Lower Cow Creek 2007 Commercial Thinning and Density Management

South River Resource Area
BLM Roseburg District

Environmental Assessment
#OR-105-07-11

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

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment –including your personal identifying information –may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

In keeping with Bureau of Land Management policy, the Roseburg District posts Environmental Assessments, Findings of No Significant Impact, and Decision Records on the district web page under **Plans & Projects** at www.blm.gov/or/districts/roseburg, on the same day in which legal notices of availability for public review and notices of decision are published in *The News-Review*, Roseburg, Oregon. Individuals desiring a paper copy of such documents will be provided one upon request. Individuals with the capability to access these documents on-line are encouraged to do so, as this reduces paper consumption and administrative costs associated with copying and mailing.

TABLE OF CONTENTS

CHAPTER ONE - PURPOSE AND NEED FOR ACTION

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

I. Purpose and Need for Action

The Bureau of Land Management (BLM) proposes commercial thinning of forest within the Matrix land use allocation and density management within Late Successional Reserves (LSR) and Riparian Reserves.

These timber management actions are needed to implement the direction of the Roseburg District *Record of Decision and Resource Management Plan* ((ROD/RMP) USDI, BLM 1995a). The ROD/RMP directs BLM to "Provide a sustainable supply of timber and other forest products" (ROD/RMP p. 60). Specifically, developing stands are to be managed to promote tree survival and growth to achieve a balance between wood volume production, quality of wood, and timber value at harvest (ROD/RMP, p. 60), by implementation of actions that include commercial thinning and density management designed to reduce competition among remaining trees. The ROD/RMP also directs that activities beneficial to the creation of late-successional habitat (such as thinning in forest stands less than 80 years of age) be planned and implemented in the LSRs (ROD/RMP p. 29).

The purpose 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 Matrix and LSR allocations, in accordance with the ROD/RMP.

II. Conformance

This environmental assessment (EA) analyzes the environmental consequences of the both 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);
- The FSEIS *for Management of Port-Orford-Cedar in Southwest Oregon* (USDA and USDI 2004a).

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

III. Decision Factors

Factors to be considered when selecting among alternatives 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 implementing the alternative and the nature and effectiveness of measures to mitigate impacts to resources including, but not limited to, wildlife and wildlife habitat, soil productivity, and water quality;
- Achievement of Late Successional Reserve Assessment (LSRA) objectives;
- 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, and the O&C Act.

CHAPTER TWO - DISCUSSION OF THE ALTERNATIVES

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

I. Alternative One – No Action

Commercial thinning and density management would not be applied to the proposed units. There would be no construction of roads for access to the proposed commercial thinning and density management units. Renovation of roads for reasons such as realignment or correction of drainage deficiencies would not be undertaken. Road maintenance would be conducted on an as-needed basis to provide resource protection, accommodate reciprocal users, and protect the federal investment. The purpose and need of the project would not be met.

II. Alternative Two – The Proposed Action

This alternative consists of commercial thinning or density management of approximately 725 acres of 40-60 year old (mid-seral) stands. While older remnant trees may be present within proposed units, they are not the focus of thinning and density management and would be retained to the greatest degree practicable. Conifer and hardwood snags would be retained to the greatest degree practical as described below in the discussion specific to individual land use allocations. In all treatment areas existing Class 3, 4 and 5 large down wood would be retained.

The original, internal proposal considered a total of 869 acres. Five units totaling 147 acres were deferred from this analysis. Four units in Matrix were deferred because of low basal area, and one unit in LSR lacked sufficient maturity to warrant commercial treatment, and will be considered for a non-commercial treatment at a later date.

A. Matrix Management

Thinning would be applied to approximately 402 acres of Matrix lands, divided among 13 units located in Section 13, T. 30 S., R. 7 W.; Sections 7, 13, 15, 17, and 19, T. 31 S., R. 6 W., W.M. Maps of the proposed units are included in Appendix A. Thinning would be designed to increase tree size through time, extend the culmination of mean annual increment, and capture anticipated mortality. Stands would be thinned from below, which means trees selected for harvest would be the suppressed, intermediate, and codominant conifer trees. Cut trees would generally consist of Douglas-fir and western hemlock. This prescription would result in a stand with variable spacing between the Douglas-fir, cedar and hemlock. By leaving hardwoods, western red cedar, incense cedar and Pacific yew trees, both species and structural diversity would be retained and tree vigor improved. Snags would be protected where feasible and possible, by designation of rub trees. Snags felled within Matrix lands could be removed if they possess commercial value, as there is no requirement for large down wood at intermediate entry.

Stands in the General Forest Management Area would be thinned to retain 90 to 100 trees per acre. Thirty-two to 40% of the basal area would be removed and canopy closure reduced to 45-60 percent. The healthiest, best-formed trees would be retained, as commodity production of timber is the primary objective for this land use allocation.

Density management in Connectivity/Diversity Block units would be thinned to retain 60 to 110 trees per acre. Marking would employ a variable density prescription based on a combination of basal area and number of trees per acre to encourage development of structural diversity. On average, 30 to 50 percent of the basal area would be removed with post-treatment canopy closure of 40 to 70 percent. The healthiest, best-formed trees would be favored for retention, with minor conifer species and large hardwoods retained in numbers reflecting the approximate percentages represented in the stands.

B. Riparian Reserve Management

Density Management in the Riparian Reserve would be designed to enhance late seral forest structure by accelerating tree growth. A variable marking prescription would be applied similar to that applied in the Connectivity/Diversity Block unit, described above, with comparable post-treatment conditions expected. To maintain structural and habitat diversity, however, tree selection would not be solely based on the best formed trees, and would include trees with broken or deformed tops. Hardwoods greater than 10 inches diameter at breast height (dbh) and minor conifer species would be retained in percentages comparable to current representation in the stands. Snags greater than 16 inches dbh would be retained where feasible and protected by the use of untreated areas or rub trees. Snags felled in the Riparian Reserve would be retained on site for potential future recruitment into streams.

Variable-width "no-harvest" buffers would be established on all streams within Riparian Reserve to protect stream bank integrity, maintain streamside shade, and provide a filtering strip for overland run-off. The buffers would be a minimum horizontal distance of 20 feet in width on intermittent non-fish-bearing streams and 50 feet in width on fish-bearing streams. Designation of actual widths would consider habitat features, streamside topography, vegetation, susceptibility to solar heating, and proximity to Essential Fish Habitat. Ground based operations would be restricted with the "no harvest" buffers. If it is necessary to fell trees within the "no harvest" buffers for operational purposes, the felled trees would be left in place to provide instream wood and protection for stream banks.

C. Late-Successional Reserve Management

Density Management

Density management treatments would be applied to approximately 320 acres in LSR 259, divided among seven units located in Sections 25, 27, and 35, T. 30 S., R. 8 W.; Section 13, T. 31 S., R. 7 W., W.M. Density management treatments would be designed to mimic natural disturbances that reduce stand density and move stand development toward late-successional conditions presented in the *South Coast-Northern Klamath LSRA* (p. 28 and 82). Canopy gaps, openings, and retention of unthinned areas would be created to break up stand homogeneity and accentuate landscape diversity across the project area. Trees greater than 20 inches in diameter breast height would generally be reserved. Snags would be retained and protected to the greatest

extent practical by surrounding them with rub trees or unthinned areas. Where felled for operational reasons they would be retained on site to supplement existing coarse wood.

The same variable-width "no-harvest" buffers used in Riparian Reserves would be established on all streams within LSRs (see description on page 4).

Three types of thinning treatments would be applied. Light thinning would retain 90 to 100 trees per acre, with moderate thinning retaining 60 to 80 trees per acre, and heavy thinning retaining approximately 50 trees per acre. At least ten percent of the area within individual units would remain unthinned to maintain processes and conditions in their present state. Retention tree selection would not be based solely on the healthiest and best formed trees, but would include trees with broken or deformed tops that could provide future roosting and nesting structure. Hardwoods selected for retention would generally be greater than 10 inches dbh and exhibit a reasonable likelihood of surviving density management operations. Minor conifer species such as western red cedar, incense cedar, and Pacific yew would be favored for retention to maintain them as stand components.

In LSR 259 openings and gaps could be up to one and one-half acre in size and would be limited to two percent of the total treated acres. Heavily thinned areas would not exceed 50 percent of the total treated acres. A combination of ponderosa pine, western red cedar, Douglas-fir, sugar pine, disease-resistant Port-Orford-cedar and/or incense-cedar would be planted in the openings and heavy thinning areas, based on site conditions.

Table 2-1 Approximate Acres by Treatment in the Proposed LSR Density Management Units.

Unit	No Treatment	Light Thin (90-100 trees per acre)	Moderate Thin (60-80 trees per acre)	Heavy Thin (~ 50 trees per acre)	Openings	Total
30-8-25A	12	0	0	42	0	54
30-8-25B	4	0	46	0	1	51
30-8-27C	22	0	70	41	1	134
30-8-35A	5	0	0	34	1	40
30-8-35B	9	0	23	0	0	32
30-8-35C	6	20	17	0	0	43
30-8-35D	Defer treatment					
31-7-13B	3		19	5		27
Total in LSR	**61**	**20**	**175**	**122**	**3**	**381**

Course Wood and Snag Objectives

For the Klamath Province, which contains LSR 259, at 80 years of age stands should have 650 to 1,300 cubic feet of coarse woody debris per acre, at least four inch diameter and three feet long, within two site-potential tree heights of any perennial stream and within the first site-potential tree height of intermittent streams. Most stands in LSR 259 presently have over 650 cubic feet per acre of coarse woody debris as illustrated in Table 3-1.

It is anticipated coarse woody debris objectives would be adequately provided for by the following:

- Reserving existing coarse woody debris in Decay Classes 3, 4, and 5[1] through contract provisions;
- Retaining snags felled for safety or operational reasons on site;
- Leaving non-merchantable materials generated during density management operations, including broken-out tree tops largely in place; and
- Natural events such as windthrow, wind break, snow break, and suppression mortality would provide additional coarse woody debris.

Snag objectives would be met through:

- Reservation and protection of snags in unthinned areas where operationally viable and consistent with the density management prescriptions;
- Operational damage leading to broken-out tops or individual tree mortality; and
- Weather damage such as wind and snow break.

Surveys would be conducted the first and third years following completion of density management in order to monitor levels of coarse wood and numbers of snags. In the event that a deficit in snags exists five years after the completion of treatment, additional trees reserved under the marking prescription would be felled or girdled to meet snag objectives.

D. Roads

Existing permanent roads would provide the primary access to units for commercial thinning and density management. Construction of approximately .35 miles of surfaced road, and 1.7 miles of temporary unsurfaced road would provide access to units. Reconstruction of approximately 0.26 miles of unsurfaced roads would provide access to Unit 31-6-19A. New roads would be constructed on ridge tops or stable side slopes and outside of riparian areas. The running surface of new roads would typically be 12 to 15 feet in width. Construction length, surfacing and post-operational disposition is subject to refinement during field layout. Refer to Table 2-2 for road details.

Renovation would occur on 2.1 miles of existing road, and approximately 47 miles of system roads would be evaluated and receive maintenance as appropriate (See Vicinity Map in Appendix A). Road renovation could include grading, realignment, surfacing, widening, adding drainage structures, and clearing vegetation. Road reconstruction consists of road work that exceeds standard renovation practices described above to bring a road up to an operational condition.

Decommissioning of roads would generally consist of removing drainage structures, constructing water bars or drain dips, sub-soiling the road bed, covering the road bed with logging slash, and blocking the roads to vehicular use. The intent is to do so in the same summer operating season in which the roads are built and used. Where circumstances, preclude use and

[1] Decay classes 3-5 are large older logs remaining from the previous timber harvest in various stages of decay from, hard to soft and powdery. Decay class 1 and 2 logs are recent additions to the coarse woody debris component that still have the bark intact.

decommissioning in this time frame, the roads would be winterized and blocked to traffic, and decommissioned in the following summer operating season.

Table 2-2 Type of Road Construction, Season of Operation, Disposition

Unit Designation	Type of Construction or Renovation	Road Length (miles)	Season of Operation[1 & 2]	Disposition of Road Following Completion of Treatment
30-7-13A	Surfaced spur	.04	All Season	Retain for future
30-7-13B	Surfaced spur	.05	All Season	Retain for future
30-7-13C	Dirt spur	.39	Dry only	Block/Decommission
30-7-13C	Reconstruct Dirt Spur	.09	Dry only	Block/Decommission
30-8-25A	Surfaced spurs (2)	.15	All Season	Block/Decommission
30-8-25B	None		All Season	
30-8-27C	Helicopter Landing 29-8-29.2 Road		All Season	Full Decommission
30-8-35A	Helicopter Landing in NW corner of unit.		All Season on Helicopter portion Dry season on tractor portion	
30-8-35B	Dirt spur	.17	Dry only	Full Decommission
30-8-35C	Dirt spurs (2)	.25	Dry only	Full Decommission
30-8-35C	Renovate 30-8-35.0	.40	Dry only	Retain for future
31-6-7A	None		Dry only	
31-6-13B	None		All Season	
31-6-13C	None		All Season	
31-6-15A	Dirt spurs (2)	.26	Dry only	Block/Decommission
31-6-15B	Cable Landings		Dry only	Full Decommission
31-6-15B	Renovate Spur	.45	Dry only	Block/Decommission
31-6-15C	Dirt landing spur		Dry only	Block/Decommission
31-6-17A	None		All Season on existing rocked road. Dry on existing dirt spurs.	
31-6-17B	Surfaced Landing spurs (2)	.04	All Season	Retain for future
31-6-17C	Dirt spur	.13	All Season below 31-6-17.0 Rd. Dry above rd.	Block/Decommission
31-6-19A	Reconstruct Dirt Spurs (2)	.26	Dry only	Block/Decommission
31-6-19A	Renovate 31-6-18.0 Rd.	1.7	Dry only	Block/Decommission
31-7-13B	Surfaced Landing spurs (2)	.06	All Season	Retain for future

[1] "Dry only" means that yarding and hauling operations would be limited to the traditional "dry season" of May 15th to mid-to-late October, subject to bark slip and seasonal wildlife restrictions.
[2] "All Season" means that yarding and hauling operations could occur throughout the year, subject to seasonal restrictions for ground-based operations, bark slip and seasonal wildlife restrictions

E. Yarding Methods

Commercial thinning and density management would be accomplished by a combination of cable, helicopter and ground-based yarding systems. Cable yarding would be proposed for approximately 488 acres, helicopter logging on 184 acres, and ground-based yarding on approximately 50 acres. (See table 2-3 and Appendix A)

Table 2-3 Land Use Allocation and Acres by Yarding Method

Unit	Treated Acres	Treatment/ Land Use Allocation	Acres Cable Harvest	Acres Ground Harvest	Acres Helicopter
30-7-13A	28	Commercial Thin (GFMA)	28	0	0
30-7-13B	24	Commercial Thin (GFMA)	24	0	0
30-7-13C	38	Commercial Thin (GFMA)	36	2	0
30-8-25A	42	Density Management (LSR)	40	2	0
30-8-25B	47	Density Management (LSR)	0	0	47
30-8-27C	112	Density Management (LSR)	0	0	112
30-8-35A	35	Density Management (LSR)	0	10	25
30-8-35B	23	Density Management (LSR)	21	2	0
30-8-35C	37	Density Management (LSR)	29	8	0
30-8-35D	0	Density Management (LSR)	0	0	0
31-6-5A	0	Commercial Thin (GFMA)	0	0	0
31-6-7A	8	Commercial Thin (GFMA)	0	8	0
31-6-13A	0	Commercial Thin (Conn./Div.)	0	0	0
31-6-13B	45	Commercial Thin (Conn./Div.)	45	0	0
31-6-13C	101	Commercial Thin (Conn./Div.)	97	4	0
31-6-15A	20	Commercial Thin (Conn./Div.)	15	5	0
31-6-15B	7	Commercial Thin (Conn./Div.)	6	1	0
31-6-15C	9	Commercial Thin (Conn./Div.)	9	0	0
31-6-17A	35	Commercial Thin (Conn./Div.)	35	0	0
31-6-17B	15	Commercial Thin (Conn./Div.)	12	3	0
31-6-17C	23	Commercial Thin (Conn./Div.)	20	3	0
31-6-19A	49	Commercial Thin (GFMA)	49	0	0
31-6-23A	0	Commercial Thin (Conn./Div.)	0	0	0
31-6-23B	0	Commercial Thin (Conn./Div.)	0	0	0
31-7-13B	24	Density Management (LSR)	22	2	0
Total	**722**		**488**	**50**	**184**

Note: Shaded units with 0 treated acres have been deferred for future consideration.

F. Hazardous Fuels Treatments

Slash piles at landings would be burned to reduce roadside fuel concentrations. Within the Wildland Urban Interface and LSRs, post-thinning fuel loading would be evaluated to determine whether treatment by hand-piling and burning, or pull back of fuels adjacent to roads and property lines is necessary.

G. Design Features

Seasonal Restrictions

- Generally prohibit felling and yarding of timber, other than that associated with clearing rights-of-way, during the bark-slip period, from April 15 to July 15.
- Restrict yarding and hauling of timber from areas accessed by unsurfaced roads between May 15th and the onset of regular autumn rains, usually in mid-to-late October.
- Treatment would not occur within 65 yards of any unsurveyed suitable habitat, known nest sites, or known activity centers from March 1-June 30th unless current year surveys indicate that Northern spotted owls (*Strix occidentalis caurina***)** are not present, are

present but not attempting to nest, or that nesting attempts have failed.

- Prohibit operations within 100 yards of any marbled murrelet site, or unsurveyed suitable nesting habitat in Zone 1 or the Zone 2 restriction corridor from April 1st to August 5th; operations would be subject to daily operating restrictions from August 6th to September 15th. Daily operating restrictions prohibit commencement of operations until two hours after sunrise and require operations to cease two hours before sunset.
- In Zone 2 outside of the restriction corridor, operations within100 yards of any marbled murrelet site or unsurveyed suitable nesting habitat would be subject to daily operating restrictions from April 1st to August 5th.

<u>All Harvest Systems</u>

- Retain large remnant trees on site; these trees would not be cut except for those in road construction right of ways, landings, yarding corridors, and those posing a safety hazard.
- Limit log lengths to 40 feet in length where necessary to protect residual trees, snags and coarse woody debris during yarding.
- Utilize directional falling and yarding for the protection of retention trees, existing coarse woody debris, snags, and reserve sections.

<u>Ground-based Yarding</u>

- Limit ground-based operations to the dry season, typically from May 15th to the onset of regular autumn rains in mid-to-late October.
- Pre-designate skid trails and generally limit skid trails to slopes less than 35 percent, using existing trails to the greatest degree practical (USDI 2007d, page 59).
- Design skid trails, landings, and large pile areas to affect less than approximately 10% of the ground-based harvest unit.
- Subsoil landings, primary skid trails, and other heavily compacted areas upon completion of operations, and place logging slash over exposed soil. Other compacted areas would be mapped for treatment at final harvest, if warranted.

<u>Mechanical Cutting</u> (Cut-to-length systems)

- Restrict operations to seasonally dry periods, typically from May 15th to the onset of regular autumn rains in mid-to-late October.
- Limit movement off primary skid trails to a single pass.
- Cover primary skid trails with a minimum of 12 inches of slash whenever possible.

<u>Skyline Cable Yarding</u>

- Equipment would be capable of maintaining a minimum of one-end log suspension to reduce the potential for soil disturbance and compaction.
- Where practical, have purchaser pre-designate yarding corridors and space them at intervals of 200 feet, reducing the number of corridors and landings required.
- Place yarding corridors on the landscape to avoid felling remnant trees.
- Treat yarding corridors with potential for accelerated erosion with logging slash and/or waterbars as needed.

Helicopter Yarding

- Yarding would be accomplished with a helicopter capable of fully suspending logs above the ground and surrounding treetops.
- All helicopter landing locations would require approval prior to construction and use.

For All Activities

- Clean logging, road construction, and tilling equipment prior to entry on BLM-administered land to prevent the spread of noxious weeds.

III. Resources That Would Remain Unaffected By Either Alternative

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

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

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. Cultural resources surveys will be conducted in the spring of 2008. If sites are found, the appropriate mitigation would be taken to preserve sites.

CHAPTER THREE - AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

This chapter discusses the specific resources potentially affected by the alternatives and the direct, indirect and cumulative environmental effects[2] of the alternatives over time. 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. The discussion is organized by individual resource and provides the basis for comparison of the effects between alternatives.

The Lower Cow Creek 5th field watershed encompasses approximately 102,447 acres and includes six subwatersheds and thirty-nine drainages. The watershed is dominated by conifer forest. The Bureau of Land Management administers approximately 39% of the watershed, almost 40,000 acres; the remaining 61% is privately owned. The South River Resource Area manages approximately 39,533 acres and the Glendale Resource Area manages the remaining BLM-administered lands. Approximately 18% of BLM-administered lands are in the Matrix Land Use Allocation, 7% of the total watershed. Approximately 64% of the BLM-administered lands within the watershed, 25% of the total watershed, are in LSR, and another 15% are within riparian reserves. Another 3% of the watershed is in other reserves; consequently, 82% of the BLM-administered lands within the watershed are largely reserved from harvest and managed to become late-seral stands. (Lower Cow Creek Watershed Analysis and Water Quality Restoration Plan, Second Iteration (USDI 2002) p. xii).

I. Forest Vegetation

Affected Environment[3]

Eighty-five percent of the Lower Cow Creek watershed is conifer forest, and about four percent of the watershed is dominated by hardwoods. Non-forest lands account for the remaining eleven percent of the watershed. The stands in this project are located within three vegetation zones: Grand Fir (64%), Cool Douglas-fir/Western Hemlock (21%), and Douglas-fir/Chinquapin (15%). Throughout the treatment area, Douglas-fir is the predominant species, with grand fir and Western hemlock also prevalent. Other conifer species in the treatment area include Port-Orford-Cedar, ponderosa pine, and sugar pine. Hardwood species include chinquapin and madrone, bigleaf maple, and red alder. Understory species include rhododendron, cascade Oregon grape, salal, red huckleberry, and chinquapin. Within the

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

[3] Detailed information pertaining to the forest vegetation in the proposed treatment area was derived from site-specific field reconnaissance and analysis conducted between April and September 2007, historic records, and from the Lower Cow Creek Watershed Analysis and Water Quality Restoration Plan, USDI, Bureau of Land Management, Roseburg District, South River Resource Area, Second Iteration, November 2002, and South Coast North Klamath LSRA. Additionally, timber stand exams were conducted in 2007, using the BLM Ecosurvey Stand Exam Program.

treatment area, elevation ranges from approximately 1,800 feet to 3,300 feet, with mostly northern aspects.

Stands proposed for treatment are dense and even-aged, 40-64 years old, mostly resulting from past regeneration harvesting (see photo, left, and Table 3-1). Few older remnant trees (generally grand fir and western hemlock) are scattered throughout the stands, and there are few snags and little down wood in decay class 1 and 2. After the last harvest, most units were broadcast burned and planted to about 500 seedlings per acre, predominantly Douglas-fir. These stands were pre-commercially thinned at approximately 15 years of age, later fertilized with nitrogen, and herbicides were used to control competing vegetation.

Ponderosa pines and sugar pines (shade intolerant species) are being out-competed for sunlight by conifers and are gradually being eliminated from the stands. Hardwoods are patchy and sparse in many stands, as is ground cover and understory development.

Seventy-five percent of the stands are subject to suppression mortality and reduced tree vigor due to the high relative stand density.[4] However, the trees are expected to respond positively to thinning, releasing well, because the average live crown ratio (the proportion of live crown to total tree height) is still greater than 30 percent in the stands proposed for treatment.

Two pathogens occur in the proposed commercial thinning and density management units; laminated root disease and Port-Orford-cedar root disease. Laminated root disease (*Phellinus weirii*), is scattered in small pockets in Stand 31-6-17C, and 30-8-25A. These stands are in a Connectivity/Diversity block and LSR respectively. The root rot is causing small openings in an otherwise dense canopy; these small gaps are contributing to small-scale structural diversity in the stand. Laminated root rot is expected to persist due to the abundance of Douglas-fir, a highly susceptible host, in the area under either alternative; as such, it will not be discussed further in the EA.

Port-Orford-cedar root disease, caused by the fungus *Phytophthora lateralis*, is present in three stands and along haul routes to seven stands within and adjacent to the project area. The

[4] Relative stand densities (a measure of stand stocking against a theoretical maximum) of the proposed units are currently between 0.44 and 0.92, with about seventy-five percent at or above 0.55. Generally, a relative density of 0.55 means greater competition among trees, resulting in suppression mortality and reduced tree vigor (Drew and Flewelling 1979). Reduced tree vigor results in slower-growing trees and a greater susceptibility to damage and mortality from insects and diseases.

Lower Cow Creek Watershed Analysis and Water Quality Restoration Plan provides an overview of Port-Orford-Cedar in the watershed (p. 62-64). Like laminated root rot, *Phytophthora lateralis* is also expected to persist and continue a slow rate of spread under either alternative. A Port-Orford-Cedar risk assessment (Appendix E) was performed but determined that no special management within the stands was warranted. As such, Port-Orford-cedar root disease will not be discussed further in this EA.

Table 3-1. Summary of Current Stand Conditions.

Unit	Stand Age	Trees/Acre (Ac) (>7"DBH) (Merchantable)	Quadratic Mean Diameter (QMD)	Basal Area/Acre	Relative Density	Coarse Woody Debris (total in all decay classes) (Cubic Feet/Acre)	Canopy Closure (%)
General Forest Management Area							
30-7-13B	38	240	11.4	177	0.55	N/A	100
30-7-13A	39	274	10.4	162	0.55	N/A	100
30-7-13C	45	444	10.6	271	0.92	N/A	100
31-6-7	64	471	9.7	243	0.6	N/A	100
31-6-19	48	312	9.2	145	0.52	N/A	100
Connectivity/Diversity Blocks & Riparian Reserves							
31-6-13B	46	259	11.3	180	0.59	N/A	100
31-6-13C	44	235	12.1	186	0.6	N/A	100
31-6-15C	51	235	14.1	256	0.77	N/A	100
31-6-15B	53	176	15.6	232	0.67	N/A	100
31-6-15A	55	200	15.7	268	0.78	N/A	100
31-6-17A	49	287	10.5	174	0.55	N/A	100
31-6-17B*	43	290	11.6	210	0.66	N/A	--
31-6-17C	43	287	11.3	200	0.66	N/A	100
Late Successional Reserves							
30-8-25B	47	195	12.8	176	0.55	3,768.0	100
30-8-25A	40	350	11	230	0.76	1,232.6	100
30-8-27 South	45	196	13.5	193	0.59	878.0	100
30-8-27 North	44	229	12.6	197	0.62	536.0	100
30-8-35B	42	260	15.6	223	0.7	1,313.4	100
30-8-35C	42	215	11.7	161	0.53	2,100.6	100
30-8-35A	46	197	13.3	189	0.58	1,155.9	100
31-7-13	53	240	12.3	198	0.63	--	100

* Stand conditions estimated based on walk through and similarity to adjacent stand.

The Late Successional Reserve Assessment (LSRA) for the South Coast-Northern Klamath Province (LSR 259) recommends 650 to 1,300 cubic feet per acre of coarse woody debris (minimum four inch diameter and three feet long) occur at stand age 80 within two site potential tree heights of any perennial stream and within the first site potential tree height of intermittent streams. All but one of the stands in LSR 259 currently meet the minimum requirements of 650 cubic feet per acre of coarse woody debris (see Table 3-1).

Alternative 1 Effects

Without thinning and density management, the proposed stands would remain dense, single-canopied stands, dominated by Douglas-fir. Canopy closure would remain at or above 100%, but the percentage of live crown would recede over time. Tree diameter growth and crown expansion would continue to decline due to competition among trees for water, nutrients, and sunlight. Height growth would continue, but with little increase in diameter, trees would become unstable and more susceptible to wind damage (Wonn 2001, Wilson and Oliver 2000).

Stand development and structural complexity would occur more slowly than under Alternative 2. Without silvicultural treatment or natural disturbances such as fire, stand growth would be stagnant, the formation of canopy gaps and multiple stories would generally not occur. Instead, the majority of stands would be single-layered and continue to lack structural complexity. Additionally, species diversity would decline as competition among trees would gradually eliminate shade-intolerant species such as sugar pine and big leaf maple. The closed canopy would reduce skylight reaching the forest floor, reducing understory and ground cover vegetation. Species richness and diversity would be delayed until a disturbance occurred to alter the stand developmental pathway.

Alternative 2 Effects

Commercial thinning and density management would directly reduce stand density and canopy closure, in turn reducing competition for nutrients, sunlight, and water among the residual trees. Thinning would improve stand health and the ability of residual trees to adapt to and survive disturbances. As a result, development of large-diameter dominant and co-dominant trees would be faster in Alternative 2 (proposed action) compared to Alternative 1 (No Action).

Within the LSR units, variable density thinning (treatments displayed in Table 3-2) would generate different results than the treatments in the Matrix. Because of variable density thinning (light, moderate, and heavy) coupled with canopy gaps and unthinned patches, post-thinning LSR stands would immediately have overstory spacing diversity. Understory and ground cover would remain sparse in unthinned patches, while vigorous dense shrub cover would develop in heavily-thinned patches, resulting in an enhanced layer effect to the canopy and understory. Reduced competition for light and nutrients would promote the growth of large trees faster, in turn providing a source for large woody debris. Existing conifer regeneration would be enhanced in areas where gaps are created, and new conifer regeneration would be initiated by natural seeding.

In lightly thinned areas, the increased growth rates would be expected to last for about 10 to 15 years; in moderately thinned areas, these rates may last 15 to 20 years. Canopy closure after 20 years is estimated to be about 90% for lightly thinned areas and 60% for moderately thinned stands. Canopy closure would increase until a disturbance alters stand characteristics.

In heavily thinned stands, increased growth would be expected to persist for 30 or more years for the following reasons: 1) the low number of residual trees occupying the stand would preclude competition among trees for nutrients, water and sunlight, although some competition from ground vegetation and advanced conifer regeneration is expected, and 2) canopy closure is expected to be about 40% to 55% in the stand. Ground vegetation, especially shrubs and grasses,

could thrive for 10 years or more in these conditions before understory trees become established. Once established, it would take another 20 to 30 years for these trees to grow to about 11 inch dbh. The development of this canopy layer could be shortened to around 20 years with site preparation and planting of seedlings.

Maintenance of hardwoods, and advanced regeneration at the time of the proposed harvest will contribute to the development of multiple canopy layers, and species diversity in the late-successional reserves. Future entries may be needed to maintain or further enhance structural and horizontal diversity within stands.

In sum, treatment would lead to the development of tree size and characteristics associated with mature and late-successional forest more quickly than without treatment (no action alternative). Table 3-3 summarizes post-harvest stand conditions across all land use allocations.

Table 3-2. Stand Silvicultural Treatments and Post-Harvest Characteristics of the LSR Stands

Unit	Thinning Treatment	Number of Gaps & Size (acres)	Planting	Potential Fuels Treatment
30-8-25A	Moderate	0		
30-8-25B	Heavy w/Gap	1x1 acre	x	Under burn
30-8-27 South	Heavy w/Gap	2x 0.5 acre	x	Under burn
30-8-27 North	Moderate	0		
30-8-35B	Moderate	0		
30-8-35C	North –moderate South-heavy	0		
30-8-35A	Heavy w/gap	1x 1 acre	x	Under burn
31-7-13	Moderate gap	0		

Figure 3-1. Comparison of Pre-Treatment GFMA Stand (left) with Post-Treatment GFMA Stand (right), immediately following treatment.

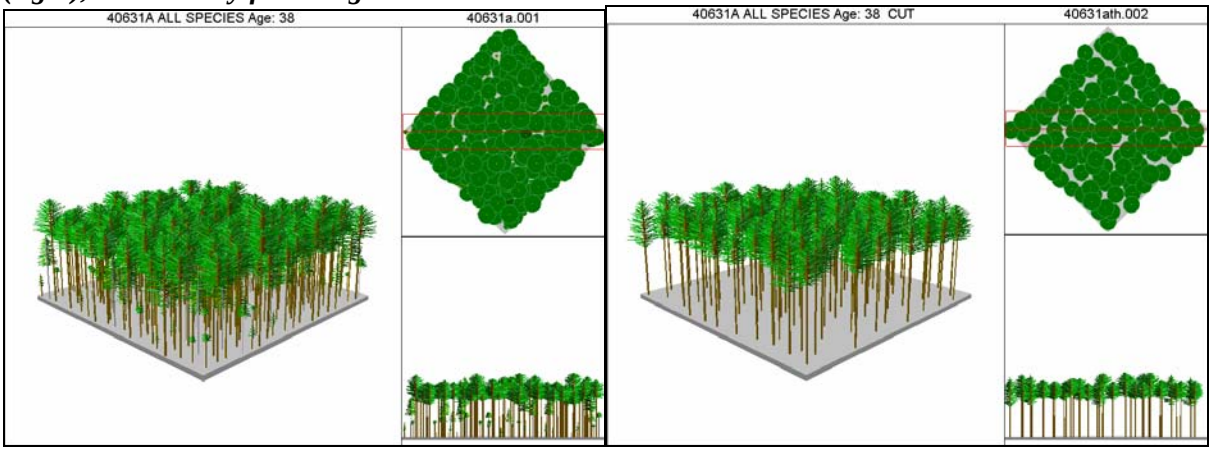


Figure 3-2. Post-treatment Connectivity/Diversity Block Stand, immediately following treatment. *(This graphic represents potential stand conditions after treatment for stands in connectivity/diversity blocks, Riparian Reserves, and LSR, due to the similar prescriptions. See Table 3-3)).*

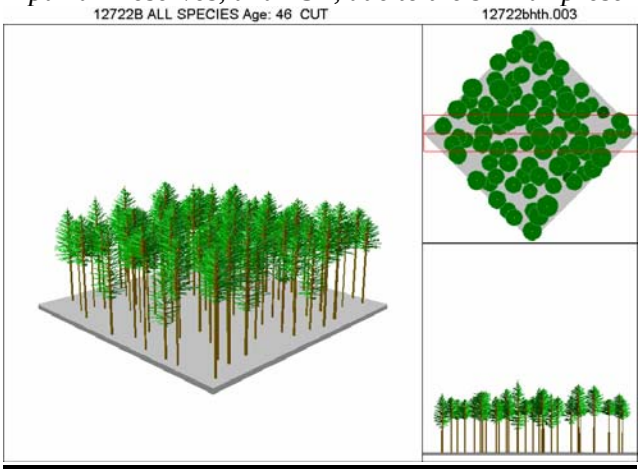


Table 3-3. Summary of Post-Harvest Stand Conditions

		Residual				
Unit	**Acres Treated**	**Trees / acre**	**QMD**	**Basal Area/Ac**	**Relative Density**	**Canopy Closure (%)**
General Forest Management Area						
30-7-13A	24	107	13.3	104	32	71
30-7-13B	28	110	12.6	96	30	67
30-7-13C	38	89	15.0	109	32	74
31-6-7A	8	92	14.6	108	32	72
31-6-19A	49	112	13.0	103	32	43
Connectivity/Diversity Blocks & Riparian Reserves						
31-6-13B	45	80	14.8	96	28	63
31-6-13C	101	88	15.1	109	32	70
31-6-15C	9	61	18.9	119	32	60
31-6-15B	7	65	18.2	118	32	63
31-6-15A	20	50	21.6	126	32	61
31-6-17A	35	86	14.7	102	30	66
31-6-17B*	15	100	14.0	100	32	43
31-6-17C	23	104	13.6	105	32	43
Late Successional Reserves						
30-8-25A	42	74	16.8	114	32	58
30-8-25B	47	93	14.5	84	25	53
30-8-27 South	112	71	17.2	102	28	54
30-8-27 North		79	16.1	112	32	65
30-8-35 B	23	79	15.6	104	30	62
30-8-35 C	37	58	15.2	73	21	45
30-8-35A	35	73	16.6	110	31	59
31-7-13B	24	80	15.4	103	30	64

* Post-treatment stand conditions estimated based on walk through and similarity to adjacent stand.

Table 3-4[5]. Conditions between No Treatment and Treated Stands over Time (Modeled Stand in Unit 30-8-27)

Stand Treatment	Year	*Trees per Acre	Basal Area (square feet per acre)	Quadratic Mean Diameter (inches)	Relative Density	Canopy Closure (percent)
Unthinned	Year 2007 Stand Age 45yrs	220	195	12.7	0.61	100
Light		71	115	17.2	0.32	62
Mod		60	102	17.6	0.28	54
Heavy		51	89	17.9	0.25	47
Unthinned	Year 2027 Stand Age 65yrs	155	235	16.6	0.66	100
Light		69	162	20.8	0.42	71
Mod		59	147	21.3	0.38	63
Heavy		50	130	21.8	0.32	55
Unthinned	Year 2117 Stand Age 155yr	84	326	26.7	0.77	100
Light		44	238	31.5	0.52	67
Mod		38	217	32.5	0.47	59
Heavy		34	204	33.2	0.44	55

*Trees per acre tally includes only the overstory trees that were initially on the site in year 2007 and does not account for ingrowth. It is expected that there would be greater ingrowth of trees and/or grasses and shrubs in stands that have a less dense residual (moderate and heavily thinned stands).

The proposed density management and commercial thinning are intermediate treatments designed to improve tree growth, species and structural diversity, stand health, and accelerate the development of late-successional stand characteristics within the LSR. Proposed gaps are relatively small and mimic small-scale disturbances such as root rot, insects and disease, lightning and small ground fires. These silvicultural treatments would not affect the age classification of the stands. For the BLM managed lands in the fifth field watershed, the approximate age class distribution[6] would remain as follows:

0-30 years = 23% 31-80 years = 14% 81-150 years = 23%
151-250 years = 38% 250-350 years = 2%

Over time, the age-class distribution of BLM-administered forest would tend toward older seral stages. Most of the BLM-administered lands (79%) in the watershed are within the LSR or Riparian Reserve where regeneration harvest is not scheduled. These forests would continue to grow older. While regeneration harvest would be done within the Matrix, these lands are still managed on harvest rotations of 80 - 110 years of age.

[5] Table 3-4 compares stand conditions under the two alternatives for three time periods (years 2007, 2027, and 2117). The table does not display or account for the silvicultural prescriptions which would maintain and promote growth of a variety of conifers and hardwoods species. In addition, it is expected that there would be an increase in the diversity of tress/ shrubs/and or grasses in stands that are more open (i.e. gaps and heavy thinning).

[6] The current age class distribution was derived from a Microstorms query, run January 7, 2008.

Forest lands under private ownership, which make up the majority of the Lower Cow Creek watershed, would continue to be managed intensively on the commercially viable rotation assumed by the PRMP/EIS (Vol. I, p.4-4) to be 50 years or less. Over time, existing mature and late-successional forest under private ownership is expected to be converted to early seral forest, and private forest is not expected to develop beyond a mature stage.

In fiscal year 2008, the BLM plans to pre-commercially thin or prune less than 300 acres. Such activities would also not affect the age classification of stands. The Cow Catcher Timber Sale, consisting of 146 acres of regeneration harvest, is also within the 5th field watershed. This 2003 sale was sold and awarded but is currently suspended due to litigation; approximately 26 acres were logged before the sale was suspended. Should the sale resume, it would replace mature and late-successional stands (approximately 110-220 years old) with early seral stands on approximately 0.3 percent of the BLM administered lands in the watershed.

II. Wildlife

The BLM Special Status Species and migratory birds potentially affected by the proposed action are discussed below. Special Status Species receive consideration due to the concern for future viability of these species and the potential for negative effects through management actions. Special Status Species consist of:

- Threatened and Endangered Species - species listed by the U.S. Fish and Wildlife Service (Service) under the Endangered Species Ac (ESA) of 1973 as amended, candidate species, or species proposed for listing under ESA, and
- BLM Sensitive and Strategic Species - species eligible for federal or state listing, or for candidate status under the ESA (USDI 2001); these species are on the BLM Special Status Species list[7]. Bureau Sensitive species are managed in compliance with BLM National Manual and OR/WA State Policy (BLM 6840). Policies from BLM 6840 do not apply to Bureau Strategic species (IM-OR-2007-072)[8]; as such they are not discussed in this analysis.

Migratory birds receive particular consideration under Executive Order 13186 (2001), with BLM utilizing management plans such as those developed by Partners in Flight[9].

[7] The Special Status Species list (available online at http://www.fs.fed.us/r6/sfpnw/issssp/) was last updated in July 2007.

[8] For Strategic species, analysis in NEPA documents is not required but if sites are located, field units are required to collect occurrence data and enter into the corporate database (e.g. GeoBOB) (IM-OR-2007-072) .

[9] Partners in Flight (PIF) is an international coalition of government agencies, conservation groups, academic institutions, private organizations, and citizens dedicated to the long-term maintenance of healthy populations of native landbirds. Its bird conservation plans are currently used as guidelines by many private and government organizations, including the BLM. Partners in Flight's Conservation Strategy for Landbirds in Coniferous Forests of Western Oregon and Washington (PIF strategy, Altman 1999) may be viewed online at http://www.orwapif.org/pdf/western_forest.pdf. The PIF strategy describes 20 species of concern, or "focal species," which were chosen based on their conservation needs and/or association with habitat types and attributes. The PIF plan assumes that management actions affecting focal species will also affect other species that use the same habitat types and attributes.

Lastly, a sharp-shinned hawk was observed in unit 30-7-13C but it is unknown if there is a nesting pair in the area. If further visits determine that sharp-shinned hawks are nesting in any proposed unit, the site would be protected by providing suitable habitat buffers and seasonal disturbance restrictions (ROD/RMP pg. 39).

A. Special Status Species

Twenty-nine special status wildlife species are known or suspected to occur on the Roseburg District. The proposed action would not affect 19 of them because the project area is outside their range or contains no suitable habitat, or because riparian buffers would provide adequate protection. These 19 species were eliminated from further consideration (Appendix B-6). The proposed action may affect the remaining ten special status species, discussed below.

1. Threatened and Endangered Species

a. Northern Spotted Owl (Spotted Owl, *Strix occidentalis caurina*)

Affected Environment

The proposed units do not contain any spotted owl suitable habitat; the proposed units are composed entirely of dispersal-only and unsuitable habitat due to relatively small tree size (quadratic mean diameter from ~10 to ~15 inches), high tree density (~175 to ~800 trees per acre), and lack of nesting structure. Dispersal habitat provides sufficient canopy cover and sub-canopy space for spotted owl movement, but lacks nesting/roosting/foraging components. Unsuitable habitat is found in forested areas currently providing no function for spotted owls.

Table 3-5. Acres of spotted owl habitat types in affected home ranges, including both BLM and private lands. Figures in parentheses are percentages of total habitat in home range.

Site (ID Number)	Suitable	Dispersal-Only	Unsuitable	Non-Habitat	Total
Boulder Creek (2042)	1,104 (33%)	303 (9%)	1,980 (58%)	6 (0.2%)	3393
***Catching Creek (2000)**	1,244 (37%)	1,721 (51%)	413 (12%)	16 (0.5%)	3393
***Council Creek (1910)**	888 (26%)	960 (28%)	924 (27%)	621 (18.3%)	3393
Dream Council (1799)	957 (28%)	480 (14%)	1,957 (58%)	0 (0%)	3393
***Gravel Creek (0302)**	589 (17%)	490 (14%)	2,314 (68%)	0 (0%)	3393
***Iron Mountain (0308)**	1,223 (36%)	289 (9%)	1,816 (54%)	66 (1.9%)	3393
Rattlesnake Creek (0300)	1,562 (46%)	367 (11%)	1,060 (31%)	406 (12%)	3393
***Reservoir (4365)**	1,087 (32%)	1,888 (56%)	361 (11%)	55 (1.6%)	3393
***Russell Creek (4054)**	1,106 (33%)	1,640 (48%)	636 (19%)	12 (0.3%)	3393
Russell Sprouts (1815)	1,260 (37%)	1,597 (47%)	486 (14%)	51 (1.5%)	3393
Silver Butte (2045)	1,155 (34%)	1,561 (46%)	659 (19%)	17 (0.5%)	3393
***Upper Middle Creek (0303)**	1,228 (36%)	1,003 (30%)	1,124 (33%)	38 (1.1%)	3393
***Wildcat Creek (2198)**	480 (14%)	1,957 (58%)	906 (27%)	50 (1.5%)	3393

* indicates sites showing repeated occupation by a pair of spotted owls and/or reproductive success over the past 5 years. The remaining sites have been less successful, typically remaining unoccupied or occupied by single or unpaired spotted owls (Appendix B-7).

Surveys identified 13 current or historic spotted owl sites with home ranges[10] that overlap some portion of the project area (Appendix B-1, B-2). Survey result summaries for the past 10 years for these sites are shown in Appendix B-7, and current habitat availability in the associated

[10] The effects of habitat modification to specific spotted owl sites are assessed by assigning a generalized home range with a radius of 1.3 miles in the Klamath Mountains physiographic province (USDI 1991).

home ranges is detailed in Table 3-5, and shown in Appendix B-3, B-4. Proposed units occur in Critical Habitat[11] Units (CHUs) OR-62 and OR-63 (Appendix B-1, B-2 and Table 3-6).

Table 3-6. Unit relationships to spotted owl Critical Habitat Units (CHUs), marbled murrelet CHUs, Habitat, & Zones

Unit	Season of Operation	Spotted Owl CHU	Marbled Murrelet Habitat		Marbled Murrelet Potential Habitat Trees?	Marbled Murrelet Zone[1]	Marbled Murrelet CHU
			Location	Mitigation			
31-6-13B	All Season	OR-63	NA	NA	NA	None	None
31-6-13C	All Season	OR-63	NA	NA	NA	None	None
31-6-15A	Dry Season	OR-63	NA	NA	NA	None	None
31-6-15B	Dry Season	OR-63	NA	NA	NA	None	None
31-6-15C	Dry Season	OR-63	NA	NA	NA	None	None
30-7-13A	All Season	None	Adjacent to Unit	Operating Restrictions	None	2	None
30-7-13B	All Season	None	Adjacent to Unit	Operating Restrictions	None	2	None
30-7-13C	Dry Season	None	None	None	Y	2	None
31-6-17A	Split	None	NA	NA	NA	None	None
31-6-17B	All Season	None	NA	NA	NA	None	None
31-6-17C	Split	None	NA	NA	NA	None	None
31-6-19A	Dry Season	None	NA	NA	NA	None	None
31-6-7A	Dry Season	None	NA	NA	NA	None	None
31-7-13B	All Season	OR-62	NA	NA	NA	None	None
30-8-25A	All Season	OR-62	Adjacent to Unit	Operating Restrictions	N	2	None
30-8-25B	All Season	OR-62	Adjacent to Unit	Operating Restrictions	Y	2	None
30-8-27C	All Season	OR-62	Adjacent to Unit	Operating Restrictions	Y	2	None
30-8-35A	Split	OR-62	None	None	N	2	None
30-8-35B	Dry Season	OR-62	Adjacent to Unit	Survey	N	2	None
30-8-35C	Dry Season	OR-62	Adjacent to Unit	Survey	N	2	None

[1] NA=Not Applicable, unit not in marbled murrelet zone

Alternative 1 Effects

The quality and availability of northern spotted owl habitat would be unaffected by this alternative, and spotted owl sites would support occupation and reproduction similar to current

[11] Critical habitat for the northern spotted owl was designated in Federal Register 57 (USDI 1992).US Fish and Wildlife Service defines critical habitat as habitat containing the physical and biological features essential to the conservation of the species. Designated Critical Habitat includes forest land that is currently unsuitable habitat, but has the capability of becoming suitable habitat in the future.

levels. Without treatment, suitable habitat characteristics would develop slower than with treatment under the proposed action (see discussion of effects to forest vegetation, p. 14-18).

Alternative 2 Effects

Overall, the proposed action would not be expected to negatively affect individual spotted owls or reduce the ability of the affected home ranges to support spotted owls because:

- *High-quality nesting, roosting, and foraging habitat would not be affected*
  The proposed density management would treat approximately 487 acres of unsuitable and dispersal-only habitat in 13 spotted owl home ranges.

- *Affected dispersal-only habitat in proposed units would retain functionality*
  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-project canopy cover would still be 40% or greater and the average tree diameter will be 11 inches or greater, 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-project levels, as discussed on p. 14 (Meiman et al. 2003).

  The proposed units generally occur at the periphery of the affected home ranges and treatment would not limit access to suitable habitat (Appendix B-3, B-4). Two units, 31-6-13B and C, are located between the Reservoir site and a large patch of suitable habitat to the west (Appendix B-2). However, treatment would not be expected block access to this habitat because there is additional dispersal-only habitat to the north and south of these units, and an 18-acre patch of suitable habitat between them. These stands would offer alternate paths around treated areas if owls chose to use them. Therefore, the unit prescriptions and spatial arrangement would not be expected to affect spotted owl habitat use at the home range scale.

- *The amount and distribution of untreated dispersal-only habitat in affected home ranges would be sufficient to allow spotted owls to access nesting, roosting, and foraging habitat*

- *Existing coarse woody debris and snags would be reserved to the greatest extent possible, providing habitat for prey species*

- *Noise disruption would not affect nesting or fledging activities*
  All activities would either be seasonally restricted from March 1st to June 30th or meet the minimum disruption distance[12] from known spotted owl sites; therefore no effects to spotted owls (such as nest abandonment or premature fledging) from noise disruption are expected under the proposed action.

- *Spotted owl CHUs OR-62 and OR-63 will retain functionality*

[12] The minimum disruption distance from sites is 65 yards for chainsaw and 35 yards for heavy equipment from any known spotted owl site (as established by the US Fish and Wildlife Service, USDI 2005).

The BLM consulted with US Fish and Wildlife Service on the effects of the proposed action to spotted owl Critical Habitat (USDI 2005). This analysis determined that habitat availability and connectivity in CHUs OR-62 and OR-63 would continue to provide for the survival and recovery of spotted owls under the proposed action.

Furthermore, density management would provide future benefits to spotted owls and their prey by accelerating the development of habitat features like large trees and snags, multiple canopy layers, herbaceous and shrub vegetation, and large coarse woody debris. Lastly, management would speed development of contiguous suitable habitat in LSR 259, improving its ability to meet its desired future condition and support reproductive owl pairs.

Table 3-7. Acres of proposed treatments in affected spotted owl home ranges (dispersal-only or unsuitable habitat). Acres occurring in multiple home ranges are counted multiple times.

Site	No Treatment	Moderate Thin	Heavy Thin	Opening	Site Total
Boulder Creek	23	70	37	1	130
Catching Creek	0	55	0	0	55
Council Creek	0	8	0	0	8
Dream Council	3	87	0	0	90
Gravel Creek	0	77	0	0	77
Iron Mountain	0	0	5	0	5
Rattlesnake Creek	0	8	0	0	8
Reservoir	0	142	0	0	142
Russell Creek	0	126	0	0	126
Russell Sprouts	0	163	0	0	163
Silver Butte	0	36	0	0	36
Upper Middle Creek	0	66	0	0	66
Wildcat Creek	13	35	6	0	54
Grand Total	39	873	48	1	961

b. Marbled Murrelet (Murrelet, *Brachyramphus marmoratus*)

Affected Environment

None of the proposed units occur in murrelet Critical Habitat, designated in Federal Register 61 (USDI 1996), nor do the units contain suitable murrelet habitat, as these units lack trees exceeding 18 inches diameter at breast height, multistoried canopies with moderate closure, sufficient limb size and substrate (moss, duff, etc.), flight accessibility, and protective cover from weather conditions and potential predators (Manley 1999, Burger 2002, Nelson and Wilson 2002). However, the following nine units occur within murrelet Zone 2 and are adjacent to suitable habitat (also see Appendix B-5, Table 3-6):

30-7-13A	30-8-25A	30-8-35A
30-7-13B	30-8-25B	30-8-35B
30-7-13C	30-8-27C	30-8-35C

This habitat will be surveyed for murrelets or these units will receive seasonal/daily operating restrictions during the breeding season as described in Chapter 2 (page 9).

Large remnant trees that provide potential nesting platforms for murrelets are sometimes found in previously harvested stands. Such trees occur in units 30-7-13C, 30-8-25B, and 30-8-27C (Table 3-6). These units will be managed according to guidance provided by the Roseburg/Coos Bay BLM Level 1 Consultation Team (Potential Habitat Guidelines, USDI 2004). This guidance provides three options:

- Units may be cleared through survey and any thinning prescription applied;
- Potential habitat trees may receive a ½ site potential tree radius 'no-touch' buffer and any thinning prescription applied; or
- An LSR density management prescription may be applied if designed to protect and enhance murrelet habitat within a ½ site potential tree radius of potential habitat trees.

Alternative 1 Effects

No marbled murrelet habitat would be modified by this alternative and any adjacent murrelet sites would experience no adverse effects to occupation or reproduction. The development of suitable habitat characteristics would occur at a slower rate than under the proposed action, Alternative 2 (see discussion of effects to forest vegetation, p. 14-18).

Alternative 2 Effects

Overall, the proposed action would not be expected to negatively impact individual murrelets or the availability of suitable murrelet habitat because:

- *No effects to murrelets from noise disruption is expected because units with adjacent suitable murrelet habitat will receive daily operating restrictions[13] (April 1- August 5) or will be surveyed[14] for murrelets*
- *Suitable murrelet habitat would not be modified*
- *Potential murrelet nest trees in units 30-7-13C, 30-8-25B, and 30-8-27C will be managed according to the Potential Habitat Guidelines, protecting existing nesting structure while allowing for enhancement of surrounding habitat. Unit boundaries may also be adjusted to exclude potential nest trees.*

Density management would benefit murrelets in the long term because the proposed action would:

- *Stimulate the development of nest trees with large branches, platforms, and suitable nesting substrate, which would decrease the time required for the units to become suitable murrelet habitat.*
- *Accelerate the development of contiguous suitable habitat in LSR 259, which would improve its ability to support reproductive murrelets, and*
- *Improve the stands' abilities to withstand disturbances such as fire, insects, or windthrow by maintaining tree growth and vigor.*

[13] Units would receive daily operating restrictions from April 1 to August 5 if murrelets are detected in adjacent habitat; these restrictions would be waived if murrelets are not detected. If necessary due to adjacent habitat (see Table 3-6), remaining units would receive daily operating restrictions from April 1 to August 5.

[14] Suitable murrelet habitat within 100 yards of units 30-8-35B and C will be surveyed for 2 years (PSG 2003) to determine murrelet occupancy.

2. BLM Special Status Species

No suitable habitat or habitat features for BLM Special Status Species would be affected under Alternative 1 (No Action) and any species sites in or adjacent to the project area would be expected to persist. The development of suitable habitat characteristics for these species such as large trees, snags, coarse woody debris, and a well-developed understory would occur more slowly than under Alternative 2. As such, the effects of Alternative 1 are not discussed on a species-by-species basis below.

a. Chace Sideband (*Monadenia chaceana*) and Oregon Shoulderband (*Helminthoglypta hertlieni*)

Affected Environment

These mollusk species are endemic to northwestern California and southwestern Oregon. They require adequate food sources, thought to be leaf litter, fungus, and/or detritus, as well as refugia from desiccation during dry periods. Possible refugia for the species include interstices in rock-on-rock habitat, soil fissures, or the interior of large woody debris (Weasma 1998*a*, Weasma 1998*b*, Frest and Johannes 2000). When active, these species can be found using herbaceous vegetation, ferns, leaf litter, or moss mats in moist, shaded areas near refugia. Where it occurs, suitable habitat will be surveyed in all units using an accepted protocol (Duncan et al 2003)[15].

Alternative 2 Effects

The proposed action would not be expected to negatively affect these mollusk species because if found, sites would be protected by altering unit configurations, designating buffers, or implementing other measures to provide suitable microclimate, undisturbed substrate, and vegetation or down wood. These measures would ensure that, if present, viable populations of these species would remain in the project area. The proposed action would indirectly benefit these species by accelerating the development of suitable habitat features like large coarse woody debris and herbaceous vegetation.

b. Purple Martin (*Progne subis*)

Affected Environment

Although many purple martin populations nest in birdhouses or other artificial structures, other populations nest in tree cavities. Snags with woodpecker cavities are thought to be the most important habitat features for these populations, and nests are typically found in open areas near water (Brown 1997, Horvath 2003). Units 31-7-13B and 31-6-15C contain some large snags and trees that could provide foraging and roosting opportunities for purple martins.

Alternative 2 Effects

The proposed action could negatively affect purple martins through both habitat modification and disturbance. While large green trees suitable for nesting would be reserved from harvest, some suitable nest snags in units 31-6-15C and 31-7-13B would likely be felled for safety reasons. Disturbance from operations in these units could occur during purple martin

[15] Surveys for these species require two visits. Unit 31-6-13B received visits in spring and fall 2007 with no target snails found; the remaining units containing suitable habitat were surveyed in fall 2007 and would receive surveys again in spring 2008.

nesting season, resulting in displacement of nesting birds. It is unknown if purple martins are using these stands, and any effects would be negligible when considered at the population scale.

c. Bat Species: Townsend's Big-Eared Bat (*Corynorhinus townsendii*), Pacific Pallid Bat (*Antrozous pallidus pacificus*), and Fringed Myotis (*Myotis thysanodes*)

Affected Environment

These insectivorous bat species use similar hibernacula and roost sites, including caves, mines, rock crevices, hollow trees and snags (Fellers and Pierson 2002, Lewis 1994, Weller and Zabel 2001). Large remnant trees in units 31-7-13B and 31-6-15C could provide foraging and roosting opportunities for these species.

Alternative 2 Effects

The proposed action would not affect most of the primary roosting and hibernating structures (caves, mines, rock outcrops, bridges, large trees) for these species. However, some suitable snags in units 31-6-15C and 31-7-13B would likely be felled for safety reasons and disturbance from operations in these units could result in displacement of roosting bats. Although it is unknown if these bat species are using the proposed units, potential effects would be negligible when considered at the population or landscape scale. Density management would benefit these species by accelerating the development of large trees suitable for roosting, and by favoring insect populations through development of herbaceous and shrub vegetation.

d. Western Pond Turtle (*Clemmys marmorata*)

Affected Environment

This omnivorous turtle inhabits marshes, ponds, lakes, streams, and rivers with emergent structure. While Manzanita Pond in unit 30-8-27 C does not provide habitat capable of supporting breeding populations of pond turtles, it may be used as a 'stepping stone' as turtles disperse across the landscape.

Alternative 2 Effects

The proposed action would not be expected to affect pond turtle habitat in unit 30-8-27C, as it is in a large "No Treatment" area along Manzanita Creek. This area would preserve shade trees and vegetative cover and maintain existing temperature regimes, and as such it could continue to support pond turtle use.

3. Migratory Birds: Hermit Warbler (*Dendroica Occidentalis*), Wilson's Warbler (*Wilsonia pusilla*), and Winter Wren (*Troglodytes troglodytes*)

The project area currently contains young forest with closed canopy and open sub-canopy habitat attributes, as defined by the Partners in Flight[16] plan. After the project is completed the

[16] Executive Order 13186 (2001) directs agencies to utilize existing management plans for migratory birds, such as those developed by Partners in Flight. Partners in Flight (PIF) is an international coalition of government agencies, conservation groups, academic institutions, private organizations, and citizens dedicated to the long-term maintenance of healthy populations of native landbirds. Its bird conservation plans are currently used as guidelines by many private and government organizations, including the BLM. Partners in Flight's Conservation Strategy for Landbirds in Coniferous Forests of Western Oregon and Washington (PIF strategy, Altman 1999) may be viewed online at http://www.orwapif.org/pdf/western_forest.pdf.

project area will remain young forest with an open sub-canopy and forest floor complexity, and will soon develop a deciduous understory/sub-canopy. Three of the Partners in Flight plan's high-priority focal species may be affected by the proposed action, the habitat attributes used by these species and the potential effects to habitat are discussed below.

Affected Environment

The hermit warbler forages in closed canopy stands with high foliage volume and would be expected to currently use the proposed units. It is associated with stands of various ages that provide closed canopies with dense crowns. Other species associated with similar habitat attributes are the golden-crowned kinglet and chestnut-backed chickadee.

Wilson's warbler is an insectivorous species that uses deciduous shrub and subcanopy layers in a wide range of forest age classes. Although the proposed units generally do not have a well-developed understory, they could provide some habitat for Wilson's warbler. Although the species is primarily associated with forest stands, it can also use early-seral shrub habitat. Other species associated with similar habitat attributes are the Swainson's thrush and warbling vireo.

The winter wren forages on the ground and low understory in structurally complex areas, is found most commonly in older forest, and is thought to be an interior species sensitive to fragmentation. It uses shrubs, rootwads, down logs, ferns, and herbaceous vegetation for foraging. Other species associated with similar habitat attributes are the orange-crowned warbler and rufous hummingbird. The proposed units are generally lacking in suitable structural complexity for these species.

Alternative 1 Effects

Existing habitat conditions would remain unchanged for the short term and stands would remain on their current growth trajectories if no action is taken. Overstocked stand conditions would result in relatively slow growth rates that would be unfavorable to the development of mature and late-successional forest attributes, particularly large-diameter trees, high crown volume, large branches, cavities, large snags, and large CWD. Stand function as wildlife habitat would remain unchanged in the near term in the proposed units.

Alternative 2 Effects

The proposed action would remove trees from the proposed units, temporarily decreasing foraging and nesting opportunities for the warblers. However, foraging and nesting opportunities would increase in the long term as residual tree growth accelerated and canopy volume increased. The units generally lack structural complexity, and management would accelerate the development of shrubs, understory trees, and residual trees – high quality, contiguous habitat for these three species.

The proposed action would meet the Partners in Flight recommendation to leave untreated areas, down wood in harvest units, and riparian buffers; these measures would provide the species with untreated refugia, providing for continuity of use.

The PIF strategy describes 20 species of concern, or "focal species," which were chosen based on their conservation needs and/or association with habitat types and attributes. The PIF plan assumes that management actions affecting focal species will also affect other species that use the same habitat types and attributes.

4. Cumulative Effects on All Wildlife

Currently, there is less late-successional forest habitat available than on historic average. As such, the availability of late-successional forest habitat is the primary wildlife concern in the Lower Cow Creek watershed, based on the effects of past and expected future timber harvest on federal and private land.[17] Early and mid-seral habitat is expected to be common on both BLM and private land in the watershed due to past and future timber harvest, but not all of this habitat is useful to wildlife. Private lands in particular may be managed for a densely-stocked Douglas-fir, with few large residual trees remaining after harvest and deciduous and minor conifer species are targeted for elimination through herbicide treatment and thinning. These stands are not expected to provide high levels of habitat for wildlife species that use attributes like herbaceous understory vegetation, a shrub or mid-story layer, or large residual trees and snags. The proposed thinning and density management would help moderate this trend by providing high-quality mid-seral wildlife habitat.

As stated at the beginning of the chapter, however, 79% of BLM-managed lands (LSRs and Riparian Reserves) in the watershed are reserved from harvest and are intended to become late-seral stands, with management activity such as the proposed action designed in part to help accelerate the development of late-successional stand characteristics. The development of forest vegetation over time within the watershed is discussed on p. 14-18.

While the proposed action will reduce tree densities, it will 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 removing canopy cover and horizontal structure. However, sufficient residual tree density, snags, and coarse woody debris will remain to provide continued wildlife habitat, and treated stands will regain pre-project cover characteristics as discussed on p. 15. Consequently, the proposed action will not affect the availability of late-seral habitat in the watershed, and will contribute to the development of functional mid-seral habitat. Additionally, late seral habitat will be continually developing in the watershed as the RMP is implemented. These factors indicate that the proposed action would not cause cumulative effects to the continued availability and functionality of wildlife habitat in the Lower Cow Creek watershed or to species associated with it.

Two spotted owl home ranges affected by the proposed action would also be affected by reasonably foreseeable actions in adjacent watersheds, the Olalla-Lookingglass Density Management (USDI 2007*b*) and the Middle Fork Coquille Thinning/Density Management (USDI 2007*c*). These actions would affect approximately 74 acres in the Boulder Creek home range and 173 acres in the Wildcat Creek home range. These managed, mid-seral conifer stands will be treated similarly to units in the proposed action, and would maintain sufficient residual tree density, snags, and coarse woody debris to retain wildlife habitat function.

The 2003 Cow Catcher Timber Sale, currently suspended due to litigation, would remove approximately 146 acres total of suitable nesting, roosting and foraging habitat for the spotted

[17] Stands in this area begin functioning as late-successional habitat at approximately age 80, when characteristics like large diameter trees, a secondary canopy layer, snags, and cavities have developed.

owl in the Lower Cow Creek 5th field watershed. The Cow Catcher and Lower Cow Creek projects would affect four of the same owl home ranges[18] and CHU OR-63. The Cow Catcher sale would remove approximately 60 acres nesting, roosting, and foraging habitat within CHU OR-63 (USDI, 2003), reducing the available suitable habitat on Federal land in the CHU by 1.2%. The Cow Catcher sale was determined to be "not an adverse effect" on critical habitat, however, because adjacent LSRs and Riparian Reserves would continue fulfilling the biological function of the CHU (USDI 2003). The Lower Cow Creek project would not remove any additional suitable habitat within the CHU, and subsequent programmatic consultation with the US Fish and Wildlife Service (USDI 2005), covering the Lower Cow Creek project, determined that habitat availability and connectivity in CHU OR-63 would continue to provide for survival and recovery of spotted owls when considered in light of other activity (see p. 22).

III. Soils

Affected Environment

The soils in the project area are predominantly derived from sedimentary rock (sandstone, siltstone, mudstone, and shale), along with metamorphosed sandstone and siltstone (slate), and small areas of volcanic rock (basalt, and andesite) (Johnson 2004, Walker 1991, Wells 2000). The bedrock ranges from thinly bedded sedimentary rock to highly fractured, metamorphosed material. Surface soil textures for all of the proposed units include loams, clay loams and silty clay loams. Subsoil textures are silty clay loams, silty clays and clays. The soils are well drained in most areas, with moderately slow permeability (Johnson 2004).

The slopes within the proposed units area mainly moderate (30 to 65% slopes) to steep (65 to 90% slopes), with convex side slope ridges. The soils are moderately deep (20-40 inches) to deep (40-60 inches), with 15 to 60 percent gravels. North facing slopes generally have deeper soils and with fewer rock fragments throughout the soil profile than south facing slopes.

Past harvest on these units in the 1950s and 1960s left cut banks and small fill slopes across the terrain. Old primary skid trails are heavily compacted (dense, massive to platy soil structure) in the top five to six inches of soil over the running surface, and the secondary skid trails generally have compacted soils of 4 to 6 inch depth along the tread areas (3 to 4 feet wide per tread area). Little erosion is currently occurring along the old skid trails and road side cast areas.

The soil and rock material within and immediately adjacent to the proposed harvest units (within 900 feet of unit boundaries) have a low incidence of slope movement, as evidenced from the analysis of past aerial photos (1967, 1968, 1978 and 2004), in conjunction with the field investigations. Given the low amount of slope movement in the proposed harvest areas, slope stability is not an overall concern.

Alternative 1 Effects

Without harvest or road-building activities, no additional soil compaction or displacement would occur. Compacted soils within the skid trails would continue to recover slowly as plant roots continue to penetrate the soil, as organic matter gets incorporated into the

[18]These home ranges are: Catching Creek, Council Creek, Rattlesnake Creek, and Upper Middle Creek.

soil, and as small animals burrow through the soil layers. The duff layer and soil organic matter would continue to increase slowly with the accumulation of needles, twigs and small branches, and decomposing larger woody material, absent a fire of sufficient intensity to consume the material.

Alternative 2 Effects

Soil displacement and compaction could be expected to result from spur and landing construction and from timber yarding. Reductions in soil productivity could be minimized by controlling the area and extent of harvest disturbance, and by restricting operating periods for ground based operations as discussed in Chapter 2. Surface soil erosion in disturbed areas can be controlled by applying erosion control measures. Best Management Practices and direction from plan maintenance would be applied throughout the construction and harvest-related activity to minimize detrimental soil displacement and compaction (ROD/RMP, USDI 1995a, Appendix D, Best Management Practices; USDI, 2001, pg.70).

The creation and use of landings and temporary spurs would displace and compact soil, decreasing soil productivity. Temporary spurs and landing areas can be tilled to help prevent runoff and erosion, by reducing the amount of soil compaction and increasing water infiltration into the soil. Tilling the soil with several offset passes of tilling equipment can bring about greater than 80 percent soil fracturing (from subsoiling monitoring, Diet Coq commercial thinning area, South River Resource Area, Roseburg BLM). Although tillage does not produce total recovery from soil compaction or restore detrimental soil displacement, tillage is an important step in the recovery process (Luce 1997).

Approximately 488 acres would be cable yarded. Soil disturbance from cable yarding varies by topography (convex vs. concave slope), slope steepness, and amount of logs yarded. Cable yarding generally produces localized areas of soil disturbance, such as duff removal or displacement of the top 1 to 3 inches of soil, along the yarding corridors, with the greatest disturbance within 100 feet of the landing. Low to moderate soil compaction is concentrated in the center of the corridors at shallow depth of 3-4 inches. Past monitoring of similar commercial thinning activities[19] under similar conditions has shown that cable yarding resulted in less than 2 percent of soil disturbance of cable yarded areas, including the landings; such soil displacement and compaction is not considered substantial enough to affect soil productivity.

Yarding of approximately 50 acres would be ground-based; the effects of such yarding varies by equipment used, number of equipment passes over the trails, the terrain, access routes, climatic conditions and operator skill. Monitoring[20] shows that harvest from tractor, rubber tired skidders, and shovel loaders affected 3 to 8 percent (an average of less than 6 percent) of ground-based harvest areas in landings (including large piles) and skid trails. The use of a harvester/forwarder has similar results, with a lesser extent and depth of compaction.

[19] Monitored sales include Diet Coq, Tator Tot and Taylor Made commercial thinnings, South River Resource Area, Roseburg BLM.

[20] Monitored sales include Smoke Screen, Diet Coq, Tator Tot and Taylor Made commercial thinnings, South River Resource Area, Roseburg BLM.

Monitoring[21] has shown that forwarder trails plus landings covered from 3 to 9 percent of the unit area. These trails resulted in the top 3 to 6 inches of soil having light to heavy compaction, mainly concentrated in the tread areas. Within the tread areas, the top 1 to 3 inches of soil were displaced. When conducted over slash and dry soil conditions, harvester operations have either not compacted soil or only lightly compacted soil in the tread areas.

Approximately 184 acres are slated for helicopter yarding. This system would have negligible displacement or compaction of soils.

With the project design features described in Chapter 2 and best management practices, resulting soil erosion would be limited to localized areas, and any reduction of soil productivity would be low to minor. The effects to soils would be consistent with those identified and considered in the Proposed Resource Management Plan/Environmental Impact Statement (Chapter 4, p. 12-16).

No cumulative effects to the soils would be anticipated as effects would remain confined to the proposed units and the immediate area. 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).

IV. Hydrology

Affected Environment

The climate within the Lower Cow Creek watershed is characterized by cool, wet winters and hot, dry summers. Annual precipitation varies with elevation and typically ranges from 32 to 80 inches (USDI 2002), mostly in the form of rain between November and March, with some snow at higher elevations. The moderately steep slopes and soil and bedrock conditions promote moderate permeability and runoff rates in response to rainfall and snowmelt. The hydrologic regime under these conditions is characterized by a runoff-dominated system with relatively "flashy" stream flows (high magnitude and short duration) and large seasonal differences. Stream flow volumes closely parallel the precipitation pattern, peak stream flows occur from November to March, and low stream flows occur from July to October.

Table 3-8. Perennial Streams in or Adjacent to Proposed Thinning Units

Stream Name	Adjacent Unit(s)
Manzanita Creek	30-8-27 C
Live Oak Creek	30-8-35 B,C & D
Table Creek	30-8-25 A & B
Council Creek	31-6-5 A, 31-6-17 A,B & C
Gravel Creek	31-6-19A
Doe Creek	30-7-13 A,B & C
Catching Creek	31-6-15 A,B & C
Russell Creek	31-6-23 A & B, 31-6-13 A & B

[21] Monitored sales include Taylor Made Commercial Thinning and Bogey Gap Density Management, South River Resource Area, Roseburg BLM.

Most streams identified within or adjacent to the proposed commercial thinning and density management units are first and second order headwater streams. Most of these first and second order streams are unnamed and intermittent, with no surface flow during the dry season. All perennial streams within or adjacent to the proposed commercial thinning and density management units are displayed in Table 3-8; these eight streams are third to fifth order streams.

Timber harvest in the Transient Snow Zone[22] (TSZ) may result in higher than normal peak flows (Harr and Coffin, 1992). Harvest creates openings, which increase snow accumulation; rain on the snow events cause rapid melt, potentially increasing peak flow. Approximately 600 acres in the proposed treatment units are located in the TSZ, (see Table 3-9).

The risk of potential peak flow enhancement was evaluated through a model[23] developed by the Watershed Professionals Network (1999). The model relates the risk of potential peak flow enhancement to the number of acres in a watershed located in the TSZ and the percent of this area with less than 30 percent canopy closure (see Table 3-9). Aerial photo interpretation and Geographic Information Systems (GIS) analysis of vegetative conditions in the subwatersheds indicated that:

- although past timber harvest and road construction has created openings within the canopy, over 75 percent of the forested lands in the TSZ have canopy closures greater than 30 percent
- the amount of openings within the TSZ in affected subwatersheds are well below the point where the risk of peak flow enhancement increases (see Table 3-9)

Roads can also increase the drainage density of a watershed, acting as a preferential pathway for surface water runoff, resulting in a decrease in the volume of overland flow that infiltrates into the ground water or soil water storage (Furniss, et al. 1991). In Pacific Northwest forests, soil infiltration capacity often exceeds precipitation inputs, therefore timing and magnitude of stream flow response in the Pacific Northwest is dependent on subsurface flow. With high rates of subsurface flow, there is an increased chance of roads intercepting this and altering the subsurface flow to surface flow. Increased surface flow is expected to temporarily increase peak flows without effecting total streamflow volume (Jones, 2000). Peak flows have been shown to increase substantially when roads occupy more than 12 percent of a watershed (Watershed Professionals Network 1999 p. IV-15). The road density within the affected subwatersheds is discussed in Table 3-9.

With the low road density, the low amount of the TSZ in openings, and the post-treatment canopy closure exceeding 30% in all stands (see Table 3-3), no substantive change from the current conditions is expected. As such, the potential for peak flow enhancement from rain-on-snow events in these areas is low (Watershed Professionals Network 1999).

[22] The Transient Snow Zone is an area between 2,000 and 5,000 feet elevation that may alternately receive snow or rain.

[23] Model recommended in the Oregon Watershed Assessment Manual (Watershed Professionals Network 1999). IV-11).

Table 3-9. Description of Current Conditions in Affected Subwatersheds

6th Field Subwatershed	Total Forested Acres	Area in TSZ (%)	TSZ Area in Openings Compared to % Needed in Openings to Increase Risk of Peak Flow (%)[1]		Road Density
Cattle Creek	10,311	35	7%	(80%)	3%
Doe Creek	18,850	35	10%	(80%)	2%
Lower Cow Creek	17,587	39	4%	(75%)	3.25%
Middle Creek	26,787	63	24%	(55%)	3.25%
Union Creek	17,455	54	11%	(60%)	3%

[1]Amount of TSZ in openings is based on GIS analysis and aerial photo interpretation. The percentage in parentheses indicates the amount of TSZ area that would need to be in openings for the risk of peak flow enhancement to be increased.

[2] Based on the Oregon Watershed Assessment Manual Risk Classes for these 6th field subwatersheds

Roads may also directly alter streams by increasing erosion and sedimentation, which in turn may alter channel morphology (Furniss, et al. 1991). Roads can be major contributors of fine sediment to streams (Reid 1981, Reid and Dunne 1984). This additional sediment can reduce water quality for domestic use and can cause detrimental changes to streams and their inhabitants (Castro and Rechendorf 1995). Where roads are hydrologically connected to the stream channel at road crossings, discharge may be sufficient enough to create gullies in the roadside ditch, and road fillslopes may encroach on streams.

No recent quantitative sediment data exists for the streams located in or adjacent to the proposed treatment units. However, BLM conducted qualitative assessments of stream channel conditions in Lower Cow Creek using the Pfankuck Stream Channel Stability Survey[24], and all the streams surveyed received a "good" rating for deposition of fines and efficiently processing flow and sediment (2002 USDI/BLM).

Four streams (listed below) in the general project area are listed on the Oregon Department of Environmental Quality (ODEQ) 303(d) Water Quality Limited List for elevated temperatures. Doe Creek is adjacent to some of the proposed units. Cattle Creek, Cow Creek, and Union Creek are within seventh field watersheds that would be treated under the proposed action, but are not adjacent to units. As such, the proposed action would not directly affect these three streams. The most common cause of elevated stream temperatures associated with timber harvesting is a reduction in streamside shade, causing streams to be more susceptible to increases in temperature by solar radiation reaching the stream surface (Moore and Miner 1997). Water temperature is a key factor affecting the growth and survival of aquatic organisms.

Manzanita Creek and Live Oak Creek are perennial tributaries to Union Creek. Data collected by the BLM in 1999-2000 indicate temperatures in Union Creek exceeded state standards by 2.2 Celsius (USDI 2002). However, reaches of Manzanita Creek and Live Oak Creek on BLM lands in or adjacent to the proposed treatment units were surveyed in 2007 and rated, by ocular estimates, to be well shaded with dense stands of conifers and hardwoods.

[24] Selected elements from the survey provide insight into erosional processes in headwater streams and document current conditions. Key identifiers include mass wasting of upper stream banks, lower stream bank cutting, and deposition of fine sediment (including sand, silt, and clay-sized particles) within the channel. Streams surveyed and located adjacent to or near proposed treatment units included Cattle Creek, Union Creek and Russell Creek.

Maintenance and enhancement of structurally diverse riparian zones on BLM lands is a key component of the Lower Cow Creek Water Quality Restoration Plan (USDI 2002).

There are no domestic use surface water rights within any of the proposed units or within one mile downstream from any of the proposed units.

Alternative 1 Effects

Without harvest, there would be no change to the level of canopy closure within the transient snow zone or alongside streams. As such, there would be no increase in snow melt rates leading to increased peak flows within the transient snow zone. Stream temperatures would not increase due to more solar radiation reaching the stream. Absent the roadbuilding and renovation activity associated with the harvest, there would be no change in the amount of roads within the subwatersheds and no extension of the drainage network. Consequently, there would be no additional flow routing associated with roads that could result in potential changes in the timing and volume of peak flows and there would be no additional contributions of sediment from roads.

Alternative 2 Effects

Overall, the proposed action would not adversely affect the hydrologic functions within the affected subwatersheds. Specifically:

- *Peak flows are not anticipated to increase within the project area, from either harvest within the transient snow zone or from roads.*
  Peak flow increases primarily occur in transient snow zones with less than 30% crown closure (Watershed Professionals Network 1999, IV-11), and the proposed action will result in an average crown closure exceeding 30%. Given the low road density in the subwatersheds (Table 3-9), the negligible increase in road density associated with the proposed action, and the fact that these new roads would remain disconnected from the stream drainage network, no enhancement of peak flows would be expected in individual streams or at the subwatershed scale.

- *Sedimentation is not anticipated to increase due to harvest activities.*
  With the exception of two segments, all new road construction would be sited away from streams. The two proposed road segments crossing stream channels would be a newly constructed dirt spur in unit 30-7-13C and a road renovation in unit 31-6-19A. All roads would be out-sloped to the greatest degree practical in lieu of the construction of ditch lines and installation of cross drains or ditch relief culverts. Where out-sloping is not practical because of road grade, the roads would be in-sloped and drain dips installed to assure that flow is dispersed onto adjoining slopes and absorbed into the forest floor. Timber hauling could occur in both the dry and wet seasons, but would be restricted to paved and rocked roads during the wet season. Since new road segments would not be directly connected to the stream drainage network and seasonal hauling restrictions would be implemented, it is unlikely hauling activity would increase sediment delivery to stream channels. Consequently, the roads would be disconnected from the stream/drainage network and would have no potential for affecting peak stream flows or sediment input.

Density management in riparian areas could cause localized soil disturbance and a short-term potential for erosion associated with yarding, but generally yarding corridors would be placed outside riparian areas. Where corridors must be built through riparian areas, the trees will be felled to stay within the riparian area and act as armor for stream bank stability, provide instream habitat, and to trap any sediment inputs from yarding over the riparian reserve. Units 30-7-13C, 30-8-25A and 31-6-17C will all have one yarding corridor through the riparian area. All three of these units have stable channels and riparian areas in such condition that yarding through the area would not cause any detrimental effects to the channel. In unit 30-7-13C, the riparian area does not consist of many standing trees; due to blow down, many of the trees have fallen into or above the channel which would result in sufficient armor for the stream banks, provide a trap for sediment and also provide instream habitat.

In a study of 26 timber harvest areas, 19 of 22 streams within the harvest area that had riparian buffers had no chronic sediment loading within 2 years of the timber harvest (Rashin, Clishe, Loch and Bell, 2006). "No harvest buffers" established on streams in or adjacent to proposed units would prevent disturbance to stream channels, stream banks, intercept surface run-off and allow sediment transported by overland flow to precipitate out before reaching active waterways. Therefore, the amount of sediment contributed from the proposed action would be negligible when compared to the amount of sediment contributed from all other natural sources.

- *Harvest activity would not contribute to increased stream temperature*
  Variable width "no-harvest buffers" with a minimum width of 20 feet from intermittent and non-fish bearing perennial streams and 50 feet from perennial fish bearing streams, would conserve the vegetation providing the primary shade along streams. Treatment of Riparian Reserves outside the "no-harvest buffers" would retain at least a 40% canopy closure and maintain and restore species composition and structural diversity of plant communities (see Table 3-4). Consequently, stream shading would not be affected by density management and it is unlikely that stream temperatures would be affected in localized reaches, or cumulatively at the watershed scale. Long-term effects of thinning would accelerate the development of large trees to provide structure and coarse woody debris to streams, in turn enhancing pool depth and reducing stream bedrock exposed to thermal loading. These benefits would serve to moderate solar inputs over time.

V. Aquatic Habitat & Fisheries

All of the proposed sale units are located within the Lower Cow Creek Watershed; below the units and along portions of the haul route, there are several larger perennial and fish-bearing streams. Aquatic habitat conditions and fish presence or absence were noted during site visits. Aquatic habitat conditions are summarized at the watershed scale.

A. Aquatic Habitat

Affected Environment

Oregon Department of Fish and Wildlife conducted Aquatic Habitat Inventory surveys on about 66 miles of streams within the watershed from 1993-1995, including 60 reaches on both BLM and private land. This inventory was used in addition to recent site surveys by BLM fishery biologists in establishing the baseline condition of habitat in the watershed.

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

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. The quality of spawning redds may be limited where fines exceed 20 percent (Waters 1995) – these fines can reduce oxygen flow to eggs or create a layer preventing the emergence of alevin (Waters 1995). When compared to the benchmarks for aquatic habitat conditions set by the Oregon Department of Fish and Wildlife (Foster et al. 2001), 51 of 60 surveyed reaches met the "desirable" criteria for the amount of sand and organic material in riffle units, and 35 reaches were "desirable" for the amount of gravel in the riffle units.[25]

Doe Creek, adjacent to thinning units, was an incised channel with gravel and small cobble substrate. Doe Creek had little fine sediment in riffle units. Manzanita Creek was a steeper channel and had some deposition of fine sediment in riffles.

Large Woody Debris

Large woody debris helps form deep scour pools and retain gravel substrate (Bilby and Ward 1989). These pool and off-channel habitats are important to salmonids, as discussed below in *Pool Quality*. Habitat forming large woody debris pieces range from large logs (exceeding 24 inches) to small hardwoods. Oregon Department of Fish and Wildlife considers reaches in "desirable" condition when they contain more than 30 cubic meters of large wood per 100 meters; the benchmark for "key" pieces[26] is three per 100 meters.

High gradient headwater intermittent and perennial streams adjacent to units generally had a high volume and number of pieces of large woody debris. However, surveyed streams below the units generally lack large woody debris. Five of the surveyed reaches met the "desirable" criteria for the volume of large wood debris, and none met the "desirable criteria for the number of key pieces of large woody debris.

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 habitat (Swanston 1991). Salmonids are found in greater densities (Roni 2002) and

[25] Riffles are considered in "desirable" condition when they contain less than 10 percent silt, sand and organics and greater than 35 percent gravel (Foster et al. 2001).

[26] Key pieces are those greater than 33 ft long and 24 inches in diameter

larger size (Rosenfeld et al. 2000) in deep pool habitats. Oregon Department of Fish and Wildlife considers reaches with more than 35 percent pool by area and having more than 2.5 complex pools (those having a large wood component) per kilometer in a "desirable" condition per kilometer.

Seven of the surveyed reaches met the desirable criteria for pool area; no reaches met the criteria for complex pools. Doe Creek adjacent to thinning units had little deep pool or complex pool habitat. Pools generally were created by lateral scour and there were no large woody debris formed pools. Manzanita Creek, downstream of units, had many pieces of large wood and complex pool habitat created by woody debris jams.

Habitat Access

Stream access for migrating fish can be restricted by outlet jumps exceeding 6 inches and outlet pools less than 1.5 times the height of the jump. While adult fish are capable of jumping more than 4 feet, juvenile fish are often prevented from upstream migration by jumps of over 6 inches. Culverts with slopes exceeding 0.5 percent can also limit passage by increasing water velocities inside the culvert (OWEB 1999).

Natural barriers (waterfalls and steep cascades) prevent anadromous fish from accessing the headwaters of several stream systems. A waterfall barrier approximately 1.4 miles from the mouth of Union Creek prevents anadromous fish from accessing upper Live Oak and Manzanita Creek. Another waterfall barrier exists on Iron Mountain Creek, 0.7 mile from its mouth. Additional manmade barriers impeding passage include steep box culverts for the railroad tracks along the northern side of Cow Creek.

Alternative 1 Effects

Under this alternative, overstocked upland and riparian stands would not be thinned to promote large conifer growth. Large woody debris would not be available for recruitment to stream channels, as such, pool habitat would not develop and spawning gravel would not be captured. This trend would continue for several decades until a natural event, such as understory fire, thinned the stand and allowed larger trees to develop.

Absent harvest, no log haul or associated road-related work including renovation, construction or decommissioning would occur. Routine road maintenance would continue, however, it is not known if any of the proposed roads are scheduled for maintenance. Without road renovation or decommissioning, aquatic habitat would continue to be affected by road runoff and sediment generated from roads with poor drainage, blocked cross drains, inadequate rock surface, and use of natural surface roads (especially during periods of wet weather). Sediment concentrated by the existing road drainage system would be routed toward the stream, rather than being dispersed across the landscape.

The road accessing unit 30-8-27C is rutted and in poor general condition. During rain storms sediment is carried off the road surface and into Manzanita Creek and several intermittent tributaries crossed by the road. Over time, such road segments would contribute additional sediment to stream channels, impairing spawning substrate and rearing habitat.

The overall effect would be a continued level or downward trend for water quality and spawning substrate. Over a period of decades, feeding and rearing conditions for fish and other aquatic wildlife and the quality of Essential Fish Habitat would be reduced through the chronic input of sediment from the road surface.

Additionally, fish and aquatic habitat downstream of the project area would continue to be indirectly and cumulatively affected by actions on privately-managed forest and agricultural lands. These activities would likely include harvest of riparian forest, run-off from fields and pastures, and run-off from natural surface roads and tractor skid trails.

Alternative 2 Effects

Harvest and road related activities could affect aquatic habitat conditions. Thinning would occur in upland stands outside the Riparian Reserve and density management would occur more than 20 ft from the stream. Buffers on intermittent streams would be variable width of at least 20 ft. Buffers on fish bearing or perennial streams would be at least 50 feet on either side of the stream. Actual distance would be based on site specific conditions including, but not limited to, fish presence, slope, bank stability and vegetative cover.

Spawning substrate/sediment

Riparian buffers of at least 20 feet would prevent sediment from reaching the stream and provide sufficient root strength to maintain bank stability (FEMAT 1993), protecting banks from erosion and preventing additional sediment from entering streams and accumulating gravel. 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).

Buffer strips adjacent to headwater (less than 3rd order) intermittent and perennial streams would remain vegetated and non-compacted, providing sufficient filtering capacity during typical winter rain events. During high runoff events, there would be potential for some sediment to reach the stream, however, the effects of this would be negligible, as the sediment would be trapped and stored locally in stream channels. Intermittent mountain streams, similar to those adjacent to units, typically have sufficient storage capacity to retain any small amount of sediment generated in the local area (Montgomery and Buffington 1997).

The majority of the effects from timber harvest come from road related activities, which contribute sediment to streams that can affect substrate (Furniss et al. 1991). All road construction, reconstruction and renovation would occur away from streams to the greatest extent practicable, and would take place on or near stable ridge tops in order to access units below.

The haul would take place during both dry and wet seasons. Haul during dry season would neither generate nor deliver road-derived sediment to live stream channels; without precipitation, there is no transport mechanism for fine sediment to enter adjacent streams.

Five all-season units have haul routes crossing resident fish-bearing stream reaches. Doe Creek has two crossings and Live Oak Creek has one; all crossings have flat grades with

sufficient ditch relief to prevent sediment delivery to streams affecting spawning substrate. The remainder of the haul route utilizes existing all-weather roads with segments located mostly in valley bottoms or along ridges. Along the existing system roads, there are six crossings that occur along fish bearing reaches of Doe, Council, Union, Live Oak, and Russell Creeks. Two of these crossings (Council and Russell Creeks) occur on coho salmon and steelhead trout bearing reaches. Stream crossings have flat approaches with adequate ditches and cross drains to prevent accumulation of runoff and to remove sediment carried in runoff onto the forest floor.

Wet season haul, which normally occurs after October 15th and before May 1st, can contribute fine sediment to streams where roads cross the stream (Waters 1995). Renovation of the haul route would include widening, blading and brushing the road matrix. Additional cross drains may be installed to remove the drainage from the ditch and reroute onto the forest floor, thereby removing a source of sediment to the stream. Cross drains will be installed consistent with the Best Management Practices in the ROD/RMP (USDI p. 129-144). Installing cross drains during the dry season would improve drainage and limit the transport of sediment to live stream channels.

Crossings on temporary spurs would be pulled and the road decommissioned to prevent further transmission of fine sediment. These crossings will normally occur far upstream from fish bearing reaches and will therefore not impact stream substrate.

In order to mitigate the potential for sediment delivery from road surfaces along the haul route, the following project design criteria would be implemented at the time of operation:

- To the extent practicable, new road construction will be located on stable ridge-tops. This would prevent sediment delivery to live streams and intermittent channels.
- Temporary roads will be decommissioned during the same season or will be rocked and made permanent for wet season use. This would reduce future erosion of the road surface and delivery of fine sediment to steams.
- Ditch lines will be left vegetated where possible to help filter sediment from road runoff.
- Water bars may be installed as directed to further route water off of the road surface and onto the forest floor.

Large woody debris

The removal of small trees adjacent to stream channels could have a short-term effect on instream habitat because small woody material can create pool habitat in smaller stream systems (Bilby and Ward 1989). However, smaller diameter wood does not persist in the stream channel for the long term due to higher decay rates (Naiman et al. 2002) and is more easily flushed from the system than large pieces (Keim et al. 2002).

Fish bearing streams adjacent to units would continue to recruit large woody debris from the riparian corridor. Although some stands adjacent to streams would be heavily thinned (to about 50 trees per acre), the remaining trees would continue to provide long-term recruitment of large wood. In the long term, as a result of density management, large woody debris recruitment would increase due to the development of larger trees close to the stream channel.

Pool quality

Pool habitat availability would remain unaffected by thinning and density management activities. Thinning in overstocked upland stands would occur outside of riparian corridors and would have no mechanism to affect pool quality or frequency.

Density management in riparian corridors would remove smaller trees and would not reduce the availability of large trees into the stream. As noted above, removal of some smaller trees may reduce the amount of pool forming woody debris in the short term. Over a period of decades, density management would promote the growth of larger conifers which, over time, would enter to the stream and enhance and create additional pool habitat.

Habitat Access

Access to spawning and rearing habitat would be unaffected by harvest or road related activities. There would be no culvert installations or replacements on fish-bearing streams near any of the units, and new road construction would occur on ridge-tops and would not cross fish-bearing streams.

B. Special Status Species

Affected Environment

Table 3-10. State and Federal listing status of fish species in or near the project area

Species	Location	Federal status	Relevance
Oregon Coast Coho salmon (*Oncorhynchus kisutch*)	Cow Creek & tributaries	Federal Proposed Threatened (Endangered Species Act); Bureau Sensitive (BLM Manual 6840); Essential Fish Habitat (Magnusson-Stevens Act)	Present in Council Creek 0.5 mile downstream from the nearest proposed units
Umpqua chub (*Oregonichthys kalawatseti*)	Cow Creek	Bureau Sensitive (BLM Manual 6840)	Predominantly found in larger order streams and rivers throughout the Umpqua River Basin (Markle et al. 1991). Present in the main-stem of Cow Creek as far up as Middle Creek (1998).
Chinook salmon (*O. tshawytscha*)	Cow Creek	Essential Fish Habitat (Magnusson-Stevens Act)	Present in the mainstem of Cow Creek
Steelhead trout (*O. mykiss*)	Cow Creek & tributaries	Bureau Strategic (BLM Manual 6840); Species of Concern (Endangered Species Act)	Present in Council Creek 0.5 mile downstream from the nearest proposed units
Coastal Cutthroat trout (*O. clarkii*)	Cow Creek & tributaries	Species of Concern (Endangered Species Act)	Common throughout the watershed in perennial 3rd order or larger streams. Present in Doe and Manzanita Creeks adjacent to the proposed units
Pacific lamprey (*Lampetra tridentata*)	Cow Creek & tributaries	Species of Concern (Endangered Species Act)	Can be found in many small 3rd order or larger tributaries of the Umpqua River. Although its complete distribution is currently not known, the lamprey is suspected to be present in many accessible 3rd order or greater streams.

Alternative 1 Effects

Generally, fish species and populations would remain unaffected. Fish will 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 circumstances change and larger trees develop. Aquatic habitat conditions would be expected to change over time (for example, sediment inputs may increase as the road system deteriorates) as discussed in the effects analysis under aquatic habitat (p. 35-36).

Alternative 2 Effects

There are no direct effects expected to fish species adjacent to or below the project area. As discussed in the effects analysis under aquatic habitat (p. 35-36), thinning in upland stands and density management in riparian corridors would not result in additional fine sediment reaching fish-bearing channels. Potential effects described are expected to be so small as to not be measurable at the project level scale.

C. Essential Fish Habitat

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 Essential Fish Habitat. Cow Creek and its major tributaries are designated Essential Fish Habitat for coho and Chinook salmon.

Alternative 2 Effects

The following components were analyzed to assess the effects of the project on Essential Fish Habitat and the appropriate, more detailed sections of this analysis are cited. There is no mitigation proposed.

- *Water quality/Water quantity* – Thinning and density management would not affect water quality and/or quantity (Hydrology, p. 33-34)
- *Substrate characteristics* – Any effect to substrate as a result of sediment would be negligible and discountable (Aquatic Habitat, p. 37-38).
- *Large woody debris (LWD) within the channel and LWD source areas* –There would be a long term benefit to LWD or LWD source areas (Aquatic Habitat, p. 38)
- *Channel geometry* – Stream channels are stable and have riparian vegetation sufficient to prevent erosion caused by high stream flow (Aquatic Habitat, p.37-39). There would be no measurable increase in stream flow affecting channel geometry (Hydrology, p.33-34)
- *Fish passage* – There would be no effect to fish passage, as there are no new crossings along fish-bearing streams and culverts currently impassable to fish would remain unaffected (Aquatic Habitat, p.39)
- *Forage species (aquatic and terrestrial invertebrates)* – Forage for coho and Chinook salmon would remain unaffected. Riparian vegetation would continue to provide sources of terrestrial invertebrates. Aquatic invertebrate populations will be unaffected as there would be no measurable effect to water quality or substrate.

Because the proposed action would not affect the components of EFH, the action "Will Not Adversely Affect" EFH for coho or Chinook salmon in Cow Creek or its major tributaries.

D. Aquatic Conservation Strategy

The BLM assessed the proposed project at both a site and watershed scale. The restorative nature of the proposed action would not retard or prevent attainment of Aquatic Conservation Strategy (ACS) objectives; rather, the proposed action would speed attainment of

ACS objectives and is consistent with ACS objectives at site and watershed scales. For specific discussion of the ACS objectives, refer to Appendices D-1 and D-2.

VI. Botany

In 2007, surveys for vascular and non-vascular special status species were completed for all but three units (30-7-13 A, B, and C). These units will be surveyed in 2008, prior to issuing a decision record for treatment of these units.

A. Vascular Plants, Lichens and Bryophytes

Affected Environment

There are 29 Special Status vascular plant, lichen, and bryophyte species with habitat in the project area potentially supporting occurrences of these species (see Appendix C-1). Based on habitat conditions in the proposed units and previous surveys conducted in similar habitat elsewhere in the South River Resource Area, there are five Special Status vascular plant species with the highest likelihood of occurrence. These species are the federally-threatened Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) and the Bureau Sensitive tall bugbane (*Cimicifuga elata*), wayside aster (*Eucephalis vialis*), Oregon bensoniella (*Bensoniella oregano*), and hairy sedge (*Carex gynodynama*).

Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), the only federally-threatened plant species on the list, has potential habitat within the project area.[27] Kincaid's lupine is an herbaceous perennial that reproduces by seed. It is native to the prairies of the Willamette Valley and southwestern Washington, and may be found in forest openings, meadow gaps, and along forest fringes in Douglas County, Oregon. No occurrences have been found in the project area.

Oregon bensoniella (*Bensoniella oregana*) is a rhizomatous perennial herb found along the margins of meadows and springs in mixed coniferous forests in partial and full sun. Unit 30-8-25A contains two known Oregon bensoniella sites.

Hairy sedge (*Carex gynodynama*) is a perennial herb found in moist meadows, open forest and seeps. Unit 30-8-25B contains a known hairy sedge site.

Tall bugbane and wayside aster have not been found in the surveyed units, however, as noted above, three units have yet to be surveyed. The results of previous surveys in this watershed and adjoining watersheds indicate a low probability that other special status species would be located in the remaining surveys. Those Special Status Species whose habitat is unknown or those species without habitat in the project area (see Appendix C) will not be discussed further in this analysis.

[27] Rough popcorn flower (*Plagiobothrys hirtus*, a federally-endangered species occurring on the Roseburg District, does not have habitat in the South River Resource Area.

Alternative 1 Effects

In the absence of commercial thinning and density management, there would be no direct effect to any populations of Kincaid's lupine, *Bensoniella oregona*, *Cimicifuga elata* and *Eucephalis vialis* that may occupy the project area. The species would be indirectly affected over time, however. Without management or natural disturbance to create and maintain gap and edge habitat, the availability of light would decline to a level insufficient to trigger flowering and reproduction.

Alternative 2 Effects

There would be no direct effect to any populations of Special Status species that may be found during surveys in the project area because:

- *Any populations would be managed in accordance with species habitat needs.*
- *The known Bensoniella oregona and Carex gynodynama sites (units 30-8-25A and B) would receive a 75 foot "no disturbance" buffer around them to protect the edge habitat and maintain partial shade, avoiding any effect to the plants.*

B. Fungi

Affected Environment

Four Bureau Sensitive fungi species are documented in the South River Resource Area, consisting of *Dermocybe humboldtensis*, *Phaeocollybia californica*, *P. olivacea*, and *Ramaria spinulasa* var. *diminutive*. However, none of these species are known to have sites within the Lower Cow fifth-field watershed. Four other Bureau Sensitive species (*Arcangeliella camphorata*, *P. gregaria*, *P. oregonensis*, and *Rhizopogon chamaleontinus*) are suspected to occur within the watershed, based on the habitat and host species present. These species are all primarily associated with members of the *Pinaceae* family, principally Douglas-fir and western hemlock. Important habitat components include: dead, down wood; standing dead trees; live, mature trees; many shrub species; a broad range of microhabitats; and for many, a well-distributed network of late-successional forest with moist and shaded conditions (USDA and USDI 2004b, p.148).

Getting complete and accurate surveys for these species is difficult, as most Special Status fungi species are highly isolated in their occurrence. They produce short-lived, ephemeral sporocarps or fruiting bodies that are seasonally and annually variable in occurrence (USDA and USDI 2004b, p.148).[28]

Alternative 1 Effects

Absent commercial thinning and density management, there would be no modification of existing habitat conditions. The availability of host trees for ectomycorrhizal fungi would remain unchanged. Existing forest canopy would continue to provide shade and maintain cooler temperatures and higher humidity on the forest floor. Forest litter, soil organic matter and large woody debris would be undisturbed and continue to provide reservoirs of moisture and nutrients.

[28] Richardson (1970) estimated that sampling every two weeks would fail to detect about 50 percent of macrofungal species fruiting in any given season. In another study (O'Dell et al. 1999), less than ten percent of species were detected in each of two consecutive years at any one of eight sites.

Alternative 2 Effects

The proposed timber harvest would not affect any known sites for Bureau Sensitive fungi species described above, as the known sites are located in other fifth-field watersheds. Surveys for these species are not considered practical as discussed above, so their presence is unknown. If fungi are present in the proposed commercial thinning and density management units, site loss could result from the removal of substrate and modification of microclimate. Some of the other important habitat components for the fungi including dead, down wood, standing dead trees would remain based on land use allocation as described in chapter 2. The abundance of live, mature trees and the network of late-successional forest would remain unchanged. After treatment, the abundance of shrub species would increase over time due to an increase in available light for understory development. This may help provide microclimates for fungi in the future.

VII. Noxious Weeds

Affected Environment

Noxious weed infestations are scattered within the project area, particularly Himalayan blackberry and Scotch broom. These infestations also occur along the access roads. Noxious weeds within the project area are currently being managed through the application of approved herbicides or through manual removal, according to the *Roseburg District Integrated Weed Control Plan and Environmental Assessment* (USDI 1995b). Herbicide is applied to individual plants and is limited to the use of truck-mounted sprayers, backpack and hand sprayers, and wick wipers. With continued treatment over time, the distribution and abundance of noxious weeds is expected to decline.

Alternative 2 Effects

There may be a short-term increase in the distribution and abundance of noxious weeds in the project area following harvest activity. Soil disturbance related to the proposed action (such as spur construction and ground based yarding) would create potential habitat for noxious weeds. New infestations in the disturbed areas are anticipated to be short-lived (less than ten years), as the canopy closes and native species eventually overtop and out-compete weeds for sunlight, soil moisture, and nutrients.

Additionally, noxious weed treatment would continue according to the *Roseburg District Integrated Weed Control Plan and Environmental Assessment* (USDI 1995b). Additional management practices, focused on preventing the introduction of new infestations or spread of existing infestations, would occur in conjunction with the proposed action. These prevention measures would include:

- Steam cleaning or pressure washing of heavy equipment used in logging and road work to remove soils and other materials that may transport weed seed or root fragments;
- Scheduling work in uninfested areas prior to working in infested areas;
- Using native seed when mulching and seeding; or
- Revegetating with native plant species where natural regeneration is unlikely to prevent weed establishment.

Over time, the distribution and abundance of noxious weeds is expected to decline due to the continued treatment of weeds and natural change (canopy closure, etc.) within the stand.

VIII. Fuels Management

Affected Environment

The project area currently has a low risk of wildfire due to the light accumulation of down woody debris, tree spacing, and the lack of low limbs and shrubs that can carry the fire from the surface to the crowns of the trees. Fuel loading currently ranges from 1.5 to 24.7 tons per acre in the LSR stands. All units in the project occur outside of the wildland urban interface described in the Roseburg Fire Management Plan.

Alternative 1 Effects

Downed fuels would continue gradually accumulating, adding to the existing fuel conditions and increasing the risk of wildfire.

Alternative 2 Effects

After commercial thinning and density management, machine generated piles at landings would be burned to reduce concentrated fuel loads. Stands would also be evaluated for fuels treatment post-harvest, though post-harvest fuel loads are expected to be within acceptable ranges within most stands. Fuels remaining from harvest activity would generally be small, less than 3 inches in diameter, and scattered across the harvest area. These additional fuels would not substantially increase the fire risk to the area, as:

- *scattered slash would suppress underbrush which could significantly increase risk*
- *most of the fine fuels, less than 1 inch diameter, would degrade within two years of harvest.*

Lastly, LSR stands that would have gaps created would be evaluated for underburning before planting.

IX. Cultural/Historical Resources

Inventories have not yet been conducted for the units. The inventory is expected to be completed in the spring of 2008. Any new sites would be avoided or evaluated, whichever would be practical. If new sites are evaluated and deemed significant, the BLM would consult on effects to these new sites. Proposed units and roads would be modified or mitigated as necessary to avoid adverse effects. Consequently, cultural/historical resources would not be affected and will not be addressed further in this analysis.

CHAPTER FOUR - PUBLIC INVOLVEMENT, CONSULTATION, AND PREPARATION

This project was originally identified in the Roseburg BLM Quarterly Planning Update. A notice of availability of the EA for public review will be published in *The News-Review*, Roseburg Oregon. At such time as a decision is made, another notice will be published.

Persons, Agencies, & Organizations Contacted or Consulted

Adjacent Landowners
Cow Creek Band of Umpqua Tribe of Indians
US Fish & Wildlife Service
National Marine Fisheries Service
American Forest Resources Council
Cascadia Wildlands Project
Douglas Timber Operators
Klamath Siskiyou Wildlands Center
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Wild
Pacific Northwest 4-Wheel Drive Association
Umpqua Valley Audobon Society
Umpqua Watersheds, Inc.
Ronald S. Yockim, Attorney-at-Law

List of Preparers:

Isaac Barner	Archaeologist	Cultural & Historical Resources
Gary Basham	Botanist	Special Status Plants & Noxious Weed
Jay Besson	Sale Planner	Timber Sale Planner
Meagan Conry	Planner	Writer/Editor
Ward Fong	Soil Scientist	Soils
Susan Johnson	Forester	Silviculture
Krisann Kosel	Fire Ecologist	Fire & Fuels Management
Christopher Langdon	Biologist	Wildlife
James Harvey	Resource Specialist	Water Resources
John Royce	Supervisor	Management Representative
Cory Sipher	Biologist	Fisheries & Aquatic Habitat

CITATIONS

Altman, R. 1999. Conservation Strategy for Landbirds in Coniferous Forests of Western Oregon and Washington. Oregon-Washington Partners in Flight. 111 pages.

Bell, M. C. 1986. Fisheries handbook of engineering requirements and biological criteria. U. S. Army Corps of Engineers, Office of the Chief of Engineers, Fish Passage Development and Evaluation Program, Portland, Oregon.

Bilby, R. E., and J. W. Ward. 1989. Changes in characteristics and function of woody debris with increasing size of streams in western Washington. Transactions of the American Fisheries Society 118:368-378.

Black, S. H. and L. Lauvray. 2005. Species Fact Sheet: Oregon Giant Earthworm. Interagency Special Status/Sensitive Species Program, Portland, Oregon, USA. 5 pages.

Brown, C. R. 1997. Purple Martin. *In* The Birds of North America No. 287, A. Poole and F. Gill, eds. The Birds of North America, Inc., Philadelphia, Pennsylvania, USA. 31 pages.

Buehler, D. A. 2000. Bald eagle (*Haliaeetus leucocephalus*). In A. Poole and F. Gill (eds.), The Birds of North America. No. 506. Philadelphia, PA: the Academy of Natural Sciences and Washington, DC: the American Ornithologists' Union.

Burger, A. E. 2002. Conservation assessment of marbled murrelets in British Columbia, a review of biology, populations, habitat associations and conservation. Pacific and Yukon Region, Canadian Wildlife Service. 168 pages

Castro, J. and F. Reckendorf. 1995. Effects of Sediment on the Aquatic Environment: Potential NRCS Actions to Improve Aquatic Habitat. Natural Resources Conservation Service. Oregon State University, Department of Geosciences, Corvallis, Oregon.

Corkran, C. C. and C. Thoms. 1996. Amphibians of Oregon, Washington and British Columbia. A field identification guide. Lone Pine Publishing, Vancouver, BC. 175 pages.

Drew, T.J. and J.W. Flewelling. 1979. Stand density management: an alternative approach and its application to Douglas-fir plantations. Forest Science, Vol. 25, No. 3. Pages 518-532.

Dietrich, W. E., T. Dunne, N. F. Humphrey, and L. M. Reid. 1982. *Construction of Sediment Budgets for Drainage Basins* in Sediment Budgets and Routing in Forested Drainage Basins. USFS General Technical Report PNW-141.

Duncan, N., T. Burke, S. Dowlan, and P. Hohenlohe. 2003. Survey Protocol for Survey and Manage Terrestrial Mollusk Species From the Northwest Forest Plan. Bureau of Land Management, U.S. Forest Service, and U.S. Fish and Wildlife Service. Portland, Oregon, USA. 70 pages.

Dunk, J. R. 1995. White-tailed kite (*Elanus leucurus*): In A. Poole and F. Gill, Eds. The birds of North America, No. 178. The Academy of Natural Sciences, Philadelphia, PA and The American Ornithologists' Union, Washington, D.C.

Federal Register. 2002. Magnuson-Stevens Act Provisions; Essential Fish Habitat. Federal Register, 67(12):2343-2383.

Fellers G. M. and E. D. Pierson. 2002. Habitat use and foraging behavior of Townsend's Big-Eared Bat in coastal California. Journal of Mammalogy 83: 167–177

Forest Ecosystem Management Assessment Team (FEMAT). 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. Report of the Forest Ecosystem Management Team.

Foster, S.C., C. H. Stein, and K. K. Jones. 2001. A guide to interpreting stream survey reports. Edited by P.A. Bowers. Information Reports 2001-06. Oregon Department of Fish and Wildlife. Portland.

Frest, T.J. and E.J. Johanes. 2000. A baseline mollusc survey of southwestern Oregon, with emphasis on the Rogue and Umpqua River Drainages. Deixis Consultants, Seattle, Washington. 403 pages.

Furniss, M. J., T. D. Roelofs, and C. S. Yee. 1991. Road Construction and Maintenance. American Fisheries Society Special Publication 19:297-324.

Gresswell, R. E. 1999. Fire and Aquatic Ecosystems in Forested Biomes of North America. Transactions of the American Fisheries Society 128:193-221.

Harr, R. D., and B. A. Coffin. 1992. Influence of Timber Harvest on Rain-On-Snow Runoff: A Mechanism for Cumulative Watershed Effects. American Institute of Hydrology. Pages 455-469.

Horvath, E. 2003. Purple Martin. Pages 428-430 *in* D. B. Marshall, M. G. Hunter, and A L. Contreras, eds. Birds of Oregon: A General Reference. Oregon State University Press. Corvallis, Oregon, USA. 768 pages.

Isaacs, F. B. and R. G. Anthony. 2004. Bald eagle nest locations and history of use in Oregon and the Washington portion of the Columbia River Recovery Zone, 1971 through 2004. Oregon Cooperative Fish and Wildlife Research Unit. Corvallis, Oregon.

Johnson, David R., John T. Haagen and Alan C. Terrell. 2004. Soil Survey of Douglas County Area, Oregon. U.S. Department of Agriculture, Natural Resources Conservation Service.

Jones, J.A. September 2000. Hydrologic processes and peak discharge response to forest removal, regrowth and roads on 10 small experimental basins, western Cascades, Oregon. Water Resources Research. Vol. 36, NO. 9, Pages 2621-2642.

Jones, S. L., and J. E. Cornely. 2002, Vesper Sparrow (*Pooecetes gramineus*): In A. Poole and F. Gill, Eds. The birds of North America, No. 624. The Birds of North America, Inc., Philadelphia, PA.

Keim, R. F, A. E. Skaugset, and D. S Bateman. 2002. Physical aquatic habitat II, pools and cover affected by large woody debris in three western Oregon streams. North American Journal of Fisheries Management 22:151-164.

Lewis, S. E. 1994. Night roosting ecology of pallid bats (*Antrozous pallidus*) in Oregon. American Midland Naturalist 132:219-226.

Luce, C.H. 1997. Effectiveness of Road Ripping in Restoring Infiltration Capacity of Forest Roads. Restoration Ecology, 5(3): 265-270.

Manley, I. A. 1999. Behavior and habitat selection of marbled murrelets nesting on the Sunshine Coast. Masters of Science Thesis. Department of Biological Sciences, Simon Fraser University, Burnaby, Canada. 163 pages.

Markle, D. F., T. N. Pearsons, and D. T. Bills. 1991. Natural history of Oregonichthys (Pisces: Cyprinidae) with a description of a new species from the Umpqua River of Oregon. Copeia 2:227-293.

Meiman, S., R. Anthony, E. Glenn, T. Bayless, A. Ellingson, M. C. Hansen, and C. Smith. 2003. Effects of commercial thinning on home-range and habitat-use patterns of a male northern spotted owl: a case study. Wildlife Society Bulletin 31:1254-1262.

Montgomery, D. L and J. M. Buffington. 1997. Channel-reach morphology in mountain drainage basins. Geological Society of America Bulletin 109:596-611.

Moore, J.A. , and J.R. Miner. 1997. Stream temperatures, Some Basic Considerations. Oregon State University Extension Service. Corvallis, Oregon

Naiman, R. J., E. V. Balian, K. K. Bartz, R. E. Bilby, and J. J. Latterell. 2002. Dead wood dynamics in stream ecosystems. USDA Forest Service PSW-GTR-181.

Nelson, S. K., and A. K. Wilson. 2002. Marbled murrelet habitat characteristics on state lands in western Oregon. Corvallis, OR: Oregon Cooperative Fish and Wildlife Research Unit, OSU, Department of Fisheries and Wildlife. 151 pages.

O'Dell, T. E., J. F. Ammirati, and E. G. Schreiner. 1999. Ectomycorrhizal Basidomycete Diversity and Abundance on a Moisture Gradient in the *Tsuga heterophylla* Zone. Canadian Journal of Botany.

Oregon Department of Environmental Quality, Oregon's Integrated Report Database, 2004/2006 303(d) list, Portland Oregon [http://www.deq.state.or.us/wq/assessment/rpt0406/search.asp].

Oregon Watershed Enhancement Board (OWEB). 1999. Oregon Watershed Assessment Manual. Salem, Oregon.

Rashin, Clishe, Loch and Bell. 2006. Effectiveness of Timber Harvest Practices for Controlling Sediment Related Water Quality Impacts. Journal of The American Water Resources Association. October 2006. Pages 1307-1327

Reeves, G. H., L. E. Benda, K. M. Burnett, P. A. Bisson, and J. R. Sedell. 1995. A Disturbance-Based Ecosystem Approach to Maintaining and Restoring Freshwater Habitats of Evolutionarily Significant Units of Anadromous Salmonids in the Pacific Northwest. American Fisheries Society Symposium 17:334-349.

Reeves, G. H., K. M. Burnett, and E. V. McGarry. 2003. Sources of large wood in the main stem of a fourth-order watershed in coastal Oregon. Canadian Journal of Forestry Research 33:1363–1370

Reid, L.M., and T. Dunne. 1984. Sediment Production from Forest Road Surfaces. Water Resources Research 20-11: pages 1753-1761.

Reid, L.M. 1981. Sediment production from Gravel-Surfaced Forest Roads, Clearwater Basin, Washington. Fisheries Research Institute. College of Fisheries, University of Washington. Seattle Washington. FRI-UW-8108.

Richardson, M. J. 1970. Studies on *Russula emetica* and other agarics in a Scots pine plantation. British Mycological Society 55:217-219.

Robertson, G. J., and R. I. Goudie. 1999. Harlequin Duck (*Histrionicus histrionicus*): In A. Poole and F. Gill, Eds. The birds of North America, No. 446. The Birds of North America, Inc., Philadelphia, PA.

Roni, P. 2002. Habitat use by fishes and Pacific Giant Salamanders in small western Oregon and Washington streams. Transactions of the American Fisheries Society 131:743-761.

Rosenfeld, J. S., and M. Porter, and E. Parkinson. 2000. Habitat factors affecting the abundance and distribution of juvenile cutthroat trout (*Oncorhynchus clarki*) and coho salmon (*Oncorhynchus kisutch*). Canadian Journal of Fisheries and Aquatic Sciences 57:766-774.

Simon, D. C. 1998. Distributional surveys of Umpqua chub *Oregonichthys kalawatseti*, 1987 and 1998. Final Report, order no. 1448-13420-97-M216. U.S. Fish and Wildlife Service. Portland, OR.

Sodhi, N. S., L. W. Oliphant, P. C. James, and I. G. Warkentin. 1993. Merlin (*Falco columbarius*): In A. Poole and F. Gill, Eds. The birds of North America, No. 44. The Birds of North America, Inc., Philadelphia, PA.

Swanston, D. N. 1991. Natural Processes. American Fisheries Society Special Publication 19:139-179.

Thomas, J. W., E. D. Forsman, J. B. Lint, E. C. Meslow, B. R. Noon, and J. Verner. 1990. A conservation strategy for the northern spotted owl: a report of the Interagency Scientific Committee to address the conservation of the northern spotted owl. Portland, Oregon. U.S. Department of Agriculture, Forest Service; U.S. Department of Interior, Bureau of Land Management, U.S. Fish and Wildlife Service, National Park Service. 427 pages.

Thompson, J., R. Goggans, P. Greenlee, and S. Dowlan. 1993. Abundance, distribution and habitat associations of the harlequin duck (*Histrionicus histrionicus*) in the Cascade Mountains, Oregon. Unpublished report prepared for cooperative agreement between the

Tobalske, B. W. 1997, Lewis' Woodpecker (*Melanerpes lewis*): In A. Poole and F. Gill Eds., The birds of North America, No. 284. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington DC.

USDA and USDI. 1994. Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. Appendix J-2.

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

USDA, Forest Service and USDI, Bureau of Land Management. 2004b. Final Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines. Vol. 1

USDI, Bureau of Land Management. 1994. Roseburg District Proposed Resource Management Plan and Environmental Impact Statement. Roseburg District.

USDI, Bureau of Land Management. 1995a. Roseburg District Record of Decision and Resource Management Plan Roseburg, Oregon. 216 pages.

USDI, Bureau of Land Management. 1995b. Roseburg District Integrated Weed Control Plan and Environmental Assessment

USDI, Bureau of Land Management. 2001. Bureau of Land Management Manual Section 6840. 50pages.

USDI, Bureau of Land Management. 2002. Lower Cow Creek Watershed Analysis and Water Quality Restoration Plan. South River Field Office. Roseburg, Oregon.

USDI, BLM. Roseburg District. South River Field Office. 2003. Cow Catcher Timber Sale Environmental Assessment. 45 pp.

USDI, Bureau of Land Management. 2004. Management of Potential Marbled Murrelet Nesting Structure in Thinning Stands. Roseburg/Coos Bay BLM Level 1 Consultation Team memorandum of August 4, 2004. 8pages.

USDI, Bureau of Land Management. 2007a. Instruction Memorandum #OR-2007-072, "Update to Director's Special Status Species List." Oregon State Office, Portland, Oregon, USA. 4pages.

USDI, Bureau of Land Management. 2007b. Olalla-Lookingglass LSR Density Management, EA #OR-105-06-06. Roseburg District, South River Resource Area. Roseburg, Oregon, USA.

USDI, Bureau of Land Management. 2007c. Middle Fork Coquille 2007 Commercial Thinning & Density Management, EA #OR-105-07-04. Roseburg District, South River Resource Area. Roseburg, Oregon, USA.

USDI, Bureau of Land Management. 2007d. Roseburg District Annual Program Summary and Monitoring Report, Fiscal Year 2006. Roseburg District Office, Roseburg, Oregon.

USDI, US Fish and Wildlife Service. 1991. Guidelines for surveying proposed management activities that may impact Northern Spotted Owls. Portland, OR.

USDI, US Fish and Wildlife Service. 1992. Determination of critical habitat for the Northern Spotted Owl. Portland, Oregon. Federal Register (57):1796-1838.

USDI, US Fish and Wildlife Service. 1996. Final designation of critical habitat for the marbled murrelet. Portland, Oregon. Federal Register 61:26256-26320.

USDI, US Fish and Wildlife Service. 2005. Letter of Concurrence: Reinitiation of consultation on Roseburg District Bureau of Land Management FY 2005-2008 Management Activities (Ref. # 1-15-05-I-0511). Roseburg, Oregon, USA. 42pages.

Verts, B. J. and L. N. Carraway. 1998. Land Mammals of Oregon. University of California Press. Berkeley, California, USA.

Walker, George W. and Norman S. MacLeod. 1991. Geologic map of Oregon. U.S. Department of the Interior, U.S. Geological Survey.

Waters, T, F. 1995. Sediment in streams: sources, biological effects, and control. American Fisheries Society Monograph 7.

Watershed Professionals Network. 1999. Oregon Watershed Assessment Manual. Prepared for the Governor's Watershed Enhancement Board. Salem, OR.

Weasma, T. R. 1998a. Management Recommendations for *Helminthoglypta herteinii*, the Oregon Shoulderband *in* N. Duncan, editor. Management Recommendations for Survey and Manage Terrestrial Mollusks, version 2.0. Regional Ecosystem Office, Portland, Oregon, USA.

Weasma, T. R. 1998b. Draft Management Recommendations for *Monadenia (Shastelix) chaceana*, the Chace Sideband (land snail) *in* N. Duncan, editor. Management Recommendations for Survey and Manage Terrestrial Mollusks, version 2.0. Regional Ecosystem Office, Portland, Oregon, USA.

Weller, T. J. and C. J. Zabel. 2001. Characteristics of fringed myotis day roosts in northern California. Journal of Wildlife Management 66:489-497.

Wells, R.E., A.S. Jayko, A.R. Niem, G. Black, T. Wiley, E. Baldwin, K.M. Molenaar, K.L. Wheeler, C.B. DuRoss and R.W. Givler. 2000. Geologic Map and Database of the Roseburg 30'x 60' Quadrangle, Douglas and Coos Counties, Oregon.

White, C.M., N. J. Clum, T. J. Cade, and W. G. Hunt. 2002. Peregrine Falcon (*Falco peregrinus*). In A. Poole and F. Gill (eds.), The birds of North America. No. 660.

Wiggins, G. B. 1977. Larvae of the North American caddisfly genera (*Trichoptera*). University of Toronto Press. Toronto, Ontario, Canada. 401pages.

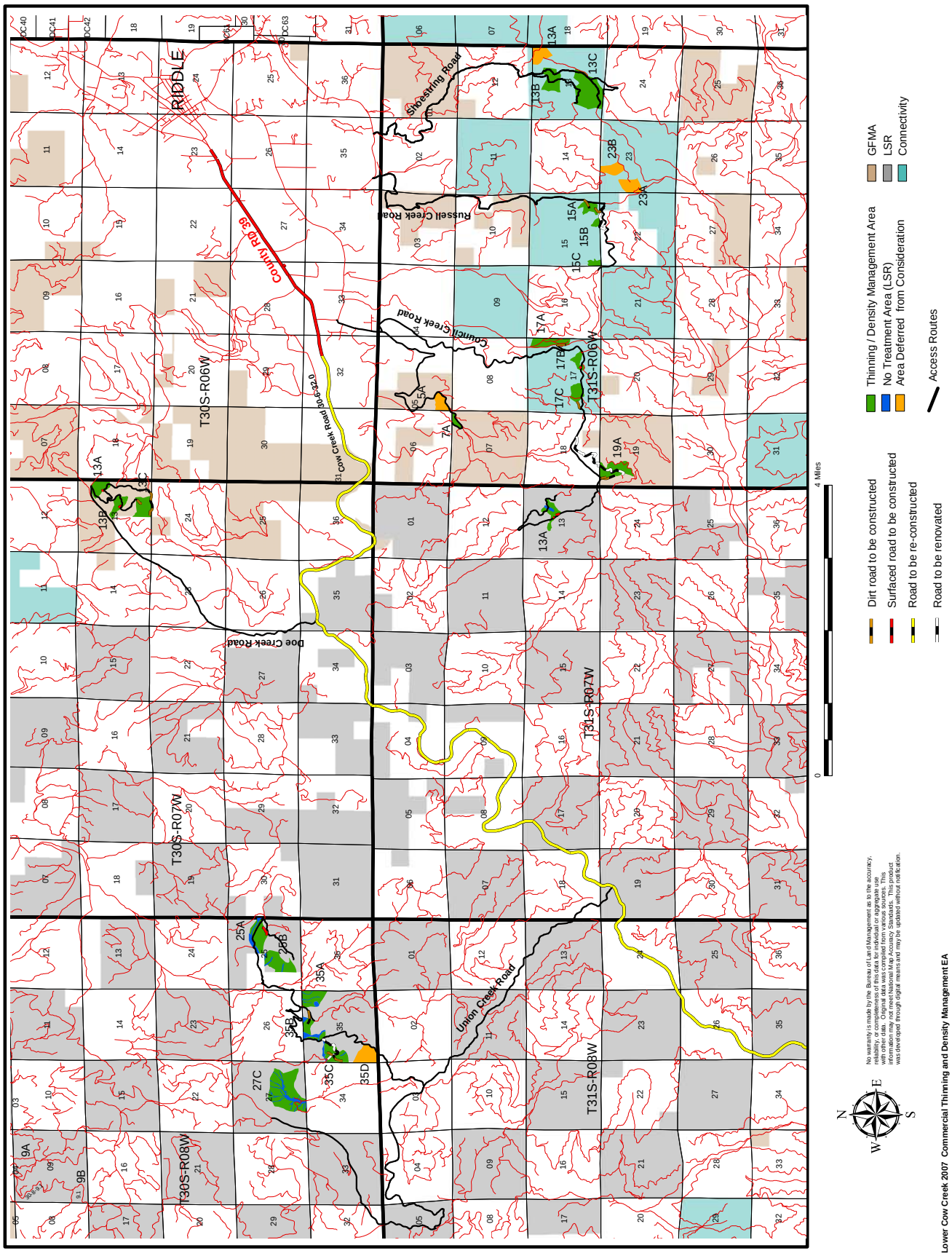
Wilson, J.S. and C.D. Oliver. 2000. Stability and density management in Douglas-fir plantations. Can. J. For. Res. 30: 910-920.

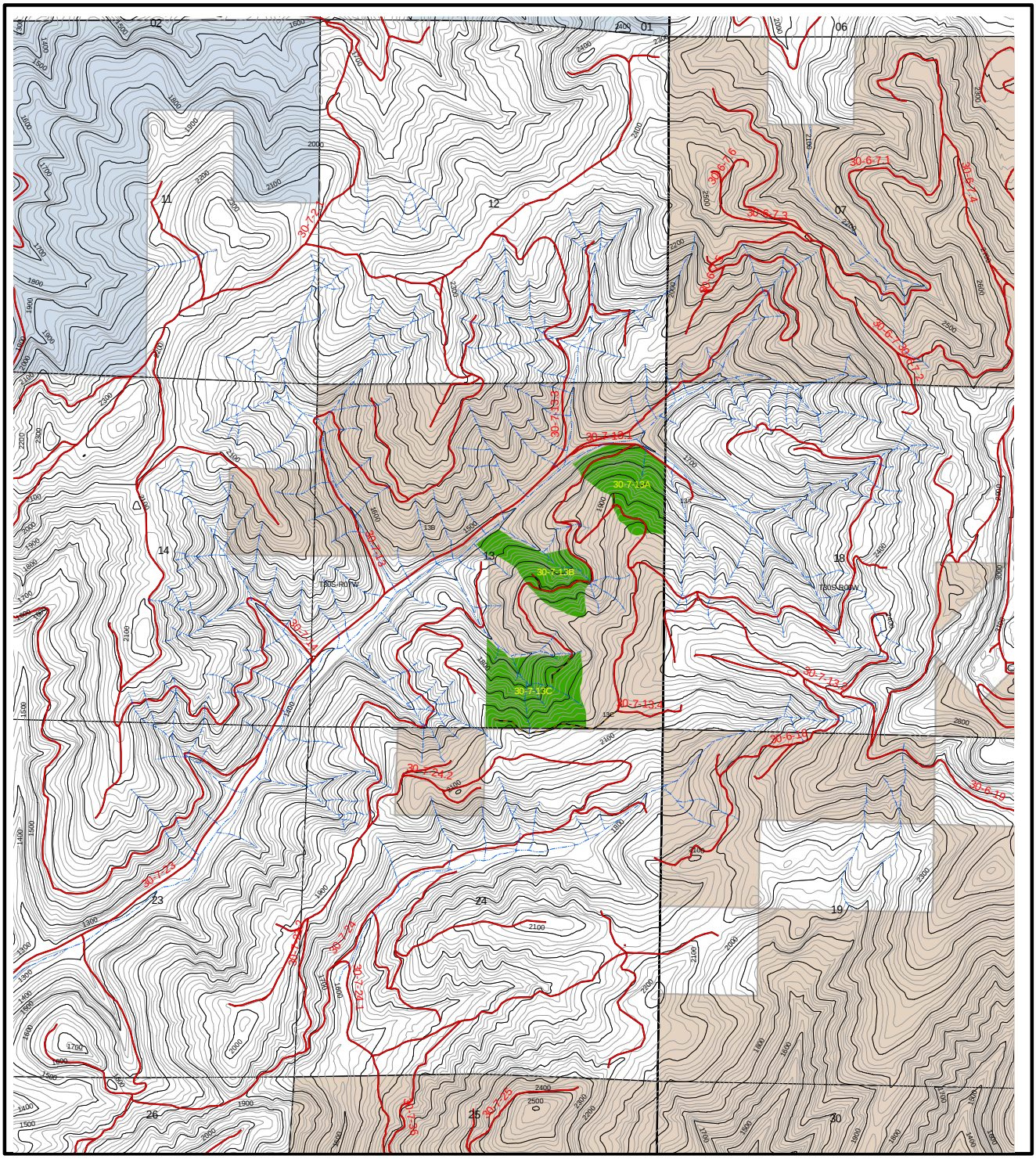
Wonn, Hagan T. 2001. Height:diameter ratios and stability relationship[s for four Northern Rocky mountain tree species. Western Journal of Applied Forestry 16(2), pages. 87-94

APPENDICES

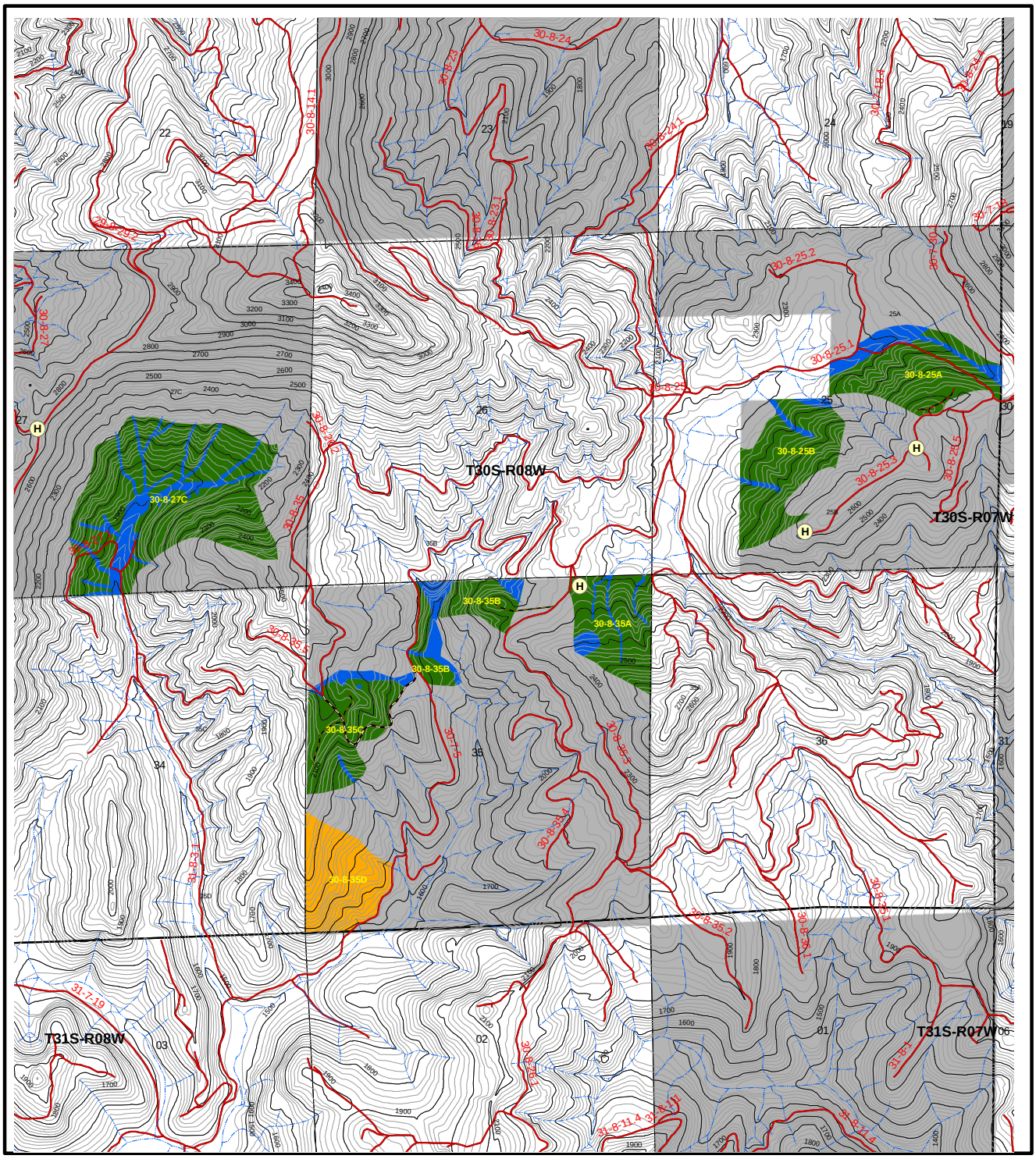
Appendix A – Maps
Appendix B – Wildlife
Appendix C – Botany
Appendix D – Aquatic Resources
Appendix E – Port-Orford-Cedar

Appendix A. Maps



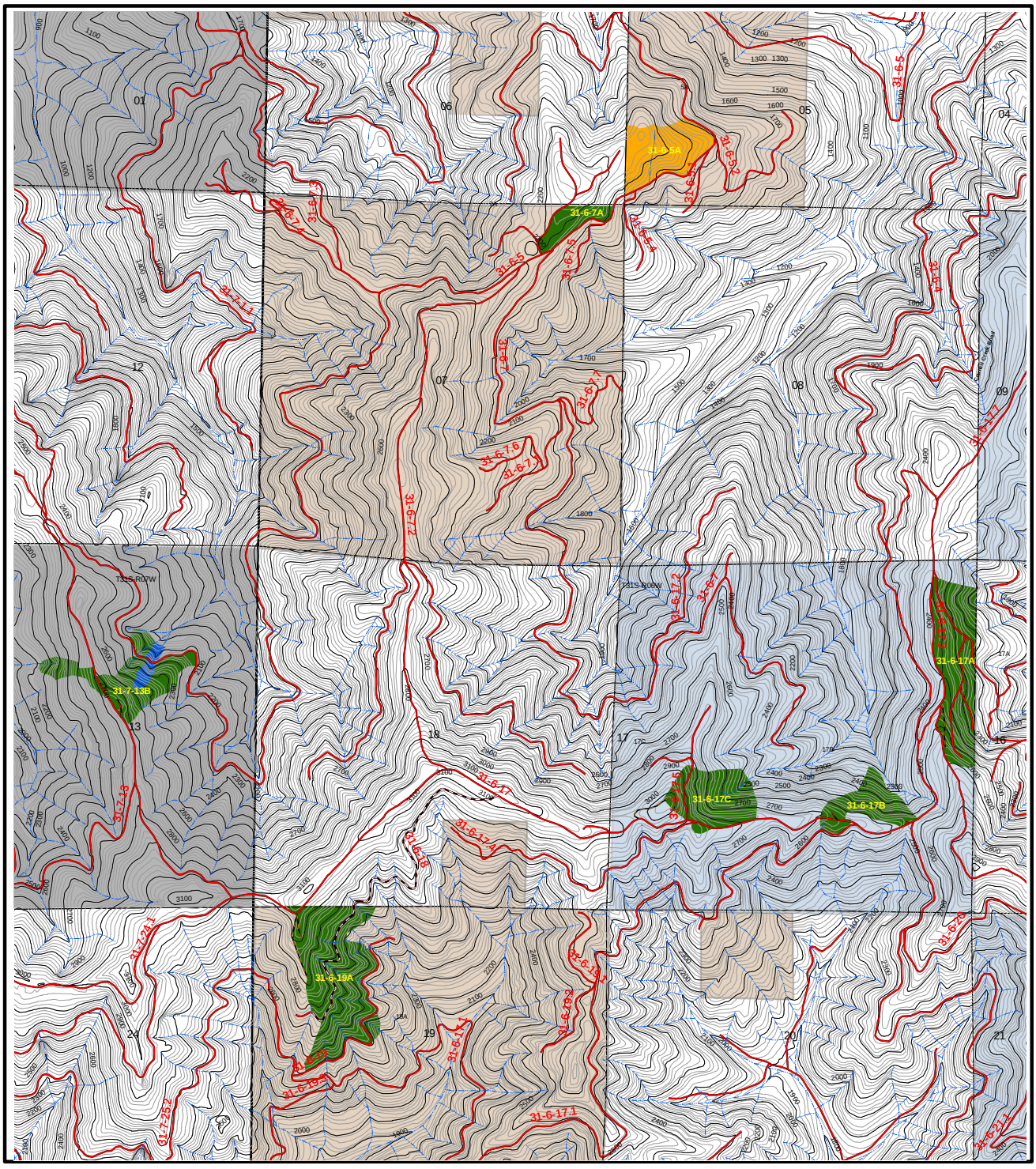


Lower Cow Creek 2007 Commercial Thinning and Density Management EA

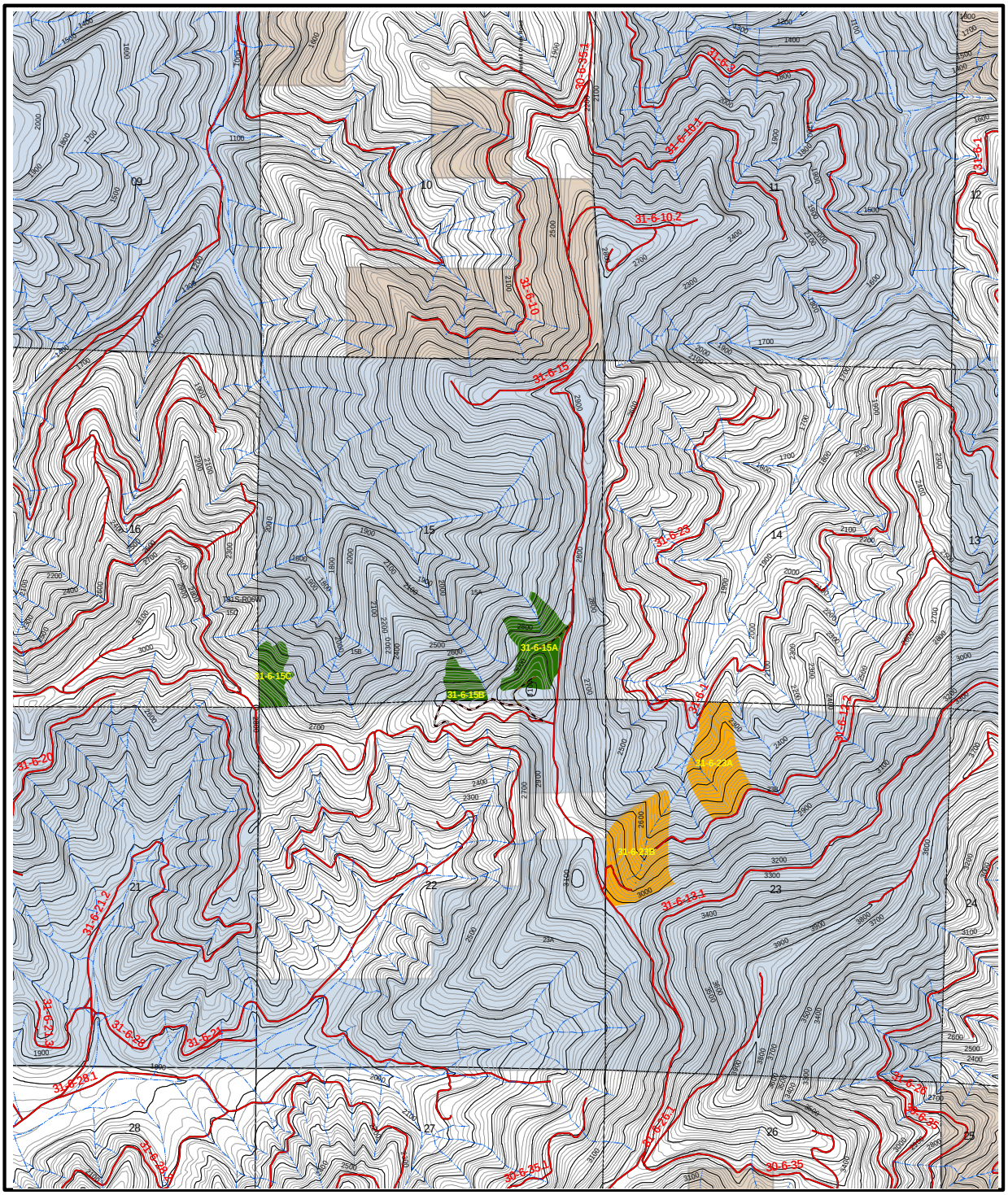


Lower Cow Creek 2007 Commercial Thinning and Density Management EA

Lower Cow Creek 2007 Commercial Thinning and Density Management Project



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



0 2,000 Feet

Scale: 1:24000

N

W E

S

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

Dirt road to be constructed

Surfaced road to be constructed

Road to be re-constructed

Road to be renovated

Thinning / Density Management Area

No Treatment Area (LSR)

Area Deferred from Consideration

Access Routes

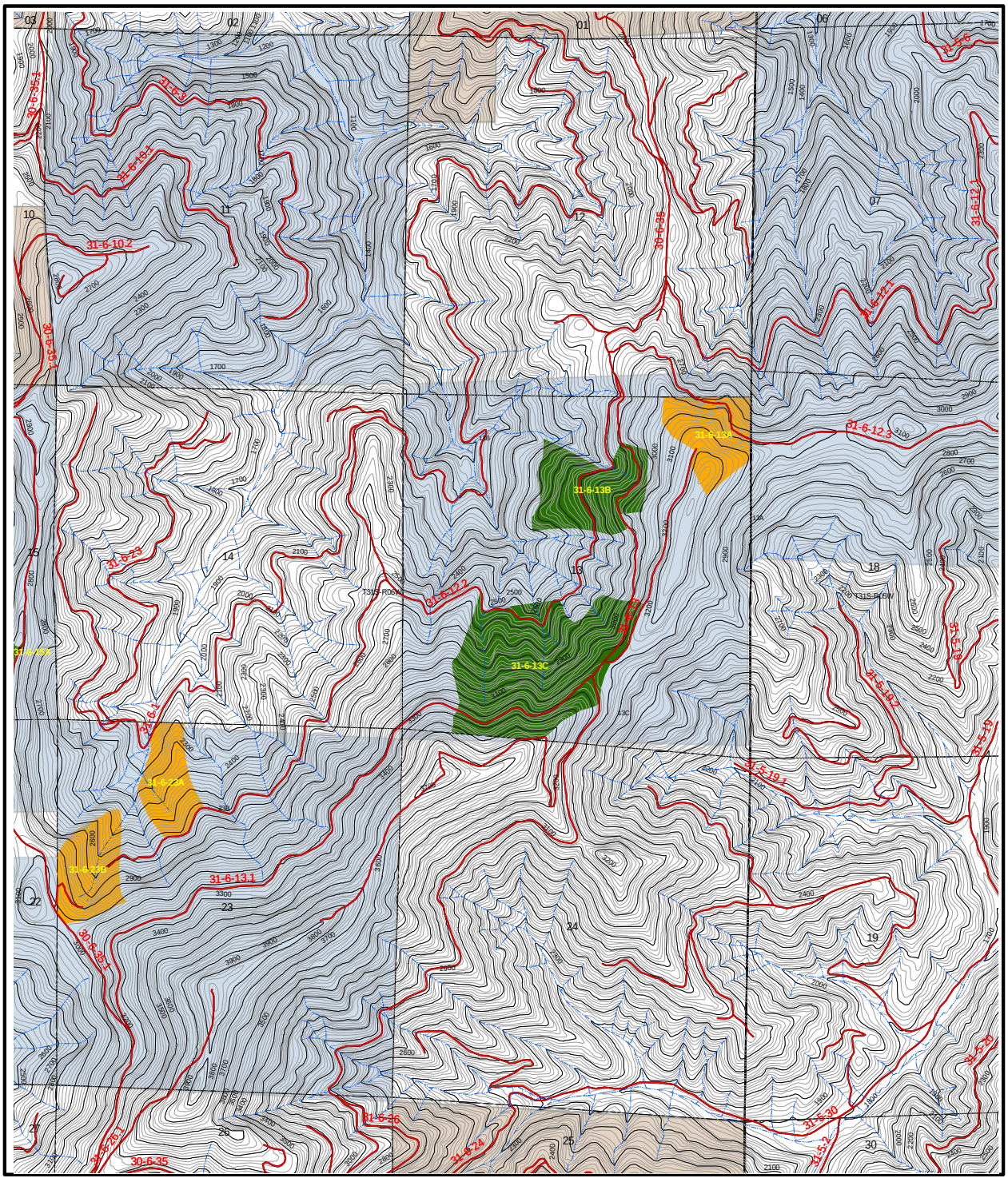
GFMA

LSR

Connectivity

Lower Cow Creek 2007 Commercial Thinning and Density Management EA

Lower Cow Creek 2007 Commercial Thinning and Density Management Project



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

- Dirt road to be constructed
- Surfaced road to be constructed
- Road to be re-constructed
- Road to be renovated

- Thinning / Density Management Area
- No Treatment Area (LSR)
- Area Deferred from Consideration
- Access Routes

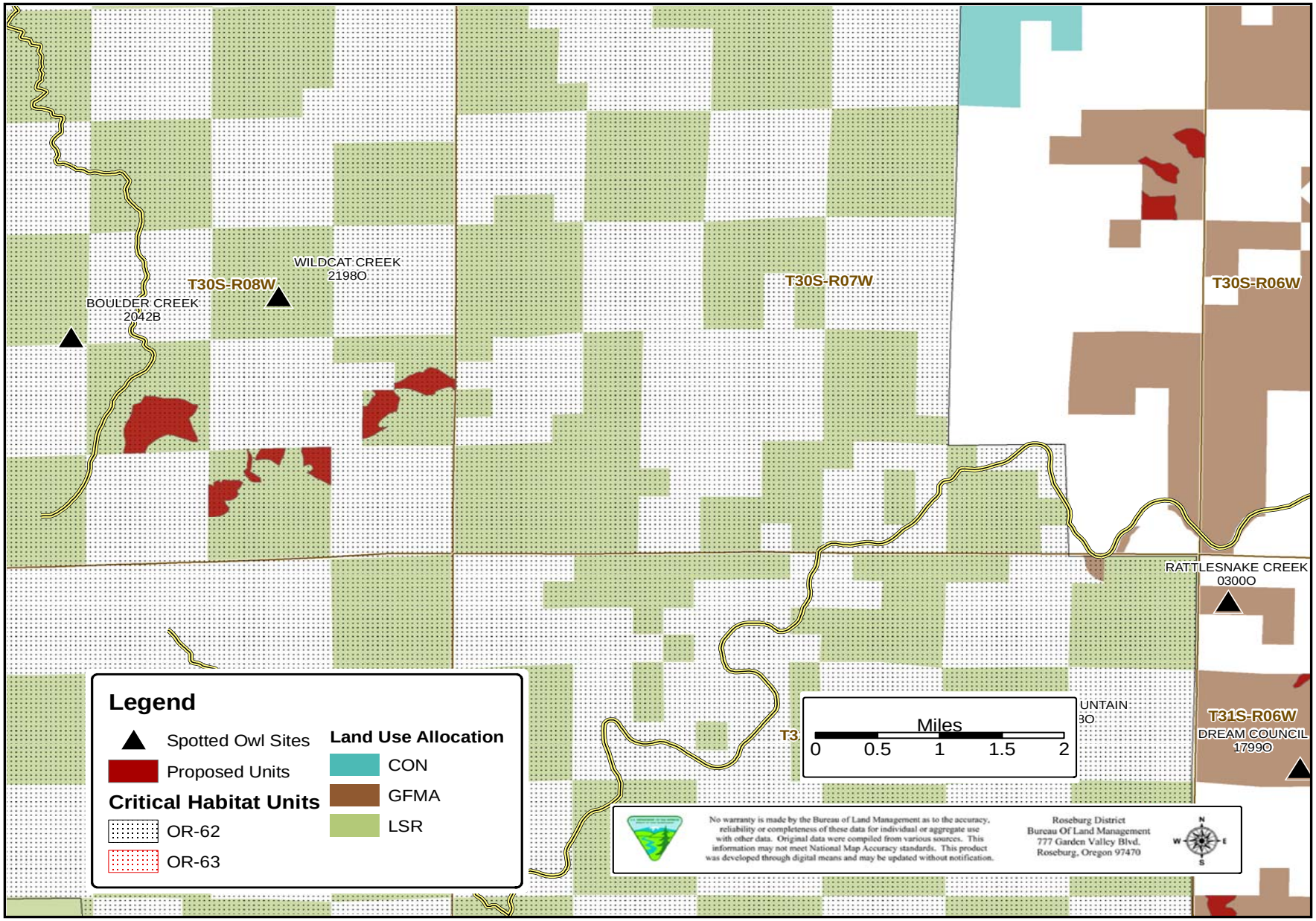
- GFMA
- LSR
- Connectivity

Lower Cow Creek 2007 Commercial Thinning and Density Management EA

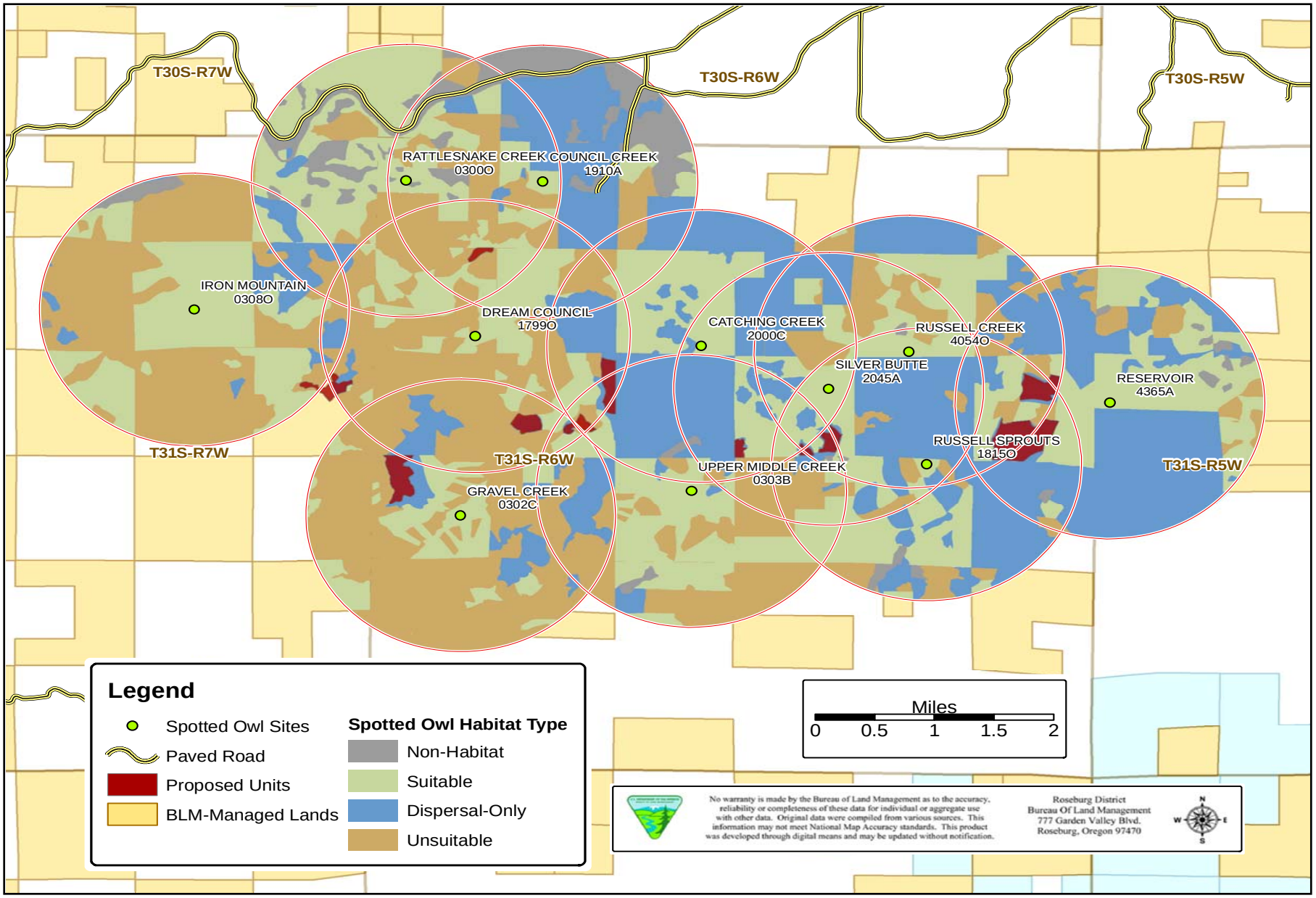
Appendix B. Wildlife

B-1. Proposed units and spotted owl sites south of Cow Creek.

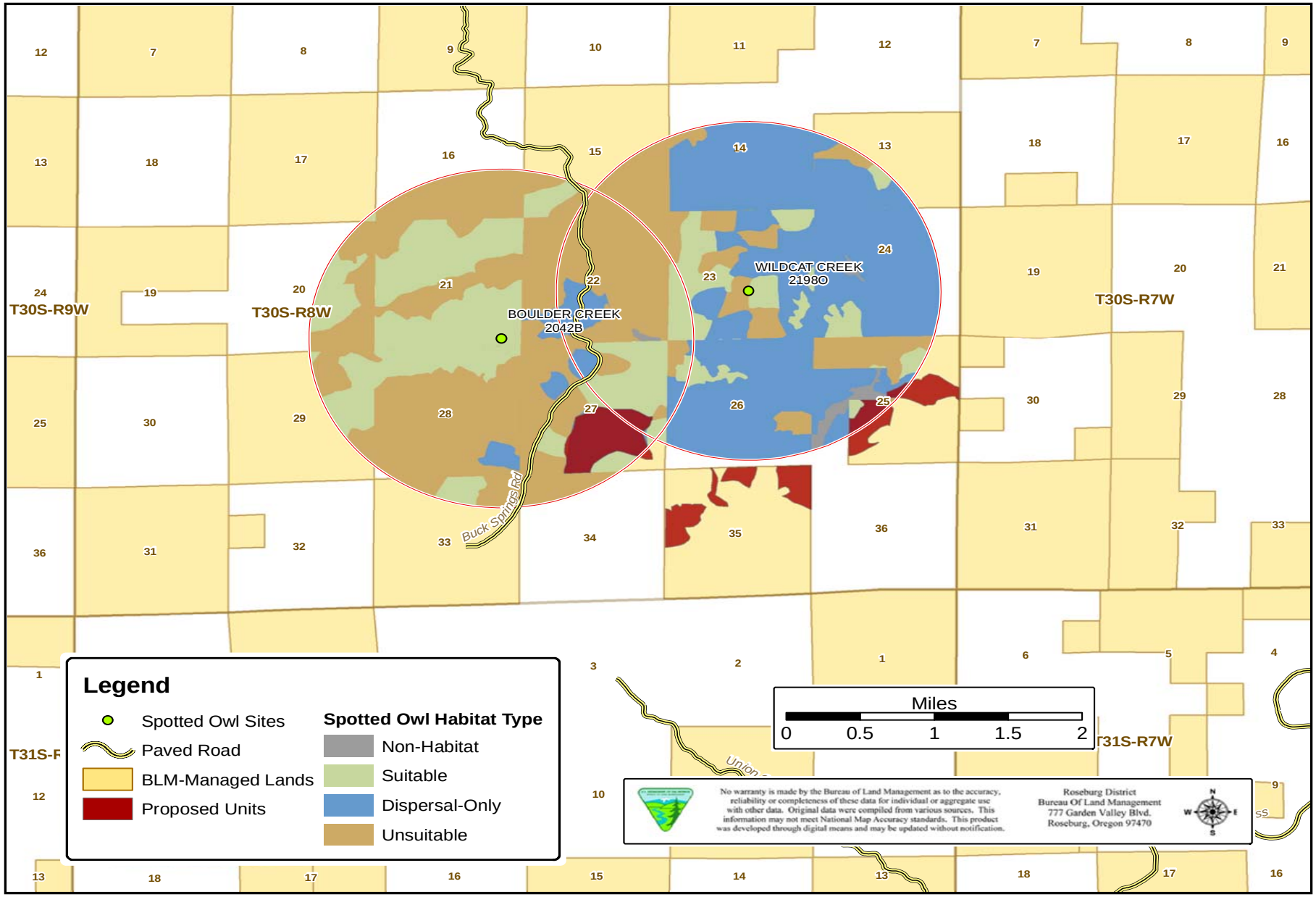
B-2. Proposed units and spotted owl sites north of Cow Creek.



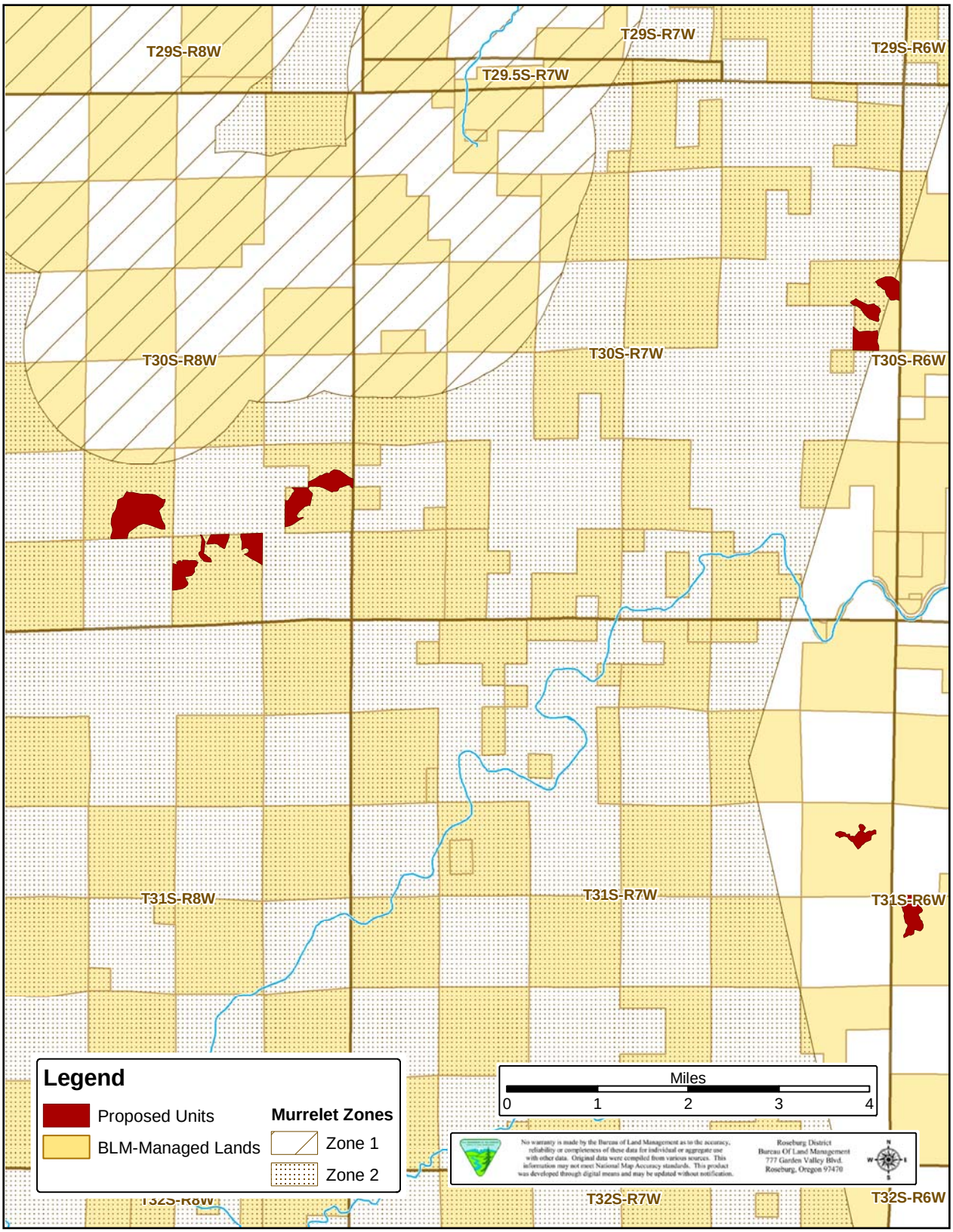
B-3. Spotted Owl home ranges and habitat types south of Cow Creek.



B-4 (Figure 4). Spotted Owl home ranges and habitat types north of Cow Creek.



B-5. Proposed units and marbled murrelet zones.



B-6. Special status wildlife species eliminated from further consideration

Status	Common Name	Scientific Name	Habitat Features Used	Reason if Eliminated
Bureau Sensitive	American Peregrine Falcon	*Falco peregrinus*	Cliffs or other sheer vertical structure, generally in open habitat near water (White et al. 2002)	No Habitat
Bureau Sensitive	Bald Eagle	*Haliaeetus leucocephalus*	Large trees near large bodies of water (Buehler 2000, Isaacs and Anthony 2004)	No Habitat
Bureau Sensitive	Columbian White-Tailed Deer	*Odocoileus virginianus leucurus*	Oak woodland	No Habitat
Bureau Sensitive	Crater Lake Tightcoil	*Pristiloma arcticum crateris*	Herbs, woody debris, or rocky cover in or near perennially wet areas of mature forest (Duncan et al. 2003)	Out of species' range
Bureau Sensitive	Foothill Yellow-Legged Frog	*Rana boylii*	Low-gradient streams with bedrock or gravel substrate (Corkran and Thoms 1996)	Protected by Riparian Reserves if present
Bureau Sensitive	Green Sideband	*Monadenia fidelis beryllica*	Deciduous trees and brush in wet forest, low elevation; strong riparian associate (USDA and USDI 1994, Frest and Johannes 2000)	Out of species' range
Bureau Sensitive	Harlequin Duck	*Histrionicus histrionicus*	Larger fast-flowing streams and riparian areas (Thompson et al. 1993, Robertson and Goudie 1999)	No Habitat
Bureau Sensitive	Lewis' Woodpecker	*Melanerpes lewis*	Open woodlands with ground cover and snags (Tobalske 1997)	No Habitat
Bureau Sensitive (Suspected)	Fisher	*Martes pennanti*	Large contiguous blocks of mature forest with structural complexity (Verts and Carraway 1998)	No Habitat
Bureau Sensitive	Oregon Vesper Sparrow	*Pooecetes gramineus affinis*	Grassland, farmland, sage. Dry, open habitat with moderate herb and shrub cover (Jones and Cornely 2002)	No Habitat
Bureau Sensitive	Rotund Lanx	*Lanx subrotunda*	Umpqua River and major tributaries (USDA and USDI 1994)	No Habitat
Bureau Sensitive (Suspected)	Scott's Apatanian Caddisfly	*Allomyia scotti*	Low-gradient streams with gravel and cobble substrates (Wiggins 1977)	Protected by Riparian Reserves if present
Bureau Sensitive (Suspected)	Spotted Tail-Dropper	*Prophysaon vanattae pardalis*	Moist mature forest (Frest and Johannes 2000)	Out of species' range
Bureau Sensitive	Western Ridged Mussel	*Gonidea angulata*	Low to mid-elevation streams with cobble, gravel, or mud substrates (Nedeau et al.	Protected by Riparian Reserves if present
Bureau Sensitive	White-Tailed Kite	*Elanus leucurus*	Low-elevation grassland, farmland or savannah and nearby riparian areas (Dunk 1995)	No Habitat
Bureau Strategic (Suspected)	Broadwhorl Tightcoil	*Pristiloma johnsoni*	Moist sites with herbaceous and tree canopy cover	BLM Policy
Bureau Strategic (Suspected)	Klamath Tail-Dropper	*Prophysaon sp. nov.*	Moist, open areas with grass and sedges (Frest and Johanes 2000)	BLM Policy
Bureau Strategic	Merlin	*Falco columbaris*	Open or semi-open areas, generally near water, use old corvid or hawk nests (Sodhi et al. 1993)	BLM Policy
Bureau Strategic (Suspected)	Oregon Giant Earthworm	*Driloleirus macelfreshi*	Deep, well-drained soils (Black and Lauvray 2005)	BLM Policy
Bureau Strategic (Suspected)	Pristine Springsnail	*Pristinicola hemphilli*	Small, cold springs and seeps	BLM Policy

B-7. Survey results for affected spotted owl home ranges, 1998-2007, Lower Cow Creek Thinning/Density Management.

Site (ID Number)	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Boulder Creek (2042)	Male, Female	Unoccupied	Female	Unoccupied	Unoccupied	Female	Unoccupied	Male	Pair	2 Fledglings
Catching Creek (2000)	Pair	Female	2 Fledglings	2 Fledglings	Pair	2 Fledglings	Pair	2 Fledglings	Male, Female	Pair
Council Creek (1910)	Pair	Male	Male, Female	Male, Female	Pair	1 Fledgling	Pair	1 Fledgling	2 Fledglings	Pair
Dream Council (1799)	No Survey	No Survey	No Survey	No Survey	No Survey	No Survey	No Survey	Male, Female	1 Fledgling	Pair
Gravel Creek (0302)	Unknown	Male, Female	Male	2 Fledglings	1 Fledgling	1 Fledgling	1 Fledgling	1 Fledgling	2 Fledglings	Pair
Iron Mountain (0308)	1 Fledgling	2 Fledglings	Pair	2 Fledglings	2 Fledglings	Pair	Pair	1 Fledgling	Male, Female	Pair
Rattlesnake Creek (0300)	Unknown	Unoccupied	Unoccupied	Unoccupied	Male	Unknown	Unoccupied	Unoccupied	Unoccupied	Unoccupied
Reservoir (4365)	Pair	Pair	2 Fledglings	Pair	Pair	Pair	Pair	Pair	1 Fledgling	Pair
Russell Creek (4054)	1 Fledgling	Pair	2 Fledglings	1 Fledgling	2 Fledglings	Male, Female	2 Fledglings	Pair	2 Fledglings	Pair
Russell Sprouts (1815)	No Survey	No Survey	No Survey	No Survey	No Survey	No Survey	No Survey	1 Fledgling	Male, Female	Pair
Silver Butte (2045)	Unknown	Male	Male	Pair	Male, Female	Male	Male	Unoccupied	Unoccupied	Occupied
Upper Middle Creek (0303)	Male, Female	Male, Female	Male	Pair	2 Fledglings	Pair	1 Fledgling	Pair	2 Fledglings	Pair
Wildcat Creek (2198)	1 Fledgling	2 Fledglings	1 Fledgling	2 Fledglings	2 Fledglings	Pair	2 Fledglings	Pair	Male, Female	Male

Appendix C. Botany
C-1 Special Status Species summary

Scientific Name	Taxon	Status	Habitat Present	Survey Done
Plagiobothrys hirtus	Vascular Plant	Federal Endangered	No	N/A
Lupinus sulphureus ssp. *kincaidii*	Vascular Plant	Federal Threatened	Yes	No
Adiantum jordanii	Vascular Plant	Bureau Sensitive	Yes	No
Arabis koehleri var. *koehleri*	Vascular Plant	Bureau Sensitive	No	N/A
Asplenium septentrionale	Vascular Plant	Bureau Sensitive	Yes	No
Bensoniella oregana	Vascular Plant	Bureau Sensitive	Yes	No
Botrychium minganense	Vascular Plant	Bureau Sensitive	No	N/A
Calochortus coxii	Vascular Plant	Bureau Sensitive	No	N/A
Calochortus umpquaensis	Vascular Plant	Bureau Sensitive	No	N/A
Carex brevicaulis	Vascular plant	Bureau Sensitive	Yes	No
Carex comosa	Vascular Plant	Bureau Sensitive	Yes	No
Carex gynodynama	Vascular Plant	Bureau Sensitive	Yes	No
Carex serratodens	Vascular Plant	Bureau Sensitive	Yes	No
Cicendia quadrangularis	Vascular Plant	Bureau Sensitive	No	N/A
Cimicifuga elata	Vascular Plant	Bureau Sensitive	Yes	No
Eschscholzia caespitosa	Vascular Plant	Bureau Sensitive	Yes	No
Eucephalis vialis	Vascular Plant	Bureau Sensitive	Yes	No
Horkelia congesta ssp. *congesta*	Vascular Plant	Bureau Sensitive	Yes	No
Horkelia tridentata ssp. Tridentata	Vascular plant	Bureau Sensitive	Yes	No
Iliamna latibracteata	Vascular Plant	Bureau Sensitive	Yes	No
Kalmiopsis fragans	Vascular Plant	Bureau Sensitive	No	N/A
Lathyrus holochlorus	Vascular plant	Bureau Sensitive	Yes	No
Limnanthes gracilis var. *gracilis*	Vascular Plant	Bureau Sensitive	Yes	No
Pellaea andromedaefolia	Vascular Plant	Bureau Sensitive	Yes	Yes
Perideridia erythrorhiza	Vascular Plant	Bureau Sensitive	Yes	Yes

Scientific Name	Taxon	Status	Habitat Present	Survey Done
Polystichum californicum	Vascular Plant	Bureau Sensitive	Yes	No
Romanzoffia thompsonii	Vascular Plant	Bureau Sensitive	Yes	No
Sisyrinchium hitchcockii	Vascular Plant	Bureau Sensitive	No	N/A
Utricularia gibba	Vascular Plant	Bureau Sensitive	No	N/A
Utricularia minor	Vascular Plant	Bureau Sensitive	No	N/A
Wolffia borealis	Vascular Plant	Bureau Sensitive	No	N/A
Wolffia columbiana	Vascular Plant	Bureau Sensitive	No	N/A
Chiloscyphus gemmiparus	Bryophyte	Bureau Sensitive	No	N/A
Diplophyllum plicatum	Bryophyte	Bureau Sensitive	Yes	No
Schistostega pennata	Bryophyte	Bureau Sensitive	Yes	No
Tayloria serrata	Bryophyte	Bureau Sensitive	Yes	No
Tetraphis geniculata	Bryophyte	Bureau Sensitive	Yes	No
Tetraplodon mnioides	Bryophyte	Bureau Sensitive	Yes	No
Bryoria subcana	Lichen	Bureau Sensitive	No	N/A
Calicium adspersum	Lichen	Bureau Sensitive	unknown	No
Hypogymnia duplicata	Lichen	Bureau Sensitive	Yes	No
Leptogium cyanescens	Lichens	Bureau Sensitive	Yes	No
Lobaria linita	Lichen	Bureau Sensitive	Yes	No
Pannaria rubiginosa	Lichen	Bureau Sensitive	Yes	No
Pilophorus nigricaulis	Lichen	Bureau Sensitive	No	N/A
Arcangeliella camphorata	Fungi	Bureau Sensitive	Yes	Not practical
Bridgeoporus nobilissimus	Fungi	Bureau Sensitive	No	N/A
Cudonia monticola	Fungi	Bureau Sensitive	Yes	Not practical
Dermocybe humboldtensis	Fungi	Bureau Sensitive	Yes	Not practical
Gomphus kauffmanii	Fungi	Bureau Sensitive	Yes	Not practical
Helvella crassitunicata	Fungi	Bureau Sensitive	Yes	Not practical

Scientific Name	Taxon	Status	Habitat Present	Survey Done
Leucogaster citrinus	Fungi	Bureau Sensitive	Yes	Not practical
Otidea smithii	Fungi	Bureau Sensitive	Yes	Not practical
Phaeocollybia californica	Fungi	Bureau Sensitive	Yes	Not practical
Phaeocollybia dissiliens	Fungi	Bureau Sensitive	Yes	Not practical
Phaeocollybia gregaria	Fungi	Bureau Sensitive	Yes	Not practical
Phaeocollybia olivacea	Fungi	Bureau Sensitive	Yes	Not practical
Phaeocollybia oregonensis	Fungi	Bureau Sensitive	Yes	Not practical
Phaeocollybia pseudofestiva	Fungi	Bureau Sensitive	Yes	Not practical
Phaeocollybia scatesiae	Fungi	Bureau Sensitive	Yes	Not practical
Phaeocollybia sipei	Fungi	Bureau Sensitive	Yes	Not practical
Phaeocollybia spadicea	Fungi	Bureau Sensitive	Yes	Not practical
Pseudorhizina californica	Fungi	Bureau Sensitive	Yes	Not practical
Ramaria amyloidea	Fungi	Bureau Sensitive	Yes	Not practical
Ramaria gelatiniaurantia	Fungi	Bureau Sensitive	Yes	Not practical
Ramaria largentii	Fungi	Bureau Sensitive	Yes	Not practical
Ramaria spinulosa var. diminutiva	Fungi	Bureau Sensitive	Yes	Not practical
Rhizopogon chamalelontinus	Fungi	Bureau Sensitive	Yes	Not practical
Rhizopogon exiguus	Fungi	Bureau Sensitive	Yes	Not practical
Sowerbyella rhenana	Fungi	Bureau Sensitive	Yes	Not practical

Appendix D. Aquatic Resources Appendix

D-1. ACS Assessment

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:

Key Watersheds: - The Lower Cow Creek project consists entirely of density management and thinning in the Lower Cow Creek 5th field watershed. Middle Creek is designated as a Tier 1 Key watershed (Roseburg District ROD/RMP, USDI 1995a).

Riparian Reserves: This project is designed to accelerate the development of late seral characteristics in upland stands (LSR) and Riparian Reserves. According to GIS data, approximately 128 acres of treatment would occur within Riparian Reserves.

Watershed Restoration: One of the primary purposes of this project is to accelerate tree growth in Riparian Reserves, and speed attainment of late seral stand conditions. Therefore, the proposed action is considered to be a watershed restoration project. *Watershed Restoration* is the only ACS component that is an action (the others are location-based or process-based).

Watershed Analysis (and Other Information) - In developing the project, the Lower Cow Creek Watershed Analysis (USDI 2002), and the *South Coast-Northern Klamath Late-Successional Reserve Assessment* were used to evaluate existing conditions, establish desired future conditions, and assist in the formulation of appropriate alternatives.

Existing watershed conditions and the short and long term effects to aquatic resources are described in the EA on pages 30-40.

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 to 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 5th 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.

Sources of variability
As previously noted, aquatic habitat in the watershed is variable over time and sensitive to a range of disturbance events. Large scale disturbance events (e.g. fire, debris torrents, wind throw, etc), can reduce the quality of aquatic habitat in the short term (less than 5 years); however, they are important to the long term diversity of habitat components such as substrate, large woody debris and pool complexity (Reeves et al. 1995).

Tributaries of Lower Cow Creek are located in often steep and confined valleys where large woody components would be recruited to the stream from adjacent hillslopes and upland stands (Reeves et al. 2003). Harvest of riparian and upland stands where debris flows would have occurred has reduced over time the amount of large wood entering the stream. Agricultural development of low lying floodplains areas has impacted stream channels by eliminating sources of large wood, reducing riparian vegetation and stream shade and limiting access to tributaries through the installation of road crossings.

High severity fires occurred over time frames of hundreds of years resulting in thinning of stands, including those adjacent to streams, and in some cases replacing entire stands (Watershed Analysis (USDI 2002) p. 17). These would have resulted in a large contribution of wood and sediment over a short period of time to adjacent stream channels (Gresswell 1999). Over decades the stream channel would have recovered and aquatic habitat complexity improved to pre-fire levels.

D-2 Individual ACS Objective Assessment **ACS Objective**	**Site/Project Scale Assessment** *(Use a site scale that is commensurate with your project area – it may be a 6th field, 7th field, etc.)* Scale Description: Units identified in this project are located in 15 separate 7th field catchments distributed throughout the watershed totaling roughly 45,294 acres in size. The BLM manages approximately 19,057 acres in these catchments (42.1 percent). Units proposed for treatment represent 2.0 percent of the total catchment area, and 4.7 percent of the BLM-managed lands in the catchment.	**5th Field Watershed Scale Assessment** Scale Description: This project is located in the Lower Cow Creek 5th field watershed. This watershed is roughly 102,483 acres in size. The BLM manages approximately 40,710 acres in this watershed (40 percent). Units proposed for treatment (904 acres) represent 0.88 percent of the total watershed area, and 2.2 percent 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 approximately 128 acres of thinned stands within Riparian Reserves. Trees within these treated stands would attain larger heights and diameters in a shorter amount of time than if left untreated. 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(s), 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	Thinning treatments would not reduce canopy closure to an extent that could potentially influence in-stream flows (Hydrology, p.33-34). In addition, "no-harvest" buffers established on streams in or adjacent to proposed units would prevent disturbance to stream channels and stream banks. Therefore, this treatment would maintain the physical integrity of the aquatic system at the site scale.	This treatment would also maintain the physical integrity of the aquatic system at the watershed 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 criteria (PDC) would ensure that water quality would not be adversely impacted by the proposed action. PDCs 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 precipitate out before reaching active waterways. 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 sediment transported by overland flow to precipitate out before reaching active waterways (Hydrology, p. 33-34, Aquatic Habitat p. 37-38). 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.	Thinning treatments would not reduce canopy closure to an extent that could potentially influence in-stream flows (Hydrology, p. 33). The project would involve partial removal of vegetation on areas constituting 0.5 percent or less of each affected catchment (7^{th} field HUC). 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. 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.
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 and upslope 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 and upslope 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, 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.	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.

Summary: Based upon the information listed above, the proposed action would meet Aquatic Conservation Strategy 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 Aquatic Conservation Strategy, and its objectives at the site and watershed scales.

Appendix E. Port-Orford-Cedar Risk Assessment

Port-Orford-Cedar (POC) Risk Assessment

Unit	Healthy POC in Harvest Unit?	PL-Infected POC in Harvest Unit?	Healthy POC Adjacent to Haul Route?	PL-Infected POC Adjacent to Haul Route?	Question*			Management Practices to Apply
					1	2	3	
30-7-13A	Yes	Yes	Yes	Yes	No	No	No	None
30-7-13B	Yes	Yes	Yes	Yes	No	No	No	None
30-7-13C	Yes	Yes	Yes	Yes	No	No	No	None

* The questions used in assessing the risk to Port-Orford-cedar come from the Record of Decision on the Port-Orford-Cedar Supplemental EIS, page 33. These questions are:
1.) Are there uninfected POC, within , near, or downstream of the activity area whose ecological, Tribal, or product use or function measurable contributes to meeting resource management plan objectives?
2.) Are there uninfected POC within, near, or downstream of the activity area that, were they to become infected, would likely spread infections to trees whose ecological, Tribal, or product use or function measurably contributes to meeting resource management plan objectives?
3.) Is the activity area within an uninfested 7th field watershed as defined in Attachment 1?