth and diminished resistance to attacks from diseases and insects. As trees increase in height with little increase in diameter, they become unstable and more susceptible to wind damage (Wilson and Oliver 2000).

Managing stands in this manner would not be consistent the objective of providing high levels of sustainable timber production in the General Forest Management Area.

The stands proposed for density management in the LSR and RR have been managed for timber production and are on a different pathway than how old-growth stands developed in the Coast Range. Old-growth stands developed at low densities, while young managed stands are developing at higher densities. It is unlikely the old-growth stands had high densities that were subsequently reduced by a disturbance, leaving the larger trees (Tappeiner et al. 1997). Without silvicultural treatment or natural disturbances, such as fire, additional time may be needed to develop the structural complexity associated with old-growth forests, including canopy gaps and multiple-layered canopies (Andrews et al. 2005).

This alternative would not achieve the Desired Future Conditions described in the LSRA or meet landscape level objectives of increasing or developing late-successional habitat. Species diversity would decrease because of competition and shading. Hardwoods would continue to be overtopped and suppressed by conifers, decreasing in number due to suppression mortality and eventually would be eliminated from the stands. Shade tolerant cedars and hemlocks would be maintained in the stands with similar proportions to the existing species mix.

In the absence of disturbance, the closed canopy conditions would allow little light to reach the forest floor. Shrubs and an understory would not become established and a multilayered canopy would not develop. This would result in reduced structural diversity within stands and limited habitat suitability for species dependent on the diversity associated with late-successional forests.

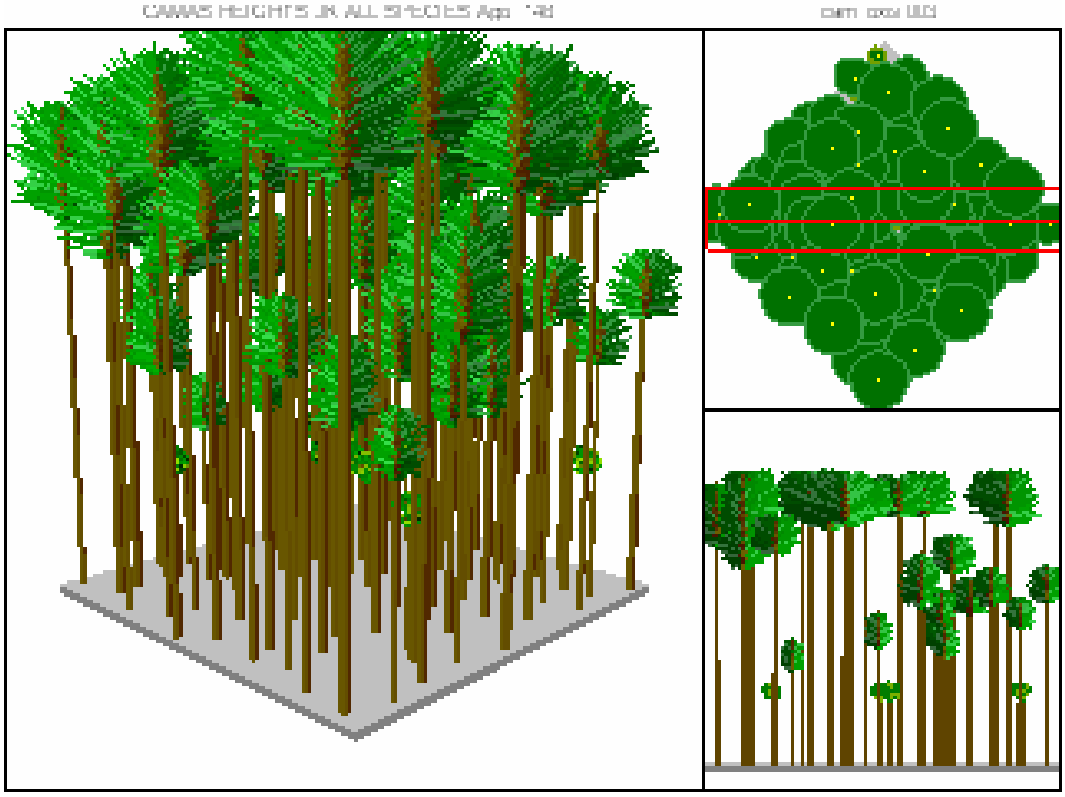
Southwest Oregon Organon version 8.0 was used to project changes in stand structure and composition expected to occur over time. Table 20 summarizes projected stand conditions at 150 years old without density management or commercial thinning. Figure 3 is a visual representation of the anticipated conditions.

The LSRA objective of 10 trees per acre greater than 40 inches in diameter would be met in the LSR when the stands are approximately 168 years old. Although the LSRA objectives for numbers of large trees would be met, the stands would lack the smaller diameter classes of trees typically growing in old-growth stands.

Table 20. Projected Stand Conditions at Age 150 with No Density Management Treatment.

	Stand Age	Trees per Acre	Basal Area (square feet per acre)	Quadratic Mean Diameter (inches)	Relative Density	Crown Closure (percent)
Bogey Gap	150	85 – 110	330 – 450	24.9 – 31.2	0.79 – 1.0	100
Power Wagon	150	115	420	25.8	1.0	100
Sherlock's Denn	150	90 –100	320-370	24.4 – 25.8	1.0	100
Camas Heights	150	90 – 140	400 - 450	22.8 – 30.2	0.96 – 1.0	100

Figure 3. Representation of Stand Conditions at 150 Years Old if Left Untreated.



Recruitment of snags and coarse woody debris would continue through the process of suppression mortality, but would mostly come from intermediate and suppressed trees with smaller diameters. Small snags usually do not have top rot (or cavities) and do not remain standing very long. They would contribute to the coarse woody debris on the forest floor for a relatively short time before decaying. Large snags and large diameter coarse woody debris would be created by disturbance factors other than suppression mortality, such as windthrow, lightning, disease, or fire. Organon modeling projected the LSRA objective of five snags per acre larger than 20 inches DBH would be met in the LSR through suppression mortality when the stands reach approximately 100 years old.

The snags would eventually fall and contribute to the LSRA coarse woody debris objectives. However, the material created through suppression mortality would have smaller diameters than desired and would not persist in the stands.

Port-Orford-cedar and Port-Orford-cedar Root Disease

The best available information on recent spread of the disease comes from site-specific mapping of infected areas, conducted using 1994 and 1999 aerial photographs. The rate of spread indicated by these surveys was estimated to be eight acres annually, and assumed would remain relatively constant under the no-action alternative.

Activities associated with roads have the potential for spreading the Port-Orford-cedar root disease, whether authorized by the BLM, privately undertaken, or casual in nature. Under the no

action alternative, the BLM would not harvest timber in the proposed units, and renovation or improvements to BLM roads proposed in conjunction with the density management would not occur at this time. Road use by private landowners, permittees, and the recreating public is beyond the management control of the BLM and would continue, however.

Most private timberlands within the watershed and tributary areas are managed on a 50 year rotation, on average. Thinning or regeneration harvest of several thousand acres would be reasonably foreseeable over the next five years. Timber hauling would be accomplished over private and BLM roads. Under the reciprocal rights-of-way agreements the BLM has little or no discretion in specifying the terms under which adjacent landowners may haul across BLM-managed lands and roads, or request permission to improve existing roads or construct new ones.

B. Alternative Two - Proposed Action

This alternative would meet the objectives of the proposed action to provide high levels of volume productivity in the GFMA and accelerate the development of late-successional and old-growth forest conditions in the LSR. This would provide habitat and structure for species associated with these conditions. In the LSR, density management would help achieve the desired future conditions described in the LSRA that include maintaining or restoring:

- Key structural components such as large trees, snags, and down logs,
- Canopy complexity,
- Variability of tree size and spacing, and
- Vegetative species composition with a diversity of both hardwood and conifer tree species.

Density management can promote structural complexity in young stands. Using the Organon model, the structure of young stands with management emulated the structural conditions found around spotted owl nest sites better than without management (Andrews et al. 2005). Research in old-growth stands indicated the average tree diameter when stands were 50 years old was greater than what typically occurs in stands with high tree densities, and the growth rates persisted (Tappeiner et al. 1997). The slower growth rates in young, managed stands are the direct result of higher tree densities. Disturbances sufficient to promote Douglas-fir regeneration in naturally occurring stands are generally absent in young, managed stands. Thinning initiates and promotes tree regeneration, shrub growth, and development of multi-storied stands even when the treatments focus on management of overstory tree density (Bailey and Tappeiner 1998).

Maintaining unthinned areas along the edge of adjacent late-successional stands would help maintain microsite habitat conditions in the late-successional stands. Culturing individual trees would allow them to grow and develop large branches faster, which would improve stand structural components. Diversity would also be created in the treated stands due to variations in microsite conditions, past treatments, gaps created by yarding corridors, and by injury to residual trees. Retention of conifer species other than Douglas-fir, hardwoods greater than 10 inches DBH, and unthinned patches would provide variation within units. Table 21 shows the average stand conditions following treatment for the three proposed thinning densities.

Table 21. Average Stand Conditions after Density Management.

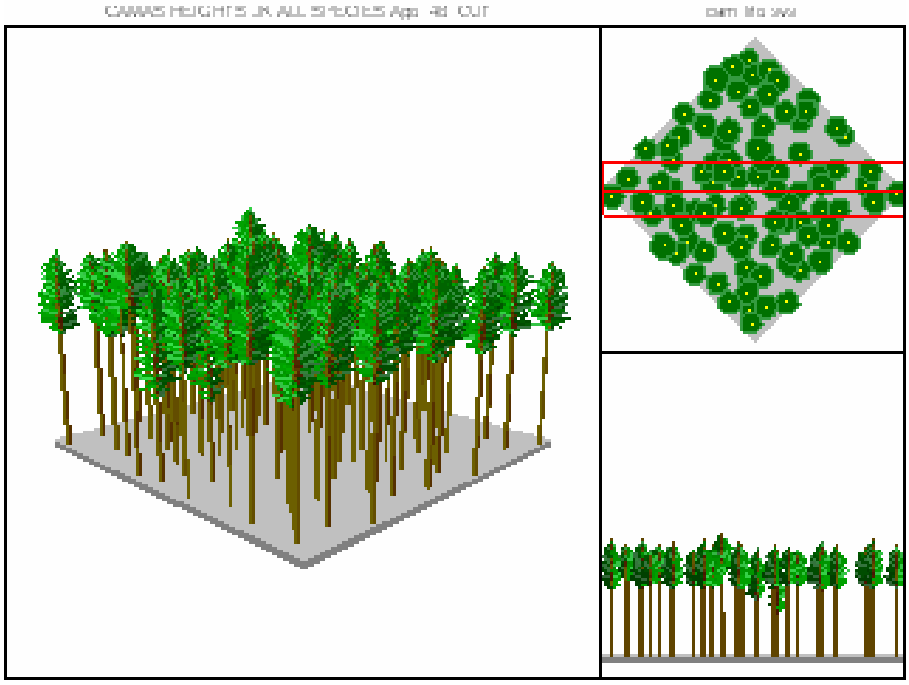
	Trees per Acre	Basal Area (square feet per acre)	Quadratic Mean Diameter (inches)	Relative Density	Crown Closure (percent)
Light Thin	80 – 90	140	17.1	0.38	80
Moderate Thin	60 – 70	120	17.7	0.32	70
Heavy Thin	40 – 50	90	18.6	0.23	50

1. Light Thinning

Light thinning would maintain a high level of volume production and reduce suppression related mortality. Canopies in the light thinning would continue to close and the amount of sunlight reaching the forest floor would be similar to unthinned stands 10 to 15 years after the treatment.

Figure 4 represents the anticipated typical post treatment condition of the light thinning treated areas.

Figure 4. Representation of Post Treatment Condition in the Light Thinning Treated Area.

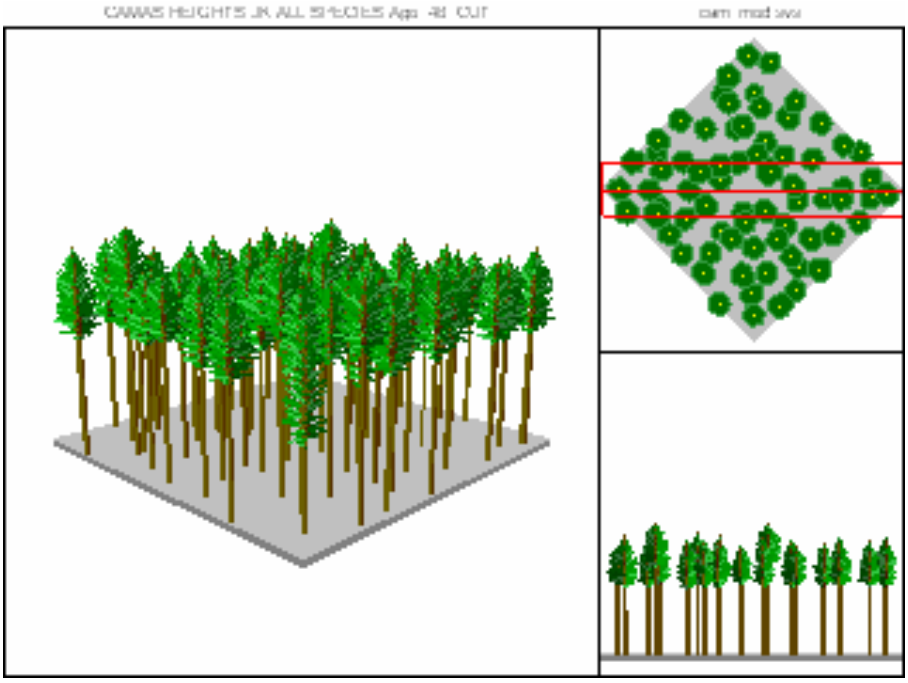


2. Moderate Thinning

Moderate thinning would maintain a high level of volume production. The variable spacing of retention trees and creation of canopy gaps would allow sufficient sunlight to reach the forest floor to simulate modest and temporary development of understory vegetation. This would create both horizontal and vertical structure.

Figure 5 represents the anticipated typical post treatment condition of the moderate thinning treated areas.

Figure 5. Representation of Post Treatment Condition in the Moderate Thinning Treated Area.



3. Heavy Thinning

Thinning to a relative density of 0.25 or less would promote understory development and vertical diversity by encouraging the establishment and growth of conifer seedlings, shrubs, and hardwoods (Hayes et al. 1997). The crowns of the leave trees would increase in length and volume because of the more open conditions. Post treatment crown closure would be about 50 percent. Canopy closure would allow enough light to support shade intolerant plants in the understory. Understory trees retained in the heavy thinned treatment areas would persist longer than those in the moderate or light thinned treatment areas.

Figure 6 represents the anticipated typical post treatment condition of the heavy thinning treated areas.

Figure 6. Representation of Post Treatment Condition in the Heavy Thinning Treated Area.

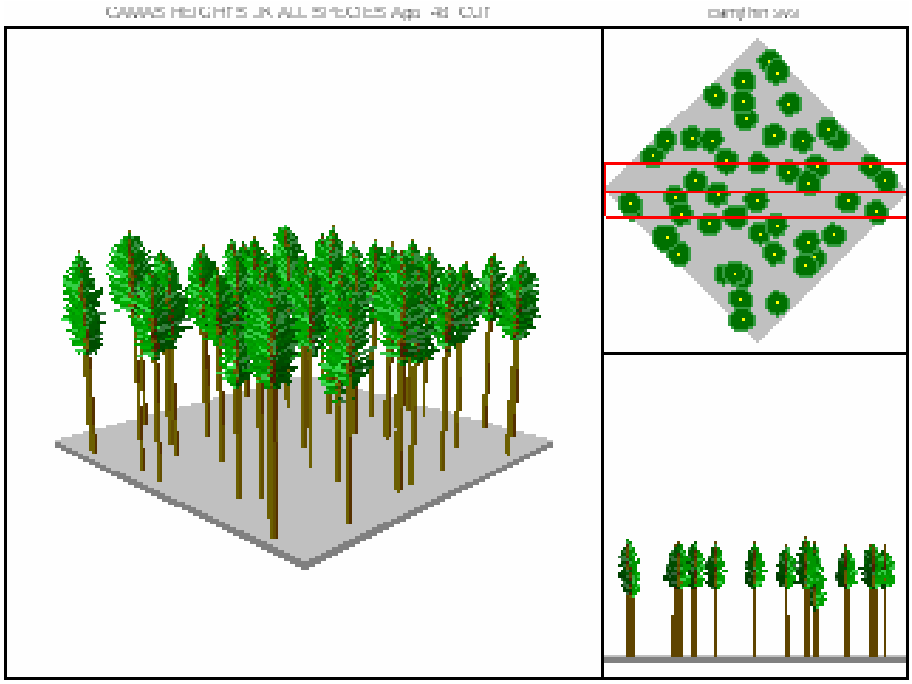
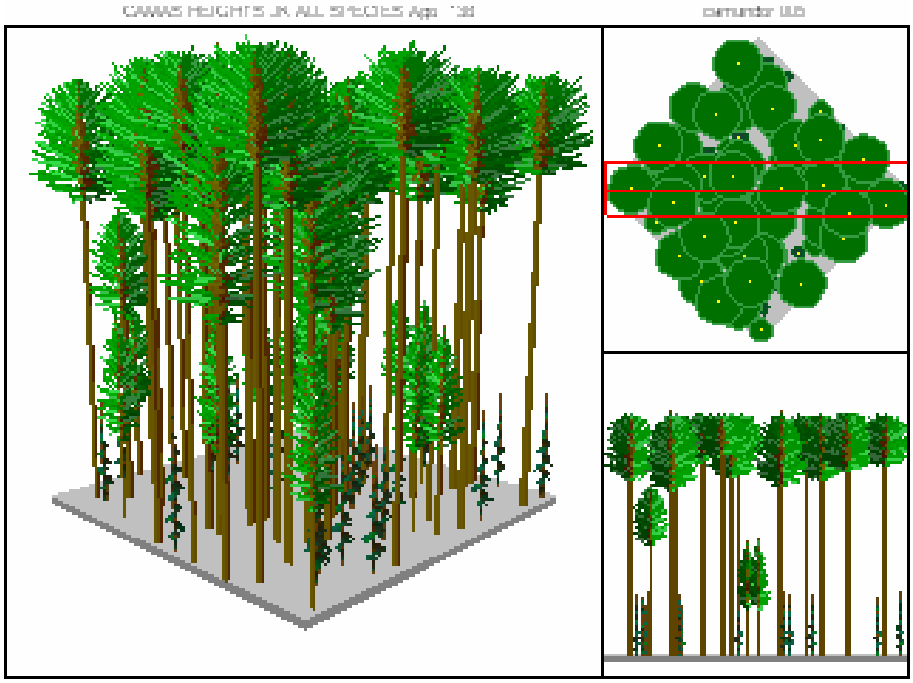


Figure 7 represents the anticipated typical post treatment condition of the heavily thinned areas after being underplanted and growing to be 138 years old.

Figure 7. Representation of the Heavily Thinned Area at 138 Years Old, after being Underplanted.



The reduction in tree density and competition from the density management would accelerate individual tree growth and shorten the period of time needed to attain large trees. The heavy thinning would have the longest period of accelerated growth and produce the largest trees over time. The quadratic mean diameter when the representative stand is 150 years old would be about 36 inches DBH with thinning compared to about 28 inches DBH if left unthinned. The LSRA objective of having ten or more Douglas-fir trees at least 40 inches in diameter would be met first in the heavy thinning treated areas within the LSR.

4. Unthinned Areas

Unthinned areas would develop similar to what was described in the no action alternative. These small untreated areas would provide differentiation in tree spacing, thermal and visual cover, natural suppression and mortality, size differentiation, and undisturbed coarse woody debris within the units.

5. Coarse Woody Debris and Snags

The immediate effects of thinning may alter the structure of coarse woody debris on the forest floor through physical damage. However, coarse woody debris would be created by non-merchantable material being left behind, damage to trees (i.e. tops being broken), and snags being felled.

Reducing stand densities by thinning from below would remove the small trees that would normally die from suppression. Through time, the average diameter of trees in the treated stand would be larger than in the untreated stands. The stands would eventually reach a density where mortality suppression occurs, however, the trees would be larger in diameter than the trees dying in the untreated stands. In the light and moderate thinning areas, there would be the recommended number of snags larger than 20 inches DBH when the stand is about 100 years old. Snags would need to be created in the heavy thinning areas to meet the LSRA recommendations in the LSR.

C. Cumulative Effects

For analysis of cumulative effects, the PRMP/EIS (USDI, BLM 1994, Vol. I, p. 4-4) assumed most private lands would be intensively managed with final harvest on commercial economic rotations averaging 50 years. Based on this assumption, private forest lands would contribute very little, if any, late-seral forest habitat in the watersheds (USDI, BLM 1994, Vol. I, p. 4-30).

In 2006, an interpretation of aerial photographs and digitized satellite imagery was used to evaluate the vegetative condition of private forest lands in the four sixth-field watersheds (Headwaters Middle Fork Coquille River, Upper Rock Creek, Lost Creek, and Tenmile Creek) the proposed units are in. It indicates approximately 6,700 acres, representing from eight to 13 percent of each sixth-field watershed, were harvested since 2001 (Table 22). This represents an annual harvest on private lands of 1,340 acres.

Assuming a continued rate of 1,340 acres harvested per year, approximately 6,700 acres would be harvested on private lands in the next five years. The effect would be to increase the acres of early seral forest on private lands by about 12 percent and about eight percent on all ownerships.

Table 22. Acres of Regeneration Harvest on Private Lands by Sixth-Field Watersheds.

Sixth-Field Watershed	Private Lands Harvested in the Past 5 Years	Acres of Private Land in Sixth-Field Watershed	Total Acres in Sixth-Field Watershed	Percent of Sixth-Field Watershed Harvested	Estimated Private Land Harvests in the Next 5 Years	Estimated Percent of Sixth-Field Watershed Harvested in the Next 5 Years
Headwaters Middle Fork Coquille River	2,392	20,554	31,575	8	2,392	8
Upper Rock Creek	1,359	11,836	18,338	7	1,359	7
Lost Creek	1,295	5,885	12,875	10	1,295	10
Tenmile Creek	1,652	18,749	25,517	6	1,652	6
Total	6,698	57,024	88,305	8	6,698	8

Over a period of 100 years, implementation of management direction from the ROD/RMP is projected to result in a 51 percent increase in the amount of old-growth forest managed on the Roseburg District (USDI, BLM 1994, Vol. I, p. 4-29). This is projected to provide an additional 131,000 acres of nesting, roosting and foraging habitat for the northern spotted owl, and habitat for those other species dependent on late-successional forest habitat (USDI, BLM 1994, Vol. I, p. 4-57).

The BLM manages about 12,808 acres of stands between 30 and 80 years old in the four sixth-field watersheds the proposed units are in (Table 23). Other than limited roadside salvage of blown down timber and removal of timber associated with reciprocal rights-of-way agreements, during the past five years timber management by the BLM has been limited to the authorization of about 748 acres of commercial thinning and density management in the four sixth-field watersheds (Table 24). The proposed action would treat about 663 acres of mid seral forest. Taken together with the previous and reasonably foreseeable future (1,724 acres) commercial thinning and density management activities, this would amount to about 24 percent of the mid seral forest stands managed by the BLM in the four sixth-field watersheds.

Table 23. Age Classes on BLM-Administered Land.

Sixth-Field Watershed	Nonforest	Percent	0 to 30 Years Old	Percent	30 to 80 Years Old	Percent	Greater than 80 Years Old	Percent	Total Acres
Headwaters Middle Fork Coquille River	102	1	1,950	18	5,176	47	3,780	34	11,009
Upper Rock Creek	20	0	1,532	24	2,443	38	2,509	39	6,504
Lost Creek	105	2	1,252	18	4,177	60	1,452	21	6,985
Tenmile Creek	717	11	1,194	18	1,012	15	3,853	57	6,775
Total	944	3	5,928	19	12,808	41	11,594	37	31,273

Table 24. Acres of Past and Planned Commercial Thinnings or Density Management.

Sixth-Field Watershed	Past Commercial Thinnings or Density Management	Proposed Density Management	Planned Commercial Thinnings or Density Management
Headwaters Middle Fork Coquille River	521	419	564
Upper Rock Creek	0	185	0
Lost Creek	227	54	950
Tenmile Creek	0	5	210
Total	748	663	1,724

While density management and commercial thinning would reduce tree densities in the treated stands, it would not affect stand ages, the ability of the stands to grow and develop into late seral habitat, or the current availability of late-seral forest habitat in the sixth-field watersheds. Overall age-class distribution of forest lands managed by the Roseburg District BLM would tend toward older seral stages because Matrix lands are managed on harvest rotations of 80 to 110 years of age and Late-Successional Reserves and Riparian Reserves are not scheduled for regeneration harvest, as illustrated in the PRMP/EIS (USDI, BLM 1994, Vol. I, pp. 4-27 and 28).

There would be no cumulative effect of the proposed action when added to past, present, and reasonably foreseeable future timber harvesting because density management and commercial thinning would not affect stand ages, the ability of the stands to grow and develop into late seral habitat, or the current availability of late-seral forest habitat in the sixth-field watersheds.

Port-Orford-cedar and Port-Orford-cedar Root Disease

Site specific analysis at the project level was analyzed with the Port-Orford-cedar Risk Key. The risk was determined to be low and no POC management practices are required because POC is a minor stand component and if the uninfected POC were to become infected, they would not spread the disease to areas that measurably contribute to meeting land and RMP objectives. In addition, there are no uninfested seventh-field watersheds on the Roseburg BLM District as defined in Attachment 1 of the POC ROD.

With the project design features and controls described in Chapter 2 (pp. 14-15), and in light of the scattered occurrence of Port-Orford-cedar within the project areas, little or no increase in the rate of spread of the root disease would be anticipated, and the project design features specified might reduce the rate of disease spread in the project area. The rate of spread of eight acres annually would remain relatively constant because timber harvesting and hauling would continue on private lands and under the reciprocal rights-of-way agreements the BLM has little or no discretion in specifying the terms that adjacent landowners may haul across BLM-managed lands and roads, or request permission to improve existing roads or construct new ones and any decrease in the rate of disease spread by following project design features would be localized and measurable at the fifth-field watershed scale.

II. Wildlife

The terms degrade, downgrade, and remove are defined here to aid the discussion of effects from the proposed projects on the spotted owl, the marbled murrelet, and other special status species.

Generally **degrade habitat** means to affect the quality of the habitat without altering its overall function (e.g. trees may be removed but the remaining forest stand continues to function for dispersal or nesting); **downgrade nesting habitat** means to alter the function of suitable nesting habitat so that the habitat no longer supports nesting, roosting, or foraging behavior but other use of the forest stand (for dispersal) may remain; **downgrade dispersal habitat** means to alter function of dispersal habitat so that habitat no longer supports short-term dispersal behavior (owls stay for days to weeks) but may provide temporary (minutes to hours) roost sites or landing areas as owls move through the landscape (personal observation); **remove habitat** means to alter suitable habitat for nesting, or dispersal such that the habitat no longer supports nesting, roosting, foraging, or dispersal.

A. Alternative One - No Action

1. Threatened and Endangered

Northern Spotted Owl and Marbled Murrelet

Existing habitat conditions would remain unchanged over the short-term. Overstocked forest stand conditions would result in growth rates unfavorable to the development of late-successional forest conditions. In the absence of density management, the current growth trajectory would not meet the objectives outlined in the LSRA for the LSR land use allocation in the following manner:

- Unable to meet LSRA objectives to enhance conditions of late-successional forest ecosystems, which serve as habitat for late-successional and old-growth forest related species;
- Would not promote the development of old-growth characteristics;
- Would not maintain the health and vigor of the stands, and promote the growth of the remaining trees;
- Would not retain hardwoods as stand components;
- Would not improve late-successional habitat connections within and between LSRs;
- Would not decrease the risk of large scale catastrophic loss from fire and insects;

In the next ten years the effects from no action on the spotted owl, marbled murrelet and its critical habitat would not be noticeable. Late-successional forest conditions would develop at the current or a slower rate because of the overstocked conditions. In the long term, the forest stands would not develop late-successional characteristics (e.g. large diameter trees, large branches, and large diameter coarse woody debris material) until after the stands are about 168 years old. There would be a delayed development of habitat characteristics adjacent to current late-successional forests and inside spotted owl territories, marbled murrelet sites, and marbled murrelet critical habitat. In addition, no action would likely delay the benefits of suitable habitat development to the recovery of the marbled murrelet.

Murrelets would continue to nest in the old-growth stands northwest of Camas Heights unit F and continue to show occupancy behavior in the younger stands in the proposed Camas Heights

units. The lack of density management would delay (for about 10 to 30 years) the development of late-successional characteristics in the Camas Heights units.

2. Bureau Sensitive, Bureau Assessment, and Survey and Manage Species

These species would be affected to various levels as a result of no action. Species like the bats, northern goshawk, and purple martin, if present, would continue to use the habitat components in Camas Heights units A, D, and F and Bogey Gap unit H until the components are lost through attrition (such as decay or blow down). Maintaining high tree densities, slow growth rates, and high canopy closures would delay (for about 10 to 30 years) the development of larger diameter trees and snags that are used by northern goshawks and purple martins for nesting and bats for roosting, overwintering, or maternity sites.

B. Alternative Two – Proposed Action

1. Threatened and Endangered

a. Northern Spotted Owl

The proposed action would modify approximately 663 acres of forested habitat in five spotted owl home ranges. Table 9 shows that the distances from the proposed units are generally greater than 0.5 miles from known spotted owl sites. Most of the proposed units would downgrade NRF habitat or degrade dispersal habitat for the spotted owl. The treatments would modify NRF or dispersal habitat to varying degrees because of the variable densities proposed (Table 25).

Table 25. Acres of Dispersal Habitat Affected by the Proposed Density Management and Commercial Thinning.

Project Name	Treatment Type	Acres	Percent of Dispersal Habitat in a Spotted Owl Home Range		Acres of Dispersal Habitat	
			Degraded	Downgraded	Within Spotted Owl Home Range	Within Sixth-Field Watershed
Sherlock's Denn	Light	67	4	0	1768	5,176
	Moderate and Heavy	76	0	4		
	No Treatment	17	0	0		
Bogey Gap	Light	63	6	0	1,010	2,443
	Moderate and Heavy	122	0	12		
	No Treatment	30	0	0		
Power Wagon	Light	22	1	0	102	5,189
	Moderate and Heavy	37	0	2		
	No Treatment	11	0	0		
Camas Heights	Light	117	0	0	0	5,176
	Moderate and Heavy	159	0	0		
	No Treatment	64	0	0		

Density management would change the physical conditions (canopy closure, tree spacing, and light conditions) in dispersal habitat for the spotted owl. Table 21 shows that the canopy closure remaining in the proposed units would range from 50 to 80 percent. The effects to the spotted owl would vary depending on the treatment level. Moderate and heavy treatments would downgrade dispersal habitat such that spotted owls would use the dispersal habitat to move around the landscape but would not stay for days or weeks. The change in vertical and

horizontal forest cover would modify the dispersal behavior of spotted owls using the proposed units. In one study (Meiman et al. 2003), radio telemetry tracking of one spotted owl indicated that owls may avoid stands thinned to low residual stand densities comparable to what is proposed in the moderate and heavy thinning areas. The study did not indicate however how long the avoidance persists.

The lightly thinned stands would continue to function as dispersal habitat for spotted owls because these areas would have more vertical and horizontal cover, perches, and coarse woody debris important for prey species.

Density management would downgrade the function of the forest stands in Camas Heights units B, C, D, and F and Bogey Gap unit H (Table 10) from suitable habitat to dispersal-only habitat by reducing horizontal and vertical cover, removing potential hunting perches, and disturbing coarse woody debris that provides habitat for prey species. Although density management would change the physical attributes of these stands in the short term, individual trees considered suitable for nesting would remain and contribute to the long-term development of NRF for the spotted owl.

No effect to spotted owls from noise disruption would be expected, because the density management and commercial thinning would occur more than 0.5 miles from known spotted owl activity centers, outside of the disruption threshold distance (USDI, FWS 2005) for known spotted owl nest sites, unsurveyed suitable spotted owl habitat, or be seasonally restricted from March 1 to June 30. Seasonal restrictions could be waived if surveys indicate that spotted owls are not present, not nesting, or failed in nesting. These project design features (PDF) would ensure that noise disruption would not cause spotted owls to abandon nests or fledge prematurely.

b. Marbled Murrelet

The effects to marbled murrelets are presented in two categories; effects of density management on unoccupied murrelet habitat and within LSR261 and designated critical habitat units, and effects of density management to the murrelet, habitat outside of designated critical habitat units, and an occupied site.

i. Effects of Density Management on Unoccupied Marbled Murrelet Habitat in LSR 261 and Designated Critical Habitat Units.

Table 11 (p. 26) shows the proposed units in Bogey Gap (except unit H), Power Wagon, and Sherlock's Denn are not suitable murrelet habitat. Density management would not affect murrelets because these proposed units do not contain suitable habitat and murrelets are not present.

Disturbance and disruption from noise would not be expected because the density management operations would occur outside of the disruption threshold distance (USDI, FWS 2005) for unsurveyed murrelet habitat, follow seasonal restricts from April 1 to August 5 if within the disruption threshold distance of unsurveyed murrelet habitat, or follow daily operating

restrictions (DOR) from August 6 to September 15. The restrictions and buffering of trees with large branches, mistletoe clumps, or moss covered branches would provide suitable habitat components in the proposed units. Therefore, the density management would not adversely affect the murrelet.

Modification of the growing dynamics of the forest stand to produce late-successional characteristics at an earlier age would benefit the murrelet by creating suitable habitat sooner. The density management outlined in the vegetation section would develop late-successional characteristics approximately 10 to 30 years before untreated stands. Effects to designated murrelet critical habitat units would occur in the short term but in about 70 to 100 years the expected increased growth of the forest stands would develop important components of critical habitat and contribute to the recovery of the marbled murrelet.

ii. Effects of Density Management to the Murrelet, Habitat Outside of Designated Critical Habitat Units, and an Occupied Site.

Camas Heights units B, C, D, F, H, and a portion of unit A are part of an occupied murrelet site. No effect to murrelets is anticipated because the trees considered suitable murrelet habitat would be left in unthinned areas and density management operations would occur outside of the disruption threshold distance (USDI, FWS 2005) for unsurveyed murrelet habitat, follow seasonal restrictions from April 1 to August 5, follow DORs from August 6 to September 15, and areas where murrelets were observed flying through the stand or showing interest would not be treated. The suspected nesting site is the late-successional forest northwest of the proposed Camas Heights units and the habitat would remain unchanged because density management is not planned for the area. Therefore, occupancy of the forest stand is expected to continue. Any effects to murrelets from noise disturbance are not expected since seasonal restrictions would be observed in the Camas Heights units (B, C, D, and F) adjacent to the late-successional forests where occupancy behavior has been observed.

Modification of the growing dynamics of the forest stand to produce late-successional characteristics would benefit murrelets by creating suitable habitat at an earlier age. The density management outlined in the vegetation section would develop late-successional characteristics approximately 10 to 30 years before untreated stands. This would increase the amount of suitable murrelet habitat in the occupied area from the isolated 20 acres of old-growth northwest of Camas Heights unit F to over 200 acres in about 70 to 100 years.

2. Bureau Sensitive and Assessment Species

a. Northern Goshawk

The proposed density management and commercial thinning would modify the forest stands by reducing canopy cover but is not expected to directly affect northern goshawks because suitable nest sites would not be removed and would be buffered to prevent possible damage. Density management and commercial thinning would accelerate the development of late-successional forest conditions in the proposed units. Implementation of the Northwest Forest Plan is expected to stabilize northern goshawk populations in a well-distributed pattern across federal land (FSEIS

3&4-179) and would be consistent with BLM Special Status Species Program objectives. Consequently, the proposed action would not be expected to contribute to the need to list the goshawk as a threatened or endangered species.

b. Purple Martin

The proposed density management would modify the forest stands but is not expected to directly affect purple martin nest sites because suitable nest sites (tall snags or trees) within habitat used by purple martins would not be removed and would be protected to prevent possible damage.

c. Fringed Myotis Bat, Pallid Bat, and Townsend's Big-eared Bat

Patriquin and Barclay (2003) showed habitat selection for foraging activity by some Myotis bat species is minimally affected by density management and commercial thinning. Although bats did not show a preference for thinned stands, in the long-term, density management and commercial thinning would increase the amount of sunlight reaching the forest floor and increase herbaceous cover used by insects that bats feed upon (Taylor 2006) and bat activity levels could eventually approximate those recorded in old-growth forests (Humes et al. 1999).

Retaining unthinned areas around large diameter trees, hollow trees, and tall large diameter snags would maintain roosting and foraging habitat components in the proposed units for these bat species. Roosting habitat for these bat species could be removed for safety reasons or along road rights-of-way, but is anticipated to be a negligible amount and unlikely to result in the extirpation of these bat species from the proposed units. Consequently, the proposed action would not contribute to a need to list these bat species as threatened or endangered.

d. Chace Sideband Snail, Oregon Shoulderband, Spotted Taildropper and Green Sideband Snail

These species have not been found in the proposed units and the density management would not affect any known sites of these mollusk species. Consequently, the proposed action would not contribute to a need to list these mollusk species as threatened or endangered.

3. Survey and Manage Species

See the discussion for the Chace sideband and Oregon shoulderband.

C. Cumulative Effects

Availability of late-seral forest habitat is the primary wildlife concern in the four sixth-field watersheds (Headwaters Middle Fork Coquille River, Upper Rock Creek, Lost Creek, and Tenmile Creek) the proposed units are in. Stands in this area begin functioning as late-successional habitat at approximately 80 years of age when characteristics like large diameter trees, a secondary canopy layer, snags, and cavities have developed. Early and mid-seral habitat is expected to be abundant on private lands as a result of past and future timber harvest (see discussion in Chapter 4, p. 49).

Past, proposed, and planned BLM commercial thinning or density management total 3,135 acres or 24 percent of the mid seral forest stands managed by the BLM in the four sixth-field watersheds (Table 24). Density management would reduce tree densities in the treated stands, in the short term but would not affect overall stand ages, the ability of the stands to grow and develop into late-successional habitat, or the current availability of late-successional forest habitat in the four sixth-field watersheds. Overall age class distribution of forest lands managed by the Roseburg District BLM would tend toward older seral stages because Matrix lands are managed on harvest rotations longer than 80 years and Late-Successional and Riparian Reserves are not scheduled for regeneration harvest. In 50 years, the 12,808 acres of mid seral forest would be at least 80 years old and contribute to the late-successional forest in the watersheds. This would increase the amount of late-successional forest by 40 percent (Table 23).

This indicates that there would be no cumulative effects on wildlife from the proposed action when added to past, present, and reasonably foreseeable future timber harvest because of the continued availability and functionality of late seral habitat in the four sixth-field watersheds.

III. Soils

A. Alternative One - No Action

1. Slope Stability

The impacts of landslides to soil quality and productivity under the no action alternative would be inconsequential based on the following discussion of landslide probability and size.

The probability of landslides occurring on the potentially unstable portions of the very steep slopes would be low (less than ten percent) based on the following:

- Only eight landslides inside the proposed units, all under clearcut conditions, were identified by examining aerial photographs taken from 1964 to 2004. Five were timber harvest related. Three were primarily caused by road sidecast overloading.
- Landslide occurrences on very steep slopes in mid seral stands are infrequent, based on field observations by Dan Cressy, Swiftwater Soil Scientist.
- The Oregon Department of Forestry study conducted after the storms of 1996 found landslides occurred in the 31 to 100 year age class stands (mid seral) the least (Robison et al. 1999). The close tree spacing probably resulted in more root binding of the soil and canopy interception of precipitation.
- The very steep slopes in the proposed units are dominantly planar and convex and lack deeply incised drainages and headwalls.

The size of any landslide occurring under the no action alternative would be small (less than 0.1 acres) based on the following:

- Landslides in mid seral stands tend to be smaller than in clearcuts.
- Aerial photograph interpretation identified only one moderate size (0.14 acre) landslide in the proposed units. The landslide occurred in Camas Heights Unit K after clearcut timber harvesting. The other four landslides were small (less than 0.1 acres).

2. Soil Compaction and Displacement

The previous timber harvesting conducted in the 1950s created widespread soil compaction. Compacted topsoil shows a fair degree of healing to date. However, much of the residual compaction where the subsoil is exposed would continue to heal very slowly and persist into the indefinite future. Topsoil development would also be very slow where the subsoil is exposed. Erosion levels in the proposed units would remain low and inconsequential.

B. Alternative two – Proposed Action

1. Slope Stability

The impacts of landslides to soil quality and productivity under the action alternative would be inconsequential based on the following discussion. New road construction would be on stable locations, at or just below ridge tops and on gentle to moderate slopes (nearly level to 50 percent). Captured drainage would be prevented from flowing onto potentially unstable slopes by placing waterbars on over-wintering roads (needed the next year) and by subsoiling and waterbarring during decommissioning. Less than five percent of the proposed units have very steep slopes that could be considered potentially unstable.

The probability of landslides occurring on the potentially unstable slopes would be a slightly more than under the no action alternative but would still be low (less than ten percent) based on the following:

- The Oregon Department of Forestry study "Storm Impacts and Landslides of 1996" indicates that fewer failures occurred in the 31 to 100 year age class stands (Robison et al. 1999). The close tree spacing resulted in more root binding of the soil and canopy interception of precipitation.
- Landslide occurrence in thinned mid seral stands on very steep slopes is infrequent based on post-harvest field monitoring of the Hello Folley and Cat Tracks commercial thinnings and aerial photo interpretations of other thinnings on the Roseburg District (personal observation by Dan Cressy, Swiftwater Soil Scientist).
- After experiencing the worst flooding in two decades in January 1997, the Applegate Ranger District of the Rogue River National Forest determined fourteen percent of the identified management-related landslides were in partial cuts (Gonzales from www.reo.gov/ama/applegate_info/applying_landslide_stabilization.htm).
- Under the proposed alternative, the light and moderate thinning prescriptions would occur on the very steep slopes where there might be potential instability to provide more root binding of the soil and canopy for interception of precipitation.

The size of any landslide occurring in the light to moderate thinning areas on the 34 acres of very steep potentially unstable slopes is small (less than 0.1 acres). The chances of a larger failure would be slightly more than the no action alternative because the wider tree spacing would result in less root binding of the soil and canopy interception of precipitation. To date, a few small landslides have been discovered in the commercial thinning and density management units harvested on the Roseburg District under the Northwest Forest Plan. The period of maximum

vulnerability for a landslide, after thinning, would be similar to a clearcut (about 10 years). More and larger landslides can occur if intense, long-return interval storms during this time period. The probability of experiencing a 20 year storm within the first 10 years after harvesting is 40 percent, for a 50 year storm it is 18 percent, and for a 100 year storm it is 10 percent.

2. Soil Compaction and Displacement

Renovation of naturally surfaced roads and new road construction would cover about nine acres. About four acres of this road construction would be where previous roads, skid trails, and landings are easily discernible with visual cues of compaction and soil displacement. The remaining five acres would be new soil disturbances where road, trail, and landing imprints are none to light. New soil disturbances would include the widened portions of trails to develop twelve foot travel surfaces and landings. Almost fifty percent of the new disturbance would be in Camas Heights.

All of the newly constructed and renovated roads and landings would be subsoiled except for 4,200 feet of roads that are to be rocked and made permanent. In addition, 5,800 feet of existing roads not needed for hauling timber would be subsoiled. Taking into account road construction and decommissioning, soil quality and productivity would be maintained or slightly improved in the short-term after subsoiling when compared to the no action alternative.

If all of the 307 acres of the ground-based portions of the units have harvester-forwarder operations, about 68 acres (22 percent) would be in harvester-forwarder trails, assuming about a 50 foot average spacing. The compaction and soil displacement caused by the equipment tracks would cover about 37 of the 68 acres. Based on monitoring information collected for the Roseburg District, when all project design features are followed the result is about three percent moderate to heavy compaction. The range has been from one to ten percent at monitored sites. At the upper end of this range soil moisture levels were too high for forwarder traffic. Keeping moderate to heavy compaction at the three percent level (about nine acres) would be attainable in the proposed units and would meet management direction to limit effects to less than 10 percent of the ground-based yarding area when added to landings. Some of the compaction would overlap existing compacted area and not appreciably add to the loss of soil quality or productivity. Under moist soil conditions, Sherlock's Denn and Camas Heights would incur a little more compaction per acre than the Bogey Gap and Power Wagon because of higher average clay contents.

If all of the 307 acres of the ground-based portions of the units are skidded, about 23 acres (8 percent) would be in trails, assuming about a 150 foot average spacing. Based on monitoring information collected for the Roseburg District, most of the skid trails would have moderate to heavy compaction, consisting of a mixture old and new compaction, with heavy compaction dominating.

The actual scenario would probably be a mix of harvester-forwarder and skidding operations with the largest acreage being harvester-forwarder. Even though skidding would be more impacting to soils than the harvester-forwarder operations, there would little difference in soil compaction between the two after subsoiling. This is because most of the skid trails would be

subsoiled and typically only a portion of the harvester-forwarder trails have compaction concentrated enough to justify subsoiling.

Cable yarding on 346 acres would add about one acre (less than one percent) of moderate to heavy compaction; dominantly moderate compaction (based on Sampson Butte Commercial Thin monitoring). The yarding corridors would not have compaction concentrated enough to justify subsoiling.

The short-term effect of the proposed action would be to maintain or slightly improve soil productivity because the roads and skid trails would be subsoiled. Subsoiling would result in a long-term improvement over the soil productivity recovery rate under the no action alternative.

C. Cumulative Effects

No cumulative effects to soils would be anticipated as any effects would be confined to the proposed units and would not exceed the level and scope of effects considered and addressed in the PRMP/EIS (Chapter 4, pp. 12-16).

IV. Water Resources

A. Alternative One - No Action

1. Stream Flow

There would be no effect to annual water yield or low flows because absent any density management there would be no reduction in existing vegetative cover and no modification to the present rates of water uptake and evapotranspiration by the vegetation.

a. Peak Flows and Transient Snow Zone

There would be no effect to peak flows because absent any density management there would be no change in the canopy closure within the TSZ. Consequently, there would be no modification of snow capture or snow melt rates that could enhance peak flows.

b. Peak Flows and Roads

Absent the need for road construction, the existing roads occupy less than four percent of the watersheds in the project area and would continue to pose a low risk to enhanced peak flows.

2. Water Quality

a. Sediment

Absent any soil disturbance from felling and yarding operations, there would be little, if any, potential for erosion and sediment delivery to streams. The risk of landslides originating inside

the proposed unit boundaries and impacting streams would continue to be low. This conclusion is based on the following (see soils section for more information):

- The probability of landslides occurring in mid-seral stands is low (less than ten percent) and the likely size of any landslide that might occur is small (less than 0.1 acre).
- Small landslides rarely travel greater than 200 feet (aerial photo interpretation of landslides on the Roseburg District). About nine acres (one percent) of the density management units are on very steep slopes that would be considered potentially unstable and within 200 feet of a stream.
- There is little potential for debris flow initiation inside the proposed units.

Only first and second order stream would be at risk of being directly impacted by landslides. A small landslide within reach of a stream would have the potential of mobilizing 400 cubic yards of material; 100 cubic yards would be more typical. The actual volume that impacts the stream would usually be less.

Absent the need for timber hauling, road construction, renovation, and decommissioning would not be undertaken. The forest road system in the affected watershed would continue to deliver fine sediment to stream channels, the magnitude of sediment delivery dependent on road surfacing, road location in relation to streams, steepness of slopes, the amount and season of traffic, and other factors (Reid and Dunne 1984).

b. Stream Temperature

There would be no effect on stream temperatures because absent any density management there would be no change in present levels of streamside shading.

B. Alternative Two – Proposed Action

1. Stream Flow

No measurable effect to stream flow would be expected as a result of density management because the project involves partial removal of vegetation in two percent or less of the affected drainages. In an overview of several studies, Satterlund and Adams (1992, p.253) found water yield responses were less substantial when partial cutting systems remove a small portion of the cover at any one time. Where individual trees or small groups of trees are harvested, the remaining trees generally use any increased soil moisture that becomes available following timber harvest.

a. Peak Flows and Transient Snow Zone

Peak flow increases primarily occur where the TSZ has less than 25 to 30 percent crown closure (Stednick 1996, Watershed Professionals Network 1999, IV-11). The density management treatments would result in no more than 10 percent of any proposed unit with less than 30 percent canopy closure. Heavy thinning and patch openings, with canopy closures less than 30 percent, in the TSZ would occur on less than five acres in the Olalla/Lookingglass Watershed, less than seven acres in the East Fork Coquille Watershed and less than 20 acres in the Upper

Middle Fork Coquille WAU. The number of acres in each watershed with less than 30 percent canopy closure would increase by less than one percent from density management treatments in the TSZ. Currently, these watersheds have a low risk of enhanced peak flows from timber harvesting in the TSZ and the risk would remain low after the density management treatments. As a result, the proposed density management would not change the risk of increased peak flows within the TSZ.

b. Peak Flows and Roads

Roads may modify peak flows by reducing infiltration on compacted surfaces, allowing rapid runoff, or by intercepting subsurface flow and surface runoff and channeling it into streams (Ziemer 1981, pg. 915). Approximately 3.1 miles of roads would be constructed and approximately 6.1 miles of roads would be decommissioned after harvest. In the short-term there would be an increase in road density due to road construction. Most of these roads would be constructed on or near ridge tops and out-sloped in lieu of constructing ditches and installing cross drains. Consequently, the new roads would be entirely disconnected from the drainage network and would not increase peak flows.

Although this would reduce the number of miles of roads in the project area, the percentage of land occupied by roads in the sixth and fifth field watersheds would be unchanged (Table 26). The affected subwatersheds and watersheds would have less than four percent of land occupied by roads, maintaining the current low potential to enhance peak flows. Any changes in peak flows as a result of road management activities would not be measurable at the project or sixth or fifth field watershed scale.

Table 26. Miles of Road Construction and Decommissioning and Pre- and Post-Treatment Percentages of Area Occupied by Roads.

Subwatershed or Watershed Name	Miles of Road Construction	Miles of Road Decommissioning	Change in Miles of Roads	Percent of Area Occupied by Roads	
				Pre-Treatment	Post-Treatment
Lost Creek (sixth field watershed)	0.4	0.5	-0.1	3	3
East Fork Coquille (fifth field watershed)	0.4	0.5	-0.1	2	2
Tenmile (sixth field watershed)	0.1	0.1	0	3	3
Olalla/Lookingglass (fifth field watershed)	0.1	0.1	0	3	3
Headwaters Middle Fork Coquille (sixth field watershed)	2.1	4.6	-2.5	3	3
Upper Rock Creek (sixth field watershed)	0.5	0.9	-0.4	3	3
Upper Middle Fork Coquille Watershed Analysis Unit	2.6	5.5	-2.9	3	3
Total Miles	3.1	6.1	-3.0		

2. Water Quality

a. Sediment

i. Density Management Adjacent to Stream Channels

Density management adjacent to stream channels can cause localized soil disturbance and the short-term potential for erosion, primarily associated with yarding operations. However, the unthinned buffers, which would be a minimum of 20 feet in width on non-fish bearing streams and 50 feet in width on fish bearing streams, would be maintained for all streams within or adjacent to proposed units. These unthinned buffers would prevent disturbance to stream channels and stream banks. These buffers would also intercept surface run off, depositing any sediment transported by overland flow before it reached active waterways.

ii. Yarding Corridors

Cable yarding across stream channels could disturb stream banks and increase sediment delivery to streams. Yarding corridors may be needed across streams in Bogey Gap unit A and the two perennial streams located adjacent to Camas Heights unit K. The location of yarding corridors would be approved by the contract administrator. The yarding corridors would be designed and constructed to minimize disturbance of the stream channel and prevent sediment delivery. Corridors would be a maximum of 20 feet in width and laid out perpendicular to stream channels. Additionally, if it is necessary to fell trees within the unthinned buffers for tailhold trees or to clear skylines, the trees would be felled toward the channel and left in place to provide in-stream wood and stream bank protection. Consequently, there would be a negligible increase in sediment as a result of these yarding corridors.

iii. Roads

Forest roads can be a major contributor of fine sediment to streams (Reid 1981, Reid and Dunne 1984). Sediment delivery to streams may result from down cutting of ditch lines and erosion of unsurfaced roads by overland flow. The project includes renovation and decommissioning of roads that have poor drainage, show signs of erosion, or are a source of fine sediment to stream channels.

Approximately 2.6 miles of roads would be renovated. Improvements to road surfacing and drainage would reduce the amount of sediment delivered to streams. However, the amount would not likely be measurable at the drainage scale.

Approximately 0.1 miles of permanent rocked road, 0.8 miles of temporary rocked road, and 2.2 miles of temporary unsurfaced road would be constructed. These roads would be located away from stream channels and on or near ridge tops or stable side slopes. These new roads would not be connected to the drainage network. Since road segments must be connected directly to stream channels in order to deliver sediment-laden water, these roads would have no effect on stream sediment.

Approximately 6.1 miles of roads would be decommissioned. Decommissioning of 3.0 miles temporary roads and 1.7 miles of renovated roads would be designed to restore the "natural hydrologic flow" (USDI, BLM 2001). In addition, 1.1 miles of road within the activity area that would not be used for harvest operations would be decommissioned as funding becomes available. Decommissioning reduces the potential for eroded transport material would reach a stream. Any increases in sediment delivery to streams following road decommissioning would be of short duration, remain localized, and not likely to be measurable at the drainage scale.

Timber hauling could occur in both the dry and wet seasons. Hauling during the dry season would not generate nor deliver road-derived sediment to live stream channels, because absent precipitation there would be no mechanism for the transport of fine sediment into adjacent or nearby streams.

Effects from sediment generated by road related activities, particularly timber hauling in wet weather, would be short term and limited to the immediate vicinity of stream crossings. Also prior to log hauling, sediment-control devices, such as silt fences and hay bales, would be placed in ditch lines and at cross drain outlets to trap sediment locally and prevent migration into streams.

b. Stream Temperature

Density management within 100 feet of a stream channel has the potential to increase stream temperature by reducing shade. Shade from trees near the stream channel is important for reducing direct solar radiation and preventing increases in stream temperatures.

Maintaining unthinned buffers along streams would retain direct shading and maintain water temperatures. Factors, such as unique habitat features, streamside topography and vegetation, whether the stream is intermittent or perennial, fish presence, and susceptibility to solar heating would be used to determine the width of the unthinned area. Additionally, light thinning adjacent to the unthinned areas would protect vegetation that produces secondary shade for the streams. The width of the light thinning areas would be based on the same factors as those used to determine the unthinned areas. Vegetation providing shade for stream channels would be protected by the unthinned and light thinning areas. Consequently, stream shading would not likely be affected by density management and it is not expected that stream temperatures would be affected.

C. Cumulative Effects

1. Sediment

Unthinned buffers adjacent to stream channels would be established on all streams adjacent to units proposed for density management. These would provide undisturbed soil and vegetation to precipitate any sediment in overland run-off and prevent sedimentation of streams, such that there would be no cumulative degradation of water quality in the East Fork Coquille, Middle Fork Coquille, and Olalla Creek/Lookingglass Creek fifth-field watersheds.

As previously discussed, new permanent and temporary roads would be primarily located on ridge top locations without any connection to the stream network. Out-sloping the roads in lieu of constructing ditches and installing cross drains would further reduce any potential for routing run-off to locations where sediment-laden water could be diverted into streams. Consequently, it is anticipated there would be no measurable increases in sediment in individual streams or cumulatively from road construction at the scale of the East Fork Coquille, Middle Fork Coquille, and Olalla Creek/Lookingglass Creek fifth-field watersheds.

In conjunction with timber management actions, renovation to existing roads would be undertaken. Coos Bay BLM District recently completed an Environmental Assessment (Brummit Creek EA 2005) proposing about 2,000 acres of density management and 500 acres of hardwood conversion in the East Fork Coquille Watershed. In association with the Brummit Creek EA, approximately 75 miles of roads would be renovated and upgraded to present day construction standards, including additional cross drains and supplemental surfacing. In association with the LSR 261 Density Management Project, an estimated 2 to 3 miles of roads would be renovated. The cumulative effects of road renovation would be long-term reductions in stream sedimentation arising from road erosion and long-term improvements to water quality in the East Fork Coquille, Middle Fork Coquille, and Olalla Creek/Lookingglass Creek fifth-field watersheds.

2. Peak Flows

The 60 acres of proposed density management represents less than 0.1 percent of the 85,785 acres within the East Fork Coquille Watershed. The risk of increasing peak flows associated with past timber harvest on all lands, both private and Federal, in the TSZ is considered low. The risk associated with the proposed density management within the TSZ, when considered with recent harvest on private lands, was also determined to be low. The Brummit Creek EA proposed treatment acres comprise less than three percent of the East Fork Coquille Watershed. Reduced stand densities resulting from both the Brummit Creek and LSR261 Density Management projects would not generate a measurable increase in peak flows.

Approximately 610 acres of the proposed density management represents less than one percent of the 67,207 acres within the Upper Middle Fork Coquille Watershed Analysis Unit. In addition, the risk of increasing peak flows was determined to be low even when considered with recent harvest on private lands, because less than 20 acres of the proposed density management is within the Transient Snow Zone.

Less than five acres of density management are proposed within the Olalla/Lookingglass Creek Watershed, which represents a negligible amount of the 103,214 acres. The negligible amount of proposed density management within the Transient Snow Zone would maintain the low risk for increasing peak flows.

Assuming harvest on private lands in the same drainages continues at current levels (1,340 acres per year), short-term increases in peak flows for small storms with less than a two-year return interval could occur because of reduced stand densities on private and public lands. However, Oregon Forest Practices Act regulations on size of harvest units, the spatial scattering of harvest

on private lands, road drainage improvements in the East Fork Coquille (Brummit Creek EA 2005), Middle Fork Coquille, and Olalla Creek/Lookingglass Creek watersheds would effectively mitigate any effects at the watershed level.

3. Stream Temperature

Unthinned and light thinning buffers would be established on all streams adjacent to units proposed for density management, with widths determined in part by susceptibility of individual streams to solar heating. Consequently, streamside shading would be maintained and no measurable change in heating potential or cumulative change in stream temperatures would be expected in the East Fork Coquille, Middle Fork Coquille, and Olalla Creek/Lookingglass Creek fifth-field watersheds.

V. Fisheries and Aquatic Resources

A. Alternative One - No Action

Under this alternative there would be no density management or thinning of overstocked riparian and upland stands to promote the growth of large diameter conifer trees. This would contribute to a declining trend in the availability of large wood for recruitment into streams. As existing large wood deteriorates there would be a reduction in pool habitat and the ability of streams to retain and store spawning gravels. This trend would continue for several decades barring some other form of disturbance that reduces stand densities and allows for the growth and development of larger trees.

The use of natural surface roads or rocked roads in poor condition, particularly during periods of wet weather, would generate sediment that could reach streams during rain events. Where these roads are improperly designed or have insufficient or improperly functioning drainage, these sediments could be concentrated and delivered to streams rather than being dispersed across forest slopes and filtered out before reaching active waterways.

In addition, fish and aquatic habitat downstream from the proposed units would continue to be cumulatively affected by actions on privately-managed forest and agricultural lands, such as harvest of riparian forests and run-off from natural surface roads, tractor skid trails, fields, and pastures would continue to reduce the availability of large woody debris for instream recruitment, lead to increases in stream temperatures and contribute additional sediment at the watershed scale.

The overall effect would be stable or deteriorating water quality and spawning substrate, degradation of feeding and rearing conditions for fish and other aquatic wildlife, and degradation of Essential Fish Habitat.

B. Alternative Two – Proposed Action

1. Special Status Species

Timber harvesting and hauling could deposit fine sediment and temporarily increase turbidity, which can hinder survival of fish eggs and alevin buried in gravel. Fine sediment and the resulting turbidity can reduce spawning success and foraging ability, impair breathing by clogging gill membranes, and increase overall stress levels in fish (Waters 1995). The effects from density management would not be expected, however, because fine sediment would be filtered out before reaching streams by the uncompacted soils and vegetation in the unthinned buffers. The anticipated magnitude of the road related effects are expected to be so small as to not be measurable at the project scale because most of the roads crossing streams are surfaced and unsurfaced roads would be used during the dry season.

2. Essential Fish Habitat

It is anticipated density management would have no adverse effect on Essential Fish Habitat because the closest EFH is more than 1.4 miles downstream from any of the units. Other reasons no adverse effects are anticipated include:

- Any sediment resulting from the density management would be intercepted and filtered out by the vegetated unthinned buffers rather than reach stream channels.

- Existing large woody debris would be reserved to provide for short-term instream wood recruitment, while density management would accelerate the growth of large diameter trees to provide long-term sources of large wood for in-stream habitat. Consequently, there would be no short-term effect on the availability and quality of pool and off-channel habitat, with increases in abundance and quality of these habitats and accumulation of spawning substrates expected in the long term.

- The effects of sediment to streams generated by road related activities, particularly timber hauling in wet weather, would be limited to the immediate vicinity of stream crossings. The application of the project design features described in Chapter 2 (p. 13) would prevent adverse effects from road related activities. Sediment from new temporary roads would not reach streams because of their distance upslope from streams.

3. Aquatic Habitat Conditions

Under this alternative, activities that could affect aquatic habitat conditions include thinning operations, timber hauling, and activities associated with road construction, renovation and decommissioning. The principle factors that could be affected are stream temperature because of reduced shade, substrate quality related to fine sediment delivery, and LWD as related to tree growth and subsequent recruitment.

a. Spawning Substrate and Sediment

Effects to stream substrates from density management activities would not be expected. Equipment operations would be prohibited within the unthinned buffers so that soils would not be displaced or compacted. Non-compacted forest soils in the Pacific Northwest have very high infiltration capacities and are not effective in transporting sediment by rain splash or sheet erosion (Dietrich et. al. 1982). Any potential sediment resulting from density management operations would be intercepted by the vegetated unthinned buffers and be filtered out rather than reach stream channels. The unthinned buffers would also provide root strength sufficient to protect bank stability and prevent abnormal bank erosion that would contribute additional sediment to streams where it could accumulate and become embedded in streambed gravels (USDA et al. 1993).

Directional felling of trees away from the unthinned buffers would prevent disturbance and erosion of stream banks and channels. Cable yarding corridors across stream channels would be designed and constructed to minimize disturbance of the stream channel and prevent sediment delivery to streams. Therefore, due to design features, there would be a negligible increase in sediment as a result of yarding corridors.

The greatest potential for effects is from road related activities that can contribute sediment to streams and affect substrate quality (Furniss et al. 1991). These activities include construction, renovation, and decommissioning of roads associated with timber sales, as well as timber hauling over the roads.

Roads would be constructed on stable ridge top or side slope locations. Permanent road segments would be surfaced for all-weather use. The roads would be out-sloped with no ditch lines or culverts that could concentrate run-off during wet weather and provide a means for sediment-laden water to reach streams.

Hauling during the wet season, which normally occurs from October to May, can mobilize fine sediment for transport to streams, especially at stream crossings (Waters 1995). Haul route renovation would include road blading and reshaping, cleaning of cross-drain culverts, and installation of additional cross-drain culverts above stream crossings to divert run-off and ditch drainage onto the forest floor and away from streams, thereby reducing or eliminating sediment sources. The following practices would also be applied, where warranted, to keep sediment from reaching fish-bearing streams.

- Ditch lines would be left vegetated where possible to help filter sediment from road run-off, and

- Water bars would be installed as directed to further route water off of the road surface and onto the forest floor.

If sediment is delivered to streams during wet season haul, it would potentially be delivered to fish-bearing reaches and might disturb habitat quality and use for resident cutthroat trout. The six perennial fish-bearing stream crossings in Sherlock's Denn have the potential to be directly

affected. Contract provisions would be included in the timber sale restricting hauling under adverse conditions when the potential for delivering sediment to streams is highly likely. Strict adherence to the wet season haul specifications would ensure that the increases in sediment delivery to streams, subsequent degradation of stream substrates (spawning gravels), and harmful effects to cutthroat trout would be negligible.

b. Large Woody Debris

The removal of trees from Riparian Reserves and riparian areas could result a short-term reduction in available wood, but smaller diameter wood does not persist for the long term due to higher decay rates (Naiman et al. 2002) and is more easily flushed from the system than large pieces (Keim et al. 2000). Current coarse woody debris would be reserved to provide for the short term, while density management would accelerate the growth of large diameter trees that would provide long-term sources of large wood for in-stream habitat.

c. Pool Habitat

The availability of pool habitat would be unaffected by density management, or road construction, renovation, or decommissioning because no existing large wood would be removed from streams.

Density management would primarily remove suppressed and intermediate trees while retaining most dominant and co-dominant trees, so availability of large trees for in-stream recruitment would be largely unchanged. In 20 to 30 years the accelerated growth and development of the remaining trees would provide an abundance of larger diameter trees that, upon recruitment into streams, would enhance pool complexity and create additional pool habitat.

C. Cumulative Effects

In the past four years, the BLM has implemented aquatic restoration projects in the project area, including replacement of stream crossing culverts and riparian vegetation treatment. In the short and long terms these projects restore access to historical habitat, riparian vegetative communities, and reduce sediment.

Several culverts in the Headwaters Middle Fork Coquille subwatershed have been replaced in the last few years. Culverts replaced on Holmes and Bingham Creek have improved connectivity of cutthroat trout populations, as well as, natural sediment transport. Post-construction restoration of the sites has included planting native hardwoods and conifers to provide streamside shade and bank stability.

The nature of this project and other density management projects to promote large diameter tree growth would increase large woody debris recruitment to riparian areas and streams and benefit fish habitat in the East Fork Coquille River, Middle Fork Coquille River, and Olalla Creek/Lookingglass Creek fifth field watersheds. The instream and road related restoration proposed for these watersheds would improve fish habitat, as well, by reducing sediment transported via ditches and road surfaces.

The proposed action of this project when added to past, present, and reasonably foreseeable future actions would result in no cumulative impacts on fish habitat and aquatic species because the unthinned and light thinning buffers along streams would prevent incremental increases to stream temperatures and sedimentation in streams beyond the project area. Road renovation and decommissioning would reduce the amount of sediment generated from roads in the project area.

VI. Botany

A. Alternative One – No Action

1. Vascular Plants

No direct effects to vascular plants would result from this alternative. The absence of management to create forest gaps or control competing vegetation may cause some Special Status Species, such as Kincaid's lupine and Wayside aster that require open growing conditions and abundant sunlight, to decline because of a decreasing amount of available light.

2. Fungi

Under this alternative, the stands would continue to function as fungi habitat and no loss of sites would be expected because microclimate temperature and humidity would be maintained by retention of present forest canopy, and soil organic matter, forest litter, and large woody debris would remain intact and undisturbed.

B. Alternative Two – Proposed Action

1. Vascular Plants

No direct effects to Special Status plant Species would be anticipated as a result of the proposed action. In the event that species identified in Appendix D are located, sites would be protected in accordance with management recommendations designed to maintain habitat conditions favorable for their persistence.

2. Fungi

The proposed action would not affect any known sites of Bureau Sensitive fungi species described on pages 39 and 40, because they are outside of the proposed units.

The presence of these species in the project area is unknown because surveys are not considered practical for the reasons described on page 40. If any of these species are present in the proposed units, a loss of sites would likely result as a consequence of the removal of substrate and modification of microclimate, as described in the *Final Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines* (pp. 150-154).

Opening up the forest canopy would alter the forest microclimate by reducing shade, resulting in more solar exposure and drier conditions. This would likely result in a reduction in moisture retention by forest litter, soil organic components, and large woody debris. Yarding would also result in the displacement and degradation of forest litter, organic matter, and large woody debris.

Studies have demonstrated that overstory removal reduces ectomycorrhizal sporocarp (fruiting bodies) production. (Luoma et al 2004). The degree of reduction depends on many factors described above. Thinning would retain a large number of potential hosts trees, so loss of all sites would be unlikely. The remaining host trees can serve as refugia allowing fungi to persist until stand conditions such as canopy closure, soil moisture and relative humidity return to pre-thinning levels. Even though a temporary reduction in fruiting would be expected, as stand conditions return to pre-thinning levels over the next 10 to 15 years, mycorrhizal fungi communities will also recover.

C. Cumulative Effects

As any populations of Special Status or Survey and Manage species found in the proposed density management units would likely be small and isolated, and measures implemented to maintain habitat integrity and microclimate would be beneficial in nature, no cumulative effects would be anticipated.

VII. Monitoring

Monitoring would be done in accordance with the ROD/RMP, Appendix I (pg. 84, 190-191, and 193-199). Specific Resources to be monitored would include: Riparian Reserves; Matrix; Water and Soils; Wildlife Habitat; Fish Habitat; and Special Status Species Habitat.

Chapter 5
LIST OF AGENCIES/PERSONS CONTACTED AND PREPARERS

This project was included in the Roseburg BLM Project Planning Update (Summer 2005). If a decision is made to implement the proposed action, a notice of decision would be published in *The News-Review*, Roseburg, Oregon.

I. The following agencies, organizations, and individuals would be notified of the completion of the EA:

Cascadia Wildlands Project
Coquille Indian Tribe
Cow Creek Band of Umpqua Indians
Douglas Timber Operators
Klamath Siskiyou Wildlands Center
National Marine Fisheries Service
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Natural Resources Council
Umpqua Watersheds, Inc.
U.S. Fish and Wildlife Service
Ronald S. Yockim, Attorney-at-Law
Umpqua Valley Audubon Society

II. List of Preparers:

Kevin Carson	Project Leader/Silviculture/Management Representative
Roli Espinosa	Project Leader/Wildlife/T&E
Paul Meinke	EA Writer/Editor
Dawn White	Botany/Noxious Weeds
Gary Basham	Botany/Noxious Weeds
Mark Beardsley	Forestry/Layout
Dan Cressy	Soils
Sharon Frazey	Fisheries
Cory Sipher	Fisheries
Jill Ralston	Hydrology

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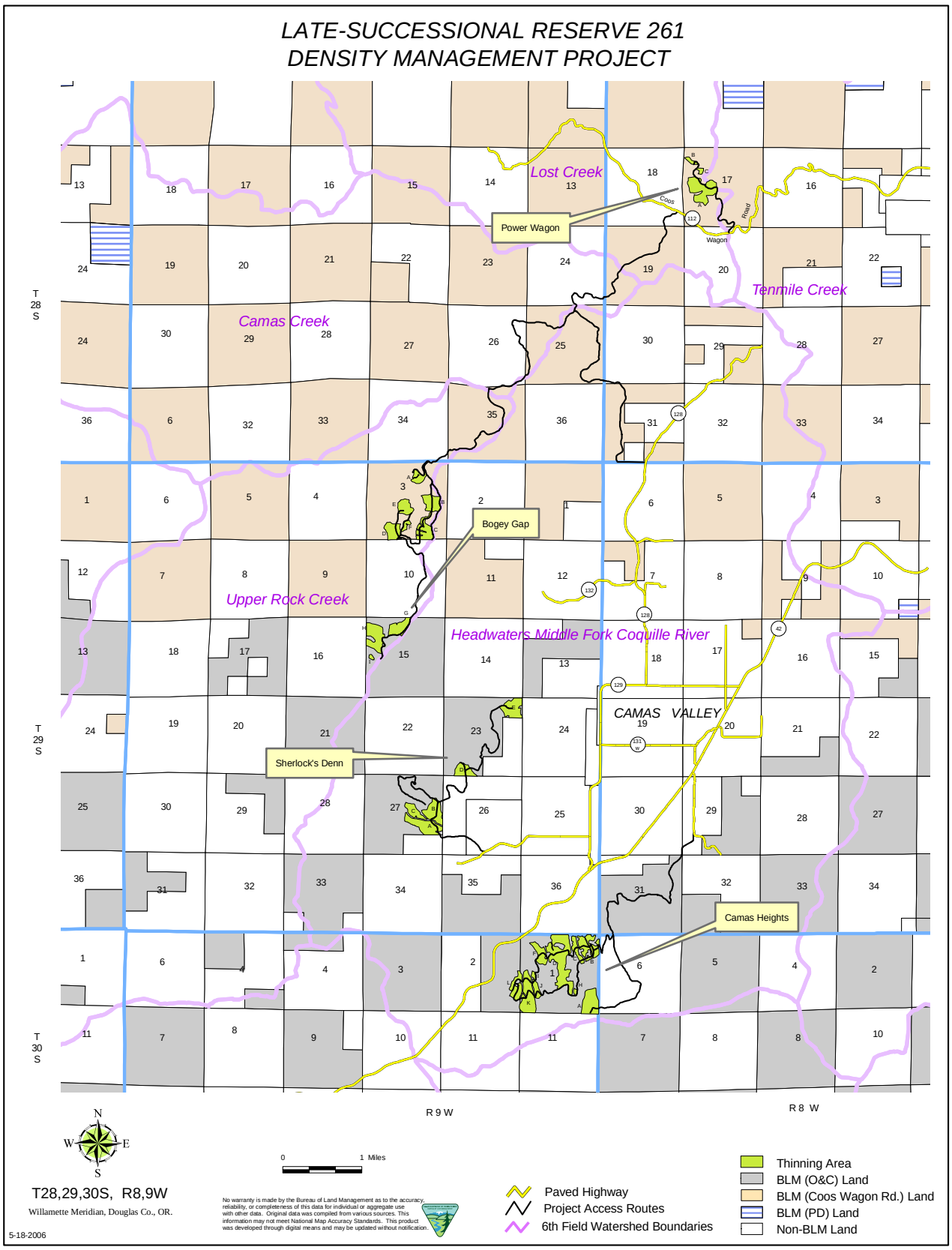
Appendix A

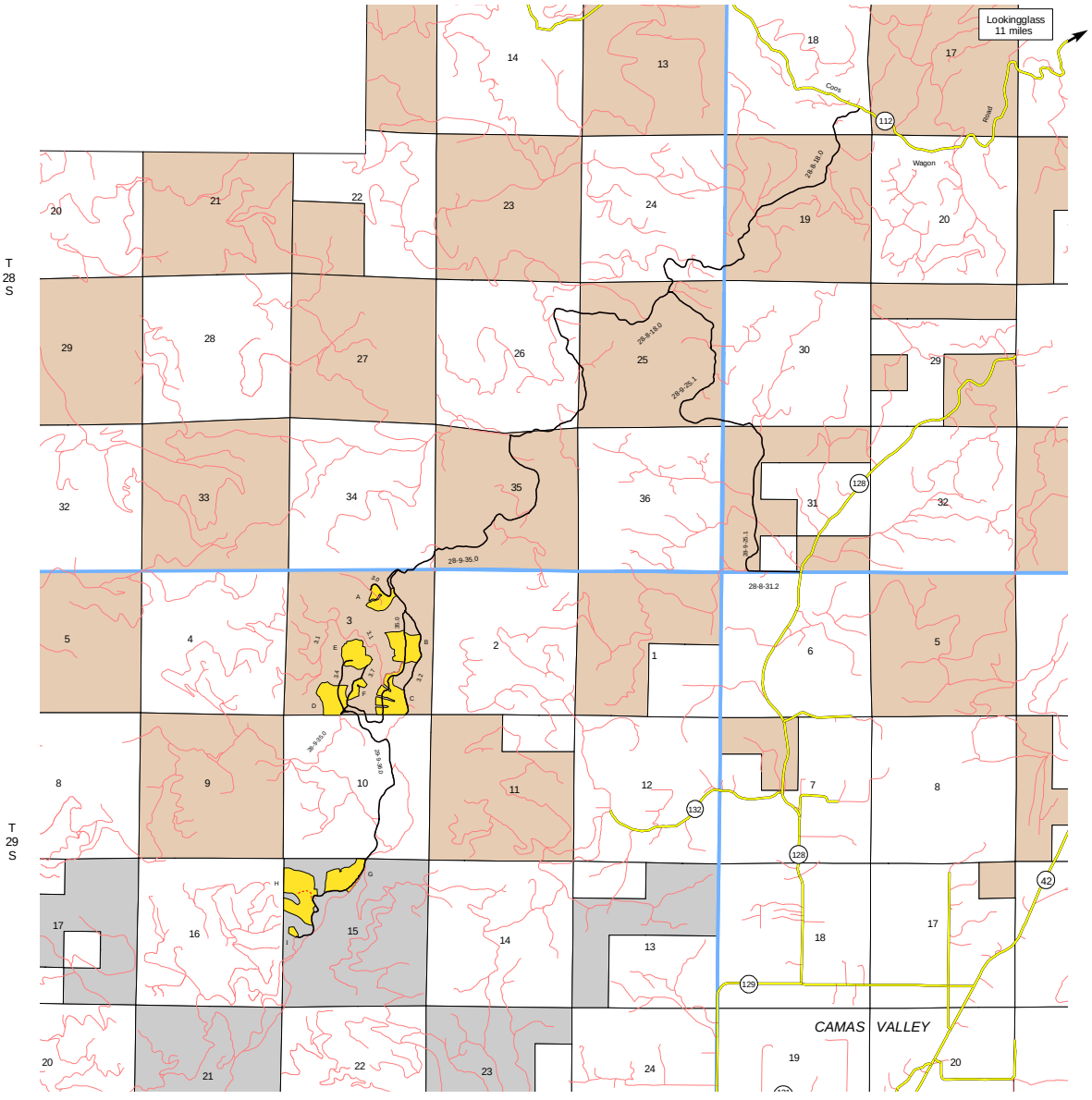
Maps of the Proposed Project Area and Units


LATE-SUCCESSIONAL RESERVE 261
DENSITY MANAGEMENT PROJECT
Lost Creek
Power Wagon
Coos
Road
Wagon
Tenmile Creek
Camas Creek
Bogey Gap
Upper Rock Creek
Headwaters Middle Fork Coquille River
CAMAS VALLEY
Sherlock's Denn
Camas Heights
T 28 S
T 29 S
T 30 S
R 9 W
R 8 W
N
W
E
S
0
1 Miles
T28,29,30S, R8,9W
Willamette Meridian, Douglas Co., OR.
5-18-2006
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of this data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
Paved Highway
Project Access Routes
6th Field Watershed Boundaries
Thinning Area
BLM (O&C) Land
BLM (Coos Wagon Rd.) Land
BLM (PD) Land
Non-BLM Land

'Late-Successional Reserve 261 Density Management' E.A.

BOGEY GAP

Density Management



N
W E
S

T29S, R9W

Willamette Meridian, Douglas Co., OR.

0 1 Miles

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of this data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Paved Highway
Existing Road
Access/Haul Route
Road to be Constructed

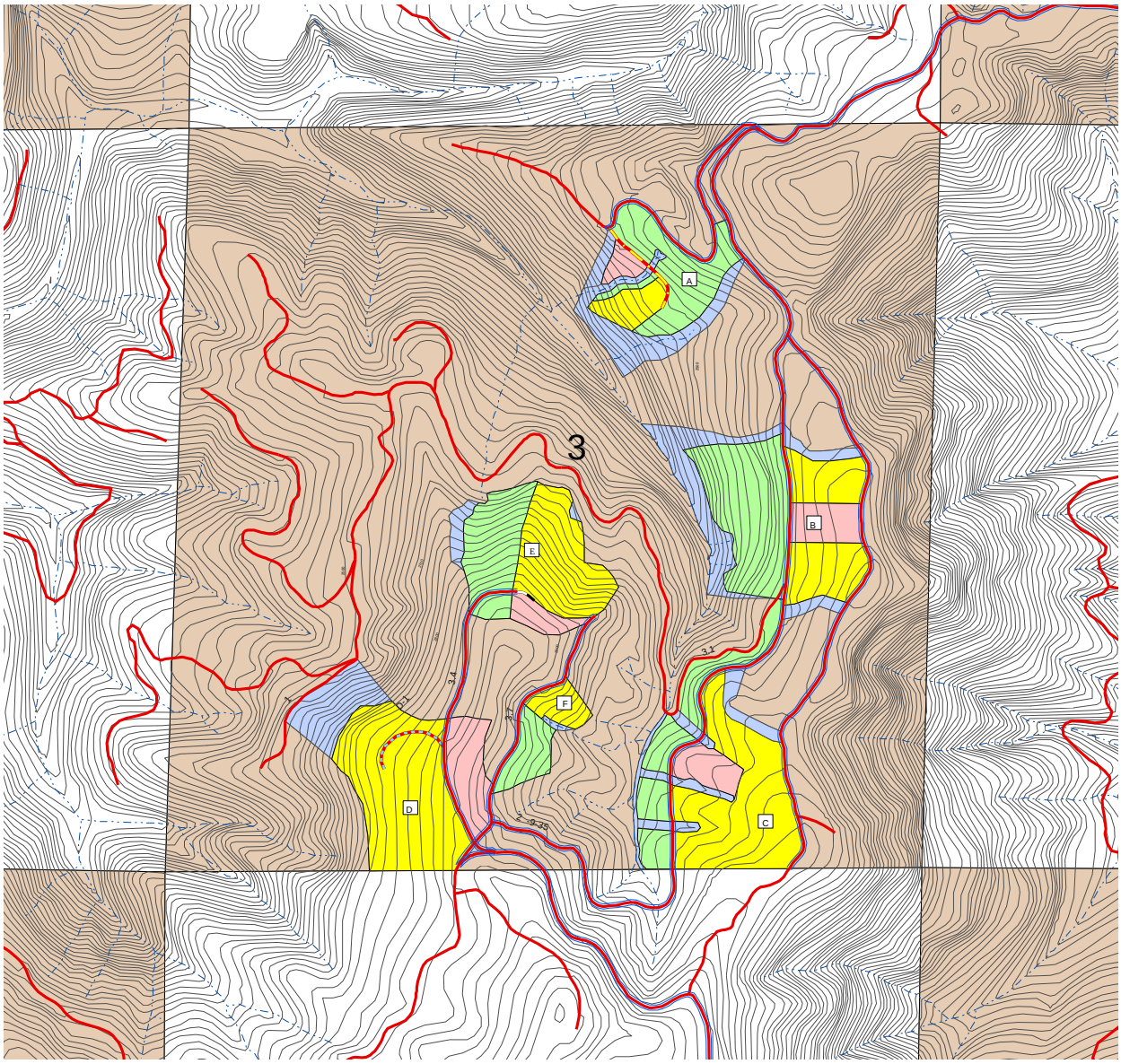
Harvest Area
BLM (O&C) Land
BLM (Coos Wagon Rd.) Land
Non-BLM Land

4-25-2006

'Late-Successional Reserve 261 Density Management' E.A.

BOGEY GAP

Density Management



N
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T29S, R9W

Willamette Meridian, Douglas Co., OR.

0 1,000 Feet

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of this data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Existing Road
Access/Haul Route
Renovate, Rock
Renovate, Decommission
Construct, Decommission
Optional Operator Spur, Decommission
Stream
100' Contour
20' Contour

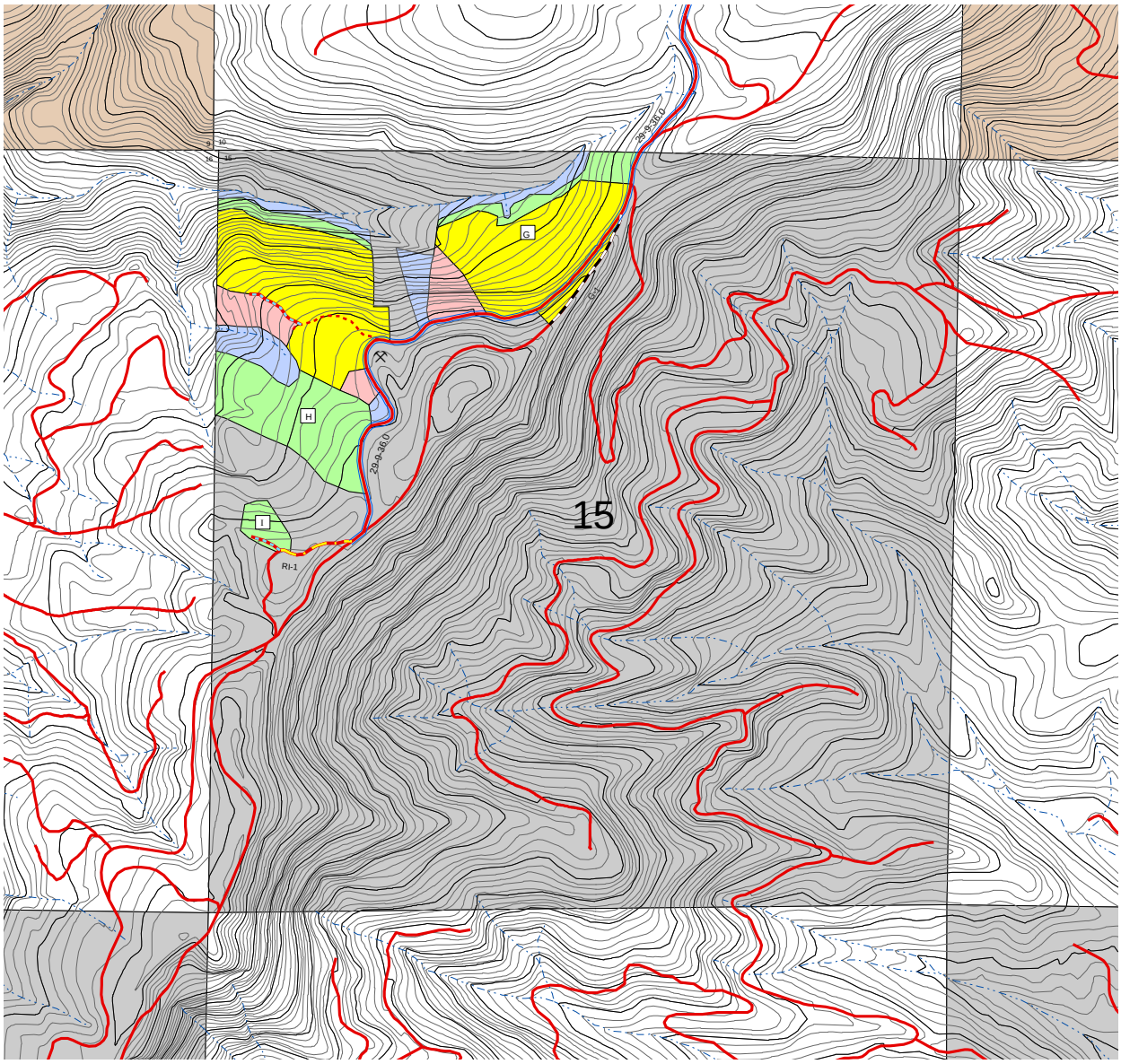
Heavy Thinning Area
Moderate Thinning Area
Light Thinning Area
No Treatment Area
BLM (O&C) Land
BLM (Coos Wagon Rd.) Land
Non-BLM Land

5-2-2006

'Late-Successional Reserve 261 Density Management' E.A.

BOGEY GAP

Density Management



N
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T29S, R9W

Willamette Meridian, Douglas Co., OR.

0 1,000 Feet

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- Existing Road
- Access/Haul Route
- Renovate, Rock
- Renovate, Decommission
- Construct, Decommission
- Optional Operator Spur, Decommission
- Stream
- 100' Contour
- 20' Contour

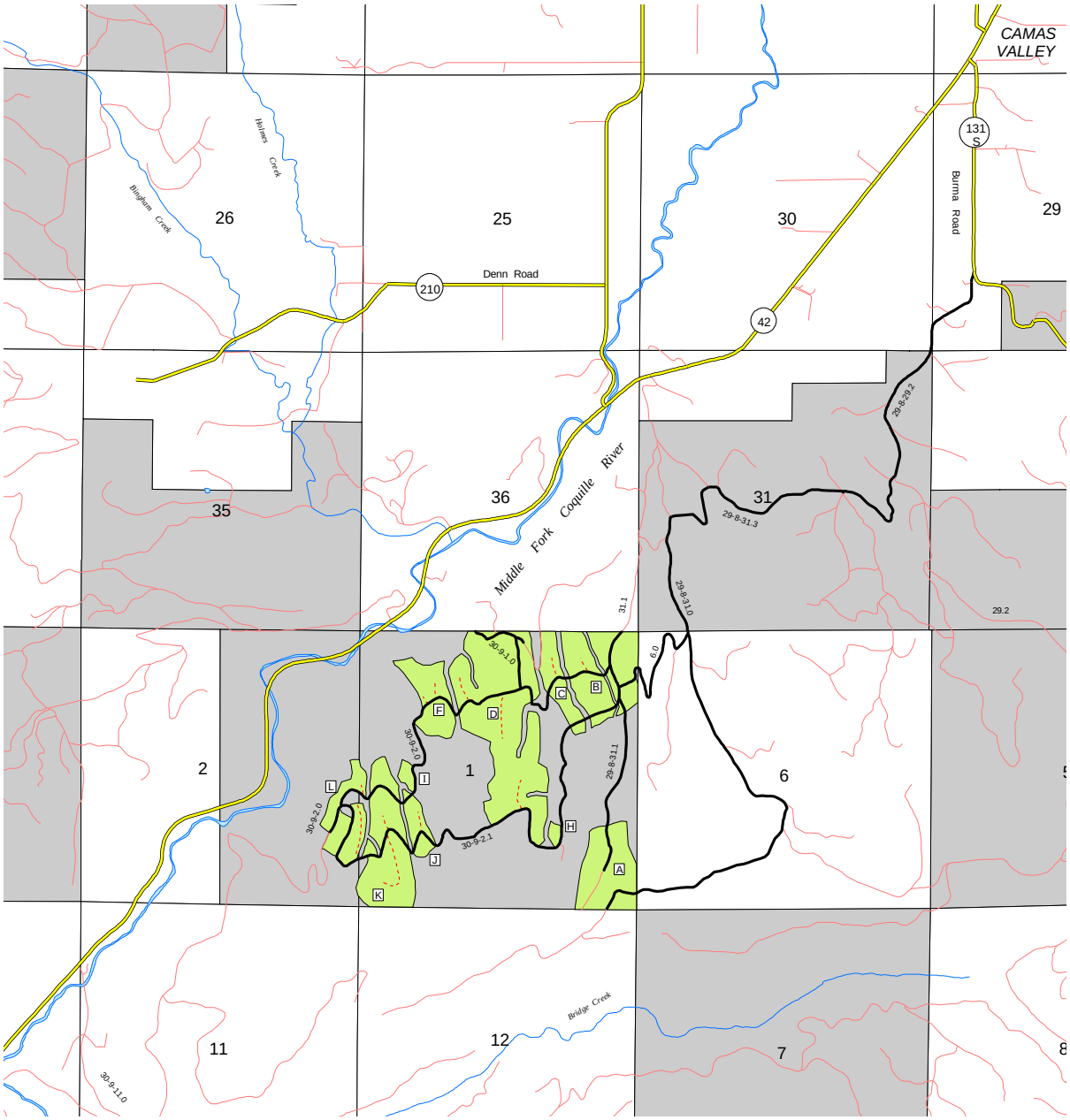
- Heavy Thinning Area
- Moderate Thinning Area
- Light Thinning Area
- No Treatment Area
- BLM (O&C) Land
- BLM (Coos Wagon Rd.) Land
- Non-BLM Land

5-2-2006

'Late-Successional Reserve 261 Density Management' EA

CAMAS HEIGHTS

Density Management



N
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T30S, R9W

Willamette Meridian, Douglas Co., OR

0 1 Miles

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Paved Highway
Haul/Access Route
Existing Road
Construct / Renovate Road

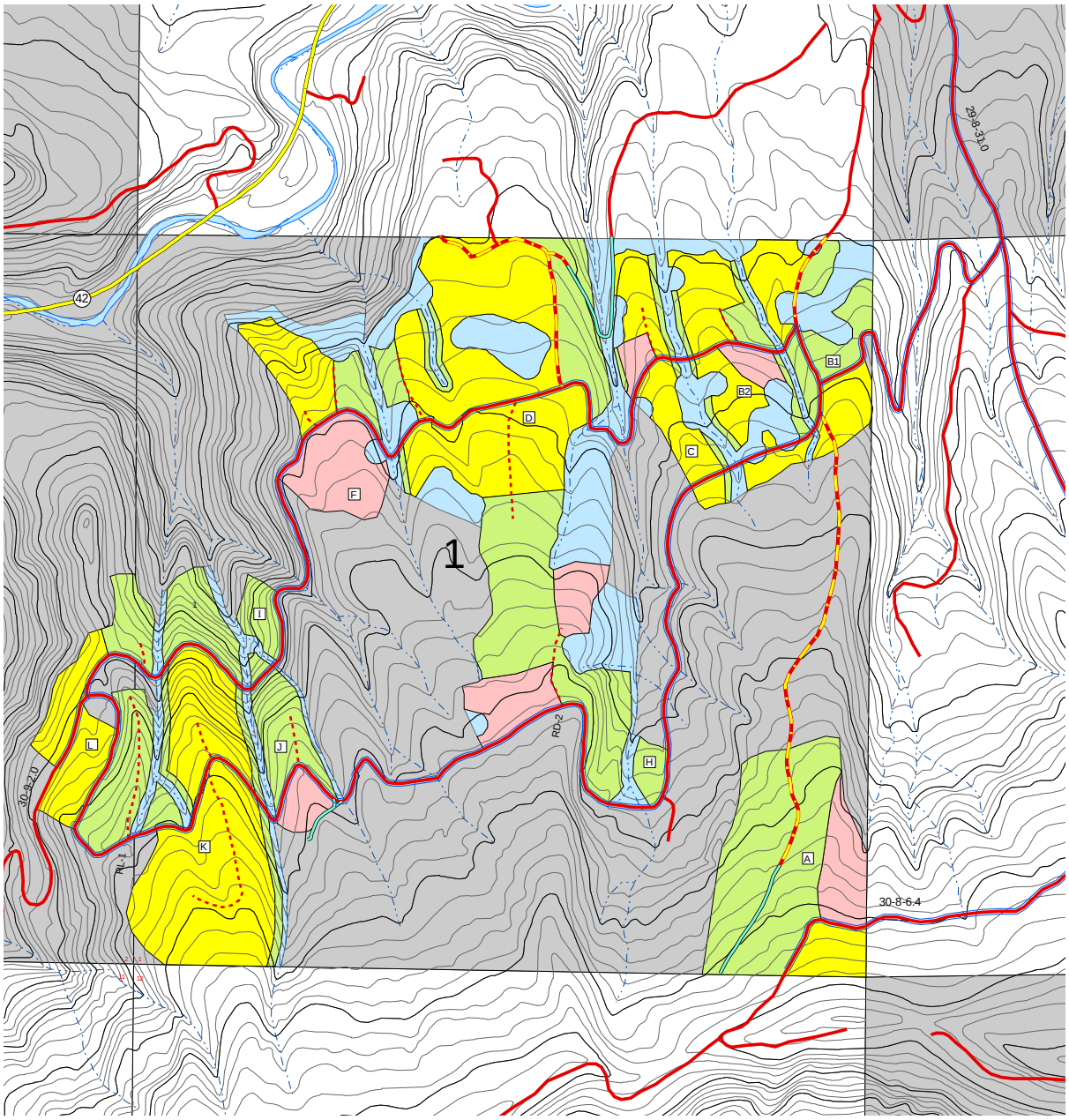
Thinning Area
BLM (O&C) Land
Non-BLM Land

5-18-2006

'Middle Fork Coquille Commercial Thinning 2001' EA

CAMAS HEIGHTS

Density Management



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T30S, R9W

Willamette Meridian, Douglas Co., OR

0 1,000 Feet

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of this data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

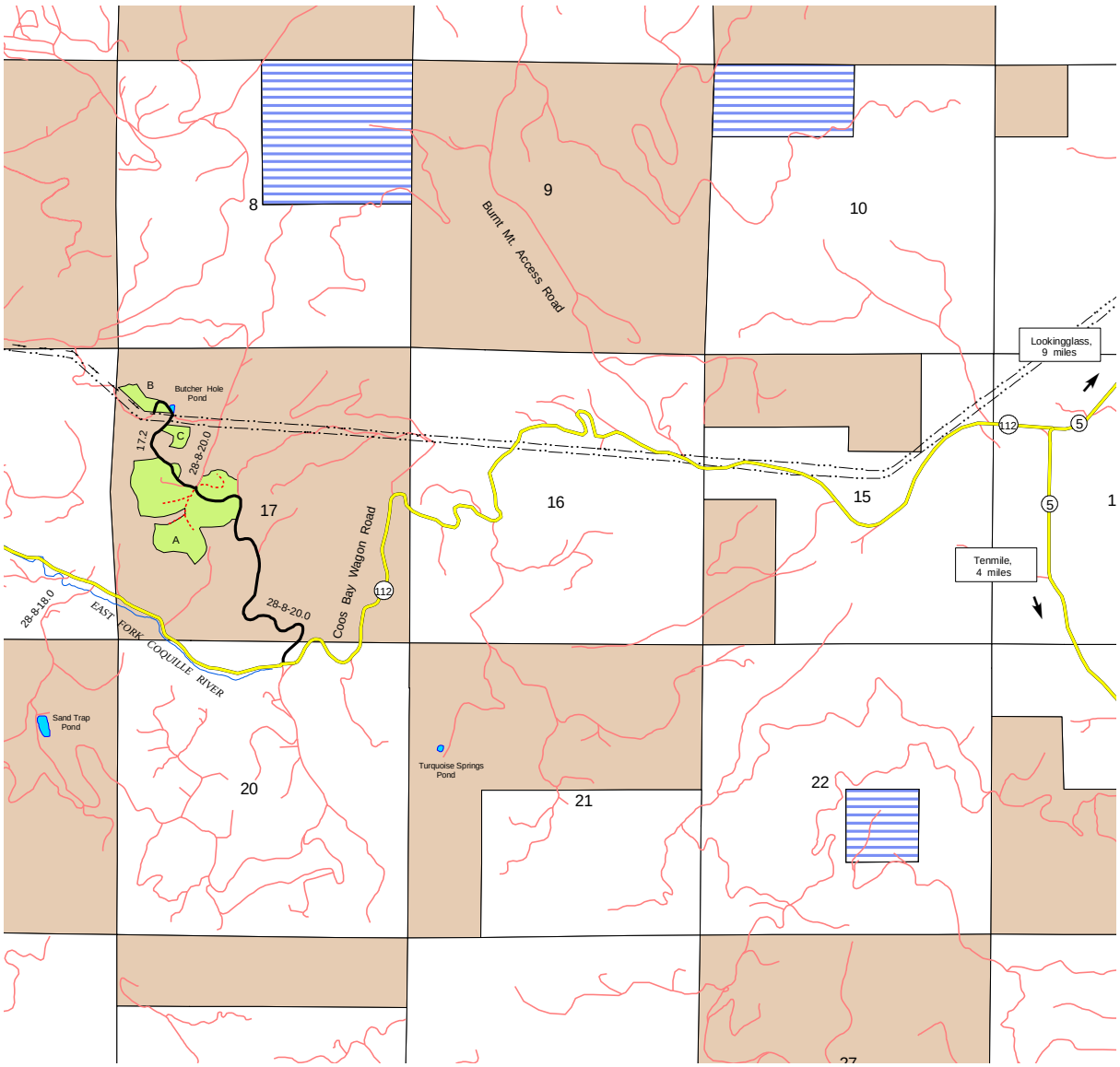
- Existing Road
- Access/Haul Route
- Renovate, Decommission
- Construct, Decommission
- No Use, Decommission
- 100' Contour
- 20' Contour
- Stream

- Heavy Thinning Area
- Moderate Thinning Area
- Light Thinning Area
- No Treatment Area
- BLM (O&C) Land
- Non-BLM Land

5-8-2006

POWER WAGON

Density Management



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T28S, R8W

Willamette Meridian, Douglas Co., OR.

0 1 Miles

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of this data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

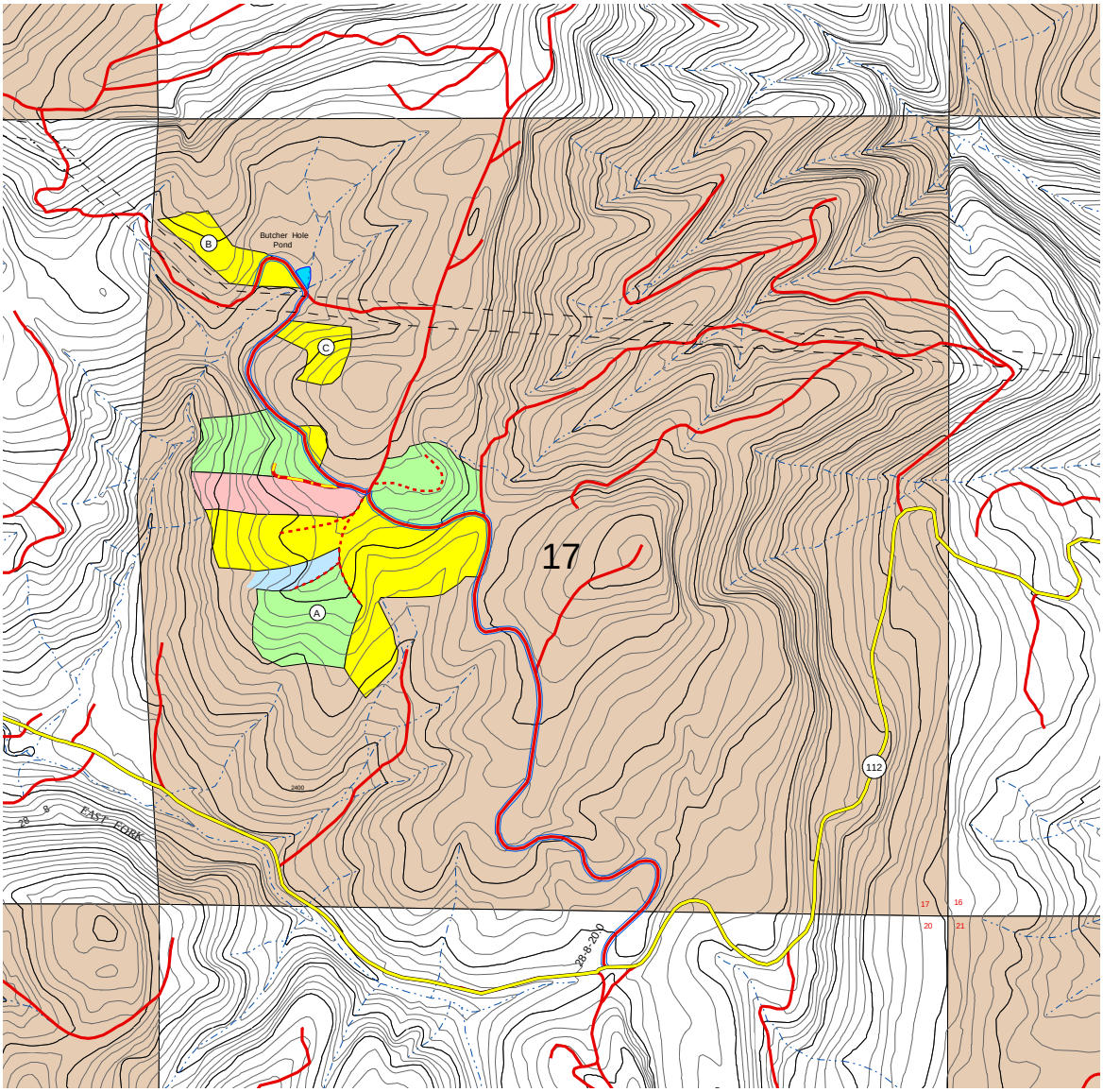
- Paved County Road
- Existing Road
- Access/Haul Route
- Spur to be Constructed
- Powerline Right-Of-Way
- Thinning Area
- BLM (Coos Bay Wagon Rd.) Land
- BLM (PD) Land
- Non-BLM Land

5-18-2006

'Late-Successional Reserve 261 Density Management' E.A.

POWER WAGON

Density Management



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T28S, R8W

Willamette Meridian, Douglas Co., OR.

0 1,000 Feet

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of this data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

- Paved County Road
- Existing Road
- Access/Haul Route
- Renovate, Decommission
- Construct, Decommission
- Stream
- 100' Contour
- 20' Contour
- Powerline Right-Of-Way

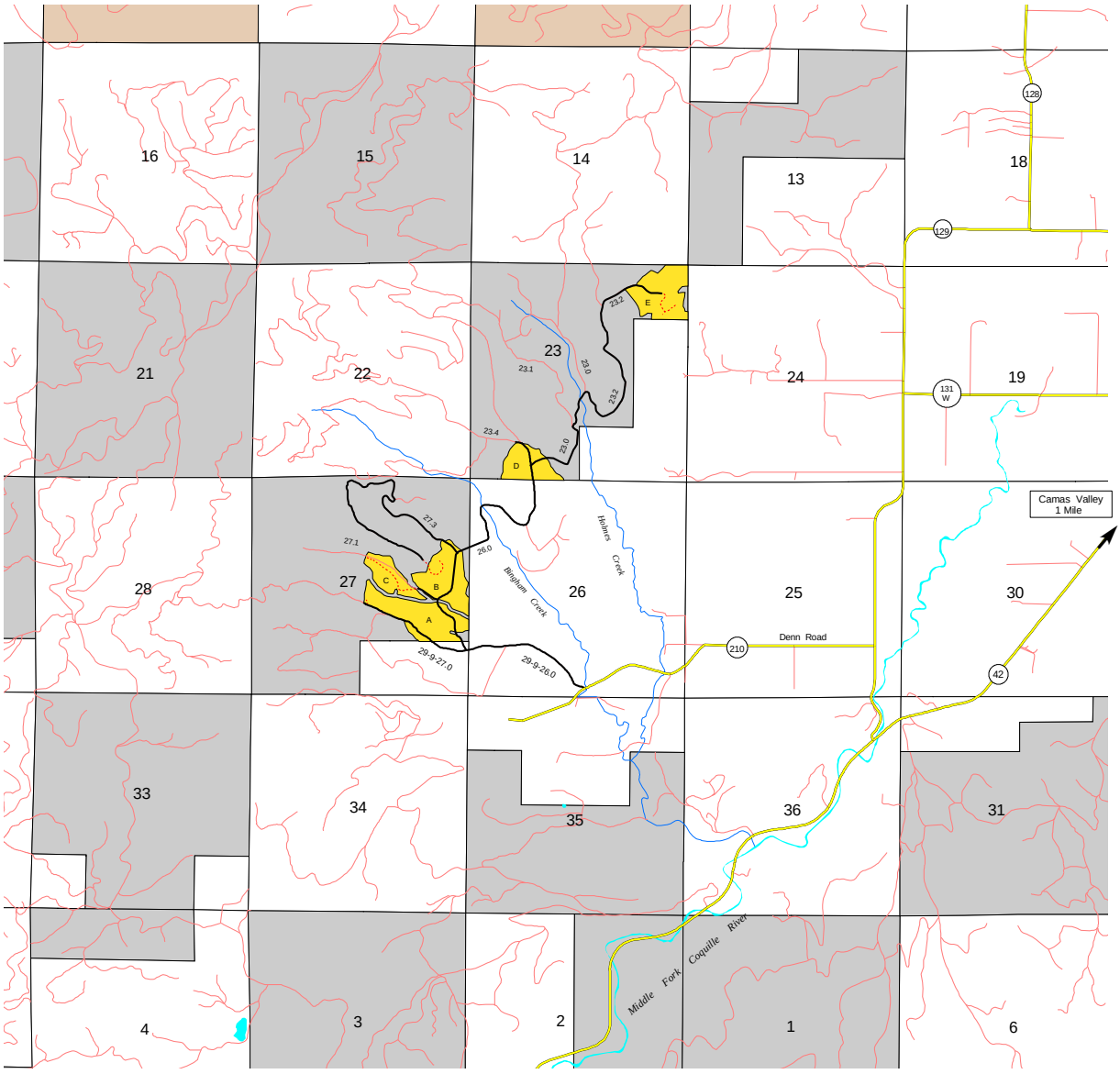
- Heavy Thinning Area
- Moderate Thinning Area
- Light Thinning Area
- No Treatment Area
- BLM (Coos Wagon Rd.) Land
- Non-BLM Land

1-10-2006

'Late-Successional Reserve 261 Density Management' EA

SHERLOCK'S DENN

Density Management



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T29S, R9W

Willamette Meridian, Douglas Co., OR

0 1 Miles

Paved Highway
Haul/Access Route
Existing Road
New Construction

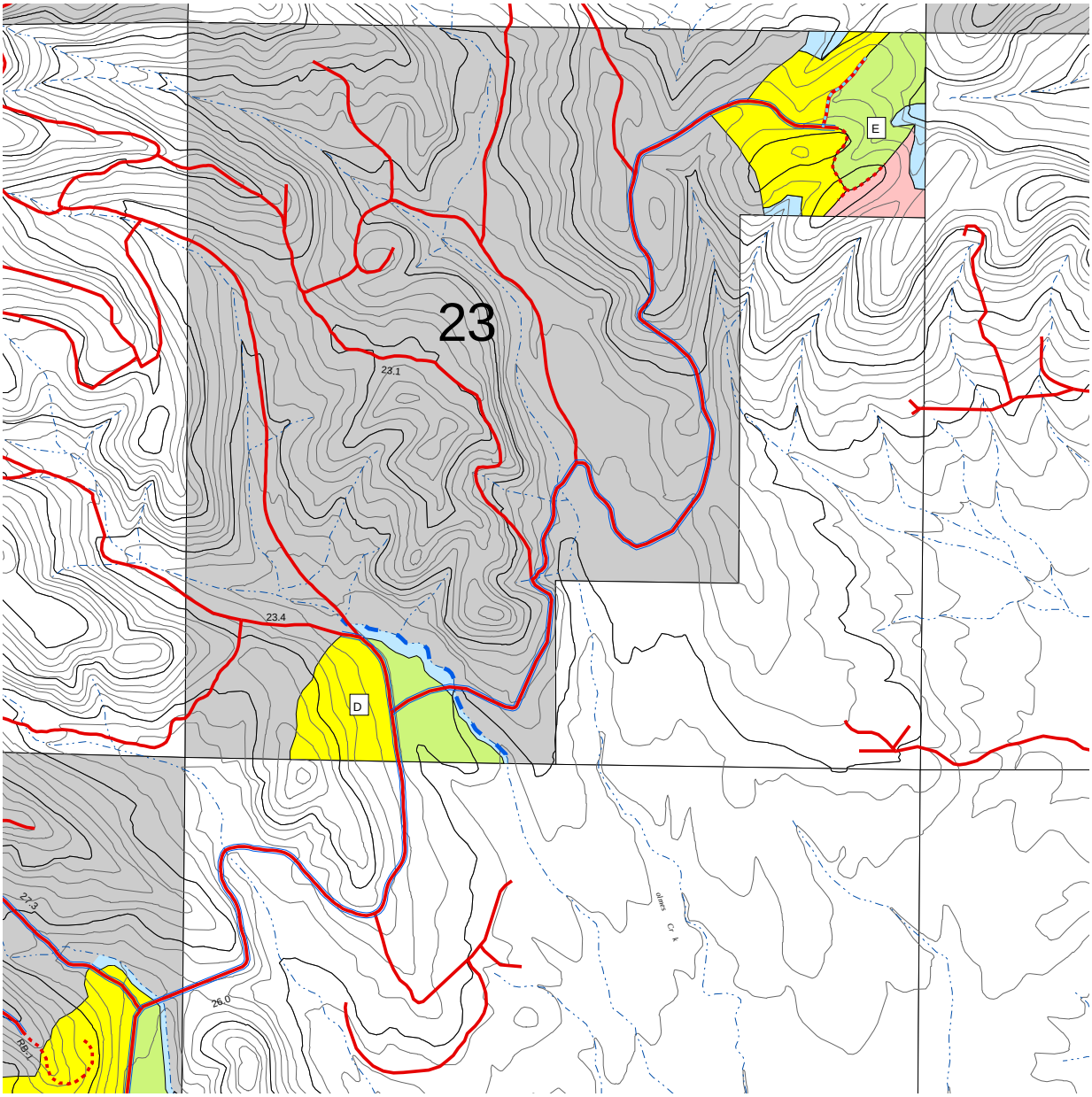
Thinning Area
BLM (Coss Wagon Road) Land
BLM (O&C) Land
Non-BLM Land

5-18-2006

'Late-Successional Reserve 261 Desinty Management' EA

SHERLOCK'S DENN

Density Management



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Willamette Meridian, Douglas Co., OR

0 1,000 Feet

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of this data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

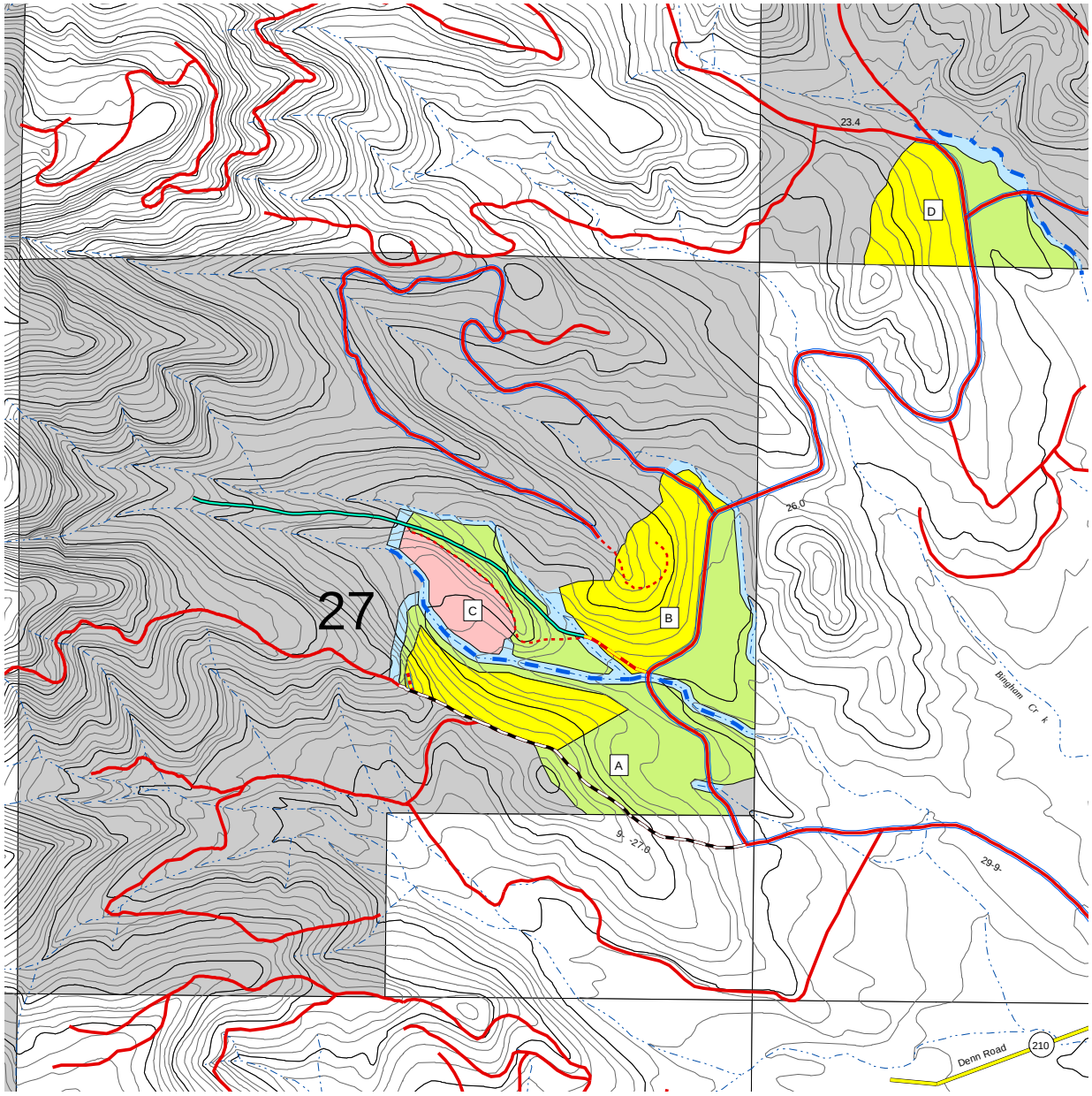
- Existing Road
- Access/Haul Route
- Construct, Decommission
- Construct Optional Operator Spur
- 100' Contour
- 20' Contour
- Stream
- Perennial/Fish-Bearing Stream
- Heavy Thinning Area
- Moderate Thinning Area
- Light Thinning Area
- No Treatment Area
- BLM (O&C) Land
- Non-BLM Land

5-8-2006

'Late-Successional Reserve 261 Desinty Management' EA

SHERLOCK'S DENN

Density Management



Existing Road
Access/Haul Route
Renovate, Rock
Renovate, Decommission
Construct, Decommission
Construct, Permanent Rock
No Use, Decommission
100' Contour
20' Contour
Stream
Perennial/Fish-Bearing Stream

Heavy Thinning Area
Moderate Thinning Area
Light Thinning Area
No Treatment Area
BLM (O&C) Land
Non-BLM Land

N
W E
S

0 1,000 Feet

T29S, R9W

Willamette Meridian, Douglas Co., OR

5-8-2006

Appendix B

Silviculture

Tables of General Unit, Road, and Vegetation Information

Table B-1. General Unit Information

Unit Designation	Unit Acres	Land Use Allocation	Yarding Method
BG-A	19	Late-Successional Reserve	Cable
BG-B	33	Late-Successional Reserve	Cable/Ground-Based
BG-C	31	Late-Successional Reserve	Cable/Ground-Based
BG-D	28	Late-Successional Reserve	Cable/Ground-Based
BG-E	21	Late-Successional Reserve	Cable
BG-F	7	Late-Successional Reserve	Cable
BG-G	27	Late-Successional Reserve	Cable
BG-H	47	Late-Successional Reserve	Cable/Ground-Based
BG-I	2	Late-Successional Reserve	Cable
CH-A	36	Late-Successional Reserve/General Forest Management Area	Cable/Ground-Based
CH-B	51	Late-Successional Reserve	Cable/Ground-Based
CH-C	21	Late-Successional Reserve	Cable/Ground-Based
CH-D	113	Late-Successional Reserve	Cable/Ground-Based
CH-F	23	Late-Successional Reserve	Cable/Ground-Based
CH-H	3	Late-Successional Reserve	Cable/Ground-Based
CH-I	4	General Forest Management Area	Cable
CH-J	13	General Forest Management Area	Cable/Ground-Based
CH-K	50	General Forest Management Area	Cable/Ground-Based
CH-L	26	General Forest Management Area	Cable
PW-A	62	Late-Successional Reserve	Cable/Ground-Based
PW-B	5	Late-Successional Reserve	Ground-Based
PW-C	3	Late-Successional Reserve	Ground-Based
SD-A	43	Late-Successional Reserve	Cable/Ground-Based
SD-B	36	Late-Successional Reserve	Cable/Ground-Based
SD-C	21	Late-Successional Reserve	Cable
SD-D	23	Late-Successional Reserve	Ground-Based
SD-E	37	Late-Successional Reserve	Cable/Ground-Based

Table B-2. Proposed Road Construction and Renovation

Unit	Action Proposed	Road Length	Disposition Following Completion of Thinning
BG-A	Renovate unnamed road	0.19 miles	Decommission after density management
BG-D	Construct temporary road	0.19 miles	Decommission after density management
BG-E	Extend 29-9-3.4 road	0.06 miles	Retain for future management access
BG-H	Construct temporary road	0.11 miles	Decommission after density management
	Renovate unnamed road	0.28 miles	Decommission after density management
BG-I	Renovate unnamed road	0.13 miles	Decommission by blocking after density management
CH-A	Renovate segment of 29-8-31.1 road	0.76 miles	Decommission after density management
CH-B	Renovate segment of 29-8-31.1 road	0.19 miles	Decommission after density management
	Construct temporary road	0.11 miles	Decommission after density management
CH-C	Construct temporary road	0.09 miles	Decommission after density management
CH-D	Renovate segment of 30-9-1.0 road	0.28 miles	Decommission by blocking after density management
	Construct temporary road	0.11 miles	Decommission after density management
	Construct temporary road	0.09 miles	Decommission after density management
CH-F	Construct temporary road	0.09 miles	Decommission after density management
	Construct temporary road	0.04 miles	Decommission after density management
	Construct temporary road	0.15 miles	Decommission after density management
CH-J	Construct temporary road	0.09 miles	Decommission by blocking after density management
CH-K	Construct temporary road	0.09 miles	Decommission by blocking after density management
	Construct temporary road	0.23 miles	Decommission after density management
CH-L	Construct temporary road	0.23 miles	Decommission after density management
	Construct temporary road	0.04 miles	Decommission after density management
PW-A	Construct temporary roads	0.57 miles	Decommission after density management
	Renovate unnamed road	0.15 miles	Decommission after density management
SD-A	Renovate segment of 29-9-27.0 road	0.57 miles	Retain for future management access
	Construct temporary road	0.02 miles	Decommission after density management
SD-B	Construct temporary road	0.23 miles	Decommission after density management
SD-C	Renovate segment of 29-9-27.1 road	0.19 miles	Decommission after density management
	Construct temporary road	0.47 miles	Decommission after density management
SD-E	Construct temporary roads	0.38 miles	Decommission after density management

Table B-3. Existing Stand Conditions

Unit	Stand Age	Trees per Acre	Basal Area	Quadratic Mean Diameter	Relative Density	Percent Crown Closure	Age at Culmination of Mean Annual Increment	Hardwoods per Acre
Bogey Gap								
A	43	218.9	182.8	12.4	0.581	100	123	24.7
B	45	195.9	227.5	14.6	0.678	100	85	0
C	45	197.3	208.2	13.9	0.632	100	120	0
D	45	285.6	272.9	13.2	0.845	100	80	0
E	37	218.3	224.4	13.7	0.685	100	92	0
G,H,I	46	172.5	238.5	15.9	0.686	100	106	0
Power Wagon								
A,B,C	55	187.7	218.8	14.6	0.651	100	125	0.4
Camas Heights								
A	57	327.2	295.4	12.9	0.925	100	82	13.7
B,C	51	192	224.2	14.6	0.667	100	101	5.2
D	57	261.2	232.4	12.8	0.73	100	102	11
F	56	157.6	257.7	17.3	0.717	100	111	8.7
I,J,K,L	48	225.9	230.9	13.7	0.705	100	98	14.4
Sherlock's Denn								
A,B,C	50	197.3	190.1	13.3	0.587	100	100	0
D	49	203.6	212.2	13.8	0.646	100	99	0
E	44	214.4	203.9	13.2	0.632	100	94	0

Table B-4. Stand Conditions at 150 Years Old with No Treatment.

Unit	Stand Age	Trees per Acre	Basal Area	Quadratic Mean Diameter	Relative Density	Percent Crown Closure	Hardwoods per Acre
Bogey Gap							
A	148	108.9	426.9	26.8	1	100	0
B	150	91	335.3	26	0.795	100	0
C	150	105.4	430.3	27.4	1	100	0
D	150	97.2	328.5	24.9	0.792	100	0
E	152	85.4	452.7	31.2	0.999	100	0
G,H,I	151	86.9	451.3	30.9	1	100	0
Power Wagon							
A,B,C	150	115.8	420.5	25.8	1	100	0
Camas Heights							
A	152	141.2	400.5	22.8	1	100	6.9
B,C	151	101	434.9	28.1	1	100	0
D	152	132.7	406.6	23.7	1	100	3.1
F	151	90.1	447.3	30.2	1	100	0
I,J,K,L	148	100.9	416.3	27.5	0.965	100	10.9
Sherlock's Denn							
A,B,C	150	103.1	334.2	24.4	0.813	100	0
D	149	102.1	370.6	25.8	0.881	100	0
E	149	90.7	317.9	25.3	0.761	100	0

Stand Conditions Following Thinning

B-5. Stand Conditions Following Light Thinning.

Unit	Stand Age	Trees per Acre	Basal Area	Quadratic Mean Diameter	Relative Density	Percent Crown Closure
Bogey Gap						
A	43	86.4	120	16	0.345	84.9
B	45	86.2	130	16.6	0.368	75
C	45	85.1	130	16.7	0.367	102.2
D	45	85.1	120	16.1	0.344	71.2
E	37	85.7	130	16.7	0.367	81.6
F	41	84.1	100	14.8	0.296	72.8
G,H,I	46	82.2	170	19.5	0.452	107.9
Power Wagon						
A,B,C	55	81.4	140	17.8	0.386	102.5
Camas Heights						
A	57	90.8	150	17.4	0.35	73.7
B,C	51	84.5	140	17.4	0.389	84.2
D	57	91.1	140	16.8	0.395	81.6
F	56	85.6	190	20.2	0.498	94.1
I,J,K,L	48	89.6	140	16.9	0.393	80.3
Sherlock's Denn						
A,B,C	50	81.6	120	16.4	0.341	67.4
D	49	81.1	140	17.8	0.386	72.1
E	44	78.6	120	16.7	0.339	65.5

B-6. Stand Conditions Following Medium Thinning.

Unit	Stand Age	Trees per Acre	Basal Area	Quadratic Mean Diameter	Relative Density	Percent Crown Closure
Bogey Gap						
A	43	66.3	100	16.6	0.283	67.9
B	45	69.8	110	17	0.308	61.9
C	45	66.9	110	17.4	0.306	85.8
D	45	67.9	100	16.4	0.284	58.9
E	37	69.1	110	17.1	0.308	67.2
F	41	72.7	90	15.1	0.265	63.5
G,H,I	46	67.7	150	20.2	0.393	94.1
Power Wagon						
ABC	55	65.6	120	18.3	0.327	87.8
Camas Heights						
A	57	71.8	130	18.2	0.298	61.9
B,C	51	67.7	120	18	0.329	70.9
D	57	72.3	120	17.4	0.333	68
F	56	65	160	21.3	0.411	77.8
I,J,K,L	48	72.4	120	17.4	0.333	67.9
Sherlock's Denn						
A,B,C	50	71.1	110	16.8	0.31	61.1
D	49	72.8	130	18.1	0.356	66.5
E	44	69	110	17.1	0.308	59.2

B-7. Stand Conditions Following Heavy Thinning.

Unit	Stand Age	Trees per Acre	Basal Area	Quadratic Mean Diameter	Relative Density	Percent Crown Closure
Bogey Gap						
A	43	41.8	70	17.5	0.194	45
B	45	47.6	80	17.6	0.222	43.1
C	45	43.1	80	18.4	0.217	62.8
D	45	43.7	70	17.1	0.196	39.1
E	37	47.4	80	17.6	0.221	48.1
F	41	44.1	60	15.8	0.173	42
G,H,I	46	43.4	110	21.6	0.281	65.7
Power Wagon						
A,B,C	55	44.8	90	19.2	0.241	65.3
Camas Heights						
A	57	47.7	100	19.6	0.222	45.3
B,C	51	46.3	90	18.9	0.242	51.7
D	57	47.1	90	18.7	0.243	48.2
F	56	43.3	120	22.5	0.301	56.3
I,J,K,L	48	48.5	90	18.3	0.245	49.8
Sherlock's Denn						
A,B,C	50	45.5	80	17.9	0.222	42.4
D	N/A	N/A	N/A	N/A	N/A	N/A
E	44	43.7	80	18.3	0.218	41

Table B-8. Summary of Coarse Woody Debris Survey Results.

Unit	Decay Class 1 and 2 (cubic feet per acre)	Decay Class 3, 4, and 5 (cubic feet per acre)	Total (cubic feet per acre)
Bogey Gap			
A	26	1,348	1,374
B	37	1,538	1,575
C	0	1,449	1,449
D	9	3,298	3,307
E	0	527	527
G,H,I	53	2,648	2,701
Power Wagon			
A,B,C	0	4,542	4,542
Camas Heights			
A	N/A	N/A	N/A
B,C,D,F	32	3,302	3,334
I,J,K,L	153	3,706	3,859
Sherlock's Denn			
A,B,C	12	2,067	2,079
D	6	2,290	2,296
E	6	3,677	3,683

LSR 261 Density Management Environmental Assessment
Port-Orford-Cedar Risk Key

Background

Port-Orford-cedar (POC) can be infected by an introduced pathogen (*Phytophthora lateralis*) that causes a root disease. Mycelia of *P. lateralis* grow in the cambial tissues of the roots of Port-Orford-cedar, and may eventually colonize the entire root system of the infected tree. Uptake of water and nutrients is blocked, resulting in tree death. Mature trees may succumb to the disease within two to four years after exposure and seedlings within a few weeks.

Phytophthora lateralis is highly adapted for spread in water and soil, and is capable of surviving in a state of dormancy. Chlamydospores may survive in infected root systems for seven years or more following the death of the host tree (Hansen and Hamm 1996). The disease is spread by the transportation of infected soil and overland flow of water, primarily in the fall, winter, and spring when the cool, moist conditions are most favorable for the pathogen. Vehicular traffic, particularly the use of unsurfaced roads in wet weather, and activities related to road construction, road maintenance, and logging can spread the disease by transporting infected soil into disease-free areas. The disease may also be spread by game animals and people, by transporting infected soil on hooves and feet.

High risk areas include stream courses, drainages, and low-lying areas down slope from infected areas, or below roads and trails where inoculum may be introduced. There is no definitive distance along roads or streams considered to be at high risk, however, Port-Orford-cedar are not usually infected at a distance greater than 40 feet down slope from roads except where streams, culverts, and wet areas are present to facilitate spore dispersal (Goheen, et al. 1986). Upslope spread of the disease depends on slope steepness and the location of Port-Orford-cedar in relation to roads, ditchlines, or streams.

Management Direction

The *Final Supplemental Environmental Impact Statement for Management of Port-Orford-Cedar in Southwest Oregon* (FSEIS) was published in January 2004. The *Record of Decision and Resource Management Plan Amendment for Management of Port-Orford-Cedar in Southwest Oregon, Coos Bay, Medford, and Roseburg Districts* (POC ROD) was signed in May 2004.

The management of Port-Orford-cedar in the proposed density management would be consistent with the direction of the POC ROD. The FSEIS describes the mid and long-term effects and cumulative effects of the disease at the range-wide scale. Site specific analysis at the project level is analyzed with this Risk Key.

Proposed Action

The proposed density management would thin approximately 663 acres of mid-seral forest stands. The proposed action would be divided into four timber sale areas that are within three fifth field watersheds. The acres of treatment within each watershed are as follows:

Middle Fork Coquille River Watershed

Bogey Gap	185 acres
Sherlock's Denn	143 acres
Camas Heights	276 acres
Total	604 acres

East Fork Coquille River Watershed

Power Wagon	54 acres

Olalla Creek/Lookingglass Creek Watershed

Power Wagon	5 acres

Port-Orford-cedar Root Disease in the Watersheds

Over 90 percent of the project area is located within the Middle Fork Coquille River Watershed Analysis Unit. This watershed analysis unit consists of 67,207 acres of which the BLM manages 25,960 acres, or 39 percent of the total area. Port-Orford-cedar occurs as individual or scattered groups of trees rather than as continuous stands, and is present on an estimated 6,163 acres or 24 percent of the BLM managed lands. Based on aerial photo interpretation, an estimated 163 acres across all owners are infested with the disease within this watershed. On BLM-managed lands in the watershed, an estimated 79 acres are infected, representing slightly more than one percent of the area in which Port-Orford-cedar is present. In contrast, the Port-Orford-cedar Range-wide Assessment estimates that the infection is present in 8 percent of the entire range of Port-Orford-cedar.

The East Fork Coquille River Watershed consists of 85,785 acres. The BLM manages 45,448 acres, (53 percent) of the watershed. This watershed is at the northern extent of the range of POC. Port-Orford-cedar is a minor component of stands in the watershed. It exists primarily as intermediate to overtopped trees in the overstory and as seedlings in the understory. On the basis of trees per acre, it makes up less than five percent of the stand. Approximately 116 acres were determined, by aerial photo interpretation, to be infected with the disease within this watershed. Approximately 51 acres on BLM-managed lands in the watershed are infected.

The Olalla Creek/Lookingglass Creek Watershed consists of 103,109 acres. The BLM manages 27,390 acres, or 27 percent of the watershed. This watershed is near the eastern limit of the range for POC and as a result, there is very little Port-Orford-cedar in the watershed. It occurs as individual or scattered groups of trees rather than as continuous stands, and is present on about 305 acres (one percent) of the BLM managed lands. The disease is not known to exist in the watershed.

The Camas Valley (Middle Fork Coquille River Watershed) and Upper Tenmile (Olalla Creek/Lookingglass Creek Watershed) seventh-field watersheds are uninfected but they do not meet the criteria for uninfected watersheds defined in the POC ROD because there are either less than 100 acres of POC in the seventh-field watersheds or the BLM manages less than 50 percent of the fifth field watershed.

Infected areas were identified using 1994 aerial photographs and verified on the ground. Spread of the disease was assessed by identifying infected areas on the 1997 Coos Bay District and 1999 Roseburg District aerial photographs and comparing those infected areas with the 1994 assessment of diseased areas. The analysis of these surveys indicated the rate of spread is about eight acres annually. It is anticipated this rate of spread would remain relatively constant.

POC in Relation to Proposed Units

Because this project is on the edge of the range for POC, the distribution of both POC and the disease is scattered. (See the attached maps for locations of POC and the disease mapped from the 99 photos.) The mapping shows the general locations of disease, but there are individual infected trees within the units that do not show. There are also units that do not contain any POC.

The POC ranges in size from seedling to large diameter trees. Uninfected and infected POC are often associated together, both within and outside of the units. Trees in this vicinity that have been dead for several years provide evidence that the disease has been for some time.

Port-Orford-cedar in the vicinity of the proposed units have been sampled and tested for resistance to the disease. Trees that exhibit some resistance have been found near the Sherlock's Denn units.

Power Wagon

Unit A contains scattered small POC. Two small trees were found dead near the ridgetop in the unit, away from any road or stream or obvious source of infection. It is unknown if this mortality was caused by *P. lateralis*. Port-Orford-cedar was not found in Units B or C. There is no POC along the haul route, which includes a paved county road within one-half mile of the units.

As mentioned previously, the POC in the Upper Tenmile seventh-field watershed is uninfected. The area with POC in the seventh field watershed is located near the ridge separating it from the East Fork Coquille River Watershed. Even if the POC was to become infected, there are no other POC at lower elevations in the watershed that the infection could spread to.

Sherlock's Denn

Units A and C contain POC in the upland areas (where the risk of infection is lower) and riparian areas in similar concentrations. The POC ranges in size from saplings to large diameter trees. There are a few residual POC larger than 20 inches in diameter. There is diseased POC in the main draw immediately upstream from these two units and along the road to the top of Unit C. Unit B contains healthy POC east of the road. The haul road from the top of Unit B goes through diseased areas. Unit D contains healthy POC in the north half. No POC has been observed in Unit E or along the haul route from Unit E to Unit D.

Bogey Gap

Port-Orford-cedar is scattered through these units and is found on low risk sites away from roads and streams, as well as, in the higher risk riparian areas. Generally the POC in the units is

seedling to sapling size. There is scattered disease along all roads, except the road at the top of units B and C even though POC was present. The main roads are rocked or paved.

Camas Heights

Port-Orford-cedar has not been observed in Units A, I, J, K, or L. Units B and C contain scattered POC that is both diseased and healthy. The roads in the vicinity also have scattered diseased and healthy POC along them.

Port-Orford-Cedar Risk Key

The Port-Orford-cedar risk key provides the site-specific analysis that helps determine where management practices would be applied. The activity areas considered for the risk key are the proposed units and probable haul routes.

1a. Are there uninfected POC within, near, or downstream of the activity area whose ecological, Tribal, product use, or function measurably contributes to meeting land and resource management plan objectives?

> No. Although there are uninfected POC within, near, and downstream of most of the units, the disease is also in many areas downstream. Port-Orford-cedar is a minor stand component in the proposed units. The existing POC does not measurably contribute to RMP objectives and mortality would not have an adverse effect on meeting those objectives. The forested stands are predominantly composed of Douglas-fir along with minor components of western hemlock, grand fir, western redcedar, and incense-cedar that could replace the function of the POC if it were lost to disease.

1b. Are there uninfected POC within, near, or downstream of the activity area that, were they to become infected, would likely spread infections to trees whose ecological, Tribal, product use, or function measurably contributes to meeting land and resource management plan objectives?

> No. As stated above, POC is a minor stand component and if the uninfected POC were to become infected, they would not spread the disease to areas that measurably contribute to meeting land and RMP objectives. In some areas there is no other POC downstream from BLM managed lands. Where there is POC downstream, there is already infection. Uninfected and infected POC are associated together wherever the species is found, both within and outside the proposed units.

1c. Is the activity area within an uninfected seventh-field watershed as defined in Attachment 1 of the ROD for the Management of Port-Orford-Cedar in Southwest Oregon, Coos Bay, Medford, and Roseburg Districts?

> No. There are no uninfected seventh-field watersheds on the Roseburg District as defined by the ROD.

The answer to all three questions is no. Risk is low and no POC management practices are required. However, the following management practices that minimize spread of the disease would be implemented.

Management Practices
Since roads are primary vectors by which *P. lateralis is* spread, the many of the following practices are concerned with the management of roads and would minimize the likelihood of transporting infected soil.

• Road construction, renovation, and decommissioning would be restricted to the dry season, when the risk of spreading spores is least likely.

• Ground based yarding and any yarding from temporary roads would occur in the dry season outside of the bark slip period.

• Approximately 0.1 miles of permanent roads would be constructed and surfaced with rock.

• Approximately 3.0 miles of temporary roads would be constructed, used, and decommissioned or blocked in the same dry season to eliminate vehicular use during wet weather, when the risk of transporting spore infected soil is the greatest.

• Approximately 2.1 miles of existing road would be renovated, used, and decommissioned or blocked in the same dry season to eliminate vehicular use during wet weather, when the risk of transporting spore infected soil is greatest.

• Approximately 0.8 miles of road that are not used for hauling would be decommissioned in the dry season to eliminate future use during the wet season.

• All logging and road construction equipment, except log trucks which are restricted to roads, would be steam cleaned or pressure washed prior to being moved into the contract area or prior to return if moved off-site during the life of the contract. Cleaning would reduce the probability of spread (Goheen, et al. 2000).

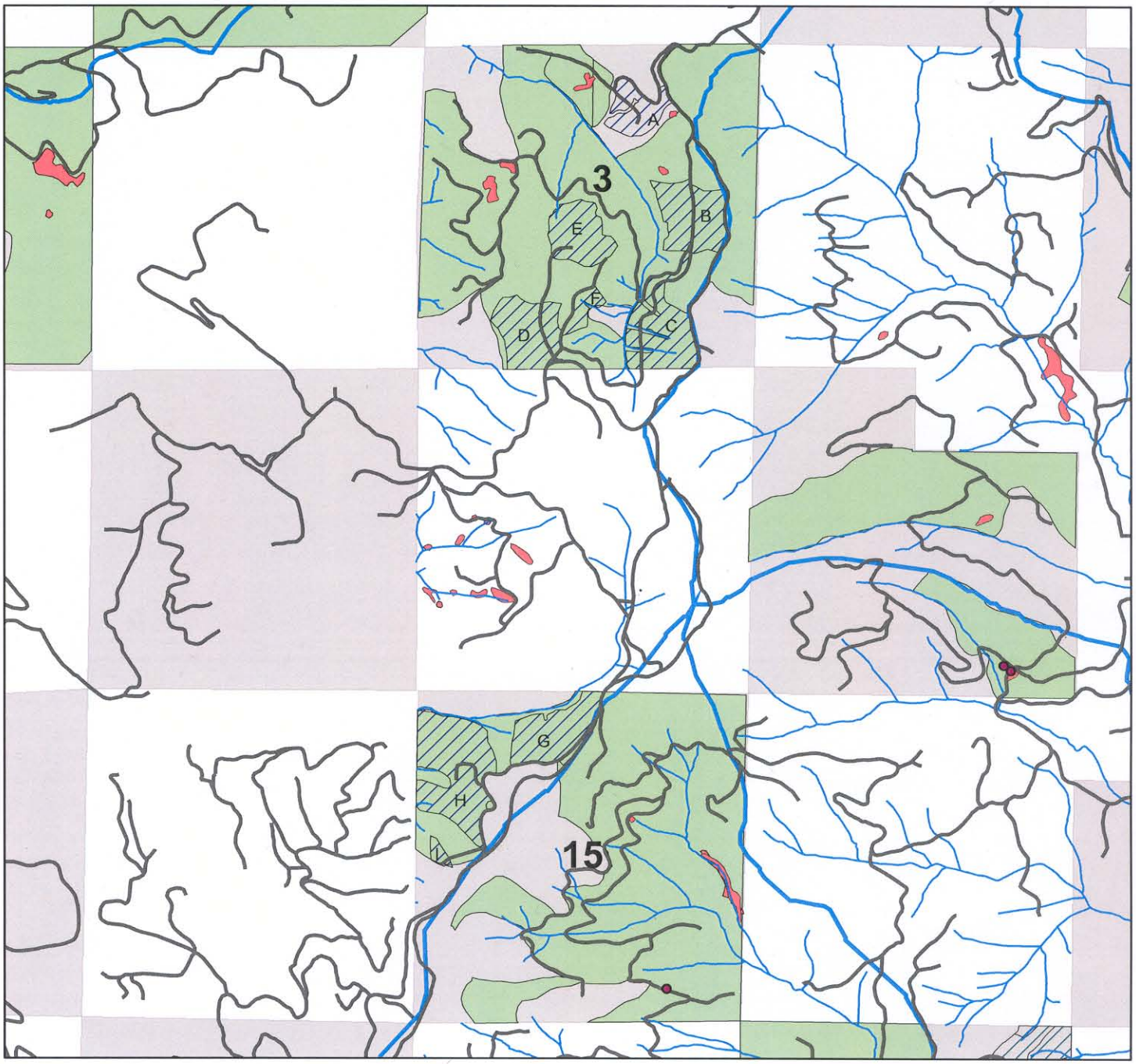
• Water taken from sources in the project areas for use in road construction, road grading, or dust abatement would be treated with a solution containing bleach, to kill any *P. lateralis* spores that might be present.

• All merchantable Port-Orford-cedar trees within 20 feet on the uphill side and 50 feet on the downhill side of roads bordering or passing through units would be cut under the sale contract to remove potential host trees that could become infected and spread the disease.

Since there is already infection present within the units, alongside the haul routes, and downstream, the units could be logged in any sequence. There is no risk of transporting the disease from an infected to an uninfected area.

No measurable increase in the rate of spread of the root disease would be anticipated because the project design features and controls previously described and the scattered occurrence of Port-Orford-cedar within the proposed units would limit the spread of the disease. Since the disease is already present in the project area, management actions would serve to minimize and may reduce the rate of spread of the disease.

LSR 261 DM - Bogey Gap
Port-Orford-cedar



T 29 S, R 9 W, Secs. 3 & 15

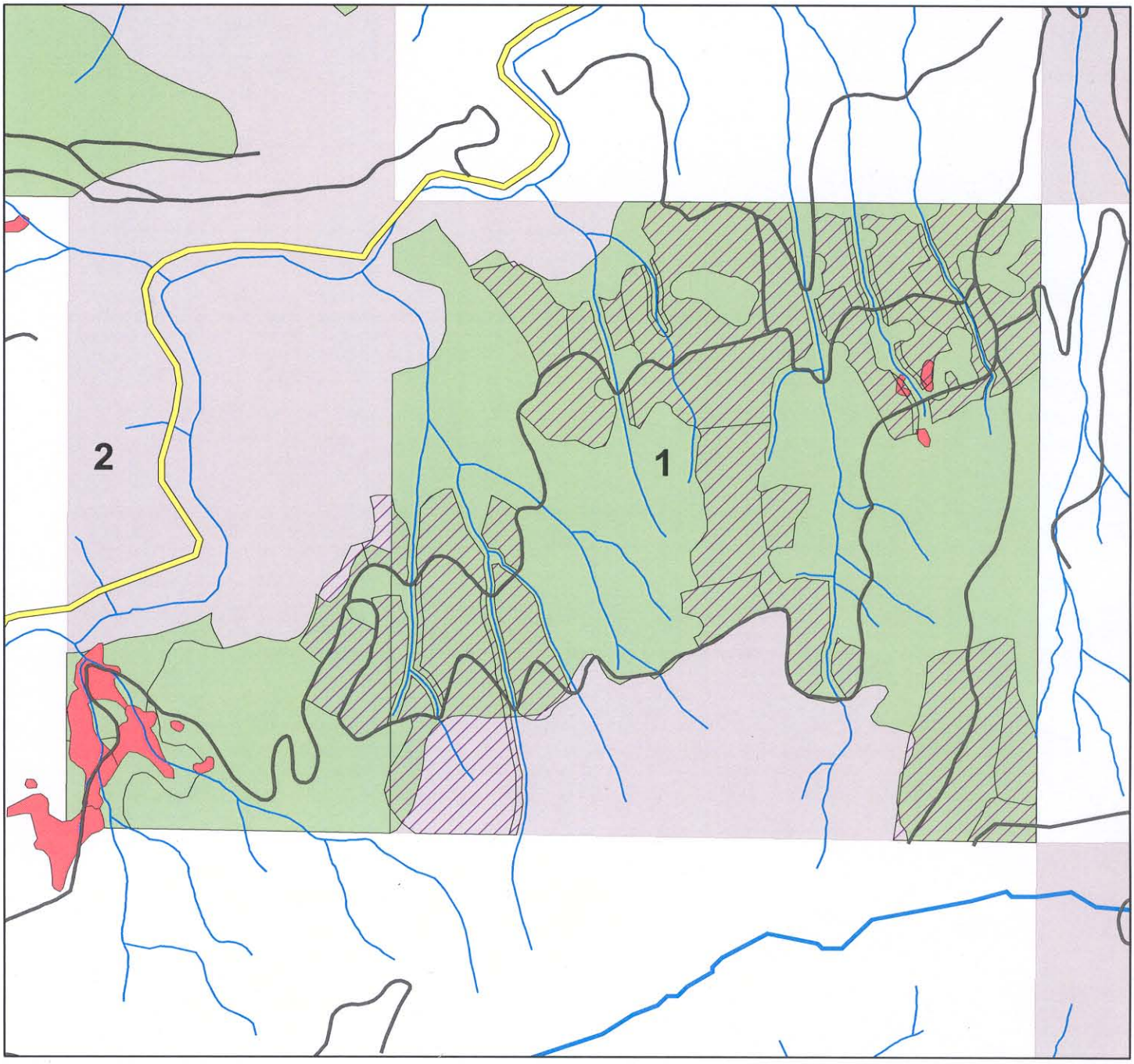
N
W E
S

0 0.3 0.6 1.2 Miles

Legend

- BLM Managed Lands
- POC Infection
  - N
  - Y
  - Bogey Gap
- Roads
- Streams
- POC Winners
- Watershed Boundary

LSR 261 DM - Camas Heights
Port-Orford-cedar



T 30 S, R 9 W, Secs. 1 & 2

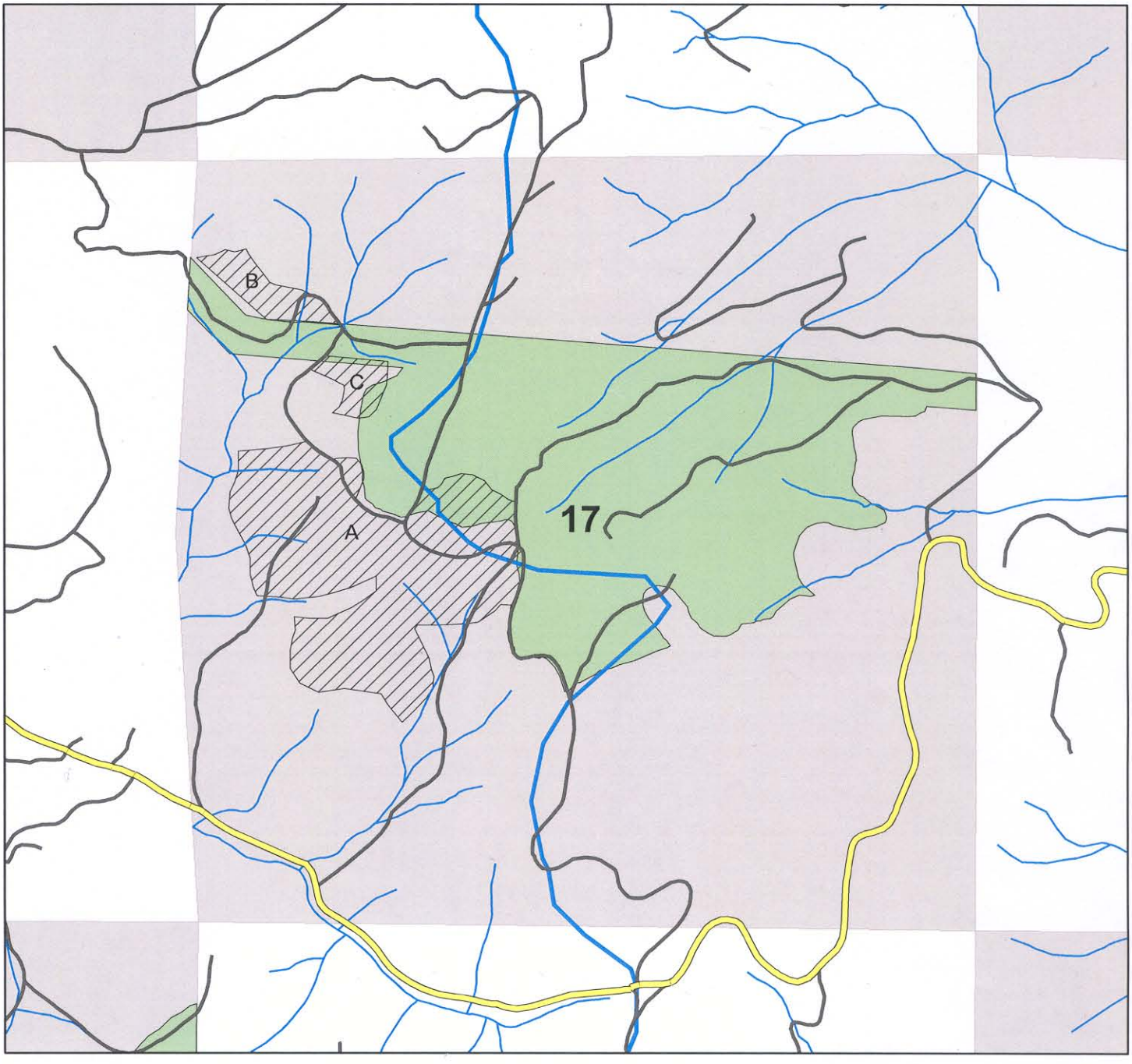
N
W E
S

0 0.15 0.3 0.6 Miles

Legend

- BLM Managed Lands
- POC Infection
  - N
  - Y
  - Camas Heights
- Roads
- Streams
- POC Winners
- Watershed Boundary

LSR 261 DM - Power Wagon
Port-Orford-cedar



T 28 S, R 8 W, Sec. 17

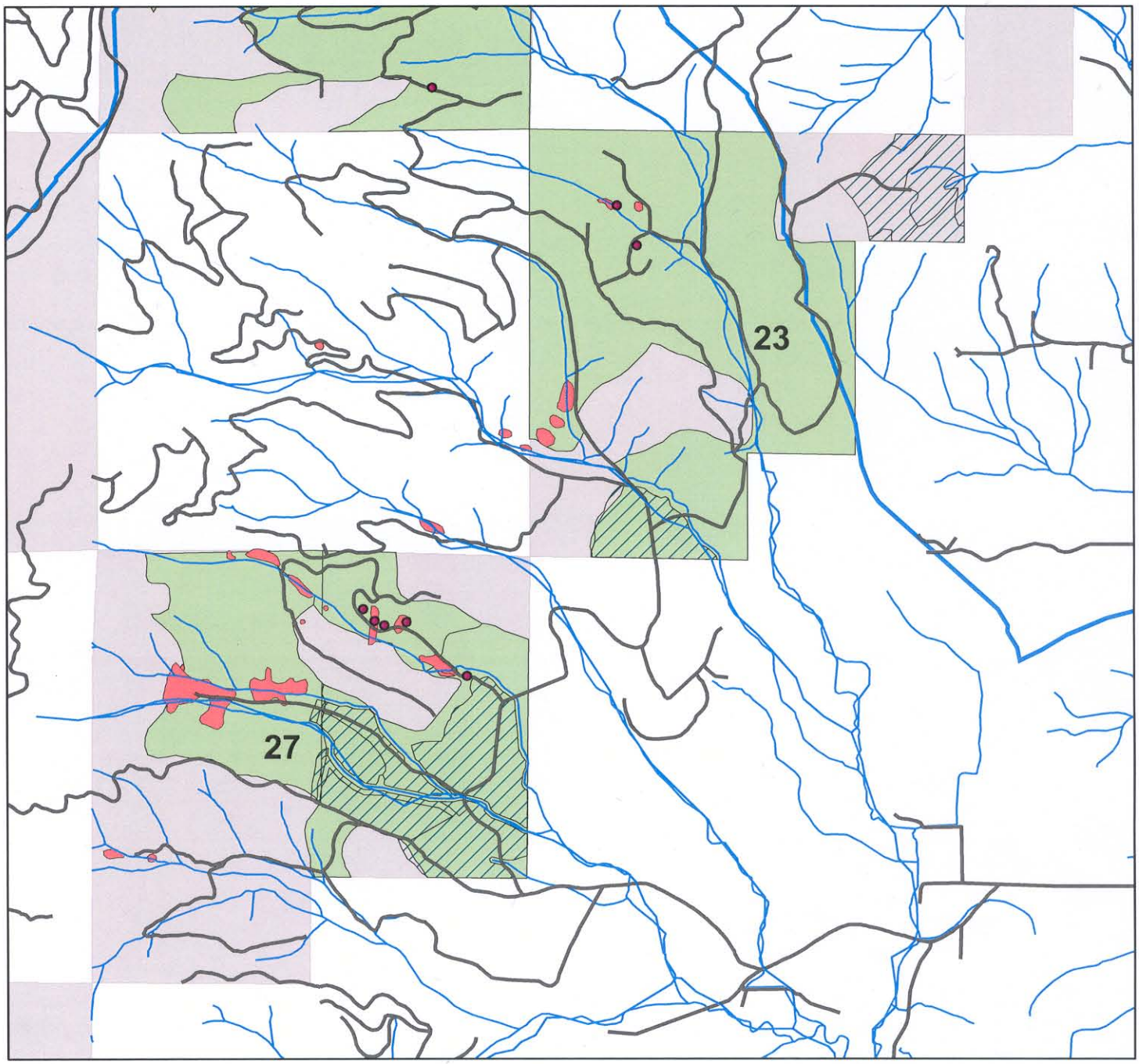
N
W E
S

0 0.1 0.2 0.4 Miles

Legend

- BLM Managed Lands
- POC Infection
  - N
  - Y
- Power Wagon
- County Roads
- Roads
- Streams
- POC Winners
- Watershed Boundary

LSR 261 DM - Sherlock's Denn
Port-Orford-cedar



T 29 S, R 9 W, Secs. 23 & 27

Legend

- BLM Managed Lands
- POC Infection
  - N
  - Y
  - Sherlock's Denn
- Roads
- Streams
- POC Winners
- Watershed Boundary

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USDA Forest Service and USDI Bureau of Land Management. 2004. Final Supplemental Environmental Impact Statement for Management of Port-Orford-cedar in Southwest Oregon.

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Appendix C

Wildlife

Preferred Habitat of Special Status Species in the Proposed LSR 261 Project Area and Rationale for Inclusion or Elimination from Analysis

Species	Status[1]	Preferred Habitat	Reason for Inclusion	Reason for Elimination
Northern Spotted Owl (*Strix occidentalis caurina*)	FT	Typically mature to old-growth stands of Douglas-fir forest. Occasionally found in younger forest stands that have remnant trees (Marshall et al. 1996).	Habitat Present	
Marbled Murrelet (*Brachyramphus marmoratus*)	FT	Nests in large conifers have deformed branches and mistletoe in mature to old-growth forests (Marshall et al. 1996).	Habitat Present	
Bald Eagle (*Haliaeatus leucocephalus*)	FT	Nests in large conifers in mature to old-growth stands within 1-2 miles from major rivers, lakes, and reservoirs (Marshall et al. 1996).		No Habitat
Fender's Blue Butterfly (*Icaricia icaroides fenderii*)	FE	Heavy association with Kincaid's lupine populations.		Out of Range and not documented in the Roseburg District
American Peregrine Falcon (*Falco peregrinus anatum*)	BS	Natural shelves, ledges, and potholes in rocky cliffs or outcrops in open or forested areas (Marshall et al. 1996).		No Habitat
Chase Sideband Snail[5] (*Monadenia chaceana*)	BSO	Rocky areas and talus deposits (Klamath Province); Large Downed Woody Material (Cascade Province) (Duncan et al 2003).	Habitat Present	
Columbian White-tailed Deer (*Odocoileus virginianus leucurus*)	BSO	Known breeding population restricted to Roseburg and vicinity, lowlands riparian in oak savannah, grasslands (Marshall et al. 1996).		Out of Range
Crater Lake Tightcoil Snail (*Pristiloma arcticum crateris*)	BSO	Talus areas and down woody debris in western Cascade Province above 2000 ft (Duncan et al 2003).		Out of Range
Green Sideband Snail (*Monadenia fidelis beryllica)*	BSO	Deciduous trees and brush, western side of Resource Area. Associated with forest floor litter, in wet undisturbed low elevations riparian areas, seeps, and springs (Duncan 2004).	Habitat Present	Out of Range
Klamath Tail-dropper *(Prophysaon* sp. nov.)	BSO	Not officially described in the literature. Found in moist open areas associated with floodplains and spring margins in Ponderosa-Douglas fir forests (Duncan 2004).		Not a Recognized Species
Lewis' Woodpecker (*Melanerpes lewis*)	BSO	Riparian areas with large cottonwoods logged or burned over ponderosa pine forests, or open oak or oak-conifer woodland (Marshall et al. 1996).		No Habitat
Northern Goshawk (*Accipiter gentilis*)	BSO	Forest stands generally 80 years +, mature deciduous and evergreen forest stands. Nests on largest trees of stand, often near water (Marshall et al. 1996).	Habitat Present (see text)	
Northwestern Pond Turtle (*Clemmys marmorata marmorata*)	BSO	Larger mountain and valley streams with deep pools, soils high in clay or silt fraction, south-southwest aspects and slope about 25%(range 0-60%, egg laying mostly June and July and incubation time average 70-80 days) (Holland 1994).		No Habitat
Oregon Shoulderband Snail (*Helminthoglypta hertleini)*	BSO	Basalt talus, under rocks and woody debris in moist forests and shrubby riparian corridors (Duncan et al. 2003).	Habitat Present	
Oregon Vesper Sparrow (*Podecetes gramineus affinis*)	BSO	Open grassland areas (Marshall et al. 1996).		No Habitat
Purple Martin (*Progne subis*)	BSO	Along rivers, other water bodies, old burns in forest stands generally 80 years +, nest in abandoned woodpecker cavities, nest boxes (Copley et al. 1999; Marshall et al. 1996).	Habitat Present	
Rotund Lanx Snail (*Lanx subrotundata*)	BSO	Aquatic snail, large river systems (Duncan 2004 personal communication).		No Habitat
Scotts Appatanian Caddisfly (*Allomyia scotti*)	BSO	Lives in small, cold mountain streams, often at high elevation, turbulent waters, vertical rock faces in a thin layer of water (Wiggins 1978).		No Habitat
Spotted Tail-dropper *(Prophysaon vanattae pardalis)*	BSO	Leaf litter under bushes in mature conifer forests in the Coast Range and the east side of the Coast Range (Duncan 2004).	Habitat Present	
Townsend's big-eared bat (Corynorhinus townsendii)	BSO	Abandoned caves, bridges, or natural caves. Trees with hollows and other cavities (Marshall et al. 1996).	Habitat Present	
Foothill yellow-legged frog (*Rana boylii*)	BAO	Deep slow moving water in larger streams (Marshall et al. 1996).		No Habitat

Species	Status[1]	Preferred Habitat	Reason for Inclusion	Reason for Elimination
Fringed Myotis (*Myotis thysanodes*)	BAO	Roost under loose bark of large diameter snags, and live trees, colonies in caves, mines, buildings (Marshall et al. 1996).	Habitat Present	
Harlequin Duck (*Histrionicus histrionicus*)	BAO	Clean fast flowing streams with abundance of riffles, rapids, gravel, coble, and boulders. Nests in riparian zone and often hidden in rock cavities, on the ground, on logs, in hollow trees, snags, undercut stream banks, under woody debris (Dowland 1996; Marshall et al. 1996).		No Habitat
Pacific Pallid Bat (*Antrozous pallidus pacificus*)	BAO	Associated with rocky dry areas near water. Known to occur in dry forests like ponderosa pine and oak forests, also western Oregon forests (Marshall 1996; (Verts and Carraway 1998).	Habitat Present	
White-tailed Kite (*Elanus leucurus*)	BAO	Open grassy areas, marshes, riparian woodlands, and meadows for foraging. Nests on trees or tall shrubs (Csuti et al. 1997).		No Habitat

[1]FT = Federally Threatened; FE = Federally Endangered; BSO = Bureau Sensitive Oregon; BAO = Bureau Assessment Oregon.

Appendix D

Botany

Special Status Plant Species Summary

Scientific Name	Taxon	Status	Habitat Present	Survey Completed
Plagiobothrys hirtus	Vascular Plant	Federal Endangered	No	N/A
Lupinus sulphureus ssp. *kincaidii*	Vascular Plant	Federal Threatened	Yes	No
Arabis koehleri var. *koehleri*	Vascular Plant	Bureau Sensitive	No	N/A
Bensoniella oregana	Vascular Plant	Bureau Sensitive	Yes	No
Calochortus coxii	Vascular Plant	Bureau Sensitive	No	N/A
Calochortus umpquaensis	Vascular Plant	Bureau Sensitive	No	N/A
Cimicifuga elata	Vascular Plant	Bureau Sensitive	Yes	No
**Corydalis aquae-gelidae*	Vascular Plant	Bureau Sensitive	No	N/A
**Cypripedium fasciculatum*	Vascular Plant	Bureau Sensitive	Yes	No
Epilobium oreganum	Vascular Plant	Bureau Sensitive	No	N/A
**Eucephalis vialis*	Vascular Plant	Bureau Sensitive	Yes	No
Festuca elmeri	Vascular Plant	Bureau Assessment	Yes	No
Frasera umpquaensis	Vascular Plant	Bureau Sensitive	Yes	No
Horkelia congesta ssp. *congesta*	Vascular Plant	Bureau Sensitive	Yes	No
Horkelia tridentata ssp. Tridentata	Vascular plant	Bureau Assessment	Yes	No
Kalmiopsis fragans	Vascular Plant	Bureau Sensitive	Yes	No
Lathyrus holochlorus	Vascular plant	Bureau Sensitive	Yes	No
Limnanthes gracilis var. *gracilis*	Vascular Plant	Bureau Sensitive	Yes	No
Perideridia erythrorhiza	Vascular Plant	Bureau Sensitive	Yes	No
Perideridia howellii	Vascular Plant	Bureau Sensitive	Yes	No
Romanzoffia thompsonii	Vascular Plant	Bureau Sensitive	Yes	No
Sisyrinchium hitchcockii	Vascular Plant	Bureau Sensitive	No	N/A
Adiantum jordanii	Vascular Plant	Bureau Assessment	Yes	No
Asplenium septentrionale	Vascular Plant	Bureau Assessment	Yes	No
**Botrychium minganense*	Vascular Plant	Bureau Tracking	No	No
**Botrychium montanum*	Vascular Plant	Bureau Assessment	No	N/A

Scientific Name	Taxon	Status	Habitat Present	Survey Completed
Carex brevicaulis	Vascular plant	Bureau Assessment	Yes	No
Carex comosa	Vascular Plant	Bureau Assessment	Yes	No
Carex gynodynama	Vascular Plant	Bureau Assessment	Yes	No
Carex serratodens	Vascular Plant	Bureau Assessment	Yes	No
Cicendia quadrangularis	Vascular Plant	Bureau Assessment	No	N/A
**Coptis aspleniifolia*	Vascular Plant		No	N/A
**Coptis trifolia*	Vascular Plant	Bureau Assessment	No	N/A
**Cypripedium montanum*	Vascular Plant	Bureau Tracking	Yes	No
Eschscholzia caespitosa	Vascular Plant	Bureau Assessment	Yes	No
**Galium kamtschaticum*	Vascular Plant		No	N/A
Iliamna latibracteata	Vascular Plant	Bureau Assessment	Yes	No
Mimulus tricolor	Vascular Plant	Bureau Assessment	Yes	No
Pellaea andromedaefolia	Vascular Plant	Bureau Assessment	Yes	No
**Plantanthera orbiculata*	Vascular Plant		No	N/A
Polystichum californicum	Vascular Plant	Bureau Assessment	Yes	No
Sedum laxum ssp. *heckneri*	Vascular Plant	Bureau Assessment	No	N/A
Romanzoffia thompsonii	Vascular plant	Bureau Sensitive	Yes	No
Scirpus subterminalis	Vascular plant	Bureau assessment	No	N/A
Utricularia gibba	Vascular Plant	Bureau Assessment	No	N/A
Utricularia minor	Vascular Plant	Bureau Assessment	No	N/A
Wolffia borealis	Vascular Plant	Bureau Assessment	No	N/A
Wolffia columbiana	Vascular Plant	Bureau Assessment	No	N/A
Chiloscyphus gemmiparus	Bryophyte	Bureau Sensitive	No	N/A
Trematodon boasii	Bryophyte	Bureau Sensitive	No	N/A
Crumia latifolia	Bryophyte	Bureau Assessment	No	N/A
Diplophyllum plicatum	Bryophyte	Bureau Assessment	No	N/A

Scientific Name	Taxon	Status	Habitat Present	Survey Completed
Funaria Muhlenbergii	Bryophyte	Bureau Assessment	No	N/A
**Kurzia makinoan*	Bryophyte	Bureau Assessment	No	N/A
**Marsupella emarginata* var. *aquatica*	Bryophyte		No	N/A
**Orthodontium gracile*	Bryophyte		No	N/A
Pseudoleskeella serpentinensis	Bryophyte	Bureau Assessment	No	N/A
**Schistostega pennata*	Bryophyte	Bureau Assessment	Yes	No
Tayloria serrata	Bryophyte	Bureau Assessment	Yes	No
**Tetraphis geniculata*	Bryophyte	Bureau Assessment	Yes	No
Tetraplodon mnioides	Bryophytes	Bureau Assessment	Yes	No
Tripterocladium leucocladulum	Bryophyte	Bureau Assessment	Yes	No
**Tritomaria exsectiformis*	Bryophyte	Bureau Assessment	No	N/A
**Bryoria pseudocapillaris*	Lichen	Bureau Sensitive	No	N/A
**Bryoria spiralifera*	Lichen	Bureau Sensitive	No	N/A
**Bryoria subcana*	Lichen	Bureau Assessment	No	N/A
Calicium adspersum	Lichen	Bureau Assessment	unknown	No
**Hypogymnia duplicata*	Lichen	Bureau Tracking	Yes	No
**Leptogium cyanescens*	Lichens	Bureau Tracking	Yes	No
**Lobaria linita*	Lichen	Bureau Assessment	Yes	No
**Niebla cephalota*	Lichens	Bureau Assessment	No	N/A
**Nephroma occultum*	Lichen-	Bureau Tracking	Yes	No
Pannaria rubiginosa	Lichen	Bureau Assessment	Yes	No
Pilophorus nigricaulis	Lichen	Bureau Assessment	No	N/A
**Pseudocyphellaria perpetua*	Lichen	Bureau Tracking	No	N/A
**Pseudocyphellaria rainierensis*	Lichen	Bureau Tracking	Yes	No
Sulcaria badia	Lichen	Bureau Assessment	Yes	No
Stereocaulon spathuliferum	Lichen	Bureau Assessment	Yes	No
**Teloschistes flavicans*	Lichen	Bureau Assessment	No	N/A
**Tholurna dissimilis*	Lichen	Bureau Assessment	No	N/A

Scientific Name	Taxon	Status	Habitat Present	Survey Completed
Arcangeliella camphorata	Fungi	Bureau Sensitive	Yes	Surveys not practical
**Bridgeoporus nobilissimus*	Fungi	Bureau Sensitive	No	N/A
Dermocybe humboldtensis	Fungi	Bureau Sensitive	Yes	Surveys not practical
Phaeocollybia californica	Fungi	Bureau Sensitive	Yes	Surveys not practical
Phaeocollybia gregaria	Fungi	Bureau Sensitive	Yes	Surveys not practical
Phaeocollybia olivacea	Fungi	Bureau Sensitive	Yes	Surveys not practical
Phaeocollybia oregonensis	Fungi	Bureau Sensitive	Yes	Surveys not practical
Ramaria spinulosa var. diminutiva	Fungi	Bureau Sensitive	Yes	Surveys not practical
Rhizopogon chamalelontinus	Fungi	Bureau Sensitive	Yes	Surveys not practical
Rhizopogon exiguus	Fungi	Bureau Sensitive	Yes	Surveys not practical

N/A = Not Applicable

APPENDIX E
CRITICAL ELEMENTS OF THE HUMAN ENVIRONMENT

The following elements of the human environment are subject to requirements specified in statute, regulation, or executive order.

These resources or values are either **not present** or **would not be affected by the proposed actions or alternative**, unless otherwise described in this EA. This negative declaration is documented below by individuals who assisted in the preparation of this analysis.

ELEMENT	NOT PRESENT	NOT AFFECTED	IN TEXT
Air Quality		X	
Areas of Critical Environmental Concern	X		
Cultural Resources		X	X
Environmental Justice		X	
Farm Lands (prime or unique)	X		
Floodplains	X		
Invasive, Non-native Species		X	X
Native American Religious Concerns	X		
Threatened or Endangered Wildlife Species		X	X
Threatened or Endangered Plant Species	X		
Wastes, Hazardous or Solid	X		
Water Quality, Drinking/Ground		X	X
Wetlands/Riparian Zones		X	
Wild & Scenic Rivers	X		
Wilderness	X		
Visual Resource Management		X	