ENVIRONMENTAL ASSESSMENT and FINDING OF NO SIGNIFICANT IMPACT

FY 2006 Timber Sale Thinning

July 2006

Environmental Assessment Number OR080-04-20

United States Department of the Interior
Bureau of Land Management, Oregon State Office
Salem District, Cascades Resource Area
Clackamas, Marion and Linn Counties, Oregon

Responsible Agency:	USDI - Bureau of Land Management
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Abstract: This environmental assessment discloses the predicted environmental effects of commercial thinning in four project areas on 1880 acres of federal land in six watersheds in the Cascades Resource Area in western Oregon. Thinning is proposed for three BLM Land Use Allocations (LUAs): Matrix (General Forest Management Areas and Connectivity/Diversity Blocks), Riparian Reserve, and Late-Successional Reserve.

FINDING OF NO SIGNIFICANT IMPACT

The Bureau of Land Management (BLM) has conducted an environmental analysis (Environmental Assessment Number OR080-04-20) for proposals to conduct commercial thinning operations on approximately 1,880 acres in four project areas located on BLM lands within the Cascades Resource Area in Clackamas, Marion, and Linn Counties, Oregon. The proposed action and location for each project area is described below.

- **Annie's Cabin Project Area,** located in T.6 S., R. 3 E. sections 7, 18, 19, 30, 31; T. 7 S., R.3 E., sections 5, 6;WM.**:** Approximately 560 acres of 40 to 100 year-old timber stands: 496 acres in the Matrix Land Use Allocation (LUA), and 70 acres in the Riparian Reserve LUA (*EA Sections 1.0 - 5.0, 9.0-14.0*).
- **Missouri Ridge Project Area,** located in T.6 S., R. 2 E. sections 7, 9, 16, 17; WM.**:** Approximately 287 acres of 30 to 70 year-old timber stands: 202 acres in the Matrix LUA, and 85 acres in the Riparian Reserve LUA (*EA Sections 1-0-4.0, 6.0, 9.0-14.0*).
- **Snakehouse Project Area,** located in T.8 S., R. 3 E. sections 31, 33; T. 9 S., R.2 E., sections 1, 15; T. 9 S., R.3 E., sections 7, 13; T.10 S., R. 2 E. section 1; T. 10 S., R.3 E., sections 3, 5; WM.**:** Approximately 834 acres of 30 to 115 year-old timber stands - 642 acres in the Matrix LUA, 172 acres in the Riparian Reserve LUA, and 20 acres in the Late-Successional Reserve (LSR) LUA (*EA Sections 1-0-4.0, 7.0, 9.0-14.0*).
- **Round Mountain Project Area,** located in T.11 S., R. 1 E. section 33; T. 12 S., R.1 E., section 3; WM.**:** Approximately 195 acres of 37 to 65 year-old timber stands - 166 acres in the Matrix LUA, and 29 acres in the Riparian Reserve LUA. (*EA Sections 1-0-4.0, 8.0, 9.0-14.0*).

The FY 2006 Timber Sale Thinning Environmental Assessment (2006 Thinning EA) documents the environmental analysis of the proposed commercial thinning activities. The EA is attached to and incorporated by reference in this Finding of No Significant Impact determination (FONSI). The analysis in this EA is site-specific and supplements analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*, September 1994 (RMP/FEIS). The proposed thinning and connected actions have been designed to conform to the *Salem District Record of Decision and Resource Management Plan***,** May 1995 (RMP) and related documents which direct and provide the legal framework for management of BLM lands within the Salem District (*EA Section 1.2*).

The EA and FONSI will be made available for public review July 20, 2005 to August 19, 2005. The notice for public comment will be published in a legal notice by the *Molalla Pioneer, Stayton Mail, and Albany Democrat Herald* newspapers. Comments received by the Cascades Resource Area of the Salem District Office, 1717 Fabry Road SE, Salem, Oregon 97306, on or before August 19, 2005 would be considered in making the final decisions for the proposed activities.

Finding of No Significant Impact

Based upon review of the 2006 Thinning EA and supporting documents, I have determined that the Proposed Action for the Annie's Cabin, Missouri Ridge, Snakehouse, and Round Mountain Project Areas are not major federal actions and would not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area.

No environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27. Therefore, supplemental or additional information to the analysis in the RMP/FEIS in the form of a new environmental impact statement is not needed. This finding is based on the following discussion, and unless otherwise specified, applies to all project areas:

Context: Potential effects resulting from the implementation of the Proposed Action have been analyzed within the context of the project area boundaries, and following fifth field watersheds: Upper Molalla, Little North Santiam, Middle North Santiam, Crabtree Creek, Hamilton Creek, and Rock Creek/Pudding River Watersheds, and. The area affected by the Proposed Action is summarized in *Table 1* [40 CFR 1508.27(a)]:

Table 1 – *Area of 5th Field Watersheds Affected by the Proposed Action*

5th Field Watershed	***Acres***	***Percent Affected by proposed activities***	***Project Area***	***Acres in Proposed Action***			
				Matrix*	***Riparian Reserve***	***LSR***	***Totals***
Upper Molalla River	129260	0.44	Annie's Cabin	496	70		566
Rock Creek/Pudding River	53764	0.53	Missouri Ridge	202	85		287
Little North Santiam	72408	0.69	Snakehouse	390	105		495
Middle North Santiam	56680	0.59	Snakehouse	252	67	20	339
Crabtree Creek	100022	0.16	Round Mountain	146	19		165
Hamilton Creek	118149	0.03	Round Mountain	20	10		30

* Includes GFMA and Connectivity

Intensity:

1. The effects of commercial thinning are unlikely to a have significant adverse impacts on the affected elements of the environment [40 CFR 1508.27(b) (1)]. The affected elements common to all project areas are: hydrology (water quality, wetland/riparian zones, and other water resources), soils, wildlife (T/E, special status species, structural/habitat components), air quality and fire hazard/risk, botany (special status species, invasive/nonnative species), fisheries and aquatic habitat (T/E species), and recreation, visual resources, and rural interface.

   Design features were incorporated into the Proposed Action for all project areas that would reduce the risk of adverse effects to the above resources (*EA Section 2.2.2*). These design features are intended proposed in order to meet the following objectives:
   - To minimize soil productivity loss from soil compaction, slope stability or soil duff layer resulting from ground-based and skyline logging operations;
   - To protect other components of hydrologic functions (channels, flows, water quality);
   - To protect and enhance stand diversity and wildlife habitat components;
   - To protect against expansion of invasive and non-native plant species;
   - To protect the residual stand;
   - To minimize disturbance to federal Threatened and Endangered Species;
   - To protect BLM Special Status plant and animal species;

- To reduce potential hazards to high-use recreation and rural interface areas;
- To reduce fire hazard risk and protect air quality;
- To protect cultural resources.

For the Annie's Cabin Project Area, additional design features were incorporated into the Proposed Action and an Action Alternative that are intended to reduce physical disturbance and interruption of use to the Molalla River Shared-Use Trail System, adverse effects to visual resources, and potential safety hazards related to log truck traffic on public roads in a high recreation-use area. (EA *Section 5.1.2*):

As a result of implementing the project design features described in EA *Section 2.2.2*, potential effects to the affected resources from thinning activities and connected actions in all project areas are anticipated to be site-specific and/or not measurable (i.e. undetectable over the watershed, downstream, and/or outside of the project area) [40 CFR 1508.27(b) (1), - *EA Sections 3.2, 5.2, 6.2, 7.2, 8.2, 9.1, 14.0*].

2. Thinning and connected actions in the project areas would not affect:
   - Public health or safety [40 CFR 1508.27(b)(2)] ;
   - Unique characteristics of the geographic area [40 CFR 1508.27(b)(3)] - There are no historic or cultural resources, parklands, prime farmlands, wild and scenic rivers, wilderness, or ecologically critical areas located within the project area (*EA Section 3.1,Table 8)*;
   - Districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places, nor would the Proposed Action cause loss or destruction of significant scientific, cultural, or historical resources [40 CFR 1508.27(b)(8)] (*EA Section 3.1, Table 8*).

3. Thinning in the project areas is not unique or unusual. The BLM has experience implementing similar actions in similar areas without highly controversial [40 CFR 1508.27(b) (4)], highly uncertain, or unique or unknown risks [40 CFR 1508.27(b) (5)].

4. Thinning in the project areas do not set a precedent for future actions that may have significant effects, nor does it represent a decision in principle about a future consideration [40 CFR 1508.27(b)(6)].

5. The interdisciplinary team evaluated the project areas in context of past, present and reasonably foreseeable actions [40 CFR 1508.27(b) (7)]. For the following elements of the environment there is a potential of cumulative effects that may be additive to those of the proposed action alternatives: Water Quality (sediment) and Fisheries. *Table 10* of the EA identifies affected elements of the environment, cumulative actions, and the section of the document where the cumulative effects are described (EA *Section 3.1*).
   - ***Water Quality (sediment) and Fisheries:*** The Action Alternatives could contribute to the risk of short-term increases in stream sediment as a result of road repair (including any culvert replacement), hauling, and thinning and yarding in the Riparian Reserve LUA , which would likely contribute to a direct increase in turbidity levels directly below road/stream intersections. However, this effect is not to be expected to be significant because:
     - Any sediment increase resulting from thinning would be very difficult to detect;

- Typically, sediment yields from forest harvest decrease over time as a negative exponential (Dissmeyer, 2000) rate. The quantity of surface erosion with delivery of sediment during large storm events would likely drop back to current levels (0.10 tons/acre) within three to five years as the remaining forest stand fills out and skid roads recover;
- Cumulatively, the limited magnitude and duration of this effect would be unlikely to result in any measurable change for water quality on the scale of the sixth or seventh-field watersheds, and would be unlikely to have any effect on any designated beneficial uses (including Fish);
- The contribution to watershed sediment yields from these action alternatives or any other present and foreseeable future actions, when considered separately or together, would be short-lived (primarily in the first winter following road repairs);
- The limited magnitude (<5% of total sixth-field watershed sediment supply) and duration (primarily in the first year following disturbance, limited to major storm events) of this effect would likely be insignificant for water quality on the watershed scale (i.e., cumulatively).
- Effects to stream turbidity from the cumulative actions described in *Table 10* have not led DEQ to list the affected streams as having a sediment problem for non-compliance with the State of Oregon's water quality criteria.

6. Thinning in the project areas is not expected to adversely affect Endangered or Threatened Species or habitat under the Endangered Species Act (ESA) of 1973 [40 CFR 1508.27(b) (9)].

- Wildlife: A Biological Assessment was prepared that determined that these projects may affect the northern spotted owl due to the modification of dispersal and suitable habitat. As a result of consultation with the U.S. Fish and Wildlife Service (USFWS), a Biological Opinion (BO) was issued that concluded that these projects would not jeopardize the continued survival of the spotted owl (EA *Section 12.1.1.1*). None of the proposed units are located in Critical Habitat for the northern spotted owl. The proposed projects described in this EA have incorporated the applicable design standards that are required for compliance with the Terms and Conditions set forth in the Biological Opinion.

  Effects to the species are not significant because: all stands proposed for thinning would be maintained as dispersal habitat after harvest; habitat conditions are expected to improve as thinned stands mature (>20 years); Residual trees would increase in size and be available for recruitment or creation of snags, culls and CWD for prey species and nesting opportunities, particularly in RR and LSR areas, and; where applied, topping and base-girdling to create snags and CWD would further increase stand structure and diversity for future northern spotted owl habitat.

  Except for the removal of hazard trees to protect public safety, no activity except hauling would take place within spotted owl suitable habitat during the March 1 to July 15 critical nesting period, unless the habitat is known to be unoccupied, or there is no nesting activity, as determined by survey to protocol. The distance and timing may be modified by the unit wildlife biologist according to site-specific information (BA, p. 7; BO Amendment, ref#1-7-05-F-0228, April 19, 2005).

- Fish: The following table shows the Endangered Species Act Determination of Effect for Upper Willamette River steelhead trout and Upper Willamette River Chinook salmon from the proposed thinning and connected actions (EA *Section 12.1.1.2*).

Species	Project Area (s)	Effect Call	Remarks
Upper Willamette River (UWR) Chinook salmon or UWR steelhead trout	Annie's Cabin Alternative 2 (Helicopter); Snakehouse, Round Mountain	No Effect	See EA *Sections 0, 7.2.3.1, 8.2.3.1*, EA *Appendix 1.*
	Annie's Cabin Alternative 1 (Proposed Action)	May affect, Not Likely to Adversely Affect	See EA *Section 5.2.3.1*, EA *Appendix 1.*
UWR steelhead trout	Missouri Ridge	May affect, Not Likely to Adversely Affect	See EA *Sections 6.2.3.2, 6.2.3.3*, EA *Appendix 1.*

Potential effects of the projects that may affect the listed fish species are related to sediment inputs associated with road repair/decommissioning and culvert replacement/removal. Effect determinations for proposed Critical Habitat for UWR Chinook salmon and UWR steelhead trout are the same as for the species. Consultation with NOAA fisheries will be initiated for those actions described in *EA Section 12.1.1.2*.

Effects to UWR Chinook salmon and UWR steelhead trout are not expected to be significant because potential increases in sediment would be minimized or prevented by project design features in the Snakehouse and Round Mountain project areas (*EA Sections 7.2.3.1 and 8.2.3.1*). Although sediment would increase in the short-term in the Annie's Cabin (Proposed Action) and Missouri Ridge (both action alternatives) project areas as a result of replacing live stream culverts, the effect would decrease in the long-term, having no lasting effect on fish (*EA Sections 5.2.3.1 and 6.2.3.1*).

7. Thinning in the project areas does not violate any known Federal, State, or local law or requirement imposed for the protection of the environment [40 CFR 1508.27(b)(10)] (*EA Section 1.2*).

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07/19/2005
Date

Reviewed by: Carolyn Sands
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7/19/2005
Date

Approved by: Cindy Enstrom
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Cascades Resource Area
7/19/2005
Date

ENVIRONMENTAL ASSESSMENT

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1.0 INTRODUCTION

1.1 Project Areas Covered in This Environmental Assessment (EA)

This EA analyzes the effects of commercial thinning operations and connected actions in forest stands in four project areas as described in *Table 2*. Average stand age ranges from 40 to 70 years (See *Section 10.1, Tables 28-33 - Vegetation Description Summaries for Each Project Area*).

The effects of thinning and connected actions in the four project areas are documented in the same environmental assessment for the following reasons:

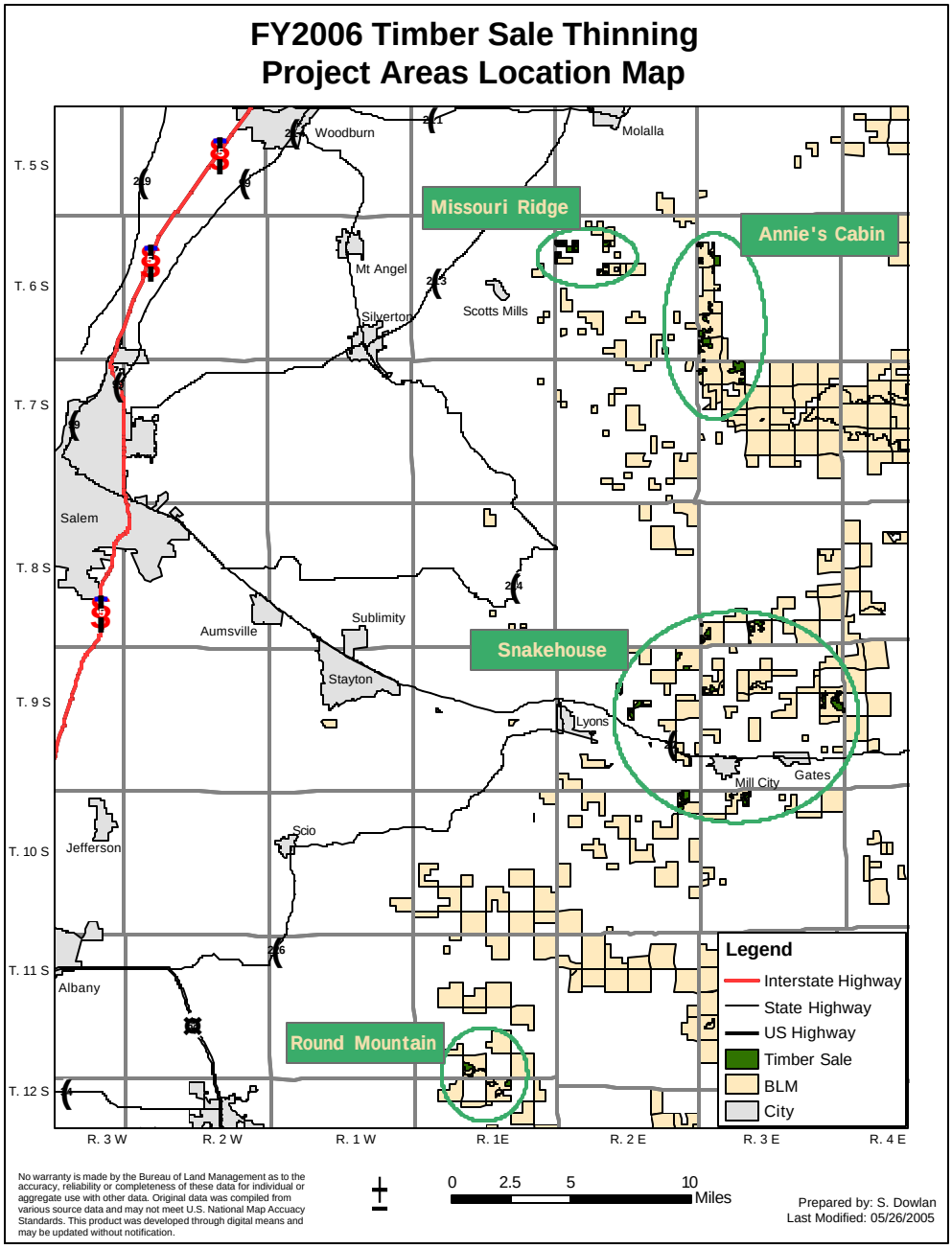
- The silvicultural prescriptions are the same for the affected Land Use Allocations in all of the project areas;
- The short-term and long-term effects to vegetation resulting from thinning would be generally similar;
- The influence on legacy features (snags and residual trees, and coarse woody debris) for the future stands would be similar;
- Little new road construction would occur;
- The environmental effects of the Cascades Resource Area 2006 timber sale program can be described in its entirety.

1.1.1 Project Area Locations:

Table 2: *Project Area Locations and Affected Watersheds*

Project Area	***Nearest Town and County***	***Township and Range (Willamette Meridian)***	***Sections***	***5th Field Watersheds***
Annie's Cabin	Molalla, Clackamas	6 South, 3 East	7, 18, 19, 30, 31	Upper Molalla
		7 South, 3 East	5, 6	
Missouri Ridge	Molalla, Clackamas	6 South, 2 East	7, 9, 16, 17	Rock Creek/ Pudding River
Snakehouse	Mill City, Marion/Linn	8 South, 3 East	31, 33	Little North Santiam,
		9 South, 2 East	1, 15	
		9 South, 3 East	7, 13	
		10 South, 2 East	1	Middle North Santiam
		10 south, 3 East	3, 5	
Round Mountain	Lebanon, Linn	11 South, 1 East	33	Crabtree Creek,
		12 South, 1 East	3	Crabtree Creek/ Hamilton Creek

Map 1: *Vicinity Map*



1.2 Conformance with Land Use Plan, Statutes, Regulations, and other Plans

The proposed commercial thinning activities in the four project areas have been designed to conform to the following documents, which direct and provide the legal framework for management of BLM lands within the Salem District: **1/** *Salem District Record of Decision and Resource Management Plan***,** May 1995 (RMP): The RMP has been reviewed and it has been determined that the proposed thinning activities conform to the land use plan terms and conditions (e.g. complies with management goals, objectives, direction, standards and guidelines) as required by 43 CFR 1610.5 (BLM Handbook H1790-1). Implementing the RMP is the reason for doing these activities (RMP p.1-3); **2/** *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl,* April 1994 (the Northwest Forest Plan, or NWFP); **3/** *Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl,* March 2004 (SSSP); **4/** *Record of Decision Amending Resource Management Plans for Seven Bureau of Land Management Districts and Land and Resource Management Plans for Nineteen National Forests within the Range of the Northern Spotted Owl, Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy,* March 2004 (ACSROD)**.**

The analysis in the 2006 Thinning EA is site-specific and supplements analyses found in the Salem District Proposed Resource Management Plan/Final Environmental Impact Statement, September 1994 (RMP/FEIS). The RMP/FEIS includes the analysis from the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl,* February 1994 (NWFP/FSEIS).

The RMP/FEIS is amended by the *Final Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines,* January 2004 (SSSP/FSEIS); and the *Final Supplemental Environmental Impact Statement, Clarification of Language in the 1994 Record of Decision for the Northwest Forest Plan National Forests and Bureau of Land Management Districts Within the Range of the Northern Spotted Owl,* October 2003 (ACS/FSEIS).

The following documents provided additional direction in the development of the proposed thinning activities: **1/** *Molalla River Watershed Analysis*, [May, 1999]; **2/** *Little North Santiam Watershed* Analysis, [December, 1997]; **3/** *North Santiam Watershed Assessment, Lower and Middle Reach Subwatersheds,* [June, 2002]; **4/** *Crabtree Creek Watershed Analysis*, [July 2001]; **5/** *Hamilton Creek Watershed Analysis*, [March, 1995].

These documents are available for review in the Salem District Office. Additional information about the proposed activities is available in the FY 2006 Timber Sale Thinning EA Analysis File (2006 Thinning AF), also available at the Salem District Office.

1.3 Purpose of and Need for Action – Common to All Project Areas

Data analysis and field examinations by BLM resource specialists have identified specific stands in which growth rates will soon decline, and structural diversity is limited. The Salem BLM Resource Management Plan (RMP) describes Management Actions/Direction that may be applied to developing timber stands to attain specific resource objectives. The purpose and need for action is summarized below:

- **Matrix Land Use Allocation (LUA) (RMP p. 20-22):** To manage developing timber stands in the Matrix LUA in order to:
  - Maintain the health and growth of developing stands;
  - Achieve a desirable balance between wood volume production, quality of wood, and timber value at harvest (RMP p. D-3);
  - Providing a sustainable supply of timber as described in the RMP (p. 1, 46, 47);
  - Develop timber sales that can be successfully offered to the market place;
  - Retain elements that provide ecosystem diversity (snags, old growth trees, etc.) so that a healthy forest ecosystem can be maintained with habitat to support plant and animal populations (RMP p.1, 20)
  - Increase protection for the public, facilities and high-value resources from large intense wildfires in rural/urban interface and high-use recreation areas in accordance with the National Fire Plan's Healthy Forest Initiative and Restoration Act.

- **Riparian Reserve, Late Seral Reserve (LSR) and Matrix/Connectivity LUA (RMP p. 9-15):** To apply silvicultural practices in some dense conifer-dominated sites within the stands of the Riparian Reserve LUA in order to:
  - Develop future large coarse woody debris, snag habitat, in-stream large wood and other elements of late-successional forest habitat. (RMP p.1);
  - Develop structural and spatial diversity of the forest ecosystem on a landscape level in the long term.

- **Roads:** To maintain and develop a safe, efficient and environmentally sound road system (RMP p. 62)] in order to:
  - Provide appropriate access for timber harvest, silvicultural practices, and fire protection vehicles needed to meet the objectives above;
  - Reduce potential human sources of wildfire ignition by controlling access;
  - Reduce environmental effects associated with identified existing roads within the project areas (RMP p. 11).

1.4 Decision to be Made

The decision to be made by the Cascades Field Manager is:

- Whether to implement the proposed thinning activities as proposed, not at all, or to some other extent.
- Whether site specific impacts would require supplementation of the analysis found in the RMP/FEIS through a new EIS.

1.5 Organization of this EA

EA Sections 1.0 – 4.0 describe the location, purpose and need, alternatives, affected environment, and environmental effects common to all areas proposed for thinning. *Sections 5.0 – 8.0* describe the location, purpose and need, alternatives, affected environment, environmental effects and other information specific to each project area. *Sections 9.0 -14.0* describe other information common to all project areas.

2.0 ALTERNATIVES – COMMON TO ALL PROJECT AREAS

2.1 Alternative Development

Pursuant to Section 102 (2) (E) of the National Environmental Policy Act (NEPA) of 1969, as amended, Federal agencies shall "…study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."

For the Snakehouse and Round Mountain project areas, no unresolved conflicts concerning alternative uses of available resources (section 102(2) (E) of NEPA) were identified. No alternatives were identified that would meet the purpose and need of the project and have meaningful differences in environmental effects from the Proposed Action. Therefore, this EA will analyze the effects of the "Proposed Action" and the "No Action Alternative" in these project areas. Alternative development for the stands in the Annie's Cabin and Missouri Ridge Project Areas are described in *Sections 5.1 and 6.1*.

2.2 Proposed Action

The Proposed Action is to thin approximately 1880 acres of mixed-conifer stands with an average age ranging from 40 to 70 years. Within the General Forest Management (GFMA) portion of the Matrix LUA, units would be thinned by removing suppressed, co-dominant, and occasional dominant trees (thinning from below), leaving residual overstory trees at a uniform stocking level. Generally, the largest trees would be left. Within units in the Connectivity/ Diversity portion of the Matrix, Late-Successional Reserve, and Riparian Reserve LUAs, up to ten percent of the treatment area would be left in unthinned patches, small gaps (up to one acre in size, retaining up to 20 trees per acre) would be created in 5 – 15 percent of the treatment area, and the remaining area would be thinned to a variable residual tree density, generally leaving the largest trees. Vine maple and California hazel would be cut in selected areas to enhance or initiate understory conifer regeneration. Average canopy closure would be no less than 40 percent within GFMA/Matrix, Connectivity/Matrix, and LSR portions of each unit after thinning, and no less than 50 percent with RR LUAs. See *Section 10.1, Table 34* for a unit-specific summary of tree densities before and after thinning.

Approximately 70 percent of the project areas would be harvested using conventional ground-based logging equipment, and approximately 30 percent would be harvested using skyline or low-impact ground-based yarding systems.

Table 3: *Thinning Treatment Summary by Acres* for the Action Alternatives*

Project Area	*Matrix GFMA Acres*	*Matrix Conn. Acres*	*RR[1] Acres*	*LSR[2] Acres*	*Total Acres*	*Logging Systems (acres)*	
						Ground- based[3]	*Skyline[4]*
Annie's Cabin	496		70		566	336	230
Missouri Ridge	202		85		287	219	68
Snakehouse	594	48	172	20	834	619	215
Round Mountain	166		29		195	143	52
Totals	1450	48	356	28	1882	1317	565

* - Acres are approximate, 1 - Riparian Reserve LUA, 2 – Late-Successional Reserve LUA, 3 - Skidder, harvester/forwarder, shovel, etc., 4 – portable tower and skyline systems.

2.2.1 Connected Actions

1. Road Work

- **New Road Construction:** Approximately three miles of new road construction would occur. All new roads would be natural surface (no rock would be added).
- **Road Renovation:** Up to 67.5 miles of existing roads under BLM and private control would be renovated as necessary to accommodate log-hauling. This would include brushing, blading, drainage structure improvement or replacement, and spot rocking at deficient locations. Up to 60 culverts may be replaced on roads under BLM control to meet 100-year flood design criteria.
- **Road Improvement:** Approximately 0.6 miles of existing natural surface road would be improved over the original design standard. This could include widening of the sub-grade to accommodate modern trucks and equipment, and upgrading existing culverts or replacing one log fill with a culvert.

Table 4: *Summary of Proposed Road Work by Project Area*

Project Area	*Road Work (Distances in miles)*					
Type	*Renovation*		*Improvement*		*New Construction*	
Surface	*Rock[1]*	*Natural*	*Rock*	*Natural*	*Rock*	*Natural[2]*
Annie's Cabin	12.0[3]					0.6
Missouri Ridge	3.5					1.0
Snakehouse	41.0	1.5		.6		1.0
Round Mountain	12.0	0.2				0.2
Totals	*68.5*	*1.7*		*0.6*		*2.8*

1: Rounded to the nearest ½ mile.

2: Rounded to the nearest $1/10^{th}$ mile

3: Minimal renovation would occur on up to 11 miles of road closed to public motorized travel to facilitate one-time movement of equipment for brush-piling

2. Fuels Treatments

- Fuel treatment strategies would be implemented on portions of the project areas. Strategies would include directional falling (to keep slash away from fuel breaks), followed by a reduction of surface fuels in order to reduce both the intensity and severity of potential wildfires in the long term (after fuels reduction has occurred).

Fuels reduction may be accomplished by burning of slash piles, by machine processing of slash on-site, or by a combination of these techniques.

- Portions of the project areas would be maintained after thinning specifically as fuel breaks. These areas would be maintained over time by repeated thinning and surface fuel management. Maintenance of this desired condition would be accomplished by prescribed fire, piling and burning of fuels, or other mechanical treatments.

Table 5: *Summary of Proposed Fuels Treatments by Project Area*

Project Area	***Fuels Treatments***					
	Directional falling		*Pile burning*		*Machine treatment*	
	acres	*# units*	*acres*	*# units*	*acres*	*# units*
Annie's Cabin	62	7	189	15	64	7
Missouri Ridge	37	3	75	10	44	5
Snakehouse	15	1	124	10	13	3
Round Mountain	0	0	0	0	0	0
Totals	*114*	*11*	*388*	*35*	*121*	*15*

3. Blocking Unauthorized Off-Road Motor Vehicle Trails (RMP p. 41)

- Areas subject to unauthorized use by motorized vehicles would be individually evaluated to determine the best combination of treatments to stabilize and prevent further use of trails while avoiding damage to other resources.
- Skid trails and other potential access points that could result in new unauthorized use by motor vehicles would be blocked and/or made impassible.

4. Special Forest Products (SFP) (RMP p. 49)

- Special Forest Products from the harvest units would be offered for harvest if market demand, product availability, and contract timing allow such offerings

5. Invasive Plant Eradication

- False brome populations will be eradicated prior to ground-disturbing activities by using hand pulling and disposal and/or the application of herbicide designed to kill plants in place (covered under Environmental Assessment No. OR-080-02-02, *Cascades Resource Area Invasive Non-Native Plant Management*).

2.2.2 Project Design Features

The following is a summary of the design features that reduce the risk of effects to the affected elements of the environment described in *Section 3.1*. Design features are organized by resource management objectives. *Table 6* lists design features that achieve multiple objectives.

Table 6: *Actions That Achieve Multiple Objectives*

Design features	***Objectives***
All logging operations and road work would utilize currently available equipment and practices that can achieve the objectives of the Best Management Practices (BMPs) required by the Federal Clean Water Act (as amended by the Water Quality Act of 1987)	Objective 1 - To minimize soil productivity loss Objective 2 - To protect other components of Hydrologic Functions
Ground-based skidding trails within the Riparian Reserve LUA would be designated in advance of thinning operations.	Objectives 1 and 2
Skid trail patterns would be designed to avoid concentrating runoff water flows or directing them into streams.	Objectives 1 and 2
Coarse woody debris (CWD) already on the ground that is of a size suitable for Special Status Species terrestrial mollusk and amphibian habitat and that would provide a renewable supply of large down logs (generally 20" and larger, RMP p. 21) would be retained and protected to the greatest extent possible from disturbance during treatment (NWFP S&G p. C-40, RMP 21, p. D-2). If CWD needs to be moved, a section of the log would be cut to allow access, instead of moving the entire log.	Objective 3 – To protect and enhance stand diversity and wildlife habitat components Objective 7 - To protect Special Status plants and animals

1. **To minimize soil productivity loss:**
   - **Ground-based logging operations:**
     - Tractor skidding trails and other ground-based logging equipment use would be designed to confine soil compaction and disturbance to no more than 10 percent of the unit area.
     - Tractor skidding operations would not be allowed when soil moisture is high (generally November through May) (RMP p. 23, 24, C-2).
     - Slash, organic debris and limited passes by equipment would be used on skid trails.
     - Slash piles would be located to reduce the amount of soil surface area subject to heat damage.
     - Ground-based log skidding equipment utilizing one-end suspension would be allowed to skid logs only on slopes up to 35 percent. Full suspension log transport equipment (forwarders) and harvesters may operate on slopes up to 45 percent.
     - Existing skid trails would be used when practical.
     - ***In Riparian Reserve LUA (RR):***
       - Ground-based harvesting would be limited to slopes under 30 percent.
       - Where existing skid trails cannot be used, low ground-pressure undercarriage equipment utilizing limited (typically single) passes would operate on top of a slash and brush mat.
   - **Skyline logging operations:**
     - Yarding with one end suspension of logs would be required.
     - Equipment with lateral yarding capabilities would be used.
     - Waterbars would be installed on skyline yarding roads as needed.

- Landing construction, maintenance and use requirements would be designed to keep soil compaction and disturbance within the minimum surface area needed for safe operations.

2. **To protect other components of Hydrologic Functions (Channels, Flows, Water Quality):**
   - A "no treatment" buffer would be established on topographic or ecological breaks with a minimum distance of 60 feet from the edge of perennial stream channels. This is intended to protect the primary shade zone, and is also referred to as the "stream protection zone" (SPZ).
   - A 25 foot buffer would be established along intermittent stream channels to protect bank stability.
     - Mechanical (ground-based) harvesters would not operate within 75 feet of any stream that has a "no treatment" buffer.
     - No trees within the "no treatment" buffer would be removed.
     - Reserve trees in the RR outside of the "no treatment" buffer that must be incidentally felled to ensure safe operations would be left on site.
     - Replacement of live stream culverts would be conducted during the in-stream work period for the watershed in which the work takes place. See *Section 10.2, Table 35* for the appropriate season of operation for in-water work in affected 5th field watersheds.
   - Road construction and decommissioning would be conducted during dry conditions.
   - All new roads would be stabilized, if needed in the future, or decommissioned and blocked upon project completion. Stabilization would be accomplished by techniques such as water barring, seeding, fertilizing, and blocking access. Decommissioning would be accomplished by techniques such as removal of culverts, re-establishment of natural drainage patterns, and ripping and seeding of the roadbed.
   - Natural surface roads needed to complete operations that would be left open over the winter would require erosion control measures that may include; erosion matting, drainage modification, seeding or other appropriate techniques to prevent soil loss.
   - Roadside ditch sediment would be filtered above stream crossings. Typical methods include maintaining vegetation in ditches and use of sediment traps or filters above stream crossings.

3. **To protect and enhance stand diversity and wildlife habitat components:**
   - Old-growth trees and snags (generally above 20" dbh) of all decay classes would be left standing to the greatest extent possible under standard contractual logging procedures, BMP, and Occupational Safety and Health Administration (OSHA) requirements (RMP p. D-2). Any snags of this type which are cut or knocked down incidentally would remain on site.
   - Minor conifer tree species, hardwoods, and most cull and deformed trees would generally be left standing where they are uncommon. Open grown "wolf trees" would be reserved and maintained in an open-grown condition.

4. **To protect against expansion of invasive and non-native plant species:**
   - Ground disturbing equipment would be cleaned as needed to be free of off-site soil, plant parts and seed (e.g. noxious weeds) prior to entering the project area (RMP p. 64).

5. **To protect the residual stand:**
   - Operations would be restricted during the spring growing season, when bark is easily damaged (typically May 01-June 30).
   - Directional falling would be used.
   - Slash piles to be burned would be located and constructed to minimize heat damage to tree crowns or tree boles.

6. **To minimize disturbance to federal Threatened and Endangered Species:**
   - A seasonal restriction would be in place for spotted owls where appropriate. No activity except hauling would take place within spotted owl suitable habitat during the March 1 to July 15 critical nesting period (BA, p. 7; BO Amendment, ref#1-7-05-F-0228, April 19, 2005). The seasonal restriction could be waived if surveys indicate no presence of nesting spotted owls within disturbance range (0.25 to 0.5 miles) of the units. Spotted owl dispersal habitat would be maintained (to an average range of 40 to 50 percent canopy closure on each unit) after timber harvest.

7. **To protect Special Status plants and animals:**
   - Operations may be shut down or restricted at any time if plant or animal populations that need protection (RMP p.29) are found.

8. **To reduce potential hazards to high-use recreation and rural interface areas:**
   - Signs and barricades would be required where necessary to ensure public safety while thinning, hauling and fuel treatment activities are occurring.

9. **To reduce fire hazard risk and protect air quality:**
   - Activity fuels (woody debris that could contribute to fire spread) resulting from road construction and logging debris would be treated. Treatment methods may include pile-and-burn (hand or machine-pile, cover with plastic, and burn), mulching, lop-and-scatter, and pull-back (RMP p. 23, 24).
   - All burning would occur under favorable smoke dispersal conditions in the fall, in compliance with the state Smoke Management Plan (RMP p. 22, 65).
   - Roads would be gated and closed to reduce fire risk on a site-specific basis.

10. **To protect cultural resources:**
    - Operations may be shut down or restricted at any time if cultural resources that need protection (RMP p. 36) are found.

11. **Summary of seasonal restrictions and permitted operational periods:**

Table 7: *Typical Seasonal Restrictions Calendar*

Restriction	***Reason***	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
Most logging operations and road work	Owl nesting			Can be waived if "no nesting" is determined									
Falling and yarding	Bark slippage												
Tractor operations	Soil damage												
Road Construction / Decommissioning	Soil damage/erosion control												
In-water work, roads[1]	Protect fish species												
Key		Operations generally allowed.				Operations typically dependent on conditions.				Operations generally not allowed.			

1 – Includes live stream culvert replacement. See Section 10.2, Table 35 for in-water work period for specific watersheds.

2.3 No Action Alternative

The Proposed Action and connected actions would not be implemented. Management activities and other uses (e.g. road use, road maintenance, harvest of special forest products on public land) would continue on BLM and non-federal lands within and adjacent to the project area according to plans for those areas. This alternative also serves to set the environmental baseline for comparing effects to the Proposed Action.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS - COMMON TO ALL PROJECT AREAS

3.1 Identification of Affected Elements of the Environment

The interdisciplinary team reviewed the elements of the human environment, required by law, regulation, Executive Order and policy, to determine if they would be affected by the Proposed Action. *Table 8* (Critical Elements of the Environment) and *Table 9* (Other Elements of the Environment) summarize the results of that review. Affected elements are **bold**. All entries apply to the action alternatives, unless otherwise noted.

Table 8: *Review of Critical Elements of the Environment (BLM H-1790-1, Appendix 5)*

Critical Elements Of The Environment		***Status: (i.e., Not Present , Not Affected, or Affected)***	***Does this project contribute to cumulative effects? Yes/No***	***Remarks If not affected, why?***
Air Quality (Clean Air Act)		**Affected**	**No**	***Addressed in text* (*Section 3.2.6*)**
Areas of Critical Environmental Concern		Not Affected	No	The Wilhoit Springs is in the sub-basin of the Missouri Ridge Project Area and adjacent to three units. No thinning would occur in the ACEC.
Cultural Resources		Not Present	No	No cultural resources are known or suspected to be present in the proposed project areas. Survey reports are listed in *Section 12.1.2*.
Adverse Impacts on the National Energy Policy (Executive Order 13212)		Not Present	No	There are no known energy resources located in the project area. The Proposed Action will have no effect on energy development, production, supply and/or distribution.
Environmental Justice (Executive Order 12898)		Not Present	No	The Proposed Action is not anticipated to have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.
Prime or Unique Farm Lands		Not Present	No	
Flood Plains (Executive Order 11988)		Not Present	No	The Proposed Action does not involve occupancy and modification of floodplains, and will not increase the risk of flood loss.
Hazardous or Solid Wastes		Not Present		
Invasive, Nonnative Species (plants) (Executive Order 13112)		**Affected**	**No**	***Addressed in text* (*Section 3.2.1*)**
Native American Religious Concerns		Not Present	No	No Native American religious concerns were identified during the public scoping period.
Threatened or Endangered (T/E) Species or Habitat	**Fish**	**Species Affected for Annie's Cabin Alt. 1 and Missouri Ridge.** Species Not Affected for Snakehouse and Round Mountain.	**No**	***Addressed in text: Common to all project areas, Section 3.2.3 *Annie's Cabin: *Section 5.2.3* Missouri Ridge: *Section 6.2.3***
	Plant	Not Present	No	
	Wildlife (including designated Critical Habitat)	Northern spotted owl (NSO) Species Not Affected **NSO habitat Affected**	**No**	***Addressed in text: Common to all project areas, Section 3.2.5 *Annie's Cabin: *Section 5.2.5* Missouri Ridge: *Section 6.2.5* Snakehouse: *Section 7.2.5* Round Mountain: *Section 8.2.5***
Water Quality (Surface and Ground)		**Affected**	**Yes**	***Addressed in text* (*Section 3.2.2*)**
Wetlands/Riparian Zones (Executive Order 11990)		**Affected**	**No**	***Addressed in text* (*EA Sec. 3.2.2*)**

Critical Elements Of The Environment	*Status: (i.e., Not Present , Not Affected, or Affected)*	*Does this project contribute to cumulative effects? Yes/No*	*Remarks If not affected, why?*
Wild and Scenic Rivers	Not Affected	No	Portions of units in Annie's Cabin (133 acres) and House Mountain (29 acres) Project Areas lie within the ¼-mile interim boundary of a segment of the Molalla River and Little North Santiam River that are "eligible" for National Wild and Scenic River Designation. None of the units are within Riparian Reserves within the eligible portions, and thinning is not prohibited in the uplands as long as the segment's free-flowing qualities and outstandingly remarkable values for the Molalla River (scenic, recreation, and geologic) and the Little North Santiam River (scenic, recreation, and fisheries) are protected. Thinning units with the ¼-mile interim boundary is not expected to affect either river's free-flowing quality, geologic (Molalla River) or fisheries (Little North Santiam River) values. Recreational and Scenic values would be protected, with only short term effects expected. See *Sections. 3.2.7.1* and *3.2.7.3*, Common to all Project Areas, and *Section 5.2.7.2,* Annie's Cabin. Fisheries values for the Little North Santiam River would be protected with only short term effects expected *(Section 7.2.3.1)*.
Wilderness	Not Present	No	

Table 9: *Review of Other Elements of the Environment Common to All Project Areas*

Other Elements of the Environment	*Status: (i.e., Not Present , Not Affected, or Affected)*	*Does this project contribute to cumulative effects? Yes/No*	*Remarks If not affected, why?*
Coastal zone	Not Present		
Fire Hazard/Risk	**Affected**	**No**	***Addressed in text (Section 3.2.6*)**
Other Fish Species with Bureau Status and Essential Fish Habitat (RMP p. 29)	Not Affected	No	No non-ESA listed fish species are found within the project areas. Thinning and connected actions in the project areas would have no effect on Essential Fish Habitat as designated under Magnuson-Stevens Fishery Management Act because no aquatic habitat modification would occur.
Land Uses (right-of-ways, permits, etc)	Not Affected	No	
Late Successional and Old Growth Habitat	Not Affected	No	Stands proposed for thinning are not functioning as late-successional old growth habitat
Mineral Resources	Not Present		
Recreation	**Affected**	**No**	***Addressed in text:*** **Common to all project areas – *Section 3.2.7*** **Annie's Cabin - *Section 5.2.7***

Other Elements of the Environment		*Status: (i.e., Not Present , Not Affected, or Affected)*	*Does this project contribute to cumulative effects? Yes/No*	*Remarks If not affected, why?*
Rural Interface Areas		**Affected**	**No**	***Addressed in text:*** **Common to all project areas – *Section 3.2.7*** **Annie's Cabin - *Section 5.2.7***
Soils		**Affected**	**No**	***Addressed in text (Section 3.2.4*)**
Special Areas outside ACECs (Within or Adjacent) (RMP p. 33-35)		Not Present	No	
Other Special Status Species / Habitat	**Plants**	**Affected**	**No**	***Addressed in text (Section 3.2.1*)**
	Wildlife	**Affected**	**No**	***Addressed in text (Section 3.2.5)***
Visual Resources		**Affected**	**No**	***Addressed in text:*** **Common to all project areas – *Section 3.2.7*** **Annie's Cabin - *Section 5.2.7***
Water Resources – Other (303d listed streams, DEQ 319 assessment, Downstream Beneficial Uses; water quantity, Key watershed, Municipal and Domestic)		**Affected**	**No**	***Addressed in text (Section 3.2.2)***
Wildlife Structural or Habitat Components - Snags/CWD/ Special Habitats, road densities		**Affected**	**No**	***Addressed in text (Section 3.2.5)***

Those elements of the human environment that were determined to be affected are hydrology (water quality, wetland/riparian zones, and other water resources), soils, wildlife (T/E, special status species, structural/habitat components), air quality and fire hazard/risk, botany (special status species, invasive/nonnative species), fisheries and aquatic habitat (T/E species), and recreation, visual resources, and rural interface. *Section 3.2* describes the current condition and trend of those affected elements, and the environmental effects of the alternatives on those elements which are common to all project areas.

Conditions and effects that are unique to individual project areas are described in: *Section 5.0 - Annie's Cabin*; *Section 6.0 - Missouri*; *Section 7.0 - Snakehouse*; and *Section 8.0 - Round Mountain*.

Cumulative Effects Analysis in this EA:

Proposed road work at stream crossings, timber haul on roads adjacent to streams and thinning and yarding in the Riparian Reserve LUA may contribute to cumulative effects to the following elements of the environment identified in *Tables 8 and 9*: Water Quality (sediment) and Fisheries. *Table 10* identifies affected elements of the environment, cumulative actions, and the section of the document where the cumulative effects are described.

Table 10: *Affected Resources, Cumulative Actions, and the Section of the Document Where the Cumulative Effects Are Described*

Resource or Element of the Environment	Component	Scale for Cumulative Effects	2006 Thinning EA Actions	Project Area	Cumulative Actions		Section Of EA Describing Cumulative Effects
					Past Actions[1]	Present and Foreseeable Future Actions	
Water Quality and Fisheries (including T/E)	Sediment	Within and downstream from the project area to the extent that the sediment would move	Road work at stream crossings, timber haul on roads adjacent to streams. Thinning and yarding in the Riparian Reserve LUA[2]	Annie's Cabin Missouri Ridge Snakehouse Round Mountain (thinning and yarding in the Riparian Reserve LUA only)	Existing roads with stream crossings and /or adjacent to streams producing current stream sediment. Road work and haul from timber sales on non-federal land on same haul route that affect the same streams	Road work, haul from timber sales on same haul route and thinning and yarding in the Riparian Reserve LUA that affect the same streams on non-federal and federal land. The following sales on Federal Land: ***Annie's Cabin:*** B Cubed Timber sale (BLM) -road work, haul and thinning and yarding in the Riparian Reserve LUA. Pine Rock Timber Sale (BLM) - haul and thinning and yarding in the Riparian Reserve LUA Butte Creek Timber sale (BLM) - haul and thinning and yarding in the Riparian Reserve LUA ***Snakehouse:*** Turnridge Timber Sale (BLM) – haul and thinning and yarding in the Riparian Reserve LUA AG 47 Timber Sale (BLM) – road work, haul and thinning and yarding in the Riparian Reserve LUA	***Common to All Project Areas:*** *Section 3.2.2.2*

[1] CEQ interprets NEPA and CEQ's NEPA regulations on cumulative effects as requiring analysis and a concise description of the identifiable present effects of past actions to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for action and its alternatives may have a continuing, additive and significant relationship to those effects. (*CEQ Guidance on the Consideration of Past Actions in Cumulative Effects Analysis – June 24, 2005*)

[2] Direct effect is theoretically detectable, based on the Water Erosion Prediction Project (WEPP) soil erosion model used to predict potential changes in erosion and sediment yield resulting from thinning and yarding in the Riparian Reserve LUA proposed in this EA. This model is applied on a "worst-case scenario", and likely overestimates the potential for sediment delivery to the perennial stream network in the project areas (*Annie's Cabin Hydrology/Channels/Water quality report p. 28, Missouri Ridge Hydrology/Channels/Water quality report p. 26, Snakehouse Hydrology/Channels/Water quality report p. 27, Round Mountain Hydrology/Channels/Water quality report p. 24)*.

3.2 Affected Environment and Environmental Effects – Common to All Project Areas

3.2.1 Vegetation and Forest Stand Characteristics

Source:

Annie's Cabin Silvicultural Prescriptions – 2006 Timber Sale Thinning EA, Missouri Ridge Silvicultural Prescriptions – 2006 Timber Sale Thinning EA, Snakehouse Silvicultural Prescriptions – 2006 Timber Sale Thinning EA, Round Mountain Silvicultural Prescriptions – 2006 Timber Sale Thinning EA, Cascade Resource Area Botanical Report – Annie's Cabin T.S., Cascade Resource Area Botanical Report – Missouri Ridge T.S. Cascade Resource Area Botanical Report – Snakehouse T.S., Cascade Resource Area Botanical Report – Round Mountain T.S.

Affected Environment

In general, stands proposed for thinning in all project areas originated after logging, scarification to remove brush and competing vegetation, or conversion from pasture. Regeneration after logging was by planting, natural reseeding, or both. Stand age ranges from 30 to 115 years with an average stand age of 40 – 70. Several stands are of natural origin, but have been thinned previously, which removed species other than Douglas-fir and simplified stand structure. Most are even-aged stands of uniformly stocked Douglas-fir. Other species such as western hemlock, red alder, and bigleaf maple constitute a small portion of the canopy in some stands.

Crowns are generally closed with little light reaching the forest floor. The younger stands have few if any residual snags or large down woody material. The understory varies from very sparse and nonexistent in the younger stands to moderately shrubby in the older stands. Understory vegetation consists mostly of sword fern, vine maple, California hazel and salal with very few understory conifers present. Throughout all project areas there are occasional small patches of *Phellinus weirii* (root rot) as indicated by down and dying trees. Specific stand histories and vegetative descriptions for each unit of each project area in project area are described in *Section 10.1, Tables 28 - 33*.

Special Status Botanic Species: Comprehensive botanical inventories of the proposed project areas were conducted in June and July, 2001 (portions of the Snakehouse Project Area) and in June, July, and August, 2004. One Bureau Sensitive Species was found during these surveys. Tall bugbane (*Cimicifuga elata*), a Bureau Sensitive Species, was identified in four locations within the Annie's Cabin Project Area. Three populations were identified in Section 30, T6S, R3E, W.M. and one in Section 5, T7S, R3E, W.M. The species was also found at one location within the Missouri Ridge Project Area, in Section 16, T6S, R2E, W.M.

Invasive / Non-native Plant Species (including Noxious Weeds): The following invasive/non-native species are widespread and well-established throughout the Cascades Resource Area, and were found to occur within or adjacent to units throughout the project areas: Tansy ragwort (*Senecio jacobaea*), bull and Canadian thistles (*Cirsium vulgare* and *C. arvense*), St. John's wort (*Hypericum perforatum*) and Scot's broom (*Cytisus scoparius*). Meadow knapweed (*Centaurea pratensis*), primarily an invader of pastures and meadows, has become a common roadside plant in portions of the Cascades Resource Area. A population of meadow knapweed (*Centaurea pratensis*) is known to occur in the vicinity of the Snakehouse Project Area within a road/power-line right-of-way on private land.

False brome (*Brachypodium sylvaticum*), a perennial bunchgrass can spread into closed canopy coniferous forests, riparian forests, and forest edges was identified in three locations in the Snakehouse and Round Mountain project areas.

Environmental Effects

3.2.1.1 Proposed Action

Vegetation and Forest Stand Characteristics

Matrix (GFMA): Thinning would increase average stand diameter and concentrate future growth on fewer trees to develop larger-diameter dominant and co-dominant trees compared to an unthinned stand. Thinning these stands at this time would slow crown recession, leading to the development of larger crowns and larger limbs as they grow into the spaces left after harvest has occurred. Less-dense wood (wider growth rings) and a higher proportion of wood with large knots in the live crown would be expected to develop throughout the thinned areas compared to the No Action Alternative. Areas thinned for the first time would be expected to develop these characteristics faster than untreated areas. Any units that have been thinned previously would be expected to develop these characteristics faster than those thinned for the first time. Spacing of residual trees would be more or less uniform throughout the treatment area. Understory and ground cover species would increase in vigor, variety, and structural complexity with the additional light reaching the forest floor. *Phellinus weirii* (root rot) pockets would continue to spread, creating and enlarging canopy gaps over the next few decades. The forest canopy would be expected to close again in 10-20 years.

Matrix (Connectivity/Diversity), Riparian Reserves, and Late-Successional Reserves: Thinning prescriptions specific to these LUAs would result in a wide range of residual tree densities. Canopy gaps and unthinned patches would result in immediate overstory spacing diversity. Understory and ground cover would remain sparse in unthinned patches, and vigorous dense shrub patches would develop in heavily-thinned patches of up to an acre in size, resulting in an enhanced layer effect to the canopy and understory.

Existing conifer regeneration would be enhanced in areas where gaps are created, especially where vine maple and California hazel is cut, and new conifer regeneration would be initiated, either by natural seeding or planting of seedlings in selected areas. Future entries may be needed in order to maintain or further enhance structural and horizontal diversity within stands. The increased growth in these stands would be expected to develop tree size and crown characteristics associated with mature and late-successional forest more quickly than untreated forest stands in the area.

Management direction for Matrix/Connectivity blocks calls for maintaining 25 to 30 percent of each block in late-successional forest at any point in time (RMP p. 21). Connectivity Block "J" associated with the Snakehouse Project Area currently has 48 percent in late-successional forest, and Connectivity Block "N" associated with the Round Mountain project area currently has 40 percent in late-successional forest. The Proposed Action would not reduce these amounts.

The photos below demonstrate the visual difference that results from thinning prescriptions proposed the Matrix LUA of all project areas.

Photo 1: *Before Treatment, previously thinned area*

Photo 2: *After Treatment, ground based yarding*

Photo 3: *Before Treatment, area not previously thinned.*

Photo 4: *After Treatment, skyline yarding.*

Special Status Botanic Species: The Proposed Action and Action Alternatives would not contribute to the need to list any Special Status Species known or expected to occur in the vicinity of the project area. Small geographically isolated *Cimecefuga elata* populations are part of a large well-dispersed population (Liston 1998). Kaye (2000) provided no evidence that forest disturbances associated with timber harvest harm *Cimecefuga elata*, either in terms of plant size or population growth. Canopy removal appears to result in larger, more reproductive plants, and at least a temporary increase in population size. Plants in unmanaged forests tended to be smallest and least reproductive of all management histories.

If additional SEIS Special Attention Species or Special Status Species are discovered on site, appropriate mitigation would be implemented as described on pages 2-41 and 2-86 of the RMP. Thinning may have an affect on Special Status Species that are not practical to survey for, mainly hypogeous (underground fruiting) fungi species. However, with the exception of *Leucogaster citrinus* (Bureau Tracking) located in T8S,R3E,Sec.25, these species have no known sites within the Cascade Resource Area.

Invasive / Non-native Plant Species: Adverse effects from invasive/non-native would not be anticipated. Existing populations of noxious weed species that are widespread and well-distributed could increase in vigor in the short term, as more sunlight reaches the forest floor after treatment. As the canopy closes over the next 20 years, it is anticipated that they would be shaded-out and be reduced again to low-vigor populations. Design features would be expected to reduce the risk of significant spread or new populations of noxious weeds as a result the Proposed Action.

3.2.1.2 No Action Alternative

Vegetation and Forest Stand Characteristics (all LUAs): Without thinning, crowns would be expected to recede over the next 10 to 20 years, reducing the live crown ratio and slowing growth rates on the trees. Average tree size would continue to increase, but at a slower rate as competition for light and nutrients increases. Suppression mortality of smaller and weaker trees in the stand would be expected. Declining vigor in understory and ground cover species would be expected with increased shading from the closed canopy. Denser wood (narrower growth rings) and longer clear boles would develop, compared to the Proposed Action.

Special Status Botanic Species: Habitat conditions for *Cimecefuga elata* populations would remain unchanged. Plant size and population growth would remain on the trajectory as directed by existing habitat conditions. No affect would occur to species (such as underground fruiting fungi) that are not practical to survey for. The potential changes to noxious weed populations associated with the Proposed Action would not take place.

Invasive / Non-native Plant Species (including Noxious Weeds): Without any new human caused disturbances in the proposed project areas, established invasive/non-native species population numbers would remain at or near current levels. False brome populations would be also be eradicated under the No Action Alternative.

3.2.2 Hydrology

Source:

Annie's Cabin Hydrology/Channels/Water quality report, Missouri Ridge Hydrology/Channels/Water quality report; Snakehouse Hydrology/Channels/Water quality report, Round Mountain Hydrology/Channels/Water quality report

Affected Environment

See individual project area sections for descriptions of Affected Environment: *Section 5.2.2 – Annie's Cabin*; *Section 6.2.2 –* Missouri Ridge; *Section 7.2.2 – Snakehouse*; *Section 8.2.2 – Round Mountain*

Environmental Effects

3.2.2.1 Proposed Action

Long-term measurable effects (five years or more) to watershed hydrology, channel morphology, and water quality as a result of the Proposed Action are unlikely. These actions are unlikely to permanently alter the aquatic systems of affected watersheds by affecting physical integrity, water quality, sediment regime or stream-flow. Effects to hydrology were analyzed on a watershed basis because

- Direct and indirect effects to hydrology, channel conditions or water quality as a result of the action, if they were observable, would be seen on a stream reach directly in or adjacent to the action.
- There is no physical mechanism for the proposed action in one watershed to translate across a topographic divide and directly affect a channel in a separate watershed.

Temporary road construction and road repair at stream crossings and wetlands would result in small (limited to the road right-of-way), short-term (one to two year) alteration of channels and wetlands. All effects would be within the range of effects disclosed in the *Salem District Proposed Resource Management Plan / Final Environmental* (RMP/FEIS 1994). Other than these effects, the Proposed Action would be unlikely to alter the current condition of channels, wetlands and ponds in the project area: minimization of direct and indirect disturbances from the Proposed Action would likely result in the maintenance of stream channels and wetlands in their current condition. At the same time, where current conditions in stream channels are poor, this proposal would be unlikely to lead to measurable improvement in stream channels in the short-term.

Overall, the Proposed Action would be unlikely to have any measurable effect on stream temperatures, pH, or dissolved oxygen. Any effects to these attributes as a result of the Proposed Action (including skid trails, landings, and road renovation and construction) would likely be within the range of effects disclosed in the RMP/FEIS (p. 4-14 to 4-19). Sediment transport and turbidity in this watershed is likely to increase over the short term as a direct result of road repair and construction, hauling and yarding in and around the Riparian Reserve LUA. Over the long-term (beyond three to five years), current conditions and trends in turbidity and sediment yield would likely be maintained under the Proposed Action.

Over the long term, the incremental improvement of forest stand characteristics (increased species diversity and wood recruitment) in the riparian would support the improvement in these conditions that is anticipated throughout these watersheds in response to the Northwest Forest Plan. This would add to the improvement in the condition of stream channels and wetlands in the watersheds.

See *Sections 5.2.2* and *6.2.2* for environmental consequences of alternatives to the Proposed Action for the Annie's Cabin and Missouri Ridge project areas.

Watershed Hydrology:

- **Ground Water:** It is unlikely the proposal would result in any measurable change to local ground water. The proposal would remove less than half the existing forest cover and the root systems of the conifers retained would quickly exploit any additional soil moisture availability. Proposed road construction would not involve excavation into side slopes where water tables could be intercepted.

- **Base Flow:** It is unlikely that the proposal would result in any measurable change to local base flow. The Proposed Action would remove less than half of the existing forest cover, and root systems of the retained conifers would quickly exploit any additional soil moisture.

- **Peak flow effects from harvest:** With the exception of the Missouri Ridge Project Area, portions of all of the project areas are in a zone subject to transient snow accumulations in the winter. It can be assumed that the reduction in stand density in these project areas may result in some small increase in snow accumulation and melting during rain-on-snow (ROS) events. However, due to the small area considered in Proposed Action, this effect is not likely to result in detectable changes to peak flows in these watersheds.

- **Peak flow effects from new road construction:** New road construction under the Proposed Action would be limited to stable slopes outside of the Riparian Reserve LUA. Slopes in these areas are low to moderate, and would not require extensive full-bench or cut-and-fill construction. This is unlikely to have a detectable effect on peak flows because there would be no interception of surface or ground water no additional interception and routing of surface or ground water to stream systems.

- **Peak flow effects from existing roads:** Most of the roads that would be utilized under this proposal already exist. This proposal will not alter these roads in a way that would likely reduce or increase any existing effect to peak flows attributable to the current road network, and thus would maintain the current condition and trends relative to hydrology and stream flow contributed by existing roads. Improvement and repair of road surfaces would be implemented under the Proposed Action. Some of these actions may reduce existing road effects on local and watershed hydrology.

Stream channel morphology (physical integrity):

Under the Proposed Action (with the exception of stream crossing repairs and road repair/decommissioning) there would be no direct alteration of any stream channel, wetland or pond morphological feature. All operations, equipment and disturbances would be at least 60 feet from all wetlands and perennial stream channels (and 25 feet from intermittent stream channels) Refer to *Sec. 2.2.2 Project Design Features* common to all project areas.

Physical integrity of channels at existing stream crossings would be altered for one to several years following repair/maintenance. Within the road prism (estimated at 30 feet maximum width), the channel surface, banks and bed would be compacted (bulk density of soils increased by as much as 30%), vegetation would be disturbed or removed, and the bed/banks within the road prism would be obliterated. Due to the stable nature of channels at these locations, little to no additional disturbance to channel morphology would be expected either upstream or downstream from the crossing.

Water Quality (sediment):

Sediment transport and turbidity in the affected watersheds would be likely to increase over the short term (one to three years) as a direct result of road repair and construction, hauling and yarding in and around the Riparian Reserve LUA. Over the long-term (beyond three years), current conditions and trends in turbidity and sediment yield would be maintained under the Proposed Action. Any effects to these attributes as a result of the Proposed Action would be within the range of effects disclosed in the RMP/FEIS (p. 4-14 to 4-19).

Tree removal and road renovation and construction would not occur on steep unstable slopes where the potential for mass wasting adjacent to stream reaches is high. Therefore, increases in sediment delivery to streams due to mass wasting are unlikely to result from these actions.

In addition, potential impacts resulting from tree harvest (including skid trails and landings), road construction, maintenance and use would be mitigated to reduce the potential for measurable sediment delivery to streams, by implementing Best Management Practices (BMPs), such as stream and road buffers, minimum road widths, minimal excavation, ensuring appropriate drainage from road sites, and seasonal limitations on road use and ground-based harvest operations (RMP Appendix C, p. C-1 to C-9; EA *Sec. 2.2.2*).

Water Quality (Temperature):

The Proposed Action would comply with the requirements of the Oregon Department of Environmental Quality's (ODEQ) *Draft Willamette Total Maximum Daily Load* (TMDL) (http://www.deq.state.or.us/wq/willamette/WRBHome.htm) for the maintenance of and/or increase in effective shade adjacent to perennial streams.

No shade-producing vegetation within the "primary shade zone" (PSZ, estimated to be no more than 60 feet from the active stream channel in all cases) of perennial streams would be intentionally cut. Falling of isolated trees in the PSZ may occur for safety purposes but is unlikely to reduce shade enough to have any measurable effect on stream temperature, since, in densely stocked stands, individual trees provide only a small fraction of the total shade available along the entire stream reach.

Canopy closure in the secondary shade zone would be reduced to no less than 50 percent and therefore, following the BLM/USFS Sufficiency Analysis for Stream Temperature (U.S. Forest Service and Bureau of Land Management. 2004. *Northwest Forest Plan Temperature TMDL Implementation Strategies*. Draft. Portland, Oregon. P. 19), shade loss would be too small to affect stream temperature.

3.2.2.2 Cumulative Effects

Watershed Hydrology (ground water, base flow, peak flows from harvest, new road construction or existing roads): No cumulative effects would be expected because:

- The Action Alternatives are not likely to result in measurable direct or indirect effects to stream flow to annual flow, base flow, flow timing or peak flows in these watersheds, , and therefore would be unlikely to contribute to any potential cumulative effects.
- The Action Alternatives would result in no net increase in forest openings in Transient Snow Zone with crown closure <30 percent, and therefore would not contribute cumulatively to peak flow augmentation that may be occurring in these watersheds as a result of forest harvest.
- Proposed road use and construction is unlikely to alter surface or subsurface hydrology or to contribute cumulatively to any change in the watershed base, peak, or annual flow.

Stream Channel Morphology (physical integrity): No cumulative effects would be expected because:

- Although physical integrity of channels at existing stream crossings would be altered for one to several years following repair/maintenance (culvert replacement), these alterations would be limited to the local area only (due to the stable nature of channels at these locations), so little to no additional disturbance to channel morphology would be expected either upstream or downstream from the crossing.
- Over the long term, the incremental improvement of forest stand characteristics (increased species diversity and wood recruitment) in the riparian would support the cumulative improvement in these conditions that is anticipated throughout these watersheds in response to the Northwest Forest Plan. This would add cumulatively to the improvement in the condition of stream channels and wetlands in the watersheds.

Water Quality (temperature): No cumulative effects would be expected because:

- Canopy closure in the primary shade zone would be essentially unaffected, and the secondary shade zone would be reduced to no less than 50 percent. Shade loss would be too small to affect stream temperature.

Water Quality (sediment): The Action Alternatives could contribute cumulatively to accelerated sediment loads in streams adjacent to roads. *Table 10* identifies affected elements of the environment, 2006 thinning actions, and cumulative actions associated with this effect. The scale for cumulative effects to sediment is in adjacent streams within and downstream from the project area to the extent that the sediment would move. This scale was chosen because effects resulting from actions which overlap in time and space accumulate downstream from the separate actions where they occur in a shared watershed.

For all cumulative actions, the risk of short-term increases in stream turbidity as a result of road repair (including any culvert replacement) and timber hauling would likely contribute to direct increases in turbidity levels directly below road/stream intersections. The effect would be of very limited magnitude; sediment would originate from areas generally no more than a few hundred square feet of surface area. The risk of short-term increase in stream turbidity resulting from live-stream culvert replacement would be episodic, occurring while the repairs are being made, and again after the first heavy rains have occurred. Short term increases in sediment resulting from hauling would occur after the first heavy rains. Over the long-term (beyond three to five years after repairs are made and hauling is finished), conditions and trends in turbidity and sediment yield would likely return to current levels.

Effects to Water Quality: The cumulative accelerated sediment load is unlikely to result in any measurable change in water quality on the scale of the sixth or seventh-field watersheds, and would therefore be unlikely to have any effect on any designated beneficial uses.

3.2.2.3 No Action Alternative

The No Action alternative would result in the continuation of current conditions and trends at this site as described in the *Description of the Affected Resource* sections of the individual project areas of this report. Effects to the watersheds would continue to occur from the development of private and other agency lands (primarily timber harvesting and road building).

3.2.3 Fisheries and Aquatic Habitat

Source:
2006 Timber Sale Thinning EA - Fisheries and Aquatic Habitat (Fisheries Report)

Affected Environment

Most of the 3rd order and larger streams in the vicinity of the project areas support populations of cutthroat trout (*Oncorhynchus clarki*). Generally the absence of fish in the smaller order streams is due to small stream size (low stream flow) and/or steep gradients, rather than waterfalls or man-made barriers. Larger streams, downstream of the project areas generally support winter steelhead trout (*O. mykiss*), and in some cases spring Chinook salmon (*O. tshawytscha*). Most of the stream channels are stable, with well-vegetated banks and riparian areas.

Threatened and Endangered Species: Upper Willamette River (UWR) Chinook salmon (*O. tshawytscha*) and UWR steelhead trout (*O. mykiss*) are listed as 'Threatened' under the Endangered Species Act of 1973 (ESA). Both species are present in all of the project area watersheds at varying distances downstream of the proposed project units.

Approximate distances from proposed project units to potential resident and ESA listed fish habitat for all project area units is listed in *Section 10.2, Table 36*. Fish presence/absence is summarized in the individual project area sections: *Annie's Cabin – Section 5.2.3; Missouri Ridge – Section 6.2.3; Snakehouse – Section 7.2.3; Round Mountain – Section 8.2.3.*

Environmental Effects

3.2.3.1 Proposed Action

Stream temperatures would not be affected by the Proposed Action because the minimum 60' stream protection zones (SPZs) on perennial streams would prevent any decrease in stream shade. Sediment inputs to streams as a result of yarding would be prevented by excluding those activities from the SPZs. New roads proposed for construction would be located on stable locations with no hydrologic connectivity and would not contribute to degradation of aquatic habitat. Haul routes are generally well-established rocked roads with well-vegetated ditches. Hauling would be restricted to dry conditions in order to minimize road generated sediment from entering stream channels as a result of hauling.

Thinning within the Riparian Reserve LUA is expected to have a long-term beneficial effect on aquatic habitat as a result of an anticipated acceleration in growth rate of trees left in the stands, which would restore large conifers and provide future large woody debris to restore or maintain stream channel complexity (RMP p. 7).

For descriptions of Environmental Effects unique to project areas, see: *Section 5.2.3 – Annie's Cabin; Section 6.2.3 – Missouri Ridge; Section 7.2.3 – Snakehouse; Section 8.2.3 – Round Mountain*.

3.2.3.2 Cumulative Effects

Cumulative effects to fish and fish habitat are connected to effects to water quality (stream temperature and sediment). No cumulative effect to canopy closure in the primary shade zone would be essentially unaffected, and the secondary shade zone would be reduced to no less than 50 percent. Shade loss would be too small to affect stream temperature. The cumulative accelerated sediment load is unlikely to result in any measurable change in water quality that could have adverse effects to fish or fish habitat. See *Section 3.2.2.2, Hydrology Cumulative Effects.*

3.2.3.3 No Action Alternative

Under the No Action alternative there would be no direct impacts to fish or aquatic habitat. The anticipated beneficial effects on aquatic habitat resulting from the thinning of riparian stands would not be realized.

3.2.4 Geology and Soils

Source:
Timber Sale Thinning EA Soils Report; Annie's Cabin Hydrology/Channels/Water quality report, Missouri Ridge Hydrology/Channels/Water quality report, Snakehouse Hydrology/Channels/Water quality report, Round Mountain Hydrology/Channels/Water quality report

Affected Environment

Soils in the project areas include clay loams, silty clay-loams, silt loams, and cobbly loams, with varying percentage of gravels or cobbles. These soils are well-drained to moderately well-drained, and moderately deep to very deep, with some local areas of shallow soils on ridge tops. Project areas seldom exceed 35 percent slopes. Less than five percent of the project area acres exceeds 65 percent slope (*Table 11*). Such steeper slopes have lower infiltration capacity and structural stability. Where slopes approach 50 percent or steeper, erosion potential is moderate to severe. Soil rutting hazard is severe if the duff layer has been displaced on these slopes (NRCS, 2005). All proposed treatment units are outside of any areas mapped as unstable or prone to mass wasting.

Table 11: *Approximate Slope of Project Areas*

Project Area	Percent of Total Project Area*			
	0-35% slope	35-45% slope	45-65% slope	>65% slope
Annie's Cabin	70	15	15	0
Missouri Ridge	80	10	5	5
Snakehouse	90	5	3	2
Round Mountain	70	20	5	5

**Visual estimate from slope classification of DEM (Digital Elevation Model)*

Tractor-yarding trails and haul roads from earlier regeneration harvest and thinning entries are evident throughout the project areas, as revealed by aerial photos dating from the 1950s to the present. Extensive networks of roads and trails are evident in some areas. Portions of the Annie's Cabin, Missouri Ridge, and Round Mountain were scarified (vegetation was mechanically scraped and the topsoil layer was loosened). Many of the old skid trails have begun to recover productive capability as roots and animal activity have started to break-up compaction and organic material has begun to accumulate.

Other old skid trails (typically heavily-used main skid roads) and haul roads have very little vegetation growing in them and show little evidence of recovery. Generally, existing road surfaces are stable with areas of surface erosion.

Environmental Effects

3.2.4.1 Proposed Action

Timber Harvest

Ground-based Yarding (skid trails, skyline yarding routes, and landings): Soil compaction and topsoil displacement is expected on a maximum of ten percent of each project area as a result of skid trails and landings – consistent with RMP standards and guidelines (p. C-1-2). This estimate includes use of existing skid trails already compacted from historic logging, so new areas compacted from thinning would be less than ten percent. Limiting tractor operations to periods of low soil moisture, when resistance to compaction is higher, and using one-end suspension on slopes less than 35 percent would reduce the relative degree of soil compaction where tractors operate. Logs would mostly be sorted and decked on ground adjacent to roads until transport; soil compaction in these places (out of the road prism) would not inhibit natural revegetation or biochemical soil processes more than approximately one to five years. In spots where equipment turns or backs-around multiple times, compaction and topsoil disturbance would be greater; here current biochemical soil processes and natural revegetation could be inhibited beyond several years. Surface erosion and dry ravel resulting from thinning would be minimal because the Proposed Action would leave the majority of the surface vegetation, root systems, and litter intact, and limbs from thinned trees would remain on site.

As trees age and become established, the negative effect on growth from soil compaction and displacement would become less pronounced and growth rates may approach that of trees on similar undisturbed sites. This is especially true where compaction and displacement tend to be in narrow strips (e.g. yarding trails and small landings).

Skyline Yarding: On portions of units that would be skyline-yarded (away from landings), compaction would be relatively light (i.e. not expected to inhibit natural revegetation or biochemical soil processes more than approximately one to five years). Skyline yarding routes with one-end suspension of logs during in-haul would result in a compacted and disturbed trail two to four feet wide for each yarding route. Severe erosion or soil rutting down skyline yarding corridors (including those on slopes 50 percent or greater) would be mitigated by constructing water bars and leaving slash on corridors where appropriate. Skyline landing construction and use would displace and compact soil (by cutting and filling to create the landings) in various locations along all roads where they pass through proposed harvest units. Constructing and using landings would inhibit natural revegetation and biochemical soil processes more than approximately three to five years.

Roads

Constructing up to 2.8 miles of new temporary natural surface spur roads would displace topsoil and compact subsoil on less than 7 acres (approximately 0.4 percent of combined project areas). This activity would locally decrease soil productivity in the short term (one to five years).

The roads to be constructed would be on relatively gentle topography, and the total width of the clearing would be around 20 feet. Roads would be located and designed so that any resulting runoff would infiltrate rapidly into adjacent undisturbed soils, well away from riparian areas. Placing slash debris on exposed surfaces, inserting water bars, and blocking vehicle access would decrease surface erosion and runoff. The slash would also provide a source of organic material to the disturbed soil.

Depending on expected future transportation needs, some road beds would be stabilized and left to be utilized in the next harvest cycle. The design features for treating these roads after operations (shaping and/or ripping roadbeds, partially covering with slash, revegetating, and blocking access) would stabilize the soil surface while leaving the subgrade intact for use in future management operations. The subgrades would remain as non-forest land. Other roads would be decommissioned (ripped, seeded, and blocked) following harvest. Some recovery to a forested condition would occur in these areas over time.

Renovating and improving approximately 5.4 miles of existing dirt-surface roads would retain approximately 10.5 acres of current non-forest land in a non-forested condition. Encroaching vegetation along these older roads would be removed and surface rock would be added where needed. Cross drains and stream crossings (culverts) would be added, improved, or replaced to better withstand future high-water events. These improvements would enhance drainage and road surface conditions, decrease road surface erosion into streams, and lower risk of culvert or fill failure. Soil compaction would be reduced on approximately one acre of land in the Snakehouse Project Area (T 10 S, R 2E, Section 1) as a result decompaction of BLM Road # 9-3E-31. Table 12 summarizes soil compaction resulting from road work.

Table 12: *Soil Surface Compaction Resulting From Road Work*

Project Area	***Surface Compaction (Acres)***							*% of total project area*
Type	*Renovation†*		*Improvement†*		*New Construction*		*Decom-mission*	
Surface	*Rock*	*Natural*	*Rock*	*Natural*	*Rock*	*Natural*		
Annie's Cabin	*					1.4		0.2
Missouri Ridge	*					2.4		0.8
Snakehouse	*	3.5		1.4		2.3	- 0.5	1.0
Round Mountain	*	0.5				0.5		0.5
Totals	*****	**4.0**		**1.4**		**6.6**	**- 0.5**	**0.6**

* Compacted paved and rock-surface haul roads are currently in use as part of the Salem BLM transportation system, and the road mileage summarized in *Table 4 (Section 2.2.1, Connected Actions)* includes routes outside of the project areas. † *Acres already in a compacted condition.*

Vegetation generally reestablishes within one or two seasons, and erosion rates return to levels at or near geologic rates thereafter. Road maintenance would occur during dry seasons to minimize soil erosion.

Pile Burning:

On the sites where piles are burned, surface organic material (O-horizon) would be removed, increasing localized erosion potential. However, such localized erosion is highly unlikely to deliver sediment to streams, since burn-pile areas are outside of the Riparian Reserve LUA, widely dispersed, and typically smaller than 20 feet in diameter. Pile burning and rain impact on burned spots can decrease infiltration capacity until natural re-vegetation occurs. Displaced soil would be filtered and retained by the intact vegetation immediately surrounding the burn-pile spot. Since burning would occur during wet soil conditions, heat damage to the upper soil layer (A-horizon) would be moderated and only occur in scattered localized sites. See *Section 3.2.6* for additional information on pile burning.

3.2.4.2 Cumulative Effects

No cumulative effects to soil resources would result from thinning or connected actions in the project areas. Effects would be contained within the project areas, and there would be no other uses affecting this resource.

3.2.4.3 No Action Alternative.

Existing paved roads, maintained rocked roads would continue to be part of the transportation system and be maintained according to the Salem District transportation management plan, and would remain as non-forest land and provide access for management activities and public use. Historic unmaintained skid trails, haul roads and landings would be left in their current condition, which range from virtually no evidence of recovery to advanced recovery where understory vegetation is similar to adjacent areas and trees are growing in the compacted area. Vegetation and other natural processes would continue to slowly break up compaction and continue the process of recovering productive capability over time, but would remain as non-forest land for the foreseeable future.

The duff and litter layer would continue to build, with a high component of woody debris up to sapling size boles as stem exclusion occurs. No new soil compaction or displacement would take place within the project area.

3.2.5 Wildlife

Source:
2006 Timber Sale Thinning EA - Wildlife Report

Affected Environment

Residual Old Growth Trees, Snags and Coarse Woody Debris (CWD), and Special Habitats: Stand exam data indicate that residual old-growth trees are present in low numbers in only seven units throughout the project areas. Coarse woody debris material (at least 20" in diameter at the large end, 20 feet in length, and in decay classes 1 and 2) that would meet RMP standards and guidelines (at least 240 linear feet per acre)is currently lacking to in all but two units (RMP p. 21). Snags at least 20' dbh and over 15' tall (all decay classes) are present in low numbers (<1 to 3 per acre) in twelve units.

Most of the snags and CWD material that are present are small (less than 20" dbh) and/or highly decayed. Trees that could have developed into large snags and down logs were removed by past timber management treatments. In general stands throughout the project area are in a condition in which there is a near-term (less than three decades) snag deficit (RMP page 21).

Remote sensing and field surveys indicate that no special habitats such as rock out-crops, talus slopes, or seeps and springs are included in any of the proposed units.

Residual old growth trees, snags and CWD, and special habitats are listed for all project areas in *Section 10.3, Table 37* and summarized for individual project area sections: *Annie's Cabin – Section 5.2.5; Missouri Ridge – Section 6.2.5; Snakehouse – Section 7.2.5; Round Mountain – Section 8.2.5.*

Threatened Species - Northern Spotted Owl: Habitat (by suitability) for individual project areas is listed in *Section 10.3, Table 38* and summarized for individual project area sections: *Annie's Cabin – Section 5.2.5; Missouri Ridge – Section 6.2.5; Snakehouse – Section 7.2.5; Round Mountain – Section 8.2.5.*

BLM Special Status Species: Vegetation surveys (stand exam data) indicate that most of the stands proposed for thinning are lacking in habitat elements that support diverse populations of forest floor-associated species, especially CWD, snags (with loose or detached bark), deciduous understory and ground cover vegetation, or deep accumulation of leaf litter. Habitat and range data and previous surveys for mollusks and amphibians conducted over 9000 acres on the Cascades Resource Area since 1991 indicate that no mollusk Bureau Sensitive (BS) mollusk species are likely to be present in the proposed thinning units.

Oregon slender salamander, a Bureau Sensitive Species, is expected to occur in portions of the project areas where CWD of adequate size (generally >16" dbh) occurs (totaling 546 acres). These units have some decay class 5 (well-decayed) CWD and down logs. Snags and down logs in a less decayed state, representing future habitat, are still generally scarce to non-existent in all units. Presence is possible, but not expected, in the remaining portion of the project areas.

There are approximately 1,050 acres of marginal habitat for Northern Goshawks (a Bureau Sensitive species) in the Snakehouse and Round Mountain Project Areas, though none known or suspected to occur there. Goshawks are not suspected to occur as a nesting species in the Missouri Ridge and Annie's Cabin project areas due to the areas' elevation and proximity to the Willamette Valley.

Migratory Birds: Even-aged conifer stands provide habitat for a relatively high abundance of a few bird species (hermit warbler, red-breasted nuthatch, and golden-crowned kinglet, for example) which feed on insects gleaned from conifer foliage, however, these species are generally common in conifer stands of all ages. The light-limited understory of unthinned stands does not provide for a diverse community of shrub and ground cover plant species that are important in providing insect and plant food resources for bird species which are associated with living hardwood trees and shrubs, and on leaf litter. Common understory species in stands such as those proposed for thinning include winter wren and Swainson's thrush, both of which are also common (or more abundant) in stands with greater structural complexity.

Based on current habitat conditions, no migratory or resident bird species with BLM special status are expected to occur in the project areas.

Environmental Effects

3.2.5.1 Proposed Action

Remnants, Snags, Culls and CWD: Design features common to all project areas would protect existing large snags (at least 20" DBH) and old growth trees. This would effectively reserve the best existing habitat features for primary excavators (woodpeckers), secondary cavity users such as songbirds, bats and other small mammals. It is expected that these snags and trees would also be retained through future logging operations. Most units throughout the project areas would be expected to remain in a snag deficit condition (RMP p. 21) for one to three decades, until live trees reach a size (at least 20" DBH) at which they could persist and provide long-term habitat for cavity-dwelling species and provide CWD to meet RMP standards and guidelines when they fall. By accelerating the growth of live trees, larger material would be available sooner (than without thinning) to contribute additional large snags to the future stand. This would replace existing snags that are lost to CWD, and augment snag numbers for the future stand.

Management direction for the Matrix LUA (both GFMA and Connectivity) is to provide a renewable supply of down logs well-distributed across the landscape (RMP p. 21). In thinning units where trees are not now large enough to meet RMP standards and guidelines for down logs, the residual stands would take one to three decades for trees to attain adequate average diameter. It is expected that logs of adequate size would be available for future logging operations, if they should occur in these stands, that could be left on the ground to meet RMP standards and guidelines.

Management direction for RR and LSR is not specific for snags, CWD, and large live trees, however, silvicultural treatments are recommended that would be beneficial to the creation of late-successional habitat (LSR, RMP p.16) and to acquire desired vegetation characteristics needed to attain ACS objectives (RR, RMP p. 11).

The Proposed Action and associated design features for LSR and RR would contribute to accomplishing these management directions by promoting the growth large trees faster, and providing a renewable supply of snags and large CWD.

Federally Listed Species: Northern Spotted Owl: Effects to habitat for individual project areas are listed in *Section 10.3, Table 38,* and summarized for individual project area sections: *Annie's Cabin – Section 5.2.5; Missouri Ridge – Section 6.2.5; Snakehouse – Section 7.2.5; Round Mountain – Section 8.2.5.* The tables and summaries utilize terms which are defined below:

- "Degrade" habitat means to affect the quality of spotted owl suitable or dispersal habitat *without* altering the functionality of such habitat. Such treatments can have long-term benefits to spotted owls by encouraging late-successional characteristics to occur more rapidly. In the short-term, disturbance associated with accomplishing thinning (logging, road-building, etc,) may have a temporary negative effect on presence or movement of adults between blocks of suitable habitat, or movement of juveniles to disperse from natal territories. However, thinning maintains a minimum of 40 percent average canopy cover throughout the stand, therefore maintaining the ability of the habitat to accommodate movement of birds after thinning is completed.

- "Downgrade" suitable habitat means that, in the short term, the functionality of spotted owl suitable habitat is changed such that the habitat no longer supports nesting, roosting, and/or foraging behavior, but still functions as dispersal habitat.

In general, over the long term (>20 years), as stands respond to thinning, northern spotted owl habitat conditions are expected to improve. Residual trees would increase in size and be available for recruitment or creation of snags, culls and CWD for prey species and nesting opportunities for northern spotted owls, particularly in RR and LSR LUAs. In the GFMA portion of the Matrix LUA, these larger residual trees could contribute larger snags, culls and CWD to the future stand.

BLM Special Status Species: Oregon slender salamander would be expected to persist over the short term at sites within stands where CWD of adequate size and distribution occurs. *The Forest Ecosystem Management* (FEMAT) report (p. IV-149) recommends retention of logs >16" dbh at levels comparable to unmanaged stands as a mitigation measure in order to reach an 80 percent or better likelihood of achieving habitat conditions to support a stable, well-distributed population. It is unlikely that any stands in any of the project areas now have CWD amounts comparable to unmanaged stands. Thinning would assist in making this material available sooner.

Design features common to all project areas would minimize disturbance to existing CWD, though some mortality to individuals could result from crushing or loss of wood/soil contact.

Ground disturbance from tractor skidding trails and other ground-based logging equipment would be limited to ten percent of project unit areas, and therefore, no more than ten percent of potential Oregon slender salamander habitat within any unit. Some microhabitat drying would occur at the forest floor as canopies are opened-up, however, this would be minimal due to the high green tree retention after thinning. As canopies close (expected to occur 10 to 20 years), the effects of microhabitat drying would decrease.

As decay class 3, 4 and 5 CWD continues the process of deterioration after thinning, habitat conditions would become less suitable during the one to three decades that stands would be in the process of growing trees large enough to become long-lasting CWD. Habitat would be augmented to a minor degree in the interim period by mortality of smaller, less long-lasting material due to windthrow, disease, insects, and other factors not directly resulting from thinning operations. In the future, larger live trees that result from thinning could be converted to dead material by treatment or by natural processes, resulting in higher-quality forest floor habitat conditions for Oregon Slender Salamander and other CWD-associated species. Non-habitat would continue to be non-habitat until this material becomes available and begins to decay on the forest floor.

No northern goshawks are known to be present in the project areas, so none are likely to be affected by thinning. The marginal Northern Goshawk habitat in the Snakehouse and Round Mountain Project Areas would be temporarily degraded due to reduction of canopy closures below current levels. This habitat would become higher quality habitat as structural complexity of stands increases and larger trees become available for nest platforms.

Thinning in the project areas, either individually or collectively, would not be expected to contribute to the need to list any Bureau Sensitive species under the Endangered Species Act (IM OR-91-57, Oregon-Washington Special Status Species Policy) because habitat for the species that is known to occur in the project areas would be not be eliminated, habitat connectivity would not be changed, any habitat alteration would have only short-term negative effects, and long-term effects would be beneficial.

Migratory and Resident Birds: Changes in habitat structure are expected to have an immediate effect on bird communities in thinned stands. Thinning densely-stocked conifer stands would be expected to immediately enhance habitat suitability for species which prefer a less dense conifer canopy, and reduce habitat suitability for a small number of species (<5) that prefer continuous conifer canopies. Individuals of some species would be displaced from thinned areas, but would likely find refugia in nearby unthinned patches, and slowly return as stands respond to thinning and canopy closes. No species would be likely to become extirpated in stands as a result of thinning, though some less common species would be likely to enter thinned stands immediately in response to reduced canopy closure and tree density.

After the initial effects of thinning, overall bird species richness (a combination of species diversity and abundance) would be expected to gradually increase for up to 20 years (prior to the closing of the canopy again) as hardwood components of stand structure develop, plant species composition becomes more complex, and hardwood shrub layers, epiphyte cover, and snag density become more prominent within the stands.

For areas in Matrix LUA that would be subject to regeneration harvest at some future time (prior to the development of old-growth characteristics, as defined in FEMAT, IX-24, Glossary) legacy features (snags, large trees, large down logs, and retained hardwood trees and shrubs) would enhance bird species richness in the future stand. Specifically, larger, longer-lasting snags would be available for cavity-nesting species in the future stand. In RR and LSR areas for which late-successional conditions are intended to develop indefinitely, bird species richness would continue to increase, level-off when the canopy closes, increase as natural mortality of large trees creates canopy gaps, and level-off when old-growth characteristics are attained.

3.2.5.2 Cumulative Effects

Remnants, Snags, Culls and CWD and BLM Special Status Species: The proposed action alternatives would not contribute to cumulative effects to Remnants, Snags, Culls and CWD, BLM special status species because the effects of the proposed action alternatives in all project areas would be contained within the project area boundaries.

Migratory and Resident Birds: The proposed action alternatives would not contribute to adverse cumulative effects to migratory and resident birds because the proposed action alternatives in all project areas would be expected to enhance structural and spatial diversity of local forest habitat conditions over the life of the stands in the Matrix LUA, and provide longer-lasting legacy components for the future stand.

Northern Spotted Owl: The scale for cumulative effects for the northern spotted owl is the provincial home range of any known owl site. The scale was chosen because a goal for conservation and recovery for northern spotted owl would be to maintain suitable owl habitat within the provincial home range of known northern spotted owl sites (known owl sites), and maintain dispersal habitat between LSRs and known owl sites.

The proposed action alternatives would not contribute to cumulative effects to northern spotted owls because proposed the proposed action alternatives in all project areas maintain dispersal habitat within and between known owl sites and maintain suitable habitat within known owl sites.

3.2.5.3 No Action Alternative

Habitat Structure and Diversity: Stand structural diversity in all three LUAs would develop more slowly without management intervention. Stands would take longer to develop late successional habitat conditions, and animal communities would remain less diverse for a longer period of time. In upland Matrix areas, desirable habitat elements such as large trees, snags and CWD would not develop as quickly to provide a greater array of habitat options for a greater number of animal species over the life of the stand.

Northern Spotted Owl: There would be no change in spotted owl habitat and no effect to spotted owls. Habitat conditions would remain as described in the Affected Environment, and would continue to develop over time. In unthinned areas, it could take longer to develop suitable habitat conditions if left untreated.

BLM Special Status Species: There would be no change in current habitat conditions for BLM Special Status Species. As with the action alternatives, Oregon Slender Salamander habitat conditions would slowly become less suitable as existing well-decayed CWD disappears and no new material of suitable size falls to the ground to replace it.

This deficit of CWD of suitable size would last longer without thinning. Habitat would be augmented to a minor degree in the interim period by the addition of smaller, less long-lasting material, primarily due to suppression mortality (competition for resources between trees), disease, insects, and other factors.

Migratory and Resident Birds: There would be no immediate change in migratory and resident bird habitat and no effect to these species. Habitat conditions would remain as described in the Affected Environment, and would continue to develop slowly over time. Species richness of bird communities would not reflect the enhancement of vegetative diversity, and include fewer species for a longer period of time. Bird species richness in areas of the Matrix LUA that may be subject to regeneration harvest may not noticeably increase prior to harvest, and legacy features in the future stand would likely be smaller and less long-lasting, especially those that provide habitat for cavity-nesting species.

3.2.6 Air Quality and Fire Hazard/Risk

Source:
2006 Timber Sale Thinning EA - Fuels Management /Fire Ecology Fuels and Air Quality Report (Fuels Report)

Affected Environment

Air Quality: The air quality in the project areas is generally clean throughout most of the year with valley pollution more apparent during inversion periods. Most atmospheric conditions allow for good mixing because of predominately westerly flows. East wind events bring hotter air in the warmer seasons and potential for wildfires impacting valley.

Fire Hazard/Risk: The proposed project areas range from stands located in Wildland-Urban Interface (WUI), where developed lands (such as homes, businesses or agricultural lands) meet undeveloped lands, to areas which are up to three miles behind locked gates. Existing fuels (twigs to large logs) are typical for Douglas-fir stands in the Westside Cascades. Total dead fuel loading ranges from 10 to 30 tons per acre throughout the project areas. A large portion of the material is from previous stand management and is in various stages of decay. Fuels are all shaded by forest canopy. The project areas are primarily westerly aspects, but all aspects are represented. The primary sources of fire ignitions are lightning and humans.

Most of the project areas are in a mixed-severity fire regime (See *Table 13*). A mixed-severity fire regime exists where the typical fire, or combination of fires over time, results in a complex mix of patches of different severity, including unburned patches, low-severity patches where the fire may have been a low-intensity under-burn, moderate-severity patches where perhaps one-third to two-thirds of the vegetation is killed, and high-severity patches where almost all the vegetation is killed (Agee, 2004).

Table 13: *Modeling Predictions of Fire Regimes for the Project Areas*

Project Name	***Fire Return Interval***	***Severity***
Annie's Cabin	100 -200 years	mixed *
	50-100 years	mixed
Missouri Ridge	0-35 years	low
	<50 years	mixed
House Mountain	50-100 years	mixed
	100-200 years	mixed
Snakehouse	50-100 years	mixed
	100-200 years	mixed
Round Mountain	<50 years	mixed
	100-200 years	mixed

** See the preceding paragraph for a description of a mixed fire regime.*

Environmental Effects

3.2.6.1 Proposed Action

Air quality

Prescribed burning would occur under favorable wind and moisture conditions so the impact to air quality in the surrounding area would be minimal. Smoke produced from burning should have little impact on people because prevailing winds will carry smoke away from structures. Burning in November during rainy periods results in rain scrubbing smoke particles out of the air, minimizing effects to airshed quality. Redmond and Bend are the downwind communities of greatest concern during prescribed burning in the Cascades Resource Area, however, these communities are far enough to the east that most burning activities pose very little if any threat to air quality.

Fire Hazard/Risk

Fuel Load: Thinning from below would reduce ladder fuels, decrease tree crown density, and increase surface fuel load (slash). Directional falling of trees (where applied) away from open roads/trails and private property would move finer fuels further away from potential human caused ignition sources and leaves a fuel free area. The increase in slash would result in a higher risk of fire immediately following logging. Risk would be greatest during the first-year "red needle stage".

Fire risk along the roads would be reduced when slash piles are burned. Risk would decline within three years following harvest as needles and twigs detach and break down. Initiation and growth of under story vegetation would combine with break down of the slash and continue the decline in fire risk back to normal levels within 15-20 years following harvest.

Total fuel load immediately after falling would range between 40 to 60 tons per acre. After yarding, the dead fuel load left on site would range between 5 to 30 tons per acre, with 10 to 20 tons being less than 3 inches in diameter (fine fuels). (Photo Series for Quantifying Natural Forest Residues In *Common Vegetation Types of the Pacific Northwest, General Technical Report PNW-105, May 1980* and *PNW-51, 1976* and *Aids to Determining Fuel Models for Estimating Fire Behavior, GTR-INT-122, April 1982*).

Reduction of the thinning slash along open roads and within WUI would reduce the potential for a fire start to spread rapidly and increase the probability that the fire could be contained and controlled before property ore resource damage occurs.

Portions of the project areas would be maintained over time specifically as fuel breaks. Maintenance of this desired condition would be accomplished by repeated thinning, prescribed fire, piling and burning of fuels, or other mechanical treatments. The combination of thinning from below, directional falling, and slash reduction would reduce the expected intensity of future fires in the affected watersheds.

3.2.6.2 No Action Alternative

Current trends in human activity and related potential for fire starts would be expected to remain the same or increase. Most of the project areas are in mixed severity fire regimes with return intervals of 50 to 200 years. Since it has been 100 years since a fire occurred over the landscape, the potential for a fire is greater today. In the WUI and along accessible areas the potential for a start and the potential costs of a wildfire would be very high and unthinned stands have the potential to sustain crown fires because of the tree densities and monocultures now present.

3.2.7 Recreation, Visual Resources and Rural Interface (Common to All)

Source:
2006 Timber Sale Thinning EA – Recreation, Visual and Rural Interface Resources Report

Affected Environment

Affected Environment and Environmental Effects for the Annie's Cabin Project Area summarized in *Section 5.2.7*.

Common to Missouri Ridge, Snakehouse, and Round Mountain Project Areas:

General Setting: The three project areas are characterized by a forest setting and are accessed by paved county roads or paved/gravel forest roads.

All of the project areas fall within viewsheds that are a mix of public and private land ownership, limiting BLM's ability to manage these areas as a contiguous viewshed. Evidence of man-made modifications such as roads, power/phone utilities, livestock grazing and timber harvest are commonly observable in the general area.

Visual Resources: For the three project areas, 59 acres fall within Visual Resource Management (VRM) Class 2, which calls for low levels of change and retention of the existing landscape character. There are 608 acres in Class 3 which calls for the partial retention of the existing landscape character and 648 acres in Class 4, which allows for major modifications of the existing character of the landscape. See *Table 14* for a summary of acres in each VRM class by project.

Table 14: *Acres in Each VRM Class by Project Area*

Project Name	***VRM Class 2 (Acres)***	***VRM Class 3 (Acres)***	***VRM Class 4 (Acres)***
Missouri Ridge	0	6	247
Round Mountain	0	84	110
Snakehouse	59	518	256
Total (Proposed Action)	*59*	*608*	*648*

Within Class 2 and 3, portions of some of the units in each project can be seen from state highways or county roads for short periods of time (seconds to minutes) in the foreground-middle-ground (three to five miles). Topography, roadside vegetation and other foreground vegetation help screen most of the units from full view. Some of these same units are also observable in the middle ground from residences along county and private roads.

Recreation: Though there is no quantifiable visitation information available. Recreational use of units still open to motorized use appears to be low to moderate with scattered undeveloped campsites and user-established trails that are not authorized or maintained for public use. The most common recreational activities occurring in or near proposed units most likely include camping, hiking, mountain biking, horseback riding, target shooting, hunting, and motorized vehicle use. Where motorized access to units is restricted, similar non-motorized activities also occur, although most likely at much lower use levels.

Rural Interface Areas (RIAs): RIAs include BLM-administered lands that are adjacent to houses or within ½-mile of private land zoned for one to 40 acre lot sizes (RMP p. 39). In general, the concerns of property owners near timber harvest and hauling activities tend to be associated with potential noise, traffic and dust from logging and hauling activities, effects to scenic values, water quality and wildlife values, increased public access that may lead to problems with fire hazard, garbage dumping and vandalism. Some of the units in RIAs have one to two houses adjacent to or very near to the proposed units and haul routes. See Table 15 below for a summary of units with RIAs by project.

Table 15: *Project Area Units within RIAs*

Project Name	*Units with RIAs*
Missouri Ridge	MR7B, MR7C, MR7D, MR7E, MR7F, MR7G, MR7H, MR7I, MR7K, MR7L, MR7M, MR7N, MR7P, MR9A, MR16D
Round Mountain	None
Snake House	SH5D, SH7A, SH15A, SH15B

Environmental Effects

3.2.7.1 Proposed Action

General Setting: A forested appearance would be maintained in all of units after the thinning is completed, with the larger trees generally being selected for retention. Most of the observable disturbance to the units is associated with the equipment work needed to skid the trees to landings and to pile slash for burning. Evidence of forest floor vegetation disturbance and equipment tracks would be expected to decline as vegetation returns in three to five years.

Visual Resources: The proposed action would comply with VRM guidelines for Class 2, 3 and 4 categories. Changes to the landscape character are expected to be low and primarily associated with the disturbance to vegetation as described in the section above.

Recreation: Public use of the proposed thinning units would be restricted for weeks to months during active thinning activities. Similar recreational opportunities are available in other nearby public lands for those temporarily displaced by the thinning activities.

Rural Interface Areas: There may be some short term (weeks to months) noise and dust disturbance associated with equipment operation and hauling to residences adjacent to or near the thinning units and haul routes. Log truck use of BLM and county roads would increase slightly for weeks to months during hauling. Use of these roads by log trucks has occurred for many years in association with other timber harvest projects on public and private lands. Those residences adjacent to or very near units may see visual changes similar to the effects described above.

3.2.7.2 Cumulative Effects

There would be small short term (weeks to months) cumulative increase in log truck hauling to overall traffic near residences along county roads accessing the projects areas.

3.2.7.3 No Action Alternative

With the exception of unexpected changes (i.e. wildfire or disease), the proposed units would continue provide a forest setting for dispersed recreational activities. None of the recreation use restrictions or potential disturbances to residences as a result of thinning activities would occur.

4.0 COMPLIANCE WITH COMPONENTS OF THE AQUATIC CONSERVATION STRATEGY

Table 16 shows compliance with the four components of the Aquatic Conservation Strategy for all Action alternatives (1/ Riparian Reserves, 2/ Key Watersheds, 3/ Watershed Analysis and 4/ Watershed Restoration). Unless otherwise specified, this table applies to all four project areas.

Table 16: *Compliance of Components of the Aquatic Conservation Strategy*

ACS Component	***Project Consistency***
Component 1 - Riparian Reserves	Maintaining canopy cover along all streams and the wetlands would protect stream bank stability and water temperature. For project units in all watersheds, Riparian Reserve boundaries would be established consistent with direction from the *Salem District Resource Management Plan* (p. 10). Road and landing locations have been minimized in Riparian Reserves. Across all project areas, only one temporary multi-pass skid trail would cross intermittent headwater channel on a low gradient bench (in the Missouri Ridge Project Area, 6-2E Sec. 7). *See Sec. 6.2.2.1 for an analysis of the effects.*
Component 2 - Key Watershed	Snakehouse: The Little North Santiam River (LNS) watershed is a designated Tier 1 Key Watershed. No new permanent roads are proposed within the LNS portion of the project area. Riparian Reserve management direction has been incorporated in the design of thinning units in the project area (RMP p. 7).
Component 3 - Watershed Analysis	Annie's Cabin: *Molalla River Watershed Analysis*, [May, 1999]; Missouri Ridge: The watershed consists of approximately 2 % federal land. A watershed assessment for the Rock Creek/Pudding River fifth-field watershed is in-progress by the Pudding River Watershed Council. Applicable Riparian Reserve standards and guidelines were incorporated in the design of proposed thinning units in the project area (ACS ROD. p. 8 - 9). Thinning in this project area will not be implemented before the watershed analysis is completed. Snakehouse: Little North Santiam Watershed Analysis, [December, 1997]; *North Santiam Watershed Analysis (Lower and Middle Reach Sub-watersheds)* [June 2002] Round Mountain: *Crabtree Creek Watershed Analysis*, [July 2001]; and *Hamilton Creek Watershed Analysis*, [March, 1995] Thinning is consistent with the recommendations in the relevant watershed analyses.

ACS Component	*Project Consistency*
Component 4 - Watershed Restoration	Thinning in all LUAs in all project areas would be expected to result in long-term restoration of large conifers and the potential for material that would contribute to in-stream habitat complexity in. Variable density thinning in Riparian Reserves would further enhance terrestrial habitat complexity in the long and short term. Either renovation or decommissioning of the Cotton Creek Road in the Missouri Ridge Project Area and decommissioning of BLM Road # 9-3E-31 would result in improved control of road-related runoff and sediment production.

Neither the Proposed Action nor the no Action Alternatives would prevent the attainment of any of the nine Aquatic Conservation Strategy Objectives (*Section 14.2*).

5.0 ANNIE'S CABIN PROJECT AREA

5.1 Alternatives - Annie's Cabin

5.1.1 Alternative Development

An alternative to the Proposed Action was developed in order to reduce or mitigate physical disturbance and interruption of recreational use to the Molalla River Shared Use Trail System. Under this alternative, helicopter yarding is proposed for units west of the Molalla River within the trail system. The roads in the trail system (e.g. Huckleberry Trail) would not be used for hauling (as in the Proposed Action), and no skyline yarding towers or landings would be placed along these roads. These roads would still be used in their current condition for contractor and administrative access to thinning units. East of the Molalla River, timber harvest would still be accomplished primarily by utilizing ground-based and skyline logging systems.

An additional 147 acres would be thinned in areas that were excluded from the Proposed Action. These areas were excluded in order to reduce the number and length of new roads and the number of landings that would be required to thin slopes (not adjacent to existing roads) that are too steep for ground-based yarding systems. The range of trees per acre that would be retained, and minimum post-treatment canopy closure would be the same as with the Proposed Action.

5.1.2 Alternatives

Table 17 summarizes proposed management activities by action alternative. The Proposed Action is further described in *Section 2.2*.

Table 17: *Summary of Proposed Management Activities by Action Alternative for the Annie's Cabin Project Area*

Proposed Management Activities		***Proposed Action (Alternative 1)***	***Alternative 2 (Helicopter Alternative)***
Commercial Thinning (Acres)	Matrix LUA	500	604
	Riparian Reserve LUA	50	109
	Total Thinning Acres	566	713
Logging Systems (Acres)	Ground-based	336	122
	Skyline	230	154
	Helicopter	0	437
	Total	566	713
Road Work (miles)	Renovation	12.0	2.0
	Improvement	0	0
	New Road Construction	.6	.4
Fuels Treatments (Acres)	Directional Falling	62	72
	Pile Burning	189	241
	Machine Treatments	64	66
	Maintained as Fuel Breaks	181	213

Definitions can be found in Tables 3 - 5.

5.1.2.1 Connected Actions by Alternative

In addition to the Connected Actions summarized in *Section 2.2.1*, the following connected actions are specific to the Action Alternatives for the Annie's Cabin Project Area:

Common to Both Action Alternatives

- **Motorized Access Control**:
  - The existing berm blocking vehicle access to BLM Road # 6-3E-07 would be removed, and the road would be renovated for hauling and administrative access. A gate would be installed at the junction with the Molalla Forest Road.
  - Vehicle access to renovated roads behind existing gates would continue to be restricted to administrative purposes after thinning has been completed.
- **Fuels Treatments:**
  - Slash would be piled and burned in fourteen units.
  - 184 acres would be maintained as fuel breaks after the initial thinning treatment to maintain a desired canopy conditions. Maintenance would include additional thinning treatment, under-burning, and burning of slash piles.

Proposed Action Only

- **Roads and Access:**
  - The Huckleberry Road system (part of the Molalla River Shared Use Trail system) on the west side of the Molalla River would be used for hauling and yarding. Skyline yarding towers would be placed along roads, and culverts would be upgraded to current standards as necessary.

- **Landslide Crossing:**
  - One temporary crossing would be constructed over an old landslide on BLM Road 6-3E-30.02 in T6S, R3E, Section 31. Approaches would be constructed in order to provide "ramps" over the material, and a temporary roadbed would be constructed on top of the material to the minimum standards necessary for hauling logs away from units ANC6C and ANC6CC. Hauling would be completed in the same season in which the crossing is constructed.

Helicopter Alternative Only

- **Helicopter Landings:**
  - Two small areas (less than five acres each) in Unit AC7C would be cleared of all vegetation to serve as a landing, yarding and service areas for helicopters.
  - At least two additional helicopter landing areas would be selected where vegetation is already cleared for the purposes of yarding and servicing helicopters.

5.1.2.2 Project Design Features by Alternative

In addition to the design features described in *Section 2.2.2*, the following are additional design features unique to the Annie's Cabin Project Area. Most of these design features are intended to reduce physical disturbance to trails, disturbance to the visual setting near trails and restrictions on trail use in the Molalla River Shared-Use Trail System.

Common to both Action Alternatives

To minimize disturbance to federal Threatened and Endangered Species:

- A seasonal restriction would be in place from March 1 through July 15 for Units 5B, 5BB and 5C on habitat modification activities (felling, yarding, and road building) to minimize the risk of disturbance to northern spotted owls. The seasonal restriction could be waived if surveys indicate no presence of nesting spotted owls within a disturbance range (0.25 to 0.5 miles) of the units.

To minimize physical disturbance and interruption of recreational use to the Molalla River Shared Use Trail System:

- All existing footbridges would be protected.
- Where possible, trail system infrastructure would be temporarily removed and replaced after thinning activities are completed (signs and picnic tables etc.).
- Trail system infrastructure that cannot be moved (turnpikes and puncheons etc.) would be replaced in kind if damaged.
- Use of equipment along single-track trails would be prohibited. Equipment would only be allowed to cross (approximately 12 feet in width) single-track trails where necessary and restoring trail connectivity would be required.
- Where necessary, routes created by equipment use that cross roads or trails would be blocked (usually with logs) to discourage new trails.
- Tree debris associated with the thinning activities would be piled and burned as far away as is practical from roads and trails.
- Any vegetation debris left on roads or trails during thinning activities would be cleared away after operations are completed.

- Trees removed would be felled and yarded away from single-track trails to the extent possible.
- A maximum stump height of six inches would be required within 25 feet of single-track trails.
- Safety related signs and barricades would be required where necessary while thinning, hauling and fuel treatment activities are occurring.

Proposed Action Only

To minimize physical disturbance and interruption of recreational use to the Molalla River Shared Use Trail System:

- Units in the trail system area would be divided into three zones from north to south along separate haul routes. Contactors would be required to finish all work in one zone (including clean-up of roads and trails) before starting activities in the next zone.
- Any road used for log hauling would be graded as necessary after hauling is completed.
- If needed, gravel no larger than 1-inch in size would be used on the top rock layer.
- Required brushing and pruning of haul roads would be done by hand.
- Where necessary, roadsides and unrocked landings would be replanted with native seed to help restore a more natural appearance.
- During hauling activities, contractors would be required to prevent public motorized use of roads in the trail system.

To reduce potential traffic safety hazards during the peak recreation use period (all Units in the Annie's Cabin Project Area)

- Hauling activities would be prohibited during the weekends or holidays when operating between Friday of Memorial Day weekend and Monday of Labor Day weekend.

Helicopter Alternative Only

To minimize disturbance to federal to BLM Special Status Species:

- Helicopter operations would be avoided within one mile of the golden eagle historic nest site (Units 5B, 5BB, 5C, 6C, 6CC, and 31C) between January 15 and August 1 of each calendar year of operation unless surveys to protocol determine that nesting is not occurring.

To reduce potential public safety hazards during the peak recreation use period for units in the Molalla River Shared-Use Trail System

- Falling, yarding, hauling and fuels treatment activities would be prohibited during the peak recreational use season between Friday of Memorial Day weekend and Monday of Labor Day weekend.

To reduce potential public safety hazards during the peak recreation use period for units outside of the Molalla River Shared-Use Trail System

- Hauling activities would be prohibited during the weekends or holidays when operating between Friday of Memorial Day weekend and Monday of Labor Day weekend.

5.2 Affected Environment and Environmental Effects – Annie's Cabin

This section describes the current condition and trend of affected elements of the existing environment and the environmental effects of the Proposed Action and Alternative 2 that are unique to the Annie's Cabin Project Area. Refer to *Section 3.2* for a description of the affected environment and environmental effects that are common to all project areas. Unless described in this section, there are no elements of the affected environment or environmental effects resulting from the Proposed Action or the No Action alternative that are unique to this project area.

5.2.1 Vegetation and Forest Stand Characteristics

Source:
Annie's Cabin Silvicultural Prescriptions – 2006 Timber Sale Thinning EA (Silvicultural Prescription); Cascade Resource Area Botanical Report – Annie's Cabin T S
See *Section 3.2.1* for affected environment and environmental effects to vegetation and forest stand characteristics common to all project areas.

Affected Environment

Stand History: The project area consists of stands that have been actively managed for timber production for the past 50 years. For purposes of description it can be divided into two distinct parts based on past ownership and management.

Acquisition through land exchange: The area in sections 7, 18, 19, 30 and 31 of T6S, R3E was acquired through a land exchange with Hanson Natural Resources Company in 1992. The acquired land consists of managed plantations that were either established following logging or were converted from pasture or farmland. The 1956 photos show some of these stands as pasture. These plantations show evidence of intensive practices to insure maximum utilization of the site for timber production. They range in age from 40 to 70 years. Although we do not have records of past management, we can assume the slash and brush following logging was tractor piled and burned; the new plantations received brush control with herbicides; pre-commercial thinning (PCT) was applied at age 10-15, and fertilization was applied following PCT. See *EA Section 10.1*, *Table 28* for a summary of vegetation and treatment history.

Long-Term BLM Ownership: The rest of the project area in Sections 5 and 6 of T7S, R3E has been in BLM management since the O&C Act of 1937. These are either natural stands that originated following fire or as plantations following logging. They range in ages from 40 to 100. The older stands in Section 5 had a commercial thinning in 1978. The younger stands have had intensive practices applied including PCT and fertilization. See *EA Section10.1, Table 29,* for a summary of vegetation and treatment history.

5.2.2 Hydrology

Source:

Annie's Cabin Hydrology/Channels/Water quality report

See *Section 3.2.2* for affected environment and environmental effects to hydrology common to all project areas. *Section 3.2.2.2* describes cumulative effects common to all project areas.

Affected Environment

The project area contains several small headwater streams tributary to the Molalla River, many of which dry-up completely during late summer and fall. Most of the project area streams are in proper functioning condition: well shaded, stable beds and banks, adequate quantities of wood, sediment and a diversity of riparian species. Stream shading from riparian vegetation is adequate to buffer streams from temperature increases. None of the project area streams are listed on the state's 303d list or in the 319 Report for water quality issues. However, local streams flow directly into the Molalla River which is listed for exceeding summer temperature standards and coliform bacteria. Thinning units range from one eighth to three-quarters of a mile from the Molalla River. Recognized beneficial uses of in-stream flows include anadromous fish, resident fish, recreation, and esthetic value. The Molalla River is a municipal watershed for the cities of Molalla and Canby.

During field assessments for the proposed project, several road stream crossings where identified with blocked culverts and eroding fills that are currently a chronic sediment source. Some of these have diverted stream flow onto old road surfaces which have been eroded for many years by the force of the flowing water. Most of these problem road/stream intersections are located along the horse/hiking trails in T6S, R3E, Sections 30 and 31. Erosion associated with the trail system contributes, on a small scale, to cumulative levels of fine sediment and turbidity in the watershed.

Material that originated from a mass-wasting event above unit 31C that covers a short (<100') section Huckleberry Road in T6S, R3E, Section 31 (described in *EA Section 5.2.4)* appears to be stable. Other than settling, little additional movement appears to have occurred since the original event, and does not appear to be contributing to cumulative levels of fine sediment and turbidity in the watershed.

Environmental Effects

Effects resulting from either action alternative would be within the range of effects disclosed in the RMP/FEIS. Both action alternatives would be unlikely to have any effect on designated beneficial uses, for the reasons described in the following sections.

5.2.2.1 Proposed Action

In addition to the effects common to all project areas described in *EA Section 3.2.2.1*, repair of the roads in Sections 30 and 31 would reduce existing road effects on local and watershed hydrology. Repairs to these roads at stream crossings would maintain channel alterations currently in place.

In some cases, larger culverts and more stable fills will allow for improved channel morphology over the long term by reducing sediment inputs at the crossing and by increasing the culvert's capacity to accommodate the stream during peak flows (i.e., passage of water, wood and bed-load). Stream crossing maintenance would likely result in small measurable direct effects, such as turbid water during the active work period followed by slight increases in bank erosion and some limited channel incision above and below culvert replacements. Almost all of these effects would be a result of improvements in the road infrastructure. Effects to these features as a result of the proposed action would be observable during repair and in the first winter following implementation but would quickly subside in the following years.

The proposal to ramp over the top of the slump material currently blocking the Huckleberry Road in T6S, R3E, Section 31 (see *EA Section 5.2.4, Geology and Soils*, for a description of the slump) is unlikely to affect the stability of the slump material in any way and therefore is unlikely to have any observable effect on long term water quality or sediment delivery at this site. Overall, increases in sediment delivery to streams due to mass wasting are unlikely to result from the work associated with ramping over the slump.

5.2.2.2 Alternative 2 (Helicopter Alternative)

Helicopter yarding would eliminate a large proportion of the surface disturbance attributable to road repair and construction, hauling and yarding in and around RR LUAs as described in the Proposed Action. No stream crossing culverts would be upgraded or replaced. This would effectively eliminate all sediment delivery to local streams attributable to these actions in all areas where helicopter yarding is utilized. In addition, the remaining areas that would be disturbed by these activities under Alternative 2 are nearly all outside of RRs. In the short term, this would likely reduce direct sediment delivery to streams and increases in turbidity under this alternative to levels that are not detectable.

However, this alternative would defer repair and upgrading of existing infrastructure. As indicated in the *EA Section 5.2.2*, fill failures, undersized culverts, diverted streams at blocked culverts and rutted road surfaces adjacent to streams in T6S, R3E, Sections 30 and 31 are currently contributing to chronic sediment and turbidity in this watershed. By forgoing repair of these problems, this alternative would retain these chronic sediment sources. Thus, over the long-term, this alternative is likely to result in as much or more sediment contribution to the watershed as the Proposed Action.

5.2.2.3 No Action Alternative

In addition to effects described in *EA Section 3.2.2.3*, over the long-term, sediment produced by the ongoing erosion associated with the trail system and fill failures, undersized culverts, diverted streams at blocked culverts and rutted road surfaces adjacent to streams in T6S, R3E, Sections 30 and 31 will continue to contribute, on a small scale (limited magnitude), to cumulative levels of fine sediment and turbidity in the watershed.

5.2.3 Fisheries and Aquatic Habitat

Source:

2006 Timber Sale Thinning EA - Fisheries and Aquatic Habitat (Fisheries Report)

See *Section 3.2.3* for affected environment and environmental effects to *fisheries and aquatic habitat* common to all project areas.

Affected Environment

Streams within the project are predominantly small steep channels not capable of supporting fish. Only two fish-bearing streams flow adjacent to proposed project units. Shotgun Creek supports a population of cutthroat trout (*Oncorhynchus clarki*) where it flows between Units AC30A and 31A, and Bear Creek supports cutthroat trout on the south side of Unit AC5B. Eight live stream culverts are in need of replacement along the Huckleberry Road haul route (part of the Molalla River Shared-Use Trail system), ranging from approximately 0.1 to 0.5 mile upstream of the mainstem Molalla River.

Threatened and Endangered Species : Upper Willamette River (UWR) steelhead trout and UWR Chinook salmon, both of which inhabit the Molalla River downstream of all project units, are listed as 'threatened' under the Endangered Species Act of 1973 (ESA). Consultation with NOAA Fisheries is required for projects that "may affect" ESA listed species.

See *Section 10.2, Table 36* for details of fish presence in proximity to project area units.

Environmental Effects

5.2.3.1 Proposed Action

In addition to the effects described in *Section 3.2.3.1,* sediment inputs to streams along the haul routes on the west side of the river would likely increase temporarily. The primary causal mechanism of sedimentation would be the replacement of up to eight live-stream culverts along the haul routes within the Molalla River Shared Use Trail System. Project design features that include conducting work only during the designated in-stream work period for the affected watershed, sediment traps and settling ponds in the streams downstream of the culverts would minimize the sediment yield, but in the short term (while work is being done and immediately after the first flush of rainfall), sediment and turbidity would still be expected to reach the Molalla River. Though not expected, these temporary short-term increases in sediment have the potential to reduce reproductive success, reduce juvenile survival and retarded growth if fish or fish eggs are present. These effects would decrease in the long-term (after the first flush of rainfall), having no lasting effect on fish.

5.2.3.2 Alternative 2 (Helicopter Alternative)

No impact to fish or aquatic habitat would be expected. Sediment effects from hauling would be reduced because helicopter yarding would preclude the need to use the road system west of the Molalla River for hauling, and eliminate the immediate need to replace undersized and deteriorating culverts along the haul routes. Roads accessing the units on the east side of the river are generally in better condition and would not require culvert replacements in order to haul timber.

Timber hauling from the units on the east side of the river would be conducted during conditions that would prevent direct inputs to streams of road-derived sediment.

5.2.3.3 No Action Alternative

No additional sediment beyond current background levels would enter project area streams as a result of live stream culvert replacement. The sediment inputs contributed by the road/stream intersections located along the horse/hiking trails of the Molalla River Shared-Use Trail System (described in *Section 5.2.2*, Hydrology Affected Environment) do not currently contribute negative impacts to fish or fish habitat, because there are no fish in the streams directly affected by the sediment, and amount of sediment that reaches the Molalla River is negligible relative to the volume of flow in the river.

5.2.4 Geology and Soils

Source:

Timber Sale Thinning EA Soils Report
Annie's Cabin Hydrology/Channels/Water quality report

See *Section 3.2.4* for affected environment and environmental effects to *geology and soils* common to all project areas.

Affected Environment

Material that originated from a mass-wasting event above unit 31C that occurred prior to 1982 covers a short (<100') section of Huckleberry Road in T6S, R3E, Section 31, adjacent to Unit 31C. The slide lost momentum as slope decreased below the origin, and came to rest on the road bed, which was then and still is stable. The material is up to 15' deep and is covered with small trees and vegetation. Other than settling, little additional movement appears to have occurred since the original event.

Environmental Effects

5.2.4.1 Proposed Action

The material covering Huckleberry Road is currently in a stable condition on a relatively flat surface, and is unlikely to move further down slope as a result of work required to ramp over it, or as a result of hauling logs over it.

5.2.4.2 Alternative 2 (Helicopter Alternative)

Though a larger portion of the project area would be thinned under Alternative 2, compaction resulting from skid roads, haul roads and landings would occur on approximately 30 fewer acres, all in the units west of the Molalla River. East of the Molalla River, soil compaction on up to ten additional acres would result from the construction of two helicopter landing and service areas in Unit 7C. A maximum of 37 acres would be compacted (including areas compacted by previous logging operations) under Alternative 2, or approximately five percent of the project area (See *Table18*).

Table 18: *Comparison of soil surface compaction resulting from the Annie's Cabin Action Alternatives*

Proposed Management Activities		***Proposed Action (Alternative 1)***	***Alternative 2 (Helicopter Alternative)***
Total Thinning Acres		566	713
Acres compacted by logging systems (estimate based on skid roads, haul roads and landings in up to 10% of the project area)	Ground-based	34	12
	Skyline	23	15
	Helicopter	0	0
	Total	57	27
Acres compacted by road work (based on 20' width of compaction)	Road Renovation†	0	0
	Road Improvement†	0	0
	New Road Construction	1.5	.9
Acres compacted by helicopter operations	New landings	0	10
Totals		*56.5*	*37.9*

* Includes natural-surface roads within units only. Compacted paved and rock-surface haul roads are currently in use as part of the Salem BLM transportation system; the road mileage summarized in *Table 4 (Section 2.2.1, Connected Actions)* includes routes outside of the project areas. † Acres already in a compacted condition

5.2.5 Wildlife

Source:

2006 Timber Sale Thinning EA - Wildlife Report

See *Section 3.2.5* for affected environment and environmental effects to wildlife common to all project areas.

Affected Environment

Special Habitats, Remnants, Snags and Coarse Woody Debris (CWD)

Stand exam surveys found that only Unit 30B provides large coarse woody debris material that meets the RMP standards and guideline of 240 linear feet per acre of CWD at least 20" in diameter at the large end, 20 feet in length, and in decay classes 1 and 2 (RMP p. 21). Snags at least 20' DBH and over 15' tall (all decay classes) are present only in Units 31A, 31B, 31C, 31E, 5B, and 6E. Remnant old growth trees are present only in Unit 6E. Refer to *Section 10.3, Table 37,* for a unit-specific summary.

Threatened Species - Northern Spotted Owl

Bear Creek Drainage: The proposed thinning would affect marginally suitable owl habitat[3] within the Bear Creek Drainage: approximately 137 acres in the proposed action, and 145 acres in Alternative 2.

Lower Molalla Drainage: The proposed thinning would affect owl dispersal habitat within the Lower Molalla Drainage: approximately 429 acres in the proposed action, and 572 acres in Alternative 2. Spotted owls have not been observed in the lower Molalla drainage.

[3] Suitable habitat is also dispersal habitat.

The closest known spotted owl site is located 1.2 to 6 miles to the east of the proposed units in the Pine Rock area. The Pine Rock site was occupied by a pair in 2004. There are no unmapped LSRs ("unmapped" LSRs – RMP pp. 15, 32) in the vicinity of the proposed units.

BLM Special Status Species

Oregon slender salamander: Stand exam surveys found that only Unit AC30B provides large material which would eventually become suitable, long-lasting soft CWD habitat and meet the RMP Standard and Guideline (at least 20" in diameter at the large end, 20 feet in length, and in decay classes 1 and 2 (RMP p. 21). Units 6E, 6C, 7C, and 30B have concentrations of well-decayed CWD in size classes adequate to provide marginal habitat now, though material of adequate size for future habitat is not present.

Golden eagle: A golden eagle pair formerly nested in the area of the confluence of Bear Creek and the Molalla River. No nesting activity has been observed since 1994, though individual birds have occasionally been seen since then.

Environmental Effects

5.2.5.1 Action Alternatives

Threatened Species - Northern Spotted Owl

Species: No impacts to the Pine Rock pair from thinning or connected actions would be expected due to the distance from the nearest project area unit. Seasonal restrictions on habitat modification activities (felling, yarding, and road building) would minimize the risk of disturbance to nesting northern spotted owls at sites not currently identified (See EA *Sec. 5.1.2.2).*

Habitat: No suitable habitat would be altered (downgraded or degraded) within the provincial home range radius of any known spotted owl sites under either Action Alternative. Under the Proposed Action, approximately 137 acres of marginally suitable habitat would be downgraded in the Bear Creek Drainage, and 429 acres of dispersal habitat would be degraded in the Lower Molalla Drainage as a result of thinning and connected actions in the short term.

Under Alternative 2, approximately 145 acres of marginally suitable habitat would be downgraded in the Bear Creek Drainage, and approximately 572 acres of dispersal habitat would be degraded in the Lower Molalla Drainage in the short term.

These stands would be maintained as dispersal habitat after harvest. In the long term, canopy closures would increase and these stands could attain suitable habitat conditions within 10 to 40 years. See *Section 3.2.5,* environmental effects common to all project areas, for a description of effects resulting degrading dispersal habitat and downgrading suitable habitat.

BLM Special Status Species*:* Effects to Oregon slender salamander habitat common to all project areas is described in *Section 3.2.5.*. No adverse effects to golden eagles, if present, are expected from ground-based or skyline operations or connected actions, due to the distance of the known historical nest sites from any unit.

5.2.6 Air Quality and Fire Hazard/Risk

Source:

2006 Timber Sale Thinning EA - Fuels Management /Fire Ecology Fuels and Air Quality Report (Fuels Report)

See *Section 3.2.6* for affected environment and environmental effects to *air quality and fire hazard/risk* common to all project areas.

Affected Environment

All of the units in sections 7, 18, 30 and 31 are in Wildland / Urban Interface and include "at risk communities" as defined by the Healthy Forest Restoration Act of 2003. This definition applies to the interface communities (listed in the notice of 2001[4]) of Molalla and Dickey Prairie, and to groups of homes and other structures with basic infrastructure and service (such as utilities and collectively maintained transportation routes). Also, the dispersed camping sites along the Molalla River and unauthorized use of campfires increase the potential for a wildfire start.

Environmental Effects

5.2.6.1 Proposed Action

Effects resulting from the Proposed Action are described in *Section 3.2.6.*

5.2.6.2 Alternative 2 (Helicopter Alternative)

The amount of dead fuel left behind after yarding is expected to be at the high end of the expected range (up to 30 tons per acre –see *Section 3.2.6.1*). Helicopter yarding, which leaves treetops with limbs attached, would create an arrangement of fuels that is more vertical than with conventional ground-based or skyline logging systems.

- *Fuel Treatment Areas:* Slashing would be done where necessary to reduce the tops to manageable size for hand-piling in the fuel treatment areas. The increase in acres thinned would result in approximately 60 acres of additional down-slash fuel reduction treatments, or 34% of the total acres.
- *Areas without Fuel Treatment:* The resulting fuel load would make these areas more difficult to contain if a wildfire was to start. However, the portions of the project area that would be maintained over time specifically as fuel breaks (repeated thinning, prescribed fire, piling and burning of fuels, or other mechanical treatments), would be expected to reduce the risk of fire reaching these areas.

[4] "Wildland Urban Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire" Title V, Dept. of the Interior and Related Agencies Appropriations Act, 2001 (114 Stat. 1009) (66 Fed Reg. 753, January 4, 2001)

5.2.7 Recreation, Visual Resources and Rural Interface

Source:
2006 Timber Sale Thinning EA – Recreation, Visual and Rural Interface Resources Report

Affected Environment

General Setting: The units in the Annie's Cabin Project are characterized by a forest setting and are accessed by paved county roads or paved/gravel forest roads. All of the units fall within viewsheds that are a mix of public and private land ownership, limiting BLM's ability to manage these areas as a contiguous viewshed. Evidence of man-made modifications such as roads, power/phone utilities, and timber harvest are commonly observable in the general area. Public concerns were expressed during project scoping about the potential effects of the Annie's Cabin Project on scenic and recreational values in the Molalla River Corridor and the Molalla River Shared-Use Trail System.

Visual Resources: *Table 19* shows acres by Visual Resource Management (VRM) Class. Most of the unit acres in Class 2 are located along the Molalla River. Due to the screening provided by vegetation along South Molalla Road and between the Molalla River and the units, only very short glimpses (seconds) of the units are observable from the road or river. Unit acres in Class 3 are located along an approximately 1.5 mile segment of Dickey Prairie Road and would be observable for seconds to minutes while driving both directions. The units would also be observable from several residences along Dickey Prairie Road. Most of the unit acres in Class 4 are located in an area that includes the Molalla River Shared-Use Trail System. Depending on the location and length of their trip, trail users would pass in and out of units along the trail system.

Table 19: *Comparison of the Action Alternatives by Visual Resource Management (VRM) Class*

Acres by VRM	Alternative 1 (Proposed Action)	Alternative 2 (Helicopter Alternative)
VRM Class 2	26	65
VRM Class 3	110	117
VRM Class 4	430	535
Total Acres by VRM	566	717*

** The size of units increased, but no major differences to the views of the units were identified.*

Recreation: All of the units (except AC5B, AC5BB and AC5C) are within the Molalla River/Table Rock Special Recreation Management Area (SRMA). SRMA designation indicates that the BLM has recognized a particular area as needing a greater level of recreation investment or management. No special provision was provided as part the SRMA designation to preclude timber harvest except in Table Rock Wilderness (RMP, Page 44). Popular recreation activities include swimming, camping, fishing, hiking, mountain biking, horseback riding, off-highway motorized vehicle use, target shooting and hunting.

Visitation along the Molalla River is estimated to be 7,600 people per year and 3,750 people per year for the Molalla River Shared-Use Trail System. Most of the visitation occurs during the peak use season between the end of May and beginning of September.

Haul routes from the units within or adjacent to the Molalla River Shared-Use Trail System tie into South Molalla Road, a paved two-way road which parallels Molalla River. There are several designated undeveloped camping and day-use sites located between South Molalla Road and the Molalla River. Recreational traffic along South Molalla Road is the highest during the peak recreation use season and log truck traffic currently on this road occurs year round.

Units in the Molalla River Shared-Use Trail System: In the early 1990s the BLM established the Molalla River Shared-Use Trail System by closing 13 miles of rock-surfaced logging roads to motorized use by the public. Though closed to motorized use by the public, these roads are still part of the BLM's resource management transportation system.

In 1994, the BLM approved the development of additional single-track trails in the *Molalla River Recreational Corridor Equestrian/Mt. Bike Trails Decision Record and Environmental Assessm*ent (Molalla Trails DR/EA). The Molalla Trails DR/EA stated that the development of the trails would not exclude timber harvest or the management of other resources (Molalla Trails DR/EA, p. # 2). Since that time, approximately 12 miles of single-track trails have been developed by BLM in partnership with many volunteer groups and individuals. These single-track trails are generally closed during winter and spring months when wet conditions could result in excessive damage to trail tread. See *Table 20* for a comparison of the Molalla River Shared-Use Trail system affected by the action alternatives.

Table 20: *Comparison of the Action Alternatives by Miles of Roads or Trails in Molalla River Shared Use System within or adjacent to proposed thinning units*

Miles of Road or Trail that are part of the Molalla River Shared-Use Trail System:	Alternative 1 (Proposed Action)	Alternative 2 (Helicopter Alternative)
Single track trails within thinning units	.5	1.12
Single track trails within 50 feet of thinning units	1.5	1.05
Roads within thinning units	1.13	**
Roads within 50 feet of thinning units	1.9	**

** *Helicopter Alternative roads in the trail system would only be used for the transport of equipment used for slash piling.*

Most of the roads that are part of this project and are being used as trails still have the appearance of roads (See *Photos 5-7*). Road 6-3E-7 (Amanda's Trail) has grown in to the extent that it looks more like a trail (See *Photo 8*).

Units Outside of the Molalla River Shared-Use Trail System: Most of the roads going into units along Dickey Prairie Road are blocked or gated. Due to lack of easy road access and parking, recreational use is likely to be low. Recreational use of the units in T. 7 S., R. 3 E., Section 5 are similar to that described for the other project areas (see *EA Section 3.2.7*), with low to moderate use consisting primarily of camping, hunting, target shooting, motorized vehicle use and to a lesser extent hiking, mountain biking and equestrian use.

Rural Interface Areas: Only a portion of Unit AC7C falls within a RIA. Though not within an RIA, there are several houses near units along Dickey Prairie Road.

Photo 5: *Road 6-3E-30.2 (Huckleberry Trail)*

Photo 6: *Road 6-3E-30.3 (Bobcat Road)*

Photo 7: *Road 6-3E-30.5 (Red Tree Vole Road)*

Photo 8: *Road 6-3E-7 (Amanda's Trail)*

Environmental Effects

5.2.7.1 Proposed Action

General Setting: While there would be observable disturbance after thinning, a forested setting would be maintained in all of the units, with the larger trees generally being selected for retention. Refer to the photos under the *Section 3.2.1.1*. Several design features specific to Annie's Cabin have been developed to reduce potential effects to the Molalla River Shared-Use Trail System.

Units in the Molalla River Shared-Use Trail System

Visual Resources: Effects to the landscape character are expected to comply with VRM Class 4 guidelines. Most of the changes to the landscape character are associated with disturbance to vegetation by equipment use across or near trails and roads, the clearing of vegetation for landings and the piled slash. Equipment use across or adjacent to single-track trails would temporarily disturb forest floor vegetation (if present) and equipment routes would most likely be observable.

Low-stumping within 25 feet of trails, along with falling and skidding the removed trees away from single-track trails segments would help reduce the amount of vegetation disturbance and equipment tracks observable from the trails.

For trail segments in units, equipment crossings would be needed. Typically, skidding routes are located about every 150 feet. Given that there is approximately 0.5 miles (2,640 feet) of single-track trail in units, approximately 15 to 20 single-track trail crossings (12 feet wide each) may be necessary. The greatest change in appearance to the trails at these crossings would be associated with the loss of forest floor vegetation (if present) and the equipment tracks extending from each side of the trail crossing. Equipments crossings are not expected for single-track trails adjacent to units. Piled slash may be observable for one summer season after thinning is completed until it can be burned in the following fall or spring.

Evidence of disturbance to forest floor vegetation and the equipment tracks would be expected to decline in approximately three to five years as vegetation returns. For units where very little forest floor vegetation was originally present, the long term forest appearance of the units may be enhanced, as the increase in light provides for the return of vegetation at greater levels than existed prior to thinning.

Some trees and shrubs along the haul roads in the trail system would need to be removed or pruned where clearance is inadequate for log truck passage (14 feet high and four feet wide on either side of the road). Hand pruning and brushing would be done in a manner to minimize observable changes where vegetation is removed. There may be some vegetation disturbance in areas where road culverts are replaced.

These visual changes are not expected to change the general appearance and character of the majority of the roads used for truck hauling. BLM Road 6-3E-7 (Amanda's Trail) would require additional clearing of vegetation and would likely return to the appearance of a road rather than a trail.

Several landings would be needed to deck logs along roads in or adjacent to units. Trees and other vegetation at these landings (up to approximately 45 feet by 65 feet in size) would be removed. Any individual landing would only be observable for short periods of time (minutes) as visitors hike or ride past them. Unrocked landings would be replanted with native grasses to help restore a more natural appearance. Where necessary, roadsides would also be seeded with native grasses for the same reason. New road construction is minimal would result in similar effects as landings.

Recreation: To the extent possible, public use of roads and single-track trails would only be restricted in one of three zones at a time (See *Section 5.1.2.2, Project Design Features by Alternative)*. This would allow at least part of the trail system to remain open for use at any given time.

It is estimated that each zone would take weeks to months to complete and that this work would occur sometime between May and October (during dry conditions) over the three-year contract period. Segments of roads may also be closed to public use for short periods of time (days) while culverts are being replaced or road renovation is under way.

A road surface compatible with hiking, biking and equestrian use would be maintained. After culvert replacement and truck hauling is completed, the roads would be graded where necessary to reduce any potholes or wash-boarding that might result from hauling and any gravel used would be no larger than one inch in size. All of the roads in the trail system would remain closed to public motorized vehicle access. Installing a gate at the end of Road 6-3E-7 (Amanda's Trail) would allow easier access for trail maintenance, fire suppression and rescue operations.

Visitors with no tolerance for any visual changes to the recreation setting may choose to visit other areas that have no forest management activities. Located within 15 miles of the Molalla Trail System, trails in Table Rock Wilderness could provide an alternative for hikers and equestrians seeking a more primitive experience. Given the trail system's convenient proximity to several rural and urban communities, it is expected that visitation would return to near pre-thinning levels once all thinning activities are completed.

Units Outside the Molalla River Shared-Use Trail System

Recreation and Visual Resources: Effects would be similar to those described for the other three thinning project areas in *Section 3.2.7.* In addition, campers and day-use visitors along Molalla River and Road would experience noise disturbance associated with truck hauling traffic. Truck hauling would most likely occur during the peak-use summer season over the three-year contract period. Truck hauling has historically been part of the vehicle use on South Molalla Road.

Rural Interface Areas: Effects would be similar to those described for the other three thinning project areas in *Section 3.2.7.*

5.2.7.2 Alternative 2 (Helicopter Alternative)

The environmental effects would be similar to that described under the Proposed Action except for the following differences:

Units in the Molalla River Shared-Use Trail System:

Visual Resources: Visual effects to single-track trails and roads would be less than those described for the Proposed Action because no skidding or truck hauling associated with removing the trees would be needed. Equipment would still be used to pile slash, but the number of passes would be much lower and trails would be avoided as much as possible. Overall very little evidence of the thinning would be expected to be observable within one to three years.

Recreation: Restrictions on public use of the trails and roads would still occur over several weeks or months, but most of the work would occur outside the peak recreation use season. Given that the single-track trails are normally closed from late fall through spring due to wet conditions, the number of trail users temporarily displaced would be much lower for this alternative.

Units Outside the Molalla River Shared-Use Trail System

Molalla River and Road: Campers and day-use visitors would experience noise disturbance associated with helicopter activity and truck hauling noise. Some sites may need to be closed if there are safety concerns associated with helicopter landings or over-flights. The number of visitors affected should be minimal given that the work would most likely occur during the spring, fall or winter when visitation is much lower.

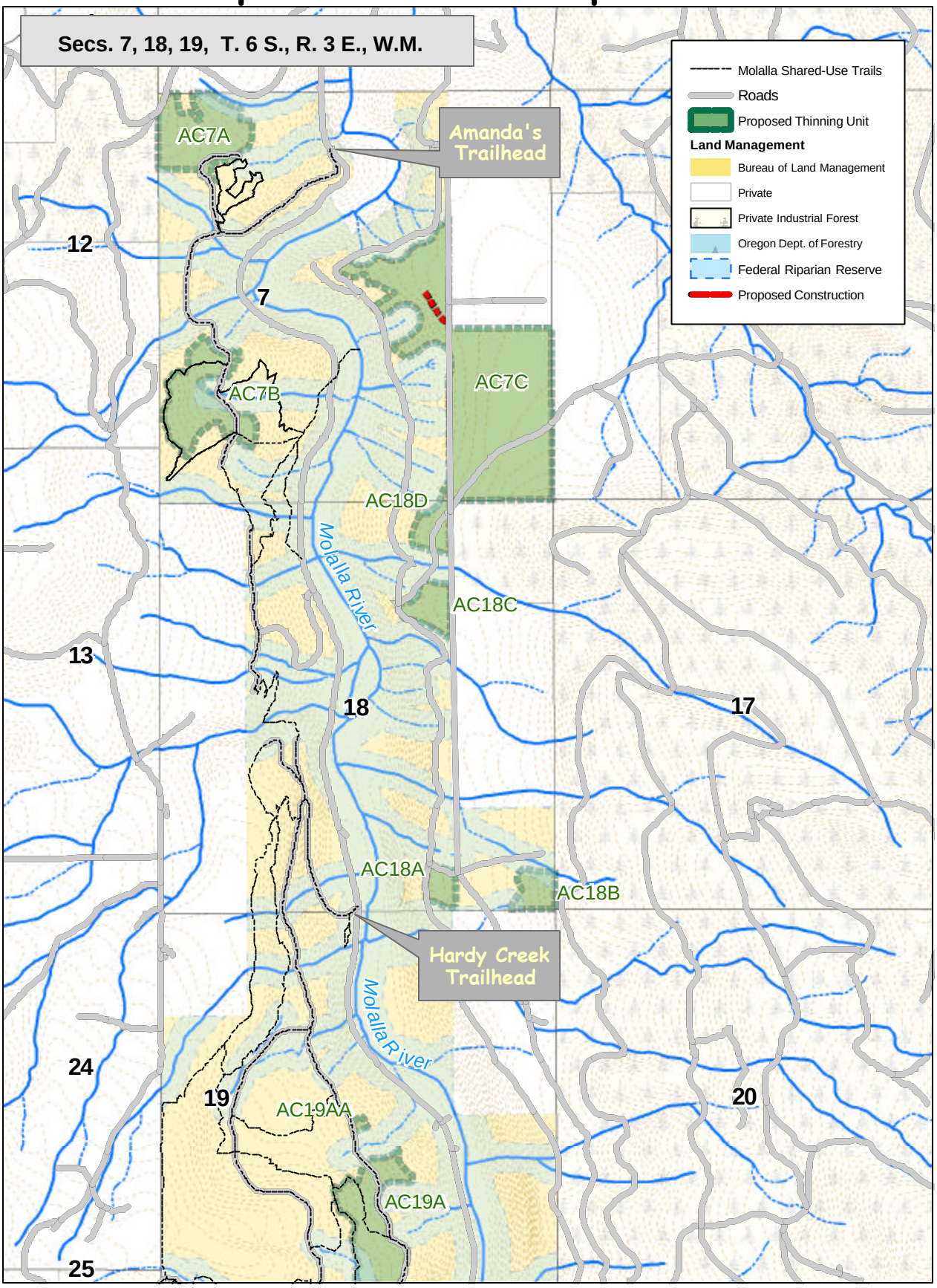
5.2.7.3 No Action Alternative

With the exception of unexpected changes (i.e. wildfire or disease), the proposed units would continue provide a forest setting for dispersed recreational activities. Roads part of the Molalla River Shared-Use Trail System would continue to be maintained as roads.

5.2.7.4 Cumulative Effects

For both the Proposed Action and Alternative 2, there would be a small short-term (weeks to months) cumulative increase in log truck hauling to overall traffic along South Molalla Road and near residences along county roads accessing the units.

Annie's Cabin Project Area Unit Location Map
Proposed Action - Map 1 of 2

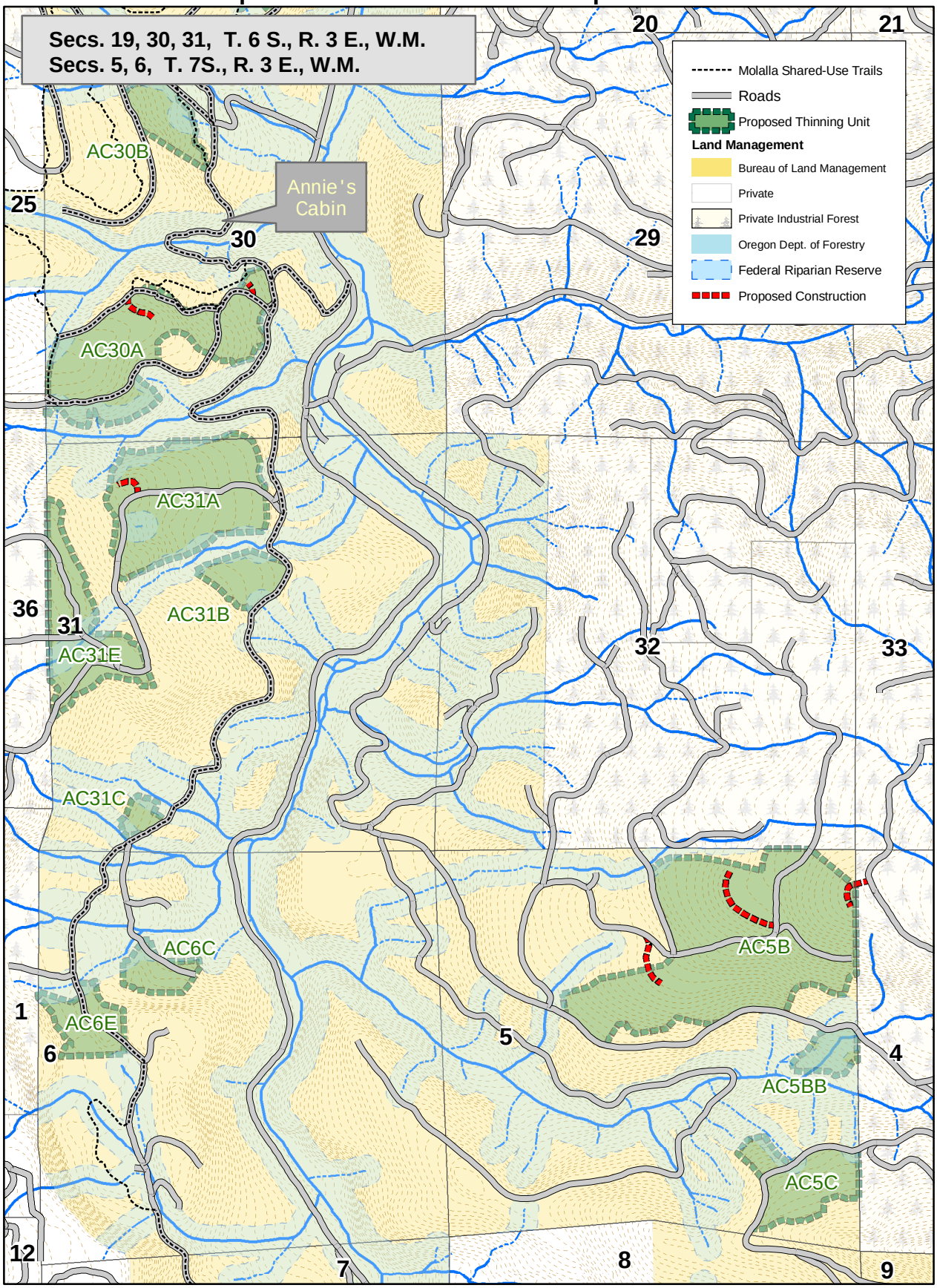


No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original

0 1,000 2,000 3,000 4,000 5,000 Feet

Contour Interval 20 ft

Annie's Cabin Project Area Unit Location Map
Proposed Action - Map 2 of 2



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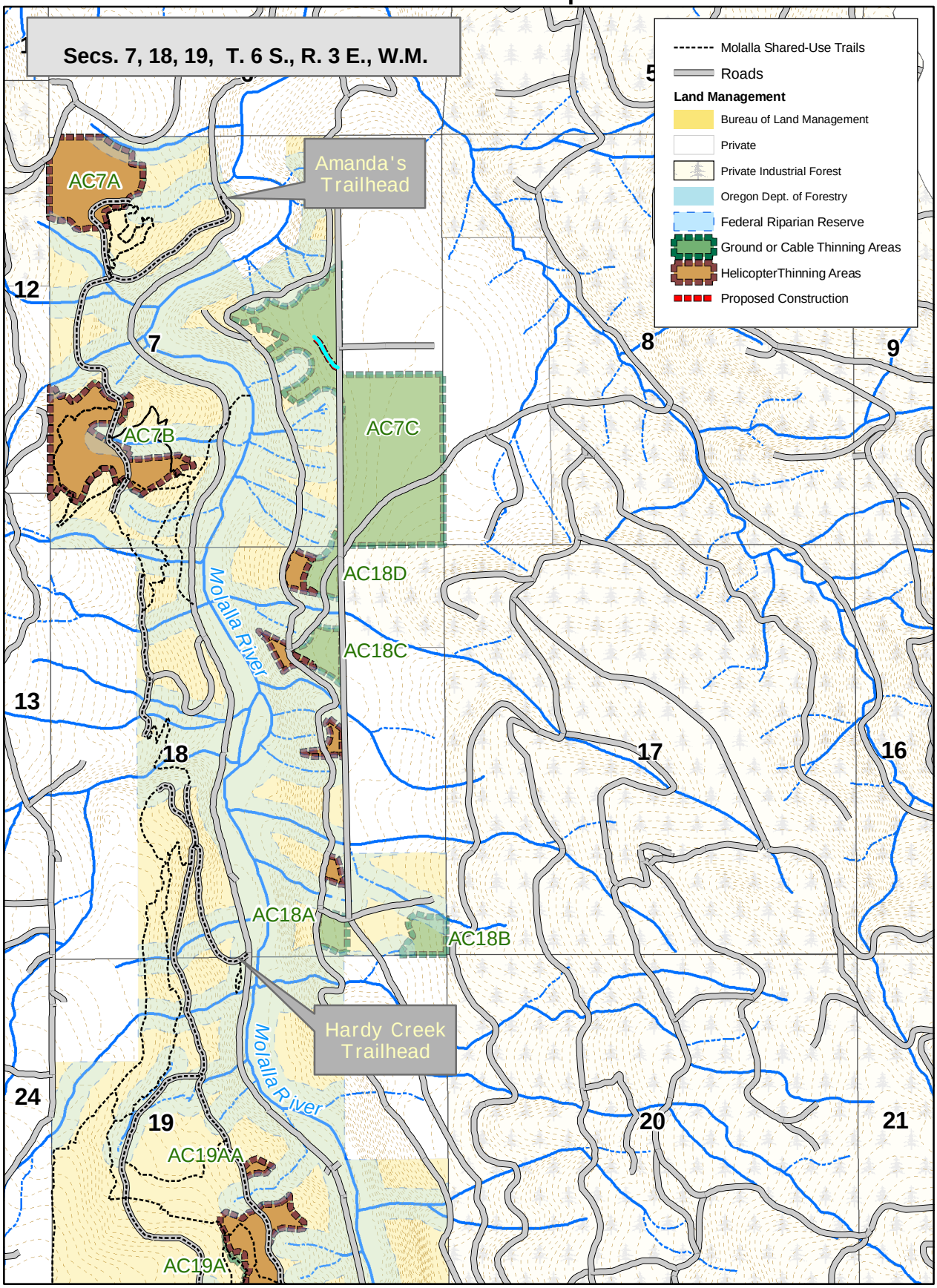
Contour Interval 20 ft

Annie's Cabin Project Area Unit Location Map
Alternative 2 - Map 1 of 2



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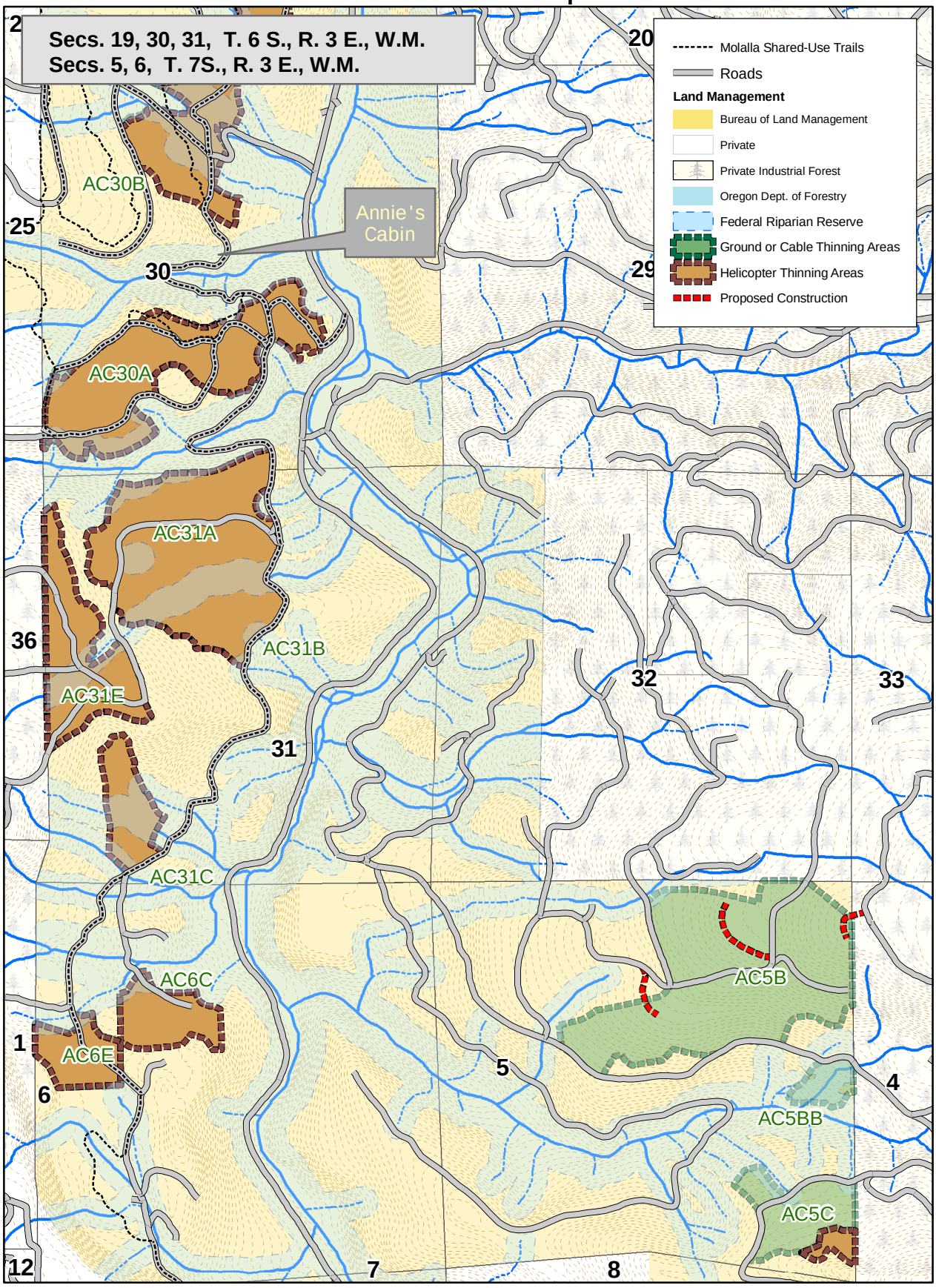
Annie's Cabin Project Area Unit Location Map
Alternative 2 - Map 2 of 2



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6.0 MISSOURI RIDGE PROJECT AREA

6.1 Alternatives - Missouri Ridge

6.1.1 Alternative Development

An alternative to the Proposed Action for improving channel function along Cotton Creek was developed. Alternative 2 proposes to thin the same areas utilizing the same methods as the Proposed Action. The only difference would be that approximately 0.9 miles of the Cotton Creek Road (BLM Road # 6-2E-05) in Sections 4 and 9 would be repaired to the minimum standard necessary for hauling, then decommissioned after use. Under the Proposed Action, this segment of the road would be improved to current standards and then would remain in the regular maintenance schedule. See *Table 21*.

6.1.1.1 Alternatives Considered but Not Fully Developed

The IDT considered alternative access for the Cotton Creek portion of the project area in Sections 4, 5, and 9, which would avoid using the Cotton Creek Road altogether. Hauling north, east, and south away from the unit on existing roads on private land was investigated and analyzed. In addition, alternative access into units in the north part of Section 7 was also investigated in order to avoid crossing an intermittent headwall stream with a multi-pass skid road. These alternatives were not fully analyzed because they resulted in more new road construction and improvement, more acquisition of new rights-of-way, and the likelihood of greater adverse environmental effects. Any other alternative access presumed that any repairs to Cotton Creek Road (or decommissioning) would occur at some future time, resulting in prolonged environmental effects due to the current deteriorating condition of the road (see *EA Section 6.2.2*).

6.1.2 Alternatives

Table 21 summaries proposed management activities by action alternative. The Proposed Action is further described in *Section 2.2*. Project Design Features are described in *Section 2.2.2*.

Table 21: *Summary of Proposed Management Activities for the Missouri Ridge Project Area*

Proposed Management Activities		***Proposed Action***	***Road Decommission Alternative***
Commercial Thinning (Acres)	Matrix LUA	202	202
	Riparian Reserve LUA	85	85
	Total Thinning Acres	287	287
Logging Systems (Acres)	Ground-based	219	219
	Skyline	68	68
	Total	287	287
Road Work (miles)	Renovation	3.5	3.5
	Improvement and Maintain	**.9**	**0**
	Improvement and Decommissioning	**0**	**.9**
	New Road Construction	1.0	1.0

Proposed Management Activities		*Proposed Action*	*Road Decommission Alternative*
Fuels Treatments (Acres)	Directional Falling	37	37
	Pile Burning	189	189
	Machine Treatments	64	64

Definitions can be found in Tables 3 - 5.

6.1.2.1 Connected Actions by Alternative

In addition to the Connected Actions summarized in *Section 2.2.1*, the following are specific to the Action Alternatives for the Missouri Ridge Project Area:

Both Action Alternatives:

- **Fuels Treatments:**
  - Slash would be piled and burned in 10 units in Sections 7, 9 and 16.
  - 75 acres would be maintained as fuel breaks after the initial thinning treatment to maintain a desired canopy conditions. Maintenance could include additional thinning treatment and burning of slash piles.

Proposed Action Only:

- **Roads and Access:**
  - Cotton Creek Road (BLM Road # 6-2E-05) would be renovated for long-term use by spot-rocking, blading, brushing, reshaping of ditches, and replacement or addition of cross-drain culverts as necessary to meet current standards.
  - Two failing culverts and one perched culvert (that does not permit fish passage) on Cotton Creek Road (BLM Road # 6-2E-05) in T6S, R2E, Section 9 would be replaced with new culverts that would accommodate fish passage through Cotton Creek.
  - Cotton Creek Road would be renovated east from the property line between Port Blakely and BLM and kept in regular maintenance.
  - **Motorized Access Control:**
  - After hauling is completed, a gate would be installed on the Cotton Creek Road at the section line between Sections 4 and 5 (private land property boundary) in order to further enhance existing access restrictions.

Road Decommissioning (Alternative 2):

- **Road Work:**
  - Cotton Creek Road (BLM Road # 6-2E-05) would be renovated to the minimum standard necessary for hauling, including minimal spot-rocking, blading, and brushing.
  - Rock or other surface material would be added to failing culverts to permit short-term use.
  - The perched outlet of the existing culvert would be left in its current condition until thinning and hauling is completed.

- After thinning and hauling is completed, approximately 0.9 miles of Cotton Creek Road in Sections 4 and 9 would be decommissioned. Decommissioning would include: removal of culverts (including live-stream culverts on Cotton Creek), decompaction of the road surface, establishing native vegetation to stabilize soil, and drainage modification. Drainage modification may include out-sloping and water bars. A gate would not be installed at the property boundary, since the road would no longer be passable to vehicles.

6.2 Affected Environment and Environmental Effects - Missouri Ridge

This section describes the current condition and trend of affected elements of the existing environment and the environmental effects of the Proposed Action and Alternative 2 that are unique to the Missouri Ridge Project Area. Refer to *Section 3.2* for a description of the affected environment and environmental effects that are common to all project areas. Unless described in this section, there are no elements of the affected environment or environmental effects resulting from the Proposed Action or the No Action alternative that are unique to this project area.

6.2.1 Vegetation and Forest Stand Characteristics

Source:
Missouri Ridge Silvicultural Prescriptions – 2006 Timber Sale Thinning EA
Cascade Resource Area Botanical Report – Missouri Ridge T.S.
See *Section 3.2.1* for affected environment and environmental effects to vegetation and forest stand characteristics common to all project areas.

Affected Environment

Stand History: The project area consists of stands that have been actively managed for timber production for over 70 years. All stands originated via natural regeneration after clearcut logging, or after brush fields were cleared of competing brush and planted. Some units were inter-planted to boost stocking levels over what natural regeneration had achieved. None of the stands have been thinned previously.

Stand Structure: The stands proposed for thinning range from early to late mid-seral Douglas-fir types. Stand ages range from approximately 30 to 70 years. Stocking levels are generally high, but some stands vary with the inclusion of some more sparsely stocked patches.

Species composition varies, but in general, Douglas-fir, western hemlock, western redcedar, bigleaf maple, and grand fir are the primary species found. Understory vegetation amount and distribution varies from light to heavy and consists mainly of sword fern, Oregon grape, salal, huckleberry and vine maple. Understory conifer regeneration is also present in some of the units. See *Section 10.0, Table 30* for a summary of vegetation and treatment history.

6.2.2 Hydrology

Source:

Missouri Ridge Hydrology/Channels/Water quality report

See *Section 3.2.2* for affected environment and environmental effects to hydrology common to all project areas. *Section 3.2.2.2* describes cumulative effects common to all project areas.

Affected Environment

The project area contains several small headwater streams tributary to the Rock Creek watershed and the Pudding River. Perennial stream channels adjacent to the project area units on BLM land that are on 20-70% slopes and in volcanic materials with constrained, step-pool channels a are currently in "proper functioning condition" (USDI, 1998). These streams have adequate shade, stable beds and banks, adequate quantities of wood, sediment and a diversity of riparian species.

Project area perennial stream channels in the fine-textured sedimentary surfaces are lower gradient, meandering channel types which tend to be deeply incised with steep, eroding, fine-textured banks. These streambeds have cut down to relatively resistant clay or sandstone rock layers. A veneer of larger gravels and small cobble material is visible along the bed surface (primarily supplied from higher gradient tributary channels in basalts) as well as a large supply of silt/clay sized material (sediment) being actively transported in these channels. Water clarity is poor and turbidity high due to the concentration of fine sediment.

Some of these perennial channel reaches observed adjacent to the project area on BLM are currently in "proper functioning condition". Due to an abundant fine sediment supply and unstable channel morphology, the main channel reach of Cotton Creek on BLM is classified as "functional at risk. The primary management factor contributing to the "functional at risk rating" determination is an under-maintained road (Cotton Creek Road) adjacent to and repeatedly intersecting Cotton Creek and adjacent wetlands. Fill failures, undersized culverts, diverted streams at blocked culverts, and rutted road surfaces are currently contributing to chronic sediment and turbidity in Cotton Creek. On BLM lands, most of these problem road/stream intersections are located in Sections 4, 5 and 9. Many of the channels observed on private lands in these watersheds also appear to be generally incised (loss of contact with floodplain) with eroding banks and high levels of fine sediment. All of these channels, whether currently in functional condition or not, tend to be highly sensitive to disturbance.

Recognized beneficial uses of in-stream flows include anadromous fish, resident fish, recreation, and esthetic value. Rock Creek is not a municipal watershed nor is it a key watershed. None of the project area streams are listed on the state's 303d list or in the 319 Report for water quality issues (see Hydrology report pg.13-14).

Environmental Effects

6.2.2.1 Both Action Alternatives

Since none of the project area is in a zone normally subject to transient snow accumulations in the winter, it can be assumed that the reduction in stand density is unlikely to result in increased snow accumulation and melting during rain-on-snow (ROS) events.

Skid Trail Crossing: One temporary skid trail stream crossing would be utilized in Section 7 (Unit 7G) under both Action Alternatives. The stream at this location is an intermittent headwater channel on a low gradient bench (<10% slopes). The temporary crossing at this location would be used when no surface flow would be evident, and ground water levels would likely be several feet below the surface. The skid trail would be covered with a slash mat, further reducing the likelihood of any measurable effect on surface or subsurface hydrology, stream flow, or channel morphology.

Physical integrity of the channel at the temporary crossing would be altered for one to several years. Within 30 foot maximum width, the channel surface, banks and bed would be compacted (bulk density of soils increased by as much as 30%), vegetation disturbed or removed and the bed/banks would be obliterated. These features would be partially restored after removal of the crossing, and pre-disturbance morphology would be recovered over time (passive restoration). Little to no additional disturbance would be expected either upstream or downstream from the crossing due to the stable nature of the channel at this location and the small stream flow (< 0.1 cfs peak flow volume).

6.2.2.2 Proposed Action Only

Cotton Creek Road Repairs: Repairs to Cotton Creek Road at stream crossings and where it passes through wetlands would maintain the existing channel morphology described in the Affected Environment. Along Cotton Creek, where channel instability (incision and loss of floodplain access) is observable, proposed road repairs are unlikely to alter the conditions that have led to channel instability and incision in this reach of Cotton Creek. Now that channel incision has been established, instability will continue until a new channel morphology, in equilibrium with altered site conditions, has formed. This can take many years to decades.

In some cases, installing larger culverts and more stable fills would allow for improved channel morphology over the long term by reducing sediment inputs at the crossing and by increasing the culvert's capacity to accommodate the stream during peak flows (i.e., passage of water, wood and bed-load).

Over the short term (one to three years), stream crossing maintenance would likely result in small measurable direct effects, such as turbid water during the active work period, followed by slight increases in bank erosion, some limited channel incision above and below culvert replacements, and alteration of local wetland hydrology along the Cotton Creek Road.

Almost all of these effects would be a result of improvements in the road infrastructure. Effects to these features as a result of the Proposed Action would be observable during repair and in the first winter following implementation but would quickly subside in the following years. Effects would be within the range of effects disclosed in the *RMP/FEIS*.

6.2.2.3 Alternative 2 Only

Cotton Creek Road Repairs: Temporary repairs to Cotton Creek Road (including the two failing culverts that would be stabilized for hauling by adding rock to the fill.) would likely reduce the amount of sediment reaching Cotton Creek during the time that the road is in use

Road Decommissioning: Over the long term, removal of Cotton Creek Road would likely contribute to improvement in channel function along Cotton Creek by reducing flow impediments and alterations such as channel narrowing and road/stream intersections. The stabilization of Cotton Creek Road may slightly reduce existing road effects on local and watershed hydrology resulting from peak flow effects from roads. Sediment and turbidity in Cotton Creek may ultimately be reduced in the long term (beyond three to five years), but it would be difficult to detect. Any effects to these attributes as a result of implementing this alternative would be within the range of effects disclosed in the RMP.

6.2.2.4 No Action Alternative

The "functional at risk rating" determination that is a consequence of the under-maintained Cotton Creek Road adjacent to and repeatedly intersecting Cotton Creek and adjacent wetlands would not change. Current channel constrictions where Cotton Creek passes through culverts would remain in place, and the surrounding fill would continue to erode during high flows. Erosion associated undersized culverts, diverted streams at blocked culverts, and rutted road surfaces, as well as the use of Cotton Creek Road in the condition described, would continue to contribute to chronic sediment and turbidity in Cotton Creek.

6.2.3 Fisheries and Aquatic Habitat

Source:
2006 Timber Sale Thinning EA - Fisheries and Aquatic Habitat (Fisheries Report)
See *Section 3.2.3* for affected environment and environmental effects to *fisheries and aquatic habitat* common to all project areas.

Affected Environment

Many fish-bearing streams exist within the project area and adjacent to proposed thinning units. Cotton Creek and Comer Creek, both tributaries to Rock Creek, support populations of resident cutthroat trout. Cotton Creek flows adjacent to Unit 9A. Comer Creek flows adjacent to Units 7H, 7N, 7F and 7D. An unnamed tributary to Rock Creek that flows between Units 7C and 7K is fish-bearing up to a point approximately 100 feet upstream of the tributary channel that forms the approximate northern boundary of Unit 7K. Another unnamed fish-bearing tributary to Rock Creek flows adjacent to Units 16D and 16F.

The Cotton Creek Road in the vicinity of Unit 9A is currently a chronic source of sediment to Cotton Creek. Causes of the sediment are the proximity of the road to the creek, failing culverts and channel re-routing along the road, probably as a result of plugged culverts and lack of maintenance. The road is currently not useable for log haul, although it is drivable for light trucks. There are three crossings of Cotton Creek along the Cotton Creek Road, two of which currently have failing culverts, and the third is a perched culvert (not failing) in Unit 9A that does not allow fish passage.

Threatened and Endangered Species: Steelhead distribution in Rock Creek is suspected to extend almost to the mouth of Cotton Creek (www.streamnet.org). Chinook are suspected to exist in Rock Creek but only to within approximately twelve miles downstream from the project area. See *Section 10.2, Table 36* for details of fish presence in proximity to project area units.

Environmental Effects

6.2.3.1 Both Action Alternatives

Stream Sediment: For both action alternatives, design features that include conducting work only during the designated in-stream work period for the affected watershed, sediment traps and settling ponds in the streams downstream of the culverts would minimize the sediment yield, but in the short term (while work is being done and immediately after the first flush of rainfall), sediment and turbidity would still be expected to reach Cotton Creek. Though not expected, these temporary short-term increases in sediment could have adverse effects on resident fish and fish habitat in Cotton Creek, and possibly on steelhead 1.5-1.75 miles downstream in Rock Creek. Sediment has the potential to reduce reproductive success, reduce juvenile survival and retarded growth if fish or fish eggs are present. These effects would decrease in the long-term (after the first flush of rainfall), having no lasting effect on fish.

Water Temperature: Although ephemeral and intermittent stream channels within the project area may have minimum SPZs of 25 feet (rather than 60 feet as for perennial streams), no increases in water temperature would be expected because those channels are dry during the summer months.

Under both Action Alternatives, the project could affect UWR steelhead trout due to the probable short-term sediment impacts resulting from replacement or modification of the culverts along the Cotton Creek Road. (See EA *Appendix 1*).

6.2.3.2 Proposed Action

Stream Sediment: The Proposed Action involves repairing the Cotton Creek Road, including replacement of culverts at three crossings. In the long-term, replacement or modification of the Cotton Creek culverts and stabilization of the Cotton Creek Road would be expected to reduce the chronic sediment inputs to Cotton Creek that result from the degraded condition of the road and culverts. However, due to the proximity of the road to the creek, road derived sediment inputs to Cotton Creek may be difficult or impossible to prevent if the road is retained after use for this project.

6.2.3.3 Alternative 2

Stream Sediment: Under Alternative 2, the two failing culverts would be stabilized for hauling by adding rock to the fill, and the perched culvert would be left as-is. Other problem areas of the road would be graded and spot rocked. After hauling is completed, the three culverts would be removed, and approximately 0.9 miles of the road would be decommissioned and the roadbed stabilized and revegetated. The culverts range from 1.5-1.75 miles upstream of where steelhead may be found in Rock Creek. In the long-term, removal of the Cotton Creek culverts and decommissioning of a portion of the Cotton Creek Road is expected to reduce or eliminate the chronic sediment inputs to Cotton Creek that result from the degraded condition of the road and culverts.

6.2.3.4 No Action Alternative

There would be no new impacts to fish or aquatic habitat. The current effects to fish from chronic sediment inputs to Cotton Creek would continue. Culverts along the haul routes proposed for use under the action alternatives would remain in their current condition until replacement is proposed under a future project. Although many of the culverts are undersized, and some are in poor condition, they did not fail during the high flow event of February, 1996. The anticipated long-term beneficial effects on aquatic habitat resulting from the thinning of riparian stands (as described in *Section 3.2.3.1)* would not be realized.

6.2.4 Geology and Soils

Source:

Timber Sale Thinning EA Soils Report
Missouri Ridge Hydrology/Channels/Water quality report

See *Section 3.2.4* for affected environment and environmental effects to *geology and soils* common to all project areas.

Affected Environment

See *Section 6.2.2* for a description of the Cotton Creek Road.

Environmental Effects

6.2.4.1 Alternative 2

Approximately 2.5 acres would be mechanically decompacted, stabilized and planted as a result of decommissioning the Cotton Creek Road. Compaction resulting from skid roads, haul roads and landings would not differ from the Proposed Action as described in *Section 3.2.4*.

Table 22: *Comparison of soil surface compaction resulting from the Missouri Ridge Action Alternatives*

Proposed Management Activities		***Proposed Action***	***Decommissioning Alternative***
Total Thinning Acres		287	287
Acres compacted by logging systems (estimate based on skid roads, haul roads and landings in up to 10% of the project area)	Ground-based	22	22
	Skyline	7	7
	Total	29	29
Acres compacted by road work (based on 20' width of compaction)	Renovation*	0	0
	Improvement†	0	0
	New Road Construction	2.4	2.4
Acres decompacted by decommissioning	Decreases rock-surface road miles in the project area	0	- 2.5
Totals		*30.4*	*27.9*

* Includes natural-surface roads within units only. Compacted paved and rock-surface haul roads are currently in use as part of the Salem BLM transportation system; the road mileage summarized in *Table 4 (Section 2.2.1, Connected Actions)* includes routes outside of the project areas.
† Acres already in a compacted condition.

6.2.5 Wildlife

Source:
2006 Timber Sale Thinning EA - Wildlife Report
See *Section 3.2.5* for affected environment and environmental effects to wildlife common to all project areas.

Affected Environment

Special Habitats, Remnants, Snags and Coarse Woody Debris (CWD): Coarse woody debris material (at least 20" in diameter at the large end, 20 feet in length, and in decay classes 1 and 2) is currently inadequate to meet RMP standards and guidelines (at least 240 linear feet per acre) in all units (RMP p. 21). Snags at least 20" dbh and over 15' tall (all decay classes) are present in very low numbers (<1 per acre) in most units in Section 7 and in Unit 16F. Scattered remnant old growth trees are present in most units in Section 7. Refer to *EA Section 10.3, Table 37* for a unit-specific summary.

Threatened Species - Northern Spotted Owl: The proposed thinning units provide 246 acres of dispersal habitat however, dispersal capability is impaired due to its location on the edge of the Willamette Valley. The proposal also includes 35 acres of capable non-habitat consisting of young stands less than 30 years of age. Spotted owls have never been observed in the vicinity of the proposed units. Barred owls have been observed in the vicinity of Wilhoit Springs in Section 16. The closest known spotted owl site is located 8 to 10 miles to the southeast. There are no unmapped LSRs in the vicinity of the proposed units.

BLM Special Status Species - Oregon slender salamander: Most units in T6s, R2E, Section 7 provide a very small amount of large material (<1 snag per acre) which would eventually become suitable long-lasting soft CWD habitat and meet RMP standards and guidelines (at least 20" in diameter at the large end, 20 feet in length, and in decay classes 1 and 2). Units 7B and 7E have concentrations of well-decayed CWD in size classes adequate to provide marginal habitat now, though material of adequate size for future habitat is not present.

Environmental Effects

6.2.5.1 Proposed Action

Threatened Species - Northern Spotted Owl:

Species: No impacts to spotted owls from the proposed thinning are anticipated because no spotted owls have been observed in the vicinity and the closest sites are located over 5 miles away.

Habitat: In the short term, 246 acres of marginal-value dispersal habitat and 35 acres of capable non habitat on the edge of the Willamette Valley would be altered as a result of thinning. These stands would be maintained as dispersal habitat after harvest. In the long term, canopy closures would increase and these stands could attain suitable habitat conditions within 20 to 50 years.

See *Section 3.2.5.1*, environmental effects common to all project areas, for a description of effects resulting degrading dispersal habitat and downgrading suitable habitat.

6.2.6 Air Quality and Fire Hazard/Risk

Source:

2006 Timber Sale Thinning EA - Fuels Management /Fire Ecology Fuels and Air Quality Report (Fuels Report)

See *Section 3.2.6* for affected environment and environmental effects to *air quality and fire hazard/risk* common to all project areas.

Affected Environment

All of the units within the project area are within the Wildland-Urban Interface (WUI). The existing gate on Cotton Creek Road (where it joins South Wilhoit Road) has not been effective in restricting access to Cotton Creek Road. Since the road also provides access to private industrial timber lands, BLM does not solely control issuance of keys to this gate.

Environmental Effects

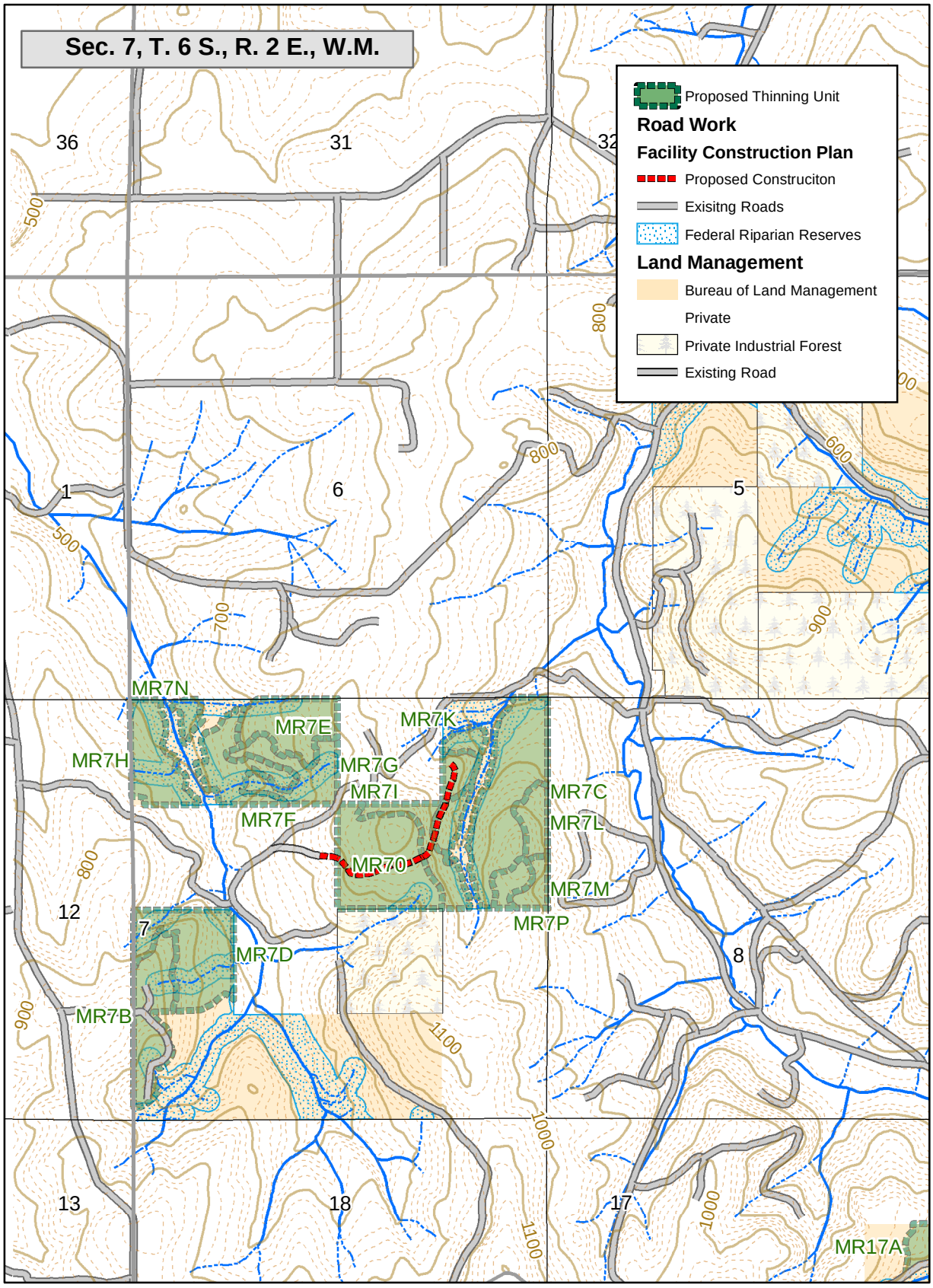
6.2.6.1 Proposed Action

The installation of a gate at the private-BLM property line on Cotton Creek Road, controlled only by BLM, would enhance existing access restrictions, prevent unauthorized public access east beyond the section line between Sections 4 and 5, and reduce or eliminate the potential for human ignition sources in that area.

6.2.6.2 Alternative 2

Decommissioning of a section of Cotton Creek Road east from the section line between Sections 4 and 5 (including live stream culvert removal) would effectively eliminate unauthorized vehicle access to BLM lands from Cotton Creek Road, and reduce or eliminate the potential for human ignition sources in that area.

Missouri Ridge Project Area Unit Location Map
Proposed Action and Alternative 2 - Map 1 of 2



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compliled from various sources. This product was developed through digital means and may be updated without notification.

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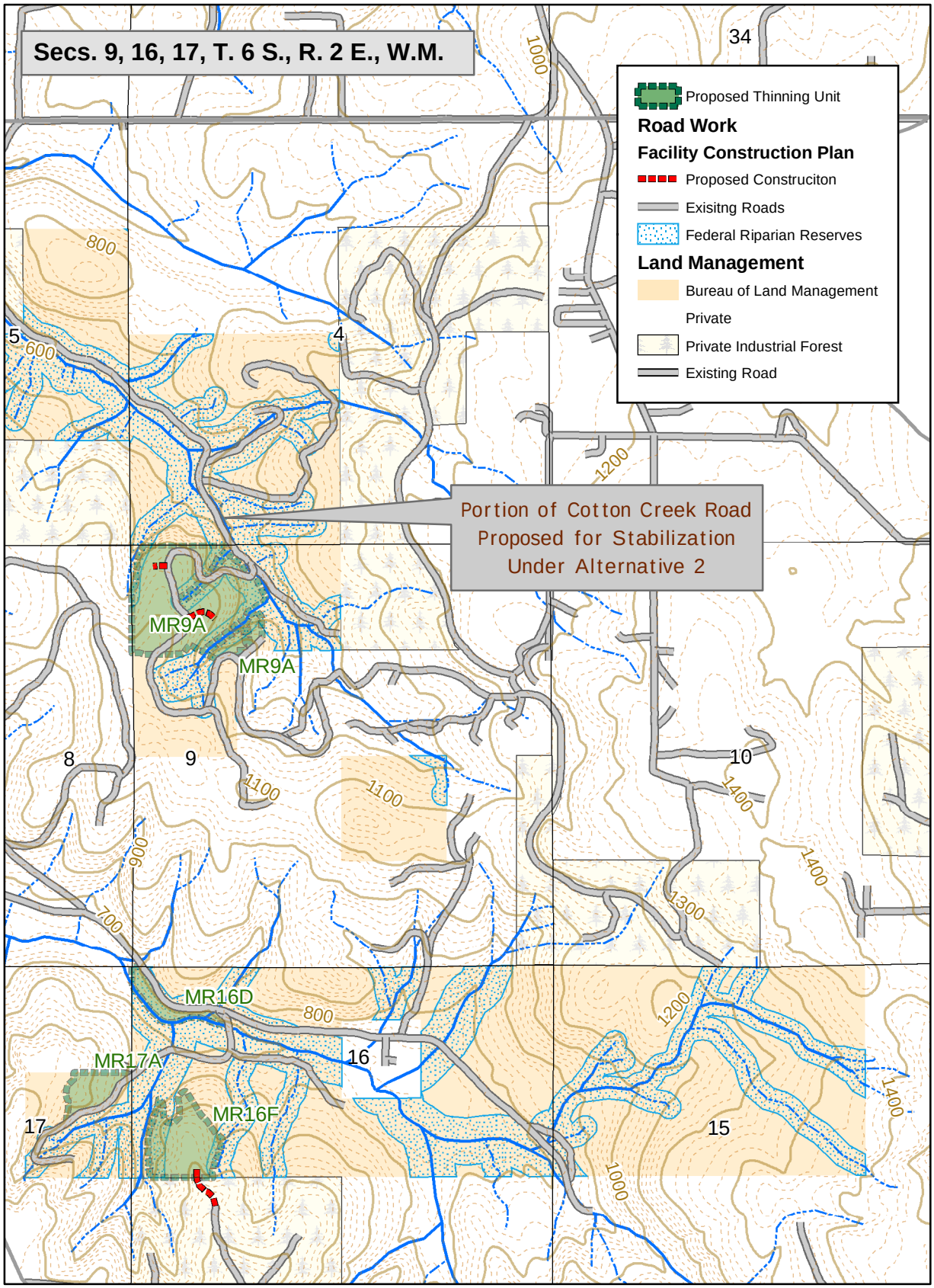
II

Missouri Ridge Project Area Unit Location Map
Proposed Action and Alternative 2 - Map 2 of 2



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compliled from various sources. This product was developed through digital means and may be updated without notification.

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II

7.0 SNAKEHOUSE PROJECT AREA

7.1 Alternatives, Including the Proposed Action –Snakehouse

7.1.1 Alternative Development

No alternatives to the Proposed Action were identified that would meet the purpose and need of the project (*EA Section 1.2*) and have meaningful differences in environmental effects from the Proposed Action.

7.1.2 Alternatives

Table 23 summarizes proposed management activities by action alternative. The proposed action is further described in *Section 2.2.*

Table 23: *Summary of Proposed Management Activities for the Snakehouse Project Area*

Proposed Management Activities		***Proposed Action***
Commercial Thinning (Acres)	Matrix LUA (GFMA)	594
	Matrix LUA (Connectivity)	48
	Riparian Reserve LUA	172
	Late Successional Reserve LUA	20
	Total Thinning Acres	834
Logging Systems (Acres)	Ground-based	619
	Skyline	215
	Total	834
Road Work (miles)	Renovation	42.5
	Improvement	.6
	New Road Construction	1.0
Fuels Treatments (Acres)	Directional Falling	15
	Pile Burning	124
	Machine Treatments	13

Definitions can be found in Tables 3 - 5.

7.1.2.1 Connected Actions

The following is a summary of the connected actions specific to the Proposed Action for this project area. See *Section 2.2.1* for a summary of connected actions common to all project areas.

- **Roads:**
  - Up to 1000 feet of BLM Road 9-3E-31 would be renovated to the minimum standard necessary for hauling, including minimal spot-rocking, blading, and brushing.

- After thinning and hauling is completed, this section of road would be obliterated. Obliteration would include: decompaction of the sub-grade, re-establishment of the pre-existing slope, and establishing native vegetation to stabilize soil. A gate would not be installed at the property boundary, since the road would no longer be passable to vehicles.

- **Log Fill Replacement:**
  - An existing log fill on BLM Road # 9-3-33 would be replaced with a culvert to meet current transportation standards.
- **Gates:**
  - A new gate would be installed at the intersection of BLM Road # 10-3E-2.01 and BLM Road # 10-3E-11 in T10S-R3E, Sec. 11 after the project is completed.
  - A new gate would be installed on BLM Road # 9-3E-33.00 in T10S-R3E, Sec. 4 just east of the line between Sections 5 and 4 after the project is completed.
- **Fuels Treatments:**
  - One hundred-thirty acres would be proposed for additional treatment after the initial thinning treatment (as a future thinning treatment) to maintain desired canopy conditions.

7.1.2.2 Project Design Features

The following is a summary of the design features unique to this project area. See *Section 2.2.2* for design features common to all project areas.

- **To minimize disturbance to nesting Spotted Owls:** A seasonal restriction would be in place from March 1 through July 15 for units 3A, 5B and 5E on habitat modification activities (felling, yarding, and road building) to minimize the risk of disturbance to spotted owls. The seasonal restriction could be waived if surveys indicate no presence of nesting spotted owls within disturbance range (0.25 to 0.5 miles) of the units.

- **To minimize disturbance to nesting Red-tailed Hawks:** A seasonal restriction would be in place from March 1 through July 31 for Units 15B and 15E for habitat modification activities (felling, yarding, and road building). The seasonal restriction could be waived if surveys indicate no presence of nesting red-tailed hawks within disturbance range (within 0.5 miles) of the units.

- **To minimize disturbance to nesting Peregrine Falcons:** For units in T.8S., R.3E., section 31, a seasonal restriction would be in place for all units from February 1 through July 15. This restriction would be in effect for all activities to minimize the risk of disturbance to nesting peregrine falcons. The seasonal restriction could be waived if surveys indicate no nesting peregrine falcons are present within the disturbance range (0.5 to 1 mile) of the units.

- **To protect and enhance stand diversity and wildlife habitat components:** Up to four green trees per acre would be topped (using a chainsaw) or base girdled after thinning in the following units:
  - T.8S., R.3E., all units in sections 31 and 33;
  - T.9S., R.2E., all units in section 1 and units 15B and 15E in section 15
  - T10S., R3E., units 3A and all units in Section 5

- **To reduce fire hazard risk:** Gates would be installed to control access to certain areas while woody debris that could result in increased fire hazard decomposes. These gates would be closed during the time that the Oregon State Department of Forestry has declared Regulated Use to be in effect.

7.2 Affected Environment and Environmental Effects –Snakehouse

This section describes the current condition and trend of affected elements of the existing environment and the environmental effects of the Proposed Action that are unique to the Snakehouse Project Area. Refer to *Section 3.2* for a description of the affected environment and environmental effects that are common to all project areas. Unless described in this section, there are no elements of the affected environment or environmental effects resulting from the Proposed Action or the No Action alternative that are unique to this project area.

7.2.1 Vegetation and Forest Stand Characteristics

Source:
Snakehouse Silvicultural Prescriptions – 2006 Timber Sale Thinning EA
Cascade Resource Area Botanical Report – Snakehouse T.S.
See *Section 3.2.1* for affected environment and environmental effects to vegetation and forest stand characteristics common to all project areas.

Affected Environment

Stand History: The project area consists of stands that have been actively managed for timber production for over 80 years. Unit 15 E is the only stand that did not originate after logging, and it was commercially thinned once. The remainder of the stands originated after logging, and approximately half of these have been thinned. See *Section 10.1*, *Table 31* and *Table 32* for a summary of vegetation and treatment history.

Stand Structure: The stands proposed for thinning range from early to early mature Douglas-fir types. Stand ages range from approximately 30 to 115 years (average 40-70 years). Stocking levels are generally high, but some stands vary, with the inclusion of some sparsely-stocked patches. Species composition varies, but in general, Douglas-fir, western hemlock, western redcedar, bigleaf maple, and red alder are the primary species found. Understory vegetation amount and distribution varies from light to heavy and consists mainly of sword fern, Oregon grape, salal, huckleberry and vine maple. Understory conifer regeneration is also present in some of the units.

7.2.2 Hydrology

Source:

Snakehouse Hydrology/Channels/Water quality report

2006 Timber Sale Thinning EA - Fisheries and Aquatic Habitat (Fisheries Report)

See *Section 3.2.2* for affected environment and environmental effects to hydrology common to all project areas. *Section 3.2.2.2* describes cumulative effects common to all project areas.

Affected Environment

The project area contains several small headwater streams tributary to the North Santiam and Little North Santiam Rivers. These streams are in proper functioning condition, with well-shaded stable beds and banks, adequate quantities of wood, sediment and a diversity of riparian species. Stream-side shading from riparian vegetation is adequate to buffer streams from temperature increases. None of the project area streams are listed on the state's 303d list or in the 319 Report for water quality issues. However, local streams flow into the North Fork and Little North Fork Santiam Rivers, which are listed for exceeding summer temperature standards.

Recognized beneficial uses of in-stream flows include anadromous fish, resident fish, recreation, and esthetic value. The North Santiam is a municipal watershed for the City of Salem. Portions of the project area are located in a key watershed, the Little North Santiam River.

In T10S, R2E, Section 1, BLM Road 9-3E-31 has been severely damaged by OHVs and is currently in very poor condition. Though not hydrologically connected to Snake Creek under normal conditions, it is an occasional source of sediment that results from heavy rainstorms, where it is passes close to Snake Creek. The site is in need of closure and restoration to eliminate the existing sedimentation problem and prevent further degradation of the area.

Environmental Effects

7.2.2.1 Proposed Action

Road 9-3E-31: Road construction and obliteration would be conducted during dry conditions when large puddles are dry (or nearly so), eliminating sediment inputs to Snake Creek resulting from these actions. Obliterating the degraded segment of the road after completion of hauling operations would result in the elimination of this occasional sediment source to Snake Creek.

7.2.2.2 No Action Alternative

Road 9-3E-31: The severely damaged portion of the road would continue to contribute sediment to Snake Creek during heavy rains.

7.2.3 Fisheries and Aquatic Habitat

Source:

2006 Timber Sale Thinning EA - Fisheries and Aquatic Habitat (Fisheries Report)

See *Section 3.2.3* for affected environment and environmental effects to fisheries and aquatic habitat common to all project areas.

Affected Environment

Streams within the project area that are north of the North Santiam River are predominantly small, steep channels not capable of supporting fish. Only one fish-bearing stream (an unnamed tributary to the Little North Santiam River) flows adjacent to a proposed project unit (Unit 7A) and supports a population of cutthroat trout. On the northeast side of Unit 13B an unnamed stream exits a man-made pond that supports fish, presumably bass or bluegill. The outlet stream is presumed to be fish bearing.

Snake Creek, where it flows adjacent to Unit 1C and where it flows between Units 1C and 1B, supports a population of cutthroat trout. Two small unnamed streams, one on the north side of Unit 5B and one on the northwest side of Unit 5F support cutthroat trout populations up to the vicinity of the proposed units. Both streams are tributary to the North Santiam River.

There are four small (24") live-stream culverts along the haul routes (one on Road 9-3E-33, two on BLM Road 10-3E-5.01) and one on BLM Road 10-3E-5.03 that would need replacement prior to hauling. The culverts range from 2.25 – 3.0 miles upstream from potential steelhead or Chinook habitat in Snake Creek or in the North Santiam River (LNSR). One new 48" culvert would need to be installed on BLM Road 9-3E-33 to replace a log fill with a pond on each side of the road.

Threatened and Endangered Species: Chinook and steelhead are found in the Little North Santiam River, downstream of most of the project units, and in the North Santiam River, downstream of all units. Steelhead are known to exist in Snake Creek approximately two miles downstream of Unit 1C, and in some years may be present one mile downstream of Unit 1C. Oregon chub (*Oregonichthys crameri*), listed as 'endangered' under the ESA, is found in the North Santiam River near Stayton. Approximate stream distances from proposed project units to known Oregon chub habitat range from 18–30 miles, and therefore, are not included in *Table 36*.

Environmental Effects

7.2.3.1 Proposed Action

The four stream culverts along the haul routes north of the North Santiam River would be replaced prior to hauling, but all are expected to be dry during the low flow season. All of those culverts are at least one mile upstream of the Little North Santiam River and the North Santiam River. Effects on fish or fish habitat in the Little North Santiam River from sedimentation resulting from the replacement of culverts are expected to be negligible due to the distance downstream to fish habitat. Implementing project design features described in *Section 0* is expected to prevent increases in water temperature, and minimize sediment input to stream channels, or increases in stream turbidity.

Road 9-3E-31: BMPs (see *Table 6*) would be expected to minimize sediment inputs to Snake Creek resulting from the repair of BLM Road 9-3E-31, and would likely have minimal adverse effects on resident fish and habitat in Snake Creek, and no effect on steelhead 1-2 miles downstream in Snake Creek. Blocking and obliterating the degraded section of the road after completion of hauling operations would result in the long-term reduction/elimination of the chronic sedimentation currently occurring in Snake Creek.

The culvert replacement and installation is expected to have no effects on ESA listed fish or habitat in Snake Creek or in the North Santiam River due to the distance downstream of potential listed fish habitat.

7.2.3.2 No Action Alternative

No improvements would be made to BLM Road 9-3E-31, and the road would remain in a damaged condition, though some attempt would still be made to block OHV access. Aquatic habitat would continue to be impacted by the occasional sediment inputs to Snake Creek that result from heavy rains. Culverts along the haul routes would not be replaced and the anticipated beneficial effects on aquatic habitat resulting from the thinning of riparian stands would not be realized.

7.2.4 Geology and Soils

See *Section 3.2.4* for affected environment and environmental effects to geology and soils common to all project areas.

Table 24: *Soil surface compaction resulting from the Snakehouse Proposed Action*

Proposed Management Activities		***Proposed Action***
Total Thinning Acres		834
Acres compacted by logging systems (estimate based on skid roads, haul roads and landings in up to 10% of the project area)	Ground-based	61.9
	Skyline	21.5
	Total	83.4
Acres compacted by road work (based on 20' width of compaction)	Renovation*	3.7
	Improvement†	1.5
	New Road Construction	2.4
Acres decompacted by decommissioning	Decreases rock-surface road miles in the project area	-1.0
Totals		*90.0*

* Includes natural-surface roads within units only. Compacted paved and rock-surface haul roads are currently in use as part of the Salem BLM transportation system, and the road mileage summarized in *Table 4(Section 2.2.1, Connected Actions)* includes routes outside of the project areas.† *Acres already in a compacted condition.*

7.2.5 Wildlife

Source:

2006 Timber Sale Thinning EA - Wildlife Report

See *Section* 3.2.5 for affected environment and environmental effects to *wildlife* common to all project areas.

Affected Environment

Special Habitats, Remnants, Snags and Coarse Woody Debris (CWD): Coarse woody debris material (at least 20" in diameter at the large end, 20 feet in length, and in decay classes 1 and 2) is currently inadequate to meet RMP standards and guidelines (at least 240 linear feet per acre) in all units (RMP p. 21). Snags at least 20" dbh and over 15' tall (all decay classes) are present in very low numbers (<2 per acre) in most units in 8- 3E, Section 31 and in Units15B, 13A, 13B, and 3A. Remnant old growth trees are present only in Units 15B, 15E, 3A, and 5E. Refer to *EA Section 10.3, Table 37* for a unit-specific summary.

Threatened Species - Northern Spotted Owl:

North of the North Santiam River, the proposed thinning units provide 562 acres of dispersal habitat, and 30 acres of marginally suitable habitat. The closest known spotted owl sites are located 1.1 to 4.5 miles to the east and south of the proposed units. Portions of units 13C and 7D are located within the provincial home range radius of these known spotted owl sites. There is one historic site located about one mile from the proposed units in 8-2E-sections 31 and 33. The site has not been occupied within the last 5 years. There are no unmapped LSRs in the vicinity of the proposed units.

South of the North Santiam River, the proposed thinning units provide 242 acres of dispersal habitat. The closest known spotted owl sites are located 0.8 to 2.7 miles to the south. Unit 3A is located within the provincial home range radius of a known spotted owl site. There are two historic spotted owl sites located in sections 3 and 5 which have been unoccupied for the last 5 years. Units 3A and 5B are located within LSRs of these historic spotted owl sites. Both sites have had some occupancy by barred owls during the last five years.

BLM Special Status Species

Oregon slender salamander: Most units in 8- 3E, Section 31 and Units 15B, 13A, 13B, and 3A provide a very small amount of large material (<2 snags per acre) which would eventually become suitable long-lasting soft CWD habitat and meet RMP standards and guidelines (least 20" in diameter at the large end, 20 feet in length, and in decay classes 1 and 2). All units in T8S, R3E, Sec. 31, T8S, R3E, Sec. 33, T9S, R2E, Section 7, and Units 15B, 13A, and 13B have concentrations of well-decayed CWD in size classes adequate to provide marginal habitat now, though material of adequate size for future habitat is not present.

Red-tailed Hawk: A red-tailed hawk nest is known in the vicinity of Units 15B and 15E. Nest surveys would be conducted and the site would be monitored during the time that any operations would be conducted in the section, if nesting is confirmed.

American Peregrine Falcon: A pair was present within ½ mile of units in T8S, R3E, Section 31 in 2004, though nesting has not been documented. The site would be monitored during the time that any operations would be conducted in the section.

Environmental Effects

7.2.5.1 Proposed Action

Threatened Species - Northern Spotted Owl:

Species: No known spotted owls would be affected by thinning or connected actions. Seasonal restrictions on habitat modification activities (felling, yarding, and road building) would minimize the risk of disturbance to nesting northern spotted owls at sites not currently identified (See *Section 5.1.2.2)*.

Habitat: No suitable habitat would be altered (downgraded or degraded) within the provincial home range radius of any known spotted owl sites under the Proposed Action. See *Section 3.2.5.1*, environmental effects common to all project areas, for a description of effects resulting degrading dispersal habitat and downgrading suitable habitat.

North of the North Santiam River - In the short term, 562 acres of dispersal habitat and 30 acres of marginally suitable habitat in the Little North and North Santiam Watersheds would be altered as a result of thinning. In the long term, canopy closures would increase and these stands could attain suitable habitat conditions within 10 to 40 years.

South of the North Santiam River - In the short term, 242 acres of dispersal habitat in the North Santiam Watershed would be altered as a result of thinning. In the long term, canopy closures would increase and these stands could attain suitable habitat conditions within 10 to 50 years.

BLM Special Status Species

Oregon slender salamander: Most units in 8- 3E, Section 31 and Units 15B, 13A, 13B, and 3A provide a very small amount of large material (<2 snags per acre) which would eventually become suitable long-lasting soft CWD habitat and meet RMP standards and guidelines (at least 20" in diameter at the large end, 20 feet in length, and in decay classes 1 and 2). All units in T8S, R3E, Sec. 31, T8S, R3E, Sec. 33, T9S, R2E, Section 7, and Units 15B, 13A, and 13B have concentrations of well-decayed CWD in size classes adequate to provide marginal habitat now, though material of adequate size for future habitat is not present.

Red-tailed Hawk: If nesting is confirmed, the known nest would be protected by a seasonal restriction on noise and physical disturbance within 0.5 miles any thinning units.

American Peregrine Falcon: If nesting is confirmed, any nest site would be protected by a seasonal restriction on noise and physical disturbance within 1 mile any thinning units.

7.2.6 Air Quality and Fire Hazard/Risk

Source:

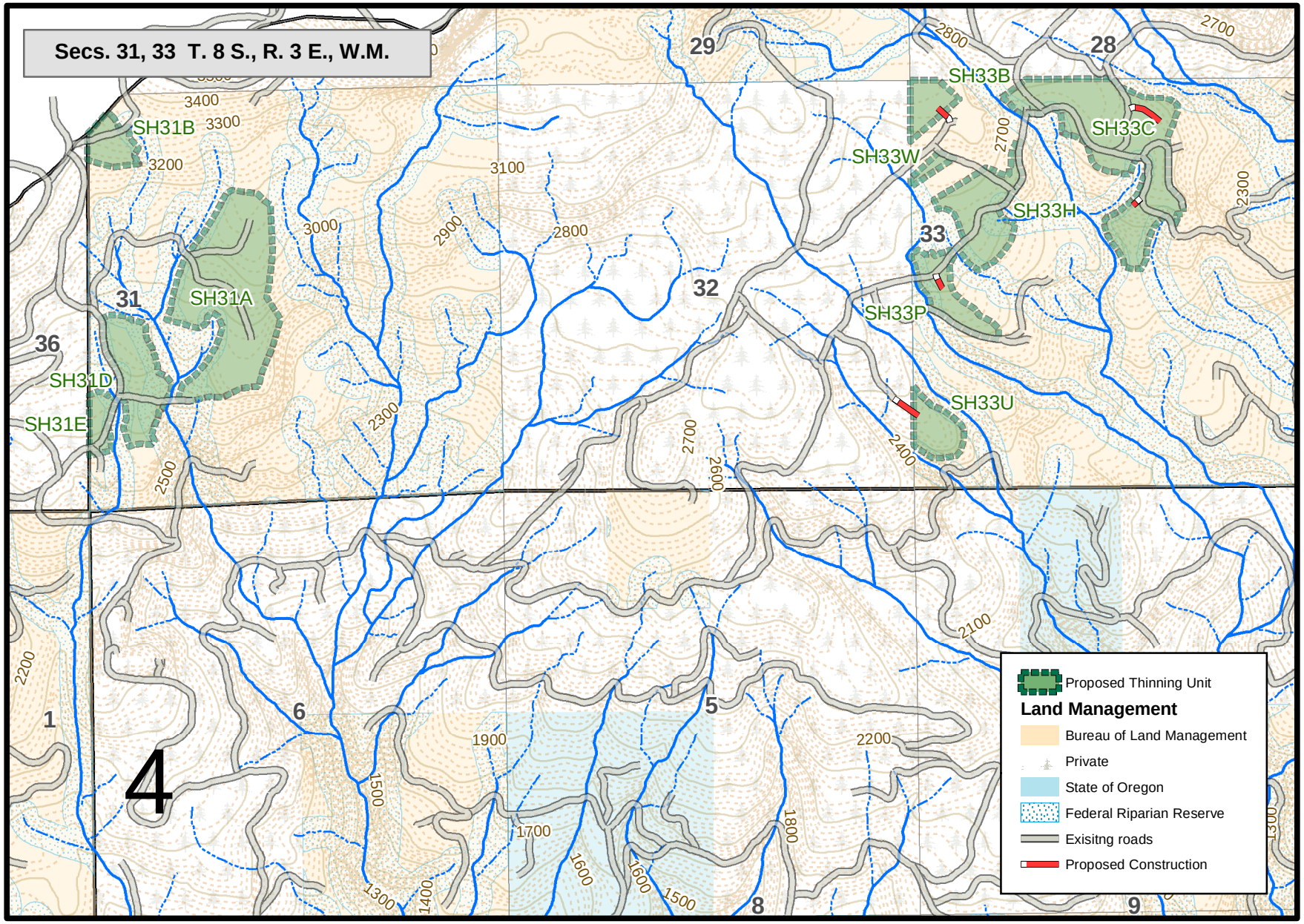
2006 Timber Sale Thinning EA - Fuels Management /Fire Ecology Fuels and Air Quality Report (Fuels Report)

See *Section 3.2.6* for affected environment and environmental effects to air quality and fire hazard/risk common to all project areas.

Affected Environment

Forty-six percent (396 acres) of the project area is within the WUI, 152 acres are within a 1½ mile radius of a designated "community-at-risk", Mill City.

Snakehouse Project Area Unit Location Map
Proposed Action - Map 1 of 6



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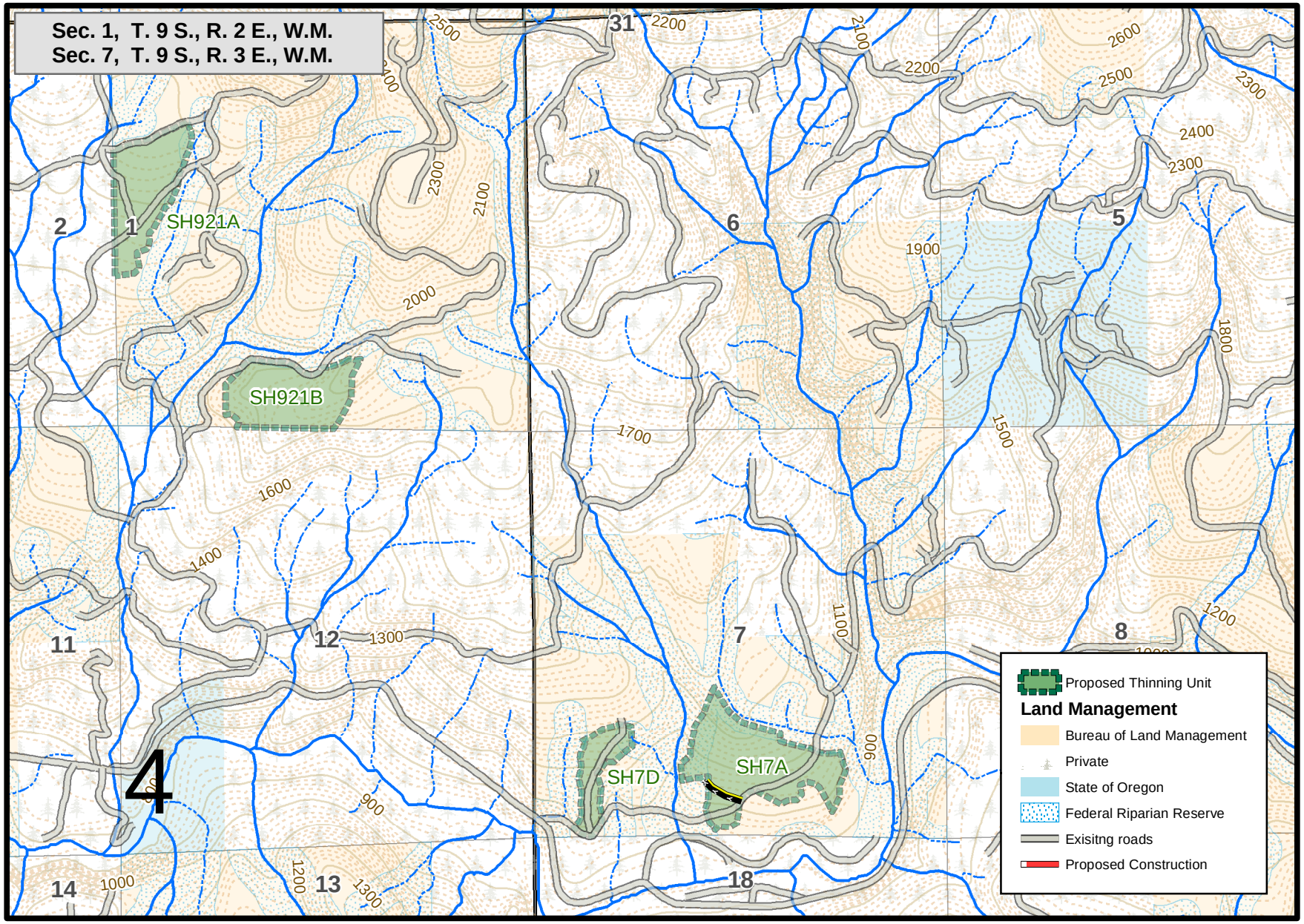
Snakehouse Project Area Unit Location Map
Proposed Action - Map 2 of 6



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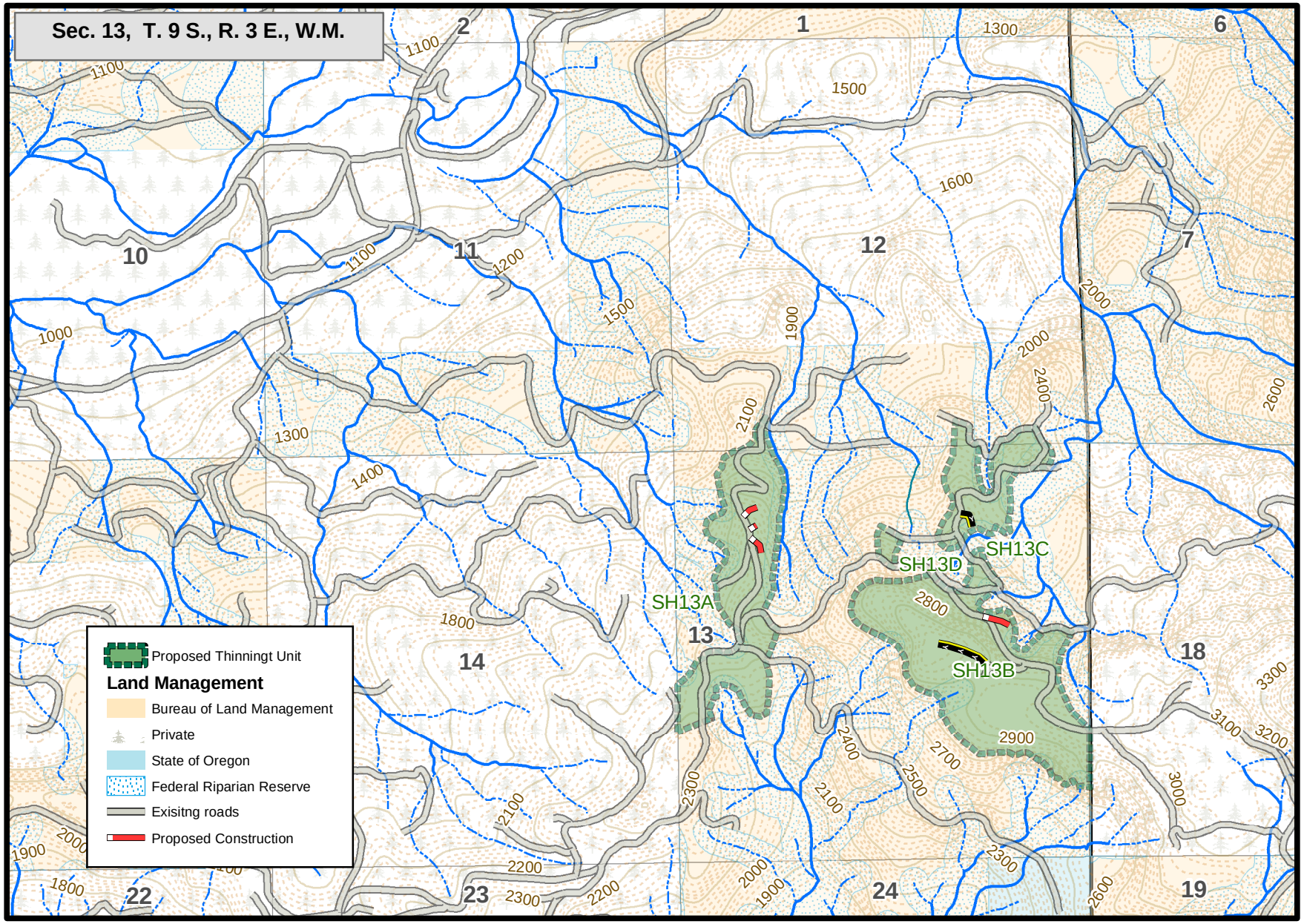
Snakehouse Project Area Unit Location Map
Proposed Action - Map 3 of 6



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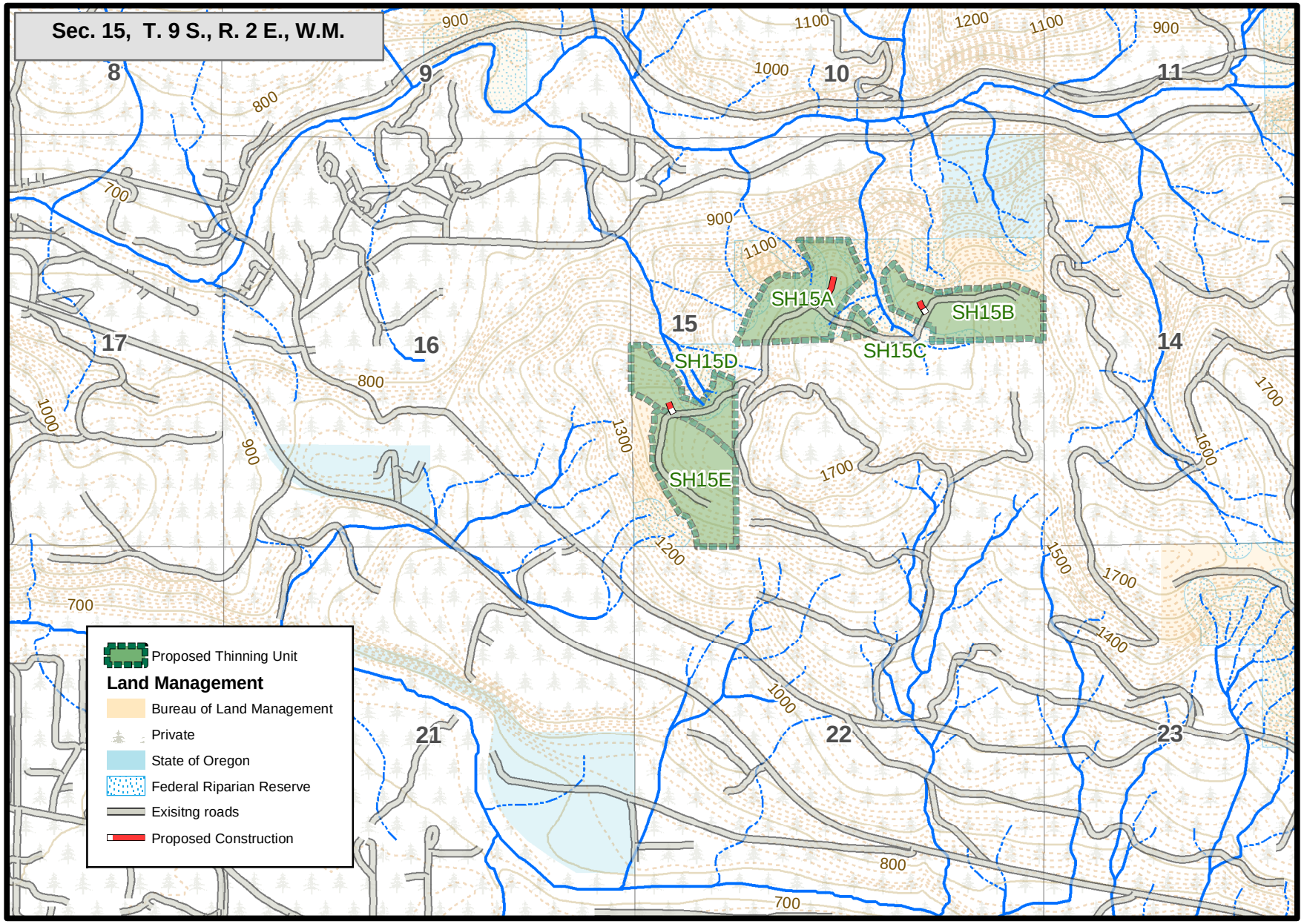
Snakehouse Project Area Unit Location Map
Proposed Action - Map 4 of 6



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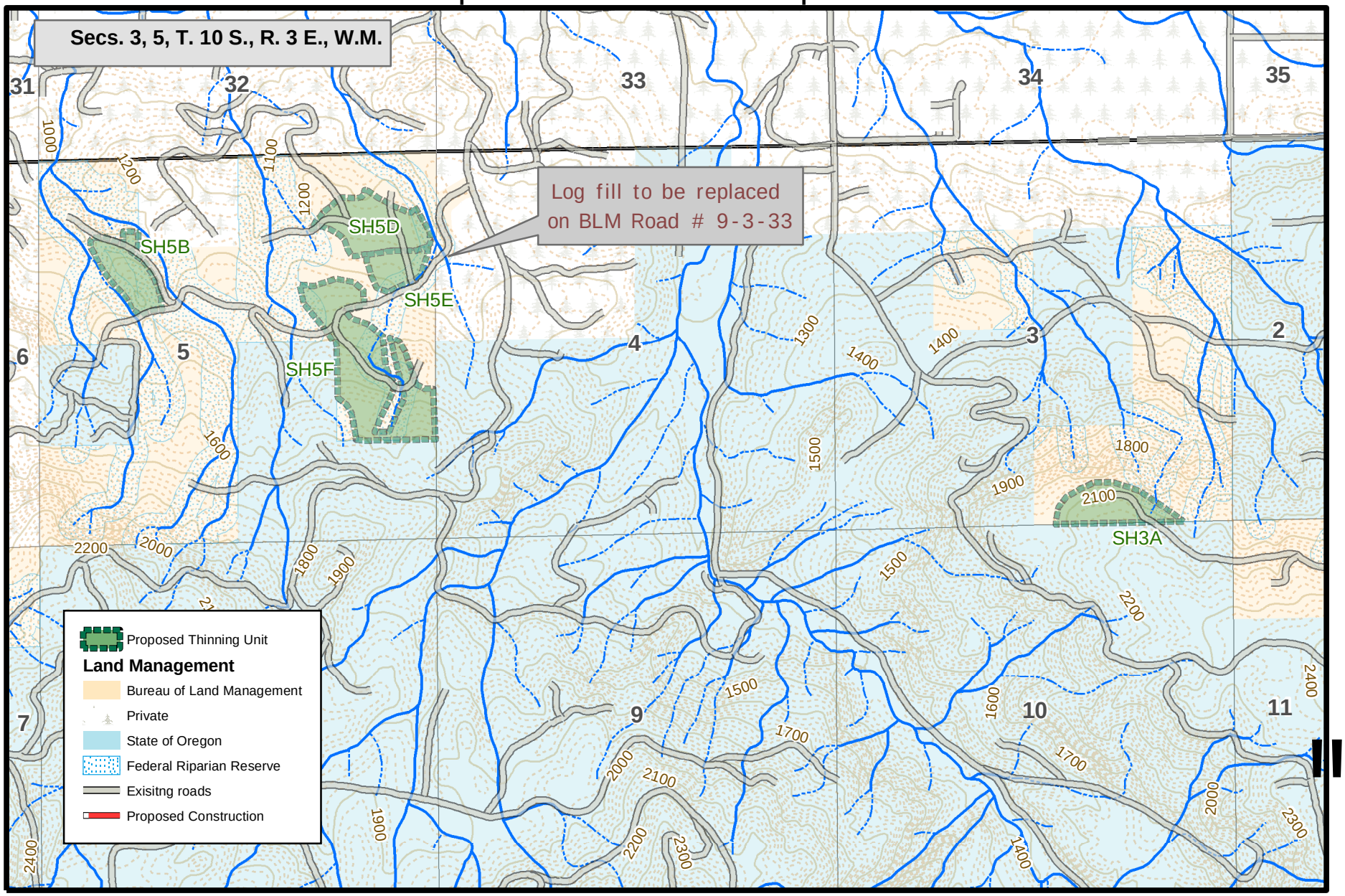
Snakehouse Project Area Unit Location Map
Proposed Action - Map 5 of 6



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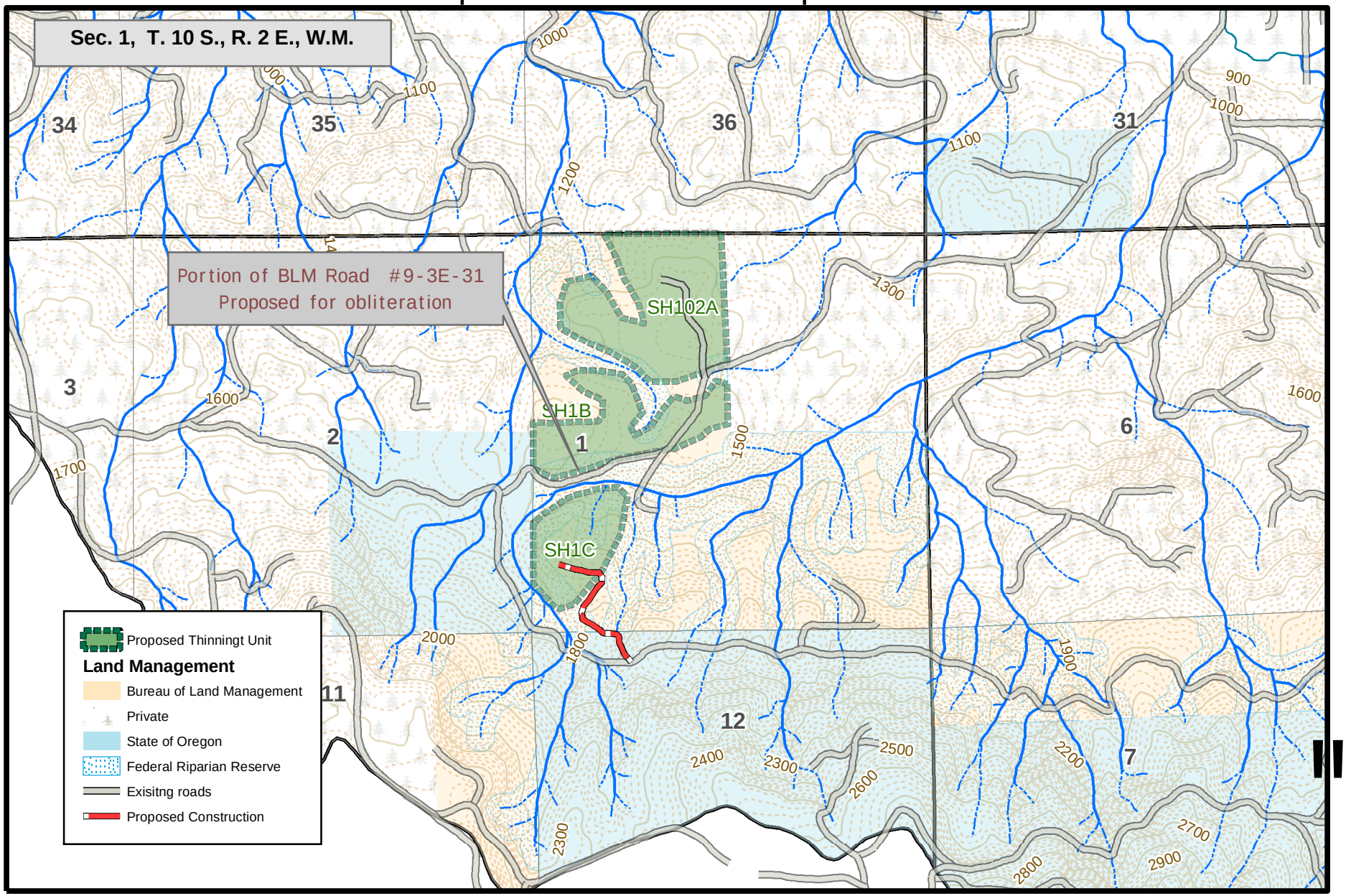
Snakehouse Project Area Unit Location Map
Proposed Action - Map 6 of 6



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8.0 ROUND MOUNTAIN PROJECT AREA

8.1 Alternatives, Including the Proposed Action – Round Mountain

8.1.1 Alternative Development

No alternatives to the Proposed Action were identified that would meet the purpose and need of the project (*Section 1.2*) and have meaningful differences in environmental effects from the Proposed Action.

8.1.2 Alternatives

Table 25 summaries proposed management activities by action alternative. The proposed action is further described in *Section* 2.2. Connected Actions are described in *Section 2.2.1*.

Table 25: *Summary of Proposed Management Activities for the Round Mountain Project Area*

Proposed Management Activities		***Proposed Action***
Commercial Thinning (Acres)	Matrix LUA (GFMA)	166
	Riparian Reserve LUA	29
	Total Thinning Acres	195
Logging Systems (Acres)	Ground-based	143
	Skyline	52
	Total	195
Road Work (miles)	Renovation	12.2
	Improvement	0
	New Road Construction	.2
Fuels Treatments (Acres)	Directional Falling	0
	Pile Burning	0
	Machine Treatments	0

Definitions can be found in Tables 3 - 5.

8.1.2.1 Project Design Features

Refer to *Section 2.2.2.2* for design features common to all project areas. One design feature is unique to this project area:

- **To minimize disturbance to federal Threatened and Endangered Species:** A seasonal restriction would be in place from March 1 through July 15 for units 33B, 33C, 33D, and 3C from on habitat modification activities (felling, yarding, and road building) to minimize the risk of disturbance to spotted owls. The seasonal restriction could be waived if surveys indicate no presence of nesting spotted owls within disturbance range (0.25 to 0.5 miles) of the units.

8.2 Affected Environment and Environmental Effects –Round Mountain

This section describes the current condition and trend of affected elements of the existing environment and the environmental effects of the Proposed Action that are unique to the Round Mountain Project Area. Refer to *Section 3.2* for a description of the affected environment and environmental effects that are common to all project areas. Unless described in this section, there are no elements of the affected environment or environmental effects resulting from the Proposed Action or the No Action alternative that are unique to this project area.

8.2.1 Vegetation and Forest Stand Characteristics

Source:
Round Mountain Silvicultural Prescriptions – 2006 Timber Sale Thinning EA
Cascade Resource Area Botanical Report – Round Mountain T.S.
See *Section 3.2.1* for affected environment and environmental effects to vegetation and forest stand characteristics common to all project areas.

Affected Environment

Stand History: The project area consists of stands that have been actively managed for timber production for over 70 years. All of the stands originated after logging, and two units have been thinned. See *Section 10.1, Table 33* for a summary of vegetation and treatment history.

Stand Structure and Forest Health: The stands proposed for thinning range from early mid-seral to mid-seral Douglas-fir types. Stand ages range from approximately 37 to 65 years. Stocking levels are generally high, but some stands vary with the inclusion of some more sparsely stocked acres. Species composition varies, but in general, Douglas-fir, western hemlock, bigleaf maple, and red alder are the primary species found. Understory vegetation amount and distribution varies from light to heavy and consists mainly of sword fern, Oregon grape, salal, huckleberry and vine maple.

8.2.2 Hydrology

Source:
Round Mountain Hydrology/Channels/Water quality report
See *Section 3.2.2* for affected environment and environmental effects to hydrology common to all project areas. *Section 3.2.2.2* describes cumulative effects common to all project areas.

Affected Environment

The project area contains several small headwater streams tributary to the Beaver and Hamilton Creeks in the South Santiam watershed. Most of the project area streams are in proper functioning condition: well shaded, stable beds and banks, adequate quantities of wood, sediment and a diversity of riparian species. Stream side shading from riparian vegetation is adequate to buffer streams from temperature increases.

None of the project area streams are listed on the state's 303d list or in the 319 Report for water quality issues. Recognized beneficial uses of in-stream flows include anadromous fish, resident fish, recreation, and esthetic value. The South Santiam River is a municipal watershed but is not a key watershed.

8.2.3 Fisheries and Aquatic Habitat

Source:

2006 Timber Sale Thinning EA - Fisheries and Aquatic Habitat (Fisheries Report)

See *Section 3.2.3* for affected environment and environmental effects to fisheries and aquatic habitat common to all project areas.

Affected Environment

Only two streams in the proposed project area are fish-bearing, supporting populations of cutthroat trout. Both streams are small tributaries to Beaver Creek, on the north and south sides of Unit 33B. All other streams in the project area are small, steep headwater channels incapable of supporting fish populations. All of the proposed units are located in the Beaver Creek drainage, except for Unit 3D which occurs partly in the Hamilton Creek drainage. Two headwater tributaries to Hamilton Creek originate in Unit 3D.

Threatened and Endangered Species: Chinook and steelhead distribution in Beaver Creek is suspected to end approximately 13 miles downstream of the project area (streamnet.org). Steelhead distribution in Hamilton Creek is suspected to end near the mouth of Deer Creek, approximately 3.5 miles downstream of Unit 3D. Chinook distribution in Hamilton Creek is suspected to end approximately 11 miles downstream of Unit 3D.

Environmental Effects

8.2.3.1 Proposed Action

The thinning and connected actions would have no impact on fish or aquatic habitat. No effect would occur to listed fish primarily due to the distances from the project area downstream to habitat that may be occupied.

8.2.4 Geology and Soils

See *Section* 3.2.4 for affected environment and environmental effects to *geology and soils* common to all project areas.

Table 26: *Soil surface compaction resulting from the Round Mountain Proposed Action*

Proposed Management Activities		***Proposed Action***
Total Thinning Acres		195
Acres compacted by logging systems (estimate based on skid roads, haul roads and landings in up to 10% of the project area)	Ground-based	14.3
	Skyline	5.2
	Total	19.5
Acres compacted by road work (based on 20' width of compaction)	Renovation*	0.5
	Improvement†	0
	New Road Construction	0.5
Acres decompacted by decommissioning	Decreases rock-surface road miles in the project area	0
Totals		*20.0*

* Includes natural-surface roads within units only. Compacted paved and rock-surface haul roads are currently in use as part of the Salem BLM transportation system, and the road mileage summarized in *Table 4 (Section 2.2.1, Connected Actions)* includes routes outside of the project areas.† *Acres already in a compacted condition.*

8.2.5 Wildlife

Source:

2006 Timber Sale Thinning EA - Wildlife Report

See *Section 3.2.5* for affected environment and environmental effects to wildlife common to all project areas.

Affected Environment

Special Habitats, Remnants, Snags and Coarse Woody Debris (CWD): Coarse woody debris material (at least 20" in diameter at the large end, 20 feet in length, and in decay classes 1 and 2) is currently inadequate to meet RMP standards and guidelines (at least 240 linear feet per acre) in Unit 3C (RMP p. 21). Snags at least 20' dbh and over 15' tall (all decay classes) are present in very low numbers (3 per acre) in Units 3C. No remnant old growth trees are present in any of the units. Refer to *Section 10.3,* Table 37 for a unit-specific summary.

Threatened Species - Northern Spotted Owl: The proposed thinning units provide 198 acres of dispersal habitat. The closest known spotted owl sites are located 0.5 to 1.5 miles to the south and west. Units 33 B, C, D, 3A, B, and C are located within the provincial home range radius of these known spotted owl sites. Both sites were occupied by males in 2004. There is one historic site in section 3 which has an unmapped LSR associated with it located adjacent to unit C. Barred owls have been observed in the vicinity of the proposed units.

BLM Special Status Species - Oregon slender salamander: Unit 3C provides an adequate amount of large material (<2 snags per acre) which would eventually become suitable long-lasting soft CWD habitat and meet RMP standards and guidelines (least 20" in diameter at the large end, 20 feet in length, and in decay classes 1 and 2). All units in T11S, R1E, Section 33, and Unit 3C have concentrations of well-decayed CWD in size classes adequate to provide marginal habitat now, though material of adequate size for future habitat is not present.

Environmental Effects

8.2.5.1 Proposed Action

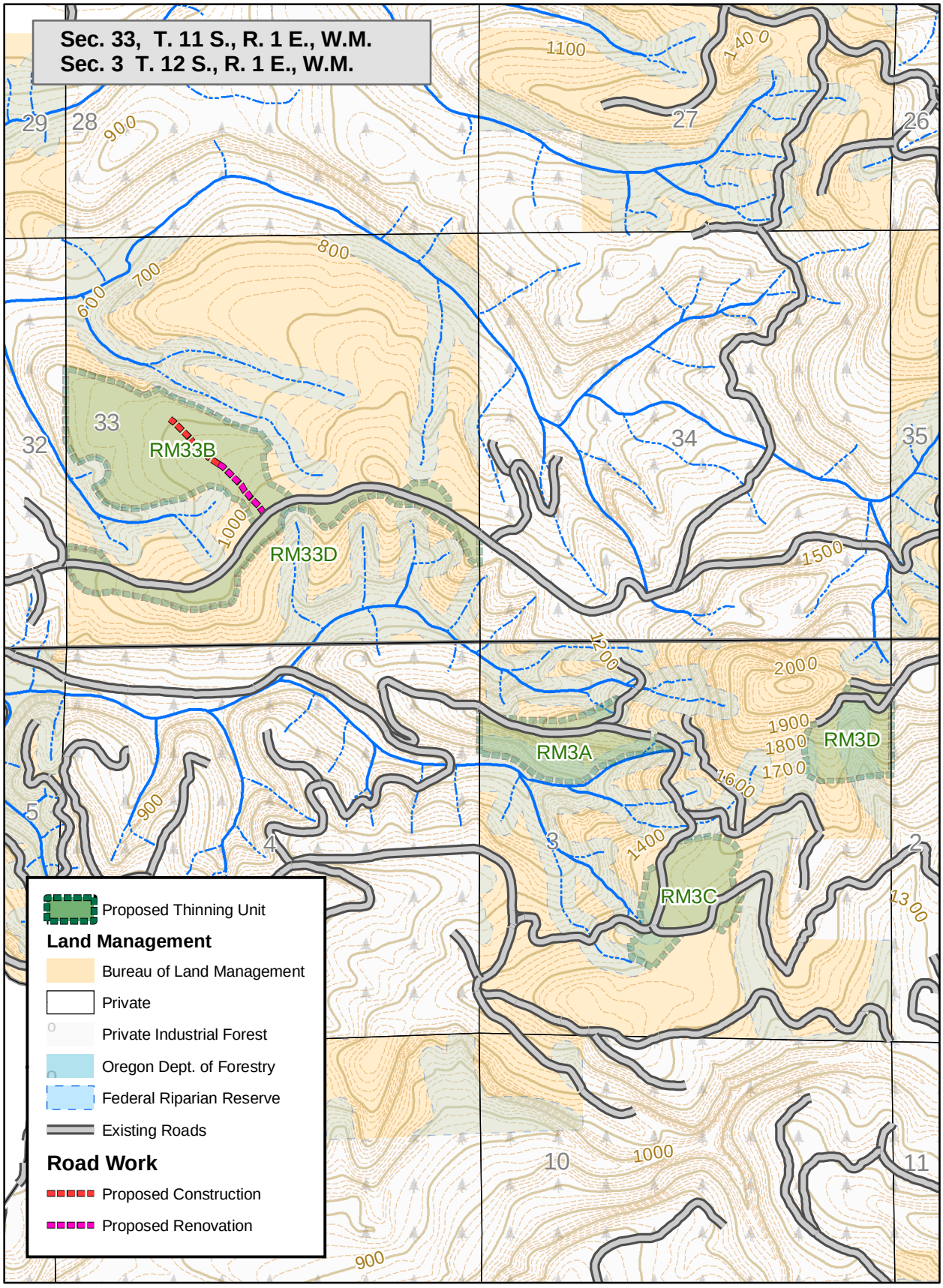
Threatened Species - Northern Spotted Owl:

Species: No known spotted owls would be affected by thinning or connected actions. Seasonal restrictions on habitat modification activities (felling, yarding, and road building) would minimize the risk of disturbance to nesting northern spotted owls at sites not currently identified (See EA *Sec. 8.1.2.1).*

Habitat: In the short term, 198 acres of dispersal habitat in the Crabtree and Hamilton Creek Watersheds would be degraded as a result of thinning. These stands would be maintained as dispersal habitat after harvest. No suitable habitat would be altered (downgraded or degraded) within the provincial home range radius of any known spotted owl sites. In the long term, canopy closures would increase and these stands could attain suitable habitat conditions within 20 to 40 years.

See *Section 3.2.5.1*, environmental effects common to all project areas, for a description of effects resulting from degrading dispersal habitat and downgrading suitable habitat.

Round Mountain Project Area
Unit Location Map - Map 1 of 1



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9.0 COMPARISON OF ALTERNATIVES WITH REGARD TO PURPOSE AND NEED

9.1 Comparison of Alternatives With Regard to Purpose and Need

Table 27: *Comparison of Alternative by Purpose and Need*

Purpose and Need (Section 1.3)	***No Action***	***Proposed Action***	***Annie's Cabin Alternative 2 (Helicopter)***	***Missouri Ridge Alternative 2 (Road Decommissioning)***
Develop timber sales that can be successfully offered to the market place.	**Does not fulfill.**	**Fulfills.**	**Fulfills**	**Fulfills**
Achieve a desirable balance between wood volume production, quality of wood, and timber value at harvest (RMP p. D-3).	**Partially fulfills.** Partially meets wood volume production over course of rotation. Logs at end of rotation would be smaller diameter which generally reduces quality and value compared to thinned stands.	**Fulfills.** Maintains volume production over the course of the rotation. Lengthens the rotation so that logs at end of rotation would be larger diameter.	**Same as Proposed Action.**	**Same as Proposed Action.**
Maintain the health and growth of developing stands.	**Does not fulfill.** Stand health and tree growth rates would begin to decline if stands are not thinned. Competition would result in mortality of smaller trees and some co-dominant trees in the stands.	**Fulfills.** Stand health and tree growth rates would be maintained as trees are released from competition.	**Same as Proposed Action.**	**Same as Proposed Action.**
Retain elements that provide ecosystem diversity (snags, old growth trees, etc.) so that a healthy forest ecosystem can be maintained with habitat to support plant and animal populations (RMP p. 1, 20);	**Partially fulfills.** Retains existing elements, but does not enhance conditions to provide these elements for the future stand.	**Fulfills.** Retains the elements described under "no action" on untreated areas of the stands in the project areas and encourages development of larger diameter trees and more open stand conditions in treated areas. This adds an element of diversity to the landscape not provided on BLM lands as soon under the No Action alternative.	**Same as Proposed Action.**	**Same as Proposed Action.**

Purpose and Need (Section 1.3)	*No Action*	*Proposed Action*	*Annie's Cabin Alternative 2 (Helicopter)*	*Missouri Ridge Alternative 2 (Road Decommissioning)*
Increase height and diameter to develop future large coarse woody debris, snag habitat, in-stream large wood and other elements of late-successional forest habitat. (RMP p.1)	**Fulfills**, but not as soon.	**Fulfills.** Would meet the Purpose and Need sooner (10-30 years) by concentrating stand growth on fewer stems.	**Same as Proposed Action.**	**Same as Proposed Action.**
Provide for structural and spatial stand diversity on a landscape level in the long term.	**Fulfills** by maintaining current trends that would develop diversity slowly.	**Fulfills** by accelerating changes in some parts of some stands to develop more elements of diversity faster.	**Same as Proposed Action.**	**Same as Proposed Action.**
Provide appropriate access for timber harvest, silvicultural practices, and fire protection vehicles.	Annie's Cabin, Missouri Ridge, and Snakehouse: **Partially fulfills**. Roads would not be renovated or maintained for fire protection vehicles. Round Mountain: **Fulfills.** Existing roads meet Purpose and Need.	All project areas: **Fulfills.** Would implement maintenance of feeder roads, allowing improved access for management activities. Would renovate and maintain roads in the Annie's Cabin and Missouri Ridge Project Areas.	**Partially fulfills**. Roads in the Molalla River Share-Use Trail System would not be renovated and maintained.	**Partially fulfills**. A portion of Cotton Creek Road would not be renovated and maintained.
Reduce potential human sources of wildfire ignition by controlling access;	Annie's Cabin and Round Mountain: **Fulfills**. Access is adequately controlled by existing gates and berms.	Annie's Cabin and Round Mountain: **Fulfills**. All existing gates and berms would be maintained or upgraded.	**Same as No Action.**	
	Missouri Ridge and Snakehouse: **Does not fulfill**. Existing gates and berms do not adequately control public motorized access.	Missouri Ridge and Snakehouse: **Fulfills**. New gates would be installed that would provide opportunities to control public motorized access.		**Fulfills.** Decommissioning and removal of culverts would eliminate motorized public access to a portion of Cotton Creek Road.

Purpose and Need (Section 1.3)	*No Action*	*Proposed Action*	*Annie's Cabin Alternative 2 (Helicopter)*	*Missouri Ridge Alternative 2 (Road Decommissioning)*
Reduce adverse environmental effects associated with identified existing roads within the project areas (RMP p. 11).	Annie's Cabin and Snakehouse: **Does not fulfill.** Roads not currently meeting ACS objectives would not be improved, decommissioned or closed and stabilized at this time.	Annie's Cabin and Snakehouse: **Fulfills.** Identified roads would be renovated or improved and maintained, closed and stabilized, or obliterated.	**Partially fulfills**. Roads in the -Use Trail System would not be renovated or repaired.	
	Missouri Ridge: **Does not fulfill.** Roads not currently meeting ACS objectives would not be improved, decommissioned or closed and stabilized at this time.	Missouri Ridge: **Partially fulfills.** Cotton Creek Road would be renovated, but would remain in a sensitive riparian location. The road would continue to contribute a small amount of sediment to Cotton Creek due to its location in a riparian zone.		**Fulfills**. Cotton Creek Road would be decommissioned in a sensitive riparian location. The road would contribute a slightly smaller amount of sediment to Cotton Creek as compared to the Missouri Ridge Proposed Action. Culverts would no longer have the potential to become barriers to fish passage as a of potential result natural events.
	Round Mountain: **Fulfills.** No roads were identified that contribute adverse environmental effects.	**Same as No Action**		

10.0 SUPPORTING DATA – TABLES

10.1 Vegetation

Table 28: *Vegetation Description Summary of Annie's Cabin Project Area Units Acquired From Cavenham Industries In 1992*

Attribute	*7A*	*7B*	*7C*	*18A*	*18B*	*18C*	*18D*	*19A*	*30A*	*30B*	*31A*	*31B*	*31C*	*31E*
Number of stand types	2	1	2	2	1	1	1	2	4	2	1	1	1	4
Ten-year age class	50/60	70	40/70	60/80	50	50	50	50/70	40/50	50	40	40	40	40/50
Average DBH	17/18	17	12/19	11/18	16	17	17	14/18	14/15	15/16	15	15	16	15/18
Total trees per acre	157/ 178	137	137/ 247	120/ 264	181	138	138	131/ 277	142/ 202	158/ 211	127		145	116/ 173
Canopy species														
Douglas-fir	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bigleaf Maple			X	X					X	X	X	X		X
Grand Fir											X	X	X	X
Hemlock			X						X		X	X	X	
Western Redcedar			X			X	X							
Red Alder			X			X	X		X	X	X	X	X	X
Stand History														
Plantation after logging	X	X	X	X					X	X	X	X	X	X
Conversion from pasture	X			X	X		X	X	X					
Natural seeding after logging			X											
Previously thinned	X													

Table 29: *Vegetation Description Summary of Annie's Cabin Project Area Units under Long-Term BLM Management*

Attribute	*5B*	*5BB*	*5C*	*6C*	*6E*
Number of stand types	4	1	2	1	1
Ten-year age class	70/100	70	40/70	40	40
Average DBH	17/22	18	13/18	11	15
Total trees per acre	95/173	173	173/210	271	134
Canopy Species					
Douglas-fir	X	X	X	X	X
Bigleaf Maple	X	X	X	X	
Grand Fir					
Hemlock				X	X
Western Redcedar					
Red Alder			X	X	
Stand History					
Plantation after logging			X	X	X
Natural seeding after fire	X		X		
Previously thinned	X		X	X	

Table 30: *Vegetation Description Summary of Missouri Ridge Project Area Units*

Attribute		***7B***	***7C***	***7D***	***7E***	***7F***	***7G***	***7H***	***7I***
Number of stand types[5]		1	1	1	1	1	1	1	1
Ten-year age class[6]		60	60	70	60	70	50	70	60
Average DBH[7]		17	16	17	16	15	13	15	16
Total trees per acre[8]		123	230	201	145	270	291	284	230
Douglas-fir		X	X	X	X	X	X	X	X
Bigleaf Maple				X	X	X	X	X	
Grand Fir		X	X		X	X	X		X
Hemlock									
Western Redcedar			X						X
Red Alder									
Plantation after logging									
Conversion from pasture									
Natural seeding after logging		X	X	X	X	X	X	X	X
Previously thinned									
Scarified and planted							X		
Attribute	***7K***	***7L***	***7M***	***7N***	***7O***	***7P***	***9A***	***16F***	***17A***
Number of stand types	1	1	1	1	1	1	1	1	1
Ten-year age class	60	60	60	70	30/50	30	40	50	40
Average DBH	16	16	16	17	10/20	10	13	16	15
Total trees per acre	230	230	230	140	120/250	300	340	200	220
Douglas-fir	X	X	X	X	X	X	X	X	X
Bigleaf Maple									
Grand Fir			X					X	
Hemlock								X	
Western Redcedar		X	X					X	**X**
Red Alder									
Stand History									
Plantation after logging							X		
Conversion from pasture									
Natural seeding after logging	X	X	X	X				X	X
Previously thinned									
Scarified and planted					X	X			

Table 31: *Vegetation description summary of units north of the North Santiam River, Snakehouse Project Area*

Attribute	***921A***	***921B***	***15A 15C***	***15B***	***15D***	***15E***	***7A***	***7B 7C***	***7D***	***13A***	***13B 13C 13D***	***31A 31D 31D***	***31B***	***All Units Sec. 33***
Number of stand types	1	1	2	1	1	1	1	1	1	1	1	1	1	1
Ten-year age class	70	80	40/ 70	80	40	115	70	50	60	60	50	80	80	50
Average DBH	21	16	12/ 19	18	11	29	17	13	12	15	13	18	17	15
Total trees per acre	106	159	102/ 225	154	258	73	125	157	138	160	267	159	184	230
Canopy Species														
Douglas-fir	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bigleaf Maple	X	X					X							
Grand Fir														
Western Hemlock	X	X								X	X	X	X	X
Noble Fir												X	X	
Western Redcedar														
Red Alder			X					X	X					
Stand History														
Plantation after logging			X		X				X	X	X			X
Natural seeding after logging	X	X	X	X		X	X	X				X	X	
Previously thinned		X		X		X	X	X				X		X

Table 32: Vegetation description summary of Snake Creek south of the North Santiam River, Snakehouse Project Area

Attribute	***1A 1C***	***1B***	***3A***	***5B***	***5D 5F***	***5E***
Number of stand types	1	2	1	1	1	1
Ten-year age class	50	40/ 50	50	90	30	50
Average DBH	12/ 17	11	12	19	13	15
Total trees per acre	165/ 260	165/ 390	260	141	122	130
Canopy Species						
Douglas-fir	X	X	X	X	X	X
Bigleaf Maple	X	X		X	X	X
Grand Fir						
Western Hemlock	X	X	X	X		
Noble Fir						
Western Redcedar						
Red Alder	X	X			X	X
Stand History						
Plantation after logging	X	X			X	
Natural seeding after logging	X	X	X	X		X
Previously thinned			X	X	X	

Table 33: *Vegetation Description Summary Of Round Mountain Project Area Units*

Attribute	**3A**	**3C**	**3D**	**33B**	**33D**
Number of stand types	2	1	2	1	1
Ten-year age class	40	60	40	70	60
Average DBH	12	16	12	19	19
Total trees per acre	275	145	275	108	120
Douglas-fir	X	X	X	X	X
Bigleaf Maple		X		X	X
Grand Fir				X	
Hemlock		X		X	X
Western Redcedar					
Red Alder				X	X
Plantation after logging				X	X
Natural seeding after logging		X		X	X
Previously thinned	X		X		

Table 34: *Unit-specific Thinning Prescriptions*

Section	***Unit(s)***	***Trees/Acre Before Treatment***	***Trees/Acre After Treatment***
Annie's Cabin Project Area			
6-3E-07	7A	157-178	85-90
	7B	178	81
	7C	137-247	74-180
6-3E-18	18A	120	93
	18AA	264	209
	18B	181	100
	18C, D, & E	138	94
6-3E-19	19A & AA	131-277	88-107
6-3E-30	30A	142-202	115-122
	30B	158-211	105-106
6-3E-31	31A & B	131	118
	31C	145	110
	31E	116-173	93-111
7-3E-05	5B	95-168	61-74
	5BB	173	78
	5C	173-235	78-139
7-3E-06	6C	271	177
	6E	168	129
Missouri Ridge Project Area			
6-2E-07	7B	123	120
	7C	230	120
	7D	201	80-90
	7E	145	120
	7F	270	80-90
	7G	291	120
	7H	284	80-90
	7I	230	120
	7K	230	120
	7L	230	120
	7M	230	120
	7N	205	80-90
	7O	120/250	80/150
	7P	300	150
6-2E-09	9A	340	150
6-2E-16	16F	200	120
6-2E-17	17A	220	120
Snakehouse			
8-3E-31	31A	159	100
	31B	184	100
	31C & D	160	100
8-3E-33	33B	225	100
	33C	225	100
	33H	176	100
	33P	230	100

Section	*Unit(s)*	*Trees/Acre Before Treatment*	*Trees/Acre After Treatment*
	33R	230	100
	33U	230	100
	33W	176	100
9-2E-01	921A	106	60
	921B	159	80
9-2E-15	15A	102-227	60-120
	15B	154	70
	15C	102	60
	15D	258	120
	15E	73	50
9-3E-07	7A	125	80
	7B & C	156	100
	7D	151	80
9-3E-13	13A	158	90
	13B	230	110
	13C & D	142	100
Round Mountain			
11-1-33	33B	108	60-70
	33D	120	60-70
12-1-03	3A	257	70-120
	3C	145	50-100

10.2 Fisheries and Aquatic Habitat

Table 35: *In-Water Work Period for Affected Watersheds*

Watershed	*Project Area*	*In-water Work Period*
Beaver Creek/South Santiam	Round Mountain	June 1 – Sept. 30
Hamilton Creek/South Santiam	Round Mountain	July 15 – Sept. 30
Little North Santiam River	Snakehouse	July 15 – Aug. 31
Middle North Santiam River	Snakehouse	July 15 – Aug. 31
Rock Creek/Pudding River	Missouri Ridge	July 15 – Sept. 30
Upper Molalla River	Annie's Cabin	July 15 – Aug. 31

Table 36: *Approximate Distances from Proposed Project Units To Potential Resident And ESA Listed Fish Habitat*

Distance estimates in miles are downstream from units. Distances estimated in feet are from Riparian Reserve boundaries to stream banks. Source: ODFW Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources (June, 2000).

Unit Number	***Dist. to resident cutthroat trout habitat***	***Dist. to steelhead habitat***	***Dist. to Chinook habitat***
Annie's Cabin			
7A, 31B, C	0.25 to Molalla R.	0.25 to Molalla R.	0.25 to Molalla R.
7B	0.15 to Molalla R.	0.15 to Molalla R.	0.15 to Molalla R.
7C, 18C	0.10 to Molalla R.	0.10 to Molalla R.	0.10 to Molalla R.
18A, D, E, 19A, 6C	0.20 to Molalla R.	0.20 to Molalla R.	0.20 to Molalla R.
18B	0.5 to Molalla R.	0.5 to Molalla R.	0.5 to Molalla R.
30A, 31A	Min. 50' on Shotgun Cr.	0.10 to Molalla R.	0.10 to Molalla R.
31E	0.20 to Shotgun Cr.	1.0 to Molalla R.	1.0 to Molalla R.
6E	0.75 to Molalla R.	0.75 to Molalla R.	0.75 to Molalla R.
5B	Min. 50' on Bear Cr.	1.0 to Molalla R.	1.0 to Molalla R.
5C	0.20 to Bear Cr.	1.25 to Molalla R.	1.25 to Molalla R.
Missouri Ridge			
9A	Min. 50' on Cotton Cr.	1 in Rock Cr.	13 in Rock Cr.
16D, F; 17A	Min. 50' on unnamed Rock Cr. Trib	3 in Rock Cr.	14 in Rock Cr.
7F, H, N	Min. 50' on Comer Cr.	7 in Rock. Cr.	11 in Rock Cr.
7E, G	0.20 to Comer Cr.	7 in Rock Cr.	11 in Rock Cr.
7C, K	Min. 50' on unnamed Rock Cr. Trib	1.5 in Rock Cr.	13 in Rock Cr.
7I, L, M,O, P	0.25 to unnamed Rock Cr. Trib	2 in Rock Cr.	14 in Rock Cr.
7D	Min. 50' on Comer Cr.	7.5 in Rock Cr.	14.5 in Rock Cr.
Snakehouse			
31A, D, E	0.5 in Canyon Cr.	2.5 to LNSR[2]	2.5 to LNSR
31B	1.5 in Canyon Cr.	3.5 to LNSR	3.5 to LNSR
33P, U	1.5 in Big Cr.	3 to LNSR	3 to LNSR
33C,H	2 in Big Cr.	3.5 to LNSR	3.5 to LNSR
33B, W	2.5 in Big Cr.	4 to LNSR	4 to LNSR
921A, B	1.25 in LNSR	1.25 to LNSR	1.25 to LNSR
15A, B, C	0.3 in LNSR	0.3 to LNSR	0.3 to LNSR
15D	0.75 in LNSR	0.75 to LNSR	0.75 to LNSR
15E	1 to NSR[3]	1 to NSR	1 to NSR
7A	Min. 50' on unnamed LNSR trib	0.2 to LNSR	0.2 to LNSR
7D	0.2 to LNSR	0.2 toLNSR	0.2 to LNSR
13A	Unknown	1.5 to LNSR	1.5 to LNSR
13B, C, D	Unknown	2 to Elkhorn Cr.	3 to LNSR
1B, C	Min. 50' on Snake Cr.	2 in Snake Cr.	4 to NSR
1A	0.2 to unnamed NSR trib	2 to NSR	2 to NSR
3A	Unknown	3 in NSR	3 in NSR

Unit Number	*Dist. to resident cutthroat trout habitat*	*Dist. to steelhead habitat*	*Dist. to Chinook habitat*
5B	Min. 50' on unnamed Snake Cr. Trib	2 to Snake Cr.	2.5 to NSR
5D, E	0.25 on unnamed Snake Cr. Trib	2 to Snake Cr.	2.5 to NSR
5F	1 to unnamed Snake Cr. Trib	2.5 to Snake Cr.	3 to NSR
Round Mountain			
33B	0.05 on unnamed Beaver Cr. Trib	17 in Beaver Cr.	17 in Beaver Cr.
33D	0.1 on unnamed Beaver Cr. Trib	17 in Beaver Cr.	17 in Beaver Cr.
3A	0.5 on unnamed Beaver Cr. Trib	18 in Beaver Cr.	18 in Beaver Cr.
3C	1.5 on unnamed Beaver Cr. Trib	19 in Beaver Cr.	19 in Beaver Cr.
3D	0.75 in Hamilton Cr.	4 in Hamilton Cr.	12 in Hamilton Cr.

[1] Upstream limits of anadromous fish distribution are obtained from *streamnet.org*. Stream distances are estimated from maps.
[2] LNSR = Little North Santiam River
[3] NSR = North Santiam River

10.3 Wildlife

Table 37: *Summary of Special Habitats, Remnants, Snags and Coarse Woody Debris (CWD) by Project Area*

Seral Stage Age Classes (years) based on Stand Exam data: Early Seral = 0-30; Early Mid Seral = 30-40; Mid Seral = 40 – 60; Late Mid Seral = 60 -80; Early Mature Seral = 80 - 120; Mature = 120 - 200; Old Growth =200+

* Special habitats (within the units only) include: wet and dry meadows, talus, cliffs & rock outcrops.
** Snags = (per acre, 19" dbh </>, all decay classes over 15 feet tall
*** Linear ft per acre >19" dbh & 20' long, does not include soft (class 5+) logs
# Adjacent special habitat, wetland, pond adequately protected with no treatment buffer.

Unit	*Location*	*Seral Stage*	*Remnant Old Growth*	*Special Habitats**	*Snags***	*CWD****
Annie's Cabin Project Area						
7A	6-3E-07	Mid	No	No	0	0
7B	6-3E-07	Mid	No	No	0	0
7C	6-3E-07,18	Mid	No	No	0	0
18A-D	6-3E-18	Mid	No	No	0	0
19A	6-3E-19	Mid	No	No	0	0
30A	6-3E-30	Mid	No	No	0	0
30B	6-3E-30	Mid	No	No	0	>240'
31A-C,E	6-3E-31	Mid	No	No	1	0
5B	7-3E-05	Early/Mature	No	No	1	0
5C	7-3E-05	Mid	No	No	0	0

Seral Stage Age Classes (years) based on Stand Exam data: Early Seral = 0-30; Early Mid Seral = 30-40; Mid Seral = 40 – 60; Late Mid Seral = 60 -80; Early Mature Seral = 80 - 120; Mature = 120 - 200; Old Growth =200+

* Special habitats (within the units only) include: wet and dry meadows, talus, cliffs & rock outcrops.

** Snags = (per acre, 19" dbh </>, all decay classes over 15 feet tall

*** Linear ft per acre >19" dbh & 20' long, does not include soft (class 5+) logs

\# Adjacent special habitat, wetland, pond adequately protected with no treatment buffer.

Unit	***Location***	***Seral Stage***	***Remnant Old Growth***	***Special Habitats****	***Snags****	***CWD*****
6C	7-3E-06	Mid	No	No	0	0
6E	7-3E-06	Early Mid	Yes	No	1	0
Missouri Ridge Project Area						
7C,G,I,J, K,L,M	6S-2E-07	Mid	Yes	No	<1	0
7B,O,P	6S-2E-07	Early	No	No	0	0
7D,E,F,H,N	6S-2E-07	Late Mid	Yes	No	<1	0
9A	6S-2E-09	Early	No	No	0	0
16F	6S-2E-16	Mid	No	No	<1	0
16D	6S-2E-16	Early	No	No	0	0
Snakehouse Project Area						
31(all)	8S-3E-31	Late Mid	No	No	1.4	60'
33(all)	8S-3E-33	Mid	No	No#	0	0
1A	9S-2E-01	Mid	No	No	0	0
1B	9S-2E-01	Late Mid	No	No	0	0
15A,C,D	9S-2E-15	Mid	No	No	0	0
15B	9S-2E-15	Late Mid	Yes	No	2	60'
15E	9S-2E-15	Early Mature	Yes	No	0	0
7(all)	9S-2E-07	Mid	No	No	0	0
13A	9S-3E-13	Mid	No	No	1	60'
13B	9S-3E-13	Mid	No	No#	1	60'
1A,C	10S-2E-01	Mid	No	No	0	0
1B	10S-2E-01	Mid	No	No	0	0
3A	10S-3E-03	Late Mid	Yes	No	1.5	0
5B	10S-3E-05	Late Mid	No	No	0	0
5E	10S-3E-05	Mid	Yes	No	0	0
5D,F	10S-3E-05	Early	No	No	0	0
Round Mountain Project Area						
33(all)	11S-01E-33	Mid	No	No	0	80'
3A,BD	12S-01E-03	Early Mid	No	No	0	0
3C	12S-01E-03	Mid	No	No	3	240'

Table 38: *FY 2006 Habitat Modification of Project Areas by Treatment type[1], Land Use Allocation[2], Pre/Post Treatment Habitat Type[3], and Habitat Modification Type[4]*

Project/5th. Field Watershed	Township-Range-Section-unit#	1) Proposed Thinning Treatment	Acres Proposed	Acres In Action Alternative	2) Land Use Allocation	3) Pre/Post Treatment Habitat Type	4) Habitat Modification
Annie's Cabin Upper Molalla	6S-3E-07 (all)	Light to moderate	135	152	GFMA/RR	Dispersal/Dispersal	Degrade
	6S-3E-18 (all)	Light to moderate	23	32	GFMA/RR	Dispersal/Dispersal	Degrade
	6S-3E-19 (all)	Light to moderate	21	26	GFMA/RR	Dispersal/Dispersal	Degrade
	6S-3E-30 (all)	Light to moderate	86	176	GFMA/RR	Dispersal/Dispersal	Degrade
	6S-3E-31 (all)	Light to moderate	114	117	GFMA/RR	Dispersal/Dispersal	Degrade
	7S-3E-05 (5B)	Heavy	137	141	GFMA	NRF/Dispersal	Downgrade
	7S-3E-05 (5C)	Light to moderate	25	31	GFMA/RR	Dispersal/Dispersal	Degrade
	7S-3E-06 (all)	Light to moderate	25	38	GFMA/RR	Dispersal/Dispersal	Degrade
TOTAL			**566**	**713**			
Missouri Ridge Rock Creek/ Pudding	6S-2E-07 (C-F,H-N)	Light to moderate	150	150	GFMA/RR	Dispersal/Dispersal	Degrade
	6S-2E-07 (B,G)	Light to moderate	35	35	GFMA/RR	Dispersal/Dispersal	Degrade
	6S-2E-07 (O,P)	Light to moderate	35	35	GFMA/RR	Capable/Capable	Degrade
	6S-2E-09 (all)	Light to moderate	44	44	GFMA/RR	Dispersal/Dispersal	Degrade
	6S-2E-16 (all)	Light to moderate	16	16	GFMA/RR	Dispersal/Dispersal	Degrade
	6S-2E-17 (all)	Light to moderate	7	7	GFMA/RR	Dispersal/Dispersal	Degrade
TOTAL			**287**	**287**			
Snakehouse Little North Santiam	8S-3E-31 (all)	Light to moderate	88		GFMA/RR	Dispersal/Dispersal	Degrade

Project/5th. Field Watershed	Township-Range-Section-unit#	1) Proposed Thinning Treatment	Acres Proposed	Acres In Action Alternative	2) Land Use Allocation	3) Pre/Post Treatment Habitat Type	4) Habitat Modification
Snakehouse Little North Santiam	8S-3E-33 (all)	Light to moderate	101		GFMA/RR	Dispersal/Dispersal	Degrade
	9S-2E-01 (all)	Light to moderate	55		GFMA/RR	Dispersal/Dispersal	Degrade
	9S-2E-15 A,B,C,D	Light to moderate	77		GFMA/RR	Dispersal/Dispersal	Degrade
	9S-2E-15 E	Heavy	30		GFMA/RR	NRF/Dispersal	Downgrade
	9S-3E-07 (all)	Light to moderate	52		GFMA/RR	Dispersal/Dispersal	Degrade
	9S-3E-13 A,B,C,D	Light to moderate	189		GFMA/RR	Dispersal/Dispersal	Degrade
TOTAL			**592**				
Snakehouse North Santiam	10S-2E-01 (all)	Light to moderate	147		GFMA/RR	Dispersal/Dispersal	Degrade
	10S-3E-03 A	Light to moderate	15		LSR/RR	Dispersal/Dispersal	Degrade
	10S-3E-05 D,E,F	Light to moderate	67		Conn/RR	Dispersal/Dispersal	Degrade
	10S-3E-05 B	Light to moderate	13		LSR/RR	Dispersal/Dispersal	Degrade
TOTAL			**242**				
Round Mountain Crabtree Creek	11S-1E-33 B, D	Light to moderate	106		CONN/RR	Dispersal/Dispersal	Degrade
Round Mountain Hamilton Creek	12S-1E-03 A, C, D	Light to moderate	89		CONN/RR	Dispersal/Dispersal	Degrade
TOTAL			**195**				

Project/5th. Field Watershed	Township-Range-Section-unit#	1) Proposed Thinning Treatment	Acres Proposed	Acres In Action Alternative	2) Land Use Allocation	3) Pre/Post Treatment Habitat Type	4) Habitat Modification

1) Treatment Type:

Light to moderate thinning in dispersal habitat can be for forest health or to improve the structural

Light to moderate thinning in dispersal habitat can be for forest health or to improve the structural characteristics of a stand. Such thinnings maintain a minimum of 40 percent average canopy cover throughout the stand. Such treatments may be described as density management, selective cut, or partial cut. Light to moderate thinnings can have long-term benefits to spotted owls by encouraging late-successional characteristics to occur more rapidly.

Heavy thinning in suitable (NRF) habitat is the partial removal of the over story primarily for commodity outputs. Such treatments may be described as density management, selective cut, or partial cut. Heavy thinning in NRF habitat results in <60% but > 40% average canopy cover.

2) Land Use Allocations: GFMA=General Forest Management Area Matrix; **CONN**=Connectivity Matrix; **RR**=Riparian Reserve; **LSR**=Late Successional Reserve.

3) Habitat Types:

Capable habitat consists of young stands under 40 years of age that are currently non habitat for the spotted owl, but have the capability of becoming dispersal and/or suitable in the future.

Dispersal habitat generally consists of mid-seral stage stands between 40 and 80 years of age with canopy closures of 40 percent or greater and an average dbh of 11". Spotted owls use dispersal habitat to move between blocks of suitable habitat; juveniles use it to disperse from natal territories. Dispersal habitat may have roosting and foraging components, enabling spotted owls to survive, but lack structure suitable for nesting.

NRF is Suitable habitat consisting of habitat used by owls for nesting, roosting and foraging. Generally this habitat is 80 years of age or older, multi-storied and has sufficient snags and down wood to provide opportunities for nesting, roosting and foraging. The canopy closure generally exceeds 60 percent.

4) Habitat Modifications:

Degrade habitat means to affect the quality of spotted owl suitable or dispersal habitat without altering the functionality of such habitat. Such treatments can have long-term benefits to spotted owls by encouraging late-successional characteristics to occur more rapidly.

Downgrade habitat means to alter the functionality of spotted owl suitable habitat so that the habitat no longer supports nesting, roosting, and/or foraging behavior, but still functions as dispersal habitat.

11.0 LIST OF PREPARERS

Resource	*Name*	*Initials*	*Date*
Silviculture	Dan Schlottmann	DS	7/19/05
	Charley Thompson	CT	7/19/05
	Dave Rosling	DR	7/19/05
Cultural Resources	Pete Hazen	PH	7-18-05
	Steve DeFord	SDD	7-19-05
Hydrology/ Water Quality/Soils	Patrick Hawe	WPH	7-18-05
Botany TES and Special Attention Plant Species	Terry Fennell	TGF	7-18-05
Wildlife TES and Special Attention Animal Species	Jim England	JSE	7/18/05
	Jim Irving	CSforJI	7/19/05
	Steve Dowlan	SD	7/18/05
Fire/Fuels	Barbara Raible	BR	7/19/05
Fisheries	Dave Roberts	DAR	7/18/05
Recreation Sites and Visual Resources Management and Rural Interface	Laura Dowlan	LD	7/15/05
NEPA	Carolyn Sands	CDS	7/19/05
Logging SYSTEMS	Randy Herrin	RH	7-15-05
	Michael Barger	MB	7-20-05
	Keith Walton	KW	7/18/05
Engineering	Bob Jordan	RWJ	18 Jul 05
	Steve Ditterick	SD	7/19/05
Soils	Wesley Wong	WW	7/19/05

12.0 CONTACTS AND CONSULTATION

12.1 Consultation

12.1.1 ESA Section 7 Consultation

12.1.1.1 US Fish and Wildlife Service

ESA Section 7 Consultation took place using the programmatic consultation process on FY 2005 and 2006 habitat modification projects in the Willamette Province. The *Biological Assessment On Fiscal Year 2005-2006 Projects Within The Willamette Province Which Would Modify The Habitat Of The Bald Eagle And The Northern Spotted Owl* (BA) was submitted in August 2004.

Using effect determination guidelines, the BA concluded that overall, thinning in these project areas may affect the northern spotted owl primarily due to the modification of dispersal habitat. The Biological Opinion (BO) associated with these thinnings was issued in March 2005 (reference # 1-7-05-F-0228). The BO concluded that these thinnings would not jeopardize the continued survival of the spotted owl (p. 75). None of the proposed units are located in Critical Habitat for the northern spotted owl.

The proposed thinning and connected actions described in this EA have incorporated the applicable design standards that were described in the BA (primarily, seasonal restrictions on habitat modification activities such as felling, yarding, and road building to minimize the risk of disturbance to northern spotted owls during the critical nesting period (BA p.7). In addition, compliance with the Terms and Conditions of "Reasonable and Prudent Measures" set forth in the Biological Opinion will be accomplished by monitoring and reporting on the implementation of projects and their adverse effects (BO p. 79).

12.1.1.2 NOAA Fisheries (NMFS)

Potential effects of the thinning and connected actions that may affect the listed fish species are related to sediment inputs associated with road repair/decommissioning and culvert replacement/removal. Effect determinations for proposed Critical Habitat for UWR Chinook salmon and UWR steelhead trout are the same as for the species. *Table 39* describes Endangered Species Act Determination of Effect for Upper Willamette River Chinook salmon and Upper Willamette River steelhead trout.

Table 39: *Endangered Species Act Determination of Effect for Upper Willamette River Chinook salmon and Upper Willamette River steelhead trout.*

Species	Project Area (s)	Effect Call	Remarks
Upper Willamette River (UWR) Chinook salmon or UWR steelhead trout	Annie's Cabin Alternative 2 (Helicopter); Snakehouse, Round Mountain	No Effect	See *EA Sections 5.2.3.2, 7.2.3.1, 8.2.3.1, Appendix 1.*
	Annie's Cabin Alternative 1 (Proposed Action)	May affect, Not Likely to Adversely Affect	See *Section 5.2.3.1, Appendix 1.*
UWR steelhead trout	Missouri Ridge	May affect, Not Likely to Adversely Affect	See *Sections 6.2.3.2, 6.2.3.3, Appendix 1.*

For action alternatives that would have "no effect" on UWR steelhead trout or UWR Chinook salmon, consultation with NOAA Fisheries on the potential effects of the project on those species would not be required. The determination of "no effect" is based primarily on project design features that would prevent increases in sediment input to stream channels, or increases in stream turbidity or temperature.

The Annie's Cabin Proposed Action **"may affect"** Upper Willamette River chinook salmon and/or Upper Willamette River steelhead trout due to increased sedimentation that is expected from the replacement of up to eight live-stream culverts along the haul routes within 0.1-0.5 mile of the Molalla River.

A Biological Assessment (BA) would be prepared to determine whether the project is '**likely**' or '**not likely**' to adversely affect the ESA listed fish species, and consultation/conferencing with NOAA Fisheries would be initiated.

The Missouri Ridge: Under both Action Alternatives, the project "may affect" UWR steelhead trout due to the probable short-term sediment impacts resulting from replacement of the culverts along the Cotton Creek Road. Consultation with NOAA Fisheries on the potential effects of the project on UWR steelhead trout would be required. The project would have no effect on UWR Chinook salmon because Chinook distribution is suspected to end 10-12 miles downstream in Rock Creek.

12.1.2 Cultural Resources - Section 106 Consultation and Consultation with State Historical Preservation Office:

Cultural Resource Inventory reports:

1. #C 0402: Snakehouse Thinning (Pete Hazen, July. 7, 2004)
2. #C 0403: Missouri Ridge: (Pete Hazen, October 6, 2004)
3. #C 0502: Round Mountain Thinning, T11S R1E Section 33: (Steve DeFord, January 24, 2005):
4. #C 0503: Annie's Cabin Thinning Units 7A; 7B; 7C: (Steve DeFord, March 22, 2005)
5. #C 0504: Annie's Cabin Thinning Units 18A; 18B; 18C; 18D; 18E; 18F: (Steve DeFord, March 23, 2005)
6. #C 0505 Annie's Cabin Thinning Units, T6S R3E, Section 19: (Steve DeFord, March 29, 2005)
7. # C 0506: Annie's Cabin Thinning Units, T6S R3E, Section 30: (Steve DeFord, April 4, 2005)

8. #C 0507: Annie's Cabin Thinning Units, T6S R3E, Section 31: (Steve DeFord, April 5, 2005)
9. #C 0508: Annie's Cabin Thinning Units, T7S R3E, Section 6: (Steve DeFord, March 23, 2005)

All Surveys were reviewed and signed by District Archeologist (Philipek). The tracking form was signed by Field Manager (Enstrom, 1/23/04).

12.2 Public Scoping and Notification - Tribal Governments, Adjacent Landowners, General Public, and State County and local government offices

Scoping letters were sent on to federal, state and municipal government agencies, nearby landowners, tribal authorities, and interested parties on the Cascades Resource Area mailing list. The letters described a summary of the Proposed Action for each project area, and included maps.

- **Annie's Cabin (AC):** A scoping letter was sent on October 7, 2004, and a public meeting was held at the Molalla Public Library on December 7, 2005. Over 50 letters with scoping comments and concerns were received by mail, by email, and by phone, and additional comments were received during the meeting.
- **Missouri Ridge (MR):** A scoping letter was sent on October 15, 2004. Fourteen letters with scoping comments and concerns were received by mail.
- **Snakehouse and Round Mountain (SH/RM):** A scoping letter was sent on January 2, 2005. One letter with scoping comments and concerns were received by mail.

12.2.1 Response to Scoping Comments

Comments and concerns that provide specific and substantive input to the development of alternatives are compiled and summarized below. Unless specified otherwise, comments apply to all project areas. *Section 3.0* addresses effects common to all project areas. The following Sections address specific project areas:
Section 5.0 - Annie's Cabin
Section 6.0 – Missouri Ridge
Section 7.0– Snakehouse
Section 8.0 – Round Mountain

1. ***Effects to riparian areas, water quality, and fisheries:*** Concerns were expressed about treatments proposed for riparian areas, impacts to water quality and temperature as a result of thinning, erosion and the effects to fish of sediment **(AC)**, and the increase in peak flows and the potential for flooding due to timber harvest **(AC)**.

   Response: *EA Section 2.2* (the Proposed Action) describes the thinning treatment proposed for the Riparian Reserve (RR) land use allocation. Design features common to all projects (*EA Section 2.2.2*) addresses the width of stream protection buffers (also referred to as a "stream protection zones").

The environmental effects to water quality and peak flows, resulting from thinning are summarized in *EA Sections 3.2.2.* Environmental effects to fish and fish habitat resulting from thinning are summarized in EA *Section 3.2.3.1*. Effects of connected actions (replacing culverts) to water quality are summarized in EA *Section 5.2.2.*, and effects to fish and fish habitat in *EA Section 5.2.3*.

2. ***Effects to old growth trees, snags and coarse woody debris (CWD):*** Concerns were expressed about cutting old-growth trees, loss of snags, and protection and enhancement of CWD.

   Response: *EA Section 3.2.5* describes the affected environment with respect to old growth trees, snags and CWD. These habitat elements are generally scarce throughout the project areas. *EA Section 2.2.2* describes design features intended to protect existing old-growth trees, snags and CWD. *Section 3.2.1.* describes the effects to residual live trees as a result of thinning, and how these effects would contribute to larger live trees, snags and CWD in the future.

3. ***Spread of invasive weeds:*** Concerns were expressed about the spread of invasive weeds as a result of timber harvest.

   Response: *EA Section 3.2.1* describes the existing condition within the project areas, and the effects of thinning to non-native and invasive plants.

4. ***Effects from road construction and reconstruction:*** Concerns were expressed about a number of effects related to roads (Concerns about roads and recreation are summarized later). These include:
   - the need to construct any new roads (especially in steep or unstable areas) or reconstruct old roads which have begun to revegetate **(AC)**;
   - reducing impacts from roads through decommissioning, ripping, and restoration;
   - cumulative impact to soil from existing and proposed roads;
   - possible use of open skid roads by four wheel drive vehicles **(AC)**;
   - detrimental impacts of road building to animal habitat, soil erosion, and streams;
   - detrimental effects resulting from hauling logs over or through the slump on Huckleberry Road in T6S, R3E, Section 31 **(AC)**.

   Response: The Purpose and Need for the action alternatives contains specific objectives for roads and road management for all project areas (*EA Section 1.3*). *EA Sections 3.2.2* and *5.2.2* summarize the short-term, long-term and cumulative effects to water quality and peak flows resulting from construction of dirt surface spur roads, renovation of existing roads, and use of rock-surface roads as haul routes (including the slump on Huckleberry Road). Effects to soil (including the slump on Huckleberry Road) are summarized in *EA Section 5.2.4*. Restrictions to public motorized use of skid trails are addressed in *EA Sections 2.2.1 and 5.1.2*. Alternative 2 (*EA Section 5.1.1*) would result in no new road construction for units west of the Molalla River and road renovation to a lower standard to access thinning units in this portion of the project area.

5. ***Effects to wildlife and wildlife habitat:*** Concerns were expressed about effects to wildlife in very general terms, with some specific concern for small wildlife species, displacement of wildlife, and habitat fragmentation. One comment expressed a desire for "forage seed openings" to be created **(AC)**.

Response: See Response #2 for a discussion of old-growth trees, snags, and CWD. Effects to BLM Special Staus Species, northern spotted owls, and migratory and resident bird species are summarized in *EA Sections 3.2.5* and *5.2.5*. With the exception of small gaps created in 5 to 15 percent of the treatment area (*EA Section 2.2*) in non-Matrix LUAs, continuous forest cover would be maintained.

6. ***Logging systems:*** Suggestions were made to:
   - use as little heavy machinery as possible **(AC)**;
   - use horse-logging methods **(AC)**;
   - not use "northern haul route" (presumed to be the Amanda's Trailhead access route) - consider helicopter logging instead **(AC)**.

   Response: The IDT briefly discussed the use of horse-logging systems. An alternative was not fully developed because a longer amount of time would be required to complete logging; affecting recreation use for a longer period of time, and all roads in the trail system would still be needed to haul logs off-site. Under the Proposed Action, portions of units were deferred due to the amount of new roads required to move in skyline yarding machinery for relatively small areas. By not using the "northern haul route", the Purpose and Need for action with respect to the Matrix LUA and roads would not be met, since these roads are considered to be important to provide appropriate access for timber harvest, silvicultural practices, and fire protection vehicles.

7. ***Type of thinning prescription, need for thinning and criteria for tree selection:*** Two comments questioned the need to thin some stands, especially those 70 – 80 years old **(AC** and **MR)**. A suggestion was made to leave thinned trees on the forest floor for nutrients **(AC)**, and to drop all units in T6S, R3E, Section 7 **(AC)**. A request was made that a variable density thinning prescription should be applied to all units, regardless of LUA.

   Response: Thinning in the project area is designed to meet the Purpose and Need for action and the objectives and management direction for the affected LUA, as described in the RMP. Leaving thinned trees on the forest floor would not meet the purpose and need to provide timber products and contribute to a sustainable supply of timber as described in the RMP. Variable density thinning prescriptions would be applied to Connectivity/Matrix, RR, and Late-Successional Reserve LUAs. Thinning from below meets the Purpose and Need for the Matrix LUA (*EA Section 1.3*).

8. ***Economic concerns:*** Questions were raised regarding the costs required to plan the thinning proposals **(AC)**, and monetary benefits that would result from the sale of thinned trees **(AC)**.

   Response: An economic analysis would not add additional relevant information in choosing between alternatives (40 CFR 1502.23: Cost/Benefit Analysis); therefore it was not documented in the EA. This action is designed to provide a viable timber sale, similar to other sales that sold at or above appraised price on the Salem District. The economic value of trees and the reasons for providing timber to the economy is described in the Purpose and Need of the Salem District Resource Management Plan (RMP p. 1-3).

9. **Private property concerns:** Adjacent landowners expressed concerns about the possibility of broken fences and escaped cattle resulting from falling and logging along a property boundary **(MR),** and gate control problems that might result in instances of vandalism or eco-terrorism **(MR).**

   Response: Contractors would be expected to avoid damage to adjacent private property while operations are under way. Existing motor vehicle access restrictions would be maintained in all project areas, during and after thinning.

10. **Cumulative effects to affected watersheds:** One comment expressed concern about cumulative effects within the Molalla River watershed when management of adjacent Weyerhaeuser lands is considered **(AC)**.

    Response: Cumulative effects to watershed hydrology are summarized in *EA Section 3.2.2.2*, and cumulative effects to wildlife are summarized in *EA Section 3.2.5.2.*

11. **Effects to Molalla River Shared-Use Trail System:** Many of the scoping comments for the Annie's Cabin project were associated with concerns about the accuracy of the trail locations, damage to single-track trails (structures and tread), restrictions on recreational use during thinning activities, the visual impacts associated with thinning the units, and truck hauling on roads that are used as part of the trail system **(AC)**.

    Response: The location of trails in or near thinning units was updated. Several project design features (See *EA Section 5.1*) and an alternative (See *EA Section 5.1.1*) were developed in response to the scoping comments. *EA Section 5.2.7.1* summarizes the potential effects of the Proposed Action to recreation and visual resources and *EA Section 5.2.7.2* summarizes the effects of the helicopter alternative.

12. **Planning Questions and Concern:** Several of the scoping comments for the Annie's Cabin project were associated with concerns about not having a long-term management plan for the Molalla River Corridor. There was also a concern that the proposed thinning did not meet the purpose stated by BLM for acquiring the lands in the Molalla River Corridor through a land exchange with Cavenham Forest Industries in 1992 **(AC)**.

    Response: The Environmental Assessment and Decision Record (May 1990) for the land exchange stated that the lands acquired in the Molalla River Corridor would be "managed for multiple-use resource programs, with outdoor recreation , wildlife and fisheries habitat protection, and timber production receiving the dominant attention." The Land Use Allocation guidance in the Salem District RMP does provide for multiple-use resource management of BLM-administered lands in the Molalla River Corridor. The Proposed Action is in compliance with this guidance and is consistent with recommendations provided in the Molalla Watershed Analysis (*See EA Section 1.2*). No further planning is required.

12.2.2 30-day public comment period

The EA and FONSI will be made available for public review July 20, 2005 to August 19, 2005. The notice for public comment will be published in a legal notice by the *Molalla Pioneer, Stayton Mail, and Albany Democrat Herald* newspapers. Comments received by the Cascades Resource Area of the Salem District Office, 1717 Fabry Road SE, Salem, Oregon 97306, on or before August 19, 2005 will be considered in making the final decisions for this project.

13.0 MAJOR SOURCES AND COMMON ACRONYMS

13.1 Major Sources

These specialists' reports can be found in the 2006 Thinning EA project file and are available for review at the Salem District Office.

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Liston, A. 1998. *Conservation Genetics of Cimicifuga elata: Results from the 1997 Population Samples*. Department of Plant Pathology, Oregon State University, Corvallis, OR

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Table 40: *Summary of RMP References*

RMP Topic	RMP page #
Air Quality	p. 22
Aquatic Conservation Strategy	pp. 5-7
Best Management Practices	Appendix C pp. C-1 to C-9
Cultural Resources	p. 36
Fire/ Fuels Management	pp. 65-67
Major Land Use Allocations	pp. 7-9
Matrix Land Use Allocation	pp. 20-22
Noxious Weeds	p. 64
Recreation	pp. 41-45
Riparian Reserve Land Use Allocation	pp. 9-15
Roads	pp. 62-64
Rural Interface Areas	pp. 39-40
Silvicultural Systems and Harvest Methods	Appendix D pp. D-1 to D-6
Special Forest Products	pp. 49-50
Special Status and SEIS Special Attention Species and Habitat –amended March 2004- see SSSP	pp. 29-33; Appendix B-1 pp. B-1-1 to B-1-7; Appendix B-2 pp. B-2-1 to B-2-2
Timber Resources	pp. 46-48
Visual Resources	pp. 36-37
Water and Soils	pp. 22-24
Wild and Scenic Rivers	pp. 37-38
Wildlife Habitat	pp. 24-26
Wilderness	pp. 38-39

13.2 Common Acronyms

ACS – Aquatic Conservation Strategy
BLM – Bureau of Land Management
BMP – Best Management Practice(s)
BO – Biological Opinion
BS – Bureau Sensitive, a category of species under the Oregon/Washington Special Status Species Policy
CONN – Connectivity land use allocation (Matrix)
CWD – Coarse Woody Debris
DBH – Diameter Breast Height
EA - Environmental Assessment
ESA – Endangered Species Act
FONSI – Finding of No Significant Impact
GFMA – General Forest Management Area land use allocation (Matrix)
NEPA – National Environmental Policy Act (1969)
NOAA – National Oceanic Atmospheric Administration (National Marine Fisheries Service [NMFS] is now called NOAA Fisheries)
NWFP – Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Related Species within the Range of the Northern Spotted Owl (1994) (Northwest Forest Plan)
ODEQ – Oregon Department of Environmental Quality
PSZ – primary shade zone
RIA – Rural-Urban Interface
RMP – Salem District Record of Decision and Resource Management Plan (1995)
RMP/FEIS – Salem District Proposed Resource Management Plan / Final Environmental Impact Statement (1994)
ROW – Right-of-Way (roads)
RR – Riparian Reserve Land Use Allocation (Riparian Reserves)
SPZ – Stream Protection Zone (no-cut protection zone/no-cut buffer/no-treatment Zone /stream buffer)
TMDL – total maximum daily load
USDI – United States Department of the Interior
USFS – United States Forest Service
USFWS – United States Fish and Wildlife Service
WUI – Wildland-Urban Interface

14.0 APPENDICES

14.1 Appendix 1 – ESA Determination of Effect for ESA Listed Fish Species

14.1.1 Endangered Species Act Determination of Effect for Upper Willamette River steelhead trout and Upper Willamette River Chinook salmon

Table 41: *Checklist for Effects of Proposed Action(s) On Relevant Indicators for the Willamette Province*

Factors Indicators	**EFFECTS OF THE ACTION(S)[1]**		
	Restore	***Maintain***	***Degrade***
Water Quality: Temperature		X	
Sediment/Turbidity **Missouri Ridge & Annie's Cabin (Alt. 1)**	X (long-term)	X	X (short-term)
Chem. Contam./Nut.		X	
Habitat Access: Physical Barriers		X	
Habitat Elements: Substrate		X	
Large Woody Debris		X	
Pool Frequency		X	
Pool Quality		X	
Off-Channel Habitat		X	
Channel Cond. & Dyn.: Width/Depth Ratio		X	
Stream bank Condition		X	
Floodplain Connectivity		X	
Flow/Hydrology: Peak/Base Flows		X	
Drainage Network Increase **Missouri Ridge (Alt. 2)**	X	X	
Watershed Condition: Road Dens. & Loc. **Missouri Ridge (Alt. 2)**	X	X	
Disturbance History		X	
Riparian Reserves		X	

[1] Effects of the actions are the same for all project areas unless listed for a specific indicator.

Short term effects occur while work is taking place and immediately after the first flush of rainfall. Long term effects occur after the first flush of rainfall.

14.1.2 Discussion of Factors and Indicators Described in *Table 41*

Water Quality

Temperature: Temperature in all streams would be maintained by minimum no-harvest buffers of 60 feet along all perennial streams.

Sediment/Turbidity

The following project design criteria and site conditions are expected to prevent any increase in sediment input to stream channels or any increase in stream turbidity in the Snakehouse and Round Mountain Project Areas.

- Thinning only proposal, with minimum no-harvest buffers of 60 feet along all perennial streams.
- Minimal road construction included in the proposal, with new roads located in stable locations with no hydrologic connections.
- Hauling restricted to dry conditions, subject to suspension when an elevated risk of water and sediment flowing in roadside ditches exists.
- Except for spot ditch-cleaning, the majority of vegetation in roadside ditches left intact.

In the **Annie's Cabin** project, Alternative 1 (conventional logging alternative) is likely to result in a short-term increase in sediment input to the Molalla River as a result of the replacement of up to eight live-stream culverts along the haul routes within 0.1 – 0.5 mile from the Molalla River. In the long-term the culvert replacements are expected to reduce the risk of catastrophic culvert failure, reducing the risk of large-scale sediment input.

In the **Missouri Ridge** project, under either alternative, removal or replacement (depending on alternative selected) of three culverts on Cotton Creek will result in short-term increases in sediment input to Cotton Creek approximately 1.5-1.75 miles upstream of where steelhead may be found in Rock Creek. Under Alternative 2 the three culverts would be removed and approximately .9 miles of the Cotton Creek Road would be decommissioned. Although BMPs are expected to minimize the impacts, sediment inputs resulting from the removal or replacement of culverts in Cotton Creek may have adverse effects on steelhead downstream in Rock Creek. In the long-term, removal or replacement of the Cotton Creek culverts would reduce or eliminate the chronic sediment inputs to Cotton Creek that result from the degraded condition of the culverts. Under Alternative 2 decommissioning of .9 miles of the Cotton Creek Road would result in a long-term reduction or elimination of the chronic sediment inputs to Cotton Creek that result from the degraded condition of the road and the proximity of the road to the creek.

Chemical Contamination/Nutrients

No activities associated with the project would increase chemical or nutrient inputs except a low probability event such as an accidental spill or vehicle accident.

Habitat Access

Physical Barriers: No barriers to fish migration would result from the project.

Habitat Elements

Substrate, Large Woody Debris, Pool Frequency, Pool Quality, Off-channel Habitat

No project activities would be sufficiently close to the stream channel or create enough of a disturbance to affect any of the above instream habitat elements in the streams within the project area.

In the **Missouri Ridge** project, some improvement may occur in the substrate and pool quality elements in Cotton Creek as a result of the removal or replacement (depending on alternative selected) of three culverts, but no change is expected 1.5 miles downstream where steelhead may be found in Rock Creek.

Channel Conditions and Dynamics

Width/depth ratio

Stream bank Condition

Floodplain Connectivity

No project activities would be sufficiently close to the stream channel or create enough of a disturbance to affect any of the above channel conditions on stream channels within the project area.

In the **Missouri Ridge** project, some improvement may occur in streambank condition in Cotton Creek but no change is expected 1.5 miles downstream where steelhead may be found in Rock Creek.

Flow/Hydrology

Peak/Base Flows

Since the proposed action will maintain all treated stands at no less than 40% crown closure**,** this proposal results in no additional risk of peak flow enhancement. For a detailed analysis of the potential effects of the project on peak/base flows, see *EA section 3.2.2 - Hydrology*.

Drainage Network Increase

There would be no changes in the drainage network as a result of the project since there would be no road construction that would contribute to increasing the drainage network.

In the **Missouri Ridge** project under Alternative 2 there would be a slight reduction in the drainage network due to roads as a result of the decommissioning of 1.25 miles of the Cotton Creek Road where it is located very close to Cotton Creek.

Watershed Conditions

Road Density & Location

The projects would result in a slight increase in road density due to the construction of several natural surface haul roads but this element would not be affected at the fifth field scale. All roads proposed for construction would be constructed in stable locations with no hydrologic connections and would be seeded, waterbarred and closed during any wet season in which they are left in place and upon project completion.

In the **Missouri Ridge** project under Alternative 2 there would be a slight reduction in the road density due to the decommissioning of 1.25 miles of the Cotton Creek Road.

Disturbance History

The project would not result in an increased level of disturbance. No potentially disturbing activities would occur in unstable areas or refugia for sensitive aquatic species.

Riparian Reserves

The RR thinning is expected enhance forest habitat conditions by increasing the growth rates of leave trees and enhancing vegetation diversity and structure.

14.1.3 Effect Call by Project Area

The **Snakehouse** and **Round Mountain** projects are expected to have '**no effect**' on any of the factors evaluated in *Table 41*, other than a very slight increase in road density by construction of 1.2 miles of natural surface roads. The action alternatives are expected to have '**no effect**' on Upper Willamette River chinook salmon or Upper Willamette River steelhead trout.

Annie's Cabin Alternative 2 is expected to have '**no effect**' on any of the factors evaluated in *Table 41*. Alternative 1 '**may affect**' Upper Willamette River chinook salmon and/or Upper Willamette River steelhead trout due to increased sedimentation that is expected from the replacement of up to eight live-stream culverts along the haul routes within 0.1-0.5 mile of the Molalla River. If Alternative 1 (the Proposed Action) is selected for implementation, a Biological Assessment (BA) would be prepared to determine whether the project is '**likely**' or '**not likely**' to adversely affect the ESA listed fish species. Consultation/conferencing with NOAA Fisheries would be completed before the Final Decision Documentation is signed.

Both **Missouri Ridge** action alternatives '**may affect**' Upper Willamette River chinook salmon and/or Upper Willamette River steelhead trout due to the increased sedimentation that is expected from the replacement or removal (depending on alternative) of three culverts in Cotton Creek necessary to use the Cotton Creek road for hauling. When an alternative is selected for implantation, a BA will be prepared to determine whether the project is '**likely**' or '**not likely**' to adversely affect the ESA listed fish species. Consultation/conferencing with NOAA Fisheries would be completed before the Final Decision Documentation is signed.

The projects are expected to have '**no effect**' on Essential Fish Habitat as defined in the Magnuson-Stevens Act.

14.2 Appendix 2 - Aquatic Conservation Strategy Objectives

14.2.1 Documentation of Consistency with the Nine Aquatic Conservation Strategy Objectives for all Action Alternatives

Unless otherwise specified, the No Action Alternative for each project would not prevent the attainment of any of the nine ACS Objectives. Current conditions and trends would continue and are described in *EA Sections: 3.0 - Common to All Project Areas*, 5.0 - Annie's Cabin; *6.0* - Missouri Ridge; *7.0, - Snakehouse*; and *8.0 - Round Mountain*. *EA Section 4.0* describes each project's consistency with the Aquatic Conservation Strategy Objectives. Action Alternatives apply to all Project Areas unless otherwise noted.

Table 42: Consistency with the Nine Aquatic Conservation Strategy Objectives

ACS Objectives	*Remarks (Common to all project areas unless otherwise noted)*
1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted. *Both the Action and No Action Alternatives do not retard or prevent the attainment of ACS objective 1*	**No Action Alternative:** The No Action alternative would maintain the development of the existing vegetation and associated stand structure at its present rate. The current distribution, diversity and complexity of watershed and landscape-scale features would be maintained. Faster restoration of distribution, diversity, and complexity of watershed and landscape features would not occur. **Action Alternatives:** The proposed variable thinning in portions of the Riparian Reserve Land Use Allocation (Riparian Reserves) would result in forest stands that exhibit attributes typically associated with stands of a more advanced age and stand structural development (larger trees, a more developed understory, and an increase in the number, size and quality of snags and down logs) sooner than would result from the No Action Alternative. Since Riparian Reserves provide travel corridors and resources for aquatic, riparian dependant and other late-successional associated plants and animals, the increased structural and plant diversity would ensure protection of aquatic systems by maintaining and restoring the distribution, diversity and complexity of watershed and landscape features.
2. Maintain and restore spatial and temporal connectivity within and between watersheds. *Both the Action and the No Action Alternatives do not retard or prevent the attainment of ACS objective 2*	**No Action Alternative:** The No Action alternative would have little effect on connectivity except in the long term within the affected watersheds. **Action Alternatives:** Long term connectivity of terrestrial watershed features would be improved by enhancing conditions for stand structure development. In time, these reserves would improve in functioning as refugia for late successional, aquatic and riparian associated and dependent species. Both terrestrial and aquatic connectivity would be maintained, and over the long-term, as Riparian Reserves develop late successional characteristics, lateral, longitudinal and drainage connectivity would be restored. **Missouri Ridge Project Area:** Removal of existing culverts (Alternative 2-Road Decommissioning) would restore movement of aquatic species in Cotton Creek. Use of organic material for the ephemeral stream crossing for one skid trail (both action alternatives) would not hinder movement of aquatic species; therefore, no aquatic barriers would be created.

ACS Objectives	*Remarks (Common to all project areas unless otherwise noted)*
3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations. *Both the Action and No Action Alternatives do not retard or prevent the attainment of ACS objective 3*	**No Action Alternative:** It is assumed that the current condition of physical integrity would be maintained. **Action Alternatives (all except Missouri Ridge Alt. 2):** Maintains: Physical integrity of channels at existing stream crossings would be altered for one to several years following repair/maintenance. Within the road prism (estimated at 30 feet maximum width), the channel surface, banks and bed would be compacted (bulk density of soils increased by as much as 30%), vegetation disturbed or removed and the bed/banks within the road prism would be obliterated. Due to the stable nature of channels at these locations, little to no additional disturbance to channel morphology would be expected either upstream or downstream from the crossing. **Missouri Ridge Alt. 2:** Restores. Physical integrity of channels at existing stream crossings would be altered for one to several years following repair/maintenance. Over the long term, removal of Cotton Creek Road would likely contribute to improvement in channel function along Cotton Creek by reducing flow impediments and alterations such as channel narrowing and road/stream intersections.
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. *Both the Action and No Action Alternatives do not retard or prevent the attainment of ACS objective 4.*	**No Action Alternative:** It is assumed that the current condition of the water quality would be maintained. **Action Alternatives (all except Missouri Ridge Alt. 2):** Maintains. Stream Protection Zones (SPZs) in Riparian Reserves would be maintained. The proposed temporary roads are on ridge top or mid-slope locations with no hydrologic connections or proximity to streams or riparian areas. Overall, these action alternatives would be unlikely to have any measurable effect on stream temperatures, pH, or dissolved oxygen. Sediment transport and turbidity in the affected watersheds is likely to increase over the short term as a direct result of road repair and construction, hauling and yarding in and around the Riparian Reserve LUA. Over the long-term (beyond 3-5 years), current conditions and trends in turbidity and sediment yield would likely be maintained under the action alternatives. The one ephemeral stream road crossing would be filled with a natural material and removed after one season. **Missouri Ridge Alt. 2:** Restores. After the sale short-term localized increases in stream sediment that would be expected during culvert removal, sediment delivery to streams and stream turbidity would decrease, though it would be difficult to detect.

ACS Objectives	*Remarks (Common to all project areas unless otherwise noted)*
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. *Both the Action and No Action Alternatives do not retard or prevent the attainment of ACS objective 5.*	**No Action Alternative:** It is assumed that the current levels of sediment into streams would be maintained. **Action Alternatives (all except Missouri Ridge Alt. 2):** Maintains. Stream protection Zones (SPZs) in Riparian Reserves would be maintained (minimum of 60 feet in treatment areas). Dry season hauling would minimize sediment delivery. After the sale short-term localized increases in stream sediment can be expected during culvert removal and replacement, but BMPs and mitigation measures would be implemented to limit acceleration of sediment delivery to streams. As a result, it is unlikely that this proposal would lead to a measurable change in sediment regime, including increases in sediment delivery to streams, stream turbidity, or the alteration of stream substrate composition or sediment transport regime. No sediment is expected from the one ephemeral stream crossing after one season. **Missouri Ridge Alt. 2:** Restores. After the sale short-term localized increases in stream sediment that would be expected during culvert removal, sediment delivery to streams, stream turbidity, or the alteration of stream substrate composition or sediment transport regime would decrease, though it would be difficult to detect. No sediment is expected from the one ephemeral stream crossing after one season.
6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. *Both the Action and No Action Alternatives do not retard or prevent the attainment of ACS objective 6.*	**No Action Alternative:** No change in in-streams flows would be anticipated. **Action Alternatives**: A preliminary analysis for the risk of increases in peak flow as a result of forest harvest was conducted using the Oregon Watershed Assessment Manual watershed analysis methods for forest hydrology (OWEB, 1997). Because the proposed project will remove less than half the existing forest cover, it is unlikely to produce any measurable effect on stream flows. Within the Riparian Reserve LUA, substantial portions of the riparian canopy would be retained, therefore maintaining riparian microclimate conditions and protecting streams from increases in temperature.
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands. *Both the Action and No Action Alternatives do not retard or prevent the attainment of ACS objective 7.*	**No Action Alternative:** The current condition of flood plains and their ability to sustain inundation and the water table elevations in meadows and wetlands is expected to be maintained. **Action Alternatives:** There would be no alteration of any stream channel, wetland or pond morphological feature. All operations, equipment and disturbances are kept a minimum of 60 feet from all wetlands and perennial stream channels, and 25 feet from all intermittent stream channels. Thus, the current condition of floodplain inundation and water tables would be maintained.

ACS Objectives	*Remarks (Common to all project areas unless otherwise noted)*
8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability. *Both the Action and No Action Alternatives do not retard or prevent the attainment of ACS objective 8.*	**No Action Alternative:** The current species composition and structural diversity of plant communities will continue along the current trajectory. Diversification will occur over a longer period of time. **Action Alternatives:** SPZs would maintain structural diversity of plant communities in riparian areas and wetlands from 25 feet (intermittent streams) to 60 feet (perennial streams) in treatment areas. Thinning in Riparian Reserve LUA outside of the SPZs would help to restore species composition by allowing more understory development and structural diversity by creating horizontal and vertical variations that are currently lacking in the riparian treatment areas.
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species. *Both the Action and No Action Alternatives do not retard or prevent the attainment of ACS objective 9.*	**No Action Alternative:** Habitats will be maintained over the short-term and continue to develop over the long-term with no known impacts on species currently present. **Action Alternative:** The proposed action would have no adverse effect on riparian dependent species. Although thinning activities may affect invertebrates within the treatment areas, adjacent non-thinned areas should provide adequate refugia for the species. In the long term, the treatments would restore elements of structural diversity to treatment areas in Riparian Reserves. These attributes would help to provide resources currently lacking or of low quality, and over the long-term, would benefit both aquatic and terrestrial species.