U.S. Department of Interior
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Roseburg District, Oregon

Environmental Assessment for the Swiftwater Field Office

Elkhead
Commercial Thinning & Density Management
EA #OR – 104 – 07 – 10

Writer/Editor: Rex McGraw
Roseburg District, BLM
777 NW Garden Valley Blvd.
Roseburg, OR 97470
541-464-3273

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U.S. Department of the Interior, Bureau of Land Management
Roseburg District Office
777 NW Garden Valley Blvd.
Roseburg, Oregon 97470

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Chapter 1. Purpose and Need for Action

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

A. Background

The Bureau of Land Management (BLM), Swiftwater Field Office proposes commercial thinning and density management of approximately 1,160 acres of mid-seral forest stands, 37-54 years old, in four separate proposed timbersales: Adams Apple (333 acres), Cedar Shingle (525 acres), Lurch (155 acres), and Slow Lane (146 acres). Within the 1,160 acres, approximately 25 acres would be cleared or brushed for spur right-of-ways or roads to access the harvest areas.

These proposed sales are located in the Elk Creek/Umpqua River Fifth-field Watershed within the General Forest Management Area (GFMA), Connectivity/Diversity Block (C/D), and Riparian Reserves. Collectively, these sales are referred to as "Elkhead".

It is anticipated that the proposed timbersales would yield approximately 11.6 million board feet (MMBF) of timber in support of local and regional manufacturers and economies.

B. Conformance

This environmental assessment (EA) analyzes the environmental consequences of the proposed action alternative and the No Action alternative, to explain the environmental effects of each in the decision-making process. In addition to the ROD/RMP, this analysis is tiered to and incorporates by reference the assumptions and analysis of consequences provided by the following NEPA analyses:

- The *Final Supplemental Environmental Impact Statement* (FSEIS) *on Management of Habitat for Late-Successional and Old-Growth Related Species Within the Range of the Northern Spotted Owl* (USDA and USDI 1994);
- The *Final Supplement to the 2004 Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standard and Guidelines* (USDA and USDI 2007);

Implementation of the actions proposed in this analysis would conform to the requirements of the ROD/RMP, incorporating the standards and guidelines of the Northwest Forest Plan as amended.

C. Objectives

The overall objective of the proposed action is to provide timber, improve stand quality and vigor, and accelerate the development of late successional habitat on forest land within the GFMA, C/D, and Riparian Reserve land-use allocations, in accordance with the ROD/RMP. Specific objectives of the proposed action are to:

1) Comply with Section 1 of the O&C Act (43 USC § 1181a) which stipulates that O & C Lands be managed "… for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities…"

2) Within GFMA, perform commercial thinning on forest stands less than 80 years of age. Design commercial thinning to assure high levels of volume productivity (ROD/RMP, pg. 151).

3) Within C/D, perform commercial thinning on forest stands less than 120 years of age. Design commercial thinning to usually assure high levels of volume productivity. Retain patches of denser habitat where desired to meet wildlife habitat criteria (ROD/RMP, pg. 153).

4) Within the Riparian Reserve, apply silvicultural treatments to restore large conifers in Riparian Reserves (ROD/RMP, pg. 21) and perform density management to help forest stands develop late-successional characteristics and attain forest conditions that contribute to the Aquatic Conservation Strategy (ROD/RMP, pgs. 151-152).

5) Select logging systems based on the suitability and economic efficiency of each system for the successful implementation of the silvicultural prescription, for the protection of soil and water quality, and for meeting other land use objectives (ROD/RMP, pg. 61). Also, provide a harvest plan flexible enough to facilitate harvesting within a three year timber sale contract.

6) Seek a balance between reducing the risk of wildfire and a fuel profile that supports land allocation objectives (ROD/RMP, pg. 78).

D. Decision Factors

Factors to be considered when selecting among alternatives would include:

- The degree to which the objectives previously described would be achieved, including: the manner in which density management would be conducted with respect to cost, the method(s) of yarding, and type of equipment; season(s) of operations; and the manner in which access would be provided, including road renovation, and the types and locations of road construction;
- The nature and intensity of environmental impacts that would result from implementation and the nature and effectiveness of measures to mitigate impacts to resources including, but not limited to, wildlife and wildlife habitat, soil productivity, water quality, air quality, and the spread of noxious weeds;
- Compliance with management direction from the ROD/RMP; and

- Compliance with applicable laws including, but not limited to, the Clean Water Act, the Endangered Species Act, O&C Act, and the National Historic Preservation Act.
- Provide revenue to the government from the sale of timber resources in a cost efficient manner.

Chapter 2. Discussion of the Alternatives

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

A. The No Action Alternative

The No Action Alternative provides a baseline for the comparison of the alternatives. This alternative describes the existing condition and continuing trends anticipated in the absence of the proposal but with the implementation of other reasonably foreseeable federal and private projects. Under the ROD/RMP, the majority of harvest and silvicultural activities are scheduled to occur within the Matrix land use allocation. If the no action alternative were selected there would be no commercial thinning or density management of timber or treatment of the mid-seral stands within the bounds of the project area at this time.

Harvest at the proposed locations for purposes of analysis would be deferred for the foreseeable future. Selection of this alternative would not constitute a decision to re-allocate these lands to non-commodity uses. Future harvesting in this area would not be precluded and could be considered again under a subsequent EA. Road maintenance would be conducted as-needed to provide resource protection, accommodate reciprocal users, and protect the federal investment.

B. The Proposed Action Alternative

The action alternative proposes the offering of four timbersales (i.e. Adams Apple, Cedar Shingle, Lurch, and Slow Lane) that would result in commercial thinning and density management of approximately 1,160 acres of mid-seral stands expected to yield approximately 11.6 MMBF of timber. The proposed action consists of the following activities (for a summary listing of these actions, see Table 1). Within the 1,160 acres, approximately 25 acres would be cleared or brushed for spur right-of-ways or roads to access the harvest areas.

Table 1. Elkhead Proposed Activity Summary.

Activity		Total
Timber Harvest	Commercial Thinning	
	General Forest Management Area	536 acres
	Connectivity/Diversity Block	192 acres
	Density Management	
	Riparian Reserve	430 acres
Yarding	Aerial or Cable	99 acres
	Cable	660 acres
	Ground Based*	376 acres
	Temporary Spur Right-of-Way	25 acres
Hauling	Dry Season Haul Only	8.35 miles
	Wet or Dry Season Haul	24.06 miles
	Total Haul Route	32.41 miles
Road Activities	New, Temporary Construction	4.45 miles
	Decommissioning with subsoiling	0.0 miles
	Decommissioning without subsoiling	4.45 miles
	New, Permanent Construction	1.06 miles
	Re-Alignment of Existing Roads	0.51 miles
	Renovation of Existing Roads	3.39 miles
	Maintenance of Existing Roads	23.0 miles
Fuels Treatment	Machine Pile and Burn at Landings	

*Up to 10 acres of additional, incidental ground-based logging could occur in each sale area designated for cable logging for a total of 416 acres. This would include activities such as removal of guyline anchor trees and small isolated portions of units not readily yarded with a cable system.

Elkhead includes lands within the General Forest Management Area (GFMA, 536 acres), Connectivity/Diversity Block (C/D, 192 acres), and Riparian Reserve (430 acres) land-use allocations and approximately two acres on private lands for spur right-of-ways. The land-use allocations of each of the four proposed sales are displayed in Table 2. Elkhead is located on Revested Oregon and California Railroad Lands (O&C Lands).

Table 2. Elkhead Land Use Allocations.

Sale Name	Township-Range-Section	Land-Use Allocation (acres)			Private (acres)	Total Acres
		Riparian Reserve	GFMA	C/D		
Adams Apple	T23S-R04W-Sec. 19	137	196	0	0.3	333.3
Cedar Shingle	T23S-R04W-Sec. 35 T24S-R04W-Sec. 3	186	147	192	0	525.2
Lurch	T23S-R04W-Sec. 7 T23S-R05W-Sec. 13	64	90	0	0.9	154.9
Slow Lane	T23S-R04W-Sec. 15, 23	43	103	0	0.2	146
Total		430	536	192	1.4	1,159.4

The Swiftwater Field Office initially proposed harvest of approximately 1,360 acres. After interdisciplinary team review, approximately 200 acres were dropped from consideration. As a result, the interdisciplinary team reduced the proposed harvest to 1,160 acres. In addition, five sales were initially proposed (i.e. Adams Apple, Cedar Mill, Shingle Bells, Lurch, and Slow Lane), but because the contract areas would overlap, the interdisciplinary team combined Cedar Mill and Shingle Bells into a single sale referred to as Cedar Shingle.

1. Timber Harvest

a) Treatment Prescription

Units proposed would be commercially thinned and have density management treatments applied (Appendix I; Figures 1, 2, 3, 4, and 5). These units consist of approximately 1,160 acres of mid-seral forest, aged 37 to 54 years.

Commercial thinning and density management treatments would be used to reduce the number of trees in generally even aged stands dominated by Douglas-fir. These treatments would be developed consistent with management objectives for the individual land use allocations. Trees would primarily be removed from the suppressed and intermediate canopy classes, although some co-dominant and dominant trees would be removed where necessary to meet specific land use objectives.

Older remnant trees may be present, but are not the numerically predominant stand components or the focus of the treatments. Since treatments would focus on removal of intermediate and suppressed canopy layers in the majority of the unit, it is possible that suppressed trees designated for cutting may include trees older than the prevailing stand age.

Stands would be thinned by leaving 70-120 square feet of basal area. A variable spacing marking prescription would be used. In Riparian Reserves and C/D land use allocations, minor conifer and hardwood species would be retained where possible to maintain stand

diversity and canopy openings would be created or enlarged to maintain trees with large limbs, full crowns, promote tree regeneration, shrubs, and forbs.

Conifer and hardwood snags 10 inches or larger in diameter breast height and at least 16 feet in height would be marked for retention in the GFMA, C/D, and Riparian Reserve. Existing snags would be felled only if they pose a safety concern. If snags are felled within GFMA or C/D lands due to safety concerns, then they could be removed if they possess commercial value. Snags felled for safety reasons in the Riparian Reserve would be retained on site as coarse woody debris. Existing coarse woody debris in decay classes 3, 4, and 5 would be retained in GMFA and C/D lands, and all coarse woody debris would be retained in the Riparian Reserve.

The residual stands following harvest would provide a pool of candidate trees for future snag and coarse woody debris recruitment. Additional coarse woody debris and snags may be created incidentally through the harvest operations (e.g. damage leading to broken-out tops or individual tree mortality) or through weather damage (e.g. wind and snow break).

b) Stream Buffers

Within Riparian Reserves, variable-width "no-harvest" buffers would be established to protect stream bank integrity, maintain streamside shade and provide a filtering strip for overland run-off. Variable buffer width would be based on site conditions and would have a width between 20 to 100 feet measured from the edges of the stream channel. Actual widths would vary subject to an on-the-ground evaluation and consideration of factors such as period of flow, unique habitat features, streamside topography, vegetation, and fish presence. Where yarding across streams is necessary, logs would be fully suspended over the stream to avoid disturbing the stream channel and banks.

No equipment operation would be allowed within the "no-harvest" buffers. If necessary to fell trees within the "no-harvest" buffers for operational purposes, the felled trees would be left in place to provide in-stream wood and protection for stream banks.

c) Timber Cruising

Timber cruising would employ methods that could include the felling of sample trees in upland stands to formulate local volume tables. The environmental effects of sample tree felling would be consistent with those described in the Roseburg District 3P Fall, Buck, and Scale EA (USDI, 2000). Felled sample trees would become part of the offered sale volume.

A small amount of additional timber could potentially be included as a modification to this project. These additions would be limited to the removal of individual trees or small groups of trees that are blown down, injured from logging, are a safety hazard, or trees needed to facilitate the proposed action. Historically, this addition has been less than ten percent of the estimated sale quantity.

d) Firewood

Firewood cutting and salvaging of logging debris (slash) could occur in cull decks, logging landings, and in the units, near roads, after the commercial thinning and density management activities are completed.

2. Timber Yarding

The Proposed Action would require a mix of aerial helicopter or skyline cable yarding (99 acres), skyline cable yarding (660 acres), and ground-based yarding (376 acres). Up to 10 acres of additional, incidental ground-based logging may be necessary (i.e. removal of guyline anchor trees, isolated portions of units, etc.) and would occur on gentle slopes (less than 35 percent) within each timber sale, during the dry season.

Table 3. Elkhead Yarding Methods.

Unit	**Yarding Method** (acres)			**Roads/Right-of-Way** (acres)	**Total** (acres)
	Aerial or Cable	Cable	Ground-Based		
Adams Apple 19A	0	152	174	7.3	333.3
Cedar Shingle 3A	0	92	8	4.8	104.8
Cedar Shingle 3B	0	15	6	0	21
Cedar Shingle 3C	0	43	48	1.8	92.8
Cedar Shingle 3D	0	33	2	0.8	35.8
Cedar Shingle 3E	0	18	0	0	18
Cedar Shingle 35A	99	102	23	2.5	226.5
Cedar Shingle 35B	0	0	25	0.9	25.9
Lurch 7A	0	84	26	3.7	113.7
Lurch 13A	0	9.5	2	0.6	12.1
Lurch 13B	0	6	22	1.0	29
Slow Lane 15A	0	13	11	0.3	24.3
Slow Lane 23A	0	27	10	0.3	37.3
Slow Lane 23B	0	65	19	1.0	85.0
Total	**99**	**659.5**	**376**	**25**	**1159.5**

3. Timber Hauling

Approximately 24 miles of rocked roads would be hauled across either in the dry- or wet-season while 8.35 miles of natural surface roads would be limited to dry-season hauling.

4. Fuels Treatment

Prescribed burning of slash (burning under the direction of a written site specific prescription or “Burn Plan”) would occur at machine-piled landing piles. The fine fuels

generated during the thinning process would remain scattered throughout the treatment units.

5. Road Activities (Construction, Renovation, Re-alignment, Maintenance & Decommissioning)

The proposed project would include dry season and wet season logging activities and use existing roads to the greatest extent practical. Road construction, renovation, re-alignment, and decommissioning would be restricted to the dry season (normally May 15 to Oct. 15). The operating season could be adjusted if unseasonable conditions occur (e.g. an extended dry season beyond October 15th or wet season beyond May 15th).

Construction – Approximately 1.06 miles of new, permanent roads and 4.45 miles of new, temporary spur roads would be constructed (Tables 4a, 4b, 4c, and 4d). New, permanent roads would be rocked and would remain open after harvest is completed whereas new, temporary spurs would be decommissioned after harvest. Approximately 4.45 miles of temporary spurs would be decommissioned by removing cross-drains/culverts, water-barring, mulching with logging slash where available (or with straw if logging slash is not available), and blocking with trench barriers.

Spurs that may be rocked at the purchaser's expense include: Adams Apple Spurs #3, #4, #5, #6, and #7, and the 23-5-13.2 road; Cedar Shingle Spurs #8, #9, #16, and #17; Lurch Spurs #1, #2, #3, #4, and #5, and the 23-4-7.1, 23-4-7.3 road; and Slow Lane Spurs #1, #2, #4, and #5. Any spurs or roads that are rocked at purchasers expense would be decommissioned by removing cross-drains/culverts, water-barring, mulching with logging slash where available (or with straw if logging slash is not available), and blocking with trench barriers.

Renovation – A total of 3.39 miles of the existing, natural surface roads would be renovated by brushing, grading, and replacing drainage structures (Tables 4a, 4c). The 23-4-19.0, 23-4-19.1, and 23-4-19.2 roads (3.25 miles; Adams Apple, Table 4a) would be decommissioned by removing cross-drains/culverts, water-barring, mulching with logging slash where available (or with straw if logging slash is not available), and blocking with trench barriers. The 23-4-7.3 road (0.14 miles; Lurch, Table 4c) would be decommissioned by water-barring, mulching with logging slash where available (or with straw if logging slash is not available), and blocking with trench barriers.

Re-alignment – The beginning (0.10 miles, Adams Apple, Table 4a) of the 23-4-19.2 road would be re-aligned to move the location of the road to keep it on BLM-administered land and to avoid draining runoff from the road towards a stream. The 23-4-7.1 road (0.41 miles; Lurch, Table 4c) would be re-aligned to reduce the grade of the road and facilitate logging of Unit 7A. These roads would be decommissioned by removing cross-drains/culverts, water-barring, mulching with logging slash where available (or with straw if logging slash is not available), and blocking with trench barriers.

Maintenance – In addition, about 23 miles of existing roads would be maintained. Road maintenance might consist of maintaining drainage structures (culverts and drainage ditches), reshaping the road surface, surfacing with rock where needed, and brushing road shoulders.

Table 4a. Adams Apple Road & Spur Summary Table*.

Road/Spur #	Length (miles)	Road (miles)				Surface	Season of Haul
		Permanent Construction	Temporary Construction	Renovation	Re-Alignment		
Spur #1	0.85	0	0.85	0	0	Natural Surface	Dry
Spur #3	0.43	0	0.43	0	0	Natural Surface	Dry
Spur #4	0.12	0	0.12	0	0	Natural Surface	Dry
Spur #5	0.34	0	0.34	0	0	Natural Surface	Dry
Spur #6	0.06	0	0.06	0	0	Natural Surface	Dry
Spur #7	0.24	0	0.24	0	0	Natural Surface	Dry
23-4-19.0	0.23	0	0	0.23		Natural Surface	Dry
23-4-19.1	2.30	0	0	2.30		Natural Surface	Dry
23-4-19.2	0.47	0	0	0.37	0.10	Natural Surface	Dry
23-5-13.2	0.35	0	0	0.35	0	Natural Surface	Dry
Total	**5.39**	**0**	**2.04**	**3.25**	**0.10**	**n/a**	**n/a**

*Approximately 4.50 miles of existing roads would be maintained for Adams Apple in addition to the roads and spurs described in the table.

Table 4b. Cedar Shingle Road & Spur Summary Table*.

Road/Spur #	Length (miles)	Road (miles)				Surface	Season of Haul
		Permanent Construction	Temporary Construction	Renovation	Re-Alignment		
Spur #1	0.14	0.14	0	0	0	Rock	Wet/Dry
Spur #2	0.09	0.09	0	0	0	Rock	Wet/Dry
Spur #4	0.21	0.21	0	0	0	Rock	Wet/Dry
Spur #5	0.20	0	0.20	0	0	Natural Surface	Dry
Spur #6	0.21	0	0.21	0	0	Natural Surface	Dry
Spur #8	0.41	0.41	0	0	0	Rock	Wet/Dry
Spur #9	0.10	0	0.10	0	0	Natural Surface	Dry
Spur #10	0.12	0	0.12	0	0	Natural Surface	Dry
Spur #11	0.04	0	0.04	0	0	Natural Surface	Dry
Spur #12	0.11	0	0.11	0	0	Natural Surface	Dry
Spur #13	0.16	0.16	0	0	0	Rock	Wet/Dry
Spur #15	0.07	0	0.07	0	0	Natural Surface	Dry
Spur #16	0.51	0	0.51	0	0	Natural Surface	Dry
Spur #17	0.06	0	0.06	0	0	Natural Surface	Dry
Total	**2.43**	**1.01**	**1.42**	**0**	**0**	**n/a**	**n/a**

*Approximately 12.1 miles of existing roads would be maintained for Cedar Shingle in addition to the roads and spurs described in the table.

Table 4c. Lurch Road & Spur Summary Table*.

Road/Spur #	Length (miles)	Road (miles)				Surface	Season of Haul
		Permanent Construction	Temporary Construction	Renovation	Re-Alignment		
Spur #1	0.15	0	0.15	0	0	Natural Surface	Dry
Spur #2	0.04	0	0.04	0	0	Natural Surface	Dry
Spur #3	0.05	0	0.05	0	0	Natural Surface	Dry
Spur #4	0.07	0	0.07	0	0	Natural Surface	Dry
Spur #5	0.10	0	0.10	0	0	Natural Surface	Dry
Spur #6	0.21	0	0.21	0	0	Natural Surface	Dry
23-4-7.1	0.41	0	0	0	0.41	Natural Surface	Dry
23-4-7.3	0.14	0	0	0.14	0	Natural Surface	Dry
Total	**1.17**	**0**	**0.62**	**0.14**	**0.41**	**n/a**	**n/a**

*Approximately 1.4 miles of existing roads would be maintained for Lurch in addition to the roads and spurs described in the table.

Table 4d. Slow Lane Road & Spur Summary Table*.

Road/Spur #	Length (miles)	Road (miles)				Surface	Season of Haul
		Permanent Construction	Temporary Construction	Renovation	Re-Alignment		
Spur #1	0.08	0	0.08	0	0	Natural Surface	Dry
Spur #2	0.07	0	0.07	0	0	Natural Surface	Dry
Spur #3	0.05	0.05	0	0	0	Rock	Wet/Dry
Spur #4	0.05	0	0.05	0	0	Natural Surface	Dry
Spur #5	0.17	0	0.17	0	0	Natural Surface	Dry
Total	**0.42**	**0.05**	**0.37**	**0**	**0**	**n/a**	**n/a**

*Approximately 5.0 miles of existing roads would be maintained for Slow Lane in addition to the roads and spurs described in the table.

C. Project Design Features as part of the Action Alternative

1. To protect riparian habitat:

a. To protect aquatic resources within riparian areas a variable width streamside no-harvest buffer would be established along all streams. The buffer width would be between 20 and 60 feet, measured from the edges of the stream channel for all non-fish bearing streams. A 100-foot no harvest buffer would be established along the fish-bearing streams (i.e. Adams Creek and Elk Creek).

b. No equipment operation would be allowed within the "no-harvest" buffers. If necessary to fell trees within the "no-harvest" buffers for operational purposes, the felled trees would be left in place to provide in-stream wood and protection for stream banks.

c. The integrity of the riparian habitat would be protected from logging damage by directionally felling trees away from or parallel to the Riparian Reserve (BMP I B2; RMP, pg. 130).

d. Prior to attaching any logging equipment to a reserve tree, precautions to protect the tree from damage would be taken. Examples of protective measures include cribbing (use of sound green limbs between the cable and the bole of the tree to prevent girdling), tree plates, straps, or plastic culverts. If, for safety reasons, it would be necessary to fall a reserve tree in the Riparian Reserves then it would be left as coarse woody debris.

2. To minimize soil erosion as a source of sedimentation to streams and to minimize soil productivity loss from soil compaction, loss of slope stability or loss of soil duff layer:

a. **Measures to limit soil erosion and sedimentation from roads would consist of:**

(1) Maintaining existing roads to fix drainage and erosion problems. This would

consist of maintaining existing culverts, replacing culverts, constructing drainage-relief ditches, stabilizing unstable cut and fill slopes, and replenishing road surface with crushed rock where deficient (BMP II H; RMP, pg. 137). In-stream work would be limited to periods of low or no flow (between July 1st and September 15th).

(2) Restricting road work (including construction, renovation, re-alignment, and decommissioning) and log hauling on naturally surfaced roads to the dry season, which is normally May 15th to October 15th. Operations during the dry season would be suspended during periods of unseasonably wet weather. This season could be adjusted if unseasonable conditions occur (e.g. an extended dry season beyond October 15th or wet season beyond May 15th).

(3) For new road construction, new cut and fill slopes would be mulched with weed-free straw, or equivalent, and seeded with a native or sterile hybrid mix.

(4) Prior to any wet season haul on surfaced roads, sediment reducing measures (e.g., placement of straw bales and/or silt fences) would be placed near stream crossings, if necessary, to prevent sediment from reaching the streams.

(5) Over-wintering natural surface spur roads in a condition that is resistant to erosion and sedimentation. This would be done by building, using, and winterizing natural surface spur roads prior to the end of the operating season. Winterization would include: installation of waterbars, mulching the running surface with weed-free straw, seeding and mulching bare cut and fill surfaces with native species (or a sterile hybrid mix if native seed is unavailable), and blocking. Implementation of over-wintering measures would be restricted to the dry season (normally May 15th to October 15th).

b. **Measures to limit soil erosion and sedimentation from logging would consist of:**

(1) Use of cable logging systems that limit ground disturbance. This would include the use of partial or full suspension (BMP I C1a; RMP, pg. 130). In some areas, partial suspension may not be physically possible due to terrain. Where excessive soil furrowing occurs, it would be hand waterbarred and filled with limbs or other organic debris.

(2) Limiting ground-based logging to the dry season (normally May 15th to October 15th; BMP I C2d; RMP, pg. 131).

c. **Measures to limit soil compaction (RMP, pg. 37) would consist of:**

(1) Limiting ground-based logging in all units and subsoiling to the dry season (May 15 to Oct. 15) when soils are least compactable (BMP I C2d; RMP, pg. 131). If soil moisture levels would cause the amount of compaction to exceed 10 percent or more of the ground-based area, operations would be suspended during unseasonably wet weather in the dry season. The soil scientist and the contract

administrator would monitor soil moisture and compaction to determine when operations may need to be suspended.

(2) Machines used for ground-based logging would be limited to a track width no greater than 10.5 feet (BMP I C2j; RMP, pg. 131). Skid and forwarder trails would be limited to slopes less than 35 percent (BMP I C2b; RMP, pg. 131). Yarding would be confined to designated skid and forwarder trails (BMP I C2c; RMP, pg. 131). Skid trails would have an average spacing of at least 150 feet apart and harvester/forwarder trails would be spaced at least 50 feet apart where topography allows. Old skid trails would be used to the greatest extent practical. Harvesters would be limited to slopes less than 45 percent for distances less than 150 feet.

(3) Harvesters would cut trees less than twelve inches above the ground to allow subsoiling excavators to pass over the stumps.

(4) Harvesters would place tree limbs in the trails in front of the equipment to minimize compaction. Slash would be placed near the boles of the reserved trees to protect the large roots at or near the surface.

d. **Measures to protect the duff and surface soil layer (RMP, pg. 36) would consist of:**

(1) Burning of slash during the late fall to mid-spring season when the soil, duff layer (soil surface layer consisting of fine organic material), and large down log moisture levels are high (BMP III D1b, pg. 140). This would confine burn impacts to the soil underneath the piles and lessen the depth of the impacts (i.e., loss of organic matter, and the change of soil physical properties, ecology and soil nutrients).

e. **Measures to protect slope stability would consist of:**

(1) New spur roads and realigned road segments would be located on geologically stable areas (BMP II B2; RMP, pg. 132) constructed with a narrow road width (i.e. maximum of 14 foot running surface) to minimize soil disturbance (BMP II C6; RMP, pg. 132). Road construction on side slopes greater than 45 percent would be full-bench construction with no sidecasting.

(2) Cable yarding would not be permitted on very steep slopes (i.e. 70 percent and greater) when soil moisture levels are high enough to squeeze water from soil samples by hand. Soil moisture would be considered too high if cable yarding creates glazed imprints on the soil and channels water downslope. This generally occurs when the soil moisture is greater than 30 percent.

(4) In Cedar Shingle Unit 3E, Lurch Unit 7A, and Slow Lane Units 23A and 23B higher tree retention would be prescribed within the Riparian Reserves where very steep slopes (75 percent and greater) occur. Higher tree retentions would also be prescribed where very steep slopes are adjacent to swale bottoms.

3. **To retain biological legacies for present and future wildlife components:**

   a. Conifer and hardwood snags 10 inches or larger in diameter breast height and at least 16 feet in height would be marked for retention in the GFMA, C/D, and Riparian Reserve.

   b. Existing coarse woody debris in decay classes 3, 4, and 5 would be retained in GMFA and C/D.

   c. All coarse woody debris would be retained in Riparian Reserves.

4. **To protect air quality:**

   All prescribed burning (i.e. slash piles) would have an approved "Burn Plan," and be conducted under the requirements of the Oregon Smoke Management Plan and in a manner consistent with the requirements of the Clean Air Act (ODEQ & ODF, 1992).

5. **To prevent and/or control the spread of noxious weeds:**

   Logging and road construction equipment would be required to be cleaned and free of weed seed prior to entry on to BLM lands (BLM Manual 9015-Integrated Weed Management).

6. **To protect cultural resources:**

   If any objects of cultural value (e.g. historic or prehistoric ruins, graves, fossils, or artifacts) are found during the implementation of the proposed action, operations would be suspended until the site has been evaluated to determine the appropriate mitigation action.

7. **To protect Special Status Plants and Animals:**

   a. Special Status (Threatened or Endangered, proposed Threatened or Endangered, State listed, Bureau Sensitive, or Bureau Strategic,) plant and animal sites would be protected to conserve and avoid the listing of species, according to established management recommendations (RMP, pg. 40).

   b. If during implementation of the proposed action, any Special Status Species are found that were not discovered during pre-disturbance surveys; operations would be suspended and appropriate protective measures would be implemented before operations would be resumed.

   c. There are currently no known northern spotted owl sites, activity centers, or unsurveyed suitable habitat within 65 yards of the proposed unit boundaries. Therefore, harvest activities (e.g. falling, bucking, and yarding) would not be

seasonally restricted due to northern spotted owl concerns, unless future surveys locate a nest site within 65 yards of the proposed unit boundaries.

d. Use of helicopters would not occur within 440 yards (Type I and II helicopters) or 120 yards (Type III and IV helicopters) of unsurveyed suitable spotted owl habitat from March 1st through June 30th, unless current calendar year surveys indicate: 1) spotted owls not detected, 2) spotted owls present, but not attempting to nest, or 3) spotted owls present, but nesting attempt has failed. Waiver of seasonal restriction is valid until March 1st of the following year.

e. Prescribed burning (i.e. slash piles) would not occur within 440 yards of any unsurveyed suitable northern spotted owl habitat, known northern spotted owl nest site, or activity center from March 1st through June 30th, unless current calendar year surveys indicate: 1) spotted owls not detected, 2) spotted owls present, but not attempting to nest, or 3) spotted owls present, but nesting attempt has failed. Waiver of seasonal restriction is valid until March 1st of the following year.

8. To prevent and report accidental spills of petroleum products or other hazardous material and provide for work site cleanup:

The operator would be required to comply with all applicable State and Federal laws and regulations concerning the storage, use and disposal of industrial chemicals and other hazardous materials. All equipment planned for in-stream work (e.g. culvert replacement) would be inspected beforehand for leaks. Accidental spills or discovery of the dumping of any hazardous materials would be reported to the Authorized Officer and the procedures outlined in the "Roseburg District Hazardous Materials (HAZMAT) Emergency Response Contingency Plan" would be followed. Hazardous materials (particularly petroleum products) would be stored in appropriate and compliant UL-Listed containers and located so that any accidental spill would be fully contained and would not escape to ground surfaces or drain into watercourses. Other hazardous materials such as corrosives and/or those incompatible with flammable storage shall be kept in appropriate separated containment. All construction materials and waste would be removed from the project area.

D. Resources that Would be Unaffected by Either Alternative

1. Resources Not in Project Area

The following resources or concerns are not present and would not be affected by either of the alternatives: Areas of Critical Environmental Concern (ACECs), Research Natural Areas (RNAs), prime or unique farm lands, floodplains/wetlands, solid or hazardous waste, Wild and Scenic Rivers, and Wilderness.

The proposed action is consistent with Executive Order 12898 which addresses Environmental Justice in minority and low-income populations. The BLM has not identified any potential impacts to low-income or minority populations, either internally

or through the public involvement process. No Native American religious concerns were identified by the team or through correspondence with local tribal governments.

There are currently no energy transmission or transport facilities, and/or utility rights-of-way in proximity to any of the proposed commercial thinning or density management units.

2. Cultural Resources

Elkhead was inventoried for cultural resources and none were discovered (Cedar Shingle and Slow Lane in June 2007; Adams Apple and Lurch in October 2007 and January 2008). It was determined that there would be no effect to any cultural resources since none were identified in the Elkhead project area. The Swiftwater Field Office has completed its Section 106 responsibilities under the 1997 National Programmatic Agreement and the 1998 Oregon Protocol. Cultural resources will not be discussed further.

Chapter 3. Affected Environment & Consequences by Resource

This chapter discusses the specific resources potentially affected by the alternatives and the direct, indirect and cumulative environmental effects[a] of the alternatives over time. This discussion is organized by individual resource, and provides the basis for comparison of the effects between alternatives. The cumulative effects of the BLM timber management program in western Oregon have been described and analyzed in the PRMP/EIS and FSEIS, incorporated herein by reference.

A. Forest Vegetation

1. Affected Environment

The proposed units are predominantly Douglas-fir forested stands 37 to 54 years old. Other conifer species in the stands include incense-cedar, western hemlock, western red cedar, and grand fir. Hardwoods and ground vegetation are common where there is sufficient light available (e.g. Pacific madrone, golden chinkapin, big leaf maple, red alder, ponderosa pine, salal, Oregon grape, and sword fern). Over half of the stands had been actively managed with precommercial thinning and fertilization treatments from 1972 to 1985. The stands are exhibiting signs of being overstocked (e.g. decreased crown ratios).

Stand ages were established by one of two methods. In stands previously harvested and reforested, operational inventory data was used. If this data was not available, stand exams (performed 1998-2007) determined the average age of the dominant and co-dominant trees that would benefit from commercial thinning and density management.

The ORGANON modeling program version 8.2 was used to model current conditions, silviculture prescriptions, and expected post-treatment stand conditions. Multiple and diverse stands may make up individual proposed harvest units. The current stand conditions for the Elkhead sales are summarized in Table 5.

[a] Cumulative effects are the impacts of an action when considered with past, present, and reasonably foreseeable future actions. (40 CFR 1508.7)

Table 5. Current Stand Conditions.

Sale Name	Stand Age (years)	Trees per Acre	Basal Area (sq. ft.)	Quadratic Mean Diameter (inches)	Relative Density Index	Canopy[b] Closure (%)	Average Crown Ratio (%)
Adams Apple	47	190	220	14.4	0.64	130	47
Cedar Shingle	37-53	199-303	140-240	9.1-14.3	0.48-0.73	110-164	24-47
Lurch	39-49	207-323	140-230	9.5-12.4	0.55-0.72	109-167	33-47
Slow Lane	37-54	168-377	180-230	10.7-14.0	0.54-0.78	103-175	19-39

2. No Action Alternative

Current stand relative densities exceed or are near suppression related mortality thresholds. In the absence of treatment, canopies would remain closed and the crowns of individual trees would continue to recede, resulting in increased suppression mortality and decreasing diameter growth as trees compete for water, nutrients, and sunlight.

Suppression mortality would occur primarily in the smaller size classes of trees and would be the main source for snag and coarse woody debris recruitment. Continued suppression would also lead to a reduction in the hardwood and shrub components, which would further simplify the vegetative composition of the stands.

Live crown ratios of the overstory trees would continue to decrease from current levels as lower limbs are shaded out and die. Closely spaced trees with small crown ratios have reduced photosynthetic capacity, which results in decreased diameter growth and lower resistance to disease and insects. As trees increase in height, with little increase in diameter, they become unstable and more susceptible to wind damage (Oliver and Larson, 1996).

The stands would not develop into multi-storied stands without altering the current growth and developmental trajectories (DeBell, et al. 1997). In the absence of treatment, shade-tolerant species (e.g. western hemlock, western red cedar) would remain suppressed in the understory. There would be insufficient sunlight to allow for shrub, conifer, and hardwood regeneration.

[b] Canopy Closure is the proportion of the forest floor covered by the vertical projection of tree crowns, which is adjusted for crown overlap in closed canopy stands. The Organon model estimates canopy cover by summing the individual tree crown areas and dividing that by the area of an acre. Estimates can exceed 100 percent of the stand due to crown overlap in dense stands and/or the presence of understory trees.

3. Proposed Action Alternative

Thinning results in increased diameter growth, stabilization of height to diameter ratios, cessation of crown recession, release of understory vegetation and increased potential for new tree and shrub understory regeneration. (Bailey 1996; Bailey and Tappeiner 1998; Bailey, et al. 1998; Oliver and Larson 1996).

Commercial thinning in GFMA would produce relative stand densities ranging from 0.34 to 0.42 (Table 6). Within that range of relative densities, commercial thinning would produce high rates of volume growth (Curtis and Marshall 1986).

Commercial thinning in C/D would result in relative stand densities ranging from 0.24 to 0.35 (Table 6). Stands thinned to a relative density of 0.15 to 0.3 would increase stand diversity and produce a high level of volume productivity. (Chan, et al. 2006).

Density management in the Riparian Reserves would be thinned to produce relative stand densities ranging from 0.24 to 0.33 (Table 6). Density management in Riparian Reserves would also reduce canopy closure to between approximately 51 and 74 percent (Table 6). Reducing the canopy closure would allow sunlight to reach the forest floor to encourage establishment and/or further development of an understory and vertical stratification of canopy layers (Hayes, et al. 1997).

Generally, trees selected for retention would have at least a 30 percent live crown ratio. Trees with at least a 30 percent live crown ratio would be more likely to develop deeper crowns (i.e. increase live crown ratio) and accelerate diameter growth (Daniel, et al. 1979).

After determining where the Riparian Reserves are located, some units have a minimal amount of GFMA acreage remaining and therefore the entire unit would have the density management prescription applied. Conversely, some small areas of Riparian Reserves would have prescriptions similar to the adjacent GFMA prescriptions applied. The C/D and the associated Riparian Reserves typically have the same prescription. The exception to this is in Cedar Shingle Unit 35A. The west half of the unit is where the majority of the riparian reserve is located and would retain a lower residual density. The east half of the unit would be marked with a higher residual density.

Table 6. Post-Treatment Stand Conditions.

Sale Name	LUA*	Trees per Acre	Basal Area (sq. ft.)	Quadratic Mean Diameter (inches)	Relative Density Index	Canopy Closure (%)	Average Crown Ratio (%)
Adams Apple	GFMA	104	120	15.7	0.40	79	47
Adams Apple	Riparian	80	90	15.9	0.31	59	47
Cedar Shingle	GFMA	100-155	100-120	12.1-15.0	0.36-0.39	70-81	28-45
Cedar Shingle	Riparian	74-162	70-90	10.5-14.7	0.24-0.33	51-74	26-46
Cedar Shingle	C/D/R	87-131	80-110	11.7-14.3	0.24-0.35	55-82	33-47
Lurch	GFMA	114-179	100	10.5-13.4	0.34-0.36	68-77	32-47
Lurch	Riparian	99-155	80	10.2-133.3	0.28-0.31	58-69	30-47
Slow Lane	GFMA	109-152	120	12.8-14.3	0.36-0.42	68-77	19-22
Slow Lane	C/D/R	105-147	80	10.9-14.0	0.27-0.33	65-72	33-39

* Land-Use Allocation: GFMA = General Forest Management Area, C/D/R = Connectivity/Diversity Block and Riparian Reserves, Riparian = Riparian Reserve.

4. Cumulative Effects

While the proposed treatments in Elkhead would reduce tree densities, they would not affect stand ages or seral stages. In the long-term, the treatment would accelerate the development of late-successional (seral) stand conditions because the proposed project would retain the dominant and co-dominant trees giving them more room to grow and produce multiple canopy layers by allowing more sunlight to reach the forest floor and encourage the establishment and development of understory vegetation.

Through 2010, the Swiftwater Field Office is planning commercial thinnings or density management on approximately 1,942 acres of mid-seral forest stands in the Elk Creek watershed in addition to the Elkhead project. No regeneration harvests are currently planned within the Elk Creek watershed through 2010.

The PRMP/EIS (Vol. I, p. 4-4) assumed that most private lands would be intensively managed with final harvest on commercial economic rotations averaging 50 years. Based on this assumption, the PRMP/EIS (Vol. I, p. 4-30) concluded that private forest lands would contribute very little, if any, late-seral forest habitat in the watershed. Because the objectives are different for each private landowner, the timing of harvest would vary throughout the watershed. Forest lands would maintain a mosaic pattern of age classes in the watershed as different forest stands are harvested and replanted. The majority of private lands would maintain young plantations or early and mid-seral forest type characteristics.

B. Wildlife

1. Federally Threatened & Endangered Wildlife Species

a) Northern Spotted Owl

(1) Affected Environment

There are four known spotted owl sites, which includes eight activity centers, within 1.2 miles (Cascades provincial home range) of the proposed Elkhead units. The closest spotted owl activity center (Adams Creek [IDNO 32690]) is located approximately 182 yards from Lurch Unit 13B. The other seven activity centers are located approximately 429 to 2,274 yards (0.2 to 1.3 miles) from proposed unit boundaries.

Known Owl Activity Centers (KOAC) have been designated to minimize impacts and protect nest sites found before 1994 (USDI, 2005). There are three KOACs within the proposed project area: (1) a 50 acre KOAC for the Adams Creek owl site is adjacent to the north boundary of Lurch Unit 13B, (2) a 112 acre KOAC for the Lane Creek owl site is southwest of Slow Lane Unit 23B, and (3) a 92 acre KOAC for the Harness Mountain owl site is adjacent to the north boundary of Cedar Shingle Unit 35A.

The Elkhead harvest units were included as part of the consultation package with the U. S. Fish and Wildlife Service (USFWS) regarding the *Reinitiation of consultation on Roseburg District Bureau of Land Management FY 2005-2008 Management Activities* (Ref. # 1-15-05-I-0511) (USDI 2005).

Cedar Shingle and Slow Lane are within spotted owl designated Critical Habitat Unit OR-24 (Appendix B, Table B-1). Critical habitat is a specific geographical area designated by the USFWS as containing habitat essential for the conservation of a Threatened and Endangered species.

(2) No Action Alternative

The quality and availability of northern spotted owl habitat would be unaffected under the No Action alternative. The 1,160 acres of mid-seral stands included in Elkhead and the northern spotted owl sites described above would provide dispersal habitat similar to current levels. Suitable habitat characteristics would develop more slowly when compared to the proposed action (see discussion of effects to forest vegetation, pgs. 18-21).

(3) Proposed Action Alternative

Local, project specific impacts to northern spotted owls due to commercial thinning and density management activities would include the modification of approximately 1,160 acres of dispersal habitat. Between five to 23 percent of the existing dispersal habitat would be modified within the home ranges of four

spotted owls and 79 percent of the existing dispersal habitat would be modified within the home range of the Adams Creek spotted owl (Appendix B, Table B-2).

Though dispersal habitat would be temporarily degraded post-treatment, the capability of the habitat to function for dispersing spotted owls would be maintained. Vertical and horizontal cover would be reduced in treated areas through overstory tree removal with varying levels of residual tree density. Spotted owls would be expected to continue using these stands because post-treatment canopy cover would still be 40 percent or more and the average tree diameter would generally be 11 inches or larger (Table 6), figures widely used as a threshold for dispersal function (Thomas et al. 1990). Spotted owls would likely use unthinned stands over the newly thinned stands (especially heavily thinned stands) until the canopy cover in thinned stands returns to pre-treatment levels in about 10 to 15 years (Meiman et al. 2003). The USFWS concurred with the Roseburg District's determination that the effect on northern spotted owls by modifying dispersal-only habitat in the proposed Elkhead harvest units was "*may affect, is not likely to adversely affect*" (USDI, 2005; pgs. 19-20).

Based on current survey data, there are no spotted owl nest sites within 65 yards of the unit boundaries, therefore seasonal restrictions would not be applied. However, if future surveys locate an activity center or nest within 65 yards of a proposed unit, seasonal restrictions from March 1st through June 30th would be applied to that portion of the harvest unit to mitigate disturbance impacts to nesting spotted owls and pre-dispersal fledglings.

In addition, seasonal restrictions would apply from March 1st through June 30th for helicopter use within 120 yards (for Type III or IV helicopters) or 440 yards (for Type I and II helicopters) of Cedar Shingle Unit 35A. These seasonal restrictions would be implemented unless current calendar year surveys indicate: 1) spotted owls were not detected, 2) spotted owls were present, but not attempting to nest, or 3) spotted owls were present, but nesting attempt has failed. Waiver of seasonal restriction would be valid until March 1st of the following year.

The proposed harvest would degrade approximately 662 acres of dispersal-only habitat within Critical Habitat Unit OR-24. Post-treatment canopy cover is projected to range from 51 to 74 percent within the Riparian Reserves and 68 to 95 percent within the GFMA and C/D (Table 6). By removing co dominant trees and reducing tree densities, primary constituent elements contributing to canopy cover and multiple canopy layers would be removed; however, there would be sufficient elements remaining that Critical Habitat Unit OR-24 would retain its functionality. The USFWS concurred with the Roseburg District's determination that the effect of the proposed action on northern spotted owl Critical Habitat Unit OR-24 by modifying dispersal-only habitat was "*may affect, is not likely to adversely affect*" (USDI, 2005; pgs. 28-29). Critical Habitat Unit OR-24 would

continue to provide for the survival and recovery of spotted owls under the proposed action.

Furthermore, density management within the Riparian Reserves would accelerate the development of late-successional characteristics used by spotted owls (e.g. large diameter trees, multiple canopy layers, and hunting perches). Development of late-successional characteristics and suitable habitat would be expected in approximately 50 years, roughly 100 years sooner than through natural stand development.

2. Bureau Sensitive Species

Bureau Sensitive species suspected to occur within the project area and that may be affected by the proposed action are discussed below. Other Bureau Sensitive and Bureau Strategic species suspected to occur on the Roseburg BLM District but not in the project area are discussed briefly in Appendices C and D.

a) No Action Alternative

No suitable habitat or habitat features for BLM Special Status Species would be affected under the No Action Alternative and any species sites in or adjacent to the project area would be expected to persist. The development of suitable and/or late-successional habitat characteristics for these species such as large trees, snags, coarse woody debris, and a well-developed understory would occur more slowly than compared to the proposed action (see discussion of effects to forest vegetation, pgs. 18-21). Therefore, the effects of the No Action Alternative are not discussed on a species-by-species basis.

b) Fisher (Bureau Sensitive)

(1) Affected Environment

Fishers primarily use mature closed-canopy forests with the presence of large diameter trees, snags, and downed wood for natal and foraging behaviors, and with some deciduous component, frequently along riparian corridors. Although the project area does not contain suitable natal or foraging habitat, the fisher may use the proposed units as dispersal habitat. The nearest known observation is more than 11 miles east-northeast of the proposed project area; however, fishers may use the proposed units because they are capable of traveling six miles within a few hours and more than 29 miles in two days (Verts and Carraway, 1998).

(2) Proposed Action Alternative

Treatment of the mid-seral stands would improve the quality of dispersal habitat by reducing stand densities, thus creating habitat conditions favorable for the development of a multi-canopy understory and larger trees. Additionally, project design features to retain snags and coarse woody debris (pg. 15) would maintain habitat for potential prey species (i.e. small mammals) that use these habitat features. Fishers would be able to continue to use the proposed units for dispersal habitat post-harvest.

Development of late-successional characteristics would be expected in approximately 50 years, roughly 100 years sooner than through natural stand development. The proposed action would produce suitable fisher natal and foraging habitat sooner than through natural stand development.

c) Purple Martin (Bureau Sensitive)

(1) Affected Environment

Purple martins nest in colonies within snag cavities located in forest openings, meadows, and other open areas. Although the project area does contain snags they are not located in open areas typical of purple martin colonies. There are currently no known purple martin sites within the project area and the nearest known purple martin colony is approximately 5.2 miles northwest of the proposed project area. However, purple martins would be expected to forage above the canopies within the project area.

(2) Proposed Action Alternative

Snags are expected to be retained in the proposed units due to the protection afforded snags in the project design features (pg. 15). However, unless windthrow or other catastrophic events occur that create openings around these snags, the project units would continue to be unsuitable for purple martins to colonize the snags. Purple martins would continue to forage above the canopies within the units post-harvest.

d) Townsend's Big-eared Bat (Bureau Sensitive) & Fringed Myotis (Bureau Sensitive)

(1) Affected Environment

Townsend's big-eared bat and the fringed myotis can roost in snags or trees with deeply furrowed bark, loose bark, cavities, or with similar structures typically found in late-successional conifers. Surveys have not been conducted for either bat species since surveys are not practical. Potential bat roosts are typically located within the overstory canopy, thus it is unknown if the Townsend's big-eared bat or the fringed myotis is present within the proposed project area. There are an unknown number of remnant snags and potential bat roosting trees in the proposed units. No caves were found within the harvest units during field review.

(2) Proposed Action Alternative

Existing snag habitat is expected to be retained in the harvest units due to the protection afforded them by the project design features (pg. 15). As described under the Proposed Action (pg. 7), additional snags may be created incidentally through harvest operations or weather damage, thus providing additional snag recruitment as future habitat for bats.

3. Wildlife Cumulative Effects

Availability of late-seral forest habitat is the primary wildlife concern in the Elk Creek fifth-field watershed. Stands in this area begin functioning as late-seral habitat at approximately 80 years of age when characteristics like large diameter trees, a secondary canopy layer, snags, and cavities have developed.

The BLM manages approximately 41,700 acres of conifer forest lands in the Elk Creek fifth-field watershed (Table 7). Of this total, there are approximately 16,805 acres of late-seral stands representing 40 percent of forest lands managed by the BLM. In the Elk Creek fifth-field watershed there are approximately 15,965 acres of mid-seral forest stands managed by the BLM (see Table 7) that would be expected to develop into late-successional habitat within 150 years if untreated or 50 years if density management prescriptions were applied.

Of the 92,300 acres of forested land in private ownership within the Elk Creek fifth-field watershed there are approximately 3,200 acres of late-seral forest (Table 7). The PRMP/EIS assumed (Vol. I, pg. 4-4) that ". . . most private forest lands would be intensively managed with final harvest on commercial economic rotations averaging 50 years." Given this harvest rotation age, late-seral forest habitat is expected to be unavailable on private, industrial forest-lands within the next 40 years.

While the proposed action would reduce tree densities, it would not affect overall stand ages or affect the ability of the project area to grow into late seral habitat. The proposed action may temporarily reduce the utility of the project area for some wildlife species by reducing canopy cover and horizontal structure. However, sufficient residual tree density, snags, and CWD would remain to provide wildlife habitat, and treated stands would regain pre-project cover characteristics within 10 to 15 years. Consequently, the proposed action would not affect the availability of late-seral habitat in the watershed, and would contribute to the development of additional habitat with late-successional characteristics at a faster rate than would occur if the proposed units were left untreated.

Additionally, late seral habitat would continually be developing in the watershed as the RMP is implemented. Over a period of 100 years, implementation of management direction from the ROD/RMP is projected to result in a 51 percent increase in the amount of old-growth forest managed on the Roseburg District (PRMP/EIS, Chapter 4 – 29). This is projected to provide an additional 131,000 acres of nesting, roosting and foraging habitat for the northern spotted owl, and habitat for other species dependent on late-successional forest habitat on the Roseburg District (PRMP/EIS, Chapter 4 – 57).

Table 7. Forest Habitat within the Elk Creek Fifth-Field Watershed.[1, 2]

Forest Habitat	Private Lands[1] (acres)	Federal Lands: Available for Harvest[2] (acres)	Federal Lands: Reserved from Harvest[2] (acres)	Total[1] (acres)
Late-Seral Forest (QMD ≥ 20")	3,200	3,330	13,475	20,000
Mid-Seral Forest (10" ≤ QMD < 20")	58,030	6,170	9,795	74,000
Early-Seral Forest (QMD < 10")	31,070	3,145	5,785	40,000
Non-Forest Lands	46,990	65	355	47,410
Total	**139,290**	**12,710**	**29,410**	**181,410**

1. Acreages estimated based on the 1997 Interagency Vegetation Management Project dataset and forest change detection since 1972 (Elk Creek/Umpqua River WA, March 2004, pp. 15-16).
2. Data obtained (April 2005) from Biological Assessment for the Roseburg District BLM FY2005-2008, Appendix B-Table B-3 (pp. 139-140). Analysis determined using Forest Operations Inventory data.

C. Fire and Fuels Management

1. Affected Environment

Adams Apple, Lurch, and a part of Slow Lane are within the Wildland Urban Interface (WUI) boundary as identified in the Roseburg District Fire Management Plan. Cedar Shingle is outside of the WUI boundary. In most areas, current fuel conditions are best described by photo 1-MC-3 in *Photo Series for Quantifying Natural Forest Residues in Common Vegetation Types of the Pacific Northwest* (Maxwell and Ward, 1980). Based on this photo series, the estimate for downed woody debris in Elkhead is 11 tons per acre although there are some small areas that have a lighter fuel load. Adams Apple and Lurch have several gates along the access road which would decrease the risk of human-caused wildfires by limiting access to the public. The portion of Slow Lane that occurs within the WUI boundary has no homes near by and the surrounding fuels around the project area are not likely to carry fire. Therefore, the current risk of wildfire in the Elkhead project is low to moderate.

2. No Action Alternative

Downed fuels would continue to gradually accumulate adding to the existing fuel conditions of 11 tons per acre. The risk of wildfire would also gradually increase as fine fuels continue to accumulate.

3. Proposed Action Alternative

After commercial thinning and density management, the down woody debris would increase from 11 tons per acre to 15 tons per acre as depicted in the photo 2-DF-3-PC from *Photo Series for Quantifying Forest Residues in the Coastal Douglas-Fir – Hemlock Type* (Maxwell and Ward, 1976). The down woody debris created at landings by the proposed action would be machine piled and burned to reduce concentrated fuel loads. The remaining fuels created by the proposed action would be predominately small (i.e. less than three inches in diameter) and scattered over the harvest area.

4. Cumulative Effects

The additional amount down woody debris (i.e. four tons per acre) would not dramatically increase the fire risk to the area. In addition, most of the fine fuels, less than one inch in diameter, would degrade within two years after harvest and decrease the risk of a fire building in intensity to consume larger diameter fuels.

D. Soils

1. Affected Environment

Topography varies from gently sloping (0 to 35 percent) to very steep (greater than 70 percent) within the proposed units. Cedar Shingle, Lurch, and Slow Lane have small areas with slopes greater than 90 percent and ledge rock outcrops.

Table 8. Slope Distribution, Amount, and Percent of Area by Sale

Sale Name	Percent Slope	Area (acres)	Percent of Area
Lurch	0 to 70	146	94
	greater than 70	9	6
Adams Apple	0 to 70	331	99
	greater than 70	2	1
Slow Lane	0 to 70	138	94
	greater than 70	9	6
Cedar Shingle	0 to 70	478	91
	greater than 70	47	9

Adams Apple and Lurch have soils with more clay content than Cedar Shingle and Slow Lane (Table 8). Soils with higher clay content are more susceptible to compaction and recover more slowly when compacted. Soils on the gentle slopes are well drained and moderately deep to very deep (20 to more than 60 inches to bedrock). Lurch and Adams Apple soils typically have silty clay loam surfaces and silty clay subsoils. Slow Lane and Cedar Shingle typically have silt loam to silty clay loam surfaces and silty clay loam to silty clay subsoils over soft sandstone and siltstone bedrock. On slopes steeper than 70 percent, very gravelly shallow soils over hard bedrock are major components in parts of Cedar Shingle Unit 35A, where the bedrock is volcanic, and in Slow Lane Unit 23A.

Ground-based yarding was used extensively in all four sale areas when logged in the 1960s, except parts of Cedar Shingle were cable-yarded (1964 and 1970 aerial photo interpretation). Substantial soil displacement and compaction resulted. The skid trail density is generally high on gentle slopes (0 to 35 percent slopes) and heavy compaction is common on existing skid trails, decking areas, and landings. Compaction created by the timber harvesting in the 1960s exceeds 25 percent of the harvest area where ground-based yarding occurred. Soil productivity is recovering very slowly where the topsoil had been displaced and the highly compacted subsoil is exposed or where there is less than ten inches to bedrock. Some organic matter incorporation and soil structure

development is occurring on skid trails where native understory vegetation is growing well.

Currently, little erosion is occurring because: (1) vegetation and woody debris dissipate rainfall energy, (2) natural soil structure and porosity outside of old ground-based yarding areas allow high water infiltration rates into the soil, and (3) the near absence of new disturbance, such as off-highway vehicle traffic in the trails helps keep erosion low.

About 54 acres of the project area are considered to be fragile due to slope gradient but suitable for forest management with mitigation for surface erosion and shallow-seated landslides (FGR) under the Timber Production Capability Classification (TPCC) system (Appendix E, Table E-1). Approximately 25 acres of the project area are on moderate to steep slopes (35 to 70 percent) that have mildly active slump-earth flow topography and are suitable for forest management with mitigation for slump-earth flow movements (FPR) under the TPCC system, primarily in the western part of Cedar Shingle Unit 35A (Appendix E, Table E-1). No tension cracks or fresh scarps were discovered from the field investigation, indicating no recent slope movements had occurred.

Cedar Shingle Unit 35A had the highest landslide density in the Elkhead project area (approximately 2.4 percent of the unit area [5.3 acres]). An important factor contributing to this is 1,100 feet of topographic relief in the highly dissected terrain downslope from the 23-4-28.1 road in Unit 35A. Of the 56 identified landslides inside the proposed units, 54 occurred by 1970 after clearcut harvesting (aerial photo inventory; Appendix E, Table E-2). A large percentage of the landslides may have been initiated by the December, 1964 storm event (considered a 100-year event) including a debris flow approximately 0.8 acres in size and 930 feet long in Cedar Shingle Unit 35A. Adams Apple Unit 19A had the lowest landslide density (0.03 percent of the unit area [0.1 acre]).

2. No Action Alternative

a) Soil Compaction/Displacement & Productivity

Without timber harvesting or road construction, no additional soil compaction or displacement would occur beyond the current level. Erosion would remain low except for the roads that get occasional off-highway vehicle traffic. Compacted soils within the skid trails would continue to recover over time, as plant roots penetrate through the soil, organic matter becomes incorporated into the soil, and small animals burrow through the soil layers. The duff layer would increase with the accumulation of needles, twigs, and small branches, along with decomposing larger woody material, absent a fire of sufficient intensity to consume the material.

b) Landslides & Slope Stability

Landslides on the potentially unstable areas would have a low probability of occurring (less than ten percent chance in a given year). If landslides do occur they would likely be less than 0.15 acre in size and few in number. This assessment is based on:

- No in-unit landslides have occurring after1980 were identified by aerial photo interpretation landslide inventory or field observations; (pers. obs.; Cressy, 2007);

- No actively failing slopes were discovered (pers. obs.; Cressy, 2007);
- Over 80 percent of historic, timber harvest-related landslides within the project area were 0.03 to 0.15 acres in size (aerial photo landslide inventory; field observations; Cressy, 2007);
- Most historic landslides were probably triggered by a one-hundred year event (i.e. the December 1964 storm) after the units had been clearcut in the early 1960s. The Oregon Department of Forestry found that landslide numbers were lowest in mid-seral stands (31 to 100 years old) following the intense 1996 storms (ODF Forest Practices Technical Report No. 4, 1999, pg. 64).
- Many of the sites that were most vulnerable to failure probably failed after the units were clearcut in the early 1960s. This left the FGR and FPR slopes in a more stable state.

3. Proposed Action Alternative

a) Soil Compaction/Displacement & Productivity

The proposed road construction would result in soil displacement and compaction on approximately 14 acres, removing those areas from timber production (Table 9). Spurs and numbered roads would not be subsoiled after harvest because they are anticipated to be used in the future.

Ground-based yarding is proposed on approximately 376 acres where slopes are generally less than 35 percent. Up to 34 acres of soil displacement and compaction would result from ground-based yarding. Compaction is defined, for this analysis, as an increase in soil bulk density of 15 percent or more and an alteration of soil structure to platy or massive to a depth of four inches or more. The relatively high clay content of the surface makes these soils highly sensitive to compaction. Limiting the area of harvest disturbance and restricting operating periods for ground-based operations would reduce soil productivity loss (as included in the project design features, pgs. 12-14). There are short slope pitches of 35 to 60 percent up to 150 feet in length where ground-based operations are designated. The soils on these steeper pitches are more sensitive to soil displacement and compaction under moist soil conditions. Harvesters traveling over slash on slopes less than 45 percent can create little soil displacement and compaction when the soils are dry, whereas, skidders and forwarders would be too impacting on these slopes. On ground-based yarding trails, the top three to six inches of soil would have compaction, mainly concentrated in the tread areas.

Where there is no existing compaction, ground-based yarding with a tractor or rubber-tired skidder would compact approximately six to seven percent of the ground when project design features are followed. A harvester-forwarder operation, where slash is plentiful, would compact approximately one to three percent of the ground-based area (D. Cressy, 2006; pers. obs.). The amount of new compaction would be reduced by using existing compacted trails when ground-based yarding. Landings and log deck ground would account for about an additional two percent of the ground-based harvest area. Therefore, up to nine percent of the ground-based harvest area (i.e. 34 acres) would be compacted if tractors or rubber-tired skidders were used. This would be within the

ROD/RMP direction that the cumulative main skid trails, landings, and large pile areas affect less than ten percent of the ground-based harvest unit (USDI, 2007; pgs. 58-59). The area compacted would be five percent of the ground-based harvest area if harvester-forwarders were used.

Table 9. Amount of Soil Disturbance and Compaction from Road Construction and Re-alignment.

Sale	Soil Disturbance acres (percent of project area)		
	New Disturbance	Re-disturbance of Existing Roads/Trails	Total Soil Disturbance
Lurch	0.6 (0.38%)	1.4 (0.87%)	2.0 (1.25%)
Adams Apple	2.1 (0.63%)	4.7 (1.42%)	6.8 (2.05%)
Slow Lane	0.6 (0.38%)	0.4 (0.25%)	1.0 (0.63%)
Cedar Shingle	2.6 (0.49%)	1.9 (0.36%)	4.5 (0.85%)
Total	**5.9 (0.50%)**	**8.4 (0.72%)**	**14.3 (1.22%)**

Approximately 660 acres would be cable-yarded, with an additional 99 acres in Cedar Shingle Unit 35A that could be helicopter or cable yarded. Cable yarding corridors would cover about three percent of the treatment area's surface or about 23 acres (Adams 2003). Soil disturbance from cable yarding would vary by topography (convex vs. concave slope, slope steepness, and the presence or absence of pronounced slope breaks), and amount of logs yarded. Compaction would typically be absent or light with little soil displacement in the cable-yarding corridors, partly because intermediate supports would be required where necessary to get one-end suspension. Light compaction would be confined to the topsoil and would recover without mitigation. There would be areas with heavier compaction, especially along terrain breaks. Excessive furrowing created by cable yarding would be hand waterbarred and filled with limbs or other organic debris to prevent erosion, sedimentation and the channeling of water onto potentially unstable slopes (project design features, pg. 13).

Approximately 99 acres could be helicopter yarded or cable yarded. Helicopter yarding would have negligible in-unit displacement or compaction of soils. The greatest impact from helicopter logging is the compaction of the soil to create the landings.

Surface soil erosion in disturbed areas would be controlled by applying erosion control measures (e.g. new cut and fill slopes would be mulched with weed-free straw, or equivalent, and seeded; pgs. 12-13). With the project design features described in Chapter 2, resulting soil erosion would be limited to localized areas, and any reduction of soil productivity due to erosion would be minor. The effects to soils would be consistent with those identified and considered in the Roseburg District Proposed Resource Management Plan/Environmental Impact Statement (Chapter 4, pgs. 12-16).

There would be a flush of sediment from newly constructed spurs, ground-based yarding trails, and cable-yarding corridors during the first wet-season event following harvest. The amount of sediment generated from yarding trails and corridors would be too small

to reliably measure. Little sediment would reach streams because overland flow is rare on these high infiltration soils covered with slash and the "no harvest" buffers would prevent disturbance to stream channels and stream banks. The "no harvest" buffers would also intercept run-off from roads allowing for deposition of sediment transported by overland flow before it reached active stream channels. Negligible amounts of sediment from Adams Apple spurs #1 and #5 would reach first and second order stream crossings during the first rainy season.

b) Landslides & Slope Stability

Proposed spurs and re-aligned road segments would be located in stable positions that have: (1) gentle side slopes, benches, or ridge top positions (nearly level to 30 percent) and (2) have no apparent signs of potential instability, such as curved or pistol-butted conifer boles or instability such as, tension cracks, scarps, or jack-strawed trees that indicate active slope movement. The proposed road construction would not create instability (based on the monitoring of spurs constructed on similar stable terrain).

Where soils are classified as FGR and FPR, the risk of in-unit landslide occurrence would fall between the low risk of the no action alternative and the moderate risk under clearcut conditions (moderate risk determined from interpretation of 1964 and 1970 aerial photos). The risk would range from "low" to "low and moderate". Since three-quarters (60 of 79 acres) of the FGR and FPR slopes are found in Cedar Shingle Units 3E and 35A (western half) and Slow Lane Units 15A, 23A, and 23B, they would have more of a risk of landslides than the other proposed units in the project area. About one-third of the FGR and FPR slopes are situated where a 0.15 acres landslide could potentially reach a stream. The period of maximum vulnerability would be the ten year period immediately following harvest as root systems and canopies expand. If in-unit landslides do occur during this period of vulnerability, then there would be few in number and likely be less than 0.15 acre in size, for similar reasons as stated previously under the No Action Alternative (pgs. 29-30). Larger and more numerous landslides could occur if an intense, long-return interval storm (i.e. 100 year event) occurred during the period of maximum vulnerability, although the likelihood would be less than a ten percent chance.

4. Cumulative Effects

Soil productivity would not be maintained in the short-term following implementation of the proposed action because road construction and ground-based yarding would cause soil compaction on up to 48 acres, which would not be subsoiled to reduce the amount of compaction. In the long-term, (i.e. one harvest rotation), soil productivity would be maintained or improved at the watershed scale on BLM-administered land because of natural recovery and subsoiling ground-based yarding trails and roads after final harvests. As a result, cumulative effects to soil productivity at the site scale and fifth-field watershed scale would be negligible. These effects would not exceed the level and scope of effects considered and addressed in the Proposed Resource Management Plan/Environmental Impact Statement (USDI 1994). The effects of forest management on private timber lands in the watershed would be variable.

Landslide aerial photo inventories within the Swiftwater Resource Area show a declining number of landslides during the past 50 years. The declining number of landslides corresponds with improved management practices. The rate of road-related landslides has declined the most. Fluctuations occur because of variations in weather and levels of management activity. Because of management improvements and Riparian Reserves, the distribution of landslides in time and space and their effects, now, more closely resemble those within relatively unmanaged forests (Skaugset and Reeves 1998). The distribution would be approaching natural variability.

E. Hydrology

1. Stream Temperature, Water Quality, & Beneficial Uses

a) Affected Environment

The Elkhead project area lies within the Adams Creek, Walker Creek, Lane Creek, Shingle Mill Creek and Elk Creek Headwaters drainages of the Elk Creek fifth-field watershed, and the Mill Creek drainage of the Calapooya fifth-field watershed. Out of a total of 1,160 acres of proposed thinning, 40 acres is along the upper ridge of Mill Creek in the Calapooya Creek Watershed. Thinning 40 acres of the 157,600 acre Calapooya Creek Watershed would result in no measurable change to any watershed parameter. Therefore, effects to the Calapooya Creek Watershed will not be discussed further.

There are 80 first or second-order headwater streams and two perennial fish-bearing streams (Elk Creek and Adams Creek) adjacent to or within the proposed units totaling 16 miles of stream length. Approximately 75 percent of this stream length is classified as perennial (flows year-round) and 25 percent is classified as intermittent or ephemeral (flow ceases for some portion of the year). Elk Creek has been placed on the Oregon 303(d) list for excessive temperature year round (ODEQ, 2006).

The affected beneficial uses of water within the project area are: resident fish and aquatic life, and salmonid fish spawning and rearing. Beneficial uses of water downstream of the project area consist primarily of: livestock watering, domestic water supply, irrigation, and fish and aquatic life.

No surface water rights for domestic use exist within one mile downstream of the proposed thinning units. Two points of diversion for irrigation use are within one mile downstream of the Cedar Shingle project area. A portion of the Elkhead project area is within the drinking water protection area for the City of Yoncalla. An intake to Yoncalla's municipal drinking water system is approximately 0.5 miles downstream from the Adams Apple project area.

b) No Action Alternative

Generally, there would be no impact to water quality, Beneficial Uses of Water, or hydrologic processes under the No Action Alternative. Trees within the Riparian Reserve would continue to compete for space and stands would persist in an overly dense condition and not attain potential growth rates (see Forest Vegetation section above).

This slow development would result in a smaller size of potential wood for long-term recruitment to streams and slower canopy development to provide shade.

Should a stand-replacing event (e.g. wildfire) occur, it would result in an increase in water yield and peak flows due to a loss of vegetation and reduction in evapotranspiration. Subsequent impacts to water quality and Beneficial Uses of Water would then follow.

Road renovation or improvement would not repair existing sediment sources. Some road stream crossings and drainage features are in poor condition and have an increasing likelihood of failure over time, which could introduce sediment into streams. The amount of sediment would vary depending on the condition of the road and the size of the storm event. The poorer the road condition and the larger the storm event (such as a 100-year event) could result in the loss of the road at the crossing.

The likelihood of a landslide reaching a stream would be low since slopes with potential instability are located above gentle to moderate slopes away from streams. Landslides would be small and impact low order streams. They would produce a short-term increase in sedimentation until the material is dispersed downstream and the potential for an increase in large wood. Effects of sediment in the stream bed from small landslides would have a low probability of being detected more than a few hundred feet downstream from the landslide (during normal flow conditions) since small streams have low capacity for carrying sediment because of their small size and low flows.

c) Proposed Action Alternative

(1) Water Temperature

Approximately 25 percent of the streams in the project area are ephemeral (i.e., they transport water only in response to precipitation events) or intermittent (i.e., they stop flowing in the dry season), which makes them less susceptible to propagating temperature impacts downstream during the warm dry season. Approximately 75 percent of the streams are perennial (i.e., flow continues year round), which makes them more susceptible to temperature impacts. Variable width (20 to 100 feet) “no-harvest” buffers would be established along streams to retain direct shading as necessary for maintenance of water temperatures. The final width of the “no-harvest” buffers would be based on consideration of factors such as unique habitat features, streamside topography and vegetation, the nature of the stream (intermittent or perennial), fish presence, and susceptibility to solar heating.

Buffer widths of 100 feet would be used for fish-bearing streams and 60 foot buffers would be used for streams flowing into the summer or having poor slope stability. Minimum buffer widths would be used on first or second order, ephemeral or intermittent streams, which lack riparian vegetation and where riparian habitat components are also absent. Vegetation that provides primary shading for stream channels would be protected by the “no-harvest” buffers.

Consequently, stream shading would not be affected by thinning or density management and therefore stream temperatures would not be affected.

(2) Water Quality

Density management in Riparian Reserves can cause localized soil disturbance and the short-term potential for erosion, primarily associated with yarding operations. However, "no-harvest" buffers would be established for all streams adjacent to proposed units. These "no harvest" buffers would prevent disturbance to stream channels and stream banks and would intercept surface run-off allowing for deposition of any sediment transported by overland flow before it reached active stream channels.

According to Reid (1981) and Reid and Dunne (1984), forest roads can be a major contributor of fine sediment to streams, through down cutting of ditch lines and erosion of unprotected road surfaces by overland flow. Under this alternative, there would be five entries (all in the Adams Apple project area) by new road construction into the no-harvest buffer: (1) three stream crossings by proposed Spur #1 (in the northeast corner of Unit 19A) and (2) two stream crossings by proposed Spur #5 (in the southern portion of Unit 19A). All of these entries would be on existing skid trails and few trees would be cut to facilitate road construction. These entries through the no-harvest buffers would be necessary to avoid road construction on potentially unstable ground and still be able to access areas for treatment.

Spur #5 would cross two second-order perennial streams midway between their headwaters and confluence with Adams Creek. Spur #1 would cross a third-order perennial portion of Adams Creek about ¼ mile below its headwaters, the upper portion of a first order intermittent stream to the west, and a first order perennial stream to the south.

Aside from the stream crossings on Spurs #1 and #5 in Adams Apple, the proposed new road construction would not be connected to the drainage network. Since road segments must be connected directly to channels in order to deliver sediment-laden water, most (approximately 27,400 feet) of the new road construction would not be connected to the streams through ditchline drainage and therefore have no effect on stream sediment. The remaining 1,600 feet of new road construction (a portion of Spur #1 and #5 in Adams Apple) could be connected to the drainage network from ditchline drainage. However, road construction and log hauling on these spurs would be limited to the dry season and the spurs would be over-wintered in a condition that is resistant to erosion and sedimentation (pgs. 12-14). The stream crossings would also be rocked and the amount of sediment contributed from these crossings would be negligible when compared to the amount of sediment contributed along the entire length of the stream from all natural sources.

Timber hauling could occur in both the dry and wet seasons, although during the wet season hauling would be limited to rocked roads. Hauling during dry season would not deliver road-derived sediment to live stream channels because without precipitation there would be no mechanism for the transport of fine sediment into streams. However, during the first seasonal rains there could be a flush of sediment from the roads near stream crossings. The amount of sediment contributed from these crossings during the first seasonal rains would be negligible when compared to the amount of initial sediment flush from ephemeral channel beds and stream banks.

The Adams Apple Commercial Thinning and Density Management lies entirely within the drinking water source area for the City of Yoncalla. Project Design Features as discussed on pages 10 and 11 are designed to prevent impacts to water quality. As discussed above, water quality impacts from the proposed action would be negligible. Therefore, there would be no impact to the City of Yoncalla's source water.

2. Stream Flow (Water Yield & Peak Flow)

a) Affected Environment

Average annual precipitation in the Elkhead project area ranges from 50 to 60 inches, occurring primarily between October and April. Precipitation occurs mostly as rainfall since 92 percent of the drainage is less than 2,000 feet in elevation. Therefore, more of the annual streamflow is concentrated to this period (Harr, et al. 1979).

Water yield and peak flows are dependent upon the capture, storage, and runoff of precipitation. Water yield is the total amount of water that comes out of a watershed or drainage measured over a period of time. Timber harvest can result in increases in water yield due to a decrease in evapotranspiration and interception (Satterlund and Adams, 1992).

Roads can affect the hydrologic function of a watershed in a number of ways. They can increase the drainage density of a watershed and act as a preferential pathway for surface runoff. The increase in surface runoff can decrease the volume of water that infiltrates into groundwater or soil water storage. The increase in surface runoff also can increase the rate at which runoff is routed through a basin, which can result in higher peak flows and less time between a precipitation event and peak runoff (Harr, et al. 1975).

b) No Action Alternative

Existing roads and landings may modify storm peaks by reducing infiltration, which would allow more rapid surface runoff (Ziemer, 1981, pg. 915). Existing roads may also intercept subsurface flow and surface runoff and channel it more directly into streams (Ziemer, 1981, pg. 915). However, peak flows have been shown to have a statistically significant increase due to effects from roads only when roads occupy at least 12 percent of the watershed (Harr, et al. 1975).

Within the drainages of the Elkhead project area, roads occupy three to four percent of the land. Therefore, no statistically significant increase in peak flows would be expected to occur due to road effects. Also, with no change in the vegetative cover there would be no change in the average water yield from the Elkhead project area drainages.

c) Proposed Action Alternative

The impact of thinning and density management would result in a decrease in evapotranspiration which may lead to an increase in water yield. Removal of trees can increase soil moisture and base stream flow in summer when rates of evapotranspiration are high. These summertime effects last a few years until the canopy closes and the understory develops (Ziemer and Lisle, 1998, pg. 61). Because evapotranspiration from riparian vegetation accounts for most of the daytime decreases in summertime low-streamflow conditions (Bond et al., 2002), riparian buffers reduce the potential for thinning treatments to increase summertime low-flows (Moore and Wondzell, 2005).

Bosch and Hewlett (1982, pg. 16) concluded that water yield increases are usually detectable when at least 20 percent of the forest cover has been removed in a watershed. Stednick (1996, pg. 88) evaluated twelve studies in the Pacific Coast hydrologic region and determined there was no measurable annual yield increase until at least 25 percent of the watershed was harvested. These relationships are based on watersheds that were clearcut logged with minimal stream buffers. To date, no research has been published that describes the effect that thinning and density management treatments designed following Northwest Forest Plan guidelines have on stream flow.

No measurable effect to peak flow would be anticipated as a result of the proposed action because the Elkhead project would involve thinning less than eight percent of the Elk Creek Headwaters sixth-field subwatershed. Without a measurable effect to peak flow, the proposed action would also have no measurable effect on channel geometry. In addition, 92 percent the proposed project is located below the transient snow zone elevation and would have no potential to impact the amount or timing of snow-melt runoff.

3. Cumulative Effects

Several studies have shown that the first rains in the fall have the most increase in peak flow from pre-logging conditions (Rothacher 1973; Harr et al. 1975; Harr et al. 1979; Ziemer 1981). These fall rainstorms are generally small and geomorphically inconsequential (Harr 1976). Large peak flows occur in mid-winter after soil moisture deficits are satisfied in both logged and unlogged watersheds (Ziemer and Lisle, 1998, pg.60). Increases in peak or storm flows in winter and spring can alter channel morphology by flushing smaller substrate, causing the channel to downcut and increase stream bank failures.

Studies on increased peak flows are varied in their findings on how much increase in flow would result from a given amount of timber harvest. Most studies agree that the effects of harvest treatment decreases as the flow event size increases (Rothacher, 1971,

pg. 51; Rothacher 1973, pg. 10; Wright et al., 1990; Moore and Wondzell, 2005) and is not detectable for flows with a two year return interval or greater (Harr, et al., 1975, pg. 443; Ziemer, 1981, pg.915; Thomas and Megahan, 1998, pg. 3402; Thomas and Megahan, 2001, pg. 181). At the drainage scale (seventh-field HUC), there may be short- and long-term increases in peak flows of small (less than two year return interval) storm events; this effect would decrease over time. As small streams form larger drainage networks, the ability of individual small watersheds to affect streamflow decreases (Garbrecht, 1991). As a result, peak flow increases following harvesting at the drainage level are likely to be undetectable further downstream.

Road densities and condition within the Elk Creek Watershed would remain the same into the reasonably foreseeable future. At present, the road densities are not sufficient to cause a measurable increase in peak flows (pgs. 36-37).

"No-harvest" buffers would be established on all streams adjacent to the proposed units. These "no-harvest" buffers would prevent disturbance to stream channels and stream banks. They would also intercept surface run-off and prevent sedimentation of streams, such that there would be no cumulative degradation of water quality in the Elk Creek Watershed.

F. Aquatic Habitat & Fisheries

1. Aquatic Habitat

a) Affected Environment

Aquatic Habitat Inventory surveys were conducted by the Oregon Department of Fish and Wildlife (ODFW) between 1991 and 1997 on fish-bearing streams in the Elk Creek Watershed. This inventory was used in addition to recent site surveys by Swiftwater Field Office fisheries biologists in establishing the baseline condition of habitat in the watershed.

Key factors defining the quality of aquatic habitat are temperature (previously discussed in hydrology section; pgs. 34-35) substrate/sediment, large woody debris, pool quality, and habitat access.

(1) Substrate/sediment

The availability of spawning substrate is an important factor in fish productivity. Gravel and small cobble substrate (Bell, 1986) relatively free from embedded fine sediment is ideal spawning substrate for resident and anadromous salmonids. In reaches where spawning substrate is present, the quality of those spawning sites may be limited where fines exceed 20 percent (Waters, 1995). During incubation of eggs and alevin emergence, fine sediment deposition can fill interstitial spaces in the spawning substrate reducing oxygen flow to eggs, smothering eggs, or forming an armor layer preventing emergence of alevin (Waters, 1995)

Habitat surveys within the project area in the Elk Creek Watershed indicate an average fine sediment composition of 30 percent. When compared to the benchmarks for aquatic habitat conditions set by ODFW (Foster et al. 2001), this is considered to be in "fair" condition.

(2) Large Woody Debris

Large woody debris is important to the formation of deep scour pools and the retention of gravel substrate (Bilby and Ward, 1989). These pool and off-channel habitats are important to salmonids, as discussed in the Pool Quality section.

Habitat forming large woody debris pieces range from large logs (exceeding 24 inches) to small hardwoods. ODFW considers stream reaches to be in an "excellent" condition when they contain more than 30 cubic meters of large wood per 100 meters and three "key pieces" per 100 meters. A "key piece" is at least 33 feet long and 24 inches in diameter.

High gradient headwater intermittent and perennial streams adjacent to the proposed units generally had high volumes and numbers of pieces of large woody debris, ranging from large logs greater than 24 inches to small hardwoods. Streams surveyed within the project area averaged 7.0 cubic meters of large woody debris and 0.3 key pieces per 100 meters. This results in an ODFW benchmark rating of "poor" for wood volume and key pieces.

(3) Pool Quality

Pools are important habitat features for salmonids, especially for juvenile rearing. Pools are cool water sources during low flow months and off-channel pools provide refuge during high flow events (Swanston, 1991). Salmonids are found in greater densities (Roni 2002) and larger sizes (Rosenfeld et al. 2000) in deep pool habitats. The Oregon Department of Fish and Wildlife considers stream reaches with more than 35 percent pool by area and having more than 2.5 "complex pools" per kilometer as "good". A "complex pool" is one that has a large wood component.

Streams surveyed within the project area averaged 26 percent pool habitat by area and 0 complex pools per kilometer. This results in an ODFW benchmark rating of "fair" for pool area and "poor" for complex pools.

(4) Habitat Access

Access to the streams by migrating fish can be restricted by culvert outlet jumps greater than six inches and culvert outlet pools less than 1.5 times the height of the jump. While adult fish are capable of jumping more than four feet juvenile fish are often prevented from upstream migration by jumps of more than six inches. Culverts with slopes exceeding 0.5 percent can also limit passage by increasing water velocities inside the culvert (OWEB, 1997). There are no culverts in the project area that are barriers to adult or juvenile anadromous fish.

b) No Action Alternative

Under this alternative, overstocked mid-seral stands would not be thinned to promote conifer growth. Woody debris from these mid-seral stands would be available for recruitment to stream channels, but would be from the small tree size classes typical of the stand (e.g. 10-14 inches diameter). Small woody material can create pool habitat in smaller stream systems (Bilby and Ward 1989), however, smaller diameter wood does not persist in stream channels because it decays more quickly (Naiman et al., 2002) and is more easily flushed from the system than larger diameter wood (Keim et al., 2002). As a result, the quality of pool habitat would not improve and spawning substrate would not be captured as well as if larger woody debris were available. This trend would continue for several decades until a natural event, such as an understory fire, reduced stand densities and allowed larger trees to develop.

Additionally, fish and aquatic habitat downstream from the project area would continue to be cumulatively affected by actions on privately-managed forest and agricultural lands. The results would likely include fewer trees along streams, run-off from fields and pastures, and run-off from natural surface roads and tractor skid trails on private forest lands.

c) Proposed Action Alternative

Thinning would occur in the uplands and density management would occur more than 20 feet from the edge of the stream channel. Buffers varying from 20 to 60 feet wide on intermittent streams and 100 feet wide on fish-bearing streams (pgs. 7 and 12) would retain trees to provide shade and protect stream temperature (see hydrology section, pgs. 34-35).

(1) <u>Substrate/sediment</u>

Stream substrate would not be affected by the proposed commercial thinning and density management. A buffer width of 20 feet or greater would provide root strength sufficient to maintain bank stability (FEMAT, 1993), protect stream banks, and prevent additional sediment from entering streams and accumulating in stream gravels. Overland sediment transportation by rain splash or sheet erosion would be unlikely because non-compacted forest soils in the Pacific Northwest have very high infiltration capacities (Dietrich et al. 1982). The vegetated, non-compacted "no-harvest" buffers would provide sufficient filtering capacity such that sediment generated by commercial thinning and density management operations would be intercepted and captured before it could reach stream channels.

The majority of potential effects would be associated with road related activities, which can contribute sediment to streams and affect substrate (Furniss et al. 1991). These activities would include: construction of new roads; renovation of existing system roads; re-alignment of existing roads; timber hauling; and road decommissioning.

Road reconstruction, renovation, and re-alignment would occur away from streams to the greatest extent practicable, and would take place on stable side slopes or ridge tops to access units. Project design features for new road construction within Riparian Reserves (pgs. 12-14) would prevent adverse impacts to fish-bearing streams. New stream crossings would be located on non-fish bearing streams, consequently, they would not be barriers to fish migration. Spur #1 and Spur #5 in Adams Apple would cross streams and be connected to the existing drainage network. Road construction and timber hauling on these spurs would be restricted to the dry season, resulting in a negligible amount of sediment entering the stream (pgs. 35-36). There is sufficient woody material in these streams that the negligible amount of sediment created would be filtered out before reaching fish-bearing streams.

As stated previously in the hydrology discussion (pgs. 35-36), the amount of sediment contributed from stream crossings during the first seasonal rains would be negligible when compared to the amount of sediment contributed from ephemeral channel beds and stream banks. Steep-gradient intermittent stream channels, such as those in the project area, generally have storage capacity sufficient to retain small amounts of sediment that may be generated locally (Montgomery and Buffington, 1997). Most stream reaches along the proposed haul routes possess large woody debris sufficient to trap and store sediment in headwater reaches. To further mitigate the potential for sediment delivery from road surfaces along the haul route, maintenance on existing roads would fix drainage and erosion problems and natural surface roads would be left in a condition that is resistant to erosion and sedimentation after completion of the proposed project (pgs. 12-14). Consequently, the risk for sediment to affect aquatic habitat in the project area would be negligible and there would be no cumulative effects at the fifth-field watershed scale.

(2) Large Woody Debris

Streams adjacent to the proposed units would continue to recruit large woody debris from the "no-harvest" buffers. Although there would be fewer trees available for recruitment in the treated portions of the Riparian Reserves, the remaining trees would be larger and continue to provide a source for the recruitment of woody debris. Most woody debris comes from within one site potential tree height of the stream channel (Naiman et al. 2002), but large woody debris can also be recruited from more than 90 meters away in steep confined channels (Reeves et al. 2003). As a result of density management, large woody debris recruitment would increase due to the accelerated development of larger trees close to the stream channel.

(3) Pool Quality

The availability of pool habitat would remain unchanged by the proposed commercial thinning and density management activities since no existing large wood would be removed from streams. Thinning in upland stands outside of

large wood source areas (e.g. more than 90 meters from streams) would not affect future wood recruitment and, hence, would not affect pool quality or frequency.

Density management in Riparian Reserves would generally remove smaller trees from the suppressed and intermediate canopy layers, while reserving co-dominant and dominant trees. The proposed action would reduce the amount of small woody debris available for pool formation in the short-term but would increase the amount of large woody debris available for the formation of persistent pool habitat in the long-term. Density management in Riparian Reserves would not impact on aquatic organisms.

(4) Habitat Access

Fish passage and access to spawning and rearing habitat would be unaffected under the proposed action. Proposed road construction would be located on or near ridge tops, away from fish-bearing portions of streams, and would not involve the construction of new stream crossings across fish-bearing streams.

2. Fish Populations

a) Affected Environment

(1) Proposed Federally Threatened Species

On February 4, 2008 NOAA Fisheries announced it is listing the Oregon coast coho salmon evolutionary significant unit (ESU) as threatened under the Endangered Species Act. This includes the designation of critical habitat. The BLM is required to consult with NOAA Fisheries on any action that the BLM determines "may affect" the Oregon coast coho salmon. The Oregon Coast coho is also considered a Bureau Sensitive species.

The Swiftwater Field Office is in the process of consulting with NOAA Fisheries regarding the effects of the proposed Elkhead project on the Oregon Coast coho salmon. The results of this consultation would be disclosed in the Decision Records for the individual Elkhead timber sales.

(2) Bureau Sensitive & Strategic Species

Bureau Sensitive fish species and their habitats are managed by the BLM so as not to contribute to the need to list under the Endangered Species Act, and to recover the species (ROD/RMP, pg. 41). Bureau Sensitive fish species in the Elk Creek Watershed include the Oregon Coast coho salmon (discussed above) chum salmon (*Oncorhynchus keta*), Oregon Coast steelhead (*Oncorhynchus mykiss*), and the Umpqua chub (*Oregonichthys kalawatseti*). Oregon Coast steelhead are present in the project area. The Umpqua chub has been documented in the watershed but not in the project area. There are no independent populations of chum salmon in the Elk Creek Watershed.

b) No Action Alternative

Generally, fish species and populations would remain unaffected. Fish would continue to utilize existing spawning and rearing habitat that is lacking in large woody debris and complex pool habitat. The riparian habitat adjacent to the aquatic environment would continue to develop slowly in the absence of thinning or density management, contributing small coarse woody debris until larger trees develop. Aquatic habitat conditions could change over time, as discussed in the effects analysis under aquatic habitat (pgs. 38-39).

c) Proposed Action Alternative

No effects to fish species, including the Oregon Coast coho salmon, adjacent to or below the project area would be expected because the aquatic habitat would not be affected by the proposed action (as discussed on pgs. 40-42). Commercial thinning and density management would not result in fine sediment reaching stream channels because uncompacted soils in the "no-harvest" buffers between the units and adjacent to stream channels would be sufficient to filter out sediment from runoff.

In the long-term, fish and other aquatic species would benefit from the proposed action because of the increased availability of large woody debris for recruitment into stream channels that would lead to the development of persistent, pool habitat (pgs. 41-42).

3. Cumulative Effects

Sediment regime, stream temperature, water chemistry, peak flows, and water yield together influence fish habitat or aquatic species. Since stream temperature and water chemistry would not be affected by the proposed action (pgs. 34-36); and changes in sediment would be negligible (pgs. 35-36), fish habitat and aquatic species would not be affected.

Changes in peak flows and water yield from the project do not have the capacity to alter channel morphology (pg. 37) and effects would be indistinguishable from background levels at the fish-bearing streams downstream. Therefore, fish habitat and aquatic species populations would not be incrementally affected by the proposed action at the project level nor would they add to the cumulative effects at the fifth-field watershed.

4. Essential Fish Habitat

a) Affected Environment

Essential Fish Habitat (EFH) is designated for fish species of commercial importance by the Magnuson-Stevens Fishery Conservation and Management Act of 1996 (Federal Register 2002, Vol. 67/No. 12). Streams and habitat that are currently or were historically accessible to Chinook and coho salmon are considered EFH. The distance from the proposed units to the nearest EFH is presented in Table F-2 in Appendix F.

b) No Action Alternative

Essential Fish Habitat would generally remain unaffected for the same reasons as discussed previously in the effects to aquatic habitat (pgs. 40-42). Large woody debris sources would continue to provide of smaller diameter material until circumstances change and larger trees develop. Water quality and substrate characteristics would either remain unchanged or deteriorate due to existing stream crossings that are in a poor condition and have an increasing likelihood of failing. Under the No Action Alternative there are no reasonably foreseeable mechanisms that would affect channel geometry, fish passage, and forage species.

c) Proposed Action Alternative

The following components were analyzed to assess the effects of the proposed project on EFH. Many of the resources have been discussed in previous sections of the EA and are referenced in those instances.

- *Water quality/Water quantity* – There would be no affect to water quality and/or quantity as a result of proposed commercial thinning and density management (Hydrology, pgs. 34-37).
- *Substrate characteristics* – The risk for sediment to affect aquatic habitat (i.e. substrate characteristics) in the project area would be negligible (Aquatic Habitat & Fisheries, pgs. 40-42).
- *Large woody debris (LWD) within the channel and LWD source areas* – No existing LWD would be removed from stream channels and there would be an increased availability of LWD for recruitment in the long-term from LWD source areas (Aquatic Habitat & Fisheries, pg. 41).
- *Channel geometry* – There would be no measurable increase in stream flow that would affect channel geometry (Hydrology, pg. 37).
- *Fish passage* – Fish passage and access to spawning and rearing habitat would be unaffected under the proposed action (Aquatic Habitat & Fisheries, pg. 42).
- *Forage species (aquatic and terrestrial invertebrates)* – Prey species for fish would be unaffected as riparian vegetation within the "no-harvest" buffers would continue to provide organic material and terrestrial invertebrates, which aquatic invertebrates use for food. In addition, aquatic invertebrate populations would be unaffected by sediment since effects to aquatic habitat are negligible (Aquatic Habitat & Fisheries, pgs. 40-42).

Because the proposed action would not affect the components of EFH, the action "W*ill Not Adversely Affect*" EFH for coho or Chinook salmon in the Elk Creek Watershed. Without any mechanisms for an adverse effect to EFH, no mitigation measures are proposed.

5. Aquatic Conservation Strategy

The BLM assessed the effect of the proposed project on the Aquatic Conservation Strategy (ACS) objectives at both the site and watershed scale (assessment included in Appendix G). The proposed project would not retard or prevent attainment of ACS objectives at the site or watershed scales. Instead, the proposed action would speed

attainment of these objectives. Therefore, this action is consistent with the ACS, and its objectives at the site and watershed scales.

G. Botany

1. Special Status Species

a) Affected Environment

The project area is within the known range of Kincaid's Lupine (*Lupinus sulphureus* ssp. *kincaidii*), a Federally Threatened plant. Kincaid's Lupine habitat occurs in the project area. The project area is also within the known range of the Federally Endangered popcorn flower (*Plagiobothrys hirtus)*; however, habitat for the popcorn flower is not present in the project area.

Field surveys were conducted in the spring and summer of 2007 to comply with Departmental Manual 6840 directives and the Special Status Plant program (ROD/RMP, pg. 40). There were no Special Status Plants (i.e. Kincaid's lupine, popcorn flower, Bureau Sensitive Species, or Bureau Strategic Species) detected within the project area (refer to Appendix H).

Since there are no known sites, Special Status Plants will not be discussed further.

2. Noxious Weeds

a) Affected Environment

There are noxious weeds infestations scattered throughout the project area. The severity of infestations ranges from low to high. The noxious weeds are generally located within the road prism or on previously used landings in the project area (Table 10). The primary species of noxious weeds in the project area include: English hawthorn (*Crataegus monogyna*), Scotch broom (*Cytisus scoparius*), Himalayan blackberry (*Rubus discolor*), and Medusa-head rye (*Taeniatherum caput-medusae*).

Table 10. Noxious Weed Infestations.

Weed Species	**Area of Noxious Weed Infestation** (acres)				
	Adams Apple	Cedar Shingle	Lurch	Slow Lane	**Total**
English hawthorn	0.1	trace	0.1	0.1	**0.3**
Scotch broom	0.5	1.3	5.0	0.2	**7.0**
Himalayan blackberry	0.3	9.0	trace	trace	**9.3**
Medusa-head rye	0	0	1.0	0	**1.0**
Total	**0.9**	**10.3**	**6.1**	**0.3**	**17.6**

Several other species of noxious weeds are also present, primarily on roadsides, including: Meadow knapweed (*Centaurea pratensis*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), field bindweed (*Convolvulus arvensis*), common St. John's wort (*Hypericum perforatum*), pennyroyal (*Mentha pulegium*), evergreen blackberry

(*Rubus laciniatus*), and tansy ragwort *(Senecio jacobea*).

Noxious weeds were treated in the project area in 2007. Past treatments were performed by manual removal and/or applying an approved herbicide.

b) No Action Alternative

Noxious weeds within the project area would be managed as part of the Roseburg District's Noxious Weed Program and would be monitored and evaluated for treatment at regular intervals (USDI 1995a). Control of weed populations is planned for treatment in 2009 by applying approved herbicides or manual removal.

Over time the distribution and abundance of noxious weeds in the project area would decline. Repeated treatments of existing noxious weed populations, limited opportunities (e.g. disturbed soil) for establishment of new infestations, and ongoing competition from native vegetation would reduce the noxious weed numbers in the project area.

c) Proposed Action Alternative

Soil disturbance associated with commercial thinning and density management (e.g. ground-based yarding, cable-yarding corridors, spur construction, and slash pile burning) would create areas of exposed mineral soil, which would serve as habitat for noxious weeds. New weed infestations on exposed mineral soil would be expected while there are openings in the canopy. As the conifer canopy closes, noxious weeds would decrease in abundance as native understory species eventually overtop and out-compete weeds for sunlight, soil moisture, and soil nutrients. Project design features that require logging and construction equipment to be clean and free of weed seed prior to entry onto BLM lands would help control and/or prevent the spread of noxious weeds in the project area (pg. 15).

Scotch broom is known to have long lived seeds, which can remain viable up to 80 years. Existing infestations of Scotch broom would be treated prior to commercial thinning and density management operations in order to limit the development and spread of seeds. As under the No Action Alternative, noxious weeds would be monitored, evaluated, and treated under the Roseburg District's Noxious Weed Program.

Chapter 4. Contacts, Consultations, and Preparers

A. Agencies, Organizations, and Persons Consulted

The Agency is required by law to consult with certain federal and state agencies (40 CFR 1502.25).

1. **Threatened and Endangered (T&E) Species Section 7 Consultation -** The Endangered Species Act of 1973 (ESA) requires consultation to ensure that any action that an Agency authorizes, funds or carries out is not likely to jeopardize the existence of any listed species or destroy or adversely modify critical habitat.

a. A Letter of Concurrence was received from the US Fish and Wildlife Service (USFWS) (*Reinitiation of consultation on Roseburg District Bureau of Land Management FY 2005-2008 Management Activities* [Ref. # 1-15-05-I-0511]) dated June 24, 2005 which concurred with the Roseburg District's conclusion that the proposed commercial thinning or density management activities *are not likely to adversely affect* northern spotted owls and *are not likely to adversely affect* the northern spotted owl as a result of disturbance (pgs. 19-20).

b. The Swiftwater Field Office is in the process of consulting with NOAA Fisheries regarding the effects of the proposed Elkhead project on the Oregon Coast coho salmon. The Adams Apple, Slow Lane, and Lurch timber sales were found to have no effect on the Oregon Coast coho or their critical habitat. The Cedar Shingle timber sale was found to be a "not likely to adversely affect (NLAA)" on the Oregon Coast coho salmon and its critical habitat. A Biological Analysis (BA) for the Cedar Shingle sale would be submitted to NOAA Fisheries at the Level One meeting in May, 2008. The results of this consultation would be disclosed in the Decision Records for the Cedar Shingle Commercial Thinning and Density Management.

2. **Cultural Resources Section 106 Compliance –** Compliance with Section 106 of the National Historic Preservation Act under the guidance of the 1997 National Programmatic Agreement and the 1998 Oregon Protocol has been documented with Project Tracking Forms dated June 5, 2007, October 18, 2007, and January 29, 2008. A "No Effect" determination was made. It has been determined that there would be no effect to scientific, cultural, or historical resources.

B. Public Notification

1. A scoping letter was sent (August 24, 2007) to 31 **adjacent landowners**, **landowners along the proposed haul route**, and interested members of the **general public**. Comments were accepted until September 25, 2007 and six comments were received. Comments received typically concerned the general design of the proposed project. The comments were considered, although not specifically for each comment, in the design of the proposed project.

2. Notification was provided (September 28, 2007) to affected **Tribal Governments** (Confederated Tribes of Grand Ronde, Confederated Tribes of Siletz, Cow Creek Band of Umpqua Tribe of Indians, and the Komemma Cultural Protection Association). No comments were received.

3. The **general public** was also notified via the *Roseburg District Planning Updates* (i.e. Summer 2007, Fall 2007, and Winter 2007) which were sent to approximately 150 addressees. These addressees consist of members of the public that have expressed interest in Roseburg District BLM projects. Comments were received requesting additional information about the project.

4. This EA, and its associated documents, would be provided to certain **State, County and local government** offices including: USFWS, NOAA Fisheries, Oregon Department of Environmental Quality, and the Oregon Department of Fish and Wildlife. If the decision is made to implement this project, it will be sent to the aforementioned State, County, and local government offices.

5. A 30-day **public comment period** would be established for review of this EA. A Notice of Availability would be published in *The News-Review*. The public comment period will begin with publication of the notice published in *The News-Review* on March 18, 2008 and end close of business April 17, 2008. Comments must be received during this period to be considered for the subsequent decision. This EA and its associated documents will be sent to all parties who request them. If the decision is made to implement this project, a notice will be published in *The News-Review* and notification sent to all parties who request them.

C. List of Preparers

Core Team

Bruce Baumann	Project Lead / Layout
Al James	Management Representative
Jeff McEnroe	Fisheries
Dan Cressy	Soils
Dan Dammann	Hydrology
Krisann Kosel	Fuels Management
Elizabeth Gayner	Wildlife
Rex McGraw	Planning & Environmental Coordinator
Trixy Moser	Silviculture
Terrie King	Engineering
Julie Knurowski	Botany/Weeds

Expanded Team (Consulted)

Isaac Barner	Cultural Resources
Erik Taylor	Recreation / Visual Resource Management

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Appendix A. Critical Elements of the Human Environment

Table A-1. Summary of Critical Elements of the Human Environment.

Element	Relevant Authority	Environmental Effect
Air Quality	The Clean Air Act (as amended)	Impacts to areas designated for attainment of federal Clean Air standards is not considered likely since the units would be burned under parameters of the Oregon Smoke Management Plan which prescribes smoke emission reduction measures (e.g., rapid ignition and aggressive mop-up) and directs burning under conditions when smoke would rise high in the atmosphere and be transported away from designated areas.
Areas of Critical Environmental Concern	Federal Land Policy and Management Act of 1976 (FLPMA)	**None** - Project area is not within or near a designated or candidate ACEC.
Cultural Resources	National Historic Preservation Act of 1966 (as amended)	**"No Effect"** – A determination of no effect to cultural resources was made since no cultural resources were identified (EA, pgs. 16, 47).
Environmental Justice	E.O. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Feb. 02, 1994). ***This EO requires that agencies insure that adverse health or environmental effects do not disproportionately affect minority or low-income populations.***	**None** - The proposed project areas are not known to be used by, or disproportionately used by, Native Americans, minorities or low-income populations for specific cultural activities, or at greater rates than the general population. According to 2004 U.S. Census Bureau data approximately six percent of the population of Douglas County was classified as minority status. It is estimated that approximately 14% of the county is below the poverty level (2003 U.S. Census Bureau data).
Farm Lands (prime or unique)	Surface Mining Control and Reclamation Act of 1977. ***This act seeks to identify and restore prime farmlands and other unique federal land characteristics.***	**None** - No prime or unique farm land would be affected. (PRMP, pgs. 1-7).
Floodplains	E.O. 11988, as amended, Floodplain Management (May 24, 1977). ***This EO requires agencies to determine if a proposed action will occur in a floodplain and that the action will avoid adverse impacts associated with occupancy and modification of floodplains and avoids floodplain development.***	**None** - Project is not within 100 yr. floodplain.

Element	Relevant Authority	Environmental Effect
Invasive and Nonnative Species	Lacey Act, as amended; Federal Noxious Weed Act of 1974 as amended; Endangered Species Act of 1973, as amended; and EO 13112 on Invasive Species dated Feb. 03, 1999. ***This EO requires the prevention of introduction of invasive species and to provide for their control to minimize their economic, ecological, and human health impacts.***	Infestations of noxious weeds are being treated under the Roseburg District Integrated Weed Control Plan (USDI, 1995a). Project design features are included in the proposed action to prevent or control the spread of noxious weeds (EA, pgs. 15, 46).
Native American Religious Concerns	American Indian Religious Freedom Act of 1978. ***This act seeks to protect and preserve for American Indians the right of exercise of traditional religion including access to religious sites.***	No concerns were noted as the result of public and tribal contact including impacts to Indian Trust Resources.
Threatened or Endangered Species	Endangered Species Act of 1973 (as amended); The Pacific Coast Recovery Plan for the American Peregrine Falcon (1982); Columbian White-tailed Deer Recovery Plan (1983); Recovery Plan for the Pacific Bald Eagle (1986); and Recovery Plan for the Marbled Murrelet (1997).	**Botany** – Surveys were performed in 2007. Kincaid's Lupine (federally threatened) and the popcorn flower (federally endangered) were not detected (EA, pg. 45). **Wildlife** – The USFWS concurred with the Roseburg District's determination that the proposed action is *not likely to adversely affect* the northern spotted owl (EA, pgs. 23, 47) or designated critical habitat for the northern spotted owl (EA, pgs. 23, 47). **Fisheries** – The Swiftwater Field Office is in the process of consulting with NOAA Fisheries regarding the effects of the proposed Elkhead project on the Oregon Coast coho salmon. The Adams Apple, Slow Lane, and Lurch timber sales were found to have no effect on the Oregon Coast coho or its critical habitat. The Cedar Shingle timber sale was found to "not likely adversely affect (NLAA)" the Oregon Coast coho salmon and its critical habitat. The results of this consultation would be disclosed in the Decision Records for the Cedar Shingle Commercial Thinning and Density Management.
Wastes, Hazardous or Solid	Resource Conservation and Recovery Act of 1976; Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (as amended). ***These laws regulate hazardous waste that endangers public health or the environment.***	**None** - Applicable HazMat policies would be in effect.

Element	Relevant Authority	Environmental Effect
Water Quality, Drinking / Ground	Clean Water Act of 1987; Safe Drinking Water Act Amendments of 1996; EO 12088, Federal compliance with pollution control standards (Oct. 13, 1978); EO 12589 on Superfund implementation (Feb. 23, 1987); and EO 12372 Intergovernmental review of federal programs (July 14, 1982).	**None** - Project is not in a municipal watershed covered under a Memorandum of Understanding. The Adams Apple timber sale lies within the drinking water source area for the City of Yoncalla. Project Design Features discussed on pages 12-16 would prevent impacts to the City of Yoncalla's source water. No domestic water users have been identified within one mile downstream from the project area.
Wetlands/ Riparian Zones	E.O. 11990, Protection of Wetlands (May 24, 1977). ***This EO requires federal agencies to avoid destruction or modifications of wetlands and to avoid undertaking or providing assistance for new construction located in wetlands.***	**None** - "The selected alternative [of the FEIS] complies with [E.O. 11990]..."(ROD p. 51, para.7).
Wild and Scenic Rivers	Wild and Scenic Rivers Act of 1968 (as amended); The North Umpqua Wild and Scenic River Plan (July 1992).	**None** - Project is not within the North Umpqua Scenic River corridor.
Wilderness	Federal Land Policy and Management Act of 1976; Wilderness Act of 1964.	**None** - "There are no lands in the Roseburg District which are eligible as Wilderness Study Areas." (ROD/RMP pg. 54).

Table A-2. Other Resources Considered.

Resource	Environmental Effect / Concerns
Minerals	**None** - Project has no mining claims or leases of record.
Recreation	**Minimal short-term impacts** – Temporary road closures that could occur due to active haul/logging would reduce the dispersed recreational activities but would not have long term impacts on the recreational use of the project area once the treatment has been completed.
Visual Resources	**None** - The VRM classification for this area is IV. The basic elements of form, line, color and texture as required by the ROD/RMP (pg. 52) would be maintained under the proposed action.

Appendix B. Northern Spotted Owl Habitat

Project: Elkhead Commercial Thinning & Density Management
Prepared By: Elizabeth Gayner
Date: September 10, 2007
SSSP List Date: July 26, 2007 (IM-OR-2007-072)

Table B-1. Northern Spotted Owl Habitat Modified or Removed within the Project Units and Currently Present in the Elk Creek/Umpqua River Fifth-Field Watershed.

Project Area							Fifth-Field Watershed[4]		
Project Unit	Suitable NRF Habitat[1] (acres)		Dispersal Habitat[2] (acres)			Critical Habitat[3] (acres)	Suitable Habitat[4] (acres)	Dispersal Habitat[2,5] (acres)	Critical Habitat[3] (acres)
			Modified						
	Modified	Removed	CT	DM	Removed				
Adams Apple									
19A	0	0	*218.0*	*115.0*	0	*0*			
Cedar Shingle									
3A	0	0	*68.2*	*36.4*	0	*104.6*			
3B	0	0	*8.0*	*13.0*	0	*21.0*			
3C	0	0	*49.8*	*33.0*	0	*82.8*			
3D	0	0	*16.8*	*19.0*	0	*35.8*			
3E	0	0	*4.0*	*14.0*	0	*18.0*			
35A	0	0	*170.5*	*56.0*	0	*226.5*			
35B	0	0	*21.8*	*4.1*	0	*25.9*	17,700	24,800	38,400
Lurch									
7A	0	0	*75.5*	*37.6*	0	***0***			
13A	0	0	*5.2*	*6.0*	0	***0***			
13B	0	0	*21.0*	*8.0*	0	***0***			
Slow Lane									
15A	0	0	***21.3***	***3.0***	0	***24.3***			
23A	0	0	***30.3***	***7.0***	0	***37.3***			
23B	0	0	***51.8***	***33.2***	0	***85.0***			
TOTALS	*0*	*0*	*762.2*	*385.3*	*0*	*661.2*			

1. **NRF- N**esting, **R**oosting, and **F**oraging Habitat on federal lands. For analysis purposes is considered stands ≥ 80 years of age based on FOI (0 < DK ≤ 1927).
2. Suitable Dispersal Habitat on federal lands, for analysis purposes, is considered stands aged 40 to 79 years based on FOI (1927 < DK ≤ 1967).
3. Designated Critical Habitat includes habitat that supports Northern spotted owl nesting, roosting, foraging, and dispersal activities on federal lands. Critical Habitat also includes habitat that is currently unsuitable, but has the capability of becoming suitable habitat in the future.
4. Information obtained from Appendix Table B-17 in the Biological Opinion for the Roseburg District Programmatic Activities FY 2005-2008 (1-15-05-F-0512 [August 29, 2005]). The primary expectation for private lands is their contribution to demographic support [dispersal habitat] and/or connectivity with other lands (pg. 40, Ref. # 1-15-05-F-0512 [Aug. 29, 2005]).
5. Suitable NRF habitat also functions as dispersal habitat and is included in the total dispersal acres.

Table B-2. Direct impacts to Northern Spotted Owl habitats under the Action Alternative (Commercial Thinning/Density Management) within the Cascades Provincial Home Range (1.2 miles = 2,895 acres) of Known Northern Spotted Owl Sites. The acres (federal land only) of available habitat types within each home range are provided in the table.

Northern Spotted Owl		**Adams Creek**	**Lane Creek**	**Harness Mountain**	
Site Identification Number (id #s) [1]		**3269O**	**2102O**	**1358O**	**1358A**
Known Owl Activity Center (KOAC) (federal acres)		49.7	111.6	91.8	None
Total Acres of Federal Lands within Home Range		499 (17%)	1,142 (39%)	1,018 (35%)	890 (31%)
Critical Habitat (acres) (percent of home range in designated Critical Habitat)		0	1,027 (35%)	1,018 (35%)	863 (30%)
Critical Habitat degraded (acres)		0	136 (13%)	335 (33%)	123.6 (14%)
Suitable NRF (federal acres) (0 < stand birth date ≤ 1925) (acres)	**pre-harvest**	57 (11%)	273 (24%)	140 (14%)	160 (18%)
	post-harvest	57 (11%)	273 (24%)	140 (14%)	160 (18%)
Dispersal Habitat (federal acres) (0< stand birth date ≤ 1966) (acres)	**pre-harvest**	356 (71%)	703 (62%)	685 (67%)	612 (69%)
	post-harvest	356 (71%)	703 (62%)	685 (67%)	612 (69%)
Dispersal Habitat degraded (federal acres) (percent dispersal degraded)[2]		282 (79%)	161 (23%)	335 (5%)	123.6 (20%)

Northern Spotted Owl		**Mill Creek MS[1,3]**	
Site Identification Number (id #s)		**3900**O, **A**-C	
Known Owl Activity Center (KOAC) (federal acres)		None	
Total Acres of Federal Lands within Home Range		1,343 (46%)	
Critical Habitat (acres) (percent of home range in designated Critical Habitat)		1,343 (46%)	
Critical Habitat degraded (acres)		100 (7%)	
Suitable NRF (federal acres) (0 < stand birth date ≤ 1925) (acres)	**pre-harvest**	455 (34%)	
	post-harvest	455 (34%)	
Dispersal Habitat (federal acres) (0< stand birth date ≤ 1966) (acres)	**pre-harvest**	937 (69%)	
	post-harvest	937 (69%)	
Dispersal Habitat degraded (federal acres) (percent dispersal degraded)[2]		100 (11%)	

1. If activity centers occurred within the same contiguous stand, the activity centers were analyzed together as one site using the activity center that best represented the stand (indicated in bold) for this analysis.
2. Percentage degraded is calculated using total acres of dispersal habitat (suitable NRF dispersal-only habitat).
3. Activity centers 3900O, B, and C are located on private lands adjacent to the activity center located on BLM land.

Appendix C. Bureau Sensitive & Bureau Strategic Wildlife Species.

Project: Elkhead Commercial Thinning & Density Management
Prepared By: Elizabeth Gayner
Date: September 10, 2007
SSSP List Date: July 26, 2007 (IM-OR-2007-072)

The following tables include those species which are documented or suspected to occur within the Roseburg District BLM. Those Bureau Sensitive or Bureau Strategic species which are suspected or documented to occur within the project area are detailed in **Appendix D: Wildlife Summary** and may be further discussed in the body of the EA as appropriate.

Bureau Sensitive Species. BLM districts are responsible to assess and review the effects of a proposed action on *Bureau Sensitive* species. To comply with Bureau policy, Districts may use one or more of the following techniques:

a. Evaluation of species-habitat associations and presence of potential habitat.
b. Application of conservation strategies, plans, and other formalized conservation mechanisms.
c. Review of existing survey records, inventories, and spatial data.
d. Utilization of professional research and literature and other technology transfer methods.
e. Use of expertise, both internal and external, that is based on documented, substantiated professional rationale.
f. Complete pre-project survey, monitoring, and inventory for species that are based on technically sound and logistically feasible methods while considering staffing and funding constraints.

When Districts determine that additional conservation measures are necessary, options for conservation include, but are not limited to: modifying a project (e.g. timing, placement, and intensity), using buffers to protect sites, or implementing habitat restoration activities (IM-OR-2003-054).

Strategic Species. If sites are located, collect occurrence data and record in corporate database.

Table C-1. Bureau Sensitive & Strategic Wildlife Species.

Species	Status[1]	Present in Project Area?[2]	General Habitat Requirements
BUREAU SENSITIVE			
American Peregrine Falcon *Falco peregrinus anatum*	BS, SE	No Habitat	Cliffs, rock outcrops; open habitats for hunting birds
Bald Eagle *Haleaeetus leucocephalus*	BS, ST	No Known Nest/ Roost Sites	Late successional forests with multi-canopies, generally within two miles of a major water source
Chace Sideband *Monadenia chaceana*	BSO	Out of Range	Rocky, talus habitats in the Klamath Province and southwards
Columbian White Tailed Deer *Odocoileus virginianus leucurus*	BSO, CR	No Habitat	Bottomlands, oak/hardwood forests; cover for fawning
Crater Lake Tightcoil *Pristiloma arcticum crateris*	BSO	No Habitat	Perennially wet areas in late seral forests above 2000ft elevation and east of Interstate-5; seeps, springs, riparian areas
Fisher *Martes pennanti*	BS	Suspected	Structurally complex forests; mature open forests with large live trees, snags, and down wood.
Foothill Yellow-legged Frog *Rana boylii*	BSO, V	No Habitat	Low gradient streams/ponds; gravel/cobble, bedrock pools

Species	Status[1]	Present in Project Area?[2]	General Habitat Requirements
Fringed Myotis *Myotis thysanodes*	BSO, V	Suspected	Late-successional forest features (e.g. snags or trees with deeply furrowed bark, loose bark, cavities), caves, mines, bridges, rock crevices
Green Sideband *Monadenia fidelis beryllica*	BSO	Out of Range	Coast Range, riparian forests at low elevations; deciduous trees & shrubs in wet, undisturbed forest
Harlequin Duck *Histrionicus histrionicus*	BS, U	No Habitat	Mountain Streams in forested areas on west slope of the Cascade Mountains
Lewis' Woodpecker *Melanerpes lewis*	BSO, CR	No Habitat	Open woodland habitat near water; open woodland canopy and large diameter dead/dying trees, snag cavities
Northwestern Pond Turtle *Clemmys marmorata marmorata*	BS, CR	No Habitat	Ponds, low gradient rivers; upland over-wintering habitat, CWD
Oregon Shoulderband *Helminthoglypta hertleini*	BSO	No Habitat	Talus and rocky substrates, grasslands or other open areas with low-lying vegetation
Oregon Vesper Sparrow *Pooecetes gramineus affinis*	BS, CR	No Habitat	Open habitats such as grasslands, meadows, farmlands
Pallid Bat *Antrozous pallidus*	BS, V	No Habitat	Usually rocky outcroppings near open, dry open areas; occasionally near evergreen forests
Purple Martin *Progne subis*	BSO, CR	Suspected	Snags cavities in open habitats (e.g. grasslands, brushlands, open woodlands)
Rotund Lanx *Lanx subrotundata*	BSO	No Habitat	Major rivers and large tributaries with cold, well-aerated water and rocky substrate
Scott's Apatanian Caddisfly *Allomyia scotti*	BSO	Out of Range	High-elevation (>4,000ft), cold streams in the mountainous regions of Oregon
Spotted Tail-dropper *Prophysaon vannattae pardalis*	BSO	Out of Range	Mature conifer forests in the Coast Range; associated with significant deciduous tree/shrub component
Townsend's Big-eared Bat *Corynorhinus townsendii*	BS, CR	Suspected	Late-successional forest features (e.g. snags or trees with deeply furrowed bark, loose bark, cavities), caves, mines, buildings, bridges, tunnels
Western Ridgemussel *Gonidea angulata*	BS	No Habitat	Creeks, rivers, coarse substrates; Umpqua R. and possibly major tribs.
White-Tailed Kite *Elanus leucurus*	BS	Adjacent Habitat	Open grasslands, meadows, emergent wetlands, farmlands, lightly, wooded areas; wooded riparian habitats close to open hunting; tall trees and shrubs
BUREAU STRATEGIC			
Broadwhorl Tightcoil *Pristiloma johnsoni*	Strategic	Out of Range	Moist forest sites, typically with deciduous component; Coast/Cascades in WA, Coast Range in OR, as far south as Lane County
Klamath Tail-Dropper *Prophysaon sp. nov.*	Strategic	Out of Range	Moist, open areas along streams or springs in Ponderosa Pine forests; as far North as Crater Lake
Merlin *Falco columbarius*	Strategic	Suspected	Coniferous forests adjacent to open habitats, along forest edges.
Pristine Springsnail *Pristinicola hemphilli*	Strategic	No Habitat	Shallow, cold, clear springs/seeps; strongly spring-influenced streams, slow-moderate flow; Umpqua R. drainage
Oregon Giant Earthworm *Driloleirus macelfreshi*	Strategic	Suspected	Deep, moist, undisturbed soils of riparian forests.

[1] Status abbreviations: FE--Federal Endangered, FT--Federal Threatened, SE--State Endangered, ST--State Threatened, XC--Former Federal Candidate, CR--ODFW Critical, V--ODFW Vulnerable, P--ODFW Peripheral/Naturally Rare, U--ODFW Undetermined, BS-- Bureau Sensitive in Oregon and Washington, BSO-- Bureau Sensitive in Oregon,

Appendix D. Wildlife Summary

Project: Elkhead Commercial Thinning & Density Management
Prepared By: Elizabeth Gayner
Date: September 10, 2007
SSSP List Date: July 26, 2007 (IM-OR-2007-072)

Table D-1. Summary of Wildlife Effects.

Critical Habitat					Management Concerns			
Species	**Present**	**Concern**	**Critical Habitat Unit(s)** (CHU #)		**Habitat Removal, Modification, or Both?**			**Critical Habitat Affected by Project** (acres)
Marbled Murrelet	No	No	-		-			-
Spotted Owl	Yes	Yes	OR-24		Modification of dispersal-only habitat			661.2
Species	**Within Species Range?**	**Habitat Present?**	**Species Present?[2]**	**Wildlife Concern[1]?**	**Reason for concern or no concern[1]**	**Mitigation Measures**		
						Seasonal Restriction Required?	**Daily Operating Restriction Required?**	**Buffers Required?**
Threatened & Endangered Species								
Canada Lynx	No	No	No	No	Out of species range	No	No	No
Fender's Blue Butterfly	Yes	No	No	No	No suitable habitat	No	No	No
Marbled Murrelet	No	No	No	No	Out of species range	No	No	No
Northern Spotted Owl	Yes	Yes	Yes	Yes	Degradation of Dispersal Habitat	Refer to PDFs	No	No
Bureau Sensitive Species								
American Peregrine Falcon	Yes	No	No	No	No cliffs/ rock outcrops within units	No	No	No
Bald Eagle	Yes	No	No	No	No roost or nest sites	No	No	No
Fisher	Yes	Yes	Suspected	No	No treatment of natal or foraging habitats	No	No	No
Fringed Myotis	Yes	Yes	Suspected	No	No impact to adjacent suitable habitat	No	No	Snag PDFs
Purple Martin	Yes	No	Suspected	No	No measurable impact to foraging \habitat	No	No	No
Townsend's Big-eared Bat	Yes	Yes	Suspected	No	No impact to adjacent suitable habitat	No	No	Snag PDFs
White-tailed Kite	Yes	Yes	Adjacent Habitat	No	No impact to nesting habitat	No	No	No
Bureau Strategic Species								
Merlin	Yes	Yes	Suspected	No	No measurable impact to nesting habitat	No	No	No
Oregon Giant Earthworm	Yes	Yes	Suspected	No	No measurable ground disturbance of deep soils in riparian habitat	No	No	No

[1] Wildlife concerns and rationale are discussed more fully in the body of the EA.

Appendix E. Soils

Project: Elkhead Commercial Thinning & Density Management
Prepared By: Dan Cressy
Date: September 13, 2007

Table E-1. Timber Production Capability Classification (TPCC).

Unit	FGR[1] (acres)	FPR[2] (acres)	FSR[3] (acres)	FGNW[4] (acres)	FPNW[5] (acres)	Category 1[6] (acres)
Lurch 7A	6	1	NA	0	0	NA
Lurch 13A	1	0	NA	0	0	NA
Lurch 13B	0	0	NA	0	0	NA
Lurch Sub-Total	*7*	*1*	*NA*	*0*	*0*	*NA*
Adams Apple 19A	2	0	NA	0	0	NA
Adams Apple Sub-Total	*2*	*0*	*NA*	*0*	*0*	*NA*
Slow Lane 15A	0	0	NA	0	0	NA
Slow Lane 23A	3	0	NA	0	0	NA
Slow Lane 23B	5	0	NA	0	0	NA
Slow Lane Sub-Total	*8*	*0*	*NA*	*0*	*0*	*NA*
Cedar Shingle 3A	3	4	NA	0	0	NA
Cedar Shingle 3B	0	0	NA	0	0	NA
Cedar Shingle 3C	1	0	NA	0	0	NA
Cedar Shingle 3D	1	0	NA	0	0	NA
Cedar Shingle 3E	2	0	NA	0	0	NA
Cedar Shingle 35A	30	20	NA	0	0	NA
Cedar Shingle 35B	0	0	NA	0	0	NA
Cedar Shingle Sub-Total	*37*	*24*	*NA*	*0*	*0*	*NA*
Grand Total	**54**	**25**	**NA**	**0**	**0**	**NA**

[1] **FGR** = soils considered fragile due to slope gradient but suitable for forest management with mitigation for surface erosion and landslides.
[2] **FPR** = soils on moderate slopes that have mildly active slump-earth flow topography and are suitable for forest management with mitigation for slump-earth flow movements.
[3] **FSR** = fragile soils due to moisture deficiencies caused by shallow, rocky soils on but are suitable for timber production with mitigation.
[4] **FGNW** = soils considered fragile due to slope gradient and unsuitable for forest management even with mitigation for surface erosion and landslides; withdrawn from units.
[5] **FPNW** = soils on moderate slopes that have active slump-earth flow topography and are not suitable for forest management because of active movement; withdrawn from units.
[6] **Category 1** = soils that are highly sensitive to broadcast burning due to shallow soil depths, that have A horizons less than 4 inches in depth and/or that are on slopes over 70 percent.

Table E-2. Mass Wasting & Landslides in the Action Area. An analysis of mass wasting events initiating inside the proposed thinning unit was done using aerial photo interpretation covering 1960 to 2004 and field reconnaissance.

Sale Name	# Debris Torrents	# Landslides			
	Large (>0.5 acre)	Small (< 0.1 acre)	Medium (0.1-0.5 acre)	Large (> 0.5 acre)	All
Lurch	0	3	1	0	4 (0.40 acres)
Adams Apple	0	1	0	0	1 (0.10 acres)
Slow Lane	0	1	3	1	5 (1.00 acres)
Cedar Shingle	1	29	16	1	46 (5.80 acres)
Total	**1**	**34**	**20**	**2**	**56 (7.3 acres)**
Probability of occurrence expected within units:					
No Action Alternative	none	low	low	low	low
Action Alternative (Treatment)	low	low-mod	low-mod	low	low
Cumulative Effects	Unchanged[2]	Unchanged[2]	Unchanged[2]	Unchanged[2]	Unchanged[2]

[1] Thirteen of the identified landslides were road-related and 43 were harvest-related.

[2] "Unchanged" indicates that the current conditions and current probabilities of mass wasting or landslide events are expected to be essentially the same at the 6th field watershed scale.

Appendix F. Fisheries

Project: Elkhead Commercial Thinning & Density Management
Prepared By: Jeff McEnroe
Date: March 5, 2008
SSSP List Date: July 26, 2007 (IM-OR-2007-072)

Table F-1. Special Status Fish Species within the Project Area. The project area for fisheries analysis includes the harvest units and associated haul routes where an effect to fisheries may occur.

Species	Present in Project Area?	Source of Detection
PROPOSED FFEDERAL THREATENED		
Oregon Coast Coho Salmon (North of Cape Blanco) *Oncorhynchus kisutch*	Documented	Streamnet 2005 Personal Obs. (McEnroe)
BUREAU SENSITIVE		
Oregon Coast Coho Salmon (North of Cape Blanco) *Oncorhynchus kisutch*	Documented	Streamnet 2005 Personal Obs. (McEnroe)
Umpqua Oregon Chub[1] *Oregonichthys kalawatseti*	Suspected[3]	-
Chum Salmon[2] *Oncorhynchus keta*	Documented	Streamnet 2005
Oregon Coast Steelhead *Oncorhynchus mykiss*	Documented	Streamnet 2005 Personal Obs. (McEnroe)

[1] Umpqua Chub is documented in the watershed but have not been documented in the Project Area
[2] Chum Salmon are occasionally documented crossing over Winchester Dam in small numbers. These fish are thought to be strays and not part of an independent population..

Table F-2. Nearest Location of Special Status Fish Species to the Proposed Timbersales.

Sale	Stream Type	Stream Name	Location (T-R-S)	Distance to Proposed Units (miles)			
				OC Coho Salmon	OC Steelhead	Umpqua Chub	Essential Fish Habitat
Adams Apple	Perennial	Adams Creek	23-4-19	2.6	2.6	Unknown	2.6
Cedar Shingle	Perennial	Elk Creek; Shingle Mill Creek	23-4-35 24-4-3	0.1	0.1	Unknown	0.1
Slow Lane	Perennial	Lane Creek	23-4-23 & 15	0.3	0.3	Unknown	0.3
Lurch	Perennial	Adams Creek	23-5-13 23-4-7 & 17	0.4	0.4	Unknown	0.4

Appendix G. Aquatic Conservation Strategy Assessment

Project: Elkhead Commercial Thinning & Density Management
Prepared By: Jeff McEnroe
Date: September 7, 2007

The Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The ACS must strive to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitats. This approach seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds. (Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl, page B-9).

ACS Components:

(1) Riparian Reserves (ACS Component #1)

Riparian Reserves were established. The ROD/RMP (pg. 24) specifies Riparian Reserve widths equal to the height of two site potential trees on each side of fish-bearing streams and one site-potential tree on each side of perennial or intermittent non-fish bearing streams, wetlands greater than an acre, and constructed ponds and reservoirs. The height of a site-potential tree for the Elk Creek Watershed has been determined to be the equivalent of 200 feet (Elk Creek Watershed Analysis, pg. 2). Approximately 430 acres of this treatment are within Riparian Reserves. One of the objectives of this project is to accelerate the development of late seral characteristics in the Late Successional Reserves and Riparian Reserves.

(2) Key Watersheds (ACS Component #2)

Key Watersheds were established "as refugia . . . for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species [ROD/RMP, pg. 20]." There are no key watersheds within the Elk Creek fifth-field watershed.

(3) Watershed Analysis (ACS Component #3) and other pertinent information:

In developing the project, the Elk Creek Watershed Analysis was used to evaluate existing conditions, establish desired future conditions, and assist in the formulation of appropriate alternatives. The Elk Creek Watershed Analysis is available for public review at the Roseburg District office or can be viewed under "Plans & Projects" on the Roseburg District website at www.blm.gov/or/districts/roseburg/index.php.

Existing watershed conditions are described in the Hydrology (pg. 33-38) and Aquatic Habitat & Fisheries (pg. 38-45) sections of the EA and in the Elk Creek Watershed Analysis. The short and long term effects to aquatic resources are also described in these sections of the EA.

(4) Watershed Restoration (ACS Component #4)

One of the purposes of this project is to accelerate tree growth in Riparian Reserves and the attainment of late seral stand conditions. Therefore, the Riparian Reserve and Late-Successional Reserve (LSR) portions of the proposed action are considered to be a watershed restoration project.

Additionally, since 1994, numerous stream enhancement projects have been implemented in the Elk Creek Watershed. This includes placing instream structures (e.g. logs, boulders, root wads, etc…) to improve aquatic habitat on over four miles of stream, replacing over 13 culverts identified as barriers to fish passage to open up access to additional habitat, or improving or decommissioning over ten miles of road to reduce road sediment impacts to aquatic systems. This work has been done in collaboration with private timber companies, the Partnership for Umpqua Rivers watershed council, Oregon Department of Fish and Wildlife, and the BLM. Future opportunities for restoration are discussed in the Elk Creek/Umpqua River Watershed Analysis. Approximately 52 miles of road were identified for improvement or decommissioning, 55 miles of stream for instream restoration and 31 culverts for replacement. This work would be implemented as budgets allow.

Range of Natural Variability within the Watershed:

Based on the dynamic, disturbance-based nature of aquatic systems in the Pacific Northwest, the range of natural variability at the site scale would range from 0-100 percent of potential for any given aquatic habitat parameter over time. Therefore, a more meaningful measure of natural variability is assessed at scales equal to or greater than the fifth-field watershed scale. At this scale, spatial and temporal trends in aquatic habitat condition can be observed and evaluated over larger areas, and important cause/effect relationships can be more accurately determined.

Natural disturbance events to aquatic systems in the Pacific Northwest include wildfires, floods, and landslides. Average fire return intervals at the drainage scale were calculated between 50 and 75 years (prior to the advent of fire suppression). The more destructive stand replacement fires occurred irregularly at intervals from 150 to 350 years (Elk Creek Watershed Analysis, pg. 9). Most of the Elk Creek watershed is dominated by Tyee and Umpqua Formations of sandstones and siltstones which have a relatively high frequency of debris avalanches on slopes steeper than 65 percent and debris flows on slopes steeper than 35 percent.

Timber harvesting and road construction over the past 50 years have substantially increased the frequency and distribution of landslides above natural levels in the Elk Creek Watershed. However, there is a downward trend in landslide incidence over the last 50 years that is associated with improved management practices. (Elk Creek Watershed Analysis, pgs. 35-36) On BLM land, future landslides, mostly during large storm events, are expected to deliver large wood and rock fragments to lower-gradient streams because of BLM Riparian Reserves. These events would more closely resemble landslides within relatively unmanaged forests. These disturbance events are the major natural sources of sediment and wood to a stream system and are very episodic in nature.

Due to the dynamic nature of these disturbance events, stream channel conditions vary based on the time since the last disturbance event. This results in a wide range of aquatic habitat conditions at the site level. Site level habitat conditions can be summarized by Oregon Department of Fish and Wildlife (ODFW) habitat surveys. Surveys have been conducted throughout Elk Creek mostly in the third through sixth-order streams. Approximately 20 stream reference reaches in the Coast Range of the Umpqua Basin were used to compare against all surveyed streams. These relatively unmanaged reaches represent the variability of conditions within natural stream systems as well as characteristics desirable for a variety of fish species (including salmonid habitat). When compared to these "reference streams", aquatic habitat survey data from the Elk Creek watershed indicates that most of the tributaries are lacking large woody debris. While this condition is considered typical at any given site scale, it is considered atypical for most streams to be devoid of wood at the larger fifth-field scale. Therefore, at this larger scale, aquatic habitat conditions are considered to be outside the range of natural variability.

Because of its dynamic nature, sediment effects to streams can only be described in general terms. It is important to remember that ODFW instream habitat data is a snapshot in time. When compared to reference reaches, sediment conditions in most of the tributaries of Elk Creek Watershed appear to be similar to the reference reaches (Elk Creek Watershed Analysis).

Stream temperatures vary naturally in this watershed as a result of variation in geographic location, elevation, climate, precipitation, and distance from the source water (Elk Creek Watershed Analysis, pgs. 43-44). Stream temperatures also naturally vary as a response to the natural disturbance events mentioned in the previous paragraphs, as well as current practices on private forest, agricultural, and residential properties. Due to the large amount of riparian clearing that has occurred over the last 150 years (converting forest into farmland), coupled with management-induced channel widening, irrigation withdrawals, and loss of gravels, it is likely that stream temperature increases have been greater over larger spatial and temporal scales than observed naturally. One of BLM's objectives for managing Riparian Reserves is to maintain and enhance shade providing vegetation along streams.

Changes in stream flow can result from consumptive withdrawals and effects of land use activities on storm water runoff, infiltration, storage and delivery. Commercial and domestic withdrawals are common along Elk Creek. There is evidence that previous management has heavily influenced stream channels throughout the Elk Creek Watershed (Elk Creek Watershed Analysis, pg 44). Over the last 150 years, much of the lower elevation forest land has been converted to farmland. Many tributaries within Elk Creek have also been cleaned (had large wood removed) or salvage logged. BLM Forest management in Elk Creek would be designed to reduce or prevent watershed impacts.

Table G-1. Individual Aquatic Conservation Strategy Objective Assessment.

ACS Objective	Site/Project Scale Assessment	Fifth-Field Watershed Scale Assessment
	Scale Description: Units identified in this project are located in six separate seventh-field drainages (detailed below*) distributed throughout the watershed totaling roughly 18,261 acres in size. The BLM manages approximately 6,110 acres in these drainages (33.5%). Units proposed for treatment represent 6.4% of the total drainage area, and 19.0% of the BLM-managed lands in the drainage.	Scale Description: This project is located in the Elk Creek/Umpqua River fifth-field watershed. This watershed is roughly 187,000 acres in size. The BLM manages approximately 45,000 acres in this watershed (24%). Units proposed for treatment represent 0.9% of the total watershed area, and 4% of the BLM-managed lands in the watershed. This project also located in the Calapooya Creek fifth-field watershed. This watershed is roughly 157,600 acres in size. The BLM manages approximately 11,760 acres in this watershed (7%). Units proposed for treatment represent 0.03% of the total watershed area, and 0.3% of the BLM-managed lands in the watershed.
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.	Within the drainage, the proposed action would result in 430 acres of thinned riparian stands. Trees within these treated stands would attain larger heights and diameters in a shorter amount of time than if left untreated. PDF's such as variable width "no-harvest" buffers established along streams would retain shading and therefore maintain water temperature. "No-harvest" buffers established on streams in or adjacent to proposed units would prevent disturbance to stream channels and stream banks and intercept surface run-off allowing sediment transported by overland flow to be filtered out before reaching active waterways (EA, pg. 35-36) and would prevent impacts to aquatic resources. This treatment would speed attainment of this objective.	This treatment would also speed attainment of this objective at the watershed scale.
2. Maintain and restore spatial and temporal connectivity within and between watersheds	Within the drainage, the proposed project would have no influence on aquatic connectivity. Therefore this treatment would maintain the existing connectivity condition at the site scale.	Within the watershed, the proposed project would have no influence on aquatic connectivity. Therefore this treatment would maintain the existing connectivity condition at the watershed scale.
3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations	Treatments would not reduce canopy closure to an extent that could potentially influence in-stream flows (EA, pgs. 36-37). In addition, "no-harvest" buffers established on all streams in or adjacent to proposed units would prevent disturbance to stream channels and stream banks (EA, pg. 12). Therefore, these	This treatment would also maintain the physical integrity of the aquatic system at the watershed scale.

ACS Objective	Site/Project Scale Assessment	Fifth-Field Watershed Scale Assessment
	treatments would maintain the physical integrity of the aquatic system at the site scale.	
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.	Project design features (PDF) would ensure that water quality would not be adversely impacted by the proposed action. PDF's such as variable width "no-harvest" buffers established along streams would retain shading and hence maintain water temperature. "No-harvest" buffers established on streams in or adjacent to proposed units would prevent disturbance to stream channels and stream banks and intercept surface run-off allowing sediment transported by overland flow to be filtered out before reaching active waterways (EA, pgs. 35-36). Therefore, this treatment would maintain the existing water quality at the site scale.	Based on the information discussed at the site scale, this project would also maintain water quality at the watershed scale.
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved.	As mentioned above, "No-harvest" buffers established on streams in or adjacent to proposed units would prevent disturbance to stream channels and stream banks and intercept surface run-off allowing any management related sediment transported by overland flow to settle out before reaching active waterways (EA, pgs. 35-36). Therefore, this project would maintain the existing sediment regime.	This project would maintain the existing sediment regime at the watershed scale as well.
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.	Treatments would not reduce canopy closure to an extent that could potentially influence in-stream flows (EA, pgs. 36-37). The project would involve partial removal of vegetation on areas constituting three percent or less of each affected sub-watershed. In addition, new road construction would not extend the drainage network or contribute to a potential increase in peak flow because the new roads would be located on ridge tops or stable side slopes with adequate cross drain structures. Therefore, this treatment would maintain stream flows within the range of natural variability at the site scale.	As discussed at the site scale, thinning treatments would not reduce canopy closure to an extent that could potentially influence in-stream flows. Therefore, at the larger watershed scale, this treatment would also maintain stream flows within the range of natural variability.
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and woodlands.	As discussed in #6 above, this project would maintain stream flows within the range of natural variability at the site scale. Therefore, it would also maintain stream interactions with the floodplain and respective water tables at the site scale.	At the watershed scale, this project would also maintain stream interactions with the floodplain and respective water tables within the range of natural variability.

ACS Objective	Site/Project Scale Assessment	Fifth-Field Watershed Scale Assessment
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.	The proposed treatment is designed to return riparian stands to a more natural density and growth trajectory. Therefore this treatment would serve to restore plant species composition and structural diversity at the site scale.	The proposed treatment is designed to return riparian stands to a more natural density and growth trajectory. Therefore this treatment would serve to restore plant species composition and structural diversity at the larger watershed scale as well.
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.	As mentioned previously, one of the objectives of this project is to restore riparian stand conditions in the proposed treatment areas. Implementation of riparian restoration projects will help restore adequate habitat to support riparian-dependent species at the site and watershed scales.	As mentioned previously, the intent of this project is to restore riparian stand conditions in the proposed treatment areas. Implementation of riparian restoration projects will help restore adequate habitat to support riparian-dependent species at the site and watershed scales.

*Detailed scale description of the six seventh-field drainages: Adams Creek, Walker Creek, Lane Creek, Shingle Mill Creek, Elk Creek Headwaters, and Mill Creek.

1) The **Adams Creek** drainage is roughly 3,980 acres in size. The BLM manages approximately 1,130 acres in this drainage (28%). Units proposed for treatment represent 12% of the total drainage area, and 44% of the BLM-managed lands in the drainage.
2) The **Walker Creek** drainage is roughly 5,470 acres in size. The BLM manages approximately 1,340 acres in this drainage (25%). Units proposed for treatment represent 2% of the total drainage area, and 6% of the BLM-managed lands in the drainage.
3) The **Lane Creek** drainage is roughly 2,251 acres in size. The BLM manages approximately 680 acres in this drainage (30%). Units proposed for treatment represent 8% of the total drainage area, and 26% of the BLM-managed lands in the drainage.
4) The **Shingle Mill Creek** drainage is roughly 950 acres in size. The BLM manages approximately 550 acres in this drainage (58%). Units proposed for treatment represent 32% of the total drainage area, and 55% of the BLM-managed lands in the drainage.
5) The **Elk Creek Headwaters** drainage is roughly 2,480 acres in size. The BLM manages approximately 1,120 acres in this drainage (45%). Units proposed for treatment represent 23% of the total drainage area, and 50% of the BLM-managed lands in the drainage.
6) The **Mill Creek** drainage is roughly 3,130 acres in size. The BLM manages approximately 1,290 acres in this drainage (41%). Units proposed for treatment represent 1% of the total drainage area, and 3% of the BLM-managed lands in the drainage.

ACS Summary:

Based upon the information listed above, the proposed action would meet ACS objectives at the site and watershed scale. In addition, based upon the restorative nature of the action, this project would not retard or prevent attainment of ACS objectives; it would actually speed attainment of these objectives. Therefore, this action is consistent with the ACS and its objectives at both the site and watershed scales.

Appendix H. Botany Summary

Project: Elkhead Commercial Thinning & Density Management
Prepared By: Julie Knurowski
Date: February 8, 2008
SSSP List Date: February 8, 2008 (IM-OR-2008-038)

Those Bureau Sensitive or Bureau Strategic species which are suspected or documented to occur within the Roseburg District BLM area are detailed below in Tables H-1 and H-2 and may be further discussed in the body of the EA as appropriate.

Bureau Sensitive Species. BLM districts are responsible to assess and review the effects of a proposed action on *Bureau Sensitive* species. To comply with Bureau policy, Districts may use one or more of the following techniques:

a. Evaluation of species-habitat associations and presence of potential habitat.
b. Application of conservation strategies, plans, and other formalized conservation mechanisms.
c. Review of existing survey records, inventories, and spatial data.
d. Utilization of professional research and literature and other technology transfer methods.
e. Use of expertise, both internal and external, that is based on documented, substantiated professional rationale.
f. Complete pre-project survey, monitoring, and inventory for species that are based on technically sound and logistically feasible methods while considering staffing and funding constraints.

When Districts determine that additional conservation measures are necessary, options for conservation include, but are not limited to: modifying a project (e.g. timing, placement, and intensity), using buffers to protect sites, or implementing habitat restoration activities (IM-OR-2003-054).

Strategic Species. If sites are located, collect occurrence data and record in corporate database.

Table H-1. Federally Listed & Bureau Sensitive Botanical Species.

Species	Within species range?	Habitat Present?	Species Present?	Reason for concern or no concern	Surveys Completed	Mitigation Measures
Threatened & Endangered Species						
Lupinus sulphureus ssp. *kincaidii* Kincaid's lupine (T)	**Yes**	**Yes**	No	Surveys performed, not detected.	June/July 2007	N/A
Plagiobothrys hirtus Rough popcorn flower (E)	**Yes**	No	No	No habitat present.	N/A	N/A
Sensitive Species						
Chiloscyphus gemmiparus Liverwort	**Yes**	No	No	No habitat present.	N/A	N/A
Diplophyllum plicatum Liverwort	**Yes**	No	No	No habitat present	N/A	N/A
Entosthodon fascicularis Moss	**Yes**	No	No	No habitat present	N/A	N/A
Gymnomitrion concinnatum Liverwort	**Yes**	No	No	No habitat present.	N/A	N/A
Helodium blandowii Moss	**Yes**	No	No	No habitat present	N/A	N/A
Meesia uliginosa Moss	**Yes**	No	No	No habitat present	N/A	N/A
Schistostega pennata Moss	**Yes**	No	No	No habitat present	N/A	N/A

Species	Within species range?	Habitat Present?	Species Present?	Reason for concern or no concern	Surveys Completed	Mitigation Measures
Tayloria serrata Moss	**Yes**	No	No	No habitat present	N/A	N/A
Tetraphis geniculata Moss	**Yes**	No	No	No habitat present	N/A	N/A
Tetraplodon mnioides Moss	**Yes**	No	No	No habitat present	N/A	N/A
Tomentypnum nitens Moss	**Yes**	No	No	No habitat present	N/A	N/A
Tortula mucronifolia Moss	**Yes**	No	No	No habitat present	N/A	N/A
Trematodon boasii Moss	**Yes**	No	No	No habitat present.	N/A	N/A
Bridgeoporus nobilissimus Giant polypore fungus	No	No	N/A	No habitat present.	N/A	N/A
Cudonia monticola *Fungi*	Yes	No	N/A	Surveys Not Practical. [1]	N/A	N/A
Dermocybe humboldtensis Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Gomphus kauffmanii Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Helvella crassitunicata Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Leucogaster citrinus Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Otidea smithii Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia californica Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia dissiliens Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia gregaria Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia olivacea Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia oregonensis Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia pseudofestiva Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia scatesiae Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia sipei Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Phaeocollybia spacidea Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Pseudorhizina californica Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Ramaria amyloidea Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Ramaria gelatiniaurantia Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Ramaria largentii Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Ramaria spinulosa var.	**Yes**	**Yes**	N/A	Surveys Not	N/A	N/A

Species	Within species range?	Habitat Present?	Species Present?	Reason for concern or no concern	Surveys Completed	Mitigation Measures
diminutiva Fungus				Practical. [1]		
Rhizopogon chamalelotinus Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Rhizopogon exiguus Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Sowerbyella rhenana Fungus	**Yes**	**Yes**	N/A	Surveys Not Practical. [1]	N/A	N/A
Adiantum jordanii California maiden-hair	**Yes**	No	N/A	No habitat present.	N/A	N/A
Arabis koehleri var. *koehleri* Koehler's rockcress	**Yes**	No	N/A	No habitat present.	N/A	N/A
Arctostaphylos hispidula *Hairy manzanita*	**Yes**	No	N/A	No habitat present.	N/A	N/A
Asplenium septentrionale Grass-fern	**Yes**	No	N/A	No habitat present.	N/A	N/A
Bensoniella oregana Bensonia	**Yes**	No	N/A	No habitat present.	N/A	N/A
Botrychium minganense Gray moonwort	**Yes**	No	N/A	No habitat present.	N/A	N/A
Calochortus coxii Crinite mariposa-lily	**Yes**	No	N/A	No habitat present.	N/A	N/A
Calochortus umpquaensis Umpqua mariposa-lily	**Yes**	No	N/A	No habitat present.	N/A	N/A
Camassia howellii Howell's camas	**Yes**	No	N/A	No habitat present.	N/A	N/A
Carex brevicaulis Short stemmed sedge	**Yes**	No	N/A	No habitat present.	N/A	N/A
Carex comosa Bristly sedge	**Yes**	No	N/A	No habitat present.	N/A	N/A
Carex gynodynama Hairy sedge	**Yes**	**Yes**	No	Surveys performed, not detected.	June/July 2007	N/A
Carex serratodens Saw-tooth sedge	**Yes**	No	No	No habitat present.	N/A	N/A
Cimicifuga elata Tall bugbane	**Yes**	**Yes**	No	Surveys performed, not detected.	June/July 2007	N/A
Cypripedium fasciculatum Clustered lady slipper	**Yes**	**Yes**	No	Surveys performed, not detected.	June/July 2007	N/A
Delphinium nudicaule Red larkspur	**Yes**	**Yes**	**No**	Surveys performed, not detected.	June/July 2007	**N/A**
Epilobium oreganum Oregon willow-herb	**Yes**	**Yes**	**No**	Surveys performed, not detected.	June/July 2007	**N/A**
Eschscholzia caespitosa Gold poppy	**Yes**	**No**	**No**	No habitat present.	N/A	**N/A**
Eucephalus vialis Wayside aster	**Yes**	**Yes**	**No**	Surveys performed, not detected.	June/July 2007	**N/A**
Horkelia congesta ssp. *congesta* Shaggy horkelia	**Yes**	**Yes**	**No**	Surveys performed, not detected.	June/July 2007	**N/A**
Horkelia tridentata ssp. *tridentate* Three-toothed horkelia	**Yes**	**Yes**	No	Surveys performed, not detected.	June/July 2007	N/A
Iliamna latibracteata California globe-mallow	**Yes**	No	N/A	No habitat present.	N/A	N/A

Species	Within species range?	Habitat Present?	Species Present?	Reason for concern or no concern	Surveys Completed	Mitigation Measures
Kalmiopsis fragrans Fragrant kalmiopsis	**Yes**	No	N/A	No habitat present.	N/A	N/A
Lathyrus holochlorus Thin-leaved peavine	**Yes**	No	N/A	No habitat present.	N/A	N/A
Lewisia leana Lee's lewisia	**Yes**	No	N/A	No habitat present.	N/A	N/A
Limnanthes gracilis var. *gracilis* Slender meadow-foam	**Yes**	No	N/A	No habitat present.	N/A	N/A
Lotus stipularis *Stipuled trefoil*	**Yes**	No	N/A	No habitat present.	N/A	N/A
Meconella oregana *White fairypoppy*	**Yes**	No	N/A	No habitat present.	N/A	N/A
Pellaea andromedifolia Coffee fern	**Yes**	No	No	No habitat present	N/A	N/A
Perideridia erythrorhiza Red-rooted yampah	**Yes**	No	N/A	No habitat present.	N/A	N/A
Polystichum californicum California sword-fern	**Yes**	No	N/A	No habitat present.	N/A	N/A
Romanzoffia thompsonii *Thompson's mistmaiden*	**Yes**	No	N/A	No habitat present.	N/A	N/A
Schoenoplectus subterminalis Water clubrush	**Yes**	No	N/A	No habitat present.	N/A	N/A
Scirpus pendulus *Drooping rush*	**Yes**	No	N/A	No habitat present.	N/A	N/A
Sisyrinchium hitchcockii Hitchcock's blue-eyed grass	**Yes**	No	N/A	No habitat present.	N/A	N/A
Utricularia gibba Humped bladderwort	**Yes**	No	N/A	No habitat present	N/A	N/A
Utricularia minor Lesser bladderwort	**Yes**	No	N/A	No habitat present.	N/A	N/A
Wolffia borealis Dotted water-meal	**Yes**	No	N/A	No habitat present.	N/A	N/A
Wolffia columbiana Columbia water-meal	**Yes**	No	N/A	No habitat present.	N/A	N/A

[1] Surveys are considered not practical for these species based on the 2003 Annual Species Review (IM-OR-2004-034).

Table H-2. Bureau Strategic Botanical Species.

Scientific Name	Roseburg Occurrence?	Occurrence in the Project Area?
Bryophytes		
Cephaloziella spinigera	Suspected	None Observed
Grimmia anomala	Suspected	None Observed
Scouleria marginata	Suspected	None Observed
Fungi		
Cazia flexiascus	Suspected	None Observed
Choiromyces alveolatus	Suspected	None Observed
Clavariadelphus subfastigiatus	Documented	None Observed
Gymnomyces monosporus	Documented	None Observed
Helvella elastica	Documented	None Observed
Hygrophorus albicarneus	Suspected	None Observed
Mycena quinaultensis	Suspected	None Observed
Nolanea verna var. *isodiametrica*	Suspected	None Observed
Plectania milleri	Suspected	None Observed
Psathyrella quercicola	Suspected	None Observed
Ramaria abietina	Documented	None Observed
Ramaria rubribrunnescens	Suspected	None Observed
Ramaria suecica	Documented	None Observed
Ramaria thiersii	Suspected	None Observed
Rhizopogon brunneiniger	Suspected	None Observed
Rhizopogon clavitisporus	Suspected	None Observed
Rhizopogon flavofibrillosus	Documented	None Observed
Rhizopogon variabilisporus	Suspected	None Observed
Sarcodon fuscoindicus	Documented	None Observed
Lichens		
Buellia oidalea	Suspected	None Observed
Lecanora pringlei	Suspected	None Observed
Lecidea dolodes	Suspected	None Observed
Leptogium rivale	Documented	None Observed
Leptogium teretiusculum	Documented	None Observed
Peltula euploca	Suspected	None Observed
Vezdaea stipitata	Documented	None Observed
Vascular Plants		
Camissonia ovata	Suspected	None Observed
Frasera umpquaensis	Suspected	None Observed

Appendix I. Map Packet Table of Contents

Figure 1. ElkHead Commercial Thinning and Density Management Environmental Assessment Vicinity Map

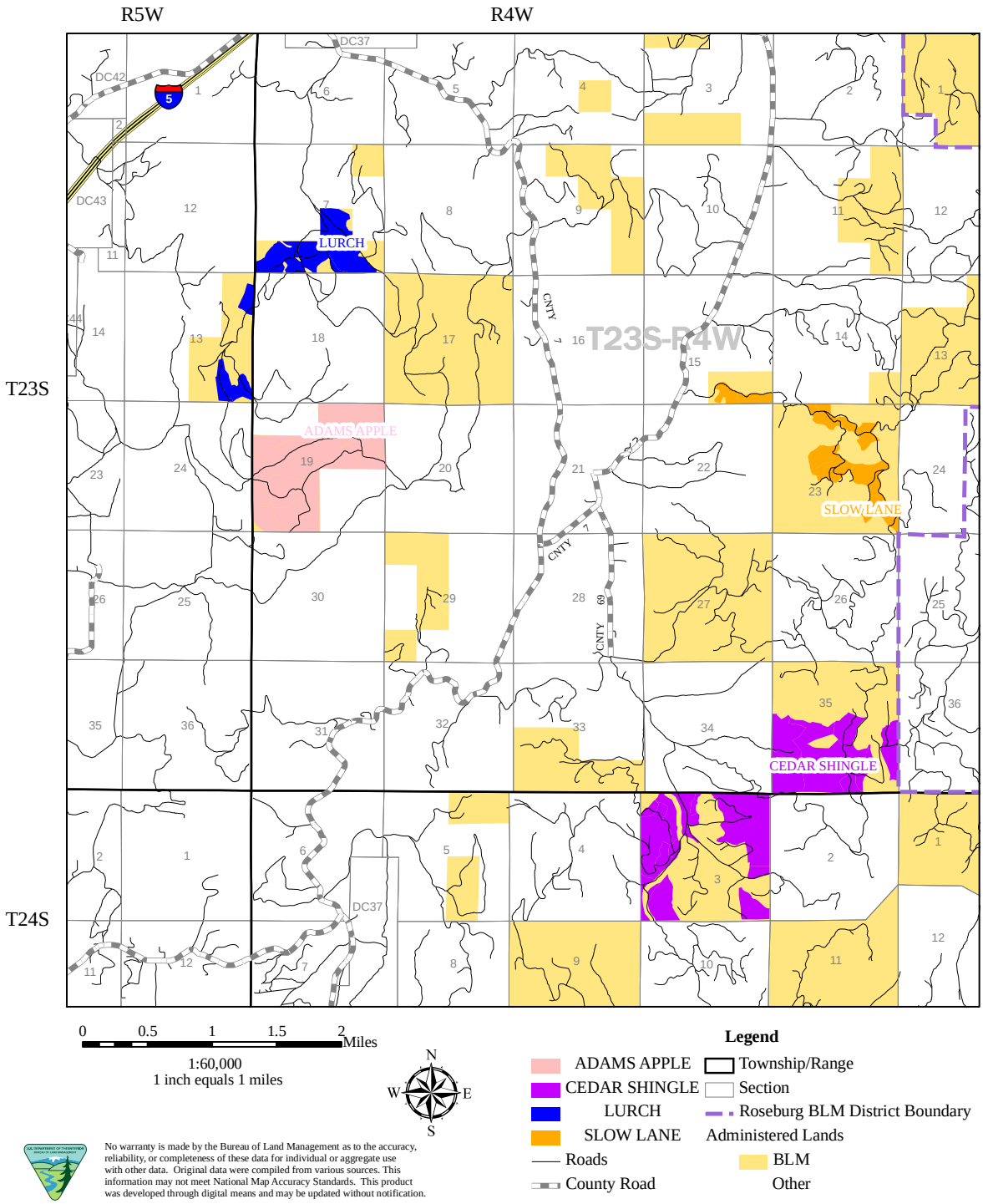
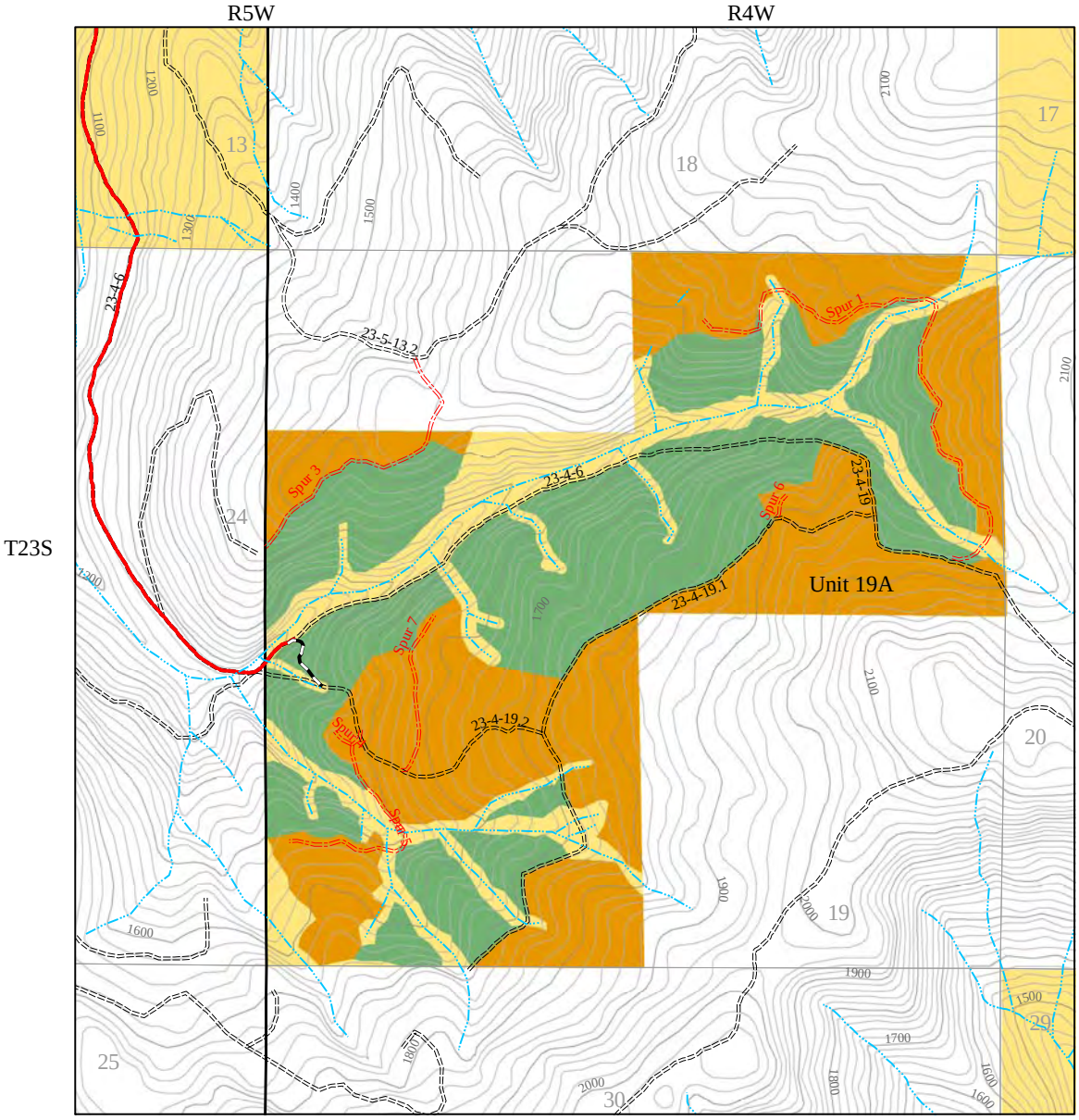


Figure 2. Adams Apple Commercial Thinning and Density Management



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

1:12,000

Legend

Logging System
- CABLE
- GROUND
- Roads
- Road Realignment
- New Road Construction
- Haul Routes

Streams
Township/Range
Section
Administered Lands
- BLM
- Other

Figure 3. Cedar Shingle Commercial Thinning and Density Management

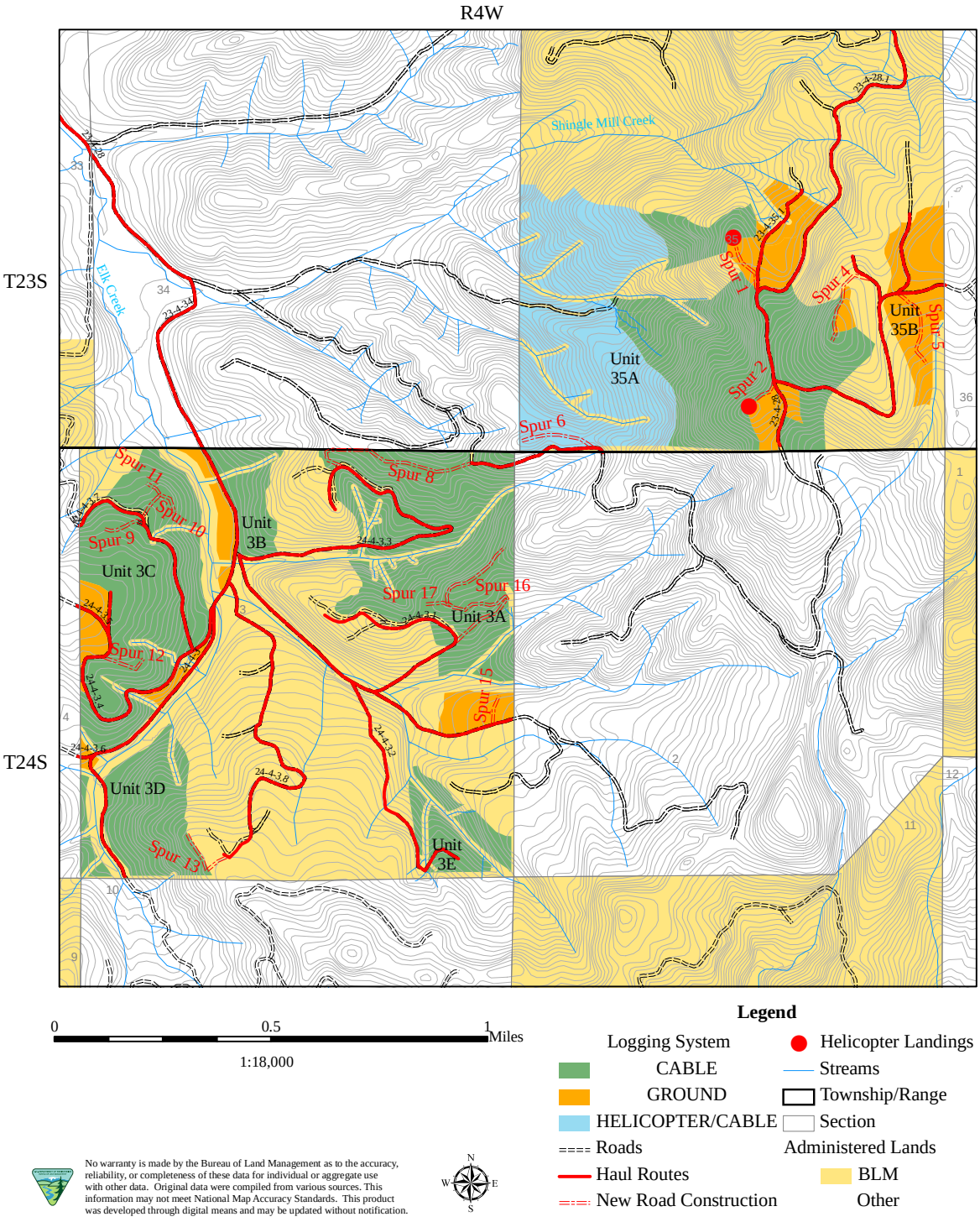


Figure 4. Lurch Commercial Thinning and Density Management

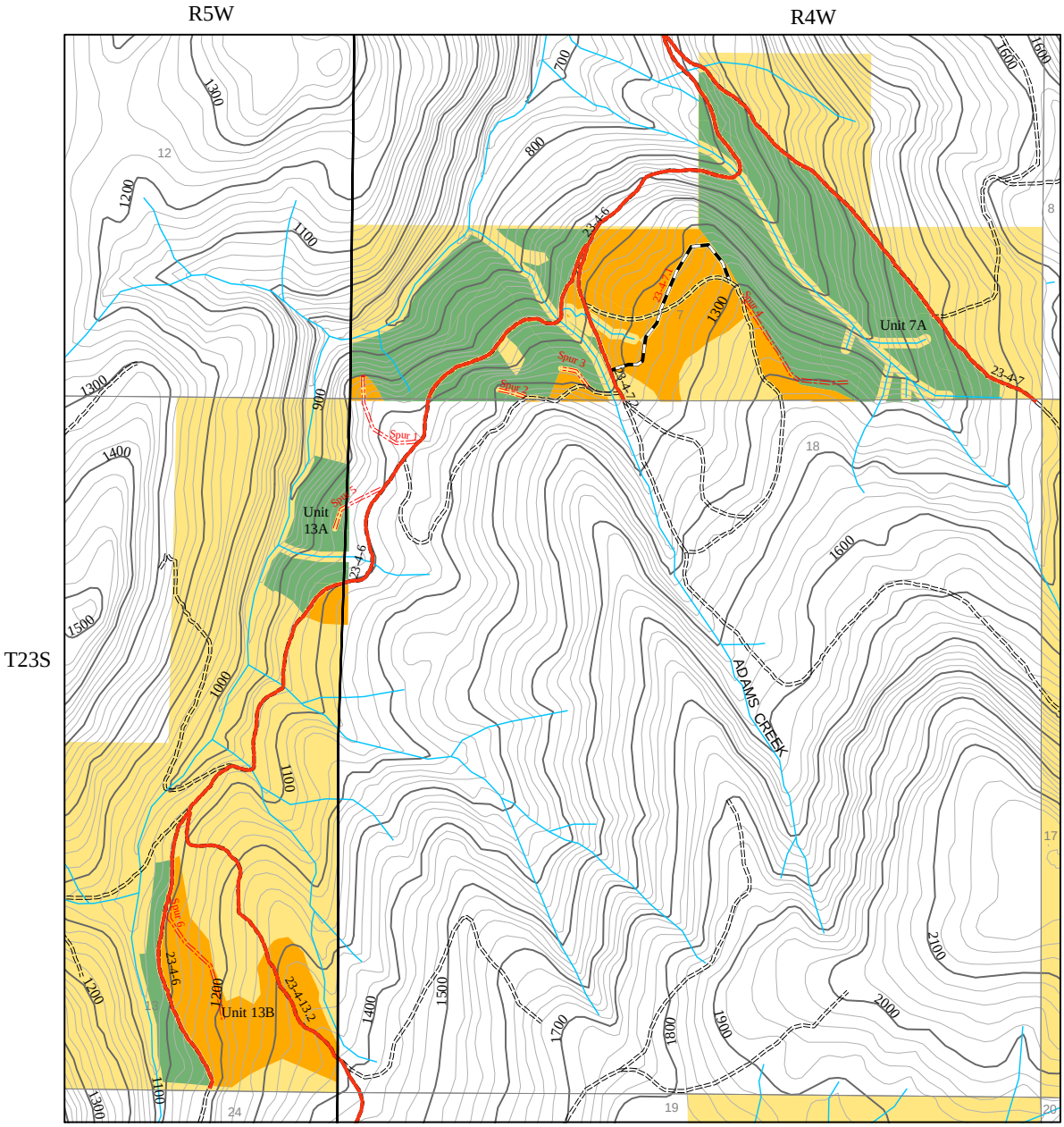
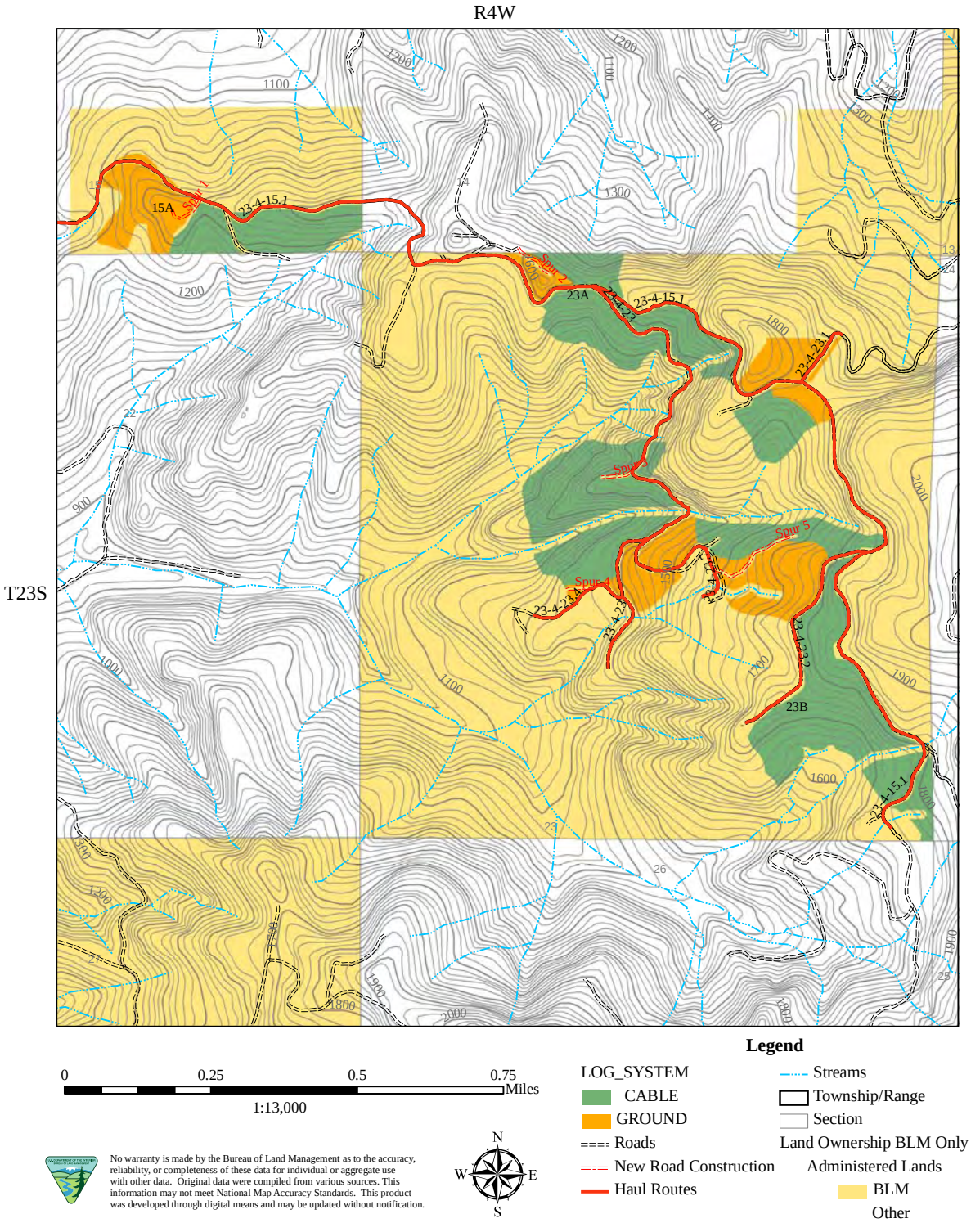


Figure 5. Slow Lane Commercial Thinning and Density Management



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