# *Middle Fork Coquille 2007 Commercial Thinning and Density Management Environmental Assessment*

Bureau of Land Management
Roseburg District Office
South River Field Office
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# 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. Background

The Upper Middle Fork Coquille Watershed Analysis (USDI, BLM 1999, (WA, p. 92)) identified approximately 5,509 acres of mid-seral forest, 30-80 years old, on the Matrix lands that could be suitable for commercial thinning. Approximately 5,054 acres were between 30 and 60 years of age, and the remaining 455 acres from 60 to 80 years old. Distribution between the General Forest Management Area and Connectivity/Diversity Block land use allocations was approximately 5,064 acres and 445 acres, respectively. Since 1999, thinning decisions have been implemented on 846 acres within the General Forest Management Area and 51 acres within Connectivity/Diversity Blocks. A further decision to authorize thinning of approximately 120 acres in the General Forest Management Area is planned for the summer of 2007.

Watershed analysis (WA, p. 96) also identified approximately 1,301 acres in LSRs and Marbled Murrelet Reserves between 30 and 50 years of age, and 436 acres between 50 and 80 years of age which could be suitable for density management. In 2006, a decision was made to implement density management on 135 acres in LSR 261, with authorization for density management of an estimated 164 acres in LSR 261 planned for the summer of 2007, in conjunction with the thinning decision noted above.

The Roseburg District *Record of Decision and Resource Management Plan* (USDI, BLM 1995a (ROD/RMP)) directs that commercial thinning be practiced in the Matrix where practical and where research indicates increased gains in timber production are likely (p. 62).

- In the General Forest Management Area, commercial thinning would be programmed in stands under 80 years of age and would be designed to assure high levels of timber volume productivity (p. 151).

- In Connectivity/Diversity Blocks, commercial thinning would be undertaken in stands up to 120 years of age and usually designed to assure high levels of timber volume productivity (p. 153).

- In Riparian Reserves, density management is to be applied to control stocking levels, establish and manage non-conifer vegetation, and acquire vegetation characteristics consistent with Aquatic Conservation Strategy objectives (pp. 153-154).

The ROD/RMP (p. 29) also directs that activities beneficial to the creation of late-successional habitat be planned and implemented in the Late-Successional Reserves (LSRs), including thinning in forest stands up to 80 years old, if needed to create and maintain late-successional forest conditions.

The *South Coast-Northern Klamath Late-Successional Reserve Assessment* (USDI and USDA 1998 (LSRA)) provides guidance for determining which forest stands warrant silvicultural treatments to achieve desired stand conditions, and the nature of appropriate treatments. With specific respect to LSR 259, revisions made to the silviculture criteria of the LSRA were found by the Regional Ecosystem Office to be consistent with objectives of the Standards and Guidelines of the Northwest Forest Plan for managing LSRs.

The *South Coast-Northern Klamath* LSRA listed LSRs 259 and 261, both of which overlap portions of project analysis area, as high priorities for management actions based on their large size, key links to the LSR network, and land ownership pattern. Management priorities for LSRs 259 and 261 include enlarging existing interior late-successional habitat blocks, maintaining and improving habitat connections between and within the LSRs, and creating late-successional habitat where absent (LSRA, pp. 63-66 and Maps 6 and 8).

## II. Proposed Action

Commercial thinning, with density management in associated Riparian Reserves, would be implemented on approximately 350 acres in the General Forest Management Area and 12 acres in the Connectivity/Diversity Block land use allocations. Density management would be implemented on approximately 493 acres located in LSRs 259 and 261. It is anticipated that the thinning and density management treatments combined would yield between 8.5 and 9.5 million board feet of timber.

The stands proposed for treatment are located in the Twelve Mile Creek and Headwater Middle Fork Coquille River 6$^{th}$-field subwatersheds of the Middle Fork Coquille 5$^{th}$-field watershed. Individual units are located in: Sections 5, 15, 29, 31, 32 and 33 in T. 29 S., R. 8 W.; Sections 1, 11, and 35 in T. 29 S., R. 9 W.; Sections 5, 9, 15, 27, and 33 in T. 30 S., R. 8 W.; and Section 3 in T. 30 S., R. 9 W., W.M.

This EA will consider the environmental consequences of the proposed action and no action alternatives in order to provide sufficient evidence for determining whether there would be impacts exceeding those considered in the Roseburg District *Proposed Resource Management Plan/Environmental Impact Statement* (USDI, BLM 1994 (PRMP/EIS)) which would require preparation of a Supplemental Environmental Impact Statement (SEIS). In addition to the PRMP/EIS, this analysis is tiered to and incorporates by reference the assumptions and analysis of consequences provided by:

- The *Final Supplemental Environmental Impact Statement* (FSEIS) *on Management of Habitat for Late-Successional and Old-Growth Related Species Within the Range of the Northern Spotted Owl* (USDA and USDI 1994a);
- The FSEIS *for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (USDA and USDI 2001a); and
- The FSEIS *for Management of Port-Orford-Cedar in Southwest Oregon* (USDA and USDI 2004b).

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

## III. Objectives

The objective of the proposed action is to reduce stand densities within the project stands in order to maintain individual tree and stand vigor, consistent with stand and landscape objectives for the individual land use allocations, as described in Appendix E of the Roseburg District ROD/RMP (pp. 150 and 154).

Commercial thinning in the Matrix would also:

- Provide a high level of quality wood and sustainable timber production from the General Forest Management Area; and moderately high levels of timber production from the Connectivity/Diversity Blocks (pp. 150-151); and
- Recover the commodity value of trees that would be lost to suppression mortality.

Timber volume derived from commercial thinning in the General Forest Management Area and Connectivity/Diversity Block land use allocations would contribute toward the Roseburg District declared annual allowable sale quantity (ASQ) of 45 million board feet, in support of the socio-economic benefits envisioned in the PRMP/EIS (Vol. 1, p. xii). The PRMP/EIS estimated that BLM management programs (including timber sales) would support 544 jobs and provide $9.333 million in personal income annually.

Density management in Riparian Reserves would aid in the retention of hardwoods as stand components. It would also diversify the species and structural composition, and accelerate the growth of the retained trees, consistent with management direction to develop vegetation characteristics needed to attain objectives of the Aquatic Conservation Strategy (ROD/RMP, pp. 153-154).

Density management in project stands within LSRs 259 and 261would:

- Aid in achieving LSRA objectives by protecting and enhancing conditions of late-successional forest ecosystems, which serve as habitat for late-successional and old-growth forest related species (ROD/RMP p. 153);
- Promote development of old-growth forest characteristics that include snags, logs on the forest floor, large trees, and canopy gaps that enable establishment of multiple tree layers and diverse species composition (ROD, p. B-5);
- Maintain the health and vigor of the stands, and promote the growth of the remaining trees;
- Retain hardwoods as stand components;

- Maintain native species diversity and structural composition of the forest stands (LSRA, pp. 62);
- Maintain and improve late-successional habitat connections within and between LSRs (LSRA, pp. 65-66);
- Create larger blocks of interior late-successional habitat (LSRA, pp. 65-66); and
- Decrease the risk of large scale disturbance from fire, wind, insects, and diseases that would destroy or limit the ability of the reserves to sustain viable species populations (ROD, B-5).

While timber volume generated from density management in Riparian Reserves and LSRs would not be chargeable against the annual ASQ, it would further contribute to the socio-economic benefits envisioned in the PRMP/EIS.

## IV. Decision Factors

Factors to be considered when selecting among the alternatives will include:

- The degree to which the objectives previously described would be achieved, including: the manner in which commercial thinning and density management would be conducted with respect to method of yarding and the type(s) of equipment used; season(s) of operations; and the manner in which access would be provided, including road renovation, and the types and locations of road construction;
- The nature and intensity of environmental impacts that would result from implementing the alternative and the nature and effectiveness of measures to mitigate impacts to resources including, but not limited to wildlife and wildlife habitat, soil productivity, and water quality;
- Compliance with management direction from the ROD/RMP;
- Degree to which the alternative(s) would contribute to the achievement of LSRA objectives; and
- Compliance with applicable laws including, but not limited to the Clean Water Act and Endangered Species Act.

# Chapter Two
# DISCUSSION OF THE ALTERNATIVES

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

## I. Alternative One – No Action

Under this alternative, commercial thinning and density management would not be applied to the units being considered for treatment under the proposed action. The stands would continue to develop along present growth trajectories characterized by dense and overstocked conditions and high levels of canopy closure. Over time, the persistence of such conditions would lead to increased mortality in suppressed trees combined with potential stagnation of overall stand growth, unless these trajectories were altered by a natural disturbance such as wind or fire.

There would be no construction of roads for access to the proposed commercial thinning and density management units. Road maintenance would be conducted on an as-needed basis to provide resource protection, accommodate reciprocal users, and protect the government's investment in the roads. Renovation of roads for reasons such as realignment or correction of drainage deficiencies would not be undertaken, nor would the decommissioning of roads identified as surplus to long-term transportation and management needs.

## II. Alternative Two – The Proposed Action

Under this alternative, a total of 855 acres of mid-seral stands within the watershed would receive either a density management or commercial thinning treatment.

Density management treatments would be applied to approximately 493 acres in LSRs 259 and 261, divided among 16 units located in Sections 5, 15, and 33, T. 29 S., R. 8 W.; Sections 1 and 11, T. 29 S., R. 9 W., and Sections 9, 15, 27, and 33, T. 30 S., R. 8 W., W.M.

Commercial thinning would be applied to approximately 362 acres of Matrix lands, divided among 12 units located in Sections 29 and 33, T. 29 S., R. 8 W.; Section 35, T. 29 S., R. 9 W.; Section 5, T. 30 S., R. 8 W.; and Section 3, T. 30 S., R. 9 W., W.M. Maps of the proposed units are included in Appendix A.

### A. General Unit Design and Marking Prescriptions

Commercial thinning and density management would be used to reduce the stand density of generally even-aged forest stands dominated by Douglas-fir. These treatments would be developed consistent with management objectives for the individual land use allocations.

Trees would primarily be removed from the suppressed and intermediate canopy classes, although some co-dominant and dominant trees could be removed where necessary to meet specific density objectives. Generally, trees selected for retention would have at least a 30 percent live crown ratio so that live crown expansion and accelerated diameter growth would be more likely following thinning (Daniel, et. al. 1979).

Stand ages are established by one of two methods. Where previous harvest and reforestation have occurred, operational inventory data may be used. In stands that naturally regenerated, stand exams are the principal means for determining age and are derived from the measured age of dominant and co-dominant trees representing the numerically predominant stand components. While older remnant trees may be present within proposed units, they are not the stand components or the focus of thinning and density management, and would be retained to the greatest degree practicable.

Circumstances under which older remnant trees could be cut would be typically limited to: clearing of road rights-of-way; clearing landing areas; and removing the trees to address operational safety concerns subject to Oregon State laws and regulations. Conversely, since treatments would focus on removal of intermediate and suppressed canopy layers, it is possible that suppressed trees designated for cutting may include trees older than the prevailing stand age.

Hard conifer and hardwood snags at least16 inches in diameter breast height and 20 feet tall would be would be retained to the greatest degree practical as described below in the discussion specific to individual land use allocations. Circumstances under which snag retention would not be a viable option would include: proximity to roads and landings where they pose operational safety concerns subject to Oregon State laws and regulations; location in a proposed road right-of-way where no other reasonable means of access exists; and where retention and protection would preclude achieving silvicultural objectives of the thinning and density management.

In all land use allocations contract provisions would stipulate the reservation of all existing Class 3, 4 and 5 large down wood.

Variable-width “no-harvest” buffers would be established within all Riparian Reserves in the Matrix allocations, and on all riparian areas within the LSRs to protect stream bank integrity, maintain streamside shade, and provide a filtering strip for overland run-off. The buffers would be a minimum slope distance of 20 feet in width on intermittent non-fish-bearing streams and 50 feet in width on fish-bearing streams, measured from the top of the stream bank. Designation of actual widths would be based on factors such as unique habitat features, streamside topography, and vegetation. The susceptibility of a stream to solar heating and proximity to Essential Fish Habitat would also be considered in determining specific buffer widths. Trees designated for cutting and removal would be felled away from these “no-harvest” buffers.

No ground-based equipment operations would be allowed within 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. The need for cable yarding corridors across streams would be clearly demonstrated by the purchaser. Corridors would be a maximum of 20 feet wide and laid out perpendicular to stream channels at locations and in a manner approved by the contract administrator.

## B. Late-Successional Reserves Unit Design and Marking

Development of late-successional and old-growth forests characteristic in southwest Oregon largely resulted from fires of varying intensities, including both natural fires and those set by indigenous peoples for the purpose of managing vegetative conditions to meet their needs. Today, the extent to which fire may be used as a management tool for manipulating vegetative conditions is limited because of concerns over potential impacts to adjoining private property and air quality. Mechanical treatments represent the most effective means for managing vegetation for development of late-successional and old-growth forest habitat.

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* (pp. 28 and 82).

Three types of thinning treatments would be applied, individually or in combination, in conjunction with creation of canopy gaps and openings, and retention of unthinned areas within the units 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 in the marking prescription. Snags would be retained and protected to the greatest extent practical by enclosing them in unthinned areas. Where felled for operational reasons they would be retained on site to supplement existing coarse wood.

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. 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. Less common (numerous) conifer species would be favored for retention, in sufficient numbers to maintain them as stand components.

At least ten percent of the area within individual units would remain unthinned to maintain processes and conditions in their present state. Among these are thermal and visual cover, natural suppression and mortality, natural size differentiation in tree sizes that includes small trees, and undisturbed coarse woody debris.

In LSR 261 openings and gaps would be limited to a maximum size of one-quarter of an acre, and in combination with heavily thinned areas would not exceed ten percent of the total treated acres. In LSR 259 openings and gaps could be up to 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. In the application of heavy thinning and the creation of gaps and openings it is anticipated that the removal of some dominant and co-dominant trees, possibly greater than 20 inches diameter breast height, would be a necessity. A combination of ponderosa pine, western redcedar, Douglas-fir, sugar pine, 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 |
|---|---|---|---|---|---|---|
| 29-8-5A | 7.0 | 25.25 | 27.0 | 0 | .75 | 60 |
| 29-8-5B | 1.4 | 0 | 12.6 | 0 | 0 | 14 |
| 29-8-33D* | 9.0 | 0 | 45 | 0 | 0 | 54 |
| 29-9-1A | 3.5 | 0 | 31.0 | 0 | .50 | 35 |
| 29-9-1B | Dropped as unviable for treatment | | | | | |
| 29-9-1C | 6.0 | 0 | 10.75 | 0 | .25 | 17 |
| 29-9-1D | 9.0 | 0 | 33.25 | 0 | .75 | 43 |
| 29-9-1E | 3.5 | 8.0 | 0 | 28.5 | 0 | 40 |
| 29-9-11A | 31.0 | 0 | 26.0 | 0 | 0 | 57 |
| 29-9-11B | 4.0 | 0 | 0 | 34.0 | 0 | 38 |
| **Total in LSR 261** | **74.4** | **33.25** | **185.6** | **62.5** | **2.25** | **358** |
| 29-8-15A | 1.5 | 0 | 13.5 | 0 | 0 | 15 |
| 30-8-9A | 1.5 | 0 | 0 | 13.5 | 0 | 15 |
| 30-8-9B | 5.9 | 0 | 18.4 | 0 | .70 | 25 |
| 30-8-15A | 2.0 | 0 | 12.0 | 0 | 0 | 14 |
| 30-8-27A | 4.0 | 0 | 18.0 | 0 | 1.0 | 23 |
| 30-8-27B | 2.0 | 0 | 14.67 | 0 | .33 | 17 |
| 30-8-33A | 3.0 | 7.0 | 15.0 | 0 | 1.0 | 26 |
| **Total in LSR 259** | **19.9** | **7.0** | **91.57** | **13.5** | **3.03** | **135** |
| **Total of All Units** | **94.3** | **40.25** | **277.17** | **76.0** | **5.28** | **493** |

*****This unit is being managed as part of an unmapped Marbled Murrelet Reserve.

### C. Matrix Unit Design and Marking

Stands in the General Forest Management Area would be thinned to a relative density index of 0.30 to 0.35 to maximize stand volume growth. One-third to one-half of the basal area would be removed and canopy closure reduced to 45 to 60 percent, comparable to a light LSR thinning treatment. The healthiest, best-formed trees would be retained, as commodity production of timber is the primary objective for this land use allocation. Minor conifer species would be retained to reflect the approximate percentages represented in the stands.

Density management in the single Connectivity/Diversity Block unit would reduce the relative density index to approximately 0.25. 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, 40 to 50 percent of the basal area would be removed with post-treatment canopy closure of 40 to 50 percent, comparable to a moderate LSR thinning treatment. The healthiest, best-formed trees would be favored for retention, with minor conifer species retained in numbers reflecting the approximate percentages represented in the stands.

Large hardwoods would be retained to further the objective of providing two per acre for retention at the time of regeneration harvest. The stand would also be evaluated for conifer under-planting to help create a secondary canopy layer as well as non-conifer understory vegetation.

In those portions of the Riparian Reserves located outside of the "no-harvest" buffers, a variable marking prescription would be applied similar to that applied in the Connectivity/Diversity Block unit, 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 and minor conifer species would be retained in percentages comparable to current representation in the stands.

In Matrix stands, snags would be protected where feasible and possible, by designation of rub trees. In Riparian Reserves, untreated areas could be used to afford protection. Snags felled within the Matrix lands could be removed if they possess commercial value, as there is no requirement for large down wood at intermediate entry. Snags felled in Riparian Reserves would be retained on site for potential future recruitment into streams.

## D. Timber Cruising

Timber cruising would employ methods that could include the felling of sample trees to formulate local volume tables. The felling of sample trees would be limited to upland stands in the General Forest Management Area and Connectivity/Diversity Block land use allocations. No sample tree felling would be conducted in lands allocated to LSRs and Riparian Reserves. Trees selected for felling would be subject to a 20 inch diameter breast height limit for Douglas-fir, and 15 inches diameter breast height for minor conifer species. Felled sample trees would become a part of the offered sale volume. The effects of sample tree felling would be consistent with those described in the Roseburg District 3P Fall, Buck and Scale EA (USDI, BLM 2000).

## E. Access

Existing permanent roads would provide primary access to units for commercial thinning and density management, and for timber hauling. Access to suitable landings would be provided by construction of approximately 2.8 miles of new permanent and temporary roads, renovation of approximately 33 miles (as indicated on the Vicinity Map in Appendix A), and reconstruction of approximately 0.42 miles of system roads.

New roads would be constructed on ridge tops or stable side slopes and outside of riparian areas to the extent practicable, reducing the need for excavation and modification to the existing slopes, contours, and natural drainage patterns. The running surface of temporary roads would typically be no more than 12 to 13 feet in width.

Table 2-2 identifies the proposed road construction and disposition of roads associated with each of the proposed commercial thinning and density management units. The proposed construction may change with respect to length, surfacing and post-operational disposition based on refinement of the project on the ground.

**Table 2-2 Miles of Proposed Road Construction, Reconstruction, and Disposition After Completion of Density Management and Commercial Thinning.**

| Unit Designation | Type of Construction or Renovation | Road Length (miles) | Season of Operation[1 & 2] | Disposition of Road Following Completion of Treatment |
|---|---|---|---|---|
| 29-8-5A | Surfaced spur | .20 | All Season | Block/Decommission |
| 29-8-5B | Dirt spur | .07 | Dry only | Full Decommission |
| 29-8-15A | Dirt spur | .24 | Dry only | Full Decommission |
| 29-8-29A | Dirt spurs (3) | .25 | Dry only | Full Decommission |
| 29-8-29B | Surfaced spur | .12 | All Season S ½ | Block/Decommission |
| 29-8-31A | Dirt spur | .06 | Dry only | Full Decommission |
| 29-8-33A | Surfaced spur | .16 | All Season S ½ | Retain for future |
| 29-8-33B | Surfaced spur | .15 | All Season | Retain for future |
| 29-8-33C | none | | All Season | |
| 29-8-33D | Dirt spur | .18 | Dry only | Full Decommission |
| 29-9-1A | Surfaced spur | .30 | All Season S½ | Block/Decommission |
| 29-9-1C | Reconstruct dirt spur (29-9-1.0 rd) | .14 | Dry only | Full Decommission |
| 29-9-1D | Surfaced spur | .10 | All Season | Block/Decommission |
| 29-9-1E | Surfaced spur | .09 | All Season | Block/Decommission |
| 29-9-1E | Reconstruct and surface spur | .19 | All Season | Block/Decommission |
| 29-9-1E | Dirt spur | .15 | Dry only | Full Decommission |
| 29-9-11A | none | | All Season | |
| 29-9-11B | Reconstruct portion of Road 29-9-11.2 | .09 | All Season | Retain for future. |
| 29-9-35A | Surface spur | .15 | All Season | Block/Decommission |
| 29-9-35B | none | | All Season | |
| 30-8-5A | Construct & rock spur | .39 | All Season | Retain for future |
| 30-8-5B | none | | All Season | |
| 30-8-9A | none | | All Season | |
| 30-8-9B | none | | All Season | |
| 30-8-15A | Reconstruct dirt spur | .23 | Dry only | Full Decommission |
| 30-8-27A | none | | All Season | |
| 30-8-27B | Dirt spur | .20 | Dry only | Full Decommission |
| 30-8-33A | none | | Dry only | |
| 30-9-3A | none | | Dry only | |
| 30-9-3B | Surface spurs (2) | .10 | All Season | Block/Decommission |

[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

Road renovation could include grading; repairing; realigning; surfacing; or widening existing roadbeds. It could also include cleaning and reshaping drainage ditches; cleaning, repairing, or adding drainage structures; and clearing vegetation and trees from cut and fill slopes.

Where future management access needs are anticipated in 15 to 20 years, retention of new roads as part of the permanent transportation system would be considered.

In decommissioning temporary unsurfaced roads, the intent is to do so in the same summer operating season in which the roads are built and used. This 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. Where circumstances, such as prolonged fire closure or early onset of autumn rains, preclude use and decommissioning in this time frame, the roads would be winterized and blocked to traffic, and decommissioned in the following summer operating season. Renovated natural-surface roads would be decommissioned in a similar fashion unless prohibited under third-party access rights, in which case they would be weatherized and blocked to prevent vehicular use and reopened in the future if needed. Decommissioning surfaced roads would generally consist of removing drainage structures, constructing water bars or drain dips, and blocking to vehicular use.

## F. Yarding Operations

Commercially thinning and density management would be accomplished by a combination of cable and ground-based yarding systems.

Skyline cable yarding would be the primary harvest system because of the steep terrain in the project area. Equipment would be capable of maintaining a minimum of one-end log suspension to reduce the potential for soil disturbance and compaction. Yarding corridors would be pre-designated by the purchaser and approved by the contract administrator. A minimum of 100 feet of lateral yarding capability would be required so that corridors could be spaced at intervals of 200 feet, where practical, reducing the number of corridors and landings needed and limiting the area subject to potential disturbance and compaction. Where necessary, yarding corridors would be water-barred by hand and covered with woody debris to minimize the potential for erosion.

Ground-based operations would be limited to the dry season, typically from May 15$^{th}$ to the onset of regular autumn rains in mid-to-late October. If weather conditions are unusually wet, ground-based operations would be delayed or suspended until soil moisture is sufficiently low to resist compaction. If autumn weather conditions remain dry, operations could be extended subject to issuance of a provisional waiver. Skid trails would be pre-designated and limited to slopes less than 35 percent, using existing trails to the greatest degree practical (ROD/RMP, p. 131). Landings and primary skid trails, including existing trails that would be re-used, would collectively affect no more than 10 percent of the ground-based harvest area. Primary skid trails are defined as trails with mineral soil exposed on more than 50 percent of the trail.

Landings, primary skid trails, and other heavily compacted areas identified by the soil scientist, silviculture staff, or the contract administrator would be subsoiled on completion of commercial thinning and density management operations, and logging slash placed over the exposed soils or other treatments such as mulching used to reduce potential for surface erosion. Other affected areas would be mapped for treatment at final harvest, if warranted.

For both cable and ground-based yarding operations, the contract administrator would reserve trees designated for cutting to replace trees cut to clear yarding corridors, if deemed necessary for maintenance of the desired post-treatment stand density.

Table 2-3 provides estimated acres by harvest method for each commercial thinning and density management unit. The 92 acre difference from the 855 acres stated in Chapter One reflects the dispersed unthinned areas required within the LSR density management units.

**Table 2-3 Acres by Yarding Methods and Season of Operation.**

| Unit | Treated Acres | Treatment/ Land Use Allocation | Acres Cable Harvest | Acres Ground Harvest |
|---|---|---|---|---|
| 29-8-5A | 53 | Density Management (LSR) | 53 | 0 |
| 29-8-5B | 12.6 | Density Management (LSR) | 2.6 | 10 |
| 29-8-15A | 13.5 | Density Management (LSR) | 0 | 13.5 |
| 29-8-29A | 33 | Commercial Thin (GFMA) | 3 | 30 |
| 29-8-29B | 50 | Commercial Thin (GFMA) | 30 | 20 |
| 29-8-31A | 12 | Commercial Thin (Conn./Div.) | 10 | 2 |
| 29-8-33A | 33 | Commercial Thin (GFMA) | 18 | 15 |
| 29-8-33B | 44 | Commercial Thin (GFMA) | 44 | 0 |
| 29-8-33C | 13 | Commercial Thin (GFMA) | 13 | 0 |
| 29-8-33D | 45 | Density Management (MLSR) | 30 | 15 |
| 29-9-1A | 31.5 | Density Management (LSR) | 19 | 12.5 |
| 29-9-1C | 11 | Density Management (LSR) | 3 | 8 |
| 29-9-1D | 34 | Density Management (LSR) | 34 | 0 |
| 29-9-1E | 36.5 | Density Management (LSR) | 36.5 | 0 |
| 29-9-11A | 26 | Density Management (LSR) | 26 | 0 |
| 29-9-11B | 34 | Density Management (LSR) | 34 | 0 |
| 29-9-35A | 23 | Commercial Thin (GFMA) | 23 | 0 |
| 29-9-35B | 30 | Commercial Thin (GFMA) | 25 | 5 |
| 30-8-5A | 68 | Commercial Thin (GFMA) | 68 | 0 |
| 30-8-5B | 28 | Commercial Thin (GFMA) | 28 | 0 |
| 30-8-9A | 13.5 | Density Management (LSR) | 13.5 | 0 |
| 30-8-9B | 19.1 | Density Management (LSR) | 19.1 | 0 |
| 30-8-15A | 12 | Density Management (LSR) | 10 | 2 |
| 30-8-27A | 19 | Density Management (LSR) | 19 | 0 |
| 30-8-27B | 15 | Density Management (LSR) | 15 | 0 |
| 30-8-33A | 23 | Density Management (LSR) | 19 | 4 |
| 30-9-3A | 8 | Commercial Thin (GFMA) | 0 | 8 |
| 30-9-3B | 20 | Commercial Thin (GFMA) | 20 | 0 |
| **Total** | 760.7 | | 615.7 | 145.0 |

## G. Seasonal Restrictions

In addition to seasonal restrictions on ground-based harvest, discussed above, the following restrictions might also apply to operations within the project area.

Felling and yarding of timber, other than that associated with clearing rights-of-way, would generally be prohibited during the bark-slip period, from April 15 to July 15 when active cambial growth results in bark being less firmly attached to tree boles and more susceptible to mechanical damage, particularly in younger trees. Circumstances may exist, however, where

it would be practical to waive this restriction, such as in the use of harvester-forwarder equipment capable of severing trees, setting them aside, and transporting them to landings without damaging adjoining trees.

Yarding and hauling of timber from areas accessed by unsurfaced roads would be restricted to the period between May 15th and the onset of regular autumn rains, usually in mid-to-late October. If autumn weather remains dry, operations could be extended under waiver.

If Federally-threatened northern spotted owls (*Strix occidentalis caurina*) are determined to be nesting within 65 yards of a commercial thinning or density management unit, seasonal restrictions would be implemented to avoid disruption during the nesting and rearing period. Operations would be prohibited from March 1st to June 30th, both dates inclusive, unless surveys determine owls are not present, are not nesting, or have failed in the nesting attempt.

Density management within 100 yards of any known occupied marbled murrelet (*Brachyramphus marmoratus*) site, or any unsurveyed suitable nesting habitat in Zone 1 or the Zone 2 restriction corridor would be prohibited from April 1st to August 5th, and subject to Daily Operating Restrictions (DOR) from August 6th to September 15th to avoid disturbance during the nesting and fledging season. Daily Operating Restrictions prohibit commencement of operations until two hours after sunrise and require operations to cease two hours before sunset. In areas of Zone 2 outside of the restriction corridor, operations would be subject to Daily Operating Restrictions from April 1st to August 5th. These restrictions would be waived if two years of surveys indicate the area is unoccupied.

## H. Evaluating Achievement of LSRA Coarse Wood and Snag Objectives

For the Coast Range Province, which contains LSR 261, the LSRA recommends that stands 80 years of age have 3,600 to 9,400 cubic feet of coarse woody debris per acre, at least four inches in diameter and three feet long, within the first site-potential tree height of perennial streams. Within the second site-potential tree height of perennial streams or the first site potential tree height of intermittent streams 1,600 to 2,300 cubic feet per acre is recommended.

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 3-2 on page 22.

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

- Contract provisions would stipulate reservation of existing coarse woody debris in Decay Classes 3, 4, and 5;
- Snags felled for safety or operational reasons would be retained on site;
- Non-merchantable materials generated during density management operations, including broken-out tree tops would largely be left 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.

If monitoring indicated a deficit of coarse wood and snags following density management, trees would be girdled or felled. At least 3 snags per acre on north facing slopes and 1 snag per acre on south facing slopes would be created. Monitoring would continue and within five years of treatment the desired numbers of 5 snags per acre on north slopes and 3 snags per acre on south slopes would be met. Depending on the size class distribution of the stand, the size of these snags may not meet the 20 inch diameter LSRA requirement, but would meet a short term need until larger trees are available. For those units not meeting the coarse wood levels, trees would be felled to contribute to meeting the recommended levels.

The potential need for additional trees to meet snag and coarse wood needs would be factored into the marking prescriptions. Surveys would be conducted after the first winter following completion of density management in order to monitor levels of coarse wood and numbers of snags. In the event that deficits in snags and/or coarse wood still exist five years after density management treatments are completed, additional trees reserved under the marking prescription would be felled or girdled to meet coarse wood and/or snag objectives. Felling and/or girdling would be accomplished under a service contract or by qualified District personnel.

### I. Hazardous Fuels Treatments

In order to reduce the risk of fire and damage to the thinned forest stands, slash piles at landings would be burned to reduce roadside fuel concentrations. In proposed Unit 29-9-1A, logging residues (slash) within 50 feet either side of Road No. 28-8-31.2 would be hand piled and burned for hazard reduction. Subject to a post-thinning evaluation, proposed Unit 29-9-11B would be under-burned. Within the remaining units in the Wildland Urban Interface and LSRs, post-thinning fuel loading and arrangement would also be evaluated in order to determine whether a need exists for additional treatment in the form of limited hand-piling and burning, or pull back of fuels adjacent to roads and property lines.

## III. Alternatives and/or Actions Considered But Not Analyzed In Detail

### A. Helicopter Yarding vs. Building or Reconstructing Roads

Comments on previous commercial thinning and density management analyses suggested the BLM should consider helicopter yarding as an alternative to any construction of new roads or renovation of decommissioned roads. This is not considered and analyzed as a reasonable alternative to the proposed action for the following reasons:

- Primary road access already exists to all but one (Unit 29-8-15A) of the 28 units proposed for treatment in this analysis. Access for the ground-based thinning of this unit would only require the construction of one-quarter of a mile of temporary road;

- Of the 19 units for which new road construction is proposed, construction would be located entirely within the boundaries of 15 units, for the purpose of accessing advantageous yarding locations or allowing landings to be located off of main roads in order to avoid impeding other traffic; and
- Using representative appraisal criteria for a comparison of costs indicates that helicopter yarding would be at least two and a half times more expensive than traditional cable yarding methods, and more than four times the cost of ground-based harvest.

  Based on the use of a medium-size ship (Sikorsky 61 or Boeing Vertol 107), average distance of one-half from unit to landing and a production rate of 12 truck loads per day, logging costs would be $400 to $450 per thousand board feet (MBF) loaded at the landing.

  By comparison, using a 40-foot tower, average yarding distance of 400 feet, and production rate of four truck loads per day, production cost is $162 per MBF loaded at the landing. For ground-based harvest, assuming an average yarding distance of 400 feet and a production rate of six truck loads per day, production costs would be on the order of $90 to $115 per MBF loaded at the landing.

  For construction of temporary roads on gentle terrain without culverts, a cost of $200 per station (100 feet) would be reasonable and customary. Decommissioning costs would be comparable. Cost of renovating decommissioned road beds or existing natural-surface roads would be similar. Average construction costs per station of permanent all-weather road would be on the order of $1,500.00. Surfacing existing dirt roads, where no major construction would be necessary is estimated to cost approximately $1,200.00 per station.

  To illustrate the differences in cost of conventional yarding vs. helicopter yarding, Unit 29-8-15A is used as it is the sole unit with no present road access. Construction and decommissioning of 0.24 miles of temporary road (~ 13 stations) would cost roughly $5,200.00. Based on a projected average volume of 11,000 board feet per acre over the entire project, the cost of yarding this 15-acre unit with a helicopter would be approximately $66,000.00 (165 MBF @ $400.00 per MBF). Yarding costs for ground-based harvest would run in the neighborhood of $16,500.00 (165 MBF @ $100.00 per MBF). The savings of $5,200 on road construction and decommissioning under a helicopter yarding alternative would not begin to off-set the additional yarding costs of nearly $50,000.00.

Previous comments have also suggested that temporary roads gouge out mountainsides, leave clearcut strips, can spread disease if they are tilled, and that the soil compaction has a lasting effect. To the last point, reference was made to a study[1] showing that "sub-soiling, ripping or otherwise de-compacting the road after use" does not restore the soil to pre-road condition.

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

[1] Luce, Charles H. September 1996. Effectiveness of Road Ripping in Restoring Infiltration Capacity of Forest Roads. Intermountain Research Station, U.S. Department of Agriculture, U.S. Forest Service. Moscow, ID. Restoration Ecology, Vol. 5, No. 3.

- As described on page 9, new roads would be primarily located on ridge tops or gentle, stable side slopes. This would greatly reduce the need for excavation and the level of modification to existing slopes, contours, and natural drainage patterns;
- The running surface of temporary roads is typically 12 to 13 feet wide within a narrow right-of-way of 20 to 25 feet. These road corridors would not appear as clearcut strips as they would be largely indistinguishable from yarding corridors and the spacing between trees that is typical following thinning;
- Root diseases are endemic in forest soils and spread by root grafts between live trees. Sub-soiling road surfaces would not affect this process in either an adverse or beneficial manner; and
- The BLM is aware of the research cited regarding the effectiveness of ripping in restoring the infiltration capacity of road surfaces. The study acknowledged limits to the degree of restoration achievable, but concluded on page 269 of the cited publication that: "Ecological restoration of forest roads and watersheds requires improved vegetation cover and improved infiltration for forest road surfaces. These findings suggest that ripping can be a reasonably effective step in the restoration process."

### B. Reservation of the Largest Trees in Riparian Reserves and LSRs to Provide Down Wood and Snags

Comments received have suggested that the BLM should identify the "biggest and best" of the trees to be thinned and reserve them for "dead wood" snags before they are sold. This was not considered to be a necessary alternative for the following reasons.

- As discussed on pages 6, 7 and 8 the largest trees (dominant, co-dominant and remnant old-growth) are not the focus of thinning and would generally be reserved from cutting, subject to the exceptions noted, and
- As discussed on page 13, it is anticipated that coarse woody debris will be adequately provided for in the LSRs. As further described on page 14, additional trees would be marked for retention above the numbers needed to meet post-thinning objectives. If post-treatment assessment indicates a need for additional coarse wood or snags, these trees would be felled or girdled to provide such.

It has also been suggested an upper diameter limit should be established for trees designated for cutting. Within LSR 259 and LSR 261, the *South Coast-Northern Klamath LSRA* already prescribes retention of trees with a diameter breast height of 20 inches or greater.

Within the Matrix allocations there is no silvicultural basis for limiting the size of trees cut. To do so would be arbitrary and could preclude development and implementation of site-specific marking prescriptions designed to achieve maximum timber production prescribed by management direction from the ROD/RMP.

## IV. 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.

As discussed in Chapter Three, cultural/historical resources would not be affected (p. 38) and there would be no measurable increase or decrease anticipated in the introduction or rate of spread of non-native/invasive plants (pp. 38-39).

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 unit. A proposed natural gas transportation pipeline, if authorized and constructed, would pass through density management Unit 29-9-11B, descending a ridge from the northwest before intercepting and following Road No. 29-9-12.2 and exiting the unit to the southeast. If the density management project is implemented, it is possible that operations would be complete before construction of the pipeline. If not, thinning of the unit would be delayed until after completion of pipeline construction. Under the latter scenario, since the pipeline is to be buried at a depth of five feet, thinning operations would not be expected to have any effect on its operation. No commercially usable energy sources are known to exist in the project area. As a consequence, no adverse effect to any energy resources would be anticipated in association with either of the alternatives being analyzed in this environmental assessment.

# Chapter Three
# THE AFFECTED ENVIRONMENT

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

## I. Timber/Vegetation

*Conditions in the Middle Fork Coquille Watershed*

The Upper Middle Fork Coquille WAU covers approximately 67,207 acres (WA, p. ix). The BLM administers approximately 25,960 acres or 39 percent of the lands within the WAU, as follows: 19,571 acres - Roseburg District; 5,776 acres – Coos Bay District; and 432 acres – Medford District. Approximately 8,091 acres of BLM-managed lands are allocated to the Matrix and available for intensive forest management. The remaining 17,869 acres are allocated to Late-Successional, Marbled Murrelet and Riparian Reserves.

### Vegetation Zones

Vegetation zones in the Upper Middle Fork Coquille Watershed Analysis Unit were characterized from the Natural Resources Conservation Service Soil Survey report by Gene Hickman (1994). Vegetation zones may cover large geographical areas, but always have a single set of potential native plant communities repeated throughout the zone. The patterns are predictable since they are related to local landscape features such as aspect, soil, and landform. Microclimate should be relatively similar throughout a given zone. Vegetation zones give an approximate guide to complex local vegetation patterns, natural plant succession, and stand development processes.

Three vegetative zones are present within the Upper Middle Fork Coquille WAU. The Grand Fir and Western Hemlock Zones are the predominant zones, with the Cool Douglas-fir/Hemlock Zone occupying a small portion of the WAU at the higher elevations (WA, pp. 27 and 29).

The **Grand Fir Zone** forms a transition between moist hemlock forests and the drier central valleys. This zone is located at elevations generally below 1,500 feet, receives from 40 to 44 inches of precipitation annually, and makes up about 55 percent of the WAU.

Douglas-fir dominates the older stands with grand fir common on the northern slopes and minor or absent on the south slopes. Golden chinkapin occurs regularly on north aspects. Pacific madrone and occasionally California black oak are common on south aspects. Incense-cedar is often present. The area is generally too dry for western hemlock except in some drainages or very moist north slopes.

The **Western Hemlock Zone** occupies 36 percent of the WAU, primarily along its western and southern edges, from 1,500 to 2,500 feet in elevation. Douglas-fir is the dominant species. On northern aspect, western hemlock is well-represented in the understory species and as an overstory dominant in older stands. It may be present in minor amounts on south aspects. Grand fir, western redcedar, and chinkapin can also occur in the stands. Red alder and bigleaf maple occur in moister locations.

The **Cool Douglas-fir/Hemlock Zone** occupies about nine percent of the WAU, generally above 2,500 feet on Signal Tree Ridge and Ketchin Butte at the western edge of the WAU.

Douglas-fir is the dominant species, and depending on the soil, western hemlock may also occur. Some areas also include sporadic occurrences of western redcedar, incense-cedar, sugar pine, Pacific yew, and white fir. Canyon live oak is found on soils with high amounts of rock fragments. Slower tree growth rates, climatic limitations for regeneration, and severe competition from evergreen shrubs are some of the more notable management challenges.

**Forest Age-Class Distribution**

In 1993, approximately 18,000 acres of private forest lands were in early-seral condition, under 30 years of age, while approximately 13,500 acres were mid-seral forest, 30 to 80 years old, and slightly more than 3,600 acres were late-seral forest greater than 80 years old. (WA, p. 37)

The seral stage distribution of BLM-managed forest lands managed by the Roseburg District in 1998 was approximately 8,600 acres of early-seral forest, 7,300 acres of mid-seral forest, and 9,860 acres of late-seral forest. (WA, p. 23) The BLM has not conducted any regeneration harvest in the WAU over the past ten years or so, so the amount of late-seral forest on BLM-managed lands has gradually increased as some of the 1,767 acres of 50 to 80 year old forest have matured.

*Conditions within the proposed commercial thinning and density management units*

The stands proposed for commercial thinning and density management range in age from 37 to 57 years old (see Table 3-1), and are the result of regeneration harvests that occurred from the 1950s up to about 1970. Tractor logging was the principal means of harvest and most units were broadcast burned for site preparation. Active reforestation, primarily with Douglas-fir, was supplemented by some natural regeneration. Intensive management practices were implemented that included pre-commercial thinning, fertilization and herbicide application to control competing vegetation, though not every unit received each of these described treatments.

Approximately 79 percent of the acres proposed for treatment are in the Grand Fir Zone, with the remaining 21 percent in the Western hemlock Zone. Throughout the project area, Douglas-fir is the dominant conifer species with grand fir, western redcedar, and incense-cedar occurring in most of the stands. Some stands also include western hemlock, Port-Orford-cedar, ponderosa pine, and sugar pine. Other tree species present include chinkapin and madrone on drier slopes, bigleaf maple on moister slopes and north aspects, and Pacific yew most often in association with riparian areas. The primary shrub species are rhododendron, vine maple, Oregon-grape, and salal. Other understory growth includes western swordfern, Oregon oxalis, and vanilla leaf.

The historic fire regime is considered to be mixed severity with fire frequency ranging from 35 to 100 years. Under this fire regime and site conditions, Douglas-fir would probably dominate stands for hundreds of years until grand fir or hemlock gradually become the dominant species or became co-dominant with Douglas-fir and other species.

These stands are dense and generally even-aged, with a few scattered older remnant trees that are primarily grand fir not harvested in the previous entry. There are few residual snags, and little large down woody material in Decay Classes 1 and 2. See Table 3-2 for a description on the abundance of coarse wood in proposed density management units located in Late-Successional Reserves 259 and 261.

Canopy closure currently ranges from 95 to 100 percent, and consequently ground cover and understory development are patchy and sparse. Hardwoods, which are generally shade intolerant, are being overtopped by conifers and are gradually being eliminated from the stands, as are ponderosa and sugar pines. Live crown ratios, a ratio of live crown to total height of the tree, are still above 30 percent, a level considered important for maintaining or increasing the health and vigor of individual trees and the stands as a whole.

Unit 30-9-3B was selected for visual representation of present stand conditions using Organon version 8.2 for Southern Oregon and depicted (Figure 3-1) using Stand Visualization System Version 3.36 (SVS).

**Figure 3-1 Representative Stand Conditions (Stand Age 42 years)**

**Table 3-1 Summary of Current Stand Conditions**

| Units | Stand Age | Trees per Acre (at least seven inches DBH) | Basal Area (square feet per acre) | Quadratic Mean Diameter (inches) | Relative Density | Canopy Closure (percent) |
|---|---|---|---|---|---|---|
| 29-8-15A | 44 | 220 | 153 | 10.6 | 0.5 | 95 |
| 29-8-29A | 42 | 209 | 152 | 11.6 | 0.5 | 97 |
| 29-8-29B | 44 | 203 | 158 | 12.2 | 0.53 | 98 |
| 29-8-31A | 42 | 217 | 147 | 11.1 | 0.49 | 95 |
| 29-8-33A | 44 | 216 | 148 | 11.2 | 0.49 | 98 |
| 29-8-33B | 40 | 153 | 170 | 14.1 | 0.52 | 97 |
| 29-8-33C | 40 | 265 | 227 | 13.2 | 0.79 | 100 |
| 29-8-33D | 57 | 201 | 243 | 15.2 | 0.72 | 100 |
| 29-8-5A N½ | 37 | 243 | 207 | 11.5 | 0.6 | 100 |
| 28-85-A S½ | 46 | 155 | 207 | 15.6 | 0.59 | 100 |
| 29-8-5B | 49 | 323 | 275 | 11.8 | 0.69 | 100 |
| | | | | | | |
| 29-9-11A | 47 | 229 | 176 | 11.9 | 0.57 | 99 |
| 29-9-11B | 47 | 213 | 190 | 12.8 | 0.6 | 100 |
| 29-9-1A | 40 | 168 | 168 | 13.5 | 0.83 | 100 |
| 29-9-1C | 44 | 107 | 130 | 14.9 | 0.69 | 100 |
| 29-9-1D | 40 | 201 | 153 | 11.8 | 0.85 | 100 |
| 29-9-1E | 42 | 191 | 158 | 12.3 | 0.5 | 97 |
| 29-9-35A | 55 | 270 | 280 | 13 | 0.87 | 100 |
| 29-9-35B | 48 | 213 | 158 | 11.5 | 0.89 | 100 |
| | | | | | | |
| 30-8-15A | 40 | 202 | 146 | 11.5 | 0.47 | 95 |
| 30-8-27A | 38 | 279 | 217 | 11.9 | 0.69 | 100 |
| 30-8-27B | 38 | 225 | 158 | 11.2 | 0.52 | 98 |
| 30-8-33A | 38 | 220 | 142 | 10.9 | 0.48 | 95 |
| 30-8-5A | 40 | 216 | 147 | 12.9 | 0.49 | 96 |
| 30-8-5B | 38 | 216 | 147 | 11.2 | 0.48 | 96 |
| 30-8-9A | 40 | 172 | 135 | 12 | 0.43 | 95 |
| 30-8-9B | 38 | 199 | 168 | 12.4 | 0.53 | 95 |
| 30-9-3A | 54 | 288 | 208 | 11.5 | 0.57 | 99 |
| 30-9-3B | 50 | 207 | 175 | 12.5 | 0.58 | 99 |

Relative stand density, or relative density index[2], is a measure of stand stocking compared to a theoretical maximum. As illustrated in Table 3-1, relative stand densities in the proposed commercial thinning and density management units currently range between 0.48 and 0.85 with approximately half of the stands exceeding a relative density of 0.55. As a general rule, at a relative density of 0.55, competition among trees would result in increasing suppression mortality and reduced tree vigor (Drew and Flewelling 1979).

[2] Relative density index compares current stand density to a theoretical maximum. Simply put, for an average number of trees per acre, there is a maximum achievable mean diameter. Conversely, for a given mean diameter, a maximum number of trees per acre can be supported. The ratio may be used as a guide to determine if stand conditions will support understory establishment and growth, and whether or not a stand is entering or already experiencing suppression mortality.

**Table 3-2 Volume of Coarse Woody Material by Decay Class and Pieces per Acre**

| LSR | Unit | Coarse Wood Volume in cubic feet | | | | | | Total Pieces per Acre |
|---|---|---|---|---|---|---|---|---|
| | | Decay Class 1 | Decay Class 2 | Decay Class 3 | Decay Class 4 | Decay Class 5 | Total All Classes | |
| 259 | 29-8-15A | | | 34 | 345 | | 380 | 31 |
| 261 | 29-8-5A (N½) | | | 19 | 324 | 26 | 369 | 56 |
| 261 | 28-8-5B (S½) | | | | 1097 | 337 | 1434 | 48 |
| 261 | 29-8-5B | | | 99 | 841 | 202 | 1142 | 46 |
| | | | | | | | | |
| 261 | 29-9-11A | | | | 33 | 181 | 214 | 15 |
| 261 | 29-9-11B | 85 | 20 | 1253 | 1607 | 781 | 3745 | 92 |
| 261 | 29-9-1A | | | 206 | 881 | 486 | 1573 | 56 |
| 261 | 29-9-1C | No Data | | | | | | |
| 261 | 29-9-1D | 8 | 19 | 405 | 728 | 419 | 1580 | 53 |
| 261 | 29-9-1E | No Data | | | | | | |
| | | | | | | | | |
| 259 | 30-8-15A | No Data | | | | | | |
| 259 | 30-8-27A | 30 | 31 | 45 | 2944 | 100 | 3150 | 116 |
| 259 | 30-8-27B | 15 | 32 | 206 | 806 | 432 | 1790 | 31 |
| 259 | 30-8-33A | | | 503 | 1577 | 240 | 2319 | 86 |
| 259 | 30-8-9A | | | 90 | 1026 | 938 | 2054 | 47 |
| 259 | 30-8-9B | No Data | | | | | | |

Two pathogens were noted in the proposed commercial thinning and density management units.

Small and scattered pockets of laminated root disease (*Phellinus weirii*) are present at endemic levels in proposed Unit 29-9-1D, which is located in Late-Successional Reserve 261. The disease is not expected to do more than cause occasional mortality of individual trees or small groups of trees resulting in the creation of small canopy gaps.

Port-Orford-cedar is susceptible to a root disease caused by the pathogen *Phytopthora lateralis* that is present in the WAU. Healthy, uninfected Port-Orford-cedar was noted: in proposed commercial thinning and density management Units 29-9-35A and B; along roads accessing Units 29-9-1E, 29-8-29A and B, and 29-8-33A, B, C and D; and downstream of Units 29-9-11B, 29-9-35A an B, 30-9-3A, 29-8-29A and B, and 29-8-33A, B, C and D. Infected Port-Orford-cedar was located: in Units 30-9-3A and B; and along roads accessing Units 29-9-11A and B, 29-9-35A and B, and 30-9-3A and B.

## II Wildlife

The three areas of concern for wildlife associated with the proposed action are: Survey and Manage Species, Special Status Species, and migratory birds.

### A. Survey and Manage Species

The Survey and Manage program has undergone several changes since 2001. The 2004 *Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure*

*Standard and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (USDA and USDI 2004) removed Survey and Manage mitigation requirements. In a January 2006 ruling in the lawsuit Northwest Ecosystem Alliance, et al. vs. Mark E. Rey, et al., Survey and Manage requirements were reinstated as described in the 2001 Record of Decision. Exceptions to this ruling, released on October 11, 2006, stated that thinning projects in stands younger than 80 years old were not subject to the January 2006 ruling. Based on the October 11, 2006 exceptions, Survey and Manage species will not be discussed further in this document.

## B. Special Status Species

Special Status Species, consisting of two classes, receive particular consideration in BLM actions.

- Threatened and Endangered Species, as listed by the U.S. Fish and Wildlife Service, and
- BLM Sensitive and Assessment species

Twenty-four special status wildlife species are known or suspected to occupy lands managed by the Roseburg District. The proposed action would have no effect on 14 of these species, and they are eliminated from further discussion, because the project area is outside their range, suitable habitat is absent in the project area, or because riparian buffers would provide adequate habitat protection (Appendix B – *Wildlife*, Table B-1). The remaining 10 special status species that may be affected by the proposed action are described below.

### 1. Threatened and Endangered Species

These are species listed as threatened or endangered under the Endangered Species Act (ESA) of 1973, as amended; candidate species; or species proposed for listing under the ESA.

The Federally-threatened **northern spotted owl** (*Strix occidentalis caurina*) is a long-lived forest-dwelling raptor that preys primarily on small mammals (Forsman et al. 1984). It generally occupies forest stands with multiple shrub and canopy layers, large overstory trees, large snags, accumulations of coarse woody debris, and nesting structures like large broken-topped trees, cavities in trees and snags, or platforms in tree canopies (Forsman et al 1984, Hershey et al. 1997). On the Roseburg District these features are generally found in stands 80 years old or older, which are referred to as suitable or nesting, roosting, and foraging habitat. Stands with sufficient canopy cover and sub-canopy space for spotted owl movement, but without nesting/roosting/foraging components are referred to as dispersal-only habitat. Forested areas that currently provide no function for spotted owls are called unsuitable habitat, while areas that will never provide for spotted owl use (*e.g.* rock outcrops or water bodies) are called non-habitat. The proposed units are composed entirely of spotted owl dispersal-only and unsuitable habitat because of the relatively small tree size (quadratic mean diameter from ~11 to ~15 inches), high tree density (~100 to ~500 trees per acre), and lack of nesting structure.

Information on the location and status of spotted owls in the project area is available from yearly Northwest Forest Plan effectiveness monitoring surveys (Lint et al. 1999) which covers all nesting/roosting/foraging habitat within one-quarter mile of all of the proposed units addressed in this environmental assessment. Consequently, the proposed action would not affect any unsurveyed nesting/roosting/foraging habitat.

The effects of habitat modification to specific spotted owl sites are assessed by assigning a generalized home range centered on the activity center of individual territories. This is represented by 1.3-mile and 1.5-mile radius circles in the Klamath Mountains and Oregon Coast Range physiographic provinces, respectively (USDI 1991). There are nine current or historic home ranges that overlap some portion of the project area (Appendix B – *Wildlife*, Figure B-1). Survey results from the past ten years are summarized in Table B-2 (Appendix B – *Wildlife*). Current habitat availability in the associated home ranges is described in Table 3-3, and illustrated in Figures B-2, B-3, and B-4 (Appendix B – *Wildlife*).

Of the nine sites that could be potentially affected the Bear Naked, Berry Creek, Deep Creek, and Wildcat Creek RB sites have shown repeated occupation by a pair of spotted owls and/or reproductive success over the past five years. The remaining five sites have been less successful, typically remaining unoccupied or occupied by single or unpaired birds (Appendix B – *Wildlife*, Table B-2).

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

| Site (ID Number) | Suitable | Dispersal-Only | Unsuitable | Non-Habitat | Total |
|---|---|---|---|---|---|
| Bear Naked (4588 O) | 861 (25%) | 408 (12%) | 2123 (63%) | 0 (0%) | 3392 |
| Berry Creek (1807 C) | 862 (25%) | 690 (20%) | 1803 (53%) | 38 (1.1%) | 3393 |
| Boulder Creek (2042 O) | 977 (29%) | 186 (5%) | 2223 (66%) | 6 (0.2%) | 3393 |
| Deep Creek (2099 A) | 975 (22%) | 1329 (29%) | 2001 (44%) | 212 (4.7%) | 4517 |
| Happy Hour (2747 O) | 923 (20%) | 1850 (41%) | 1050 (23%) | 693 (15.3%) | 4517 |
| Lower Berry Creek (2748 O) | 700 (21%) | 1685 (50%) | 924 (27%) | 84 (2.5%) | 3394 |
| Weaver Ridge (2190 A) | 1179 (26%) | 1912 (42%) | 1279 (28%) | 147 (3.2%) | 4517 |
| Wildcat Creek CB (4639 O) | 1124 (25%) | 1254 (28%) | 2132 (47%) | 7 (0.2%) | 4517 |
| Wildcat Creek RB (2198 O) | 479 (14%) | 1864 (55%) | 1020 (30%) | 29 (0.9%) | 3393 |

Critical Habitat for the northern spotted owl was designated by the U.S. Fish and Wildlife Service in 1992 (Federal Register 1992), and defined as the habitat on which are found the physical and biological features essential to the conservation of the species. Designated critical habitat includes forest land that is currently unsuitable, but which has the capability of becoming suitable in the future. As illustrated in Table 3-4 and depicted in Figure B-1 (Appendix B – *Wildlife*) a dozen proposed commercial thinning and density management units are located within the boundaries of Critical Habitat Unit (CHU) OR-62.

The Federally-threatened **marbled murrelet** (*Brachyramphus marmoratus*), a member of the auk family, spends most of its life in coastal areas and is reported to nest up to 35 miles inland on platforms or large branches in trees (Lank et al. 2003), but has been documented over 40 miles inland in the South River Resource Area. Murrelets do not build nests, but simply create a depression to hold a single egg. Nesting habitat is generally characterized by conifer trees greater than 18 inches diameter breast height with sufficiently large limbs and substrate (moss, lichens, etc) to support nest cups, in multistoried canopies with moderate canopy closure that provide flight accessibility and protective cover from weather conditions and potential predators (Manley 1999, Burger 2002, Nelson and Wilson 2002).

Two marbled murrelet management zones were adopted from the Forest Ecosystem Management Assessment Team report (FEMAT 1993). In Oregon, Zone 1 generally extends 35 miles inland from the coast and Zone 2 extends from this boundary to 50 miles inland. A seasonal restriction corridor was subsequently extended into Zone 2 for 1.3 miles along several major rivers and streams on the Roseburg District, consequent to consultation with the U.S. Fish and Wildlife Service in 2005 (USDI, USFWS 2005; and Figure B-6, Appendix B – *Wildlife*). Zone 1 is expected to include most murrelet sites, and consultation has resulted in more restrictions on forest management activities there than in Zone 2 (USDI, USFWS 2005). The location of the proposed commercial thinning and density management units in relationship to the murrelet management zones is described in Table 3-4 and illustrated in Figure B-5 (Appendix B – *Wildlife*).

Suitable nest trees are present in many of the proposed commercial thinning and density management units. Units with potential nesting trees are identified in Table 3-4. These units would be managed in accordance with guidance provided by the Roseburg/Coos Bay BLM Level 1 Consultation Team (USDI, USFWS 2004).

Suitable habitat is defined in Potential Habitat Guidelines as any 5-acre area containing at least 6 potential habitat trees. Habitat is present in Unit 29-8-33D, provided by large remnant trees (Appendix B – *Wildlife*, Figure B-6). The proposed unit and adjacent habitat has been surveyed since 2002. An occupied site was identified approximately 0.15 miles east of the proposed unit. A second detection, not indicative of occupancy, was made approximately 0.10 miles to the west. No detections have been made in the proposed unit, however. The area is being managed as an unmapped Late-Successional Reserve (ROD/RMP, p. 48) due to the proximity of the occupied site (Appendix B – *Wildlife*, Figure B-7). Suitable murrelet habitat is also found adjacent to many of the other proposed commercial thinning and density management units as indicated in Table 3-4. This habitat will be surveyed and cleared for murrelets, or subject to seasonal and daily operational restriction described in Chapter Two of this document (p. 13).

Critical habitat for the murrelet was designated by the U.S. Fish and Wildlife Service in 1996 (Federal Register 1996). It is defined as the habitat on which are found 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. The relationship of the proposed commercial thinning and density management units to murrelet Critical Habitat Unit (CHU) OR-06-D is illustrated in Table 3-4 and depicted in Figure B-5 (Appendix B – *Wildlife*).

**Table 3-4 Northern spotted owl CHUs, marbled murrelet habitat and management zones, and marbled murrelet CHUs.**

| Unit | Spotted Owl CHU | Marbled Murrelet Habitat | | Murrelet Potential Habitat? | Marbled Murrelet Zone[3] | Marbled Murrelet CHU |
|---|---|---|---|---|---|---|
| | | Presence[1] | Mitigation[2] | | | |
| 29-8-5A | | A | Survey: '06-'07 | No | RC | OR-06-D |
| 29-8-5B | | A | Survey: '06-'07 | Yes | RC | OR-06-D |
| 29-8-15A | | None | None | No | RC | OR-06-D |
| 29-8-29A | | None | None | No | RC | |
| 29-8-29B | | A | SR | Yes | 2 | |
| 29-8-31A | | None | None | No | RC | |
| 29-8-33A | OR-62 | A | SR | Yes | RC | |
| 29-8-33B | OR-62 | A | SR | Yes | RC | |
| 29-8-33C | OR-62 | A | SR | No | RC | |
| 29-8-33D | OR-62 | U & A | Ongoing Survey | Yes | RC | |
| 29-9-1A | | A | SR | Yes | RC | OR-06-D |
| 29-9-1B | | A | SR | Yes | RC | OR-06-D |
| 29-9-1C | | A | SR | Yes | RC | OR-06-D |
| 29-9-1D | | A | SR | Yes | RC | OR-06-D |
| 29-9-1E | | A | SR | Yes | RC | OR-06-D |
| 29-9-11A | | A | Survey: '06-'07 | No | 2 | OR-06-D |
| 29-9-11B | | A | Survey: '06-'07 | Yes | 2 | OR-06-D |
| 29-9-35A | | A | SR | Yes | RC | |
| 29-9-35B | | None | None | No | RC | |
| 30-8-5A | OR-62 | A | SR | Yes | RC | |
| 30-8-5B | OR-62 | A | SR | Yes | 2 | |
| 30-8-9A | OR-62 | A | SR | No | RC | |
| 30-8-9B | OR-62 | A | SR | No | RC | |
| 30-8-15A | OR-62 | A | SR | No | RC | |
| 30-8-27A | OR-62 | A | SR | Yes | RC | |
| 30-8-27B | OR-62 | None | None | Yes | 2 | |
| 30-8-33A | OR-62 | A | SR | Yes | 2 | |
| 30-9-3A | | None | None | No | RC | |
| 30-9-3B | | A | SR | No | RC | |

[1] A=Adjacent to unit, U=In unit

[2] SR=Seasonal Restrictions (see Chapter 2)

[3] RC = Zone 2 restriction corridor

## 2. BLM Special Status Species

BLM Sensitive and Assessment Species are those species eligible for federal or state listing, or for candidate status under the ESA (USDI 2001). These species are managed in accordance with BLM Manual section 6840, which states that Bureau actions must not contribute to the need to list BLM Special Status Species under the Endangered Species Act. The Special Status Species list (http://www.or.blm.gov/isssp/) was last updated on 14 March 2005.

The **Chace sideband snail** (*Monadenia chaceana*), **green sideband snail** (*Monadenia fidelis beryllica*), **Oregon shoulderband snail** (*Helminthoglypta hertlieni*), and **spotted taildropper** (*Prophasaon vannatae pardalis*) are mollusk species 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 on herbaceous vegetation, ferns, leaf litter, or moss mats in moist, shaded areas near refugia.

The **northern goshawk** (*Accipiter gentilis*) is a large forest-dwelling hawk found throughout temperate forested regions of the northern hemisphere. Goshawks forage below the forest canopy for a variety of birds and small mammals. In the Pacific northwest, stands used for foraging and nesting are generally mature with large trees, a closed canopy, and a relatively open understory; however goshawks are known to use younger stands as well (Reynolds et al. 1982, Daw et al. 1998, Daw and DeStefano 2001). More than a dozen goshawk observations have been made in the resource area and it is suspected that goshawks nest throughout the South River Resource Area. The proposed commercial thinning and density management units would not be expected to support goshawk nesting due to relatively small tree size and high tree density, but could be used by goshawks for foraging.

The **Townsend's big-eared bat** (*Corynorhinus townsendii*) is an insectivorous species found throughout the western U.S. and the Ozark and Appalachian Mountains. The bat occupies a variety of habitats, including desert scrub, pinyon-juniper, and coniferous forest (reviewed in Verts and Carraway 1998). Townsend's big-eared bat typically roosts and hibernates in mines and caves, but has been found roosting in hollow trees as well (Fellers and Pierson 2002). Large remnant trees present in some of the proposed commercial thinning and density management units may provide foraging and roosting opportunities.

The **pallid bat** (*Antrozous pallidus pacificus*) is an insectivorous species found throughout the Southwest, southern Rocky Mountains, and Pacific Northwest. It generally uses arid or semi-arid environments with rock, brush, or forest edge habitat (reviewed in Verts and Carraway 1998). Known hibernacula and roost sites for the species include caves, mines, rock crevices, bridges, buildings, and hollow trees or snags (Lewis 1994). Large remnant trees present in some of the proposed commercial thinning and density management units may provide foraging and roosting opportunities.

The **fringed myotis** (*Myotis thysanodes*) is an insectivorous bat species found throughout the western United States. The species appears to utilize a range of habitats, from sagebrush to Douglas-fir forest (reviewed in Verts and Carraway 1998). Known hibernacula and roost sites include caves, mines, buildings, and large snags (Weller and Zabel 2001). Although definitive evidence is lacking, it is thought that fringed myotis populations in Oregon migrate in winter. Large remnant trees present in some of the proposed commercial thinning and density management units may provide foraging and roosting opportunities.

## C. Migratory Birds

Guidance was issued in Executive Order 13186 (2001), directing Federal agencies to integrate bird conservation principles, measures, and practices into agency planning processes; to restore and enhance the habitat of migratory birds, as practicable; and to ensure that environmental analysis considers the effects of agency actions and plans on migratory birds, with emphasis on species of concern. This Executive Order directs agencies to utilize existing management plans, such as those developed by Partners in Flight.

Partners in Flight is an international coalition of government agencies, conservation groups, academic institutions, private organizations, and citizens dedicated to long-term maintenance of healthy populations of native landbirds. Its 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 (Altman 1999) may be viewed online at http://www.orwapif.org/pdf/western_forest.pdf.

The project area currently contains young forest with closed canopy and open sub-canopy habitat attributes, as defined by the Partners in Flight conservation strategy. If the proposed action were implemented, the project area would remain as young forest with an open sub-canopy and forest floor complexity post-treatment, and would soon develop a deciduous understory/sub-canopy.

The Partners in Flight conservation 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 Partners in Flight conservation strategy assumes that management actions affecting focal species would also affect other species that use the same habitat types and attributes. The three high-priority focal species that would be most likely to be affected by the proposed action and the forest conditions and habitat attributes they use are individually discussed below.

The **hermit warbler** forages in closed canopy stands with high foliage volume, and based upon the presence of such conditions in the units proposed for commercial thinning and density management might be expected to use these stands. Other species utilizing similar habitat attributes are the golden-crowned kinglet and chestnut-backed chickadee.

**Wilson's warbler** is an insectivorous species that forages in 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 utilizing 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 containing shrubs, rootwads, down logs, ferns, and herbaceous vegetation. It commonly inhabits older forest and is thought to be sensitive to habitat fragmentation. Other species with similar habitat requirements are the orange-crowned warbler and rufous hummingbird. The proposed commercial thinning and density management units are generally lacking in suitable structural complexity for this species.

## III. Fish and Aquatic Resources

Units are generally located along or near ridges and are far from resident fish bearing streams. Intermittent and perennial streams are located adjacent and outside of unit boundaries. Three units are located adjacent to fish bearing streams: Bar Creek in Section 5, T. 29 S., R. 8 W.; Lang Creek in Section 1, T. 29 S., R. 9 W.; and Day Creek in Section 31, T. 29 S., R. 8 W.

Haul routes are generally located away from fish bearing streams. There are two crossings along fish bearing streams on Bar Creek in Section 5, T. 29 S., R. 8 W. and Day Creek in Section 31, T. 29 S., R. 8 W.

### A. Aquatic Habitat

Aquatic Habitat Inventory surveys on 129 stream reaches comprising about 166 miles of streams within the watershed were conducted by the Oregon Department of Fish and Wildlife between 1995 and 2002. Of these, 35 reaches comprising 26 miles of stream are located on lands managed by the South River Field Office, Roseburg District BLM. The remaining reaches surveyed were located outside of the Roseburg District boundary, on the Coos Bay District. This information was used in conjunction with recent site-specific surveys conducted by BLM fishery biologists to describe the baseline reference habitat condition for streams in the watershed.

*Substrate/sediment*

The availability of spawning substrate is an important factor in fish productivity. The suitability of spawning habitat varies with the amount, size and quality of substrate. Gravel and small cobble substrate 1.3 to 10.2 cm (0.5 to 4.0 inches) in diameter (Bell 1986) relatively free from embedded fine sediment is ideal spawning substrate for resident and anadromous salmonids.

In reaches where spawning size gravel is present, the presence of fines may limit the quality of spawning sites. During incubation of eggs and alevin emergence, fine sediment deposition can fill interstitial spaces in the spawning substrate reducing oxygen flow to eggs, smothering eggs, or forming an armor layer preventing emergence of alevin (Waters 1995).

Based on surveys conducted on reference stream reaches, the Oregon Department of Fish and Wildlife has set benchmarks for aquatic habitat conditions (Foster et al. 2001). Riffles are in "desirable" condition when they contain less than 10 percent sand and organics and greater than 35 percent gravel. Of the 129 surveyed reaches 60 met desirable criteria for sand and organic material in riffle units. Sixty three met the desirable criteria for amount of gravel in riffle units.

Intermittent and small perennial stream channels had moderate amounts of gravel and fines in riffles. Perennial channels were comprised of disconnected pools with subsurface flow in riffle units. During winter flows, gravel becomes inundated and provides additional spawning habitat.

*Large Woody Debris*

Large woody debris is important to the formation of deep scour pools and the retention of gravel substrate (Bilby and Ward 1989). These pool and off channel habitats provide refuge for salmonids during high flow events and cool water sources during dry months (Swanston 1991).

Steeper, confined valleys in headwaters lead to more contribution from adjacent riparian stands (May and Gresswell 2003). High gradient headwater intermittent and perennial streams adjacent to units generally had a high volume and number of pieces of large woody debris, ranging from large logs greater than 24 inches to small hardwoods. The lack of redistribution by large floods contributes to these larger pieces being retained in the stream for longer periods of time.

Surveyed streams generally were lacking in large woody debris. Oregon Department of Fish and Wildlife considers reaches in desirable condition when they contain greater than 30 $m^3$ of large wood per 100 meters. Of the 129 surveyed reaches 33 met the desirable criteria for the volume of large woody debris pieces. The benchmark for the number of key pieces (pieces greater than 30 meters long and 60 cm in diameter) is three per 100 meters. There were eight reaches that meet the desirable criteria for the number of key pieces of LWD.

*Pool quality*

Pool habitat is important for juvenile rearing, during low flow months when high stream temperatures add to stress, and high flow events when off channel pools provide refuge habitat. Salmonids are found in greater densities (Roni 2002) and larger size (Rosenfeld et al. 2000) in deep pool habitats.

Oregon Department of Fish and Wildlife considers reaches in a desirable condition when they contain greater than 35 percent pool by area and have greater than 2.5 complex pools (those having a large wood component) per kilometer. Of the 129 surveyed reaches 56 met the desirable criteria for pool area and 30 met the criteria for complex pools.

*Habitat access*

Access to the streams by migrating fish can be restricted by outlet jumps greater than 6 inches and outlet pools less then 1.5 times the height of the jump. Adult fish are capable of jumping in excess of 4 feet; however, 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 1997).

In Section 5, T. 29 S., R. 8 W., a culvert and pump chance are located along the haul route. About 0.5 mile of fish habitat is currently blocked by the culvert and pump chance.

## B. Special Status Species

Salmonid species found in watersheds in the South River Resource Area include winter-run Oregon Coast steelhead trout and resident rainbow trout (*Oncorhynchus mykiss*), resident and sea-run Coastal cutthroat trout (*O. clarki clarki*), fall and spring Oregon Coast Chinook salmon (*O. tshawytscha*), and the Oregon Coast coho salmon (*O. kisutch*).

*Proposed-threatened species*

The National Marine Fisheries Service designated the Oregon Coast coho salmon Evolutionary Significant Unit (ESU) as a threatened species in 1998 (Federal Register 1998b Vol. 63/No. 153). In February 2004, the Court of Appeals for the Ninth Circuit upheld a 2001 ruling by the District Court for the District of Oregon that removed the threatened status of Oregon Coast coho salmon. The Oregon Coast Coho salmon was proposed for relisting (Federal Register 2004 Vol. 69/No. 113); but found not to warrant listing (Federal Register 2006 Vol. 71/No. 12). It remains a Bureau Sensitive species.

Coho salmon are present in the Middle Fork Coquille River up to a waterfall barrier approximately 0.8 mile below the confluence of Twelvemile Creek (USDI, BLM 1999). This is a point over 2 miles distant from the nearest proposed unit (30-9-3B).

*Species of Concern*

The Oregon Coast steelhead trout ESU was proposed as a candidate for threatened species designation in 1998 (Federal Register 1998a). In 2005, it was downgraded to a “Species of Concern” (Federal Register 2005)

The waterfall barrier described above marks the upper distribution of steelhead trout, although there is anecdotal evidence that during high water years, steelhead can navigate this barrier (USDI, BLM 1999). A second high water barrier 1.5 miles above the confluence of Twelvemile Creek with the Middle Fork Coquille River would impede any further movement by steelhead trout that might possibly pass the lower barrier.

### C. Essential Fish Habitat

Essential Fish Habitat is designated for fish species of commercial importance by the Magnuson-Stevens Fishery Conservation and Management Act of 1996 (Federal Register 2002). Streams and habitat that are currently or were historically accessible to chinook and coho salmon are considered Essential Fish Habitat. This includes the Middle Fork Coquille River up to the limits of coho salmon distribution previously described.

## IV. Water Resources

The proposed project area is in the Headwaters Middle Fork Coquille River and Twelve Mile Creek sixth-field subwatersheds of the Middle Fork Coquille fifth-field watershed. The climate is characterized by cool, wet winters and hot, dry summers. Annual precipitation varies with elevation and typically ranges from 50 to 64 inches. Most precipitation is in the form of rain; however some snow is likely at higher elevations in most years.

### A. Stream Flow

Most precipitation is in the form of rain, concentrated between November and March. 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. Streams located within or adjacent to the proposed commercial thinning and density management units are primarily, with the exception of a third-order stream within Unit 29-8-29B, first and second-order headwater streams that are generally intermittent with no surface flow during the dry season.

#### 1. Peak Flows and the Transient Snow Zone

Higher than normal peak flows can occur as a result of timber harvest in the Transient Snow Zone (Harr and Coffin 1992). The Transient Snow Zone is the area between 2,000 and 5,000 feet elevation that may alternately receive snow or rain. Harvest in the Transient Snow Zone can create openings where snow accumulates. Warm rain-on-snow events and higher wind speeds can melt this increased snow pack quickly and create higher than normal flows.

Approximately 225 acres proposed for commercial thinning and density management are located in the Transient Snow Zone. The remaining 600 acres proposed for treatment are below the Transient Snow Zone in the rain dominated zone. Areas within the Headwaters Middle Fork Coquille River and Twelve Mile Creek sixth-field subwatersheds the percent of each that is located in the Transient Snow Zone are displayed in Table 3-5.

**Table 3-5. Acres, Percent Area, and Percent Openings in the Transient Snow Zone**

| Subwatershed Name | Total Forested Acres | Area in TSZ (percent) | TSZ Area in Openings[1] (percent) |
|---|---|---|---|
| Headwaters Middle Fork Coquille River | 22,900 | 20 | 5.4 |
| Twelve Mile Creek | 24,041 | 44 | 4.8 |

[1] Based on GIS analysis and aerial photo interpretation.

The present risk of peak flow enhancement resulting from past timber harvest was evaluated using a model recommended in the Oregon Watershed Assessment Manual (Watershed Professionals Network 1999 p. IV-11). The model predicts increases in peak flow based on the number of acres in a watershed located in the Transient Snow Zone and the percent of this area with less than 30 percent canopy closure. 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 90 percent of the forested lands in the Transient Snow Zone have canopy closures greater than 30 percent and the potential for peak flow enhancement from rain-on-snow events in these areas is low (Watershed Professionals Network 1999).

### 2. Roads and Peak Flows

Roads can 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). Increased drainage density increases the rate at which runoff leave a basin, resulting in higher flows in times of snow melt or rainfall and reduced flows in late summer. The magnitude of flow enhancement is also dependent on whether or not road segments drain directly into streams. Roads not connected to stream channels, or with effective drainage that directs surface flow to the forest floor where it can infiltrate, would have a negligible effect on flow magnitude and timing.

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). Roads occupy less than 3 percent of the Headwaters Middle Fork Coquille sixth-field subwatershed and less than 4 percent of the Twelve Mile Creek sixth-field subwatershed. Therefore, it is unlikely peak flows are being measurably affected by the present road density in the project area.

## B. Water Quality

Water quality standards are determined for each water body by the Oregon Department of Environmental Quality. Those not meeting standards are placed on the 303(d) list as Water Quality Limited (ODEQ 2003). The following streams located within the analysis area are identified as Water Quality Limited for summer temperature standards: Middle Fork Coquille River, Dice Creek, Bingham Creek, Twelvemile Creek, Boulder Creek, Belieu Creek and Battle Creek. However, these streams are not located adjacent to proposed treatment units.

### 1. Stream Temperature

Water temperature is a key factor affecting the growth and survival of aquatic organisms. Effect on aquatic organisms, such as fish, amphibians, and macroinvertebrates, varies between species and within the life cycle of a given species (Lantz, 1971). Factors influencing water temperature include elevation, slope, aspect, local topography, stream flow patterns, channel geometry, vegetation, stream shading, and distance from the headwaters.

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). Streams in or adjacent to the proposed treatment units were determined, by ocular estimates to be well shaded with dense stands of conifers and hardwoods.

### 2. Sediment

No known sediment data exists for the streams located in or adjacent to the proposed treatment units. Studies by Reid (1981) and Reid and Dunne (1984) have shown, however, that forest roads can be major contributors of fine sediment to streams. This additional sediment can reduce water quality for domestic use and can cause detrimental changes to streams and their inhabitants (Castro and Reckendorf 1995).

Roads may directly alter streams by increasing erosion and sedimentation, which in turn may alter channel morphology (Furniss, et al. 1991). Roads can act as a link between sediment sources and streams, and often account for most of the sediment problems in a watershed. Roads can be hydrologically connected to the stream channel at roads crossings, where discharge is sufficient create gullies in the roadside ditch, and where road fillslopes may encroach on streams.

## C. Water Rights

Surface water rights for domestic use exist within one mile downstream of three proposed units in the Middle Fork Coquille 2007 Commercial Thinning and Density Management project analysis. Table 3-6 displays the point of diversion location and permit number of the domestic water rights within a mile of the proposed units.

**Table 3-6 Surface Water Rights for Domestic Use within A Mile Downstream of Units**

| Unit | Location of Point of Diversion | Permit # |
|---|---|---|
| 29-9-11A | 29-9-11 NESE | S 48877 |
| 29-8-29A | 29-8-29 NESW | S 40995 |
| 29-8-29B | 29-8-29 SWNW | S 4894 |

## V. Soils

The following information was derived from the Soil Survey of the Douglas County Area, Oregon (Johnson 2004), historical and current aerial photos, and field reconnaissance.

Soils in the project area are predominantly derived from sandstone and siltstone, with small areas of metamorphic and volcanic rock (Johnson 2004, Walker 1991, Wells 2000, Wert 1977). Rock types are generally soft (highly weathered) to moderately hard.

Slopes within the proposed commercial thinning and density management units are generally flat to moderate (0 to 65 percent), with smaller areas of steeper slopes (65 to 80 percent) off ridges and rock outcrops, and below the slope breaks above streams. The topography is primarily convex (rounded) and smooth or planar (flat) with some benches. Soil depths are mainly moderately deep (20-40 inches) to deep (40-60 inches), with small areas of shallow soils (less than 20 inches) on the steeper slopes.

Surface soil textures include loams, silt 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). Flat to gentle slopes of 0 to 20 percent, however, proposed Units 29-9-35B, 30-8-5B and 30-8-33A contain somewhat poorly drained soils, with moderately slow to slow soil permeability. These soils are highly susceptible to compaction because of moister soil conditions in the depressions and swales, coupled with the high amounts of clay in the soils.

When previously harvested, many of the stands were tractor yarded. Tractor yarding was generally limited to slopes less than 50 percent, but extended to 70 percent slopes in areas, with skid trail gradients up to 32 percent. Little erosion is occurring as skid trail running surfaces and cut slopes are revegetated and covered with organic material and duff layers one-half inch to two and one-half inches deep.

Soil compaction was evaluated using a tile spade and knife to determine the soil structure and the resistance to penetration in the soil profile. The old skid trails are compacted to varying degrees, with major skid trails exhibiting heavy compaction characterized by a dense, massive to platy soil structure in the top five to six inches of soil. Secondary skid trails generally exhibit 4 to 6 inch compaction along the 3 to 4 foot wide tread areas.

The majority of slopes within the proposed commercial thinning and density management units are stable with no recent signs of soil and slope movement. Within Unit 29-9-11B there is an exposed scarp in deep soils located in a draw (swale), at the base of a 60-65 percent slope. The scarp is about 30 square feet in size at the head of an old, narrow land flow, 35-40 feet in width, located on gentle slopes of 30-35 percent. This area would be marked out and left undisturbed. A section of road at the top of proposed Unit 29-9-11B has sunken 2 to 3 feet, possibly the result of over-steepened road fill.

## VI. Botany

### A. Vascular Plants, Lichens and Bryophytes

Based upon habitat conditions in the proposed commercial thinning and density management units, and previous surveys conducted in similar habitat elsewhere in the South River Resource Area, there are four Special Status species vascular plants whose presence may be considered a reasonable possibility. These are the: Federally-threatened Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*); Bureau Sensitive tall bugbane (*Cimicifuga elata*), wayside aster (*Eucephalis vialis*) and Oregon Bensoniella (*Bensoniella oregano*.

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.

Tall bugbane is a temperate herbaceous perennial found in wooded areas, primarily on north-facing aspects. Known populations on the resource area occur on sites representative of all stages of succession from recent clear-cuts to mature forest. Its constant association with deciduous trees also suggests that it may respond to gaps created in conifer forest (Kaye and Kirkland 1993).

Wayside aster is most commonly found in canopy gaps, on edges where forest and meadows meet, and in clearcuts. Current known populations in the resource area occur in sites representative of all stages of secondary succession.

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.

California globe mallow is an herbaceous perennials found in clearcut and wooded areas in habitat that include stream banks and moist ground.

There are an additional 65 special status vascular plant, lichen and bryophyte species whose accepted range includes the Roseburg District (see Appendix C – *Botany*). For 30 of these species, habitat is not present in the project area and these species will not be discussed further.

For the remaining 34 habitat is present that may support the species. These species would be surveyed for, but the results of previous surveys in this watershed and adjoining watersheds indicates a low probability that they would be located.

### B. Fungi

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. *diminutiva*. Four other species (*Arcangeliella camphorata*, *P. gregaria*, *P. oregonensis*, and *Rhizopogon chamaleontinus*) are suspected based on the habitat and host species present.

There are two known occurrences of *Dermocybe humboldtensis* in the South River Resource Area, but not within the Middle Fork Coquille fifth-field watershed.

Five occurrences of *Phaeocollybia olivacea* are documented on the Roseburg District. One site is in the Middle Fork Coquille fifth-field watershed approximately one mile from one of the proposed commercial thinning and density management units.

*Phaeocollybia californica* is documented in the Upper North Myrtle Creek sixth-field subwatershed, more than 25 miles to the east. A single documented occurrence of *Ramaria spinulasa* var. *diminutiva* is located in the same general vicinity in the North Myrtle Research Natural Area/Area of Critical Environmental Concern. No known sites for either species have been identified in the Middle Fork Coquille fifth-field watershed.

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

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

## VII. Fuels/Fire Management

Sixteen of the 28 proposed commercial thinning and density management units are located within the Wildland Urban Interface of the Camas Valley/Tenmile Wildfire Protection Plan Area as described in the Douglas County Community Wildfire Protection Plans.

Table 3-7 describes the current fuel conditions for those proposed units located in the Wildland urban interface. These estimates are based on comparison with vegetation and fuels series described in the *Photo Series for Quantifying Natural Residues in Common Vegetation Types of the Pacific Northwest* (Maxwell and Ward, 1980). Arguments can be made for a few of the units to be considered under different photos for portions of the area due to variations in plant community composition.

Of the units located in the Wildland Urban Interface, four units have an estimated fuel loading of 20 tons per acre, and three units have an estimated seven tons per acre, while 11 tons per acre is representative of the majority of the Wildland Urban Interface units. Not all of the proposed units located outside of the Wildland Urban Interface were surveyed but the majority of those surveyed had current estimated fuel accumulations of 11 tons per acre.

**Table 3-7 Estimated Fuel Loading in Proposed Units in the Wildland Urban Interface**

| Unit | Acres | Descriptive Photo | Present Estimated Fuel Load in Tons per Acre |
|---|---|---|---|
| 29-9-11A | 54 | 2-MC-3 | 20 |
| 29-9-1A | 35 | 1-MC-2 | 7 |
| 29-9-1C | 12 | 1-MC-2 | 7 |
| 29-9-1D | 39 | 1-MC-2 | 7 |
| 29-8-29A | 33 | 1-MC-3 | 11 |
| 29-8-29B | 51 | 1-MC-3 | 11 |
| 29-8-33A | 36 | 1-MC-3 | 11 |
| 29-9-11B | 39 | 1-MC-3 | 11 |
| 29-9-1E | 40 | 1-MC-3 | 11 |
| 29-9-35A | 23 | 1-MC-3 | 11 |
| 30-9-3A | 8 | 1-MC-3 | 11 |
| 29-8-5B | 13 | 2-MC-2 | 11 |
| 29-8-15A | 15 | 2-MC-3 | 20 |
| 29-8-31A | 12 | 2-MC-3 | 20 |
| 29-8-5A | 56 | 2-MC-3 | 20 |
| 29-9-35B | 30 | 2-MC-3 | 20 |

## VIII. Cultural/Historical Resources

There are no known cultural resources within the project area. However, no inventories have been conducted as yet. If resources are discovered during inventory, several options will be available to address them. The first option would be to avoid the resources by reconfiguring the units. If that option is not viable the resources would need to be evaluated to determine their significance. If the resources were found to be not significant, the project could proceed. If the resources were found to be significant, they would need to be avoided or mitigated by recovering a portion of the information that they contain. Development of a mitigation plan or treatment plan would require consultation with interested Tribal governments and the State Historic Preservation Office to determine appropriate measures to be implemented.

## IX. Non-native/Invasive Plants

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

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

Management practices that would be implemented in conjunction with the proposed action would be focused on preventing the introduction of new infestations or the spread of existing ones. Prevention measures would include: steam cleaning or pressure washing of heavy equipment used in logging and road construction to remove soils and other materials that could transport weed seed or root fragments; scheduling work in uninfested areas prior to working in infested areas; using native seed when mulching and seeding; or revegetating with native plant species where natural regeneration is unlikely to prevent weed establishment.

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

# Chapter Four
# ENVIRONMENTAL CONSEQUENCES

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

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

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

## I. Timber/Vegetation

### A. Alternative One – No Action

Under this alternative, the BLM would not apply commercial thinning and density management to the stands described in this analysis, and they would continue to develop as relatively homogeneous and even-aged stands, primarily single-storied and dominated by Douglas-fir.

Elsewhere in the Middle Fork Coquille fifth-field watershed those forest lands under private ownership would continue to be intensively managed on a commercially viable rotation assumed by the PRMP/EIS (Vol. I, p. 4-4), to be 50 years or less.

In 2006, aerial photograph and digitized satellite imagery interpretation was used to evaluate the vegetative condition of private forest lands in the entire Middle Fork Coquille fifth-field watershed. The interpretation indicates approximately 6,700 acres of private harvest since 2001, representing an annual harvest on private lands of 1,340 acres. This will result in the eventual conversion of almost all privately-managed mature and late-seral forest, estimated in 1993 to be in the neighborhood of 3,600 acres, to younger forest.

Absent any treatments to reduce present stand densities, the percentage of live crown of individual trees in the project stands is projected to recede below 30 percent over the next 10 to 20 years, as lower limbs are shaded out and die. Diameter growth and crown expansion would continue to decline due to competition for water, nutrients, and sunlight. Height growth, which is less affected by stand density, would continue but with little commensurate increase in diameter, causing trees to become unstable and more susceptible to wind damage (Wonn 2001; Wilson and Oliver 2000). Trees would also become less capable of adapting to and surviving disturbances such as wildfire, insects and diseases.

Suppression mortality and the potential for stand stagnation would increase as live crowns recede. Hardwoods trees and shade intolerant conifers such as sugar pine and ponderosa pine would be gradually eliminated as stand components. Establishment and growth of woody shrubs and herbaceous plants in the forest understory would be largely precluded.

The Organon Stand Growth and Yield Model, Version 8.2, Southwest Oregon, was used to project current stand conditions and future growth. The Stand Visualization System (SVS), Version 3.36, was used to provide a visual representation that may be used as a comparison of present and future conditions for each of the alternatives.

Figure 4-1 depicts the current stand conditions of proposed Unit 30-9-3B, which for the purposes of modeling the effects of the "No Action" alternative is considered representative.

**Figure 4-1 Current condition of Unit 30-9-3B**

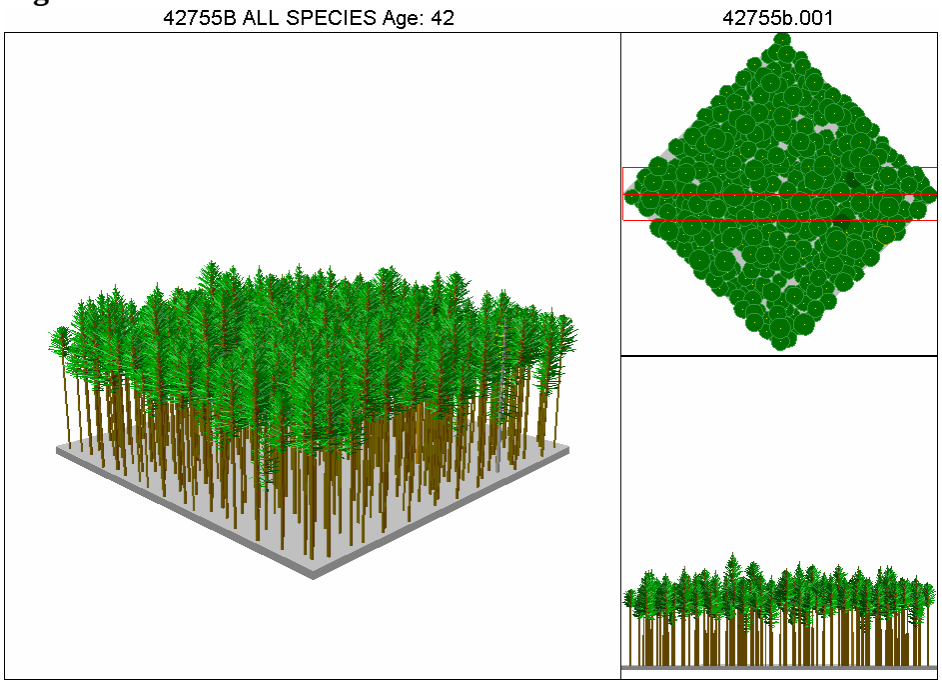
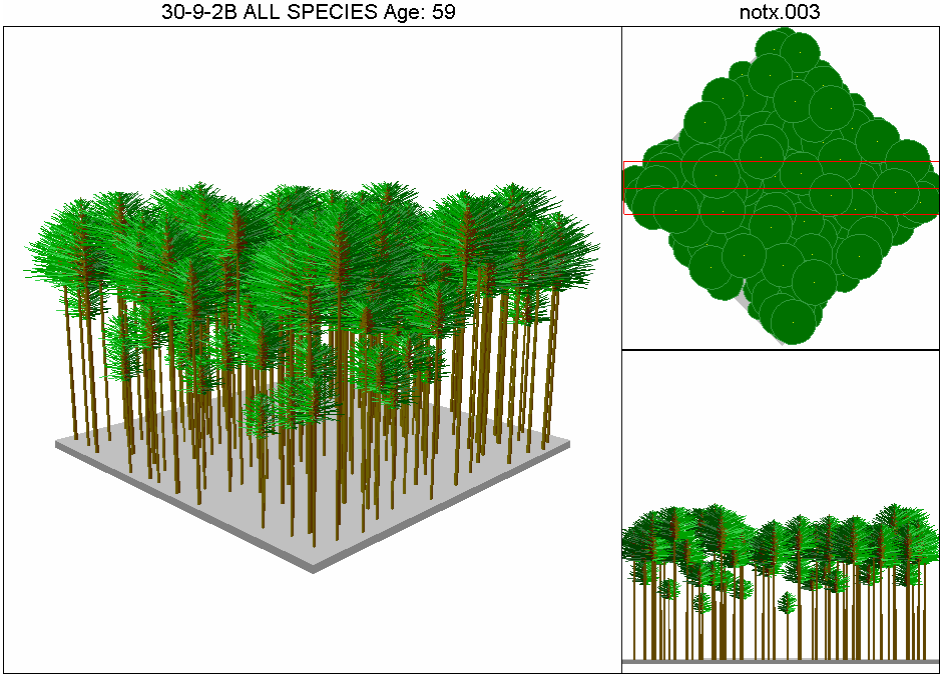



Figure 4-2 depicts the anticipated structural condition of the stand in the year 2027 absent thinning to reduce present stand density.

**Figure 4-2 Unit 30-9-3B in 2027 without thinning**




***Matrix Allocations***

Table 4-1 provides a comparison of the structural changes that would occur in the modeled stand in 20 years, absent commercial thinning.

**Table 4-1 Comparison of Present Stand Conditions in Unit 30-9-3B with Untreated Conditions in 20 Years**

| Year | Trees per Acre | Basal Area (square feet per acre) | Quadratic Mean Diameter (inches) | Relative Density Index | Percent Canopy Closure | Percent Live Crown |
|---|---|---|---|---|---|---|
| 2007 | 207 | 175 | 12.5 | 0.56 | 100 | 37 |
| 2027 | 172 | 240 | 16.0 | 0.69 | 100 | 27 |

The percent canopy closure remains at 100 percent while relative stand density increases to nearly 0.7. This is well beyond the 0.55 threshold at which suppression mortality increases, as illustrated by the declining number of trees. There would be a corresponding decline in the health and vigor of individual trees as live crown ration declines below 30 percent, a level important for maintaining or increasing stand health and vigor.

This alternative would not meet the resource management objectives for the General Forest Management Area and Connectivity/Diversity Block land use allocations described in Chapter One of this EA (p. 3) because it would not:

- Provide a high level of quality wood and sustainable timber production from the General Forest Management Area; and moderately high levels of timber production from the Connectivity/Diversity Blocks;

- Maintain stand vigor; and
- Recover the commodity value of trees that would be lost to suppression mortality.

It would not meet the resource management objectives for Riparian Reserves described in Chapter One (p. 3) because it would not:

- Retain hardwoods as stand components;
- Diversify the species and structural composition of riparian stands; and
- Accelerate the growth of the remaining trees to provide short and long-term sources of large wood for instream recruitment.

***Late-Successional Reserves***

Old-growth stands typically developed at low tree densities, while these young managed stands are developing at comparatively higher densities (Tappeiner et al. 1997). Without silvicultural treatment or natural disturbances, stand growth would likely stagnate resulting in stands with little structural complexity. This would be indicated by lack of large overstory trees, a decrease in species diversity as hardwoods and shade intolerant conifers die from suppression, and canopy conditions that are closed and single-layered. Available sunlight reaching the forest floor would be low and generally insufficient to support establishment and survival of understory vegetation.

Table 4-2 provides a comparison and illustrates the structural changes that would occur in proposed Unit 29-9-1E in 20 years and 40 years, absent density management.

**Table 4-2 Comparison of Present Stand Conditions in Unit 29-9-1E with Untreated Conditions in 20 and 40 Years**

| Year | Trees per Acre | Basal Area (square feet per acre) | Quadratic Mean Diameter (inches) | Relative Density Index | Percent Canopy Closure | Percent Live Crown |
|---|---|---|---|---|---|---|
| 2007 | 192 | 158 | 12.3 | 0.50 | 100 | 37 |
| 2027 | 167 | 224 | 15.6 | 0.64 | 100 | 32 |
| 2047 | 148 | 268 | 18.3 | 0.73 | 100 | 27 |

Again, as illustrated for the General Forest Management area stand, the percent canopy closure remains at 100 percent while relative stand density increases to 0.64 in 20 years, and well above 0.7 in 40 years, both beyond the 0.55 threshold at which suppression mortality increases. This is illustrated by the projected 23 percent decline in the number of trees per acre. Live crown ration also eventually declines below 30 percent, at which point declines in stand health and vigor would occur. The death of 23 percent of the trees per acre also represents a substantial increase in the amount of dead fuel accumulating on the forest floor.

The formation of canopy gaps and stratification of the canopy into multiple layers would generally not occur in the majority of stands, excepting proposed Unit 29-9-1D where laminated root rot is causing periodic mortality in individual trees or small groups of trees.

The growth and development of large diameter trees would be delayed creating a deficit of large snags and down wood which would need to be created by disturbance factors other than suppression mortality, such as windthrow, root disease, lightning or fire.

This alternative would not meet the resource management objectives for Late-Successional Reserves described in Chapter One (pp. 3 and 4) because it would not:

- Promote development of old-growth forest characteristics that include snags, logs on the forest floor, large trees, and canopy gaps that enable establishment of multiple tree layers and diverse species composition;
- Maintain the health and vigor of the stands, and promote the growth of the remaining trees;
- Retain hardwoods as stand components;
- Maintain native species diversity and structural composition of the forest stands;
- Maintain and improve late-successional habitat connections within and between LSRs;
- Create larger blocks of interior late-successional habitat; and
- Decrease the risk of large scale disturbance from fire, wind, insects, and diseases that would destroy or limit the ability of the reserves to sustain viable species populations.

***Common to All Land Use Allocations in the Watershed***

Port-Orford-cedar is susceptible to a root disease caused by *Phytophthora lateralis*. Port-Orford-cedar occurs as individual or scattered groups of trees rather than as continuous stands. Based on extensive roadside surveys in 1996, it was estimated to be present on approximately 6,163 acres or 24 percent of the BLM-managed lands in the watershed.

*Phytophthora lateralis* is highly adapted for spread in water and soil, and is capable of surviving in a state of dormancy. Viable resting spores may survive in infected root systems for 7 years or more following the death of the host tree (Hansen and Hamm 1996). The disease is spread by the transport of infested soil and overland flow of water, primarily in the fall, winter, and spring when the cool, moist conditions are most favorable for the pathogen.

Vehicular traffic, particularly the use of unsurfaced roads in wet weather, and activities related to road construction, road maintenance and logging can spread the disease by transporting infested soil into disease-free areas. One study (Jules et al. 2002) concluded that 72 percent of the infected sites in the landscape under examination were the result of vehicular dispersal of contaminated soil along roads. The disease may also be spread by game animals and casual forest visitors, by transport of infested soil on hooves and feet.

For these reasons, it would be expected that under an alternative of No Action the spread of *Phytopthora lateralis* will continue at rates comparable to what has been observed and noted in the past.

## B. Alternative Two – The Proposed Action

### *Matrix Allocations*

Stands in the General Forest Management Area would be thinned to a relative density of 0.30 to 0.35, by removing up to one-half of the stand basal area. Residual canopy closure would range from 50 to 75 percent, directly after thinning. These changes in stand density would reduce competition among the remaining trees for available water, light and nutrients resulting in increased growth rates expected to persist for 15 to 20 years.

The effect of thinning would meet the objective of assuring high levels of timber productivity and quality wood production by increasing average stand diameter growth. Selecting the best formed co-dominant and dominant trees for retention, and promoting live crown expansion by releasing these trees from competition would aid in the maintenance of the health and vigor of the stands.

Post-thinning conditions were modeled in Organon Stand Growth and Yield Model, Version 8.2, Southwest Oregon and are displayed in Table 4-3. Table 4-4 compares post-thinning conditions for Unit 30-9-3B with conditions anticipated 20 years after thinning.

**Table 4-3 Summary of Post-Thinning Stand Conditions for Units in the General Forest Management Area**

| Unit | Residual Trees Per Acre | Residual Basal Area (square feet per acre) | Quadratic Mean Diameter (inches) | Relative Density Index | Live Crown Ratio |
|---|---|---|---|---|---|
| 29-8-29A | 103 | 104 | 13.6 | 0.32 | 0.39 |
| 29-8-29B | 87 | 108 | 15.1 | 0.32 | 0.48 |
| 29-8-33A | 100 | 100 | 13.2 | 0.31 | 0.36 |
| 29-8-33B | 70 | 106 | 16.3 | 0.30 | 0.48 |
| 29-8-33C | 63 | 118 | 18.6 | 0.32 | 0.45 |
| 29-9-35A | 86 | 134 | 17.0 | 0.32 | 0.47 |
| 29-9-35B | 89 | 117 | 15.5 | 0.34 | 0.36 |
| 30-8-5A | 82 | 111 | 15.7 | 0.32 | 0.45 |
| 30-8-5B | 103 | 105 | 13.7 | 0.32 | 0.35 |
| 30-9-3A | 88 | 117 | 15.7 | 0.34 | 0.46 |
| 30-9-3B | 89 | 109 | 14.9 | 0.32 | 0.41 |

**Table 4-4 Comparison of Pre-thinning Conditions and Average Stand Conditions for Unit 30-9-3B Post-thinning and at 20 years out**

| | Trees per Acre | Basal Area (square feet per acre) | Quadratic Mean Diameter (inches) | Relative Density | Canopy Closure (percent) | Live Crown Ratio (percent) |
|---|---|---|---|---|---|---|
| Unthinned | 207 | 175 | 12.5 | 0.56 | 100 | 0.37 |
| Thinned | 89 | 109 | 14.9 | 0.32 | 73 | 0.41 |
| 20 Years after thinning | 86 | 171 | 19.1 | 0.46 | 83 | 0.30 |

Post-thinning conditions for Unit 30-9-3B are represented by Figure 4-3 and conditions in 20 years in Figure 4-4.

**Figure 4-3 Post-thinning conditions in Unit 30-9-3B**

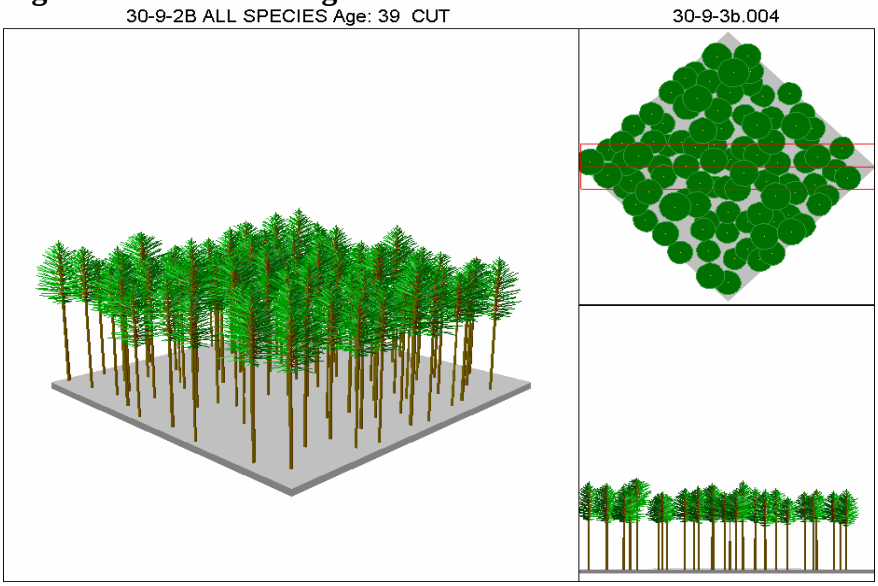
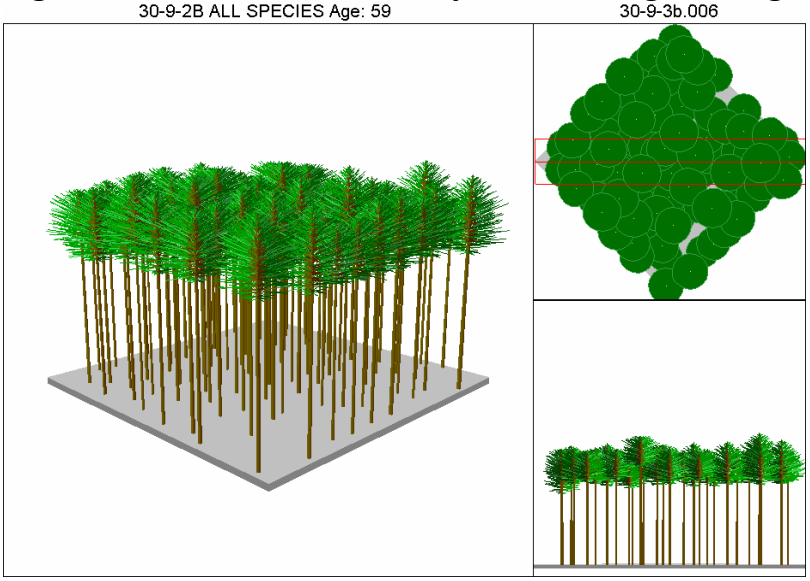



**Figure 4-4 Unit 30-9-3B in 20 years following thinning**




Proposed Unit 29-8-31A, in the Connectivity/Diversity Block land use allocation, would be thinned to a relative density comparable to moderate LSR thinning described below. Canopy closure would be reduced to 40 and 50 percent, allowing sufficient sunlight to support establishment and growth of understory vegetation over the next 20 years. Selection of trees for retention would not primarily favor Douglas-fir, but would include hardwoods and conifers such as western redcedar, incense cedar, ponderosa pine, sugar pine, and western hemlock. Tree selection would also include up to three trees per acre that exhibit crown and bole deformities that may provide future habitat structure for wildlife species.

Density management in those portions of Riparian Reserves outside of "no-harvest" buffers would reduce relative density to approximately 0.30, with post-treatment canopy closure of approximately 50 percent, again comparable to a moderate thinning treatment in the LSRs. Tree selection criteria would be comparable to selection criteria for the Connectivity/Diversity Block land use allocation.

***Late-Successional Reserves***

Old-growth Douglas-fir forests in western Oregon developed over long time periods with lower numbers of dominant trees, leading to the development of multi-aged stands with multi-canopy layers and low overstory tree densities (Tappeiner et al 1997). Research in old-growth stands indicates that when the stands were 50 years old the average tree diameter breast height was greater than what typically occurs in stands with high tree densities, and that these higher growth rates persisted over time (Tappeiner et al. 1997). The slower growth rates typically observed in young, managed stands are a direct result of higher tree densities. Disturbances sufficient to promote Douglas-fir regeneration in naturally occurring stands are generally excluded in young, managed stands.

Thinning initiates and promotes tree regeneration, shrub growth, and development of multi-storied stands even when the treatments focus on management of overstory tree density (Bailey and Tappeiner 1998). The proposed variable density thinning, in conjunction with gap creation, retention of unthinned areas, and under-planting with a variety of tree species native to the sites would alter the current developmental trajectory of the managed stands to enhance the structural and biological diversity, and provide conditions favorable for development of late-successional characteristics.

Variable density thinning would consist of light, moderate, and heavy thinning to reduce tree densities and competition among residual trees for water, nutrients, and sunlight. As a result, diameter growth of residual trees and crown expansion would improve and live crown ratios of trees would increase to 40 percent or greater making them less susceptible to windthrow.

Species diversity would be maintained or increased by favoring retention of higher numbers of hardwoods, sugar pine, ponderosa pine, incense cedar, Port-Orford-cedar, grand fir and western hemlock in the marking prescription, rather than selecting only the co-dominant and dominant Douglas-fir.

Thinning intensity would determine the length of time during which changes in stand growth trajectories would persist with the more intensive, heavy thinning providing the greatest opportunity for prolonged acceleration of tree diameter growth and understory development. For the reference unit, Table 4-5 provides a comparative illustration of the effects of various levels of thinning through time.

Future entries may be needed to maintain or further enhance structural and horizontal diversity within stands. The increased growth in these stands would be expected to develop tree size and crown characteristics associated with mature and late-successional forest more quickly than untreated forest stands in the area.

**Table 4-5 Reference Unit Stand 29-9-1E, Stand Conditions for No Treatment Compared to Various Thinning Treatments at Years 2007, 2027, and 2047**

| Stand Treatment | Year | Trees per Acre | Basal Area (square feet per acre) | Quadratic Mean Diameter (inches) | Relative Density | Canopy Closure (percent) | Live Crown Ratio (percent) |
|---|---|---|---|---|---|---|---|
| Unthinned | 2007 | 192 | 158 | 12.3 | 0.50 | 100 | 37 |
| Light | | 98 | 103 | 13.9 | 0.31 | 67 | 40 |
| Moderate | | 80 | 87 | 14.1 | 0.26 | 56 | 39 |
| Heavy | | 53 | 70 | 15.6 | 0.21 | 42 | 40 |
| | | | | | | | |
| Unthinned | 2027 | 167 | 224 | 15.6 | 0.64 | 100 | 32 |
| Light | | 96 | 135 | 18.0 | 0.38 | 76 | 36 |
| Moderate | | 77 | 137 | 18.1 | 0.38 | 69 | 31 |
| Heavy | | 52 | 112 | 20.0 | 0.30 | 53 | 33 |
| | | | | | | | |
| Unthinned | 2047 | 148 | 268 | 18.3 | 0.73 | 100 | 27 |
| Light | | 88 | 204 | 20.6 | 0.53 | 89 | 25 |
| Moderate | | 73 | 177 | 21.1 | 0.46 | 76 | 30 |
| Heavy | | 51 | 146 | 23.0 | 0.36 | 59 | 31 |

This alternative would meet the following ROD/RMP and LSRA objectives for LSR management by:

- Promoting the development of old-growth characteristics including snags, logs on the forest floor, large trees, and canopy gaps that enable establishment of multiple tree layers and diverse species composition (USDA and USDI 1994a p. B-5);
- Maintaining the health and vigor of the stands, and promote the growth of the remaining trees;
- Retaining hardwoods as stand components;
- Maintaining native species diversity and structural composition of the forest stands (LSRA, pp. 62);
- Maintaining and improving late-successional habitat connections within and between LSRs (LSRA, pp. 65-66);
- Decreasing the risk of large scale disturbance from fire, wind, insects, and diseases that would destroy or limit the ability of the reserves to sustain viable species populations (USDA, USDI 1994a p. B-5).

*Light thinning*

A light thinning, comparable to thinning to 90 to 100 trees per acre in the General Forest Management Area, would provide for individual tree growth while maintaining stand level growth. Thinning to a relative density of 0.30 to 0.35 would reduce canopy closure to 60 to 70 percent, allowing approximately fourteen percent of available sunlight to reach the forest floor.

In 15 years, increasing canopy closure would reduce the level of sunlight penetrating the canopy to approximately eight percent (adapted from Chan et al. 2006). After 20 years, relative stand density and the amount of available sunlight reaching the forest floor would return to levels comparable to those that existed prior to thinning. The opportunity for development of an herbaceous plant and shrub understory would be fairly limited under such circumstances.

Proposed Unit 29-9-1E was selected to illustrate, as depicted in Figures 4-5 and 4-6, stand conditions immediately after a light thinning, and approximately 40 years after treatment.

**Figure 4-5 Unit 29-9-1E immediately following a light thinning**

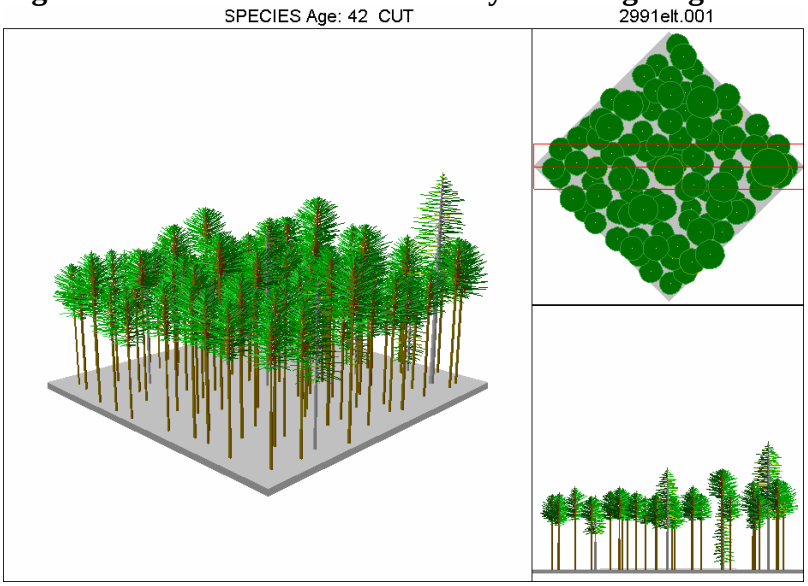
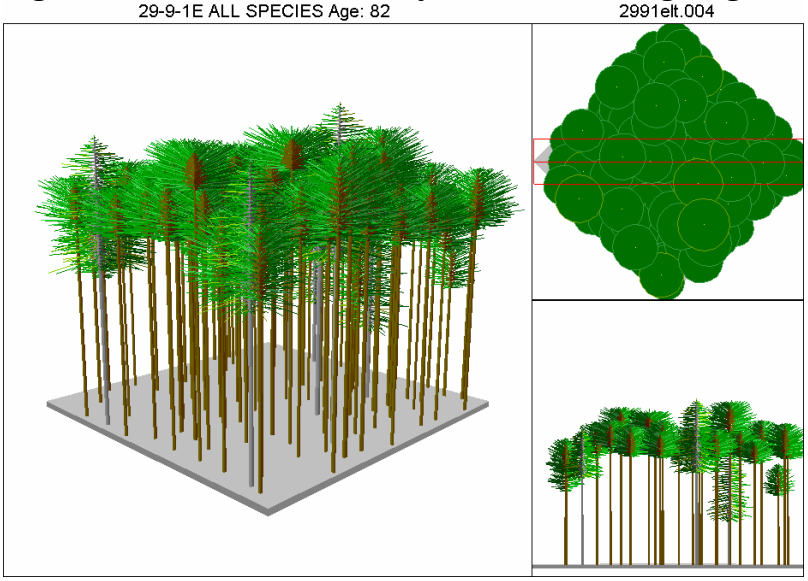



**Figure 4-6 Unit 29-9-1E, at 82 years old following a light thinning at age 42**




*Moderate thinning*

Moderate thinning to a relative density of 0.25 to 0.30 and a stocking level of 70 to 80 trees per acre would provide for individual tree growth, maintain stand level growth, provide opportunity for development of a canopy layer of shade tolerant species, and maintain hardwoods.

A residual canopy of 50 to 60 percent immediately after treatment would allow approximately 29 percent of available sunlight to reach the forest floor (adapted from Chan et al 2006). This would be sufficient to support the establishment and development of herbaceous plant and shrub layers for an estimated 20 years.

Figures 4-7 and 4-8 depict the conditions of the reference stand immediately following a moderate thinning, and at approximately 40 years after treatment.

**Figure 4-7 Unit 29-9-1E immediately following a moderate thinning.**

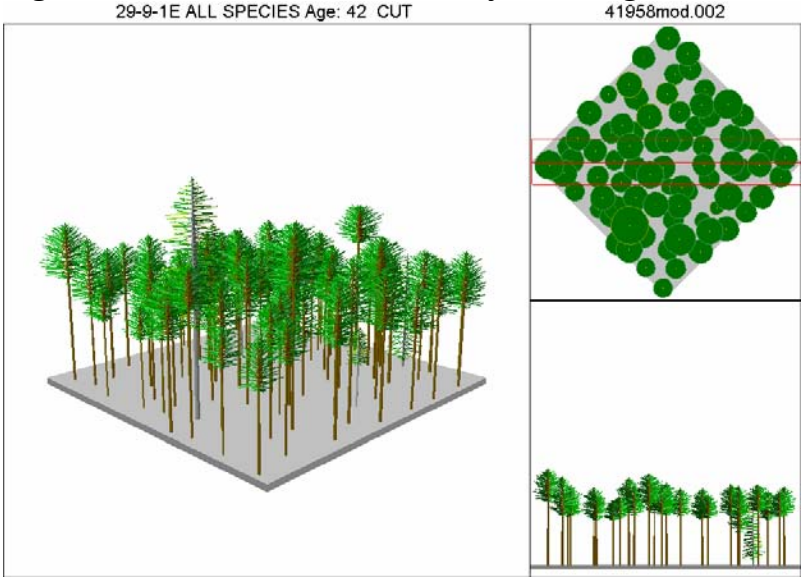
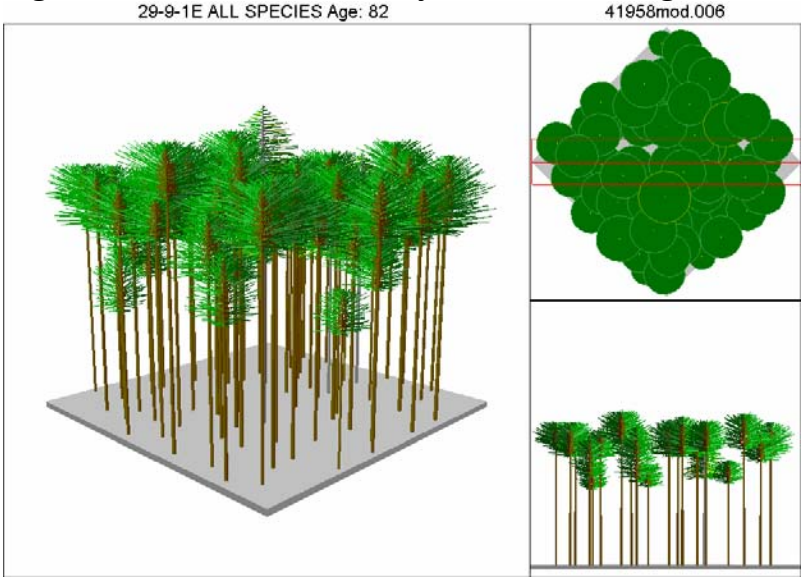



**Figure 4-8 Unit 29-9-1E, at 82 years old following a moderate thinning at age 42**




*Heavy thinning and under-planting with 100 to 300 trees per acre*

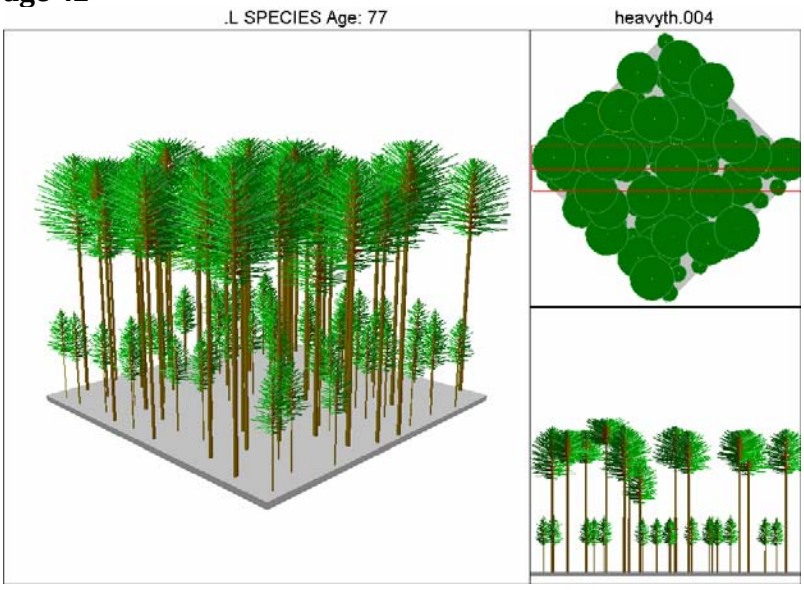
Heavy thinning would reduce relative density to between 0.20 to 0.25, canopy closure to 40 to 50 percent, and stocking to approximately 50 trees per acre. This treatment would provide the longest period of accelerated growth and produce the largest trees over time. Areas treated in this fashion would be the first to achieve the LSRA objective for at least ten Douglas-fir trees per acre of 40 inches diameter breast height or greater.

The crowns of the reserved trees would increase in length and volume because of the more open conditions. Heavy thinning would also provide the best opportunity for trees to develop larger branches and limbs. Available sunlight would be sufficient to support shade intolerant trees and plants, allowing them to persist as stand components for longer periods of time than in light and moderate thinning areas. If results from stand monitoring in the heavily thinned stands indicates there is little conifer establishment then under-planting with species such as ponderosa pine, sugar pine, incense-cedar, western redcedar, western hemlock and grand fir might be conducted, as appropriate to individual site conditions, to enhance structural and species diversity.

Figures 4-9 and 4-10 depict conditions of the reference stand immediately after heavy thinning and under-planting with 100 trees per acre, and at approximately 40 years after treatment.

**Figure 4-9 Unit 29-9-1E immediately following a heavy thinning and under-planting with 100 trees per acre**


**Figure 4-10 Unit 29-9-1E, at 82 years old following a heavy thinning and under-planting at age 42**



*Openings*

Created openings in the forest canopy would have the most positive effect on the development of herbaceous plants and shrubs, and in the future development of large trees with full crowns and large limbs that are typically open-grown when young and continue to grow under such conditions for periods of 30 years or longer. Culturing of planted trees in gaps or in heavy thinning areas to maintain an open-grown condition can enhance development of large limbs.

**Figure 4-11 Unit 29-9-1E immediately following gap creation and under-planting**

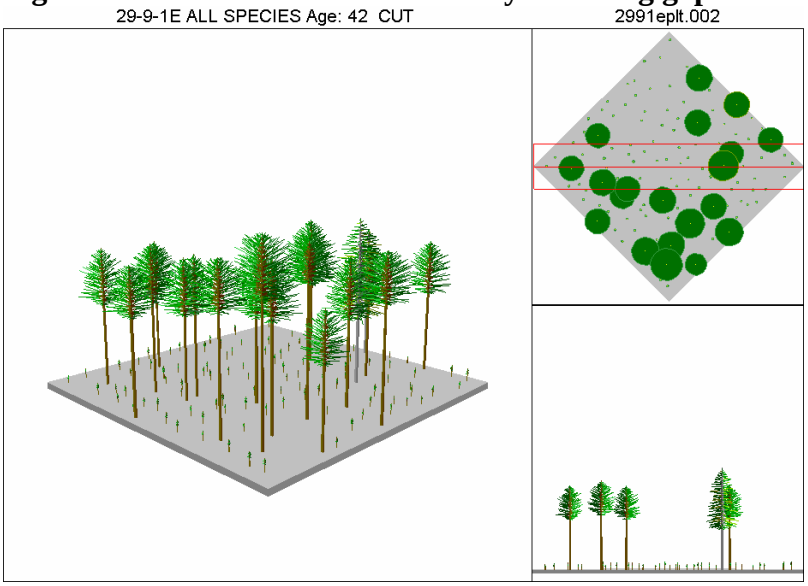
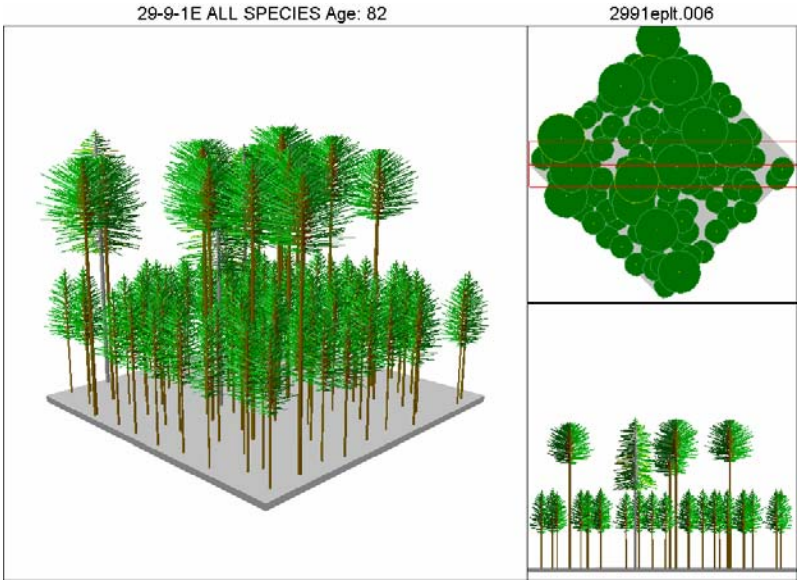



**Figure 4-12 Unit 29-9-1E, at 82 years old following gap creation and under-planting at age 42**



*Unthinned areas*

Unthinned areas totaling ten percent of the acreage comprising each LSR density management unit would develop along a trajectory similar to that described under the No Action alternative. These small untreated areas would provide structural diversity across the landscape with respect to differentiation in tree spacing, and thermal and visual cover. They would maintain processes of suppression mortality and tree size differentiation, and retain areas of undisturbed coarse woody debris.

*Coarse Woody Debris and Snags*

Reducing stand densities by thinning from below would remove the smaller trees that would normally die from suppression and limit smaller diameter snags and coarse down wood for the short term. Physical damage to existing coarse down wood would also be expected during felling and yarding operations.

In the short term, additional coarse woody debris and snags would be generated by: continuing suppression mortality in unthinned areas; non-merchantable wood left in the units following density management operations; mechanical damage to reserve trees, such as broken out tops; snow break and windfall; and snags felled for safety reasons.

Over time, trees in the treated areas of the stands would grow to larger diameters than trees in the untreated areas. The treated areas would eventually reach a level of stand density and canopy closure where mortality suppression would once again occur. This would result in snags and coarse down wood of larger size, which would persist for longer periods of time, than would be generated in untreated areas. In the light and moderately thinned areas the recommended five snags per acre larger than 20 inches diameter breast height would be achieved at about 130 years of age compared to 140 years absent thinning. Snags would be created in the heavily thinned areas to meet LSRA recommendations by girdling selected trees.

Other than limited roadside salvage of blown down timber and removal of timber associated with reciprocal rights-of-way agreements, timber management on lands in the watershed administered by the Roseburg District has been limited to authorization of 1,316 acres of commercial thinning and density management over the past five years. This represents roughly 18 percent of the mid-seral forest lands within the Roseburg District portion of the watershed. The 855 acres of commercial thinning and density management proposed in this analysis, if implemented, would increase this total to approximately 2,170 acres or 30 percent of the mid-seral forests under BLM management.

While density management and commercial thinning would reduce tree densities in the treated stands and create approximately five acres of small canopy gaps, it would not generally affect stand ages or the ability of the stands to grow and develop into late seral habitat, and hence have no cumulative effect on age class distribution. As illustrated in the PRMP/EIS (Vol. I, pp. 4-27 and 28), overall age-class distribution of forest lands managed by the Roseburg District BLM are expected to trend toward older seral stages because Matrix lands are managed on harvest rotations of 80 to 110 years of age and Late-Successional Reserves and Riparian Reserves are not scheduled for regeneration harvest.

One other reasonably foreseeable action with the opportunity to affect forest age class distribution is the proposed construction of a natural gas delivery pipeline extending from a proposed liquefied natural gas processing facility in Coos Bay, Oregon to a distribution point in Malin, Oregon. Based on analysis of the proposed pipeline route and the lands it would cross, the following estimates were derived.

The pipeline construction right-of-way, assumed to average 100 feet in width, would require the removal of approximately 4.8 acres of early-seral forest, 18.0 acres of mid-seral forest, and 7.8 acres of late-seral forest from BLM-managed lands. On private lands, approximately 10.4 acres of early-seral forest, 19.8 acres of mid-seral forest, and 3.5 acres of late-seral forest would be removed. Pipeline construction would also involve the clearing of temporary work areas outside of the permanent right-of-way. This would entail removal of approximately 1.4 acres of early-seral forest, 7.5 acres of mid-seral forest, and 4.2 acres of late-seral forest from BLM managed lands. On private lands, approximately 5 acres of early-seral forest, 6.4 acres of mid-seral forest, and 2.8 acres of late-seral forest would be removed.

Collectively, approximately 92 acres of forest land would be converted to establishment stage, a figure representing 0.15 percent of all forested lands in the WAU. Within the pipeline right-of-way, an area 15 feet either side of centerline would be managed as non-forest land. On average, approximately 15 feet, on average, either side of the central portion of the right-of-way would be regularly cut back at intervals of an estimated 15 years. Remaining areas would be allowed to grow back into a forested condition such that only approximately 39 acres would no longer be managed as forest land, a negligible amount representing only 0.06 percent of almost 61,000 forested acres in the watershed, and well within the normal range of variability.

***Common to All Land Use Allocations in the Watershed***

The *Record of Decision and Resource Management Plan Amendment for Management of Port-Orford-cedar in Southwest Oregon, Coos Bay, Medford, and Roseburg Districts* (USDI, BLM 2004c) provides direction for assessing risk and controlling spread of Port-Orford-cedar root disease in order to maintain Port-Orford-cedar as an integral component of the vegetative communities of which it is a part. The risk key is used for site-specific analysis to assess the need for application of additional management practices. An assessment of the project area indicates no special mitigation is required, because:

- There are no uninfected Port-Orford-cedar within, near or downstream of any of the proposed commercial thinning and density management units or anticipated haul routes whose ecological, Tribal, or product use or function measurably contributes to meeting resource management objectives;
- There are no uninfected Port-Orford-cedar within, near or downstream of any of the proposed commercial thinning and density management units or anticipated haul routes that, were they to become infected, would likely spread infections to trees whose ecological, Tribal, or product use or function measurably contribute to meeting land and resource management plan objectives; and
- None of the proposed commercial thinning and density management areas are located within uninfested 7$^{th}$-field watersheds (drainages).

Although no additional mitigation is indicated, measures to reduce the risk of further spread of Port-Orford-cedar root disease would be implemented. These would include: equipment washing as previously described with respect to noxious weed control (p. 39); restricting road construction and renovation to the dry season (May 15th to October 15th); restricting hauling on unsurfaced roads to the dry season; scheduling operations in uninfested areas prior to work in infested areas; and decommissioning and blocking unsurfaced roads upon completion of commercial thinning and density management operations.

## II. Wildlife

### A. Alternative One - No Action

The availability of late-successional forest habitat is the primary wildlife concern in the Middle Fork Coquille watershed, based on the effects of past and expected future timber harvest on federal and private land. Forest stands in this area begin functioning as late-successional habitat at approximately age 80, when habitat components such as large diameter trees, trees with cavities, snags, and multiple canopy layers begin to develop. Nearly 70 percent of BLM-managed lands in the watershed are in reserved land use allocations managed to retain or create sustainable late-successional wildlife habitat over the long.

As described on page 40, harvest of both mid-seral and late-successional forest on private lands would continue. It is anticipated that this would largely convert all remaining late-seral forest on private lands to early seral stages over the next 20 to 30 years, based on recent trends. Much of the existing mid-seral forest would be similar converted as it is assumed that these private lands would be managed on rotations of 50 years or less. Consequently, private lands would be expected to provide wildlife habitat that is largely limited to early seral stages of forest development.

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. However, the development and maintenance of ecologically useful early and mid-seral forests in areas of recent timber harvest is another growing concern in the watershed. This is particularly true on private lands, where densely-stocked Douglas-fir is often the management goal. Few large residual trees are left after harvest and deciduous and minor conifer species are targeted for elimination through herbicide treatment and thinning in such stands. 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.

Within the stands proposed for commercial thinning and density management, existing habitat conditions would remain unchanged in the near term. Stand development would continue along current growth and developmental trajectories. Dense and overstocked conditions would result in relatively slow growth rates and increasing mortality in smaller diameter suppressed trees.

The reduced growth rate would be unfavorable to the development of habitat characteristics typical to mature and late-successional forests. Growth of larger diameter trees with full crowns and large lateral limbs would be delayed or precluded unless some other form of disturbance was to alter stand development. This would limit the amount of suitable perching and nesting structure for many species such as murrelets, spotted owls, goshawks, and other raptors.

Lacking large trees, the creation of large snags that would persist for long periods of time would be unlikely, thus limiting the availability of habitat for cavity nesting wildlife. Large woody debris that provides habitat for many prey species would be severely limited, as dead wood provided by suppression mortality in smaller trees would not persist long.

Absent reductions in stand density and canopy closure, forest understory would remain largely devoid of herbaceous and shrub layers that provide forage and cover for many vertebrate and invertebrate species. Absent natural disturbance, forest age classes in the watershed will likely trend towards the extremes: structurally simple stands with low plant species diversity on private land and late-seral stands on BLM-managed lands, with few acres of high-quality early- and mid-seral stands.

## B. Alternative Two - The Proposed Action

### 1. Threatened and Endangered Species

The project area is overlapped by nine **northern spotted owl** home ranges in which commercial thinning and density management would applied to approximately 380 acres of unsuitable and dispersal-only habitat (Table 4-5). Within these home ranges, approximately 68 acres dispersed among proposed LSR density management units would receive no treatment.

The proposed commercial thinning and density management units are generally on the outer periphery of the affected home ranges (Figures B-2, B-3 and B-4, Appendix B – *Wildlife*), such that they would not limit access to suitable habitat. A notable exception is Unit 29-8-5A located between the Happy Hour site and a 27-acre patch of suitable habitat located to the south of the site (Figure B-2, Appendix B – *Wildlife*). Density management would not be expected to block access because the interposed portion of the unit would be either untreated (7 acres) or lightly thinned (25 acres), and contiguous dispersal-only habitat exists to the east.

**Table 4-6 Acres of proposed treatments in the affected spotted owl home ranges.**

| Site | No Treatment | Light Thin | Moderate Thin | Heavy Thin | Total Treated | Site Total |
|---|---|---|---|---|---|---|
| Bear Naked | 0 | 0 | 57 | 8 | 65 | 66 |
| Berry Creek | 0 | 0 | 14 | 0 | 14 | 14 |
| Boulder Creek | 7 | 6 | 35 | 13 | 54 | 61 |
| Deep Creek | 39 | 8 | 26 | 70 | 103 | 143 |
| Happy Hour | 8 | 25 | 41 | 1 | 67 | 74 |
| Lower Berry Creek | 0 | 0 | 13 | 0 | 13 | 13 |
| Weaver Ridge | 9 | 0 | 39 | 1 | 40 | 49 |
| Wildcat Creek CB | 15 | 7 | 40 | 37 | 84 | 99 |
| Wildcat Creek RB | 2 | 0 | 13 | 1 | 14 | 16 |

The Bear Naked and Wildcat Creek RB home ranges would also be affected by another proposed action in the adjacent Olalla Creek-Lookingglass Creek fifth-field watershed. The Olalla-Lookingglass LSR Density Management EA (OR-105-06-06, p. 42) proposes application of density management on 49 acres in the Bear Naked home range and 180 acres in the Wildcat Creek RB home range. These managed, mid-seral conifer stands would be treated in a manner similar to the LSR treatments proposed in this analysis and would maintain sufficient residual tree density, snags, and coarse woody debris to retain the functionality of the habitat for owls.

Vertical and horizontal cover would be reduced in treated areas through tree removal, with varying levels of residual tree density. Spotted owls would be expected to continue to use these stands because post-project canopy cover would remain greater than 40 percent with an average tree diameter breast height of 11 inches or greater, figures widely used as a threshold for dispersal function (Thomas et al. 1990). However, spotted owls would be less likely to utilize thinned stands, especially heavily thinned stands, until canopy cover returns to within ten percent of pre-project levels through a combination of overstory crown expansion and in-growth of understory trees.

In stands thinned in the General Forest Management Area this degree of canopy cover would be reached in about 20 years. In the lightly thinned areas in the LSRs this would occur within about 10 years and within 30 years in the moderately thinned areas. Comparable canopy cover may not be reached in the heavily thinned areas for up to 50 years. In all cases, however, density management would accelerate the development of habitat features used by both spotted owls and their prey, like large trees and snags, multiple canopy layers, herbaceous and shrub vegetation, and large coarse woody debris.

It is not expected that commercial thinning and density management on the remaining 407 acres of treatment proposed under this alternative would affect any known occupied spotted owl home ranges given that more than 20 years of surveys in the South River Resource Area have not identified any other occupied sites in the project area that could be affected. Post-treatment canopy closure and tree diameters in these areas would still provide functional dispersal habitat for continued use by resident single or dispersing owls.

No effect from noise disruption would be expected because any activities within the minimum disruption distances, as established by the U.S. Fish and Wildlife Service (USDI, USFWS 2005*a*), from any known spotted owl site; would be seasonally restricted from March 1 to June 30, subject to waiver if surveys determine that owls are not present or have not successfully nested. This would ensure that noise disruption would not cause spotted owls to abandon nests or fledge prematurely.

Effects to spotted owl Critical Habitat were analyzed through consultation with the Service (USDI, USFWS 2005*a*). This analysis determined that habitat availability and connectivity in CHU OR-62 after the proposed density management would continue to provide for the survival and recovery of spotted owls.

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;
- Affected dispersal-only habitat in proposed units would retain functionality;
- Existing coarse woody debris and snags would be reserved to the extent possible and continue to provide habitat for spotted owl prey species;
- 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;
- Noise disruption would not affect nesting or fledging activities; and
- Spotted owl CHU OR-62 would retain its intended functionality.

Density management in Late-Successional Reserves would benefit spotted owls in the long term by:

- Accelerating stand development and reducing the time in which the stands would provide additional suitable habitat;
- Creating coarse woody debris and snags and accelerating the development of future sources of coarse woody debris and snags that are important features for spotted owl prey species;
- Accelerating development of contiguous suitable habitat in LSRs 261 and 259 to improve their ability to support reproductive owl pairs; and
- Improve the ability of the stands to withstand disturbances such as fire, insects, or windthrow by maintaining tree growth and vigor.

The proposed commercial thinning and density management would not be expected to directly affect **marbled murrelets** through modification of suitable habitat. Only unit 29-8-33D contains areas of suitable habitat as defined by Potential Habitat Guidelines and depicted in Figure B-6 (Appendix B - *Wildlife*). Ongoing surveys of this unit have not indicated murrelet occupancy but detections in adjacent stands indicate that this area is used. Consequently, this unit would be managed as unmapped LSR, and would follow guidance found in the South Coast/Northern Klamath LSRA and the Potential Habitat Guidelines, with treatment designed to protect and enhance existing suitable habitat and accelerate development of additional suitable nest trees.

The silvicultural marking prescription would favor retention of trees near those trees that currently possess suitable nest structure to minimize the risk of damage and to provide future cover as they grow and develop. Marking would be conducted by BLM staff under the guidance of a wildlife biologist. Potential nest trees in other units would be protected and managed as described in the Potential Habitat Guidelines.

No effect to murrelets from noise disruption is expected. Suitable habitat within 100 yards of Units 29-8-5A, 29-8-5B, 29-9-11A, and 29-9-11B will be surveyed for 2 years (Pacific Seabird Group 2003) to determine if the stands are occupied.

If murrelets are detected in habitat adjacent to either Unit 29-8-5A or 5B, located within the Zone 2 Restriction Corridor, seasonal operating restrictions would be implemented from April 1 to August 5, followed by Daily Operating Restrictions from August 6 to September 15.

If murrelets are detected in habitat adjacent to Units 29-9-11A or 11B, both located in Zone 2, Daily Operating Restrictions would be implemented from April 1 to August 5. These restrictions would be waived if murrelets are not detected. If necessary due to the presence of adjacent suitable habitat (see Table 3-4, p. 26), other units would be subject to seasonal restrictions followed by Daily Operating Restrictions if located within the Restriction Corridor, or just Daily Operating Restrictions if located in Zone 2.

Effects to Critical Habitat were analyzed through consultation with the U.S. Fish and Wildlife Service (USDI, USFWS 2005*a*). The analysis determined that habitat availability and connectivity after the proposed density management would not affect the ability of CHU OR-O6-D to provide for the survival and recovery of the murrelet.

Overall, commercial thinning and density management would not be expected to negatively affect individual murrelets or the availability of suitable habitat because:

- Suitable habitat in Unit 29-8-33D would be marked to maintain habitat functionality,
- Potential nest trees would be managed according to Potential Habitat Guidelines, and
- Operations in units with adjacent suitable murrelet habitat would be subject to seasonal restrictions and/or Daily Operational Restrictions, or be surveyed for murrelet occupancy.

Density management in mapped and unmapped Late-Successional Reserves would benefit murrelets in the long term by:

- Stimulating the growth and development of nest trees which would decrease the time required for the units to develop into suitable habitat;
- Accelerating the development of contiguous suitable habitat in LSR 261, which would improve its ability to support reproductive murrelets; and
- Improving the ability of the stands to withstand disturbances such as fire, insects, or windthrow by maintaining tree growth and vigor.

**2. BLM Special Status Species**

Surveys for the **Chace sideband, green sideband, spotted taildropper and Oregon shoulderband** snails require two visits. Units 29-8-5A, 29-8-5B, and 29-8-15A were surveyed once in the fall of 2006 with negative results and will be surveyed a second time in the spring of 2007. The remaining units will be surveyed in the spring and fall of 2007. If found, snail sites would be protected by altering unit configurations, designating buffers, enclosing the sites in unthinned areas if within the LSRs, or implementing other measures to provide suitable microclimate, undisturbed substrate, and vegetation or down wood. This would ensure that viable populations would persist and that the proposed action would not contribute to a need to list these species under the Endangered Species Act. Indirectly, the species may benefit by the proposed action through the establishment of herbaceous understory following commercial thinning and density management, and the creation of additional coarse woody material in those stands located in the LSRs.

Potential **northern goshawk** foraging habitat would be affected by reduction of canopy cover, although no negative effects to the species would be expected because the stands do not provide nesting habitat and would still remain functional foraging habitat. Consequently, it is not anticipated that the proposed action would have any negative impact on the species that could lead to a future need to list under the Endangered Species Act. In the longer term it could be expected that the commercial thinning and density management would lead to the development of suitable nesting habitat and conditions suited to support of abundant prey.

The proposed commercial thinning and density management would not affect any caves, mines, or suitable rock outcrops, which are the primary roosting and hibernating structures used by the **Townsend's big-eared bats, Pacific pallid bats, and Fringed Myotis**. Large remnant trees, which could also be used by these species for roosting, would be reserved from harvest with the few exceptions described in Chapter Two (p. 6). Consequently, it is not anticipated that the proposed action would have any negative impact on these species that could lead to a future need to list under the Endangered Species Act. In the longer term, it is expected that commercial thinning and density management would benefit these species by accelerating the growth and development of large trees suitable for roosting, and by promoting insect populations through development of herbaceous and shrub vegetation.

### 3. Migratory Birds

After commercial thinning and density management, **hermit warblers** could continue to use the proposed units, although tree removal would decrease foraging and nesting opportunities until canopy cover returns to near pretreatment levels as previously described. Foraging and nesting opportunities in the LSRs would increase in the long term as residual tree growth accelerated and canopy volume increased.

**Wilson's warbler** would be affected by the tree removal and elimination or damage to mid-story trees and shrubs. Although the species could continue to use the units after treatment, nesting and foraging opportunities would be reduced for periods of time comparable to those previously discussed in relation to the spotted owl. Density management in the LSRs would ultimately improve habitat conditions for Wilson's warbler by accelerating residual tree, mid-story tree, and shrub growth.

The commercial thinning and density management treatments would both remove and create structural complexity near the forest floor for the **winter wren.** Existing coarse woody debris, shrubs, and understory trees could be damaged or removed, but the proposed commercial thinning and density management would also create coarse woody debris, and in many instances would stimulate shrub and understory tree growth. Because the units are now generally lacking in structural complexity, commercial thinning and density management would benefit the wren in the short term, and in the case of riparian areas and the LSRs would ultimately accelerate the development of high-quality habitat. In the long term the species would further benefit from the development of larger blocks of contiguous habitat in the LSRs.

In all cases, the proposed commercial thinning and density management would also be consistent with Partners in Flight recommendations to leave untreated areas in harvest units which would be provided by unthinned areas in LSR units and riparian buffers in all units that would provide these species with untreated refugia to maintain continuity of use.

For all wildlife, while the proposed commercial thinning and density management would reduce tree densities, it would not affect overall stand ages, the ability of the stands to develop into late seral habitat, or the ability of the LSR network to provide stable and increasing levels of habitat for the long term. There may be temporary reductions in the utility of the project area for some wildlife species by partial removal of canopy cover and horizontal structure, but sufficient residual tree density, snags, and coarse woody debris would remain to provide continued wildlife use. Over the next few decades, forest canopies will stratify and close to near pre-treatment levels and stands will trend toward late-successional conditions. Consequently, the treatments would maintain the present availability of late-seral habitat in the watershed, and contribute to the development of useful mid-seral habitat.

## III. Fisheries and Aquatic Resources

### A. Alternative One - No Action

In the absence of commercial thinning or density management, upland and riparian stands would remain overstocked, and the growth and development of large conifers would be delayed. This would contribute to short and long-term deficits in the amounts of large wood available from the riparian areas for recruitment to stream channels, which would result in reduced availability of pool habitat and storage of spawning gravels over the long term. This trend would continue for several decades until some form of natural disturbance reduced stand densities sufficiently to allow growth and development of larger trees.

There would also be no log haul or associated road-related work including renovation, construction or decommissioning. Road maintenance would be conducted on an as-needed basis, and renovations and improvements implemented as funding became available. Aquatic habitat would continue to be affected by runoff and sediment from roads with inadequate or non-functional drainage, and inadequate rock surface that would over time likely result in embedded spawning substrate and impaired rearing habitat.

Continued use of natural surface roads, particularly during wet weather, would generate sediment that could reach streams during rain events. Sediment concentrated by the existing road drainage system would be routed to streams, rather than dispersed across forested slopes where it would be filtered out before reaching active waterways.

Overall there would be a downward trend in water quality and the condition of spawning substrate. Over a period of decades, feeding and rearing conditions for fish and other aquatic wildlife would also decline. 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 that may include harvest of riparian forest, run-off from fields and pastures, and run-off from natural surface roads and tractor skid trails.

## B. Alternative Two - The Proposed Action

### 1. Aquatic Habitat Conditions

Activities that could affect aquatic habitat conditions may be separated into two categories, (1) harvest operations and (2) activities related to road construction, renovation, road use and decommissioning.

*Spawning substrate/sediment*

Stream substrate would not likely be affected by commercial thinning and density management. As described in Chapter Two (p. 6), "no-harvest" buffers would be established within all Riparian Reserves in the Matrix allocations, and on all riparian areas within the LSRs. Buffer widths would be variable, but would be a minimum of 20 feet on intermittent and non-fish bearing perennial streams and 50 feet on fish bearing streams.

A buffer width of 20 feet or greater would provide root strength sufficient to maintain bank stability (FEMAT 1993), protect stream banks and prevent additional sediment from entering streams and accumulating in stream gravels.

Non-compacted forest soils in the Pacific Northwest have very high infiltration capacities and are not effective in transporting sediment by rain splash or sheet erosion (Dietrich et. al. 1982). Vegetated and non-compacted "no-harvest" buffers would provide sufficient filtering capacity such that any sediment generated by erosion of soils disturbed by commercial thinning and density management operations would be intercepted and precipitated before it reached adjacent stream channels.

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

All road construction and renovation would take place away from streams, with new construction sited outside of Riparian Reserves and riparian areas at locations on or near ridge tops. The construction would not require the construction of any stream crossings that would have the potential to act as barriers to the upstream and downstream migration of fish and other aquatic organisms. These new roads would not be connected to the existing drainage network and, subsequently, would not have a potential to deliver sediment to streams. The remaining roads designated for timber hauling would consist of existing all-weather roads.

Renovation of existing system roads would generally include widening, blading the running surface and brushing the road prism. Additional cross drains may be installed, if deemed necessary, to remove drainage from the ditch and reroute it onto the forest floor, to reduce or eliminate the risk of sediment.

Timber hauling could be authorized year round, or restricted to the dry season only, dependent primarily on road surfacing and stream proximity.

Haul during dry season would not generate nor deliver road-derived sediment to live stream channels. Without a source of precipitation, there would be no mechanism for fine sediment from the road surface to enter adjacent streams.

Hauling during the wet season, which normally occurs after October 15th and before May 1st, can contribute fine sediment to streams, especially at stream crossings (Waters 1995). In consideration of the following factors, and with application of project deign features described below this risk is considered negligible.

While some road segments are located in valley bottoms, the stream crossings have flat approaches with adequate ditch drainage to prevent transmission of sediment to flowing streams.

Steep gradient intermittent stream channels generally have storage capacity sufficient to retain any small amounts of sediment that may be generated locally (Montgomery and Buffington 1997). Most stream reaches along the proposed haul routes possess large woody debris sufficient to trap and store sediment in headwater reaches.

In order to further mitigate the potential for sediment delivery from road surfaces along the haul route, ditch lines would be left vegetated where possible to help filter sediment from road runoff, and water bars or drain dips would be installed where indicated to further route water off of the road surface and onto the forest floor.

Consequently, the risk for sediment and effects to aquatic habitat at the site scale would be negligible and discountable. Absent any site-scale effects of a measurable nature, there would be no cumulative effects at the larger scale of the fifth-field watershed.

*Large woody debris*

The removal of small trees adjacent to stream channels could have a short term effect on instream habitat. Small woody material can create pool habitat in smaller stream systems (Bilby and Ward 1989); however, smaller diameter wood does not persist for the long term because of more rapid decay rates (Naiman et al. 2002) and a higher susceptibility to being flushed through the stream system than large pieces (Keim et al. 2000). The limited removal of some of the co-dominant and dominant trees would not result in any short-term availability of large woody debris.

Though most woody debris comes from within a site potential tree height from the channel (Naiman et al. 2002), large woody debris can also come from distances greater than 90 meters from the channel in steep confined channels (Reeves et al. 2003). Streams adjacent to units are only moderately confined and would continue to recruit large woody debris from the riparian corridor. In the long term, as a result of density management, the accelerated growth of larger trees close to stream channels would increase the availability of large wood for recruitment into streams.

Road construction and renovation would not affect the availability of large woody debris to streams. New construction would be conducted well away from Riparian Reserves and riparian areas that serve as source areas for large wood recruitment. Renovation to existing roads would require no more than brushing and the possible removal of some small diameter saplings.

*Pool quality*

Large woody debris is an important component in forming pool habitat on fish-bearing streams (Keim et al. 2002). The availability of pool habitat would remain unchanged by the proposed commercial thinning and density management activities in the short term as no existing large wood would be removed from streams. Thinning in upland stands outside of large wood source areas would not affect future wood recruitment and, hence, would not affect pool quality or frequency.

Density management in Riparian Reserves and riparian areas would primarily remove smaller trees from the suppressed and intermediate canopy layers, while largely reserving co-dominant and dominant trees. 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 will promote the growth of larger conifers which, over time, will enter to the stream and enhance and create additional pool habitat.

There would be no change in pool availability resulting from road related activities, including renovation, construction, and decommissioning as none of these activities would occur in Riparian Reserves or riparian areas.

*Shade/Temperature*

Thinning adjacent to intermittent and perennial fish-bearing streams would have a negligible affect on shade and stream temperature (Water Resources, p. 70). Intermittent streams only carry water during winter months when cloud cover and shorter days limit the amount of solar heating. On perennial fish-bearing streams, “no-harvest” buffer widths in excess of 50 feet would retain overhead canopy and stream side vegetation providing shading sufficient to limit solar heating and prevent increases in stream temperatures (Water Resources, p. 70).

*Habitat access*

Access to spawning and rearing habitat would be unaffected under the proposed action. Proposed road construction would be located on or near ridge tops and well away from any streams, and would not involve the construction of any new stream crossings or the replacement of any existing crossings that may presently act as barriers to fish passage.

## 2. Special Status Species

Direct effects to fish species from harvest and haul of timber could result from the additional fine sediment and a temporary increase in water turbidity that can hinder survival of eggs and alevin still buried in gravel. Turbidity can reduce foraging ability, clog gill membranes and impair breathing, and increase overall stress (Waters 1995).

There would be no direct effects to fish species adjacent to or below the project area, in association with commercial thinning and density management because, as noted above, there would be no risk of additional fine sediment reaching stream channels because uncompacted soils in the "no-harvest" buffers between the units and adjacent stream channels would be sufficient to filter out any sediment from runoff.

Indirect effects from road activities could include a reduction in spawning success and egg and alevin survival in gravels associated with accumulated fine sediment. The application of project design criteria to construction, renovation and use of access roads would further minimize sediment delivery. Any effects would be too small to measure at the project level scale, and having no cumulative effect at the fifth-field watershed scale.

## 3. Essential Fish Habitat

*Description of the action*

The proposed action, as described in Chapter 2 (pp. 5-14), involves the commercial thinning and density management of approximately 855 acres in the Middle Fork Coquille fifth-field watershed. As previously discussed, "no-harvest" buffers would be established on all streams, both intermittent and perennial. Harvest operations and timber hauling would be restricted to dry-season operations in some instances, and allowed as all-weather operations in others. Access would be provided by existing roads supplemented by short permanent, semi-permanent and temporary spur roads located at or near ridge tops, and disconnected from the drainage network.

*Analysis of the potential adverse effects of the action on Essential Fish Habitat and the managed species*

The following components were analyzed to assess the effects of the proposed action on Essential Fish Habitat and the appropriate sections of this document are cited.

- *Water quality/Water quantity* – There would be no affect to water quality and/or quantity as a result of proposed commercial thinning and density management (Water Resources, pp. 70-71).

- *Substrate characteristics* – Timber haul would have a small probability of contributing fine sediment to stream channels, particularly at stream crossings. Road renovation and seasonal restrictions on parts of the haul routes would reduce both the magnitude of mobilized sediment and the probability of sediment entering streams. Any resulting effect would be negligible and discountable (Fisheries and Aquatic Resources, pp. 62-63).

- *Large woody debris (LWD) within the channel and LWD source areas* – As previously noted there would be no effect to large woody debris or its source areas. Thinning and density management in close proximity to streams would not affect short-term recruitment of large woody debris and would accelerate the development of large trees for future recruitment (Fisheries and Aquatic Resources, pp. 63- 64).

- *Channel geometry* – Stream channels are stable and have riparian vegetation sufficient to prevent erosion caused by high stream flow (Fisheries and Aquatic Resources, pp. 62-63). There would be no measurable increase in stream flow that would affect channel geometry (Water Resources, pp. 68-69).

- *Fish passage* – There would be no effect on fish passage. New road construction would not involve the installation of any additional stream crossings, and no culverts that presently block fish passage would be replaced in conjunction with the proposed action. (Fisheries and Aquatic Resources, p. 64).

- *Forage species (aquatic and terrestrial invertebrates)* – Prey species for fish would be unaffected as riparian vegetation would continue to provide organic material and terrestrial invertebrates on which aquatic invertebrates feed. Aquatic invertebrate populations would be unaffected by discountable and negligible sediment increases.

As described above, it would be unlikely for harvest to affect aquatic habitat conditions, and consequently, Essential Fish Habitat located downstream from the areas in which commercial thinning and density management are proposed. "No-harvest" riparian buffers would prevent the transmission of sediment to streams adjacent to units. Short term reductions in the availability of large woody debris would be negligible. Density management adjacent to streams would promote accelerated tree growth providing additional large wood for long-term recruitment into streams. Absent any affect to large woody debris and sediment, there would be no affect to pool habitat and substrate.

Effects of road related activities on sediment delivery would be limited to the immediate vicinity of stream crossings along the haul routes, most of them on intermittent streams that are not Essential Fish Habitat. Substrate and pool habitat components would be unaffected. Where haul does occur near Essential Fish Habitat, the application of project design criteria and Best Management Practices described above would prevent adverse effects from road related activities. Any increase in sediment and therefore affect to spawning substrate would be negligible and discountable.

*Federal agency conclusions regarding the effects of the action on EFH*

It is the conclusion that the proposed action alternative *Will Not Adversely Effect* (WNAE) Essential Fish Habitat for coho or Chinook salmon located in the western portions of the Middle Fork Coquille fifth-field watershed more than two miles downstream from the nearest proposed unit.

*Proposed mitigation (if applicable)*

There is no mitigation proposed.

## IV. Water Resources

### A. Alternative One - No Action

#### 1. Stream Flow

There would be no effect to annual yield or low flows because absent density management there would be no reduction in the current amount of vegetative cover sufficient to measurably reduce present rates of water uptake and evapotranspiration by the vegetation within the subwatersheds.

Harvest undertaken on private lands in the same drainages, in the near future, could result in short-term increases in annual yields or low flows could occur, but limits on the size of harvest units specified by the Oregon Forest Practices Act in conjunction with the spatial scattering of harvest on private lands would largely mitigate these potential effects.

##### a. Peak Flows and Transient Snow Zone

Absent any commercial thinning and density management there would be no change in the level of canopy closure on BLM managed lands within the Transient Snow Zone which would modify snow capture or snow melt rates that could enhance peak flows. Consequently, no measurable changes in the timing and magnitude of peak flows would be anticipated in the project drainages or at the fifth-field watershed scale.

##### b. Roads and Peak Flows

There would be no new road construction, and hence no change in the amount of roads managed and maintained by the BLM, and hence no potential 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.

#### 2. Water Quality

##### a. Stream Temperature

There would be no change in streamside shade on stream located on BLM-managed forest lands and therefore no increase in the potential for solar heating of stream channels and increases in stream temperatures.

##### b. Sediment

There would be no change in the system of roads comprising the transportation system managed and maintained by the BLM. Consequently, there would be no additional contributions of sediment from roads anticipated.

### 3. Water Rights

This alternative would have no effect on water quantity, timing or quality, and no effect to downstream water users.

## B. Alternative Two – The Proposed Action

### 1. Stream Flow

In an overview of several studies, Satterlund and Adams (1992, p.253) found that water yield responses were less substantial when partial cutting systems removed a small portion of the cover at any one time. After examining 94 watershed experiments conducted worldwide, Bosch and Hewlett (1982) concluded that water yield increases are usually only detectable when at least 20 percent of the forest cover in a watershed has been removed. Where individual trees or small groups of trees are harvested, the remaining trees generally use any increased soil moisture that becomes available following timber harvest.

Consequently, no measurable effect to stream flow would be anticipated as a result of commercial thinning and density management, because the partial removal of vegetation would affect three percent or less of the forested area in the two project subwatersheds.

A portion of the route for the proposed Williams natural gas pipeline crosses through the watershed. Approximately 92 acres of BLM and private forest lands in various seral stages would be cleared in the construction right-of-way and temporary work areas. These acres would be spatially distributed in a narrow band across the Headwaters Middle Fork Coquille subwatershed in areas below and within the Transient Snow Zone. The area to be cleared represents less than 0.4 percent of the forested lands in the subwatershed. Because of the low percentage of land affected and the spatial arrangement of the forest lands to be cleared, there would be no effect to annual yield or low flows because the reduction in existing vegetative cover would not be sufficient to modify the present rates of water uptake and evapotranspiration by the vegetation within the subwatershed.

#### a. Peak Flows and Transient Snow Zone

Peak flow increases can occur in forested basins due to the creation of openings in the Transient Snow Zone where snow may accumulate. Warm rain-on-snow events and higher surface wind speeds can melt this increased snowpack quickly and create higher than normal flows. These effects primarily occur in areas with less than 30 percent crown closure (Watershed Professionals Network 1999, IV-11). Commercial thinning and density management within the Transient Snow Zone is proposed on approximately 112 acres within the Headwaters Middle Fork Coquille subwatershed and 110 acres within the Twelve Mile Creek subwatershed. Post-treatment, average crown closure would exceed 30 percent and would, therefore, not be considered likely to have the potential to alter rates of snow capture or snow melt, or have the potential to increase peak flow risk.

Approximately three acres of small openings, 1/4 to 1/2 acre in size, would be created within the Transient Snow Zone in the Twelve Mile Creek subwatershed. These openings have the potential to cause localized changes in rates of snow capture and snow melt. Openings created within the Headwaters Middle Fork Coquille subwatershed are located in the rain dominated portion of the subwatershed. The canopy openings would account for less than one tenth of one percent of the area of the Twelve Mile Creek Subwatershed. The increase in Transient Snow Zone openings that will result from the proposed harvest would not increase the current low risk of increased peak flows due to rain on snow events.

No detectable increase in peak flows would be expected in the drainages in which commercial thinning and density management is proposed. If harvest on private land occurs in the same drainages in the near future, peak flows may be slightly increased as a result of combined reduced stand densities on private and BLM administered lands. This could result in short and long-term increases in peak flows for small storms with less than a two year return interval. However, the limited size and spatial scattering of treatment areas on BLM lands, road drainage repairs, and Oregon Forest Practices Act regulations on size of harvest units on private land would help mitigate these potential effects. Given that only 20 percent of the Headwaters Middle Fork Coquille subwatershed and 44 percent of the Twelve Mile Creek subwatershed is in the Transient Snow Zone and that the present area with less that 30 percent canopy closure is low, there would be a low potential for a detectable peak flow increases during rain-on-snow events.

Within the Transient Snow Zone, forest land that would be cleared for the proposed pipeline construction would create approximately seven acres of openings in the forest canopy of the Headwaters Middle Fork Coquille subwatershed. This would increase the percentage of the Transient Snow Zone in the subwatershed with less than 30 percent canopy closure from approximately 5.4 percent to 5.6 percent. As described in Chapter Three (Water Resources, p. 33), the present risk of increased peak flows due to past harvest on both private and BLM-administered land was judged to be low. Proposed pipeline construction in the Transient Snow Zone would not increase the risk.

**b. Roads and Peak Flows**

Proposed road construction and reconstruction would consist of less than three miles in the Headwaters Middle Fork Coquille subwatershed and less than half a mile in the Twelve Mile Creek subwatershed. All new road construction would be sited on or near stable ridge tops and away from streams. These roads would be out-sloped to the greatest degree practical in lieu of the construction of ditch lines and installation of cross drains. 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 rather than concentrated in the drainage network. Consequently, the roads would be disconnected from the drainage network and would have no potential for affecting peak stream flows.

Peak flows have been shown to increase substantially when roads occupy more than twelve percent of the watershed (Watershed Professionals Network 1999, IV-15). If this alternative were implemented roads would still occupy less than three percent of the Headwaters Middle Fork Coquille subwatershed and less than four percent of the Twelve Mile Creek subwatershed.

Given the low road density in the two subwatersheds, 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.

**2. Water Quality**

**a. Stream Temperature**

Density management adjacent to riparian areas would have the potential to increase stream temperature by temporarily creating openings in the canopy and reducing streamside shade. Shade from trees near the stream channel is important for reducing direct solar radiation and preventing increases in stream temperatures.

Variable width "no-harvest buffers" with a minimum width of 20 feet from non-fish bearing streams and 50 feet from fish bearing streams would be established. These buffers would conserve the vegetation that provides primary shade for stream channels. 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.

**b. Sediment**

Density management in riparian areas could cause localized soil disturbance and a short-term potential for erosion associated with yarding. "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 and allow sediment transported by overland flow to precipitate out before reaching active waterways.

Forest roads can be a major contributor of sediment to streams (Reid 1981, Reid and Dunne 1984). As described in Chapter Two (p. 9), new road construction would be outside of riparian areas on ridge tops or stable locations. These new roads would not cross stream channels or be connected to the drainage network. Out-sloping the roads in lieu of constructing ditches and installing cross drains would further reduce any potential for routing run-off to locations where sediment-laden water could be diverted into streams. Since road segments must be connected directly to stream channels in order to deliver sediment-laden water, these roads would have no effect.

Decommissioning of temporary roads would be designed to restore the natural hydrologic flow (USDI, BLM 2001). Roads proposed for decommissioning do not cross stream channels nor are they connected to the drainage network. Consequently, the proposed road decommissioning would have no effect on stream sediment.

### 3. Water Rights

As described above with respect to stream flows, there would be a negligible risk of increased peak flows, or of affecting low flows or annual water yield in association with the proposed commercial thinning and density management. Consequently, there would be no anticipated impacts to water quantity, timing or quality anticipated and water rights within one mile downstream of any of the proposed units would not be affected.

## V. Soils

### A. Alternative One – No Action

Absent any commercial thinning or density management in the stands proposed for treatment, there would be no direct effects on soils associated with displacement or compaction arising from road and landing construction, cable yarding, or ground-based yarding.

Compacted soils within existing skid trails would continue to recover slowly, as the effects of compaction can last for decades, especially at lower depths (Amaranthus et al. 1996). Powers et al. (2005) found that some recovery occurred in severely compacted soils after ten years, but the recovery was slight. Over time processes such as freezing and thawing, the penetration of plant roots and burrowing of small animals will gradually break up plated soils and incorporate organic material into the upper horizons.

Duff and soil organic matter will slowly increase with the accumulation of needles, twigs and small branches, and decomposing larger woody material, absent a fire of sufficient intensity to consume the material.

### B. Alternative Two – The Proposed Action

Some level of soil displacement and compaction would be expected to result from the landing construction and yarding operations. Reductions in soil productivity can be minimized by controlling the extent of the area disturbed, however, and by reducing the degree of impacts. Loss of surface soils in disturbed areas can be largely controlled by applying erosion control measures.

Cable yarding could produce localized areas of soil disturbance along the yarding corridors. To minimize soil disturbance, cable yarding equipment would have the capacity to maintain a minimum of one-end log suspension, to reduce the amount of resulting soil displacement and compaction.

Cable yarding equipment would have a minimum lateral yarding capability of 100 feet, while maintaining the carriage in a fixed position on the skyline, to minimize the amount of soil disturbance during yarding. Yarding corridors would be spaced at 200-foot intervals whenever practicable to reduce the number of required yarding corridors and landings, thereby reducing the percentage of the unit area subject to soil disturbance and compaction. Yarding corridors would be immediately water-barred after use, where necessary to reduce the potential for surface water channeling and soil erosion.

The amount of soil disturbance from cable yarding varies with topography (convex vs. concave slope), slope steepness, and the yarding angle (i.e. perpendicular, skew, or side slope). Past monitoring of cable yarding on the Diet Coq, Tater Tot and Taylor Made commercial thinning projects in the South River Resource Area indicated there was less than two percent soil disturbance in the cable yarded areas, including the landings.

Generally, cable yarding produced either no disturbance in the yarding corridor; partial duff displacement; or displacement of the top one to three inches of soil, with the width of effect varying from one to six feet. Soil displacement primarily occurred within 200 feet of landings, with the deepest displacement in the center of the corridor. Low to moderate compaction at shallow depths of three to four inches was concentrated in the center of the corridors. This small amount of soil displacement and compaction is not considered sufficient to affect soil productivity.

For ground-based harvest operations, landings, main skid trails, and large pile areas are to affect, collectively, no more than 10 percent of the ground based harvest acres in any individual unit (USDI, BLM 2001b pg. 70). The extent of effect varies with the type of equipment employed, the terrain, access routes, and climatic conditions. Past monitoring of the Smoke Screen, Diet Coq, Tater Tot and Taylor Made commercial thinning projects on the South River Resource Area has shown that the use of tractors, rubber tired skidders, and shovel loaders affected from three to eight percent of ground based harvest areas, including old trails that were re-used. The average was less than 6 percent.

Harvester/forwarder operations have resulted in similar results, except that the extent and depth of compaction was generally less than with other equipment. Monitoring on Taylor Made Commercial Thinning showed that forwarder trails covered from 2 to 8 percent of the ground-based harvest area, with compaction primarily limited to the tread portion of the forwarder trails. Compaction in the top three to six inches of soil was highly variable and ranged from light to heavy. When operated on slash and under dry soil conditions, harvester operations resulted in little or no soil compaction.

To minimize the soil compaction and displacement in ground-based yarding, and the resulting potential for surface soil erosion, Best Management Practices, as well as other measures would be implemented, including:

- Limiting yarding operations to the dry season, when soils have dried out and are less susceptible to compaction, generally from mid-May to the onset of regular fall rains, typically around mid-October. In the case of proposed Units 29-9-35B, 30-8-5B and 30-8-33A, that exhibit somewhat poorly drained soils in the flat to concave depressions and swales, ground based yarding would be delayed until later in the season to avoid excessive compaction;

- Limiting yarding operations to slopes less than 35 percent, excepting small inclusions of steeper slopes, to reduce soil displacement;

- Pre-designating skid trails for tractors, skidders and shovel loaders, and using existing skid trails to the greatest degree practicable, for all ground-based harvest equipment;

- Spacing skid trails as far apart as practical, given the type of equipment used, and limiting the number of passes over a trail to the fewest necessary for efficient removal of timber; and

- Water-barring skid trails as needed, to minimize erosion.

Selective tilling of landings, haul roads, and skid trails would be done, based upon recommendations of silviculture and soils staff. Slash would be placed over tilled trails, or the trails would be treated in some other manner, if necessary, to minimize the risk of erosion. Main skid trails and forwarder trails not treated would be mapped and documented for treatment at a future time, such as in a second commercial thinning or at final harvest.

Although tillage does not bring about complete percent recovery from soil compaction, it is an important step in the recovery process (Luce 1997). Past monitoring of ground-based thinning operations on the Smoke Screen, Diet Coq, Tater Tot and Taylor Made commercial thinning projects in the South River Resource Area indicated that a single tilling pass results in 40 to 80 percent fracturing of compacted soil. Several passes that are offset from each other can bring about greater than 80 percent soil fracturing. Tillage also helps prevent erosion by increasing water infiltration into the soil.

Given these management practices, the proposed commercial thinning and density management would not result in excessive soil disturbance or erosion, as the area affected would be small, and the extent of soil disturbance and compaction would be low.

With implementation of the project design features and Best Management Practices, described above, the direct effects to soils would be minimal and localized. No cumulative effects would be anticipated as effects would remain confined to the proposed units and the immediate areas where road construction and renovation would be undertaken. The overall effects to soils would be consistent with those identified and considered in the Proposed Resource Management Plan/Environmental Impact Statement (Chapter 4, pp. 12-17).

## VI. Botany

### A. Alternative One – No Action

#### 1. Vascular Plants, Lichens and Bryophytes

In the absence of commercial thinning and density management there would be no direct effect to any populations of Kincaid's lupine that may occupy the project area. Over time, however, the species would be indirectly affected because without timber harvest or other vegetation management to create and maintain gap and edge habitat, the availability of light would decline to a level insufficient to trigger flowering and reproduction.

As with Kincaid's lupine, no direct effect would be expected to any populations of *Bensoniella oregona*, *Cimicifuga elata* and *Eucephalis vialis* that may be present in the project area. These species, too, are dependent on gap and edge habitat, so that absent timber management or other vegetation management, available light would decline to levels insufficient to trigger flowering and reproduction.

### 2. Fungi

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.

## B. Alternative Two – The Proposed Action

### 1. Vascular Plants, Lichens and Bryophytes

There would be no direct effect to any Kincaid's lupine populations that might be found during surveys in the project area because these populations would be managed in a manner that would maintain site integrity, while opening up the forest canopy. This would increase available sunlight resulting in greater growth and plant vigor.

There would be no direct effect to any populations of *Bensoniella oregona, Cimicifuga elata Eucephalis vialis* and *Iliamna latibracteata* that found during surveys of the project area, as these sites would also be managed to maintain site integrity. As these species are also dependent on edge and gap habitat, reductions in forest canopy and increases in available sunlight would have results akin to those for Kincaid's lupine.

### 2. Fungi

The proposed timber harvest would not affect any known sites for Bureau Sensitive fungi species described on page 61, as the known sites are at least a mile distant or located in other fifth-field watersheds.

Surveys for these species are not considered practical for reasons discussed on page 37, so their presence is unknown. If fungi are present in the proposed commercial thinning and density management units, loss of the sites could result as a consequence of the removal of substrate and modification of microclimate, as described in the *Final Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines* (pp. 150-154).

# VII. Fuels/Fire Management

## A. Alternative One – No Action

Under this alternative, there would be no short-term increase in fuel loading, associated with logging residues generated by commercial thinning and density management operations. Over the longer term, however, fuel loads would steadily increase, primarily as a consequence of increased mortality of suppressed trees in the stands.

The effects of suppression mortality were modeled in Organon Stand Growth and Yield Model, Version 8.2, Southwest Oregon for a stand (Unit 30-9-3B) representative of the units with the heavier fuel loads of 20 tons per acre. Modeling indicates that, without density management, approximately 19 trees per acre greater than six inches diameter breast height would die over the next ten years, and an additional 16 trees per acre greater than eight inches diameter breast height would die in the following decade.

The volume of accumulated bole wood that resulted would be approximately735 cubic feet. Air-dry Douglas-fir has a specific gravity of 0.48 (USDA 1974, p. 4-46) which is a density of approximately 30 pounds per cubic foot. This translates to an increase of slightly more than 11 tons per acre, for a total fuel load 31 tons. The figure would be higher, however, because the model does not capture mortality in smaller diameter trees, nor account for the volume of the needles, limbs and portions of the tree bole that do not meet the minimum analytic diameter. Consequently, actual fuel loads upwards of 40 tons per acre might be realized.

**B. Alternative Two – The Proposed Action**

Post-thinning fuel loading for proposed units located in the Wildland Urban Interface was estimated using the *Photo Series for Quantifying Forest Residues in the Coastal Douglas-Fir – Hemlock Type* (Maxwell and Ward, 1976). The actual tonnage produced would vary depending on market conditions and harvest practices. For example, if the market for wood chips is good, an operator may yard out tree tops to ship to a facility rather then leave them in the woods. In ground-based operations, if trees are harvested with a feller-buncher system and yarded whole length to a landing for processing, limbs and tops would be piled at landings rather then left in the unit. By contrast, harvester-forwarder systems process and cut trees to length in the unit such that tree limbs and tops are left behind.

Proposed Units 29-9-1A, 29-9-1C and 29-9-1D would have an estimated 15 ton per acre post-thinning fuel load comparable to descriptive photo 2-DF-3-PC. Approximately 30 percent of the activity fuels (logging residue) left behind would be fine fuels less than three inches in diameter.

Post-thinning fuel load for Units 29-8-29A, 29-8-29B, 29-8-33A, 29-9-11B, 29-9-1E, 29-9-35A, 30-9-3A and 29-8-5B was estimated at 20 tons per acre comparable to conditions represented by descriptive photo 2-DF-4-PC. Again, fine activity fuels would make up close to 30 percent of the total fuel load.

Post-thinning fuel load for Units 29-8-15A, 29-8-31A, 29-8-5A, Unit 29-9-11A and 29-9-35B was estimated at 28 tons per acre as represented by descriptive photo 4-DF-4-PC. Approximately one-third of the total fuel loading would be composed of fine fuels.

Short-term increases in fuel load would occur following commercial thinning and density management, there would not be a long-term increase in the direct wildfire risk to the surrounding homes and communities in the Wildland Urban Interface, nor an increased risk to forest stands in the LSRs, for the following reasons:

- All unit landings would be burned following utilization by firewood cutters, removing the largest concentrated accumulations of fuel;

- As described in Chapter Two (p. 14), the remaining units in the Wildland Urban Interface and LSRs, post-thinning fuel loading and arrangement would also be evaluated in order to determine whether a need exists for additional treatment in the form of limited hand-piling and burning, or pull back of fuels adjacent to roads and property lines;

- As noted above, a large percentage of the fuel load following thinning and density management would be comprised of fine fuels less than three inches in diameter. Fine fuels are at the greatest risk for ignition and primarily responsible for the rate of fire spread. These fuels deteriorate quickly, however, and after an approximate period of one to three years would no longer pose an elevated risk; and

- The increased growth and vigor of the remaining trees and the spatial arrangement would make them more resilient and less susceptible to fire mortality.

Using the same representative unit modeled above, the effect of the commercial thinning and density management on fuel loads can also be reasonably assessed. Modeling indicates that an average of only three trees per acre would die of suppression mortality over the next 20 years, contributing an additional 82 cubic feet of dead wood, a little more than one ton per acre. Allowing for the shortcomings of the model discussed above, one finds that fuel load 20 years after commercial thinning and density management would, at worst, only approach the projected tonnages of untreated units. Given the disposal of landings, deterioration of fine fuels, and the assumed under-projection by the model of additional fuel accumulation, the fuel loading in the thinned stands could be one-third to one-half less than if not thinned.

To treat fuels generated by commercial thinning and density management, landings and piles would be burned in the autumn or winter months. Short term impacts to air quality within one-quarter to one mile of units would persist for 1-to-3 days. Potential effects would be negligible because ignition would be accomplished during unstable fall and winter weather conditions when winds and atmospheric instability favor rapid smoke dispersion, and precipitation washes particulates from the air.

Proposed Unit 29-9-11B would be considered for broadcast burning following density management. The prescribed burn could be applied to all or a portion of the unit to reduce fuels and enhance late-successional forest characteristics in this LSR unit. Ignition would be conducting slowly to create a low intensity surface fire, to avoid creating excessive convective heat that would cause heavy crown scorch. Pre-treatment of fuels by pulling large fuels away from the base of trees and jackpot-piling of heavy fuel concentrations might also be done to create discontinuity in the fuel bed. General objectives of the burn would be to:

- Reduce wildfire risk by removing the majority of the naturally-occurring and thinning-generated fine fuels less than three inches in diameter;

- Create some openings to enhance wildlife habitat;

- Create some snags from the remaining trees without harming the stand as a whole; and

- Re-introduce fire as a management tool in appropriate habitat associations such as those that include manzanita.

The proposed prescribed burn would be conducted under approved clearances and in accordance with the objectives and directives of the Oregon Smoke Management Plan. Air quality objectives would be included in unit-specific prescribed fire plans. Potential adverse impacts to air quality would be minimized through the implementation of various smoke management strategies that include:

- Burning when the wind is blowing away from sensitive areas such as Roseburg to avoid smoke intrusions;
- Burning slowly to allow atmospheric dilution and dispersal of particulates;
- spatially separating units to be burned; and/or
- Burning under atmospheric conditions that favor good vertical mixing of air masses so that smoke is lifted to an elevation where it may be borne away by favorable transport winds.

Oregon State Smoke Management restrictions also limit burning during periods of stable atmospheric conditions when residual smoke from previously burned unit(s) may be trapped below a surface inversion. Under these conditions, a strategy of aggressive mop-up would be implemented to extinguish smoldering fires that would contribute smoke.

As a consequence, the effects of broadcast burning on air quality would be consistent with the assumptions described and analyzed in the PRMP/EIS (Chapter 4-8 through 12).

## III. Monitoring

Monitoring will be conducted in accordance with provisions contained in the ROD/RMP, Appendix I (pp. 84-86, 190-192, and 195-199). Monitoring efforts will focus on consideration of the following resources: Riparian Reserves; Late-Successional Reserves; Matrix; Water and Soils; Wildlife Habitat; Fish Habitat; and Special Status Species Habitat.

# Chapter 5
# LIST OF, AGENCIES AND INDIVIDUALS CONTACTED, PREPARERS AND LITERATURE CITED

This project was originally identified in the Roseburg BLM Fall 2005 Quarterly Planning Update. A Notice of Availability of the EA for public review and comment, and any subsequent decisions will be published in *The News-Review*, Roseburg, Oregon.

**I. Agencies & Persons Contacted:**

Adjacent Landowners & Down-stream Water Users
Cow Creek Band of Umpqua Tribe of Indians

**II. The following agencies, organizations, and individuals will be notified of the completion of the EA:**

American Forest resources Council
Cascadia Wildlands Project
Douglas Timber Operators, Robert Ragon - Executive Director
Klamath Siskiyou Wildlands Center
National Marine Fisheries Service
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Wild
Pacific Northwest 4-Wheel Drive Association
U.S. Fish and Wildlife Service
Umpqua Valley Audubon Society
Umpqua Watersheds, Inc.
Ronald S. Yockim, Attorney-at-Law

**III. List of Preparers:**

| | | |
|---|---|---|
| Paul Ausbeck | Environmental Coordinator | Writer/Editor |
| Isaac Barner | Archaeologist | Cultural/Historical resources |
| Gary Basham | Botanist | Special Status Plants and Noxious Weeds |
| Ward Fong | Soil Scientist | Soils |
| Susan Johnson | Forester | Silviculture |
| Krisann Kosel | Fire Ecologist | Fire and Fuels Management |
| Christopher Langdon | Biologist | Wildlife |
| Cory Sipher | Biologist | Fisheries and Aquatic Habitat |
| Jill Ralston | Hydrologist | Water Quality/Resources |
| Kevin Carson | Supervisory Specialist | Management Representative |

# LITERATURE CITED


Aiken, S.G., M.J. Dallwitz, C.L. McJannet and L.L. Consaul. 1996 onwards. *Festuca* of North America: descriptions, illustrations, identification, and information retrieval. Version: 19th October 2005

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

Amaranthus, Michael P., Debbie Page-Dumroese, Al Harvey, Efren Cazares, and Larry F. Bednar. May 1996. Soil compaction and organic matter affect conifer seedling nonmycorrhizal and ectomycorrhizal root tip abundance and diversity. Research paper PNW-RP-494. U.S. Dept. of Agriculture, Forest Service, Pacific Northwest Research Station.

Bailey, J.D. and J.C. Tappeiner. 1998. Effects of thinning on structural development in 40- to 100-year old Douglas-fir stands in western Oregon. Forest Ecology and Management Vol. 108 pp. 99-113.

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.

Bosch, J.M.; Hewlett, J.D. 1982. A Review of Catchment Experiments to Determine the Effects of Vegetation Changes on Water Yield and Evapotraspiration. J. of Hydrology 55: 3-23.

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

Castellano, M.A., et al. 1999. Handbook to Strategy 1 Fungal Species in the Northwest Forest Plan. General Technical Report PNW-GTR-476. U.S. Department of Agriculture, U.S. Forest Service.

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.

Chan, Samuel S. et al 2006. Overstory and understory development in thinned and underplanted Oregon Coast Range Douglas-fir stands. Canadian Journal of forestry Vol. 36, pp. 2696-2711.

Christy, J.A. and D.L. Wagner. 1996. Guide for the Identification of Rare, Threatened or Sensitive Bryophytes in the Range of the Northern Spotted Owl, Western Washington, Western Oregon, and Northwestern California. Bureau of Land Management, Oregon-Washington State Office, Portland, OR.

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

Daw, S. K., S. DeStefano, and R. J. Steidl. 1998. Does survey method bias the description of Northern goshawk nest-site structure? Journal of Wildlife Management 62: 1379-1384.

Daw, S. K. and S. Destefano. 2001. Forest characteristics of Northern Goshawk nest stands and post-fledging areas in Oregon. Journal of Wildlife Management 65: 59-65.

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.

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. pp. 518-532.

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. 70pp.

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. 1992. Determination of critical habitat for the Northern Spotted Owl. (57):1796-1838. U.S. Fish and Wildlife Service. Portland, OR.

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

Federal Register. 1998a. Endangered and Threatened Species; Threatened Status for Two ESUs of Steelhead in Washington, Oregon, and California. 63(53):13347-13371.

Federal Register. 1998b. Endangered and Threatened Species; Endangered Status for Oregon Coast Evolutionarily Significant Unit of Coho Salmon. 63(153):42587-42591.

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

Federal Register. 2004. Endangered and Threatened Species: Proposed Listing Determinations for 27 ESUs of West Coast Salmonids. 69(113):33102-33179.

Federal Register. 2005. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. 69(73):19975-19979.

Federal Register. 2006. Endangered and Threatened Species: Withdrawal of Proposals to List and Designate Critical Habitat for the Oregon Coast Evolutionarily Significant Unit (ESU) of Coho Salmon. 71(12):3033-3047.

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

Forsman, E. D., E. C. Meslow, and H. M. Wight. 1984. Distribution and Biology of the Spotted Owl in Oregon. Wildlife Monographs 87. 64 pp.

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 pp.

Furniss, M. J., T. D. Roelofs, and C. S. Yee. 1991. Road construction and maintenance. American Fisheries Society Special Publication 19:297-323.

Hansen, E.M. and P.B. Hamm. 1996. Survival of Phytophthora lateralis in infected roots of Port-Orford-cedar. Plant Disease 80:1075-1078.

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. Pp. 455-469.

Hershey, K. T., E. C. Meslow, and F. L. Ramsey. 1997. Characteristics of forests at spotted owl nest sites in the Pacific Northwest. Journal of Wildlife Management 62:1398-1410.

Hibler, C. and T.E. O'Dell. 1998. Management Recommendations Group 29. Management Recommendations for Survey and Manage.

Hickman, J.C. 1993. The Jepson manual: Higher plants of California. Berkeley: University of California Press.

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

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.

Jepson Herbaria Website (http://ucjeps.berkeley.edu/). University of California. Berkeley, CA.

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, 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.

Jules, E.S., M.J. Kauffmann, W.D. Ritts [and others]. 2002. Spread of an Invasive Pathogen Over a Variable landscape: a Nonnative Root Rot on Port-Orford-Cedar. Ecology (83) 11: 3167-3181.

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.

Lank, D. B., N. Parker, E. A. Krebs, and L. McFarlane Tranquilla. 2003. Geographic distribution, habitat selection, and population dynamics with respect to nesting habitat characteristics, of marbled murrelets. Centre for Wildlife Ecology, Simon Fraser University, Burnaby, Canada. 66 pages.

Lantz, R. L., 1971. Influence of water temperature on fish survival, growth, and behavior, pp 182-193 in Krygier, J.T., and J.D. Hall (EDS.), Forest land uses on stream environment, OSU Extension: Corvallis, Oregon.

Lesher, R.D., C.C. Derr and L.H. Geiser. 2000. Natural History and Management Considerations for Northwest Forest Plan Survey and Manage Lichens.

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

Lint, J. B., B. Noon, R. Anthony, E. Forsman, M. Raphael, M. Collopy, and E. Starkey. 1999. Northern Spotted Owl Effectiveness Monitoring Plan for the Northwest Forest Plan. General Technical Report PNW-GTR-440. USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon, USA. 43pp.

Luce, Charles H. September 1996. Effectiveness of Road Ripping in Restoring Infiltration Capacity of Forest Roads. Intermountain Research Station, U.S. Department of Agriculture, U.S. Forest Service. Moscow, ID. 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.

Maxwell, Wayne G., and Franklin R Ward. 1976. Quantifying Natural Residues in the Coastal Douglas-Fir – Hemlock Type. General Technical Report PNW-51. 103 pp. Pacific Northwest Research Station, U.S. Department of Agriculture, U.S. Forest Service.

Maxwell, Wayne G., and Franklin R Ward. 1980. Quantifying Natural Residues in Common Vegetation Types of the Pacific Northwest. General Technical Report PNW-105. 230 pp. Pacific Northwest Research Station, U.S. Department of Agriculture, U.S. Forest Service.

May, C. L., and R. E. Gresswell. 2003. Large wood recruitment and redistribution in headwater streams in the southern Oregon Coast Range, U.S.A. Canadian Journal of Forestry Resources 33:1352-1362.

McCune B. and L.Geiser. 1997. Macrolichens of the Pacific Northwest. Oregon State University Press. Corvallis, OR.

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.

Oregon Department of Environmental Quality, 2003b. Oregon's final 2002 303(d) list, Portland Oregon [http://www.deq.state.or.us/wq/303dlist/303dpage.htm].

Oregon Watershed Enhancement Board (OWEB). 1997. Oregon Watershed Assessment Manual. Salem, Oregon.

Pacific Seabird Group. 2003. Methods for Surveying Marbled Murrelets in Forests: A Revised Protocol for Land Management and Research. D. E. Mack, W. P. Ritchie, S. K. Nelson, E. Kuo-Harrison, P. Harrison, and T. E. Hamer, *eds.* Technical Publication Number 2. Pacific Seabird Group, Arcata, California, USA. 76pp.

Powers, Robert F., D. Andrew Scott, Felipe G. Sanchez, Richard A. Voldseth, Deborah Page-Dumroese, John D. Elioff, Douglas M. Stone. 2005. The North American long-term soil productivity experiment: Findings from the first decade of research. Forest Ecology and Management. 220:31-50.

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. 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.

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

Reynolds, R. T., E. C. Meslow, and H. M. Wight. 1982. Nesting habitat of coexisting *Accipiter* in Oregon. Journal of Wildlife Management 46: 124-138.

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:* The Birds of North America, No. 446. A. Poole and F. Gill, Editors. 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.

Satterlund, Donald R. and P.W. Adams. 1992. Wildland Watershed Management. John Wiley & Sons, Inc.

Schofield, W. B. 1992. *Some Common Mosses of British Columbia*. Royal British Columbia Museum, Victoria, B.C., Canada.

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

Tappeiner, J. C., D. Huffman, D. Marshall, T. A. Spies, J. D. Bailey. 1997. Density, ages and growth rates in old-growth and young-growth forests in coastal Oregon. Canadian Journal of Forest Research 27: 638-648.

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. 427 pp. U.S. Department of Agriculture, U.S. Forest Service; U.S. Department of the Interior, Bureau of Land Management, U.S. Fish and Wildlife Service, National Park Service. Portland, OR.

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. 37 pp. Unpublished report prepared for cooperative agreement between the Oregon Department of Fish and Wildlife, Willamette National Forest, Mt. Hood National Forest, and the Bureau of Land Management, Salem District.

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, PA. and the American Ornithologists' Union, Washington DC.

USDA, U.S. Forest Products Laboratory. 1974. Wood Handbook: Wood as an engineering material. Handbook 72, rev.

USDA, U.S. Forest Service; USDI, Bureau of Land Management; U.S. Fish and Wildlife Service, and National Park Service; USDC, National Oceanic and Atmospheric Administration, National Marine Fisheries Service; and Environmental Protection Agency. 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment: Report of the Forest Ecosystem Management Assessment Team. Portland, OR.

USDA, U.S. Forest Service and USDI, BLM. 1994a. Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl.

USDA, U.S. Forest Service and USDI, BLM. 1994b. Record of Decision for Amendments to Forest Service and Bureau of Land management Planning Documents Within the Range of the Northern Spotted Owl.

USDA, U.S. Forest Service and USDI, BLM. 1997. Draft Management Recommendations for Bryophytes.

USDA, U.S. Forest Service and USDI, BLM. 1998. South Coast-Northern Klamath Late-Successional Reserve Assessment. 170 pp. Siuslaw National Forest, and Coos Bay, Medford, and Roseburg Districts of the Bureau of Land Management.

USDA, U.S. Forest Service and USDI, BLM. 2001. Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl.

USDA, U.S. Forest Service and USDI, BLM. 2004a. Final Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines.

USDA, U.S. Forest Service and USDI, BLM. 2004b. Final Supplemental Environmental Impact Statement: Management of Port-Orford-Cedar in Southwest Oregon. Portland, OR.

USDI, BLM. 1991. Special Status Plants of Roseburg District.

USDI, BLM. Roseburg District. 1994. Proposed Resource Management Plan/Environmental Impact Statement.

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

USDI, BLM. Roseburg District. 1995b. Roseburg District Integrated Weed Control Plan and Environmental Assessment

USDI, BLM. 2000. 3P Fall, Buck, and Scale Environmental Assessment. Roseburg, OR.

USDI, BLM. 2001a. Manual Section 6840.

USDI, BLM. Roseburg District. 2001b. Roseburg District Annual Program Summary and Monitoring Report, Fiscal Year 2000.

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

USDI, BLM. 2004b. Record of Decision and Resource Management Plan Amendment for Management of Port-Orford-Cedar in Southwest Oregon, Coos Bay, Medford, and Roseburg Districts.

USDI, BLM. Roseburg District. 2005. Late-Successional Reserve 261 Density Management Environmental Assessment (EA # OR-105-05-08). Roseburg, OR.

USDI, U.S. Fish and Wildlife Service (USFWS). 1991. Guidelines for surveying proposed management activities that may impact Northern Spotted Owls. Portland, OR.

USDI. 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). US Fish and Wildlife Service, Roseburg, Oregon, USA. 42pp.

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. 1998*a*. 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. 1998*b*. 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.

Wert, Stephen R., James A. Pomerening, T. Scott Gibson and Byron R. Thomas. 1977. Soil Inventory of the Roseburg District. U.S. Department of the Interior, Bureau of Land Management, Roseburg District, Oregon.

Western Environmental Law Center. 2006. Stipulation and [Proposed] Order re: Injunction C04-844-P. Eugene, Oregon, USA. 3pp.

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. Philadelphia, PA: the Academy of Natural Sciences and Washington, DC: the American Ornithologists' Union.

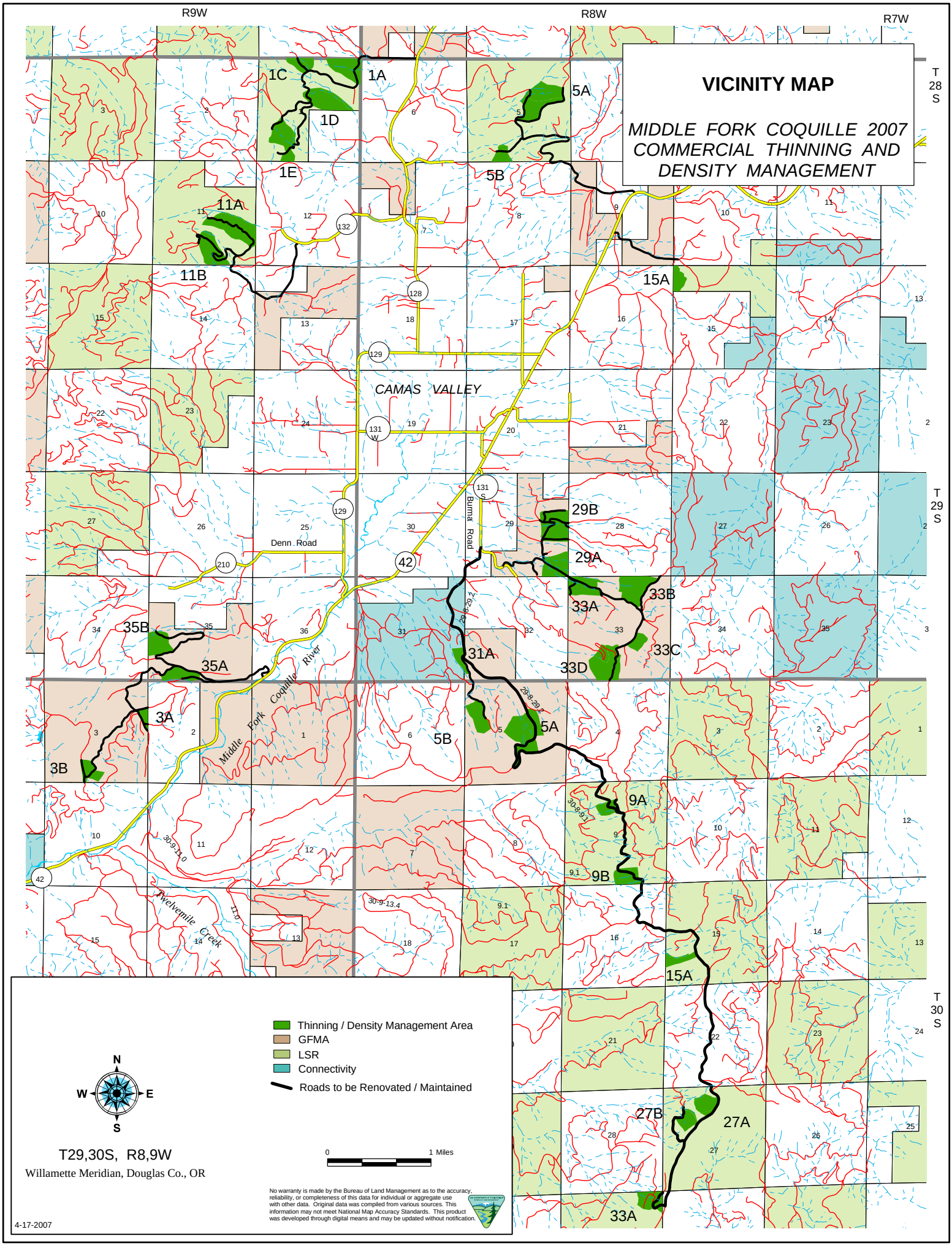
Wiggins, G. B. 1977. Larvae of the North American caddisfly genera (*Trichoptera*). University of Toronto Press. Toronto, Ontario, Canada. 401pp.

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

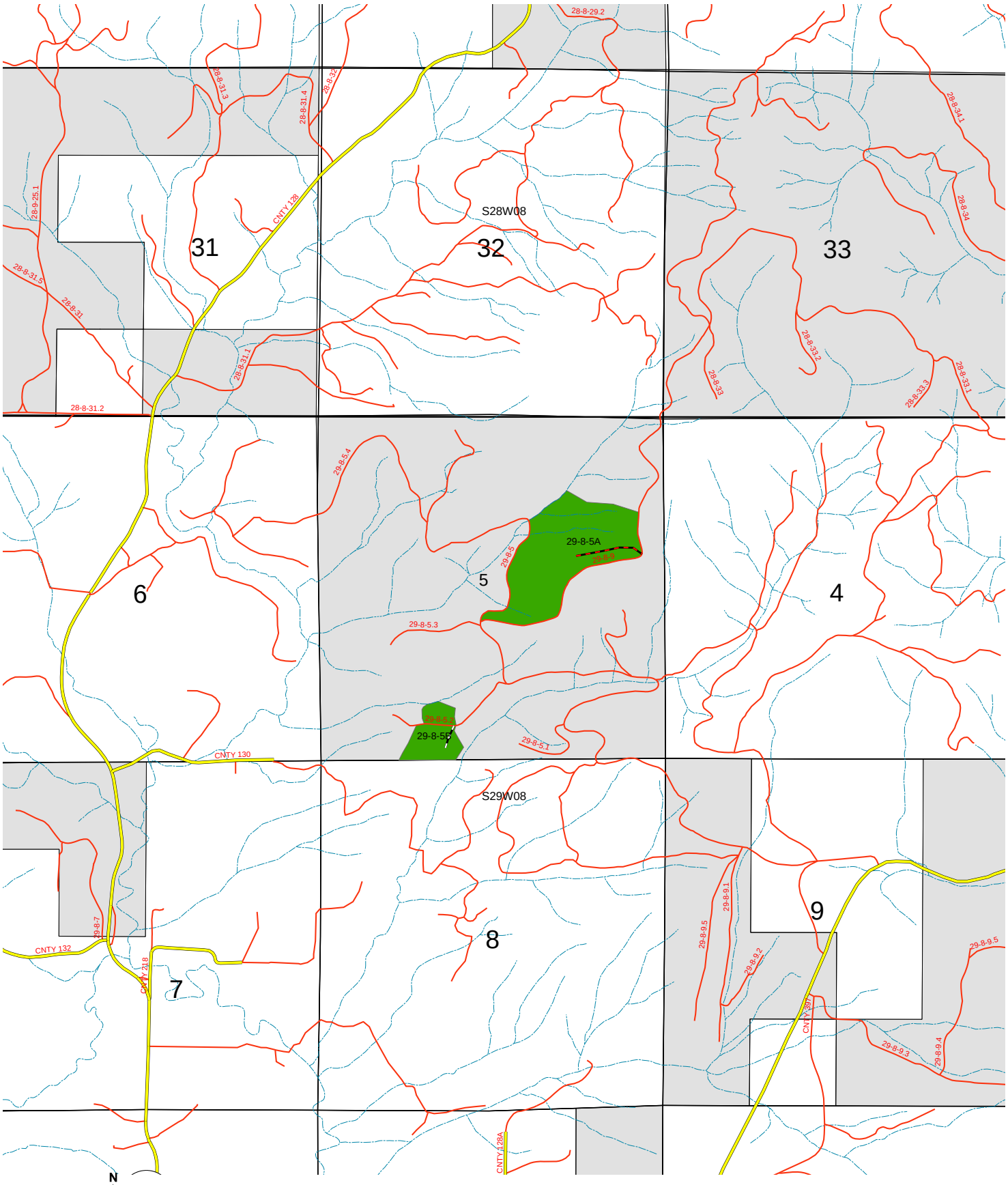
Wonn, Hagan T. 2001. Height:diameter ratios and stability relationship[s for four Northern Rocky mountain tree species. Western Journal of Applied Forestry 16(2), pp. 87-94

# Appendix A

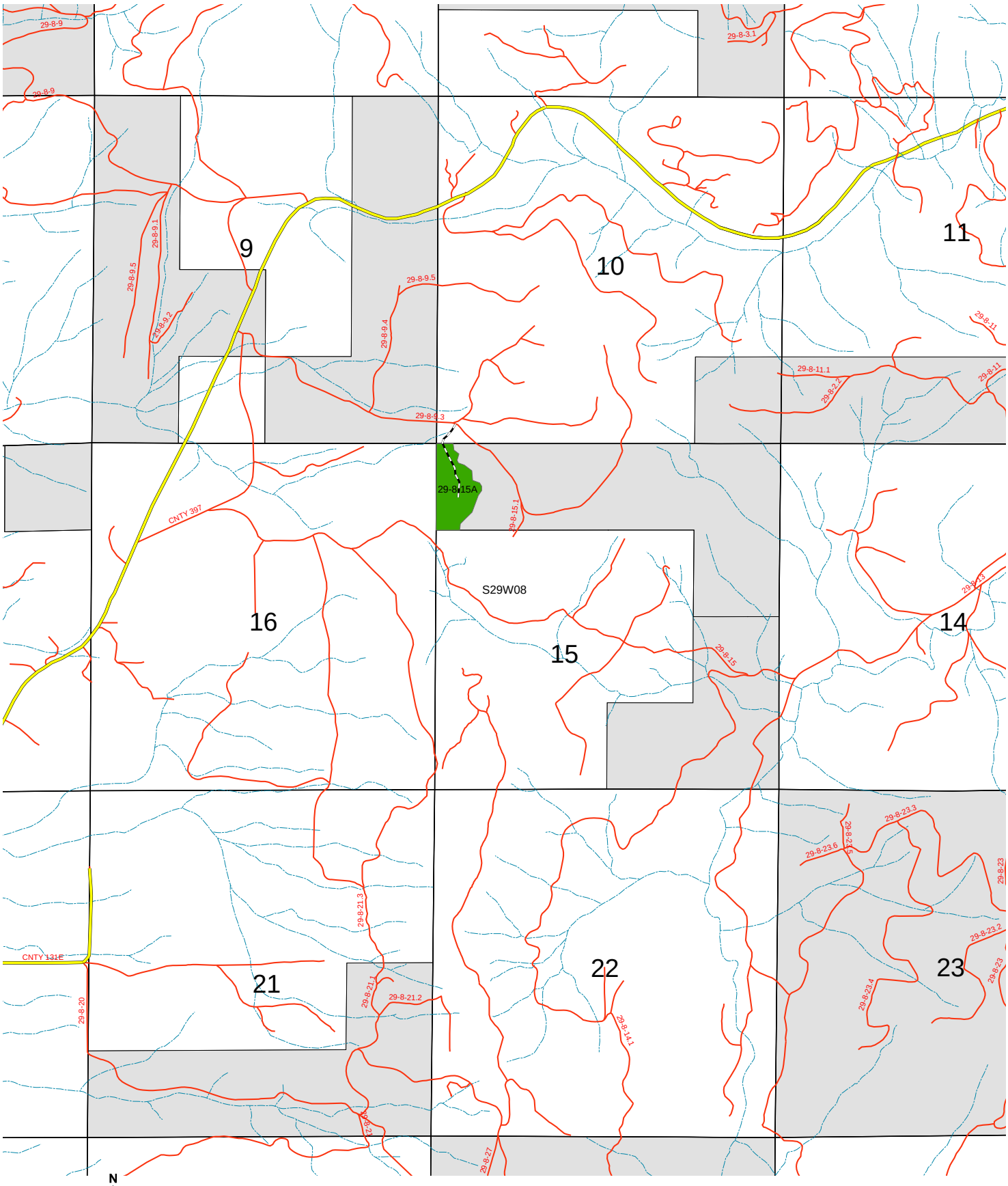
# Maps of the Proposed Project Area


VICINITY MAP
MIDDLE FORK COQUILLE 2007 COMMERCIAL THINNING AND DENSITY MANAGEMENT
R9W
R8W
R7W
T 28 S
T 29 S
T 30 S
CAMAS VALLEY
Denn Road
Burma Road
Middle Fork Coquille River
Twelvemile Creek
1C
1A
1D
1E
5A
5B
11A
11B
15A
29B
29A
33A
33B
33C
33D
31A
35B
35A
3A
3B
9A
9B
27B
27A
Thinning / Density Management Area
GFMA
LSR
Connectivity
Roads to be Renovated / Maintained
N
W
E
S
T29,30S, R8,9W
Willamette Meridian, Douglas Co., OR
0
1 Miles
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of this data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
4-17-2007

# Middle Fork Coquille 2007 Commercial Thinning and Density Management



# Middle Fork Coquille 2007 Commercial Thinning and Density Management




N
W E
S

0 2 Miles

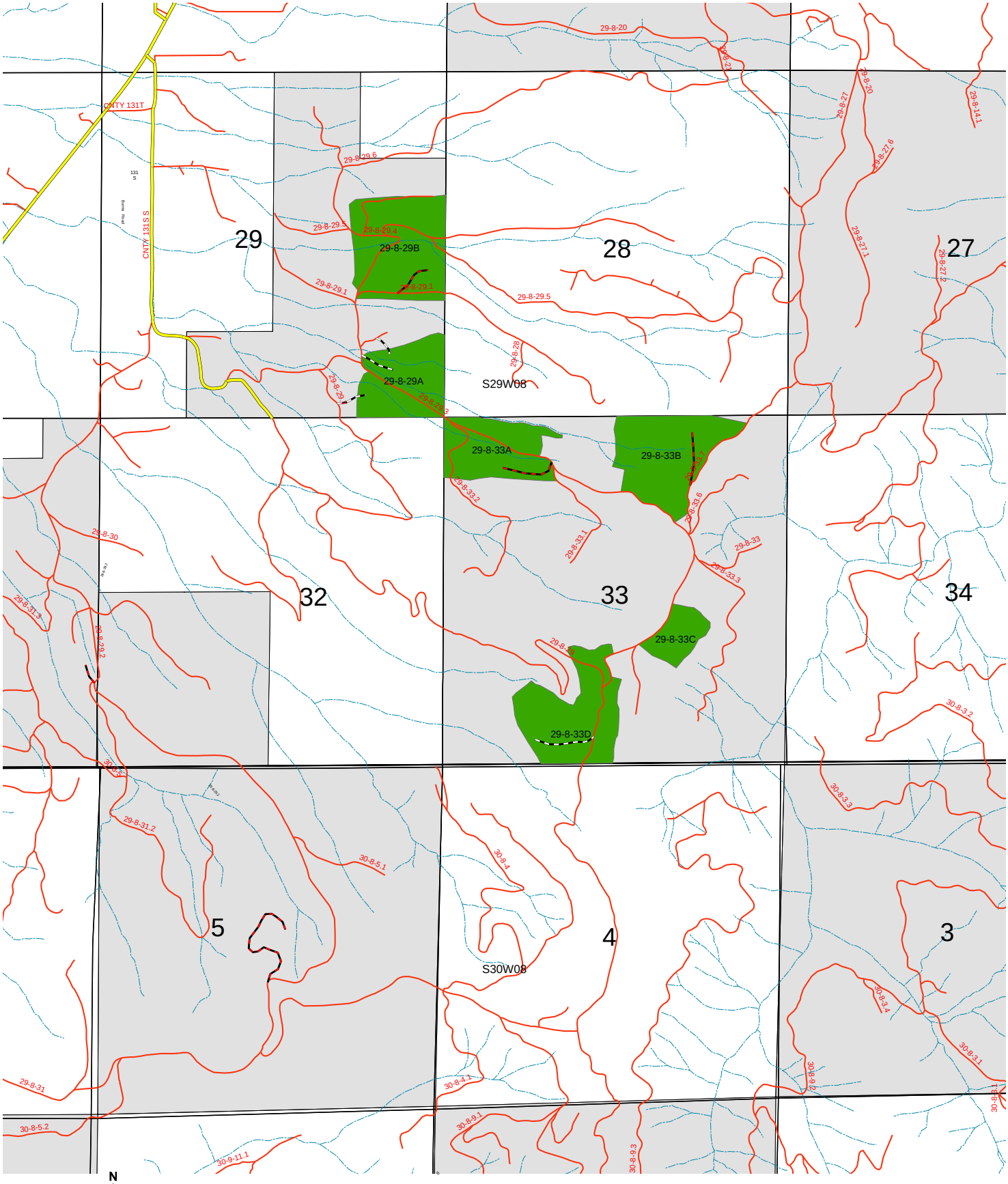
Willamette Meridian, Douglas Co., OR

3-23-2007

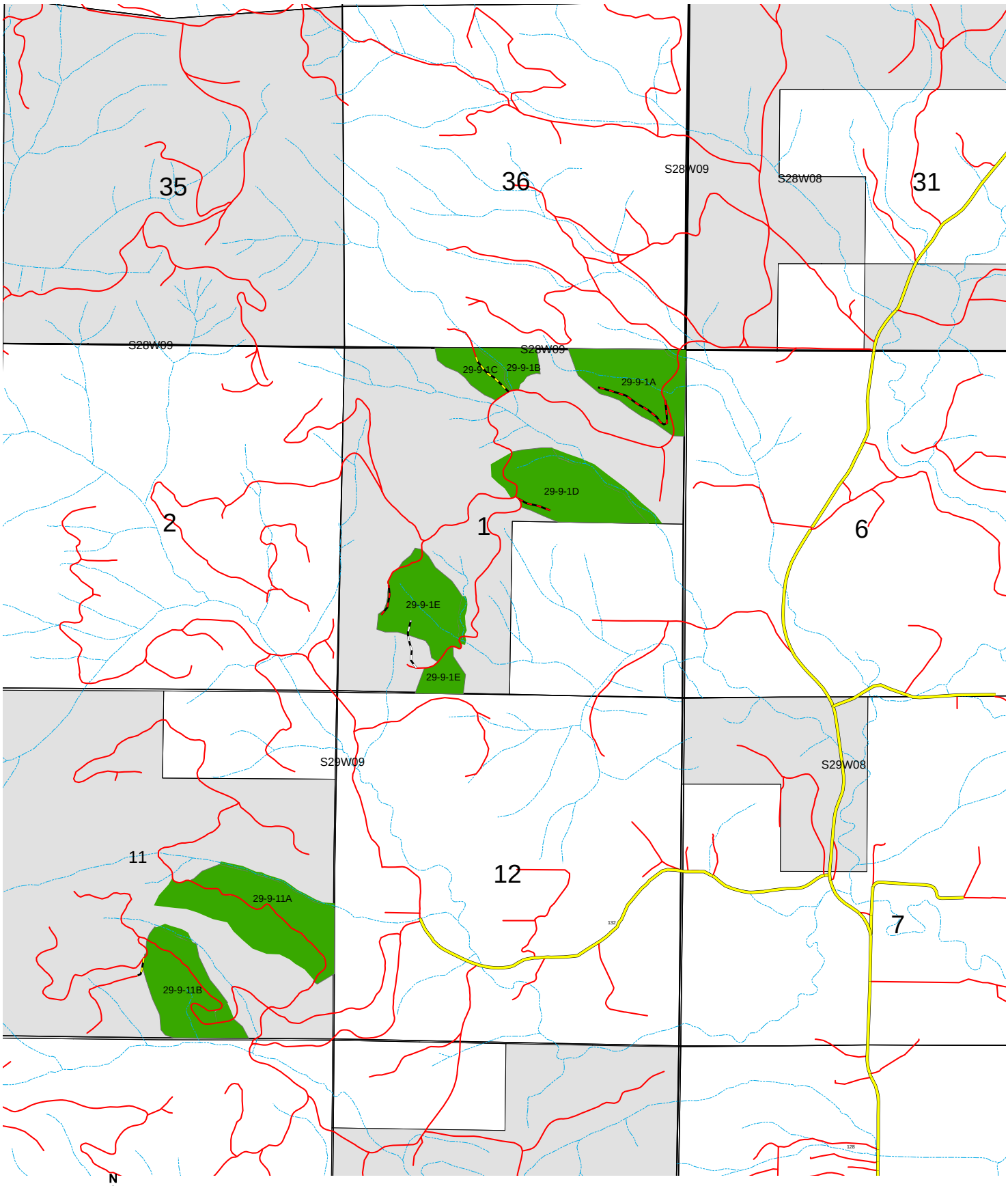


- County Road
- Existing Road
- Construct and rock spur
- Construct and rock dirt spur
- Re-construct and rock spur
- BLM Administered Land
- Unit to be treated

# Middle Fork Coquille 2007 Commercial Thinning and Density Management



# Middle Fork Coquille 2007 Commercial Thinning and Density Management




N
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0 2 Miles

Willamette Meridian, Douglas Co., OR

4-17-2007

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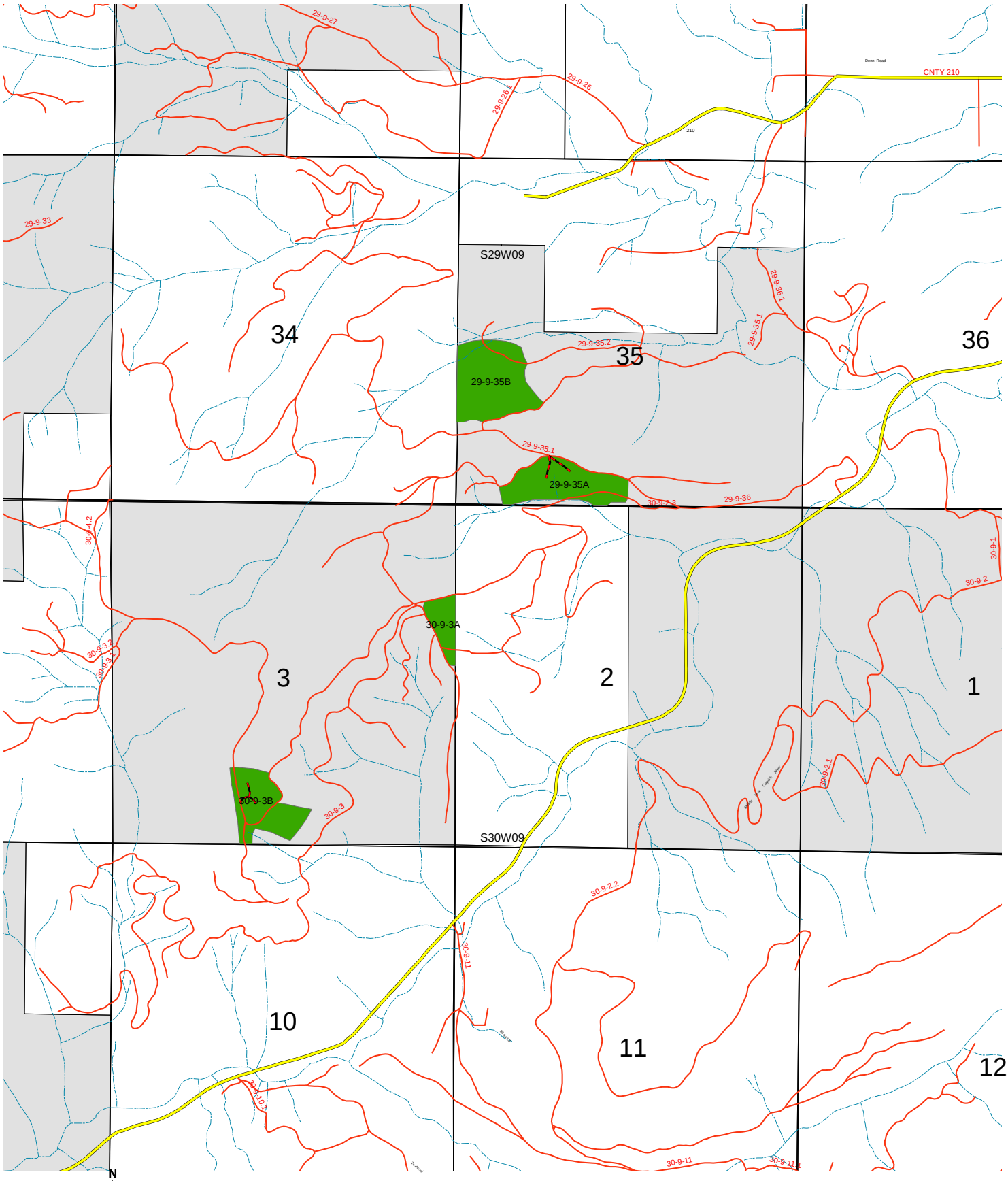
County Road
Existing Road
Construct and rock spur
Construct and rock dirt spur
Re-construct and rock spur

BLM Administered Land
Unit to be treated

# Middle Fork Coquille 2007 Commercial Thinning and Density Management




N
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0 2 Miles

Willamette Meridian, Douglas Co., OR

4-18-2007

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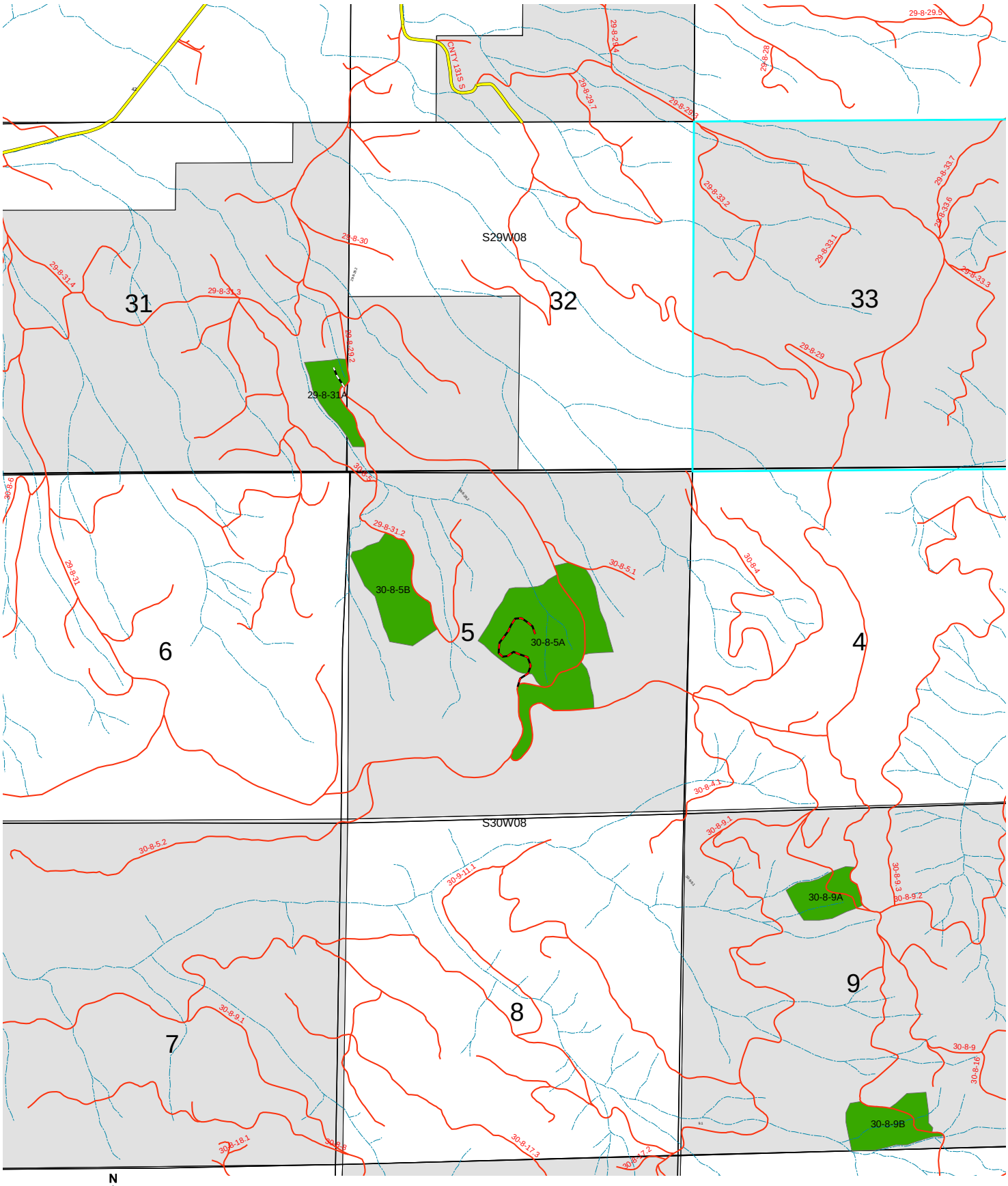
- County Road
- Existing Road
- Construct and rock spur
- Construct and rock dirt spur
- Re-construct and rock spur

- BLM Administered Land
- Unit to be treated

# Middle Fork Coquille 2007 Commercial Thinning and Density Management




N
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0 2 Miles

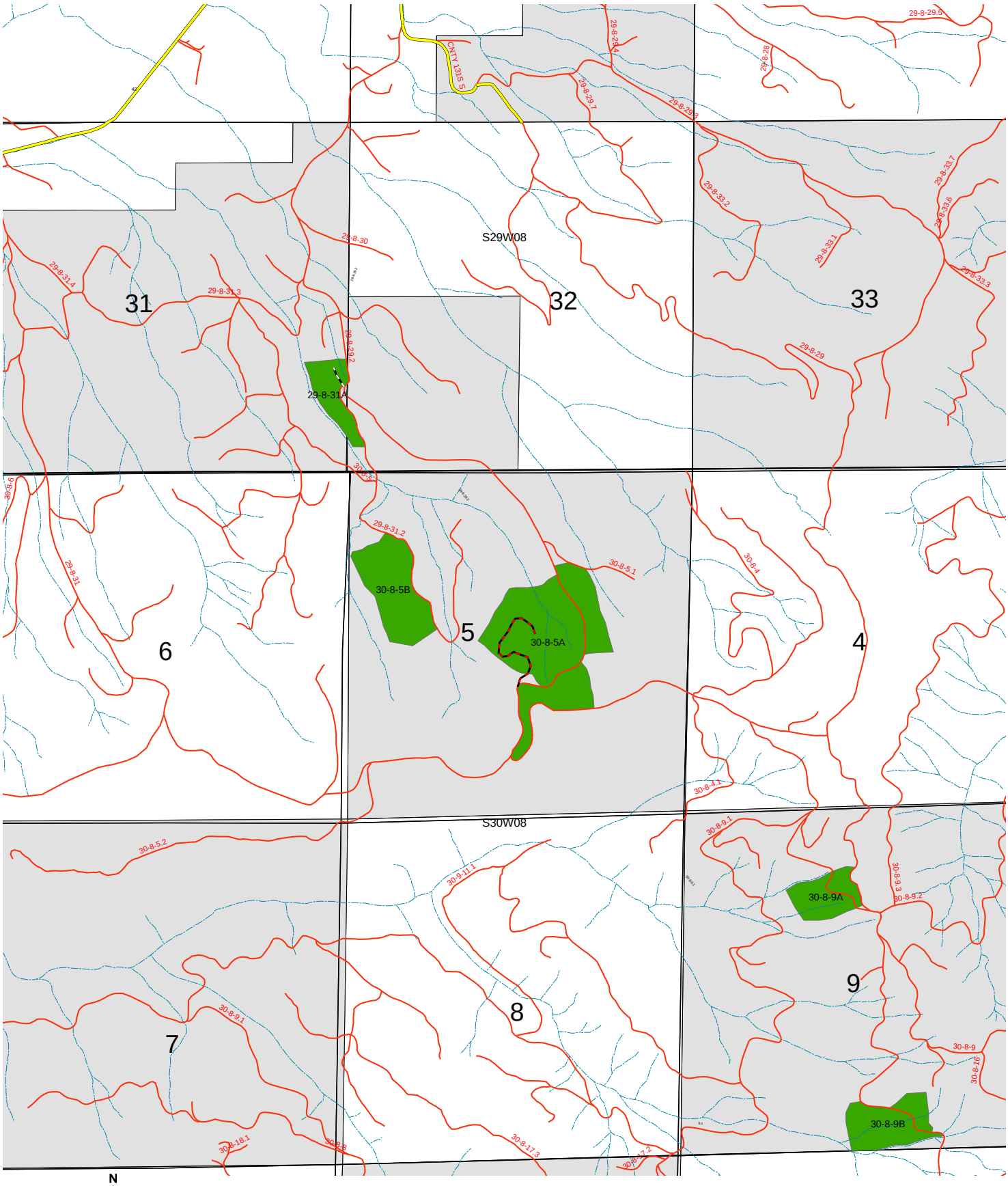
Willamette Meridian, Douglas Co., OR

4-18-2007



- County Road
- Existing Road
- Construct and rock spur
- Construct and rock dirt spur
- Re-construct and rock spur
- BLM Administered Land
- Unit to be treated

# Middle Fork Coquille 2007 Commercial Thinning and Density Management




Willamette Meridian, Douglas Co., OR

4-18-2007

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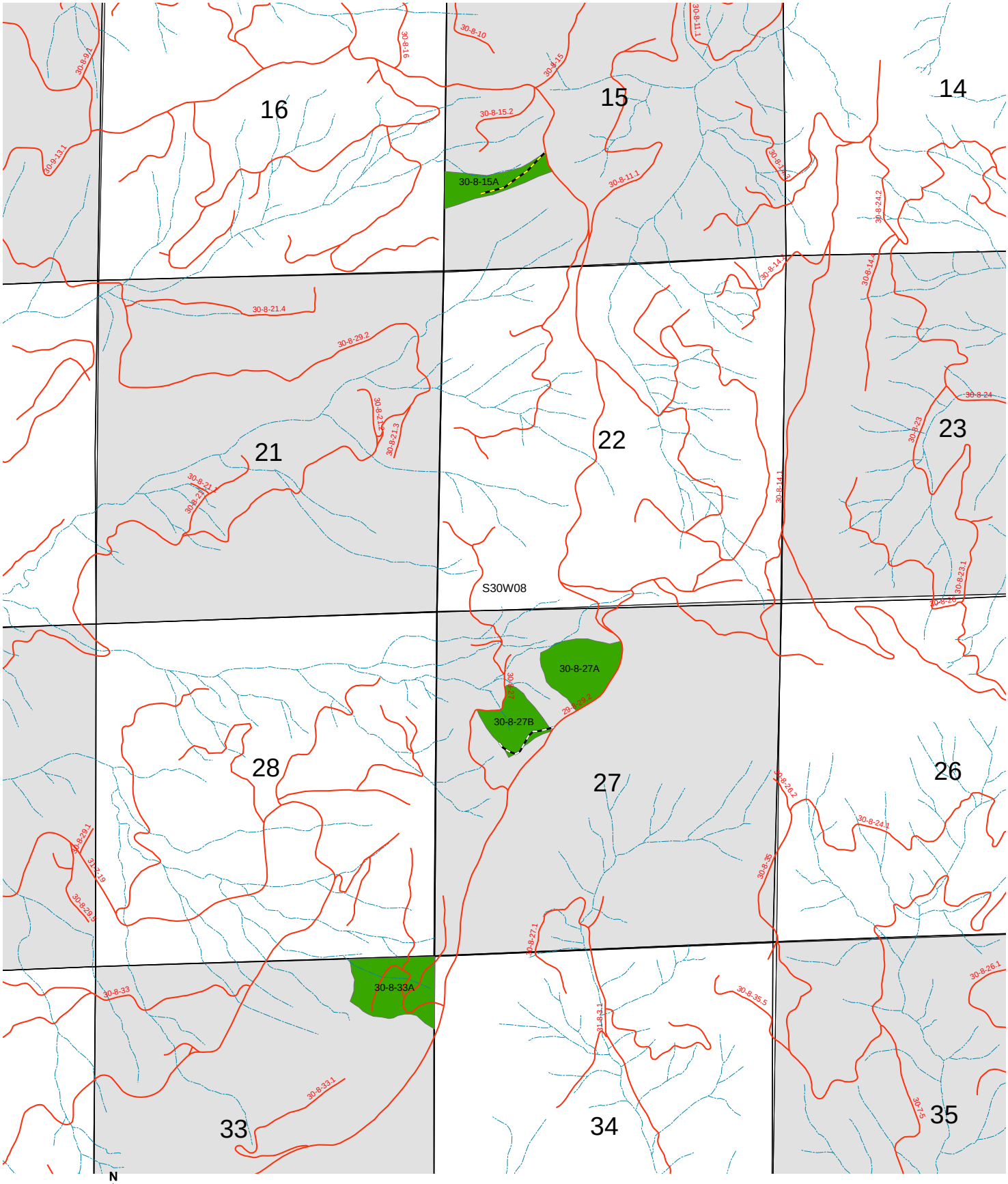
- County Road
- Existing Road
- Construct and rock spur
- Construct and rock dirt spur
- Re-construct and rock spur
- BLM Administered Land
- Unit to be treated

# Middle Fork Coquille 2007 Commercial Thinning and Density Management




Willamette Meridian, Douglas Co., OR

3-23-2007



- County Road
- Existing Road
- Construct and rock spur
- Construct and rock dirt spur
- Re-construct and rock spur

- BLM Administered Land
- Unit to be treated

# Appendix B

# Wildlife

**Table B-1 Special status wildlife species eliminated from further consideration**

| Status | Common Name | Scientific Name | Habitat Features Used | Reason if Eliminated |
|---|---|---|---|---|
| **Federal Threatened** | Bald Eagle | *Haliaeetus leucocephalus* | Large trees near large bodies of water (Buehler 2000, Isaacs and Anthony 2003) | No habitat |
| | | | | |
| **Bureau Sensitive** | American Peregrine Falcon | *Falco peregrinus* | Cliffs or other sheer vertical structure, generally in open habitat near water | No habitat |
| **Bureau Sensitive** | Columbian White-Tailed Deer | *Odocoileus virginianus leucurus* | Oak woodland | No habitat |
| **Bureau Sensitive** | Western Pond Turtle | *Clemmys marmorata* | Marshes, ponds, lakes, streams, and rivers with emergent structure on which to bask | 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 range |
| **Bureau Sensitive** | Klamath Tail-Dropper | *Prophysaon sp. nov.* | Moist mature forest (Frest and Johannes 2000) | Area policy |
| **Bureau Sensitive** | Lewis' Woodpecker | *Melanerpes lewis* | Open woodlands with ground cover and snags (Tobalske 1997) | 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** | Purple Martin | *Progne subis* | Nests in artificial structures, nest boxes, or cavities or woodpecker holes in snags. Uses open habitats: burns, clearcuts, open water, urban areas (Horvath 2003). | No habitat |
| **Bureau Sensitive** | Rotund Lanx | *Lanx subrotunda* | Umpqua River and major tributaries (USDA/USDI 1994) | No habitat |
| **Bureau Sensitive** | Scott's Apatanian Caddisfly | *Allomyia scotti* | Low-gradient streams with gravel and cobble substrates (Wiggins 1977) | Protected by Riparian Reserves if present |
| **Bureau Assessment** | 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 Assessment** | Harlequin Duck | *Histrionicus histrionicus* | Larger fast-flowing streams and riparian areas (Thompson et al. 1993, Robertson and Goudie 1999) | No habitat |
| **Bureau Assessment** | White-Tailed Kite | *Elanus leucurus* | Low-elevation grassland, farmland or savannah and nearby riparian areas (Dunk 1995) | No habitat |

**Table B-2 Survey results for affected spotted owl home ranges, 1997-2006.**

| Site (ID Number) | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|---|
| Bear Naked (4588 O) | No Survey | No Survey | No Survey | No Survey | No Survey | 2 Fledglings | 2 Fledglings | No Survey | 1 Fledgling | Male, Female |
| Berry Creek (1807 C) | No Survey | No Survey | No Survey | No Survey | No Survey | No Survey | No Survey | 2 Fledglings | Pair | 2 Fledglings |
| Boulder Creek (2042 O) | Male, Female | Male, Female | Unoccupied | Female | Unoccupied | Unoccupied | Female | Unoccupied | Male | Pair |
| Deep Creek (2099 A) | No Survey | No Survey | No Survey | No Survey | Pair | No Survey | No Survey | 2 Fledglings | Male, Female | Unoccupied |
| Happy Hour (2747 O) | No Survey | No Survey | No Survey | Unoccupied | Unoccupied | Unoccupied | Unoccupied | Unoccupied | Unoccupied | Female |
| Lower Berry Creek (2748 O) | Pair | Male, Female | Pair | Pair | Male | Unoccupied | Unoccupied | Unoccupied | Unoccupied | Male, Female |
| Weaver Ridge (2190 A) | Pair | Male | Unoccupied | Male, Female | Unoccupied | Unoccupied | No Survey | No Survey | No Survey | No Survey |
| Wildcat Creek RB (2198 O) | Pair | Pair | Pair | Pair | Pair | 2 Fledglings | Pair | 2 Fledglings | Pair | Pair |
| Wildcat Creek CB (4639 O) | No Survey | No Survey | Pair | Pair | No Survey | No Survey | Unoccupied | No Survey | No Survey | No Survey |

**Figure B-1. Proposed units, spotted owl sites, and spotted owl home ranges.**

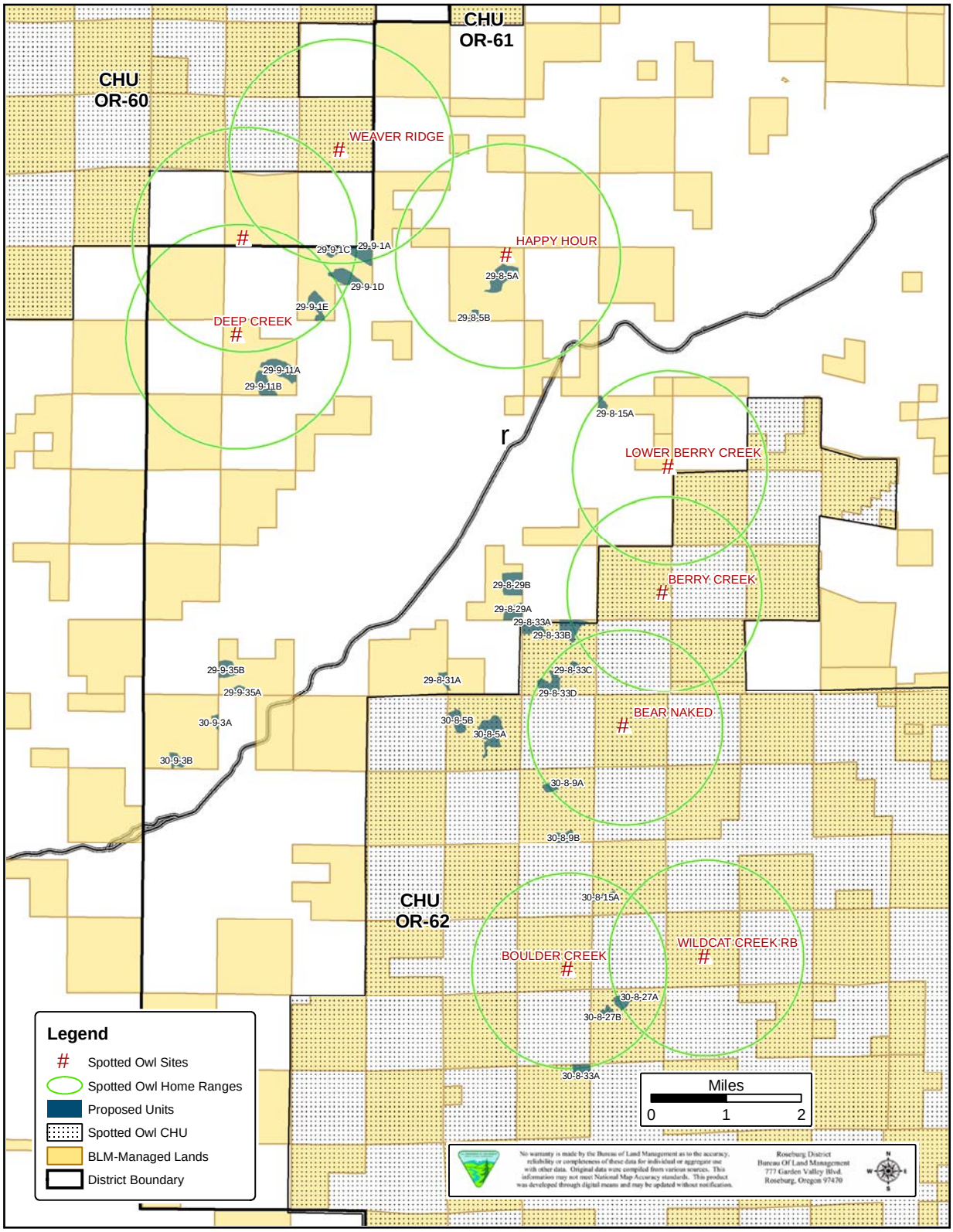


**Figure B-2 Deep Creek, Happy Hour, Weaver Ridge, and Wildcat Creek CB spotted owl home ranges and habitat.**

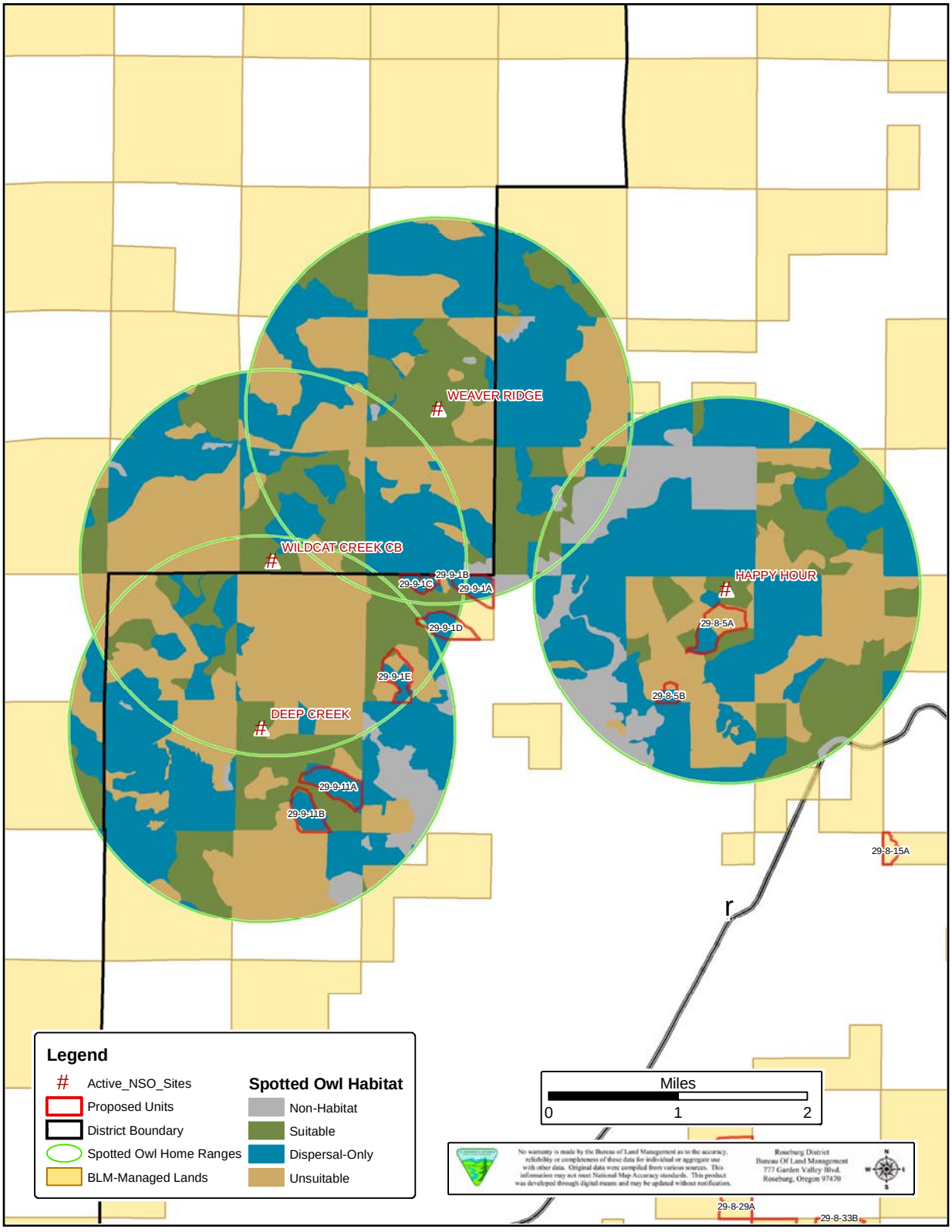


**Figure B-3 Bear Naked, Berry Creek, and Lower Berry Creek spotted owl home ranges and habitat.**

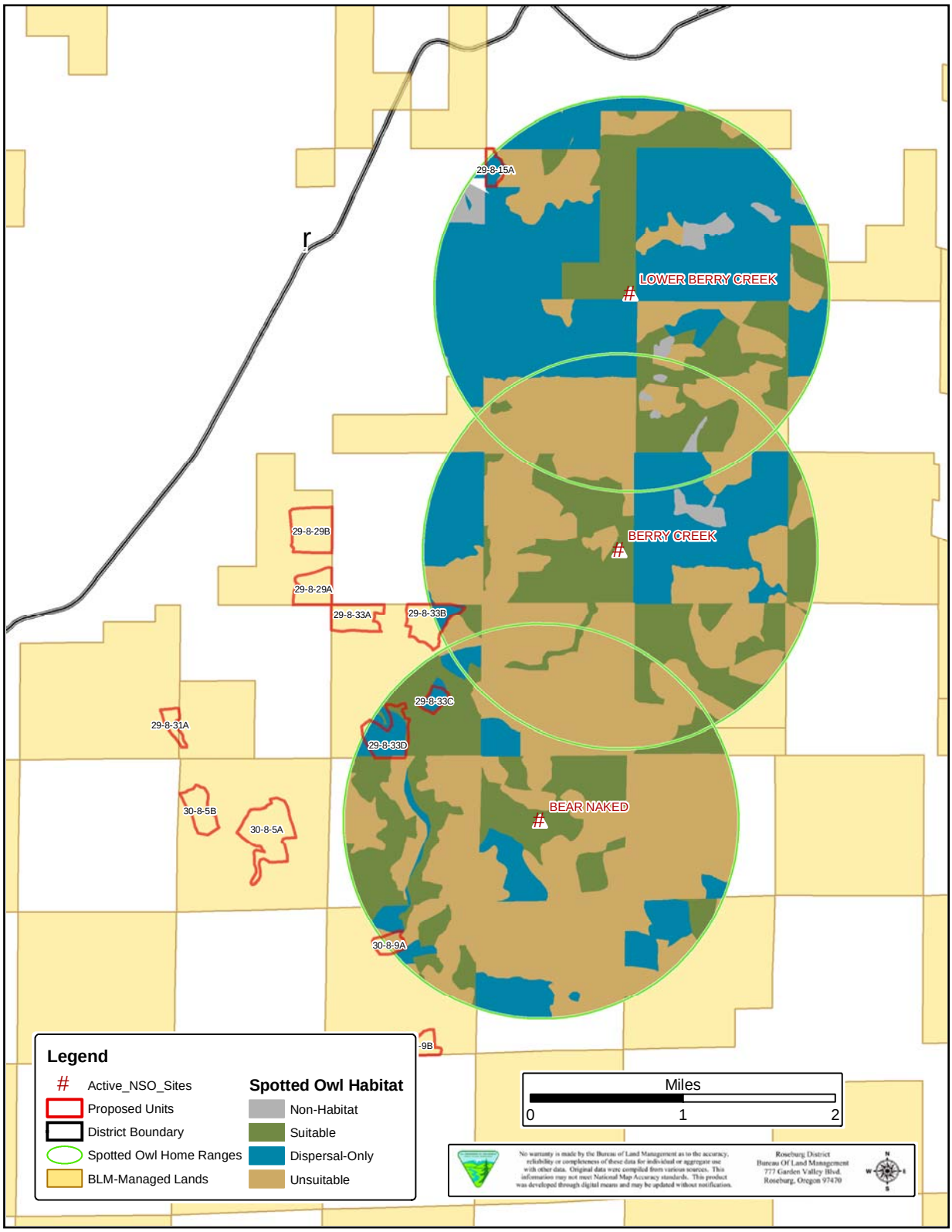


**Figure B-4 Boulder Creek and Wildcat Creek RB spotted owl home ranges and habitat.**

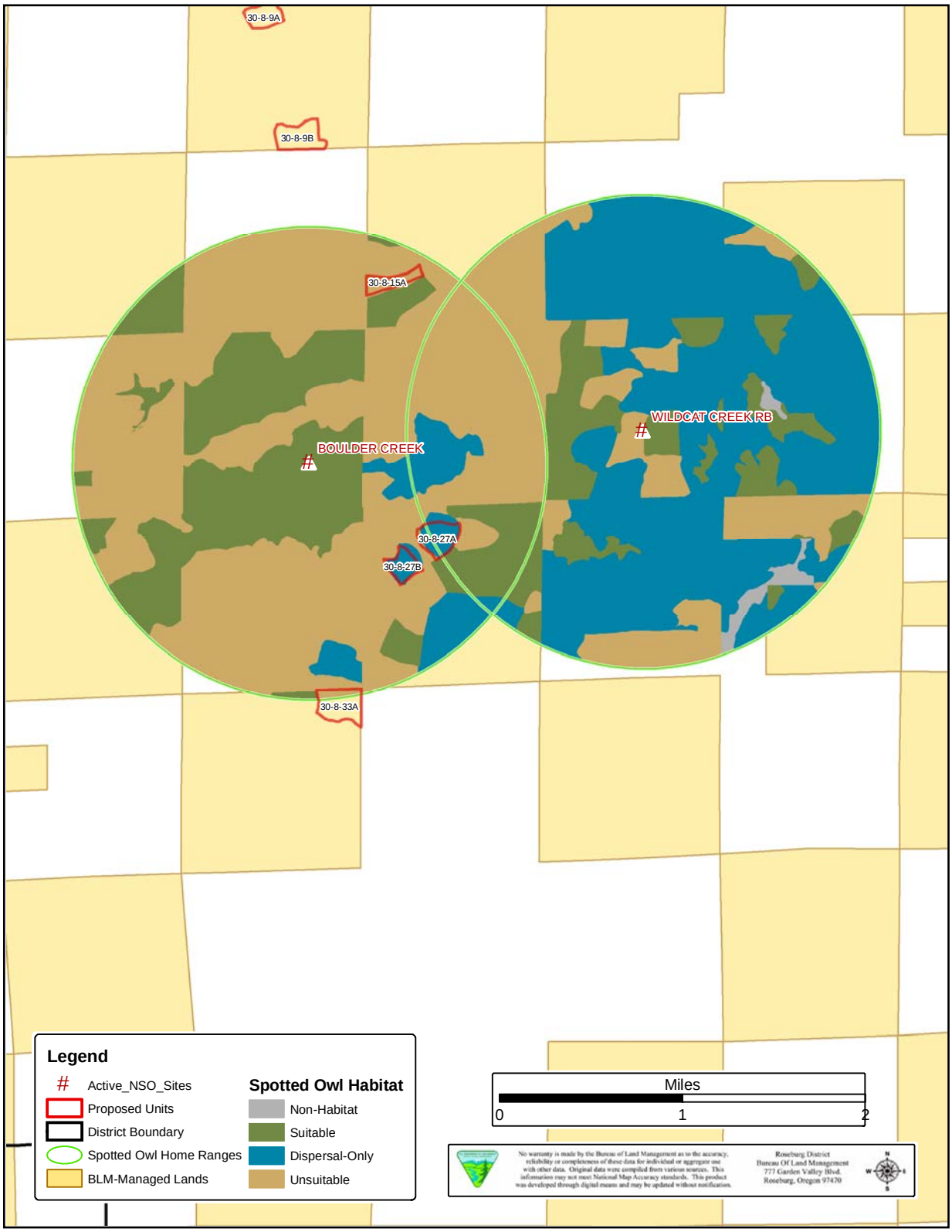


**Figure B-5 Proposed units and marbled murrelet zones.**

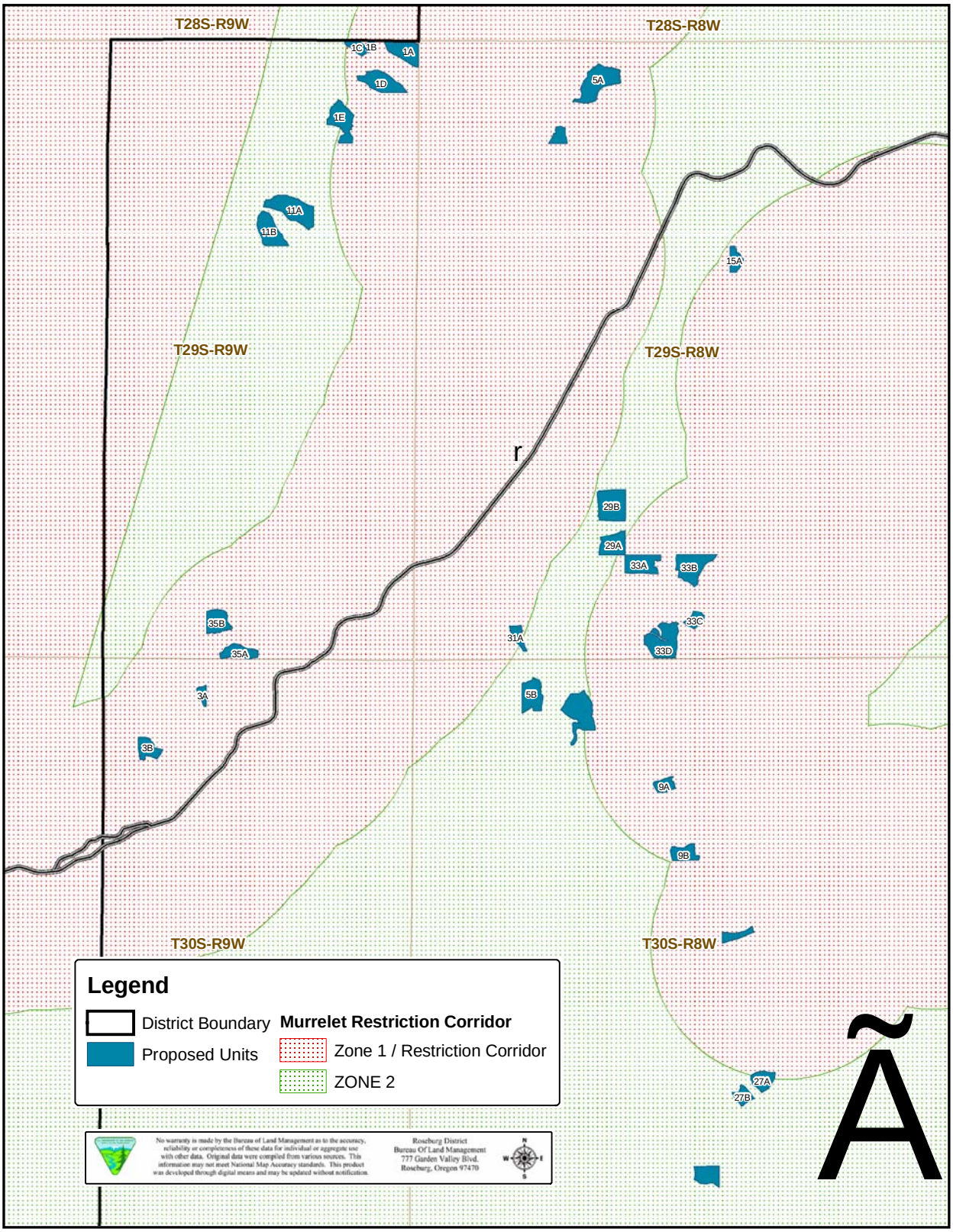
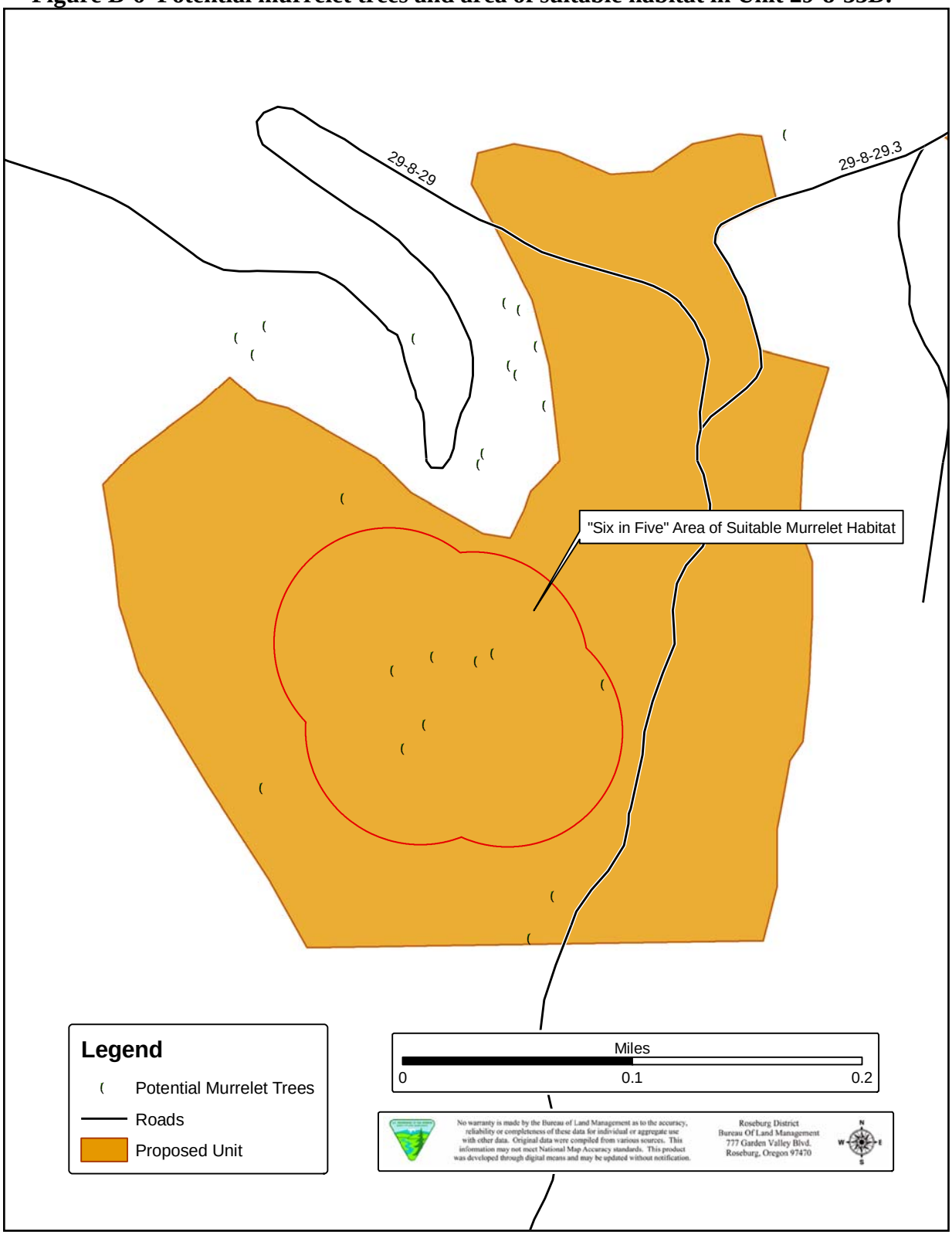


**Figure B-6 Potential murrelet trees and area of suitable habitat in Unit 29-8-33D.**



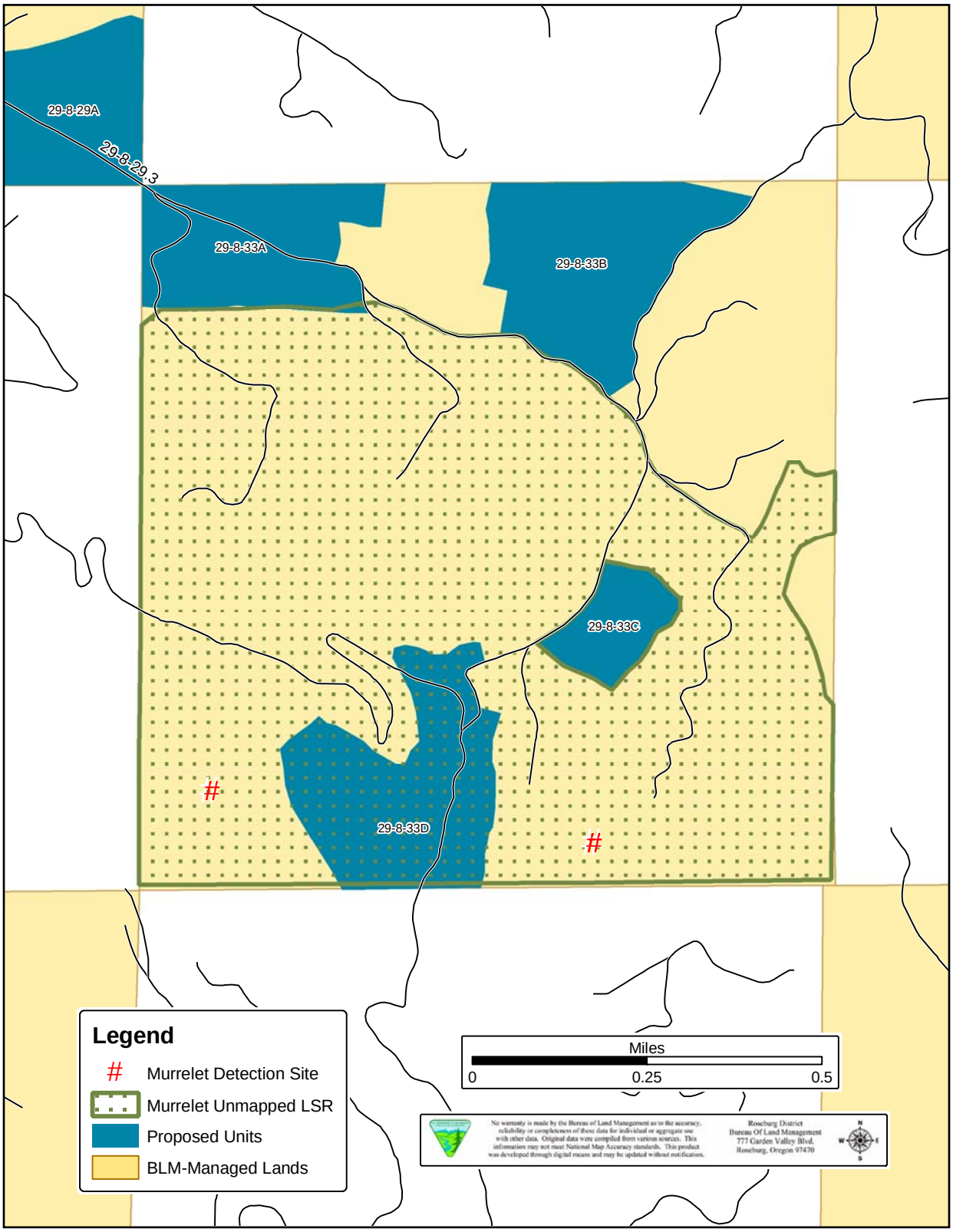



**Figure B-7 Murrelet detection sites and unmapped murrelet LSR in Section 33, T. 29 S., R. 8 W.**

# Appendix C

# Botany

**Special Status Species Summary**

| Scientific Name | Taxon | Status | Habitat Present | Survey Complete | Habitat |
|---|---|---|---|---|---|
| *Plagiobothrys hirtus* | V | F E | No | N/A | Moist to boggy meadows. |
| *Arabis koehleri* var. *koehleri* | V | B S | No | N/A | Dry, rocky serpentine slopes, ridges (Hickman 1993) |
| *Calochortus coxii* | V | B S | No | N/A | Dry open slopes or under open canopies on serpentine soils (USDI BLM 1991) |
| *Calochortus umpquaensis* | V | B S | No | N/A | Grassland and forests on serpentine soils (USDI BLM 1991) |
| *Corydalis aqua-gelidae* | V | B S | No | N/A | Perennial streams seeps and springs IM OR 99-027 |
| *Cypripedium fasciculatum* | V | B S | Yes | No | Dry to moist conifer and mixed evergreen forest (USDI BLM 1991) |
| *Epilobium oreganum* | V | B S | No | N/A | Bogs and marshes (USDI BLM 1991) |
| *Festuca elmeri* | V | B S | Yes | No | Forest and Woodland Aiken, S.G., Dallwitz, M.J., McJannet, C.L. and Consaul, L.L. 1996) |
| *Frasera umpquaensis* | V | B S | Yes | No | Moist meadows and moist coniferous forest. Mostly grows in shaded conditions but can also occur in full sun (USDI BLM 1991) |
| *Horkelia congesta* ssp. *congesta* | V | B S | Yes | No | Meadows and open woods (USDI BLM 1991) |
| *Horkelia tridentata ssp. Tridentata* | V | B S | Yes | No | Dry open coniferous forest. |
| *Kalmiopsis fragans* | V | B S | Yes | No | Dry, stony mountain slopes (USDI BLM 1991) |
| *Lathyrus holochlorus* | V | B S | Yes | No | Fencerows and partially cleared land, Willamette Valley south. to Roseburg, OR. |

| Scientific Name | Taxon | Status | Habitat Present | Survey complete | Habitat |
|---|---|---|---|---|---|
| *Lathyrus holochlorus* | V | B S | Yes | No | Fence rows and partially cleared land, Willamette Valley , s. to Roseburg, OR. |
| *Limnanthes gracilis* var. *gracilis* | V | B S | Yes | No | Vernally moist to wet rocky slopes and meadows on various substrate including serpentine (USDI BLM 1991) |
| *Perideridia erythrorhiza* | V | B S | Yes | No | Moist meadows or along the edge of coniferous forest. |
| *Perideridia howellii* | V | B S | Yes | No | Meadows or along the edge of coniferous forest (USDI BLM 1991) |
| *Romanzoffia thompsonii* | V | B S | Yes | No | Seasonally wet rock outcrops on open slopes (USDI BLM 1991) |
| *Sisyrinchium hitchcockii* | V | B S | No | N/A | Valley grasslands and oak savannahs (USDI BLM 1991) |
| *Adiantum jordanii* | V | B A | Yes | No | Shaded hillsides, moist woods on damp banks at base of rocks and trees(USDI BLM 1991) |
| *Asplenium septentrionale* | V | B A | Yes | No | Volcanic or granite rock crevices and ledges under a forest canopy (Hickman 1993, USDI BLM 1991) |
| *Botrychium montanum* | V | B A | Yes | No | Riparian and conifer forest IM OR 99-027 |
| *Carex brevicaulis* | V | B A | Yes | No | Coastal. |
| *Carex comosa* | V | B A | Yes | No | Marshes, lakeshores and wet meadows. |
| *Carex gynodynama* | V | B A | Yes | No | Moist meadows, open forests (University and Jepson Herbaria Website accessed 6/23/2004) |
| *Carex serratodens* | V | B A | Yes | No | Wet Meadows |
| *Cicendia quadrangularis* | V | B A | No | N/A | Meadows |

| Scientific Name | Taxon | Status | Habitat Present | Survey complete | Habitat |
|---|---|---|---|---|---|
| *Coptis trifolia* | V | B A | No | N/A | Riparian and wetland conifer forest |
| *Eschscholzia caespitosa* | V | B A | Yes | No | Fields and brushy slopes of the foothills and valleys (USDI BLM 1991) |
| *Mimulus tricolor* | V | B A | Yes | No | Vernal pools and wet meadows (USDI BLM 1991) |
| *Pellaea andromedaefolia* | V | B A | Yes | No | Dry rock outcrops mostly in the open sun but at times along shaded stream banks (USDI BLM 1991) |
| *Polystichum californicum* | V | B A | Yes | No | Rock outcrops beneath forest canopies or on open slopes. Often inside rock overhangs or on shear bluffs and cliffs (USDI BLM 1991) |
| *Sedum laxum* ssp. *heckneri* | V | B A | No | N/A | Rock outcrops which are typically serpentine and occasionally gabbro (USDI BLM 1991) |
| *Romanzoffia thompsonii* | V | B S | Yes | No | Seasonally wet rock outcrops on open slopes at low and mid elevations. (USDI BLM 1991) |
| *Scirpus subterminalis* | V | B A | No | N/A | Shallow water (aquatic) |
| *Utricularia gibba* | V | B A | No | N/A | Shallow water in the valleys and mountains (USDI BLM 1991) |
| *Utricularia minor* | V | B A | No | N/A | Shallow standing or slow moving water (USDI BLM 1991) |
| *Wolffia borealis* | V | B A | No | N/A | Lakes, ponds, and pools of standing water (USDI BLM 1991) |
| *Wolffia columbiana* | V | B A | No | N/A | Lakes, ponds, and pools of standing water (USDI BLM 1991) |
| *Chiloscyphus gemmiparus* | B | B S | No | N/A | Rocks in the bed of cold water streams (Christy and Wagner 1996) |

| Scientific Name | Taxon | Status | Habitat Present | Survey complete | Habitat |
|---|---|---|---|---|---|
| *Trematodon boasii* | B | B S | No | N/A | Riparian in the subalpine |
| *Crumia latifolia* | B | B A | No | N/A | Wet calcarious cliffs near the coast (Schofield 1992) |
| *Diplophyllum plicatum* | B | B A | No | N/A | Bark of hardwoods and conifers, on thin soil over rock, and on decaying wood, primarily in cool, moist sites ( USFS, BLM 1997) |
| *Funaria Muhlenbergii* | B | B A | No | N/A | Shaded forests on fine textured soil. (Schofield 1992) |
| Kurzia makinoan | B | B A | No | N/A | Well-shaded wood and humic soil at low elevation, especially on stream terraces flood plains and other cool moist forest locations. |
| *Pseudoleskeella serpentinensis* | B | B A | No | N/A | Serpentine endemic |
| *Schistostega pennata* | B | B A | Yes | No | On damp rocks, soil and decaying wood , in dark places. (Christy and Wagner 1996) |
| *Tayloria serrata* | B | B A | Yes | No | Soil and rotten wood enriched by old dung. |
| *Tetraphis geniculata* | B | B A | Yes | No | Decomposing stumps and logs of coniferous trees. (Schofield 1992) |
| *Tetraplodon mnioides* | B | B A | Yes | No | Soil and rotten wood enriched by old dung. (Christy and Wagner 1996) |
| *Tripterocladium leucocladulum* | B | B A | Yes | No | Shaded to exposed rocks, cliffs and bark of hardwoods. (Christy and Wagner 1996) |
| *Tritomaria exsectiformis* | B | B A | No | N/A | Open to shaded coniferous forest in association with low volume, perennial water flow at or near springs and seeps, along very gentle topographic gradients. Lodgepole pine (*Pinus contorta*) |

| Scientific Name | Taxon | Status | Habitat Present | Survey complete | Habitat |
|---|---|---|---|---|---|
| *Bryoria pseudocapillaris* | L | B S | No | N/A | Coastal Sites. (Lesher 2000) |
| *Bryoria spiralifera* | L | B S | No | N/A | Coastal Sites. (Lesher 2000) |
| *Bryoria subcana* | L | B A | No | N/A | Bark and wood of conifers in forest stream and high precipitation ridgeswithin 30 mile of the ocean. (Lesher 2000) |
| *Calicium adspersum* | L | B A | unknown | No | Cool microsites. Habitat not well known, rarely collected. |
| *Lobaria linita* | L | B A | Yes | No | Mature forests in the Western Hemlock Zone. (Lesher 2000) |
| *Niebla cephalota* | L | B A | No | N/A | Coastal Sites. (Lesher 2000) |
| *Pannaria rubiginosa* | L | B A | Yes | No | Mature Douglas-fir/western hemlock forest.(Lesher 2000) |
| *Pilophorus nigricaulis* | L | B A | No | N/A | Non-forest communities on talus slopes, cliffs, and rock outcrops. (Lesher 2000 |
| *Sulcaria badia* | L | B A | Yes | No | Bark and wood mainly from oak and maple. (McCune 1997) |
| *Stereocaulon spathuliferum* | L | B A | Yes | No | Cascades; cool N-facing talus slopes. (McCune 1997) |
| *Teloschistes flavicans* | L | BA | No | N/A | Coastal Sites. (Lesher 2000) |
| *Tholurna dissimilis* | L | B A | No | N/A | Old-growth Douglas-fir (*Pseudotsuga menziesii*) subalpine fir (*Abies lasiocarpa)* |
| *Arcangeliella camphorata* | F | B S | Yes | Surveys not practical | Forms sporocarps beneath the soil surface associates with Douglas-fir and Western Hemlock. Fruits in Spring and Fall (Castellano 1999.) |
| *Bridgeoporus nobilissimus* | F | B S | No | N/A | Range of Pacific Silver Fir and Noble Fir. (Hibler and O'Dell 1998) |

| Scientific Name | Taxon | Status | Habitat Present | Survey complete | Habitat |
|---|---|---|---|---|---|
| *Dermocybe humboldtensis* | F | B S | Yes | Surveys not practical | Sporocarps usually occur in association with the roots of various Pinaceae ssp. Fruits in Fall. (Castellano 1999.) |
| *Phaeocollybia californica* | F | B S | Yes | Surveys not practical | Associated with the roots of Douglas-fir and Western Hemlock. Fruits in Spring and Fall. (Castellano 1999.) |
| *Phaeocollybia gregaria* | F | B S | Yes | Surveys not practical | Associated with the roots of Douglas-fir. Fruits in the Fall. (Castellano 1999.) |
| *Phaeocollybia olivacea* | F | B S | Yes | Surveys not practical | Scattered or in arcs in mixed forests containing Fagaceae or Pinaceae in coastal lowlands. Fruits in the Fall. (Castellano 1999.) |
| *Phaeocollybia oregonensis* | F | B S | Yes | Surveys not practical | Associated with the roots of Douglas-fir and Western Hemlock. Fruits in the fall. (Castellano 1999.) |
| *Ramaria spinulosa var. diminutiva* | F | B S | Yes | Surveys not practical | Fruits in humus or soil and matures above the ground, associated with Pinaceae ssp. Fruits in the Fall. (Castellano 1999.) |
| *Rhizopogon chamalelontinus* | F | B S | Yes | Surveys not practical | Found underground in association with the roots of Douglas-fir and Sugar Pine. (Castellano 1999.) |
| *Rhizopogon exiguus* | F | B S | Yes | Surveys not practical | Found in association with the roots of Douglas-fir and Western Hemlock. (Castellano 1999.) |

# Appendix D

# Consistency of the Proposed Action with the Aquatic Conservation Strategy

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 proposed Middle Fork Coquille Commercial Thinning and Density Management project is located entirely within the Middle Fork Coquille fifth-field watershed. There are no Key watersheds within the Middle Fork Coquille fifth-field watershed.

**Riparian Reserves:** This project is designed to restore species and structural diversity and accelerate the development of late-seral forest characteristics in Riparian Reserves and riparian forest.

**Watershed Restoration:** Two of the primary objectives of this project are to accelerate tree growth in Riparian Reserves, and speed the development and attainment of late-seral habitat conditions in LSRs. Consequently, the proposed action is considered to be a watershed restoration project. *Watershed Restoration* is the only ACS component that is an action, while the others are location-based or process-based).

**Watershed Analysis (and Other Information):** In development of the proposed commercial thinning and density management project, the Upper Middle Fork Coquille Watershed Analysis (USDI, BLM 1999) 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.

As described in this document (pp. 18-19), information from watershed analysis (WA, pp. 27 and 29) was used to describe the vegetative zones within the project area and (WA, pp. 23 and 37) the age class/seral class distribution of forest stands managed by the BLM and private entities. A description of Matrix stands (WA, p. 92) and LSR stands (WA, p. 96) potentially available for thinning and density management was also described.

A description of existing aquatic habitat conditions across the watershed was derived from Aquatic Habitat Inventory by the Oregon Department of Fish and Wildlife, supplemented by site-specific evaluation as discussed in the EA (pp. 29-30). A description of watershed conditions, with respect to flows and water quality is contained in the Water Resources section of the EA (pp. 32-34).

The direct effects of the proposed action on fish, aquatic habitat and Essential Fish Habitat are addressed (pp. 62-66). The effects were judged to be non-existent, or negligible and discountable without potential for cumulative effects at the watershed scale.

The direct effects of the proposed action on stream flows and water quality are also addressed (pp. 68-70). No measurable or detectable increases in peak flows are anticipated. Commercial thinning and density management would not affect stream temperature. Effects to sediment would be localized. The effects were judged to be non-existent, or negligible and discountable without potential for cumulative effects at the watershed scale. There would be no effects to the timing and quantity of flow delivery.

**Individual ACS Objective Assessment**

| ACS Objective | Site/Project Scale Assessment | 5th Field Watershed Scale Assessment |
|---|---|---|
| | Scale Description: The proposed project is located in the Headwaters Middle Fork Coquille River and Twelve Mile Creek sixth-field subwatersheds, encompassing roughly 47,000 acres. The BLM manages approximately 39 percent of the forested acres in the two subwatersheds. Units proposed for treatment total 855 acres representing 1.8 percent of the total forested area, and 4.7 percent of the BLM-managed forest lands. | Scale Description: The project area is located in the Middle Fork Coquille fifth-field watershed, which encompasses approximately 67,200 acres. The BLM manages approximately 26,000 acres or 39 percent of the watershed area. Units proposed for treatment represent 1.2 percent of the total watershed area, and 3.3 percent of the BLM-managed lands. |
| **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 Headwaters Middle Fork Coquille River and Twelve Mile Creek sixth-field subwatersheds, the proposed action would thin riparian stands in the Matrix and LSRs. As discussed in the EA (p. 64), trees within these treated stands would attain larger heights and diameters in a shorter amount of time than if left untreated, speeding the 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 subwatersheds, as described in the EA (p. 64), the proposed project would have no influence on aquatic connectivity because there would be no construction of any stream crossings with the potential to impede upstream and downstream movement of aquatic vertebrate and invertebrate species. Consequently, the proposed action 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 | As discussed in the EA (p. 69), thinning treatments would not reduce canopy closure to an extent that would influence water yields and in-stream flows, because the remaining trees generally use any increased soil moisture that becomes available following timber harvest. As further stated in the EA (p. 70), the buffers would also prevent disturbance to stream channels and stream banks, thus maintaining 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. |

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| **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 would ensure that water quality would not be adversely impacted by the proposed action. As discussed in the EA (p. 70), as variable width "no-harvest" buffers established along streams would retain shading and hence maintain water temperature. As further described, "no-harvest" buffers 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, water quality would be maintained 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 previously described, "no-harvest" buffers 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, thus maintaining 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. | As discussed in EA (pp. 69-70), thinning would not reduce canopy closure to the extent it could potentially influence in-stream flows, nor would partial removal of vegetation on 3 to 4 percent of each affected sub-watershed. New road construction would not extend the drainage network or contribute to a potential increase in peak flow because the roads would be located on ridge tops or stable side slopes and disconnected from the drainage network. This 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. | An objective of the proposed action treatment is to return riparian forest, and in the added case of LSRs, upland 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. |

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| **9.** Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species. | As mentioned previously, one of the objectives of the proposed action is to restore riparian stand conditions. Implementation of riparian restoration projects will help restore adequate habitat to support riparian-dependent species at the site scale. | The riparian restoration components of the proposed action would help restore adequate habitat to support riparian-dependent species at the watershed scales. |

**Summary:** Based upon the information discussed above, the proposed action would meet Aquatic Conservation Strategy objectives at the site and watershed scale, and based upon the restorative nature of the action, this project would not retard or prevent attainment of ACS objectives. In many instances, 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
# CRITICAL ELEMENTS OF THE HUMAN ENVIRONMENT

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

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

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