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Long Tom Landscape Plan

**UNITED STATES**
**DEPARTMENT OF THE INTERIOR**
**BUREAU OF LAND MANAGEMENT**
**EUGENE DISTRICT OFFICE**

**ENVIRONMENTAL ASSESSMENT**
**DOI-BLM-OR-E050-2009-0006-EA**
**Long Tom Landscape Plan**

## INTRODUCTION

This Environmental Assessment (EA) analyzes alternatives for timber harvest and related management activities within the Long Tom Planning Area located in the Siuslaw Resource Area of the Eugene District BLM (see attached map). The Long Tom Planning area consists of the fifth field Hydrologic Unit Code (HUC) of the Long Tom River. A few acres outside the fifth field HUC along the ridge tops of adjacent watersheds have also been included in this planning effort to facilitate thinning of stands with similar stand conditions to those in the Long Tom River Watershed.

BLM administered lands within the Long Tom watershed consist of approximately 21,000 acres with 13,000 acres in Matrix and adjacent Riparian Reserve land use allocations, and approximately 8,000 acres designated as Late-Successional Reserves (LSR) and adjacent Riparian Reserves.

Thinning is being considered on approximately 9,280 acres with approximately 5,700 acres in the Matrix (including Riparian Reserves) land use allocation (LUA) and approximately 3,540 acres in the late-successional reserve (including Riparian Reserves) LUA.

Actions that are analyzed in this EA include density management, commercial thinning, culvert replacements, road construction, road renovation/improvement and road decommissioning.

## PURPOSE AND NEED

The purpose of these actions is to:

- Conduct commercial thinning and other treatments on overstocked stands in the Matrix LUA to provide timber and to improve forest health and habitat functionality.
- Implement silvicultural treatments, including density management thinning, in the Late-Successional Reserves and Riparian Reserve LUAs to accelerate the development of structural characteristics that occur in late-successional forests.
- Improve riparian function in the Riparian Reserve LUAs to contribute to the attainment of Aquatic Conservation Strategy (ACS) objectives.
- Improve growing conditions for individual oak trees in all LUAs.

The need is established in the Eugene District Record of Decision and Resource Management Plan (RMP) (June 1995).

Specifically, the RMP directs that:

Matrix lands be managed to provide a sustainable supply of timber, to promote structural components and the desired species composition for maintaining ecological function and productivity of the forest ecosystem and provide connectivity and dispersal habitat for late successional species.

In the Late-Successional Reserve LUA density management treatments designed to maintain, protect and enhance late successional conditions would be promoted.

Actions to be undertaken in Riparian Reserves include density management to attain Aquatic Conservation Strategy objectives that restore and maintain the ecological health of watershed and aquatic ecosystems by promoting the development of large conifers and improving species composition. The Long Tom Watershed Analysis (USDI BLM, 2000) substantiates the need for the action in the Riparian Reserves.

One goal of the Late-Successional Reserve system is to maintain biological diversity associated with native species (1995 RMP p.18). On Matrix lands the 1995 RMP (page 85) directs us to maintain plant communities and associations. ACS objectives include maintenance of species diversity in Riparian Reserves. The oak treatments would achieve the above objectives.

## CONFORMANCE WITH LAND USE PLANS

All alternatives are in conformance with the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the range of the Northern Spotted Owl (known as the Northwest Forest Plan) (USDA Forest Service and USDI Bureau of Land Management, April 1994), and the Eugene District Resource Management Plan (June 1995). Additional information has been documented in the Long Tom Landscape Plan analysis file. This file and the above referenced documents are available for review at the Eugene District Office.

## SCOPING AND ISSUES

External scoping for this Environmental Assessment was completed between September and October 2009. Internal scoping was completed during the Interdisciplinary team meetings from June through October 2009. The purpose and need for the action, design features incorporated into the alternatives and the issues analyzed were based on scoping comments received for this Environmental Assessment.

## AQUATIC CONSERVATION STRATEGY

**ISSUE 1: <u>What are the effects of timber harvest and associated activities on the attainment of Aquatic Conservation Strategy (ACS) objectives?</u>**

**Actions proposed within the Riparian Reserves and adjacent uplands may affect the attainment of ACS objectives.** Initial evaluation of this issue determined that ACS objectives 1, 4, 6, 7 and 9 would be maintained under all action alternatives, whereas effects on ACS objectives 2, 3, 5 and 8 could differ by alternative. Analysis of this issue will compare how each alternative contributes toward attainment of ACS objectives 2, 3, 5 and 8. The Long Tom Watershed contains native species of fish such as cutthroat trout, and actions are proposed that may affect their habitat.

Measures:
*<u>ACS No. 2</u>: Connectivity within watershed maintained, restored, or degraded by measuring:*

- Number of barrier culverts removed and/or replaced with non-barrier culverts.

*<u>ACS No. 3</u>: Physical integrity of the aquatic system maintained, restored, or retarded by measuring:*

- Number of stream crossings removed or added.
- Number of culverts upgraded.

*<u>ACS No. 5</u>: Sediment regime maintained, restored, or retarded by considering:*

- Miles of existing road with sediment delivery potential decommissioned.
- Number of high risk culverts removed or replaced.
- Percent increase in short term sediment delivery due to increased timber haul.
- Percent decrease in long term sediment delivery due to the addition of cross drain culverts.
- Miles of road construction, renovation and improvement with sediment delivery potential.

*<u>ACS No. 8</u>: Structural diversity maintained, enhanced or restored by considering:*

- Number of acres of Riparian Reserves treated to accelerate late-successional characteristics.

## WILDLIFE

**ISSUE 2: <u>What are the effects of management activities on spotted owl suitable habitat, potential suitable habitat and dispersal habitat within the planning area?</u>**

Conifer forests that are eighty years of age and older are defined as suitable habitat for spotted owls. Suitable habitat is considered to be essential nesting, roosting and foraging habitat for spotted owls within their home ranges. Potential suitable habitat consists of 50 to 80 year old stands that may provide nesting, roosting and foraging habitat. Conifer forests 40 to 50 years of age with minimum 40% canopy closure are considered dispersal habitat for spotted owls. Thinning may impact spotted owl habitat and analysis of this issue would allow for comparison of the effects of thinning treatments between alternatives.

***Measure**: Acres of suitable and dispersal habitat thinned in the planning area and within known spotted owl home ranges.*

**ISSUE 3: <u>What are the effects of management activities on spotted owl nest patches within the planning area?</u>**

The U.S. Fish and Wildlife Service considers the suitable habitat located within the 300 meter radius nest patch around known spotted owl nest sites to be critical for spotted owl survival. Thinning may impact habitat within nest patches and analysis of this issue would allow for comparison of the effects from thinning treatments within nest patches, between alternatives.

***Measure**: Acres of habitat modified within the 300m nest patch surrounding known spotted owl sites.*

**ISSUE 4: <u>What are the effects of management activities on spotted owls in the South Willamette – North Umpqua Area of Concern within the planning area?</u>**

Approximately 3,320 acres of the planning area are located within the South Willamette – North Umpqua Area of Concern. The Area of Concern is considered to be a critical link for genetic interchange between spotted owls in the Cascades and Coast Range Mountains. Thinning may limit the ability of spotted owls to disperse throughout the area of concern. Analysis of this issue would allow for comparison of the effects of thinning treatments in the AOC between alternatives.

***Measure**: Acres of dispersal and suitable habitat thinned in the South Willamette – North Umpqua Area of Concern within the planning area.*

## BOTANY/INVASIVE SPECIES

**ISSUE 5: <u>What are the effects of management activities on the spread of invasive species?</u>**

Ground disturbance and a decrease in canopy closure generally lead to an increase in invasive non-native and noxious weeds, as reported in published literature and from field observations within the Eugene District. Analysis of this issue will determine the increase of non-native and noxious weed cover resulting from ground disturbing activities and decreases in canopy closure proposed in the action alternatives.

***Measure**: Acres with probable cover of noxious weeds caused by thinning, road work and landings.*

## LOGGING SYSTEMS

**ISSUE 6: <u>What are the effects of logging systems on the cost of yarding, road construction and road renovation?</u>**

Each of the action alternatives employs a different combination of logging systems due to design constraints, environmental concerns, and the extent of area treated. Costs of yarding, road construction, and road renovation/improvement would vary by alternative. Analysis of these costs will provide a means to compare cost-effectiveness among alternatives.

***Measure**: Cost per acre and cost per thousand board feet (MBF).*

## HAZARDOUS FUELS

**ISSUE 7: <u>How will management activities affect the amount of hazardous fuels in the Wildland-Urban Interface (WUI)?</u>**

The entire planning area is identified as WUI, where wild fire is of particular concern. Proposed management activities for the action alternatives could alter the amount of hazardous fuels within the WUI, thereby affecting the risk of catastrophic loss of property and resources should a fire occur. Analysis of this issue allows for comparison of the risk of fire among alternatives.

***Measure**: Acres of hazardous Fuel Models (FMs) in WUI over time.*

## CARBON RELEASE AND STORAGE

**ISSUE 8: <u>How will management activities affect the release or storage of carbon?</u>**

Carbon is the primary component of the two principal greenhouse gases, carbon dioxide and methane. The proposed commercial thinning would result in carbon being released because of harvested wood, slash treatment, biomass recovery, and fuel consumption for timber operations, followed by carbon accumulations due to growth of trees and carbon storage (sequestration) in wood products from harvested wood. Analysis of this issue compares the action alternatives with the no action alternative to estimate the amount of carbon released and amount of carbon accumulated and stored as a result of timber harvest. The effects analysis

considers net changes in carbon storage from live tree carbon in the short-term and long-term (30 years post harvest).

***Measure**: Tonnes of carbon released during timber harvest, slash burning, biomass recovery and fuel consumption. Metric tons of carbon accumulated and stored due to tree growth.*

## ISSUES CONSIDERED BUT NOT FULLY ANALYZED

**What are the effects of management actions on stream temperature?**

*This issue was considered but not fully analyzed because the results of the Rapid shade modeling in the Long Tom River (LTR) Watershed indicated that existing effective shade for perennial streams on BLM lands is relatively high compared to probable (site capability) shade (USDI BLM 2008). The existing modeled shade for perennial streams on BLM land were a mean of 68% (88% median value) whereas the system potential shade for the same streams is a mean of 72% (89% median value) for a net potential shade gain of 4% (1% median). It was estimated that approximately 84% of the perennial streams on BLM land meet or exceed the target shade value in the LTR Watershed (USDI BLM 2008). Growth curves indicate the riparian vegetation along BLM perennial reaches not currently meeting the target shade values (in the LTR Watershed) would reach system potential tree height in 30 to 47 years, depending on channel size. This would occur through passive growth of riparian vegetation. The average existing shade level for all modeled streams (all ownerships) in the LTR Watershed is currently about 27% (USDI BLM 2008). All of the alternatives would implement the "sufficiency analysis" and maintain a minimum sixty foot buffer; as a result none of the alternatives would affect stream temperature. Research has indicated that shade-producing vegetation is an effective method in reducing solar radiation to streams (Brazier and Brown 1972, Beschta et al. 1987). Streams listed for temperature deficiencies by the Oregon Department of Environmental Quality Willamette Basin TMDL (2006) for the Long Tom River Watershed are listed below. The BLM (Eugene District) has completed a Water Quality Restoration Plan (WQRP) in 2008 for the Willamette basin.*

Temperature Water Quality Limited Streams in the Planning Area

| Waterbody | River Mile | Parameter | Season | List date |
|---|---|---|---|---|
| Coyote Creek | 0 to 26.2 | Temperature | Summer | 2006 |
| Ferguson Creek | 0 to 10 | Temperature | Summer | 2006 |
| Long Tom River | 0 to 24.2 | Temperature | Summer | 2006 |

**What are the effects of management actions on dissolved oxygen in streams?**

*This issue was considered but not fully analyzed. Dissolved oxygen (D.O.) was not addressed in the WQRP because of the lack of a causal link to BLM management activities in the sub-basin (USDI BLM 2008). Areas with high stream temperatures combined with low stream gradients, low flow, high loading of fine organic material, and high respiration (bacteria, algae) can cause low dissolved oxygen in stream reaches. Nutrients and organic chemicals can enter the water from fertilizing, livestock use, and chemical spraying; particularly in agricultural, rural, and urban areas. Coyote Creek and the Amazon Diversion channel have been listed for failing to meet minimum water quality standards for D.O. in the Watershed. BLM administered lands in the watershed are generally located in headwater areas that are often steep, turbulent streams with oxygen saturated waters that rapidly re-aerate. Fertilization is not currently planned on BLM lands within the Watershed. Large inputs of fine organic material into low gradient streams are unlikely to occur under any of the management actions. Streams listed for dissolved oxygen deficiencies within the Long Tom basin addressed in the Oregon Department of Environmental Quality Willamette Basin TMDL (2006) for the Long Tom River Watershed are listed below.*

Dissolved Oxygen Water Quality Limited Streams in the Planning Area

| Waterbody | River Mile | Parameter | Season | List date |
|---|---|---|---|---|
| Coyote Creek | 0 to 26.2 | Dissolved Oxygen | Spring/Summer/Fall | 2006 |
| Amazon diversion canal* | 0 to 1.8 | Dissolved Oxygen | Spring/Summer/Fall | 2006 |

*Stream/water body not located within the EA project area.

**What are the effects of management actions on peak flows?**

*The majority of the precipitation in the Long Tom Watershed is in the form of rainfall between November and March. Snow is usually not a significant contributor to annual precipitation but does occasionally occur at any elevation within the LTR Watershed. The planning area is characterized as a relatively low elevation watershed (250' to 2080' above sea level). The majority (about 95 %) of the LTR Watershed is below 1000' in*

*elevation. The highest elevation areas are located along the northwestern and southern boundaries of the Watershed. Areas that are most susceptible to rain-on-snow events in this portion of the coast range are typically above 2000' (Greenberg and Welch 1998). Less than 20 acres in the LTR Watershed are above 2000' and less than 1% of the total area is above 1500'. None of the action alternatives would harvest more than 5% of the area above 1,200' elevation in any of the sub-watersheds. This area is a low risk for impacts from rain-on-snow events using either the Oregon Watershed Enhancement Board (OWEB) or Washington Forest Practices Board (WFPB 1997) methodologies.*

*All alternatives are expected to have a slightly beneficial impact on peak flows by reducing the number of road miles connected to stream channels via decommissioning or adding cross drains to existing roads. The application of BMPs in road, harvest, and yarding design would substantially mitigate the amount of compaction from any of the action alternatives.*

**What are the effects of management actions on Special Status Species Plants?**
*This issue was considered but not fully analyzed because under all action alternatives, site specific botanical surveys would be conducted during the design phase of individual projects prior to implementation. If any Special Status plants are found, they would be managed in accordance with land use objectives and Special Status Species management policies at the time of implementation.*

**What are the effects of management actions on Special Status Species Fish and Wildlife?**
*This issue was considered but not fully analyzed because under all action alternatives, site specific design features will be implemented in accordance with land use objectives and Special Status Species management policies at the time of implementation. Habitat occupied by special status fish species would be protected by untreated riparian buffers and seasonal use restrictions on haul routes with sediment delivery.*

## ALTERNATIVES CONSIDERED BUT NOT FULLY ANALYZED

Interpretation of Government Land Office records from the 1800's suggested that the Long Tom watershed may have contained oak savanna type habitat (Christy and Alverson 2004). An oak savanna habitat restoration alternative that would have analyzed thinning treatments with very wide spacing in very young conifer plantations (approximately 20 to 25 years of age) was considered but not analyzed in this document because the project areas being considered are atypical for oak savanna ecotypes. Instead other areas in the watershed that may respond to oak savanna restoration would be analyzed in a separate environmental document. Analysis of the affected environment has indicated the presence of sparsely scattered individual oak trees in the project area which would receive a quarter acre opening to improve growing conditions in all action alternatives.

## ALTERNATIVES

Four action alternatives that consider management activities on 5,700 acres within the Matrix (General Forest Management Allocation and Connectivity) and adjacent Riparian Reserve LUAs as well as 3,540 acres within the Late Successional Reserve and adjacent Riparian Reserve LUAs have been analyzed. The no action alternative has also been analyzed. Table 9 attached as an appendix provides a summary of the alternatives. All references made to treatments in Matrix or LSR LUAs include the associated Riparian Reserves unless specified.

**Features common to all action alternatives**
The proposed action would be implemented over a 10 year period. Stand ages during analysis and implementation would use the calendar year 2010 as the base year. Stands less than 30 years of age are not being considered for treatment in this EA.

**Design Features for the action alternatives:**
The following general design features would be implemented in conjunction with the proposed action and other action alternatives. Project design features are operating procedures used to avoid or reduce adverse environmental impacts as developed by the interdisciplinary team, and can be incorporated as required standards and guidelines included in a timber sale contract. Best Management Practices (BMPs) from the Eugene District RMP (1995) will be applied where needed (pages 155 – 174).

**General**
1. All Pacific yew would be retained to the maximum extent possible, to maintain diversity of tree species.
2. Un-merchantable tree tops and limbs would not be yarded to the landing and would be left on site to contribute to soil productivity where feasible and not in conflict with hazardous fuels objectives.

3. Additional rock may be placed on existing rocked roads to accommodate timber haul.
4. All streams would receive a minimum buffer of sixty feet within which no thinning would occur and current standards would be followed at the time of implementation to maintain stream temperature. Road crossings, yarding corridors and cable corridors would be placed across streams and their buffers as needed. The criteria used to maintain stream temperature would consider topography, slope characteristics, canopy cover, under and overstory species/density, proximity to roads, skid trails, landings and silvicultural prescriptions in the adjacent Riparian Reserves.
5. All new or replaced permanent stream crossings culverts, and temporary stream crossing culverts in place for more than one summer season, would be sized to accommodate 100 year storm events to reduce the risk of failure during high flow conditions.

**Silviculture**

6. Harvest activities would not occur during sap flow season (generally April 15 – June 15) to limit bark/cambium damage to residual trees, unless waived by the Authorized Officer. Log lengths would be restricted to a maximum of 40 feet in order to protect residual trees during yarding, unless waived by the Authorized Officer.
7. Those areas that are not treated by density management projects in Late Successional Reserve and Riparian Reserve land use allocations may be evaluated for non-commercial treatments using girdling and drop and leave.

**Logging Systems**

8. Aerial yarding would be used when access limitations preclude conventional logging systems. Access limitations may include, but are not limited to seasonal concerns; stream crossings; or inaccessibility by conventional road construction and/or renovation due to topography or legal access constraints.
9. All cable yarding would be to designated or approved landings. Landings would be located to minimize impacts to reserve trees and soils.
10. Cable corridors would be kept approximately 150 feet apart at one end, where possible to minimize impacts to reserve trees, and would be limited to 12 feet in width. A cable system capable of lateral yarding 75 feet would be used.
11. A minimum of one-end suspension would be required when cable yarding. Intermediate supports could be necessary to achieve the required suspension.
12. Full suspension of logs would be required when yarding logs across streams.
13. Skyline cable corridors could be necessary through Riparian Reserves, including untreated stream buffers, in order to gain additional lift or deflection of the skyline, and to attain the required suspension of logs during yarding. Intermediate supports or lift trees could be needed to attain the required suspension. Trees in the skyline cable corridors located within the untreated stream buffers would be felled, left parallel to the stream to the extent possible, and retained on site to provide down wood.
14. Directional felling and yarding away from streams would be required where feasible to provide for streambank stability and water quality protection.

**Ground-based Yarding**

15. Ground-based yarding would be limited to slopes less than 35 percent. All ground based yarding would be to designated or approved landings. No ground-based yarding would occur on sensitive soils.
16. Ground-based yarding operations would only occur when soil moisture content provides the most resistance to compaction (generally during the dry season), as approved by the Authorized Officer.
17. All skid trails would be pre-designated, approved by the Authorized Officer, and would occupy less than 10% of the ground based yarding area. Existing skid trails would be used wherever possible. Trees would be felled to lead to the skid trail. Ground-based yarding could occur in the Riparian Reserves, but ground-based yarding equipment would generally operate 75 feet away from the harvest unit boundary.
18. All skid trails would be limited to 12 feet in width or less. Excavation (gouging) on skid trails would not exceed one foot in depth. After project completion, as needed, compacted skid trails would be de-compacted using appropriate equipment, and covered with slash.

**Noxious Weeds**

19. In order to slow the spread of noxious weeds, all yarding and road construction equipment would be cleaned prior to arrival on BLM-managed land. Other measures that may be implemented on a case-by-case basis include:

- pre-treating areas of concentrated invasive species adjacent to haul roads.
- pioneering roads outward from within the stand to keep weed seed from further entry into the stand.
- avoiding construction of truck turn-arounds or equipment staging in known noxious weed populations.
- sowing native seed and using weed free straw to restore areas of soil disturbance.

20. Evaluate sites using criteria from the BLM Manual 9015 for risk assessment and based on site conditions, recommend treatment and monitoring of the site.

**Wildlife**

21. Management activities would not occur within the disruption distance of a 1) known nest tree 2) nest patch of an occupied known site (if the nest tree is not known), during the critical breeding period for spotted owls (March 1st – July 7th, both days inclusive).
22. Thinning would maintain 60% canopy closure within suitable habitat of all occupied known spotted owl home ranges located in the Area of Concern.
23. Management activities would not occur within the disruption distance of marbled murrelet occupied habitat, during the critical portion of the breeding period (April 1 – August 5, both days inclusive)
24. For the purpose of long term productivity and maintenance of biological diversity, all down coarse woody debris of advanced decay (Decay Class 3, 4 or 5) would be retained on site.
25. To provide habitat for cavity dependant wildlife and to protect the future source of downed logs, snags not posing a safety hazard would be reserved. Directional felling and yarding would be utilized to protect residual green trees and snags consistent with the Occupational Safety and Health Administration (OSHA) practices. Snags felled for safety reasons would be retained as downed wood.

**Fuels**

26. To reduce potential sources of intense fire behavior and long term spotting in event of a wildfire, landing piles not utilized for biomass or scattered over decommissioned roads would be covered and burned.
27. If necessary to reduce roadside fire intensity and increase safe ingress and egress for the public and fire fighters in the event of a wildfire, slash within 25 feet of roads remaining open after harvest would be piled, covered and burned if not utilized for biomass. Roads that remain closed may also have slash within 25 feet of the road piled, covered and burned if not utilized for biomass to reduce risk of fire hazard to nearby homes, where relevant. Material larger than 9” in diameter would be left out of the piles.
28. If necessary to reduce fire hazard to nearby homes, firebreaks would be created by removing slash using yarding methods or burning the material on-site. Firebreaks would be located on ridge tops or other locations which enhance the ability of firefighters to protect nearby homes from wildfire.

**The following is a summary of actions for roads**: A combination of field data and GIS databases were used to determine possible harvest locations and yarding systems which aided in the estimate of miles of road construction and renovation/improvement for each alternative. An extensive road survey provided additional information about possible haul routes and the types of road renovation/improvements needed for haul. A road inventory conducted in 2009 identified locations where relief culverts could be added on BLM controlled roads to reduce existing sediment delivery by 5 to 10 miles in the planning area. The inventory indicated that approximately 75 to 150 cross drains would be added to achieve this.

- Road renovation/improvement: All existing roads including non-inventoried would be renovated or improved to meet design features. Actions could include clearing vegetation, grading, and/or widening road grades to minimum width standards.
- New road construction: Generally, new roads would be built to current standards in accordance with BMPs.
- Non-inventoried roads: Old, compacted jeep roads, skid trails or logging roads from past activities would be utilized wherever possible, unless their locations would not meet land management standards. Road locations would be determined in conjunction with BMPs for timber yarding.
- Decommissioning: Roads would be decommissioned as needed after project completion following the Western Oregon Districts BLM Transportation Management Plan guidelines (draft 2010). Prior to decommissioning a road there will be an evaluation of the following situations: 1) future use of the road, 2) private access (e.g., right of ways), 3) County Commissioner approval, 4) public access needs, 5) illicit dumping/use, 6) potential for environmental damage (e.g., sediment delivery, weeds, damage from illegal Off Highway Vehicles use), and 7) current road surfacing (dirt or gravel).

Design Features: Design features that would be considered during site specific decommissioning evaluations are listed below. Any of these design features could be used to decommission roads:

**Natural Surfaced (dirt roads)**
Natural surfaced renovated roads, newly constructed natural surfaced spur roads, and landings requiring operation during more than one dry season would be placed in an erosion resistant condition and temporarily blocked prior to the onset of wet weather. This could include construction of drainage dips, water bars, lead-off ditches, or barricades.

Decommissioning of the road could include any of the following measures:

- discontinuing road maintenance
- full obliteration of the road bed
- de-compacting the road surface with a dozer and subsoiler implement or a track mounted excavator
- scarifying roads for creation of planting areas
- removing unstable side cast from fill-slopes
- filling and re-contouring cutslope ditch lines to the adjacent hill slope
- removing stream crossing culverts
- stabilizing stream crossings (e.g. re-contouring road crossing fill, placing mulch or mats and seeding for erosion control, placing rock and logs)
- installing water bars, cross sloping or drainage dips to ensure drainage is filtered onto vegetated areas and away from streams or unstable road fills
- blocking roads using barricades, gates, or earth-berm barriers
- placing slash, boulders, and/or root wads where available on the road surface to deflect runoff, discourage motorized vehicle use, and promote vegetative growth
- seeding or planting for erosion control, weed exclusion and re-vegetation

**Surfaced Roads (gravel roads)**
Surfaced roads (gravel) and landings to be decommissioned would use any of the following measures and would be left in an erosion-resistant condition:

- discontinuing road maintenance
- leaving rock in place
- de-compacting the gravel surface
- blocking roads using barricades, gates, or earth-berm barriers
- installing water bars or drainage dips to ensure drainage is filtered onto vegetated areas and away from streams or unstable road fills
- removing fill on unstable areas along existing roads
- removing culverts and establishing water bars where needed to eliminate delivery potential to stream channels
- removing rock and road re-contouring could occur if road is eligible for a full obliteration
- treating exposed soils to reduce sedimentation if needed by utilizing slash and/or seeding, for erosion control, weed exclusion and re-vegetation
- placing slash, boulders, and/or root wads where available on the road surface to deflect runoff, and discourage motorized vehicle use

**Road Decommissioning by land use allocation:** The following is the decommissioning strategy by land use allocation for all action alternatives.

**Matrix and associated Riparian Reserves:**

- Newly constructed and renovated/improved natural surface roads.
- Newly constructed and renovated/improved roads within late-successional stands that are natural surface or have been rocked to facilitate harvest activities but are not needed for future management.

**LSR and associated Riparian Reserves:**

- All newly constructed and non-inventoried roads used for harvest activities.
- Renovated/improved roads within late-successional stands that are natural surface or have been rocked to facilitate harvest activities but are not needed for future management

## ALTERNATIVE 1 – NO ACTION ALTERNATIVE

Under this alternative none of the management actions proposed would occur. There would be no commercial thinning or density management thinning within the Matrix, Late-Successional Reserve or Riparian Reserve

land use allocations. No road construction or road renovation/improvement or road decommissioning would occur. Actions specifically required by the RMP or by law or policy would occur, such as wildfire suppression, salvage harvest in response to insects, disease or fire, felling of hazard trees along roads or trails, road maintenance, timber haul and road construction by adjacent landowners.

## PROPOSED ACTION ALTERNATIVES

**Alternative 2:** *Maintain spotted owl dispersal habitat in Matrix and LSR lands and associated Riparian Reserves. Create complexity and thin to promote structural diversity in LSR lands and associated Riparian Reserves. Minimize impacts to owl nest patches.*

This alternative analyzes thinning in forest stands between 30 and 79 years of age.

*Matrix treatments (approximately 5100 acres including 2100 acres in Riparian Reserves):* Forest stands between 30 and 79 years of age would be ―thinned from below" in treatments that remove predominantly small diameter trees to improve growing conditions of the remaining larger dominant trees in the stands. Forest stands would be thinned using the traditional silvicultural technique of thin from below to relative densities in the mid-thirties, generally ranging from 32 to 38. Spotted owl dispersal habitat would be maintained to USFWS standards. Individual oak trees would receive approximately ¼ acre openings. Where oaks are clumped together the canopy may be removed up to approximately half acre after recommendation from the unit biologist where such an opening in canopy cover would not reduce overall spotted owl dispersal habitat.

*LSR treatments (approximately 3000 acres including 1255 acres in Riparian Reserves):* Forest stands between 30 and 79 years of age would be thinned using a silvicultural technique to introduce variation in forest structure and complexity. Forest stands in LSRs would be thinned using a proportional thinning technique to relative densities generally ranging from 26 to 35. This activity would occur in stands less than 80 years old at the time of treatment and within the LSR LUA. About 85 percent of stands proposed for this treatment are 40-79 years old. This treatment would maintain a minimum average canopy cover of 40% throughout the stand, and is intended to facilitate the development of late successional and old growth forest structural characteristics while maintaining dispersal habitat. This treatment would downgrade potentially suitable habitat (50 to 80 years) to dispersal habitat. Proportional thinning in stands from 59 to 79 years of age may receive a lighter thinning to a relative density of 40 based on stand conditions.

Of the approximately 8100 acres being thinned approximately 7965 acres lie in the Long Tom River Watershed and approximately 135 acres lie in adjacent watersheds overlapping ridges demarcating the watersheds. See the table below:

| Watershed Name | ~Acres |
|---|---|
| Long Tom River | 7965 |
| Wildcat Creek | 89 |
| Lake Creek | 25 |
| Wolf Creek | 15 |
| Upper Siuslaw River | 5 |
| Lower Coast Fork Willamette River | 1 |

**Stream buffers**: All streams would receive a minimum buffer of approximately 60 feet within which no thinning would occur. Other actions such as road construction, yarding and cable corridors may cross streams and would be subject to design features as described in the ―Features common to all alternatives – general design feature 4".

**Spotted Owl Nest Patches:** Thinning would not occur in nest patches of known owl sites and all predicted owl sites would be surveyed to protocol to determine non-occupancy prior to thinning within nest patches in Matrix and LSR lands.

CWD and Snags:
*Matrix and associated Riparian Reserves*: CWD and snag recruitment would occur through natural processes.

*LSR and associated Riparian Reserves*: Coarse woody debris would be created during thinning harvest of stands when existing levels of coarse woody debris do not meet the levels defined below. Stands would be assessed for snags either during thinning treatments or three to five years post-treatment and new snags would be created when existing levels of snags do not meet the levels defined below. Snags would be located

within treated stands and/or adjacent stands and may be clumped or scattered within forest stands; snags considered a hazard under OSHA standards may be felled due to safety concerns during operations.

| | CWD Retention or Creation | | | Snag Retention or Creation | |
|---|---|---|---|---|---|
| **Stand QMD* (pretreatment)** | **Total** | **Component Diameters**** | **Component Lengths** | **Total** | **Component Diameters** |
| >14 in | 120-240 ft/ac | >14 in | >20 ft | 6.5 sq feet basal area/acre (approximately 4 to 6 trees per acre) | >=14 in dbh |
| ≤14 in | 120 ft/ac | >12 in | >20 ft | 2.4 sq feet basal area/acre (approximately 2 to 3 trees per acre) | >=12 in dbh |

* Quadratic Mean Diameter
** large end

*Source: DECAID- provides recommendations for snag densities based on correlations between habitat and species occurrences; from the Western Oregon Planning Revisions Environmental Impact Statement, 2008.*

**Yarding:** Yarding would consist of approximately 5710 acres cable, 2190 acres ground-based and 200 acres helicopter.

**Roads:** Roads would be constructed or renovated/improved as needed. Approximately 30 to 35 miles of construction and approximately 195 to 200 miles of road renovation/improvement would occur over the life of the plan. Refer to features common to all alternatives for a summary of actions for roads including decommissioning.

**Alternative 3:** *Maintain spotted owl dispersal habitat in Matrix and LSR lands and associated Riparian Reserves. Use traditional silvicultural methods to favor the largest trees. Thin within spotted owl nest patches using traditional silvicultural methods.*

This alternative analyzes thinning in forest stands aged between 30 and 99 years of age.

*Matrix treatments (approximately 5740 acres including 2320 acres in Riparian Reserves):* Forest stands between 30 and 99 years of age would be ~~"~~thinned from below" in treatments that remove predominantly small diameter trees to improve growing conditions of the remaining larger dominant trees in the stands. Forest stands aged between 30 and 79 years would be thinned using the traditional silvicultural technique of thin from below to relative densities in the mid-thirties, generally ranging from 32 to 38. Forest stands aged between 80 and 99 years would also be thinned using the traditional silvicultural technique of thin from below to relative densities generally ranging from 35 to 40. Spotted owl dispersal habitat would be maintained to USFWS standards. Individual oak trees would receive approximately ¼ acre openings. Where oaks are clumped together the canopy may be removed up to approximately half an acre after recommendation from the unit biologist where such an opening in canopy cover would not reduce overall spotted owl dispersal habitat.

*LSR treatments (approximately 3540 acres including 1460 acres in Riparian Reserves):* Forest stands aged between 30 and 79 years of age would be ~~"~~thinned from below" in treatments that remove predominantly small diameter trees to improve growing conditions of the remaining larger dominant trees in the stands. Forest stands would be thinned using the traditional silvicultural technique described above to relative densities in the mid-thirties, generally ranging from 32 to 38. Spotted owl dispersal habitat would be maintained (to USFWS standards).

Of the approximately 9280 acres being thinned approximately 9120 acres lie in the Long Tom River Watershed and approximately 160 acres lie in adjacent watersheds overlapping the ridges demarcating the watersheds. See the table below:

| **Watershed Name** | **~Acres** |
|---|---|
| Long Tom River | 9120 |
| Wildcat Creek | 89 |
| Lake Creek | 25 |
| Wolf Creek | 40 |
| Upper Siuslaw River | 5 |
| Lower Coast Fork Willamette River | 1 |

**Stream buffers:** All streams would receive a minimum buffer of approximately 60 feet within which no thinning would occur. Other actions such as road construction, yarding and cable corridors may cross streams and would be subject to design features as described in the "features common to all alternatives – general design feature 4".

**Spotted Owl Nest Patches:** Thinning would occur in nest patches of known and predicted owl sites within Matrix and LSR lands.

**CWD and Snags:**

*Matrix and associated Riparian Reserves*: CWD and snag recruitment would occur through natural processes.

*LSR and associated Riparian Reserves*: Coarse woody debris would be created during thinning harvest of stands when existing levels of coarse woody debris do not meet the levels defined below. Stands would be assessed for snags either during thinning treatments or three to five years post-treatment and new snags would be created when existing levels of snags do not meet the levels defined below. Snags would be located within treated stands and/or adjacent stands; snags considered a hazard under OSHA standards may be felled due to safety concerns during operations.

| | CWD Retention or Creation | | | Snag Retention or Creation | |
|---|---|---|---|---|---|
| **Stand QMD* (pretreatment)** | **Total** | **Component Diameters**** | **Component Lengths** | **Total** | **Component Diameters** |
| >14 in | 120-240 ft/ac | >14 in | >20 ft | 6.5 sq feet basal area/acre (approximately 4 to 6 trees per acre) | >=14 in dbh |
| ≤14 in | 120 ft/ac | >12 in | >20 ft | 2.4 sq feet basal area/acre (approximately 2 to 3 trees per acre) | >=12 in dbh |

* Quadratic Mean Diameter
** large end

*Source: DECAID- provides recommendations for snag densities based on correlations between habitat and species occurrences; from the Western Oregon Planning Revisions Environmental Impact Statement, 2008.*

**Yarding:** Yarding would consist of approximately 6720 acres cable, 2355 acres ground-based and 205 acres helicopter.

**Roads:** Roads would be constructed or renovated/improved as needed. Approximately 30 to 35 miles of construction and approximately 195 to 200 miles of road renovation/improvement would occur over the life of the plan. Refer to features common to all alternatives for a summary of actions for roads including decommissioning.

**Alternative 4 (Preferred alternative):** *Maintain spotted owl dispersal habitat in Matrix and associated Riparian Reserves. Create complexity and thin to promote structural diversity in LSR lands and associated Riparian Reserves. 25% of the LSR lands thinned to open conditions for long term gain. Minimize impacts to owl nest patches.*

This alternative analyzes thinning in forest stands aged between 30 and 99 years of age.

*Matrix treatments (approximately 5650 acres including 2280 acres in Riparian Reserves):* Forest stands between 30 and 99 years of age would be "thinned from below" in treatments that remove predominantly small diameter trees to improve growing conditions of the remaining larger dominant trees in the stands. Forest stands between 30 and 79 years of age would be thinned using the traditional silvicultural technique of thin from below to relative densities in the mid-thirties, generally ranging from 32 to 38. Forest stands aged between 80 and 99 years of age would be thinned using the traditional silvicultural technique of thin from below to relative densities generally ranging from 35 to 40. Spotted owl dispersal habitat would be maintained to USFWS standards. Individual oak trees would receive approximately ¼ acre openings. Where oaks are clumped together the canopy may be removed up to approximately half an acre after recommendation from the unit biologist where such an opening in canopy cover would not reduce overall spotted owl dispersal habitat.

*LSR treatments (approximately 3000 acres including 1255 acres in Riparian Reserves):* Forest stands between 30 and 79 years of age would be thinned using two silvicultural techniques to introduce variation in forest structure and complexity. 75% percent of forest stands would be thinned using a proportional thinning technique to relative densities generally ranging from 26 to 35; this activity would occur in stands less than 80 years old at the time of treatment and within the LSR and adjacent Riparian Reserve LUA. About 85 percent of

stands proposed for this treatment are 40-79 years old. Proportional thinning in stands from 59 to 79 years of age may receive a lighter thinning to a relative density of 40 based on stand conditions. Proportional thinning would maintain a minimum average 40% canopy closure throughout the stand (to USFWS standards), and is intended to facilitate the development of late successional forest structural characteristics while maintaining spotted owl dispersal habitat.

25% of the stands would be thinned using a variable density technique to a range in relative densities from 20 to 30. Variable density thinning would generally be applied to stands primarily between 30 and 50 years of age. Spotted owl dispersal habitat would be maintained (to USFWS standards) where proportional thinning is applied but may not be maintained (to USFWS standards) where variable density thinning is applied. The variable density thinning areas may include a range of variations in treatments from wide gaps (approximately half acre in size) to dense riparian stands. Gaps would be placed to also benefit individual oak trees where possible on LSR lands.

Of the approximately 8650 acres being thinned approximately 8515 acres lie in the Long Tom River Watershed and approximately 135 acres lie in adjacent watersheds overlapping the ridges demarcating the watersheds. See the table below:

| Watershed Name | ~Acres |
|---|---|
| Long Tom River | 8515 |
| Wildcat Creek | 89 |
| Lake Creek | 25 |
| Wolf Creek | 15 |
| Upper Siuslaw River | 5 |
| Lower Coast Fork Willamette River | 1 |

**Stream buffers**: All streams would receive a minimum buffer of approximately 60 feet within which no thinning would occur. Other actions such as road construction, yarding and cable corridors may cross streams and would be subject to design features as described in the –features common to all alternatives – general design feature 4".

**Spotted Owl Nest Patches:** Thinning would not occur in nest patches of known owl sites and all predicted owl sites would be surveyed to protocol to determine non-occupancy prior to thinning within nest patches in Matrix and LSR lands.

**CWD and Snags:**

*Matrix and associated Riparian Reserves*: CWD and snag recruitment would occur through natural processes.

*LSR and associated Riparian Reserves*: Coarse woody debris would be created during thinning harvest of stands when existing levels of coarse woody debris do not meet the levels defined below. Stands would be assessed for snags either during thinning treatments or three to five years post-treatment and new snags would be created when existing levels of snags do not meet the levels defined below. Snags would be located within treated stands and/or adjacent stands; snags considered a hazard under OSHA standards may be felled due to safety concerns during operations.

| | CWD Retention or Creation | | | Snag Retention or Creation | |
|---|---|---|---|---|---|
| Stand QMD* (pretreatment) | Total | Component Diameters** | Component Lengths | Total | Component Diameters |
| >14 in | 120-240 ft/ac | >14 in | >20 ft | 6.5 sq feet basal area/acre (approximately 4 to 6 trees per acre) | >=14 in dbh |
| ≤14 in | 120 ft/ac | >12 in | >20 ft | 2.4 sq feet basal area/acre (approximately 2 to 3 trees per acre) | >=12 in dbh |

* Quadratic Mean Diameter
** large end

*Source: DECAID- provides recommendations for snag densities based on correlations between habitat and species occurrences; from the Western Oregon Planning Revisions Environmental Impact Statement, 2008.*

**Yarding:** Yarding would consist of approximately 6190 acres cable, 2260 acres ground-based and 200 acres helicopter.

**Roads:** Roads would be constructed or renovated/improved as needed. Approximately 30 to 35 miles of construction and approximately 195 to 200 miles of road renovation/improvement would occur over the life of the plan. Refer to features common to all alternatives for a summary of actions for roads including decommissioning.

**Alternative 5:** *Maintain spotted owl dispersal habitat in Matrix and associated Riparian Reserves. Create complexity and thin to promote structural diversity in LSR lands and associated Riparian Reserves. 50% of the LSR lands thinned to open conditions for long term gain. Minimize impacts to owl nest patches in LSR lands and the AOC.*

This alternative analyzes thinning in forest stands between 30 and 79 years of age.

*Matrix treatments (approximately 5420 acres including 2220 acres in Riparian Reserves):* Forest stands between 30 and 79 years of age would be "thinned from below" in treatments that remove predominantly small diameter trees to improve growing conditions of the remaining larger dominant trees in the stands. These forest stands would be thinned using the traditional silvicultural technique of thin from below to relative densities in the mid-thirties, generally ranging from 32 to 38. Spotted owl dispersal habitat would be maintained to USFWS standards. Individual oak trees would receive approximately ¼ acre openings. Where oaks are clumped together the canopy may be removed up to approximately half an acre after recommendation from the unit biologist where such an opening in canopy cover would not reduce overall spotted owl dispersal habitat.

*LSR treatments (approximately 2110 acres including 900 acres in Riparian Reserves):* Forest stands aged between 30 and 79 years of age would be thinned using two silvicultural techniques to introduce variation in forest structure and complexity. 50% of forest stands in LSRs would be thinned using a proportional thinning technique to relative densities generally ranging from 26 to 35 and the remaining 50% of forest stands would be thinned using a variable density thinning technique to relative densities generally ranging from 20 to 30. Variable density thinning would be applied to stands primarily between 30 and 50 years of age and proportional thinning would be applied to stands less than 80 years old at the time of treatment. Spotted owl dispersal habitat would be maintained (to USFWS standards) where proportional thinning is applied but may not be maintained (to USFWS standards) where variable density thinning is applied. About 85 percent of stands proposed for proportional thinning are 40-79 years old; however, proportional thinning in stands from 59 to 79 years of age may receive a lighter thinning to a relative density of 40 based on stand conditions. This treatment would maintain a minimum average canopy cover of 40% throughout the stand, and is intended to facilitate the development of late successional forest structural characteristics while maintaining dispersal habitat. This treatment may downgrade potentially suitable habitat to dispersal habitat. The variable density thinning areas may include a range of variations in treatments from wide gaps (approximately one acre in size) to dense riparian stands. Gaps would be placed to also benefit individual oak trees where possible on LSR lands. Variable density thinning would generally occur in younger stands (about 30 to 50 years of age).

Of the approximately 7530 acres being thinned approximately 7380 acres lie in the Long Tom River Watershed and approximately 135 acres lie in adjacent watersheds overlapping the ridges demarcating the watersheds. See the table below:

| Watershed Name | ~Acres |
|---|---|
| Long Tom River | 7395 |
| Wildcat Creek | 89 |
| Lake Creek | 25 |
| Wolf Creek | 15 |
| Upper Siuslaw River | 5 |
| Lower Coast Fork Willamette River | 1 |

**Stream buffers**: All streams would receive a minimum buffer of approximately 60 feet within which no thinning would occur. Other actions such as road construction, yarding and cable corridors may cross streams and would be subject to design features as described in the "features common to all alternatives – general design feature 4".

**Spotted Owl Nest Patches:** Thinning would occur in known and predicted spotted owl nest patches within Matrix lands. Thinning would not occur in spotted owl known nest patches within LSR lands, and the area of

concern. All predicted owl sites would be surveyed to protocol to determine non-occupancy prior to thinning within nest patches on LSR lands.

**CWD and Snags:**

*Matrix and associated Riparian Reserves*: CWD and snag recruitment would occur through natural processes.

*LSR and associated Riparian Reserves*: Coarse woody debris would be created during thinning harvest of stands when existing levels of coarse woody debris do not meet the levels defined below. Stands would be assessed for snags either during thinning treatments or three to five years post-treatment and new snags would be created when existing levels of snags do not meet the levels defined below. Snags would be located within treated stands and/or adjacent stands; snags considered a hazard under OSHA standards may be felled due to safety concerns during operations.

| | CWD Retention or Creation | | | Snag Retention or Creation | |
|---|---|---|---|---|---|
| **Stand QMD* (pretreatment)** | **Total** | **Component Diameters**** | **Component Lengths** | **Total** | **Component Diameters** |
| >14 in | 120-240 ft/ac | >14 in | >20 ft | 6.5 sq feet basal area/acre (approximately 4 to 6 trees per acre) | >=14 in dbh |
| ≤14 in | 120 ft/ac | >12 in | >20 ft | 2.4 sq feet basal area/acre (approximately 2 to 3 trees per acre) | >=12 in dbh |

* Quadratic Mean Diameter
** large end

*Source: DECAID- provides recommendations for snag densities based on correlations between habitat and species occurrences; from the Western Oregon Planning Revisions Environmental Impact Statement, 2008.*

**Yarding:** Yarding would consist of approximately 5180 acres cable, 2150 acres ground-based and 200 acres helicopter.

**Roads:** Roads would be constructed or renovated/improved as needed on Matrix LUA. In LSR LUAs there would be no new road construction in this alternative; however, road renovation/improvement would occur as needed. Approximately 20 to 25 miles of construction and approximately 185 to 190 miles of road renovation/improvement would occur over the life of the plan. Refer to features common to all alternatives for a summary of actions for roads including decommissioning.

## AFFECTED ENVIRONMENT

This section describes key components of the existing environment. The resources in the planning area do not differ significantly from those discussed in the Eugene District Proposed Resource Management Plan/Environmental Impact Statement (RMP EIS) (Chapter 3). The following resources are also discussed in greater detail in the project file.

About twelve percent of the Long Tom 5th field watershed is under public ownership and eight percent consists of BLM lands. Land use in the Long Tom River Watershed includes forty six percent forestry, thirty one percent agriculture, nine percent rural residential, eight percent urban, and six percent other (USDI 2000). Forestry operations are dominant in the sub-watersheds in the ~~v~~alley fringe" while agriculture, urban, and rural residential activities are dominant in the rest of the watershed. The urban lands within the watershed include a portion of the city of Eugene, and the towns of Veneta, Monroe, Elmira, Crow, and Noti. About seventeen percent of the forestry land is federally managed and about one-fourth of the forest land is managed by large, commercial timber companies. Most of the forestry land in the Watershed is owned and managed by small family trusts and private wood lot owners (Long Tom Watershed Council 2000).

**Forest conditions:**
The forested plant communities in the Long Tom Analysis area are within the western hemlock (*Tsuga heterophylla*) zone as described by Franklin and Dyrness (1973). The major coniferous tree species include Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata)*, incense cedar *(Calocedrus decurrens),* and grand fir *(Abies grandis)*. Hardwood species include red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*), golden chinquapin (*Castanopsis chrysophylla*), Pacific madrone (*Arbutus menziesii)*, and Pacific dogwood (*Cornus nutallii*). The shrub and ground cover species associated with these forested plant communities are varied. Common understory species include vine maple (*Acer circinatum*), hazel (*Corylus cornuta*), oceanspray (*Holodiscus discolor*), salal (*Gaultheria shallon*), dwarf

Oregon grape (*Berberis nervosa*), salmonberry *(Rubus spectabilis)*, poison-oak *(Rhus diversiloba)*, and sword fern (*Polystichum munitum*).

The vegetation of the Long Tom Analysis Area can be characterized by 2 major upland plant groupings (RMP EIS, pp 3-41):

***Douglas-fir/red alder/vine maple*** – These plant communities are found on the drier sites on eastern slopes of the Coast Range and occur on the majority of the lands within the Long Tom Analysis area. Douglas-fir and western hemlock are the common overstory species. Shrub species include evergreen huckleberry, blackberry, and salal. Red alder and bigleaf maple are usually present in varying densities. The herb layer consists of swordfern and *oxalis* sp. Dry sites have more ocean spray and herbaceous competitors than more moist sites.

***Douglas-fir/ocean spray/herbs and grasses*** - These plant communities are found adjacent to the valley floor (east of the Lorane Highway) on warm, dry sites at low elevations (less than 1500 ft.) Climax tree species include western hemlock, Douglas-fir, or Oregon white oak. Other species that may be present are incense cedar, ponderosa pine, grand fir, bigleaf maple, and madrone. The shrub layer consists of hazel, ocean spray, vine maple, Oregon grape and poison oak. Following disturbance, grasses and herbs become significant components. Most of these sites have a higher-than-average fire occurrence on the Eugene District historically.

**Past vegetation management**

The Long Tom Analysis Area has a vegetation pattern that reflects the checkerboard land ownership pattern within the watershed, and decades of intensive forest management with a primary emphasis on the production of timber across the analysis area. This past management emphasis has resulted in many acres of conifer plantations in the planning area.

The forested stands within the analysis area are predominantly even-aged, dense canopied, second growth Douglas-fir forest established following logging. The forested stands within the analysis area have historically had numerous intensive forest practices applied to insure forest establishment and growth in support of timber production and other resource objectives. Some of these past management practices have included aerial seeding, tree planting, seedling protection from animal browse, competing vegetation treatments (mechanical and herbicide) to insure seedling establishment and growth, pre-commercial thinning and aerial fertilization to promote stand vigor and growth, and tree pruning to promote wood quality. Commercial aged thinning, salvage logging, and selective cuts have occurred in some stands within the analysis area to maintain stand vigor, and provide timber and forest products to the local economy.

Current forest age class distribution within the Long Tom Analysis area

BLM administered lands within the Long Tom Analysis area are comprised of the following approximate forested acres and percentages by vegetation class *(Based on Forest Operations Inventory (FOI) stand data 2009):*

**Long Tom Analysis area ten year age class distributions.**

| Ten year Age Class | Forested Acres | Percent |
|---|---|---|
| 10 year age class | 351 | 1.7 |
| 20 year age class | 3403 | 16.3 |
| 30 year age class | 2230 | 10.7 |
| 40 year age class | 2618 | 12.5 |
| 50 year age class | 1790 | 8.6 |
| 60 year age class | 2665 | 12.7 |
| 70 year age class | 4237 | 20.3 |
| 80 year age class | 335 | 1.6 |
| 90 year age class | 126 | 0.6 |
| 100 year age class | 189 | 0.9 |
| 110 year age class | 408 | 2.0 |
| 120 year age class | 54 | 0.3 |
| 130 year age class | 186 | 0.9 |
| 140 year age class | 140 | 0.7 |
| 150 year age class | 40 | 0.2 |

| | | |
|---|---|---|
| 160 year age class | 253 | 1.2 |
| 170 year age class | 94 | 0.4 |
| 180 year age class | 0 | 0.0 |
| 190 year age class | 144 | 0.7 |
| 200 year age class | 1601 | 7.7 |
| Totals | 20864 | 100 |

**Botanical Resources:**

*Lupinus sulphureus* ssp. *kincaidii*, Federal Threatened. This ESA listed plant, Kincaid's lupine, is located on lands in the West Eugene Wetlands, and on private lands directly adjacent to the project area. It is a species of dry, open woods, prairie, and is sometimes found on roadsides. It may occur in timber sales, particularly in areas of former or remnant oak woodland or prairie habitats.

*Eucephalus vialis*, Bureau Sensitive. One site of this plant, also known as wayside aster, has been found in the project area on the edge of a BLM maintained road, on private land. *Eucephalus vialis* appears to have declined in the area. This species is considered to be favored by more open conditions which are often not found in younger managed forests that have been subjected to tree planting and fire suppression (USDI-BLM 2006). *Eucephalus vialis* habitat is thought to have been more open, historically, based on greater fire frequency and the difficulty of revegetation on certain soil conditions. It appears to be a "life climax" species more than a weedy "ruderal" species, as it is a slow growing species of chronically disturbed habitats, rather than a fast growing, highly reproductive species that takes advantage of newly disturbed habitats.

*Lathyrus holochlorus, Sisyrinchium hitchcockii, S. sarmentosum*, Bureau Sensitive. These species may occur , but have not yet been found, in the project area. All are species of open habitats, such as woodlands and prairies, and have been affected similarly to *Eucephalus vialis.* These species could be beneficially affected by oak habitat maintenance.

*Cimicifuga elata* var. *elata*, Bureau Sensitive. There are several botany reserves designated for this species in the project area. All the botanical reserves are located in late successional (mature or old growth) forest areas. The Eugene District RMP designated 1,044 acres of Sensitive Plant Reserves. These areas were taken out of the timber base; salvage and other timber management activities are prohibited in these designated areas except as prescribed for the management of the Special Status plant species. Botanical Reserves generally include a larger area of unoccupied habitat around a Special Status plant site, to provide a management buffer and to provide for maintenance and recovery of the species. Although *Cimicifuga* is more frequent in late-successional forest, it also occurs in younger stands and would be buffered if found in any timber sale units.

*Quercus garryana* Scattered oaks and pines also exist within closed forest. Oaks are often more common on adjacent private lands that have been maintained in more open conditions, e.g., lining pastures, rather than intensively managed for timber.

Other Special Status botanical species could be expected in the project area, especially lichens and bryophytes, as few areas have as yet been surveyed for these taxa. Project units would be surveyed before implementation and necessary mitigation measures would apply.

Areas of Critical Environmental Concern.
The Fox Hollow RNA and Long Tom ACEC, and the Lorane Ponderosa Pine Proposed ACEC, occur in the planning area. These areas contain dry site late-successional forest with ponderosa pine. No timber management projects are proposed within these ACECs and RNA.

**Weeds:**

Executive Order 13112 refers to invasive species as non-native species whose introduction is likely to cause economic or environmental harm or harm human health. Invasive species are to be prevented from being introduced, and are to be monitored and controlled. "Noxious weeds" refers to species listed by the Oregon Department of Agriculture as Noxious Weeds. These weeds are particularly detrimental to agriculture, biodiversity, and other resources, and are the subjects of control measures. Both noxious weeds and non-native invasive weeds in general are considered.

Most weed occurrences are associated with roadsides, and roadsides are often cited as the primary path along which weeds disperse, before entering more intact vegetation. Road sides in the Eugene District were inventoried in the period 2003 through 2006 for weeds (Table 1). A large, dense false brome population was located just north of Vaughn (18S-6W-5 and 3) in 2008 during a separate survey effort. Herb Robert is a newly listed Noxious Weed that occurs in the watershed. Of the Noxious Weeds listed, four species as indicated in

Table 1 are very common; these are Bull thistle, Canada thistle, Common St. Johnswort, Tansy Ragwort. They usually produce only scattered infestations, evidently due to suppression applied by bio-control organisms. Six species – English Ivy, False Brome, Himalayan Blackberry, Japanese Knotweed, Meadow Knapweed, Scotch Broom-produce or are capable of producing more adverse cumulative effects to the native plant community. False brome is of particular concern due to its shade tolerance and wide amplitude; it is capable of dominating the forest understory indefinitely once established. The percentages of weed occurrences overlap between species and are not displayed on a relative scale.

**Table 1: Percent of 10th mile road sections with ODA listed noxious weeds present in the Long Tom Watershed.**

| Species | Percent Infested | Impact |
|---|---|---|
| Common St. Johnswort | 79 | Common scattered infestations |
| Scotch broom | 50 | Adverse cumulative effects possible* |
| Bull thistle | 41 | Common scattered infestations |
| Himalayan blackberry | 38 | Adverse cumulative effects possible |
| Tansy ragwort | 36 | Common scattered infestations |
| Canada thistle | 24 | Common scattered infestations |
| Meadow knapweed | 3 | Adverse cumulative effects possible |
| Spotted knapweed | 1 | Not common |
| Japanese knotweed | 0.4 | Adverse cumulative effects possible |
| Perennial peavine | 0.4 | Not common |
| Field bindweed | 0.3 | Not common |
| English ivy | 0.1 | Adverse cumulative effects possible |
| False brome | 0.1 | Adverse cumulative effects possible |

*The 9015 manual defines these as weeds that are capable of overtaking native plant communities.

Road side inventories were also used to estimate the percent cover of non-native invasive species and noxious weeds under various land management actions in the planning area (Table 2). Road side sampling areas generally included a 10 to 20 foot band on either side of the road. Road side non-natives were highest next to previous regeneration harvest (due to the lack of canopy cover in post regeneration harvest conditions), and very low in closed canopy sites adjacent to well-developed native vegetation. The largest component was non-native grasses in general, and nipplewort (*Lapsana communis*) under alder canopies. Roadside non-native cover was the highest where Scotch broom and blackberry thickets occurred. The greatest variation of non-native and noxious weed cover was on recently decommissioned closed roads. Occurrences of non-native invasive species and noxious weeds were least where overhead canopy closure was the greatest and where tilled roads were seeded with native grass. Recently thinned units had less non-native cover than road sides, with most weed occurrences on skid trails.

**Table 2: Approximate average percent cover of non-native vegetation for the Long Tom Fifth field watershed. Noxious weed cover is included in the non-native total.**

| | Noxious Weeds | Non-native Total |
|---|---|---|
| Closed Forest | 0 | 0 |
| Recent thinning | 0.1-1 | 1-5 |
| Previous regeneration harvest and young plantations (the more recent regeneration harvest areas and younger plantations were found to contain more weeds than the older plantations and regeneration harvest areas) | 1-20 | 1-50 |
| Roadsides adjacent to closed forest | 0-20 | 0-20 |
| Roadsides adjacent to thinned forest | 1-50 | 5-50 |
| Roadsides adjacent to previous regeneration harvest forest and young plantations | 20-80 | 90-95 |
| Closed temporary roads in timber sales | 1-25 | 1-75 |
| Single tree oak release | 1 (single sample site) | 20 (single sample site) |

**Hydrology:**
The Long Tom planning area is located within the Long Tom River (LTR) 5th field watershed (Hydrologic Unit Code 1709000301). There are a total of ten 6th field sub-watersheds within this watershed; there are no proposed activities in two of these sub-watersheds (Upper Amazon Creek and Amazon Creek) and only 40 acres of harvest proposed in the Spencer Creek sub-watershed for any of the alternatives. More than 90% of the harvest activity would take place in 5 of the sub-watersheds (Elk Creek, Headwaters-LTR, Fern Ridge Lake-LTR, Upper Coyote Creek, and Ferguson Creek-LTR).

The main drainages (5th order and greater streams) within the watershed include Long Tom River, Battle, Coyote, Elk, Ferguson, Jones, Noti, Poodle, and Spencer Creeks. Amazon Creek is also located within the watershed but there are no planned activities adjacent to this creek.

The hydrologic, aquatic, and riparian conditions are described in detail in the Eugene District Long Tom River (LTR) Watershed Analysis (USDI 2000). The Watershed Analysis covered about 23% of the total area in the Long Tom Watershed and this area was referred to as the ~~-v~~alley fringe" in that document. The BLM administered lands on which the proposed action would occur are located within the ~~-v~~alley fringe". There are approximately 1,411 miles of stream channel within the LTR watershed with about 730 miles within the ~~-v~~alley fringe" area (USDI 2000). About 12% of the total stream miles in the watershed are on BLM land. Stream density averages about 3.4 miles per square mile for the watershed and about 4.8 miles per square mile in the valley fringe area. Most (about 75%) streams in the Watershed are 1st or 2nd order tributaries to larger streams. These lower order headwater streams are typically moderately steep, particularly in the valley fringe area. Stream gradients are typically low for the larger order streams and in the northeastern (valley) portion of the watershed. Less than 1% of the larger streams (4th order and larger) are on BLM land in the watershed.

Fern Ridge reservoir divides the LTR watershed into upper and lower areas and 7 of the 10 sub-watersheds in the LTR watershed have outlets into the reservoir. Only 3 of the sub-watersheds in the LTR watershed have outlets below the reservoir. About 24 miles of the Long Tom River main stem is below the reservoir. Amazon Creek, on the east side of the Watershed, has also been extensively modified from historic conditions for flood control purposes.

Water rights for water use in the LTR watershed are predominately (approximately 98 % of total use) for irrigation purposes (Thieman 2000). More than half of this irrigation use occurs in one sub-watershed (Ferguson Creek- LTR) with the remainder of use spread fairly evenly in the other sub-watersheds. Most (99 %) of the use is from surface water (Thieman 2000). Beneficial Uses in the Long Tom River Watershed include: private domestic water supply, public domestic water supply, industrial water supply, irrigation, livestock watering, rearing and migration of resident fish and aquatic life, wildlife and hunting, boating, fishing, water contact recreation, and aesthetic quality.

ODEQ completed the Willamette Basin Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP) in 2006. The WQMP identified Designated Management Agencies (DMA's) responsible for developing restoration plans in the Willamette Basin. The BLM (Eugene and Salem districts) are DMA's for the Willamette basin and completed a Water Quality Restoration Plan (WQRP) in 2008. This WQRP is the ~~-i~~mplementation plan" to protect, maintain, and restore water quality where BLM has jurisdiction over federal lands in the Willamette basin (USDI BLM 2008).

The water quality limited stream (and water body) segments and parameters addressed in the Oregon Department of Environmental Quality Willamette Basin TMDL (2006) for the Long Tom River Watershed are listed below:

Water Quality Limited Streams in the Long Tom River Watershed

| Stream/Waterbody | River Mile | Parameter | Season |
|---|---|---|---|
| Coyote Creek | 0 to 26.2 | Dissolved Oxygen | Spring/summer/fall |
| Coyote Creek | 0 to 26.2 | Fecal Coliform | Year around |
| Coyote Creek | 0 to 26.2 | Temperature | Summer |
| Ferguson Creek | 0 to 10 | Temperature | Summer |
| Fern Ridge Reservoir/Long Tom River | 24.2 to 31.8 | Fecal Coliform | Winter/spring/fall |
| Fern Ridge Reservoir/Long Tom River | 24.2 to 31.8 | Turbidity | Year around |
| Long Tom River | 0 to 24.2 | Fecal Coliform | Winter/spring/fall |
| Long Tom River | 0 to 24.2 | Temperature | Summer |
| *Amazon Creek | 0 to 22.6 | E. Coli | June 1- Sept. 30 |
| *Amazon Creek | 0 to 22.6 | E. Coli | October 1 to May 31 |

Water Quality Limited Streams in the Long Tom River Watershed

| Stream/Waterbody | River Mile | Parameter | Season |
|---|---|---|---|
| *Amazon Diversion Canal | 0 to 1.8 | Dissolved Oxygen | Spring/summer/fall |
| *Amazon Diversion Canal | 0 to 1.8 | Fecal Coliform | Year around |
| *A-3 Drain | Mouth to headwaters | E. Coli | June 1- Sept. 30 |
| *A-3 Drain | Mouth to headwaters | E. Coli | October 1 to May 31 |

*stream/water bodies that are not within proposed E.A. project area

In addition to the parameters in the table above; the A-3 drain is listed for arsenic, lead, mercury, dichloroethylenes, and tetrachloroethylene and Amazon Creek is listed for arsenic and lead on the ODEQ 303 (d) list. These parameters were not addressed in the ODEQ TMDL for the Willamette Basin but will be addressed in subsequent TMDL efforts.

Bacteria, dissolved oxygen (D.O.), turbidity (Fern Ridge Reservoir), and toxics were not addressed in the WQRP because of the lack of a causal link to BLM management activities in the sub-basin (USDI BLM 2008). Bacteria in the sub-basin has been linked to animal feces (wild and domestic animals), failing septic systems, runoff from urban and rural residential areas, irrigation return flows, and leaking municipal sewer systems (USDI BLM 2008, Thieman 2000, ODEQ 2006). There is no livestock grazing on BLM lands in the LTR Watershed and BLM is not responsible for controlling wildlife populations. Recreation within the LTR Watershed on BLM land mainly consists of dispersed use.

Temperature exceedance (summer season) in the LTR watershed is listed for the Long Tom River main stem below the reservoir, in Coyote Creek (river miles 0 to 26.2) and in Ferguson Creek (river miles 0 to 10). Stream temperature is influenced by riparian vegetation, hydrology (groundwater and surface water), channel morphology, climate, and geographic location. Land use activities have influenced the first three factors in the LTR watershed and have generally increased summer stream temperatures above historic conditions. Fern Ridge reservoir operations have also altered stream temperature conditions below the dam through modification of natural flow regimes and release of stored heat in the reservoir. Low flow releases in the summer can be beneficial by augmenting low flow conditions. The Willamette Basin WQMP recognized the BLM and U.S. Forest Service Temperature TMDL Implementation Strategy (USDA, USFS and USDI, BLM. 2005) as the strategy for evaluating the affects of thinning stream adjacent riparian vegetation on stream temperature (ODEQ 2006).

The Rapid Effective Shade Model (Park and Hawkins, 2007) was utilized in the WQRP to characterize the heating potential of perennial streams on BLM (and Private) land in the Long Tom Watershed (USDI BLM 2008). The Rapid model analysis indicates an average of existing shade conditions for each stream reach which can be compared to the maximum potential stream shade (based on potential tree height) for the same stream reaches (USDI BLM 2008).

The results of the Rapid shade modeling in the LTR watershed indicated that existing effective shade of perennial streams on BLM lands are relatively high compared to probable (site capability) shade levels (USDI BLM 2008). It was estimated that approximately 84 % of the perennial streams on BLM land meet or exceed the target shade value in the LTR watershed (USDI BLM 2008).

Annual precipitation in the watershed is 40” to 82”. The higher rainfall areas (above 60” annually) are located in the northwestern one-quarter of the watershed. The monthly minimum temperatures in the watershed are typically above freezing. The majority of the precipitation is in the form of rainfall between November and March. Snow is usually not a significant contributor to annual precipitation but does occasionally occur at any elevation within the LTR watershed.

The Long Tom Watershed assessment (Thieman 2000) indicated that the agricultural land practices in the LTR Watershed have a low potential risk (OWEB method) for peak flow increases whereas urban and rural residential impervious surfaces have a high potential risk (OWEB method) to increase peak flows in five of the sub-watersheds (Spencer Creek, Upper Amazon Creek, Ferguson Creek- LTR, Amazon Creek, and Fern Ridge Lake- LTR). Forest road density was found to have a low impact to flow in all sub-watersheds and rural road density was found to have a low impact to peak flows except for two of the sub-watersheds (Headwaters-LTR and Fern Ridge Lake- LTR) which have low to moderate impacts to peak flows (Thieman 2000). The amount of stream miles (drainage density) has effectively been increased, from historic conditions, in all sub-watersheds of the LTR watershed where road drainage and streams are directly connected via drainage structures. This can potentially decrease the time it takes for storm flow to reach channels and increase peak flows.

There are about 2,127 miles of road in the watershed. Road density averages about 5.2 miles/square mile in the planning area with a range of 3.3 miles/square mile to 8.6 miles/square mile in the sub-watersheds. The highest road densities are in the urbanized sub-watersheds along the eastern edge of the Watershed. BLM controls about 7 % of the roads in the watershed. Most (about 75 %) of the BLM controlled roads in the planning area have a durable surface- either gravel or bituminous. These roads are much less susceptible to erosion than natural surface roads. A GIS review of the road layer indicates that road construction has added about 2.5% to 3% compaction in the ~~"v~~alley fringe" area from historic conditions. The urbanized areas within the watershed have a higher level of compaction and impervious surfaces due to higher density of roads, buildings, parking lots, etc.

The roads and drainage structures (stream and relief culverts) vary in age and design in the planning area but a majority of the roads and drainage structures are more than 20 years old on Federal land in the valley fringe area. A road inventory conducted in 2009 to evaluate the road system and drainage structures evaluated about 154 miles of road and hundreds of culverts that were likely to be used on the access routes in the planning area. This survey identified that up to 140 stream crossing culverts and 480 cross drain culverts on the projected haul routes (BLM controlled roads only) were suitable for replacement based on size, age, and/or condition. Many of these culverts are at high risk of failure in the next decade or two because they are undersized, already past the lifespan of typical use, or are rusted or damaged. This is discussed in more detail under ACS 5 in the Environmental Consequences section. Some of the stream culverts are also currently barriers to fish and aquatic passage.

A primary concern related to forest roads is the increased sediment delivery to streams and its potential impact on stream biota and water quality. Chronic delivery of sediment to streams from road surface erosion off of existing roads is the primary source of ***fine*** sedimentation in the planning area. This occurs where road drainage is routed ***directly*** into stream crossings or ***indirectly*** where relief culverts are close to a stream. Culvert failures in the planning area can episodically introduce large amounts of sediments into the stream system, usually during large storm events.

The Long Tom River Watershed Analysis and the 2009 road inventory indicate that the majority of the road segments within the valley fringe of the Watershed are not connected to the stream system and do not deliver sediment to streams. The Watershed Analysis reported that about 88% of the roads (in miles) had no potential to deliver sediment to streams. The 2009 road inventory results show that about 82% of the inventoried roads (in miles) had no potential to deliver sediment to the streams. The road surveys (2009) indicated that about 18% (14% direct delivery and 4% indirect delivery) of the non-paved surveyed roads had the potential to deliver sediment to streams in the planning area. The road inventory identified locations where relief culverts could be added on BLM controlled roads to reduce existing sediment delivery by 5 to 10 miles in the ~~"v~~alley fringe area". The inventory indicated that about 75 to 150 cross drains would be added to achieve this.

**Fisheries:**
Fish species in the Long Tom watershed include native salmonids, native non-salmonids and introduced species. These fish and their associated habitat needs and current habitat conditions have been described in detail in the Long Tom Watershed Analysis (USDI, 2000), the Long Tom Watershed Assessment (Thieman, 2000), the Long Tom Subbasin Fish Management Plan (ODFW, 1992) and the Fern Ridge Embankment Dam repair EA (US ACOE, 2005).

The BLM manages a limited amount of fish habitat in the drainage, of which most is located in upper reaches of Long Tom tributaries. Some of these headwater reaches are shaded by older stands of large, recruitable conifers and are considered good cutthroat habitat. Other stream reaches adjacent to BLM managed land has been adversely affected by past management activities and may provide an opportunity for restorative actions.

Currently, there are no Threatened and Endangered fish species identified within the planning area described in this (EA). A note of historical significance is that Oregon Chub (federally listed as endangered) and Willamette Spring Chinook (federally listed as threatened) inhabited parts of the Long Tom River basin. The Oregon Department of Fish and Wildlife (personal communication) is looking at locations to establish chub populations in low elevation locations within the watershed but not on BLM lands. Because of temperature, turbidity and migration barriers as limiting factors, no efforts are currently being made to reestablish spring chinook populations within this watershed.

**Soils:**
Soils in the area have developed from volcanic and marine sedimentary rocks and are deep, permeable and productive. Site Index for the soils in the area ranges between 120 and 180 (Patching, 1987). The valley fringe includes both a udic-mesic moisture and a xeric-mesic moisture regime. The valley fringe area is located

within several soil associations. These include the Bellpine-Nekia-Ritner, Bohannon-Preacher-Digger, and the Peavine-Blachly-Honeygrove soil associations.

Bellpine-Nekia-Ritner map unit is located in the xeric-mesic moisture regime and generally consists of 45% Bellpine, 25% Nekia and 15% Ritner. Some of the soil series associated with these soils include Jory, Panther, Hazelair, Dupee, Philomath, Witzel, Dixonville, Steiwer and Willakenzie soils.

Typically, the Bohannon-Preacher-Digger map unit consists of 40% Bohannon soils, 25% Digger and 20% Preacher and is located in the udic-mesic moisture regime. Some of the soil series associated with these soils includes Peavine, Honeygrove, Klickitat and Blachly.

The Peavine-Blachly-Honeygrove map unit consists of 55% Peavine, 20% Blachly and 15% Honeygrove and is located in the udic-mesic moisture regime. Minor soils are the McCully, Cumley, Minniece, Klickitat and Kilchis.

The soil temperatures remain warm and moist through late spring and early summer in the Coast Range, favoring the oxidation of the soluble form of iron, a basic constituent of the parent sandstone and intrusive rocks of the area. With high precipitation, excess amounts of moisture move through the soil profile removing soluble products during the weathering process, but stranding the iron which produces soils in the area that are red, such as Honeygrove soils.

Because permeability is rapid in many of the Coast Range soils, the soils tend to have rapid runoff and a high hazard of water erosion, particularly on steep slopes. Vegetation, slope, soil texture, soil infiltration rates and climate are the most important influences on the erosion hazards of a site and a variety of these combinations exist in the Coast Range and contribute to a naturally high background erosion rate. In general, background erosion rates are documented to be two to four times higher in the Coast Range than in the Cascade Range (Larson and Sidle, 1980).

**Wildlife:**
**Species listed under the Endangered Species Act**

**Northern Spotted Owl.** Spotted owls occupy forest communities throughout the Long Tom watershed. Suitable habitat for the northern spotted owl was described by Thomas *et al.* (1990:164) as ~~"~~multi-layered, multispecies canopy dominated by large (greater than 30 inches diameter at breast height [dbh]) conifer overstory trees, and an understory of shade-tolerant conifers or hardwoods; a moderate to high (60 to 80 %) canopy closure; substantial decadence in the form of large, live conifer trees with deformities—such as cavities, broken tops, and dwarf mistletoe infections; numerous large snags; ground cover characterized by large accumulations of logs and other woody debris; and a canopy that is open enough to allow owls to fly within and beneath it." Although subsequent research has refined this definition, it remains valid (Courtney *et al.* 2004, Chapter 5). Generally stands that are 80 years of age and older are considered suitable habitat providing nesting, roosting and foraging habitat. BLM lands within the planning area support approximately 3,600 acres of suitable habitat. Stands that are 50 to 80 years of age may contain elements of foraging and roosting habitat mixed along with scattered remnant older trees, therefore providing ~~"~~potential" nesting, roosting and foraging habitat for spotted owls, especially when adequate amounts of suitable habitat is low within spotted owl home ranges. This EA considers that habitat as supporting nesting, roosting and foraging habitat and is approximately 8,400 acres.

Dispersal habitat for the northern spotted owl, which supports owl movement and survival, is comprised of forest stands with an average trunk diameter of at least 11 inches dbh and an average canopy closure of at least 40 percent. Lands above 40 years of age are considered dispersal habitat for spotted owls. Approximately 75% of BLM lands within the planning area support dispersal habitat.

The stands between 50 to 80 years of age that are supporting suitable habitat currently are growing under fairly dense conditions. These stands would benefit the most from the proposed thinning. The 200 acres of stands proposed for thinning that are between 80 to 99 years lack essential suitable habitat characteristics such as multi-layered canopy and large trees for nesting and are considered low quality suitable habitat and would benefit from thinning. Other stands serving as dispersal habitat are also undergoing suppression mortality, with very little light penetrating the canopy for understory development. Thinning is needed to open overstory canopies for improving light conditions.

BLM lands support 22 known spotted owl nest sites and potentially support another 9 nest sites as predicted by the ITS methodology (USDI and USDA, 2008). Of the known spotted owl nest sites 9 are currently active.

The southern portion of the planning area is located within the South Willamette-North Umpqua Area of Concern. The Willamette Valley has long served as an ecological boundary between the Coast and Cascade mountain ranges (provinces). Spotted owl movement has been documented between these two mountain ranges, but valley grasslands have limited such movements to a certain degree. Over the years, human development has resulted in degradation of forested stands on the valley fringe, further widening this gap and impeding owl movements. To help facilitate owl dispersal between the two provinces, AOCs were identified in locations where forested stands from each province closely converge and provide areas for genetic exchange between them. Three AOCs serving as ~~"~~habitat bridges" between the mountain ranges have been delineated in western Oregon. The northern-most of these, the South Willamette-North Umpqua Area of Concern, encompasses parts of both the Siuslaw and Upper Willamette resource areas within the Eugene District, as well as parts of Roseburg District to the south.

Approximately 1,600 acres, located in the southern portion of the planning area, are located within this AOC. Of these 18% is considered to be suitable habitat and 65% is considered to be dispersal habitat and potentially-suitable habitat, the rest is considered non-habitat.

**Marbled Murrelet.** Between April 1 and September 30 murrelets nest within 35 miles of the coast in forest communities with nesting structure. Within the Long Tom watershed, BLM lands support 3,600 acres of suitable nesting habitat and an unknown amount of habitat that contains individual trees with nesting structure. Trees with nesting structure (1) occur within 50 miles of the coast, (2) occur below 2,925 ft. in elevation, (3) are one of four species: western hemlock, Douglas-fir, Sitka spruce or western redcedar, (4) are ≥ 19.1 inches (dbh), (5) are > 107 feet in height, (6) have at least one platform ≥ 5.9 in. in diameter, (7) have nesting substrate (*e.g.,* moss, epiphytes, duff) on that platform with an access route through the canopy that a murrelet could use to approach and land on the platform, and (8) have a tree branch or foliage, either on the tree with structure or on a surrounding tree, that provides protective cover over the platform (U.S. Fish and Wildlife Service 1997:32; Burger 2002; Nelson and Wilson 2002: 24, 27, 42, 44, 97-100).

Prior to the modification of suitable habitat or potential nesting structure, that habitat or structure must be surveyed to protocol. If the habitat or structure is determined to be occupied by murrelets, it must be protected. There are currently two known occupied sites on BLM-administered lands partially located in the Long Tom watershed. Murrelets generally do not occupy terrestrial habitat between September 15 and February 28 and are therefore known to be absent in the planning area during this period .

**Designated and Proposed Critical Habitat**

**Northern Spotted Owl Critical Habitat**. There is no designated spotted owl critical habitat within the project area.

**Marbled Murrelet Critical Habitat.** District-administered lands support 7,300 acres of critical habitat in two critical habitat units, OR-04-I and OR-04-J. The precise acreage of critical habitat is unknown because murrelet critical habitat is defined by the occurrences of primary constituent elements in individual stands. The primary constituent elements of murrelet critical habitat include individual trees with nesting platforms, and forested areas within 0.5 mile of individual trees with potential nesting platforms and a canopy height of at least one-half the site-potential tree height. Thus, only those lands that occur within critical habitat units and support these habitat characteristics are critical habitat.

**Sensitive Species**

Tillamook Western slug, Bald Eagle, Purple Martin, Northwestern Pond Turtle and Fringed Myotis are some sensitive species that may occur in the planning area. See Appendix A for a complete list.

**Fuels:**

All BLM managed lands within the Long Tom landscape planning area are identified as being within the Wildland Urban Interface (WUI) currently defined as being within 1.5 miles of structures. The fuels profile on BLM managed lands is generally light dead fuels with a large brush component. BLM lands are dominated by Fuel Models 5 (moderate brush and conifer reproduction), 8 (closed timber litter) and 10 (heavy timber litter/understory) with a small component of Fuel Models 9 (Hardwood litter) and 11 (light logging slash).

The ownership and fuels on adjacent lands are variable and mixed in this watershed. The majority of the land adjacent to BLM land is owned by large private timber companies but there is a large portion that consists of small land ownership and private homes are common in many areas. The fuel profile on adjacent lands are represented by Fuel Models 2 (mixed grass and conifer), 5 (moderate brush and conifer reproduction), 8 (closed timber litter), 9 (hardwood litter) 10 (heavy timber litter/understory), 11 (light logging slash) and 12 (moderate logging slash). Some areas of heavy Scotch broom are also present, which under some weather

conditions may behave like a Fuel Model 6 fuel (dormant brush). A Model 6 requires a moderate wind (>8 mph) to carry fire through the shrub layer, producing high flame lengths and fire intensities. At lower wind speeds a Model 6 becomes a low intensity, relatively slow moving ground fire.

Fire occurrence within the planning area is low in the western portion of the planning area (fire regime 3), with a 35-100 year fire return interval with mixed burn severity. The southern and eastern portion of the planning area has a low to moderate fire occurrence (fire regime 1) with a 0-35 years low severity fire return interval. Large stand replacing events can occur under certain weather conditions but are rare events in fire regime 1 areas.

## ENVIRONMENTAL CONSEQUENCES

This section explains and summarizes the direct, indirect, short term, long term and cumulative effects of all the alternatives in relation to the identified issues.

This environmental assessment incorporates the analysis of environmental consequences, including cumulative effects, in the USDA Forest Service and USDI Bureau of Land Management ―Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old Growth Forest related species within the range of the Northern Spotted Owl," February 1994, (Chapters 3 and 4) and in the Eugene District ―Final Resource Management Plan/Environmental Impact Statement ," November 1994 (Chapter 4). These documents analyze most effects of timber harvest and other related management activities. None of the alternatives in this assessment would have effects on resources beyond the range of effects analyzed in the above documents. The following section supplements those analyses, providing site-specific information and analysis particular to the alternatives considered here.

## PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

The following timber sales have been implemented within the Long Tom 5th field watershed over approximately 10 years. Link n Log – Density Management thinning (1998), 17 acres in the Long Tom Watershed. Commercial Thinning occurred under the following timber sales: Little Al (2001), 35 acres; Bishops Hat (2002), 131 acres; Get Ready (2004), 124 acres; Rock Fish (2004), 116 acres; 7th Paradise (2004), 179 acres; Dead Horse (2005), 138 acres; Trip West (2010), 170 acres. Salvage sales included Hat Trick Salvage (2008), 6 acres and Templeton Salvage (2009), 17 acres. Currently there are no other timber sales planned in the watershed. Active culvert replacement and stream restoration work has occurred and will continue to occur in the watershed. Routine road maintenance and weed control programs have and will continue to be implemented. On private lands within the 5th field Long Tom Watershed most forested acres would likely be harvested when they reach approximately 50 to 60 years of age.

## UNAFFECTED RESOURCES

The following resources are either not present or would not be affected by any of the alternatives: Areas of Critical Environmental Concern; prime or unique farm lands; wetlands; Native American religious concerns; cultural resources; solid or hazardous wastes; Wild and Scenic Rivers; and Wilderness.

## ENVIRONMENTAL JUSTICE

Executive order 12898 requires that federal agencies identify disproportionately high and adverse human health or environmental effects on minority populations and low income populations. A two-step screening process was used to determine the extent that EO 12898 applies to the Long Tom Planning Area, as shown below.

**Minority Populations and Low Income Populations:** Guidance from the Council on Environmental Quality (CEQ 1997) states that minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent; or (b) the minority population percentage of the affected area is meaningfully greater than the minority percentage in the general population or other appropriate unit of geographic analysis. U.S. Bureau of Census data from the year 2000 were used at three scales to examine minority populations: the State of Oregon, Lane County, and the City of Veneta (this town is located within the planning area). The information is shown below:

| Minority Populations | | | |
|---|---|---|---|
| | **Oregon** | **Lane County** | **Veneta** |
| 2000 population (total) | 3,825,657 | 351,109 | 2755 |
| Black/African-American | 2.0% | 1.1% | 0.3% |
| American Indian/Alaska Native | 1.4% | 1.2% | 1.4% |
| Asian/Pacific Islander | 3.6% | 2.9% | 0.0% |
| Hispanic | 11% | 6.4% | 4.2% |

Source: Lane County Census Bureau

Data from the above table illustrates that the minority populations in Oregon, Lane County, and the City of Veneta (the affected area) do not exceed 50 percent of the total population, and that the minority population of the affected area is not meaningfully greater than that at the next higher scale, therefore as per CEQ guidance minority populations do not need to be identified in the affected area.

Disproportionately high and adverse health or environmental effects on low income populations: CEQ guidance identifies ~~"~~low income populations" as persons living below the poverty level as defined annually by the Bureau of Census (CEQ 1997). According to the 2000 data from the Bureau of Census, the poverty rates for Oregon, Lane County, and the City of Veneta are 13.5%, 15.7% and 9.7% respectively. Guidance from CEQ (1997) equates ~~"~~disproportionately high" impacts as being analogous to ~~"~~significant," as used by NEPA.

The alternatives considered in this environmental assessment could affect one segment of low income populations and may include those individuals who seek employment in the logging industry. Implementation of any of the action alternatives is expected to provide job opportunities within Lane County. Low income populations within Lane County may benefit from the additional job opportunities created by the action alternatives.

## NO ACTION ALTERNATIVE

Forest stands would continue to grow under suppressed conditions. The forests on Matrix lands would lack the benefits from thinning and would not improve growing conditions, resulting in overcrowded forest stands with little understory vegetation. Late Successional Reserves would not benefit from the wide range of alternative treatments and the resulting dense stands would lack diversity and understory components that can improve habitat conditions for wildlife. Tree mortality would begin to occur several decades later which would begin the trajectory towards differentiation within the forest stands. The dense stand conditions would also increase the risk of a fire spreading very quickly due to the increase in fuel loading created due to dead limbs accumulating in overcrowded conditions. The road improvements to current standards including the addition of cross drains would not occur, increasing the risk of infrastructure failure and contributing to poor sediment controls.

## AQUATIC CONSERVATION STRATEGY

**ISSUE 1: What are the effects of timber harvest and associated activities on the attainment of Aquatic Conservation Strategy (ACS) objectives?**

*ACS No. 2: Connectivity within watershed maintained, restored, or degraded by measuring:*

***Measure***: 1) Number of barrier culverts removed and/or replaced with non-barrier culverts.
2) Miles of aquatic habitat made available.

**Alternative 1**

Under alternative 1 the existing spatial and temporal connectivity within the planning area would be maintained. Culverts that are currently functioning as barriers to fish passage have been identified and would be replaced under future actions or as funding become available.

**Alternatives 2, 3, 4, and 5**

The action alternatives propose to replace from 5 to 15 barrier culverts in addition to the 2 barrier culverts identified under alternative 1. These barrier culverts have been identified from the 2009 road and culvert surveys and from the proposed un-surveyed haul routes and Geographic Information System (GIS) estimates of potential stream crossings, see Appendix B for a list of culverts. Depending on available funding, undersized or damaged barrier culverts would be replaced to facilitate fish passage and to reduce stream crossing fill failure risk. Spatial and temporal connectivity for resident fish as well as other aquatic species would be maintained if culvert removal and/or replacement do not occur. Spatial and temporal connectivity would be restored where barrier culverts are removed and/or replaced with passage friendly culverts. The potential restoration would include:

Barrier culverts replaced: 5-15

Miles of aquatic habitat made available: 2.5 to 4.0

*ACS No. 3 and 5: Physical integrity and sediment regime maintained, restored, or retarded by considering:*

***Measures**: 1) Miles of existing road with sediment delivery potential decommissioned.*
*2) Number of high risk stream crossing culverts removed or replaced.*
*3) Percent increase in short term sediment delivery due to increased timber haul.*
*4) Percent decrease in long term sediment delivery due to the addition of cross drain culverts.*
*5) Miles of road with potential for sediment delivery on which haul may occur.*

**Alternative 1**
Under alternative 1, the physical integrity and sediment regime would be maintained in the short term. There would be no increase in road use from haul associated with the proposed actions, so there would be no associated increases in sedimentation. The road segments that currently deliver sediment would continue to deliver at the existing rate. BLM agency actions associated with road maintenance and replacement of severely damaged stream culverts would continue to occur under this alternative. The rate of replacement is likely to be much lower than proposed under alternatives 2 through 5, since the proposed culvert replacements/removals would not occur therefore there would be less direct sediment pulses from installing new temporary or permanent stream crossing culverts; or from renovating, improving, or constructing roads except for those associated with BLM agency improvements indicated above. The risk of culvert failure and chronic or catastrophic sedimentation would be much higher under this alternative than under alternatives 2, 3, 4, or 5 because old, damaged, and/or undersized culverts would not be upgraded. As a result, eventual fill or stream crossing failures could contribute large volumes of sediment to the stream system which would retard the attainment of ACS objectives 3 and 5. The long term benefits of reduced sediment delivery from adding cross drains, decommissioning roads, removing stream crossing culverts, and upgrading road surfacing would not occur.

**Alternatives 2, 3, 4 and 5**
Activities proposed under all the action alternatives would affect the sediment regime.

**Stream crossing culverts and cross drain (relief) culverts**
The addition of cross drain culverts to the existing road system would reduce the risk of chronic and/or catastrophic stream crossing failures and reduce the amount of direct sediment delivery to streams from road surface tread wear. This would maintain the physical integrity of the stream channels.

***Increases (Short term)** in sediment delivery would be caused by:*

- Adding temporary stream crossing culverts for harvest operations.
- Removing and replacing (upgrading) existing stream crossing culverts.
- Renovating, improving, or constructing road segments that have the potential for sediment delivery.
- Increased road use from timber hauling and related activities on existing and new or temporary road segments that have sediment delivery potential.

***Increases (Long term)** in sediment delivery would be caused by:*

- Chronic long term sediment delivery from new, permanent stream crossing culverts to reach harvest areas
- Road haul use on new, permanent road segments that have sediment delivery potential and that are not decommissioned upon completion of the project

***Decreases (Long term)** in sediment delivery would be caused by:*

- Replacing (upgrading) existing stream and cross drain culverts to reduce chronic and catastrophic fill failure risk.
- Adding cross drains to eliminate sediment delivery from existing road segments.
- Upgrading (adding rock to) existing road segments with sediment delivery potential.
- Removing existing stream crossing culverts.
- Decommissioning existing road segments that currently deliver sediment.

Table 3 shows the factors that would cause long or short term changes to existing sediment delivery rates. The quantities for the sediment factors were estimated using field survey of roads and culverts on the access routes to harvest areas. Road surveys were completed on more than two-thirds of the total anticipated haul route miles.

The risk of sedimentation from yarding would be minimal because appropriate BMPs (USDI 1995) would be followed and untreated stream buffers would be designed to minimize sedimentation risk. The untreated stream buffer width would be based on yarding method and on-site conditions to mitigate the risk of sedimentation from yarding. The minimum stream buffer width would be 60feet. Buffer widths of at least 33 feet (10 meters) have been shown to be an effective measure to prevent sediment delivery to streams in most cases (Rashin, et al. 2006).

Direct sediment pulses are possible from removing or replacing stream crossing culverts or adding temporary or permanent stream crossing culverts. Estimated added sediment delivery would be 1 cubic yard or less for each instance based on previous field experience with these activities (USDI-BLM 2003). The yearly yardage estimates were determined from the assumption that these activities would be spread out evenly over the life of this action (10 years).

Road Construction - Most new stream crossing culverts would be on new spur roads constructed to access individual harvest areas. There is a 3% risk of experiencing one or more 100 year events over a 3 winter season exposure to high flows. New stream crossing culverts (temporary or permanent) would be sized to accommodate 100 year storm events and with regular culvert maintenance would reduce the potential for large fill failures at these sites. Temporary culverts that are in place for one or more winter seasons (usually not more than three years) pose a small risk of future fill failure that could result in sediment delivery to streams. Leaving new temporary stream crossing culverts in place for only one summer season, where feasible, would eliminate the potential for large fill failures at these sites and would maintain the physical integrity of streams.

The transportation analysis indicates that a similar number of existing stream culverts would be removed during decommissioning as compared to the estimated number of new temporary and permanent stream culverts installed under each action alternative (see Table 3).

Road renovation and/or improvement could include clearing vegetation, upgrading road surfacing and culverts, grading, and/or widening the road grade. These activities could increase sediment delivery, in the short term, to streams where road segments are connected directly (via stream crossing culverts) or indirectly (via cross drain culverts in close proximity to streams) to stream channels. The proposed design features and adherence to BMPs would minimize sedimentation from these activities. Upgrading road surfacing and culverts would have a long term beneficial effect of reducing sediment delivery.

Increased road use for timber haul and associated activities would cause road surface erosion, contributing to a short term delivery of sediment to streams. This sedimentation would only occur where a road segment is connected (directly or indirectly) to the stream system. Road surface erosion from haul was estimated using data from the 2009 road/culvert inventory. The data from the 2009 road analysis includes road and culvert information on approximately 70 percent of the projected haul route miles. The remaining portion of the projected haul routes that were not surveyed were estimated for potential road surface erosion using GIS information and averages for road segment factors obtained from the 2009 road/culvert inventory.

The analysis indicated that on the surveyed portion of the haul route the majority (82 %) of the road miles had no sediment delivery potential. About 14 % of the total surveyed road miles were capable of direct sediment delivery and about 4 % of the total surveyed road miles were capable of indirect sediment delivery segments to streams. Indirect sediment delivery segments are road segments that can deliver sediment indirectly via a relief drain near (typically < 200‘) a stream channel.

The surveyed road segments that have the potential for sediment delivery are predominately gravel surfaced. Less than 5 % of these sediment delivery road segments are native (dirt) surface roads. Research has shown that gravel roads (6” to 8” depth) usually have much lower (75 % to 97 %) road related sediment production rates than native surface roads (Burroughs et al. 1984, Burroughs and King 1989, Swift 1984).

Table 3 displays the results of the sediment model used to estimate increases in sediment delivery from haul on the proposed haul routes above existing baseline levels. The baseline level represents existing traffic use, with existing cross drain culverts. The increase takes into consideration additional cross drain relief culverts that would be installed prior to timber haul on BLM controlled roads. This would lower sediment delivery prior to heavy haul use. The increase represents a percent change in cubic yards of sediment delivery on a year-to-year basis due to haul. In the long term the improved road segments would also have the effect of lowering sediment delivery rates below pre-project conditions as these segments return to normal traffic use. The action alternatives are very similar in estimated increase in sediment delivery due to haul because the same roads would be used across all action alternatives.

A modified version of the road surface model from the Washington Standard Methodology for Conducting Watershed Analysis- Washington Forest Practices Board (WFPB 1997) was used for this analysis. This model was used to determine the relative differences in delivery among alternatives and to highlight the road segments with the greatest sediment production potential.

This information has also been used to prioritize areas for road and culvert upgrades or additions to reduce sediment delivery. Culverts that were undersized or badly damaged were identified for replacement to reduce sedimentation risk. Areas were identified on the projected haul route where relief culverts could be added to reduce the number of road miles with sediment delivery potential. Road segments with high delivery rates would be restricted to dry season haul to minimize increases in sedimentation when road and culvert upgrades are not feasible, and/or to avoid exceedance of state water quality standards.

A comparison between the action alternatives indicates very similar impacts for ACS 3 and 5. The potential haul routes for the 4 action alternatives are very similar to each other except that new road construction under alternative 5 is estimated to be 5 to 10 miles less than alternatives 2, 3, or 4. The proposed action under alternative 5 includes no new road construction in LSR lands. The estimated number of stream crossing culverts or cross drains to be removed, replaced (upgraded), or added is very similar for all action alternatives (Table 3). The impacts under alternatives 2, 3, and 4 are expected to be identical. The effects to the physical integrity and sediment regime of streams for alternative 5 would be similar to slightly lower than for the other action alternatives (table 3). There would be a slightly lower short term increase in sediment and a slightly lower long term decrease in sediment under alternative 5. Sediment increases from activities associated with installing cross drains; yarding; road construction, renovation/improvement, and decommissioning; and removing or replacing stream crossing culverts would have a minor effect on total sediment delivery. The estimated sediment pulses from adding, removing, or replacing culverts represent less than one percent of the natural background rates in any of the sub-watersheds under any of the alternatives.

The physical integrity and sediment regime of streams from these activities is likely to be maintained under all the action alternatives. The sediment increases would occur over the 10 year span of the project. These effects would occur primarily within 5 of the 10 sub-watersheds (sixth field) of the Long Tom River fifth field watershed. These sub-watersheds are: Elk Creek, Headwaters Long Tom River, Upper Coyote Creek, Fern Ridge Lake -LTR, and Ferguson Creek -LTR. In the long term, there would be some restoration of the physical integrity and sediment regime of streams because of improvements to infrastructure.

The risk of stream crossing failures and road related landslides would be reduced where damaged and/or undersized stream crossing culverts are replaced. The replacement of damaged and/or undersized cross drains would also reduce the probability of road related landslides. Large volumes of sediment can be delivered to streams from landslides. The addition of cross drains would reduce the total number of miles of road in the watershed that have sediment delivery potential. This lowers the long term sedimentation rate from the road system.

Table 3 below shows the comparison of alternatives for ACS 3 and 5. Analysis follows the table and is specific to ACS 3 and 5.

**Table 3: Comparison of Alternatives for ACS Nos. 3 and 5 (Short and Long Term Effects)**

| **Effects – short term (typically < 1 Year to 3 years- per site)** | **Alternatives** | | | |
|---|---|---|---|---|
| | **2** | **3** | **4** | **5** |
| Number of stream crossing culverts:<br>1) existing replaced<br>2) existing removed<br>3) added temporarily | 80–140<br>0–15<br>0–12 | 80–140<br>0–15<br>0–12 | 80–140<br>0–15<br>0–12 | 75–135<br>0–12<br>0–10 |
| Increase in sediment delivery from replacing, removing, or adding stream culverts– cubic yards/year * | 8–17 | 8–17 | 8-17 | 8–16 |
| Miles of road with sediment delivery potential: Renovation/improvement † | 30–40 | 30–40 | 30–40 | 28–38 |
| Increase in failure risk from adding over-wintered temporary culverts (cubic yards for 10 years?) ‡ | 0–1,200 | 0–1,200 | 0–1,200 | 0–1,000 |
| Percent Increase in sediment delivery – heavy traffic use versus existing traffic use. ** | 10- 29 | 10- 29 | 10- 29 | 9- 28 |
| Effects- long term<br>(typically > 3 years per site) | | | | |

| Effects – short term (typically < 1 Year to 3 years- per site) | Alternatives | | | |
|---|---|---|---|---|
| | 2 | 3 | 4 | 5 |
| Number of stream crossings:<br>1) Existing replaced<br>2) Existing removed<br>3) New- added permanently * | 80–140<br>0 –15<br>0-10 | 80–140<br>0 –15<br>0-10 | 80–140<br>0 –15<br>0-10 | 75–135<br>0 –12<br>0-7 |
| Miles of road with sediment delivery potential:<br>New construction | 0-3 | 0-3 | 0-3 | 0-2.5 |
| Number of cross drains culverts added: + | 80–150 | 80–150 | 80–150 | 75–145 |
| Number of cross drain culverts replaced | 330–480 | 330–480 | 330–480 | 320–460 |
| Reduction in stream crossing failure risk by replacing stream crossings (cy). | 3000 – 7,500 | 3,000– 7,500 | 3,000– 7,500 | 2500– 7,000 |
| Reduction in stream crossing failure risk from removing existing stream crossings (cy). § | 0–3,000 | 0–3,000 | 0–3,000 | 0 –2,400 |
| Increase in stream crossing failure risk from adding new stream crossings (cy). | 0-2,000 | 0-2,000 | 0-2,000 | 0-1,400 |
| Reduction of existing road miles that deliver sediment (from adding cross drains): | 6 –10 | 6 –10 | 6 –10 | 5 –9 |
| Reduction of existing road miles with potential sediment delivery (from decommissioning). | 0 –2.0 | 0 –2.0 | 0 –2.0 | 0 –2.0 |
| Percent decrease in sediment delivery after project completion. †† | 15-20 | 15-20 | 15-20 | 15-20 |
| Acres Riparian Reserves thinned (ACS 3 only) | 3,350 | 3,780 | 3,530 | 3,120 |

Notes: Numbers of stream crossing and cross drain culverts and associated effects are based on BLM-controlled roads only.

Assumptions:

* Stream culverts to be added, replaced, or removed relatively evenly over 10 years (life span of the project).

† Does not include sediment delivery from chip seal surfaced roads (these roads would have sediment delivery primarily on the cut and fill slopes and would be negligibly impacted by timber haul).

‡ Assumes average risk of 200 cubic yards per site (increased risk of catastrophic fill failure). Assumes half of temporary culverts would be over wintered. Over wintered temporary culverts generally would be in place for 1 to 3 winter seasons.

§ Assumes average benefit of 200 cubic yards per site (decreased risk of catastrophic fill failure).

** This is a short-term, yearly increase on the proposed haul. Assumes a 1–3 year increase for secondary roads that access a single harvest unit and 2–10 year increase for mainline haul routes that access multiple harvest units. Analysis based on road inventory surveys and estimated haul route. Assumes cross drain culvert additions are made prior to haul on (surveyed-2009) BLM controlled roads. Assumes 10 % (low end) to 30 % (high end) of the road sediment delivery segments with active heavy logging traffic at any point in time during the project length.

†† This is the estimated reduction on the potential haul routes. The reduction is due to the addition of cross drains and road decommissioning and is a long term (permanent), yearly decrease on the proposed haul route. Assumes a return to existing (pre–project) traffic use with an upgraded road drainage system.

\+ This total only includes estimates of cross drain culverts added to reduce sediment delivery.

*ACS No. 8: Structural diversity, species composition and thermal regime maintained, enhanced or restored by considering:*

***Measure**: Acres of Riparian Reserves treated to accelerate late-successional characteristics.*

Alternative 1

Under this alternative the structural diversity and species composition of forest stands in riparian areas would maintain the current rate of development. The riparian stands would remain un-thinned and not provide the opportunity for faster development of large trees and understory shrubs that are important for riparian dependant species. The thermal regime would be maintained. Restoration of the riparian areas would take place over the long term due to natural mortality of trees. Stream complexity and cover components would remain similar to current conditions until riparian stands develop trees large enough to contribute to the natural recruitment into streams. As tree mortality sets in, smaller diameter trees would start to die and become available for stream recruitment. However large wood, considered most favorable for stream dwelling species

would continue to be lacking in streams and recruitment of large wood would be delayed because the stands would not benefit from the proposed thinning.
Alternatives 2, 3, 4 and 5
Thinning in the Riparian Reserves would accelerate the development of large trees more quickly than if left untreated. The potential for large woody debris (LWD) recruitment would occur in the future as some of the large trees would eventually fall into streams. The structural diversity and species composition of the streams would be restored under all action alternatives.

The potential benefit from thinning in the Riparian Reserves would be highest under alternative 3 (3780 acres), followed by alternative 4 (3535 acres), alternative 2 (3355 acres) and alternative 5 (3120 acres). Alternative 5 has the lowest benefit because no new roads would be built on LSR lands and Riparian Reserve acres thinned would be limited to those with existing access. The majority of wood that falls into stream channels from adjacent riparian stands occurs within about one site tree of the channel (FEMAT 1993, p.V-27). This benefit would be prevalent in all action alternatives; the minimum width 60 foot un-thinned buffers would protect the thermal regime of streams, therefore the thermal regime of streams in the project area would be maintained. Site specific information may recommend wider un-thinned stream buffers to protect the thermal regime which would be determined at the time of implementation. Factors used to determine stream buffers widths are included in the Design Features common to all alternatives.

## WILDLIFE

**Threatened and Endangered Species**

In Late Successional Reserve land use allocations, project design features would provide silvicultural applications to help create late successional forest habitat in the long term, with an emphasis on spotted owls and marbled murrelet habitat because these species are listed threatened under the Endangered Species Act. Design features would minimize adverse effects to spotted owls and marbled murrelets. However, issues were developed to analyze the effects of the action alternatives and the no action alternative on effects to spotted owl habitat since the planning area has breeding owl pairs within the action area and spotted owls use the area for nesting, roosting and foraging. Currently there are two occupied marbled murrelet sites overlapping the Long Tom planning area for which mitigations based on the Level 2 policy guidance from USFWS will be applied, as they would if new marbled murrelet detections are made during surveys. Marbled murrelets may use large trees with nesting structure (as described in the affected environment) in the action area for nesting. They do not use the action area for roosting or foraging and are considered a pelagic species.

The alternatives explored a balance of short-term adverse effects with long-term beneficial effects to spotted owls. The alternatives analyzed include a number of design features to best meet the project's purpose and need; all alternatives include design features important to the recovery of the threatened northern spotted owl. The majority of forest habitats proposed for thinning are generally less than 80 years old. A small amount of forest 80-100 years of age is also proposed for thinning in Matrix. Proposed thinning prescriptions are variable density, proportional, and thin from below.

1. *Variable Density Thinning* would include thinning to low densities as well as multiple patch cuts (forest openings/gaps) that are up to 1 acre each in size. The majority of stands proposed for this treatment would be less than 50 years old at time of treatment and would be located in the LSR land use allocation.

2. *Proportional thinning* (a form of light to moderate thinning) would result in a post-harvest range of diameter classes reflective of the pre-treatment range and canopy-cover of 45 to over 60 percent. This activity would occur in stands less than 80 years old at the time of treatment.

3. *Thin from Below* (a form of light to moderate thinning*)* would retain the largest most vigorous trees and would retain a canopy-cover of 45 to over 60 percent. This type of treatment would occur in stands less than 100 years old at the time of treatment.

**ISSUE 2: What are the effects of management activities on spotted owl suitable habitat, potential suitable habitat and dispersal habitat within the planning area?**

Conifer forests that are eighty years of age and older are defined as suitable habitat for spotted owls. Suitable habitat is considered to be essential nesting, roosting and foraging (NRF) habitat for spotted owls within their home ranges. Potential suitable habitat (pNRF) consists of 50 to 80 year old stands that may provide nesting, roosting and foraging habitat. Conifer forests 40 to 50 years of age with minimum 40% canopy closure are considered dispersal habitat for spotted owls. Thinning may impact spotted owl habitat and analysis of this issue would allow for comparison of the effects of thinning treatments between alternatives.

***Measure**: Acres of suitable and dispersal habitat thinned in the planning area.*

**Alternative 1**
For the no action alternative, in young forest habitat (primarily in plantations) would continue to develop mostly as dense single-storied Douglas-fir monocultures. Trees would continue to grow over time, but attributes that improve habitat for spotted owls—such as large conifer and hardwood trees and canopy gaps—would develop at rates slower than stands being thinned. Individual trees in young forest would continue to compete for limited resources, especially light. Trees would grow taller as they strive to obtain sufficient sunlight, but diameter growth would continue to slow in response to loss of crown depth and the ability to photosynthesize. The trees would remain susceptible to insects, disease, and windthrow, as inter-tree competition intensifies over time.

The abundance of under-story grasses, forbs, shrubs, or hardwoods would remain very low or not exist. Inter-tree competition would result in the mortality of the most severely suppressed conifers and provide snags and eventually down wood. The majority of this dead wood would be small; less than 10" in diameter and 60 to 70 feet tall in 25 to 45 year-old plantations. The stands are predominantly uniform monocultures and opportunities for establishing bio-complexity through natural processes such as fire would remain low for many years. Eventually, through mortality and natural disturbances, openings would be created, allowing other tree and shrub species to become established in the understory.

In summary, the no action alternative would provide limited opportunities to help meet agency wildlife goals. Habitat for spotted owls would be maintained; however, the future of this habitat would be undesirable for wildlife because many large remnant trees would die from competition and the quality of forest habitat would remain very low. Development of complex conditions from young, overstocked, monoculture stands would take much longer to develop under the no-action alternative.

**Alternatives 2, 3, 4 and 5**
For the action alternatives forest management activities that affect wildlife habitat include, commercial and non-commercial thinning in young forest stands less than 100 years old, building new roads, reconstructing existing roads, maintaining roads and dead wood creation.

Available suitable and dispersal spotted owl habitat on BLM lands in Long Tom Project Area

| Spotted Owl Habitat classification | Stand Age | Percent of BLM lands within the watershed | Approximate acres |
|---|---|---|---|
| NRF (nesting, roosting, and foraging) | > 80 | 18% | 3,600 |
| pNRF (potential NRF) | 50-80 | 42% | 8,400 |
| dispersal | 40-50 | 24% | 4,800 |
| Not yet dispersal habitat | < 40 | 16% | 3,200 |
| | | | |
| NRF (high quality) | 200+ | 8% | |
| NRF (moderate to high quality) | 120-199 | 5% | |
| NRF(moderate quality) | 80-119 | 5% | |
| pNRF | 50-79 | 42% | |
| dispersal | 40-49 | 12% | |
| dispersal | 30-39 | 12% | |
| not yet dispersal | 20-29 | 15% | |
| not yet dispersal | 10-19 | 1% | |
| not yet dispersal | 0-9 | 0% | |

Approximately 18% of BLM administered lands within the Long Tom Watershed consists of nesting, roosting and foraging (NRF) habitat (more than 80 years of age), 8% of that can be considered high quality habitat (>200 years of age), with 5% considered moderate to high quality habitat (120-199 years of age) and 5% considered moderate quality habitat (80 to 119 years of age). Therefore 13% of BLM administered lands in the watershed consists of moderate to high quality habitat (older than 120 years of age) and the remaining 5% (80 to 119 years of age) provides moderate quality habitat.

High quality habitat contains a moderate to high canopy closure (60 to 80 percent); a multi-layered, multi-species canopy with large over-story trees; a high incidence of large trees with various deformities (e.g., large cavities, broken tops, mistletoe infections, and other platforms); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for northern spotted owls to fly (Federal Register: (Volume 73, 2008).

The vast majority of stands proposed for thinning lack all these elements except for the following characteristics: very high canopy closure (greater than 80 percent), a few large trees in the suitable and potentially-suitable habitats, and space below the canopy for northern spotted owls to fly. About 204 acres of stands between 80 and 99 years of age are proposed for thinning; although these stands are older than 80 years of age and are considered suitable habitat they lack the elements described above as high quality suitable habitat and currently provide moderate quality habitat for spotted owls to nest, roost and forage in. The long term effect of thinning these stands would be to attain high quality suitable habitat characteristics more quickly than the no action alternative.

The objective for thinning on LSR lands is to improve the quality of suitable habitat for spotted owls, marbled murrelets, and other species associated with late successional habitat. Promoting development of important habitat elements of suitable habitat requires fewer over-story trees in stands currently proposed for thinning.

Thinning to benefit late successional and old growth forest will also benefit grass, forb, and shrub habitats by increasing the amount of light reaching below over-story canopies. More light would result in more grasses, forbs, and shrubs and would improve habitat conditions for small mammals, increasing foraging opportunities for spotted owls.

The following table identifies the existing amount of suitable (NRF), potentially-suitable (pNRF), and dispersal habitats being proposed for thinning. NRF habitat consists of stands that are older than 80 years of age and pNRF consists of stands from 50 to 80 years of age. It is known that potentially suitable habitat is being used by owls in this watershed because the quantity of suitable owl habitat is low in active owl home ranges. Stands 50 to 80 years of age have remnant large trees which may support nesting.

The effects of action alternatives to spotted owl habitats

| Alternative | Remove 25%-50% of dispersal habitat (variable density thinning) | Maintain dispersal habitat | Downgrade pNRF (50 to 80 years of age) | Downgrade NRF (80+ years of age) | % of existing NRF and pNRF being down-graded |
|---|---|---|---|---|---|
| 2 | 0 | 3471 | 4613 | 0 | 39% |
| 3 | 0 | 3517 | 5540 | 204 | 49% |
| 4 | 755 | 2658 | 4356 | 204 | 42% |
| 5 | 1040 | 2354 | 4221 | 0 | 36% |

The direct effects from thinning of spotted owl habitats are related to habitat quality and the amount of habitat that remains after thinning. The indirect effects from thinning of spotted owl habitats are related to the quality and the amounts of these habitats in the future. Short term adverse effects to suitable or potentially-suitable spotted owl habitats are not irrefutably certain to occur from reducing stands to 45-55% canopy-cover with thinning. Effects are uncertain because there is little information that could be used to help determine affects. Information from the Oregon Coast province (Meiman, 2003) found owls avoided recently thinned stands, whereas two landscape scale studies indicate owls should continue to use thinned stands if greater than 40% canopy-cover is retained. These landscape studies, one in northern California (Zabel, 2003) and the other in the Oregon Klamath province and Western Oregon Cascades (USDI, 2010) found owls using stands with canopy-covers as low as 40%.

The single study from the Oregon Coast province found that owls may not roost in recently thinned stands; however methods used in that study were not likely to detect foraging activity in recently thinned stands. Although this study may fall short of assessing foraging activity, studies from other provinces indicate retention of canopy cover greater that 40% would maintain foraging habitat. Due to lack of specific information from the Oregon Coast province, this analysis assumes downgrading of foraging (suitable) habitat when canopy closure is reduced below 60% canopy closure. In this analysis it is assumed that short term adverse affects would occur by thinning suitable and potential-suitable habitat when it occurs in the core or home range of active owl

sites and when cores and home ranges of active owl sites do not have adequate amounts of suitable habitat according to USFWS standards.

**Table 4: Long Tom Plan – Acres for thinning in LSR by prescription**

| | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|
| Proportional thin | 3000 | 0 | 2245 | 1070 |
| Variable Density thin | 0 | 0 | 755 | 1040 |
| Thin from below | 0 | 3540 | 0 | 0 |
| Total acres | 3000 | 3540 | 3000 | 2110 |

Alternatives 3 and 4 include thinning approximately 204 acres of stands from 80 to 99 years of age on Matrix lands. These stands are considered as moderate quality Nesting, Roosting and Foraging (NRF) habitat for spotted owls and would be downgraded from suitable to dispersal habitat. In the long term (more than 10 years) the amount of suitable habitat would return to pre-harvest levels after the crowns of retained trees expand and increase overall canopy closure in stands to more than 60%.

Spotted owl suitable habitat would be maintained with alternatives 2 and 5. Proportional thinning would temporarily downgrade pNRF to dispersal habitat by reducing canopy-cover from above 80% to about 45-55% as would thin-from-below prescriptions. All action alternatives downgrade pNRF habitat (50 to 80 years of age).

See Table 4 for quantities in the Late Successional Reserve land use allocations. Variable density thinning would not occur in suitable or potentially-suitable habitats but will remove dispersal habitat in stands from 40 to 50 years of age.

Variable density thinning would remove dispersal habitat at the stand scale, but at the landscape (watershed) scale adequate amounts of dispersal habitat will be maintained by all alternatives for spotted owls to move across the landscape. All alternatives would maintain dispersal habitat on at least 70% of BLM lands in the watershed. Variable density thinning of stands 30 to 50 years of age and the resulting removal of dispersal habitat from on 755 acres in alternative 4 and 1040 acres in alternative 5 would not have a detrimental effect on the ability of spotted owls to disperse over the landscape.

Road construction or renovation would modify stands, but would maintain functionality of suitable habitat.

Suitable habitat would not be thinned in LSR lands. Thinning would have beneficial effects to pNRF, and dispersal habitats in LSR and the associated Riparian Reserve lands because it would increase the quality of these habitats over time by growing big conifer and hardwood trees faster and by increasing bio-complexity; especially development of multilayered and multi-species canopies. Small mammal populations would also benefit by an increase in food sources, benefitting foraging opportunities for spotted owls. These beneficial effects would especially be propagated where proportional thinning and variable density thinning treatments would be applied in alternatives 2, 4 and 5. Two of the most important prey species for the spotted owl are strongly associated with multi-layered canopies and deciduous trees or shrubs; these species are the flying squirrel (Smith, 2007) (Carey, Kershner, Biswell, & Dominguez De Toledo, 1999) and the woodrat (Carey, Maguire, Biswell, & Wilson, 1999).

In Matrix lands and the adjacent Riparian Reserves, thinning would be less likely to have the same long term benefits because Matrix stands and the adjacent Riparian Reserves would have less bio-complexity due to the thin from below approach which maintains dense canopy cover precluding diverse undergrowth from thriving.

Thinning in Matrix would continue to provide spotted owl dispersal habitat for a few decades. The quality of dispersal habitat would likely be better in thinned forest stands when compared to the no action alternative.

The cumulative effects to spotted owl habitats on all lands, including those not administered by BLM, would be beneficial because BLM lands would be managed to maintain or improve spotted owl habitats with all alternatives. Most other lands are not expected to provide habitat for the spotted owl; therefore, the overall quality and quantity of spotted owl habitat would generally be low in the areas surrounding BLM lands.

**ISSUE 3: <u>What are the effects of management activities on spotted owl nest patches within the planning area?</u>**

The U.S. Fish and Wildlife Service considers the suitable habitat located within the 300m radius nest patch around known spotted owl nest sites to be critical for spotted owl survival. Thinning may impact habitat within

nest patches and analysis of this issue would allow for comparison of the effects from thinning treatments within nest patches, between alternatives.

***Measure**: Number of 300m nest patches surrounding known spotted owl sites being thinned.*

Alternatives 3 and 5 would have short term adverse effects to spotted owl nest patches. The adverse effects would be due to disturbance and modification of habitat from thinning within the nest patches of active breeding owl pairs, which may decrease the reproductive success of breeding owl pairs. Thinning within inactive nest patches would not have the same adverse impacts. Table 5 displays the number of nest patches affected by each alternative. Alternatives 2 and 4 would have no thinning occur in spotted owl nest patches and therefore would have no adverse effects from thinning. Approximately 0.2 acres of road construction would occur in one nest patch for alternative 4; however, the road would hug the outer edge of the nest patch with a very small area of disturbance which would have minimal adverse impacts to the owls. Canopy gaps created by the road construction would be restricted to the 30 foot right of way.

**Table 5: Number of spotted owl nest patches affected by treatments.**

| Alternative | Alternative design | Active nest patches | Inactive nest patches | Predicted nest patches if active | Total nest patches |
|---|---|---|---|---|---|
| 2 | No thinning in nest patches | 0 | 0 | 0 | 0 |
| 3 | Thin all nest patches | 4 | 3 | Up to 7 | 7-14 |
| 4 | No thinning in nest patches | 0 | 0 | 0 | 0 |
| 5 | Thin nest patches in Matrix but leave nest patches in LSR, CHU and AOC un-thinned | 2 | 3 | Up to 7 | 5-12 |

In the long term, thinning would have beneficial effects on habitat within spotted owl nest patches because the remaining trees would benefit from the growing space made available from the thinning treatments. Trees located in nest patches would develop into nest trees faster and survive longer in thinned nest patches. The older potential nest trees would also benefit from thinning by reducing competition for resources with younger and more vigorous trees. Alternatives 1, 2 and 4 would not gain the benefits of thinning within nest patches in the long term. Alternatives 3 and 5 would benefit from thinning in the nest patches, providing long term stable nesting areas, especially in non-occupied nest patches where short term adverse impacts would not occur because of non-occupancy of nest patches by spotted owls. In alternative 3 spotted owl nest patches would be "thinned from below," providing better growth opportunities for the larger trees. This in the long term would result in more uniform stands consisting of larger trees but less structural complexity. In alternative 5 spotted owl nest patches would be "proportionally thinned" leaving a more diverse range of tree sizes resulting in more structural diversity and more complex spotted owl habitat over the long term.

**ISSUE 4: What are the effects of management activities on spotted owls in the South Willamette – North Umpqua Area of Concern within the planning area?**

Approximately 3,320 acres of the planning area is located within the South Willamette – North Umpqua Area of Concern. The Area of Concern is considered to be a critical link for genetic interchange between spotted owls in the Cascades and Coast Range Mountains. Thinning has potential to limit the ability of spotted owls to disperse throughout the area of concern. Analysis of this issue would allow for comparison of the effects of thinning treatments between alternatives.

***Measure**: Acres of dispersal and suitable habitat thinned in the South Willamette – North Umpqua Area of Concern within the planning area.*

**Alternative 1**

No thinning would occur in the AOC under this alternative. The stands being proposed for thinning under the action alternatives would continue to maintain dense conditions without enough light penetrating the forest floor to encourage ground cover. Trees would continue to grow in suppressed conditions until natural mortality set in however making the stand more susceptible to fire because of an increase in fuel loading. Spotted owl dispersal habitat would be maintained but would consist of low quality habitat. The suggested short term effects of post thinning stand avoidance by spotted owls would not occur and the benefits of thinning with future improved conditions for roosting and foraging within dispersal habitat would not be realized.

**Alternatives 2, 3, 4 and 5**
All of the stands proposed for thinning in the AOC are in Matrix Land Use Allocation or Riparian Reserve Land Use Allocation adjacent to Matrix. Thinning would have minor direct adverse effects to the ability of spotted owls to disperse across the AOC. Thinning would occur in pNRF habitat and in dispersal habitat; however, all alternatives maintain dispersal habitat in all stands proposed for treatment in this area. Potentially-suitable habitat would be maintained in the AOC in alternative 4, and would be downgraded with all other action alternatives. Suitable habitat in the AOC is not proposed for treatment by any of the action alternatives.

**Table 6: Direct effects of action alternatives to spotted owl habitats in AOC in acres**

| Alternative | Maintain Dispersal in AOC | Maintain potentially-suitable in AOC | Downgrade potentially-suitable in AOC | Downgrade Suitable in AOC |
|---|---|---|---|---|
| 2 | 717 | | 256 | 0 |
| 3 | 723 | | 274 | 0 |
| 4 | 723 | 256 | 0 | 0 |
| 5 | 723 | | 256 | 0 |

Thinning would have beneficial effects on the ability of spotted owls to disperse across the AOC because it would improve the quality of dispersal habitat in the Long Tom watershed in the long term. The thinning treatments would increase space between trees making it easier for owls to fly through and improving roosting and foraging opportunities in the long term. In the short term owls may avoid the thinned stands for a few years (Meiman et. al.) although it is difficult to assess the length of time and severity of avoidance of recently thinned stands by spotted owls.

The Area of Concern has been emphasized as an area important to genetic interchange and recovery of the spotted owl between the Coast Range and the Cascades. Within about ten years all action alternatives of this project would maintain or improve spotted owl habitat within the AOC. pNRF spotted owl habitat would be lightly thinned in alternative 4 which would preclude the pNRF habitat from developing high quality owl habitat more quickly but the stands would continue to provide moderate quality habitat while maintaining pNRF habitat characteristics and function as suitable and dispersal habitat in the short term. All action alternatives would improve dispersal conditions for spotted owls in the AOC while the no action alternative would continue to maintain overstocked stands.

The ability of spotted owls to disperse across the AOC on all lands, including those not administered by BLM, would be improved in the long term because BLM lands would be managed by this project to maintain or improve spotted owl habitat with all action alternatives.

Other private lands in the Area of Concern would provide some level of dispersal habitat for the spotted owl however it would be low quality and subject to regeneration harvest at 50 to 60 year rotations.

## BOTANY/INVASIVE SPECIES

**ISSUE 5: <u>What are the effects of management activities on the spread of invasive species?</u>**

*Ground disturbance and a decrease in canopy closure generally lead to an increase in invasive non-native and noxious weeds, as evidenced in literature review and observations on the Eugene District. Analysis of this issue will determine the increase of non-native and noxious weed cover resulting from ground disturbing activities and decreases in canopy closure proposed in the action alternatives.*

***Measure**: Acres with probable cover of noxious weeds caused by thinning, road work and landings.*

**Alternative 1**
Under the no action alternative, the current condition is likely to continue, with some counteracting trends. Weeds would be expected to grow and spread; noxious weeds are generally spreading on federal lands (Asher and Mullahey, 1997, Weed Science Society of America Congressional Briefing, 1997). Under the no-action alternative approximately 50 acres would be affected by non-native weeds. The Eugene District's weed treatment program would continue and counteract this spread to some degree. The Eugene District's active weed control program includes manual methods that are used on certain ODA listed noxious weeds. Hoeing or grubbing appears effective on false brome and knapweeds. Scotch broom can be cut, but seed banks are prodigious. Himalayan blackberry is also sometimes cut, but re-sprouts quickly, and is widely dispersed by birds. Most weed species decline as forest shade increases with an increase in canopy cover, which would occur in the young plantations and along many roadsides under the no action alternative.

**Alternatives 2, 3, 4 and 5**
Increased weed infestation is likely under the action alternatives, and likely to persist for 15-30 years in thinning units. For example, Thysell and Carey (2001) found 10.2% exotic weed cover (9.4% higher than the controls) one year after thinning in the Puget Trough region. Non-native taxa on private and state land in western Oregon were more frequent in recently clearcut or thinned stands, with exceptions for the shade tolerant English ivy and English holly (Gray 2005). Thinned stands on mostly BLM lands in western Oregon had 0.01-0.3% exotic species cover, measured 10-25 years after thinning (Muir et al., 2002).

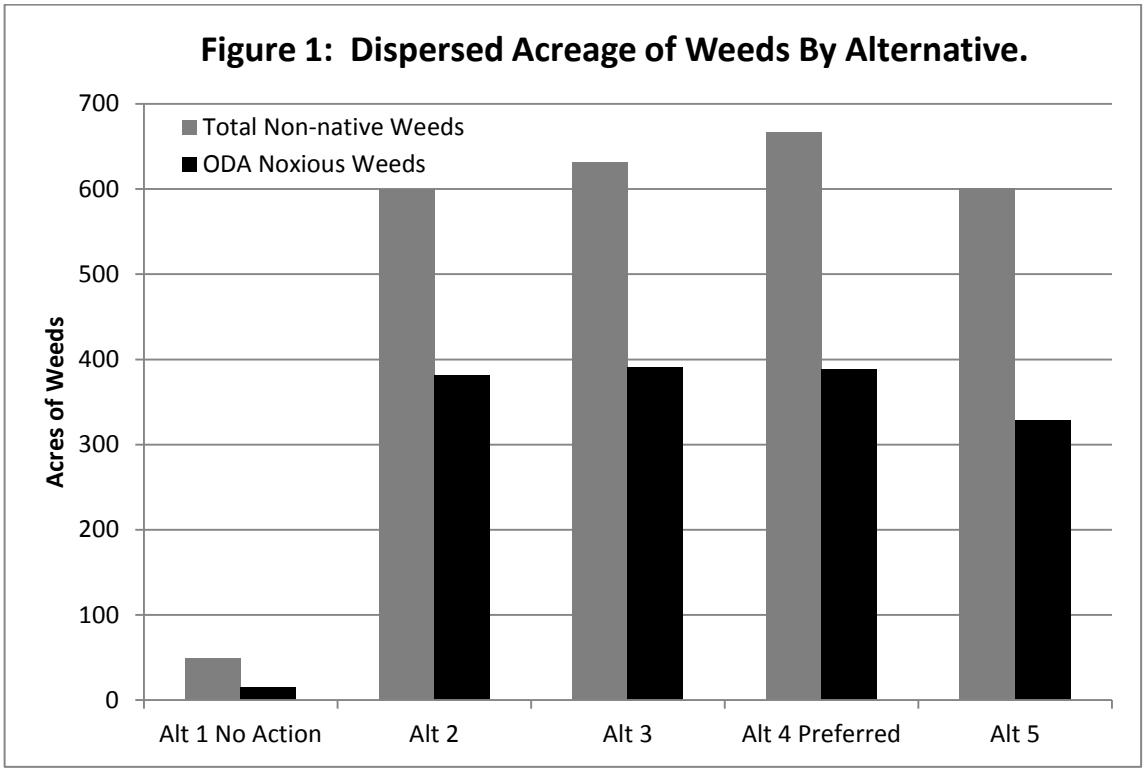
Weed cover in the planning area can be unpredictable due to local conditions and the vagaries of seed dispersal and establishment. Non-native and noxious weed abundance was modeled based on acres of disturbance in the alternatives, and the estimated resulting weed cover, based on current observations within the planning area.

**Estimated average percent cover of weeds under all the action alternatives**

| | Noxious Weeds | Non-native Total |
|---|---|---|
| Recent (existing) thinning units | 0.4 | 2 |
| Roadsides - Closed forest | 1 | 5 |
| Roadsides – Recently thinned forest | 10 | 25 |
| Recently closed temp roads | 5 | 20 |
| Existing roads within new thinning units | 10 | 25 |
| New road construction | 5 | 20 |
| Oak release | 0.6 | 18 |
| New ground based thinning units | 1 | 5 |
| New cable and helicopter thinning units | 0.1 | 1 |
| Heavy thin (Variable Density Thinning) | 1 | 10 |
| Thinning units in Vaughn sections* | 30-50 | 30-50 |

*These estimates do not include weed control prior to the timber sales. Control measures will be applied to False Brome at the Vaughn sites prior to thinning the stands.

Existing roads are expected to show a slight increase in weed cover because canopy cover would be reduced in the thinning areas. Road improvements may consist of simply adding gravel to the road surface, not contributing significantly to an increase in weeds. Increases in weed cover would occur where new roads are constructed; the weed cover found on recently closed roads was used for this estimate. Thinning areas would be most vulnerable to weed infestations where skid trails have been located. The variable density thins are expected to allow more weed increase due to less canopy cover. The estimate for false brome in the Vaughn area were obtained from observations of management actions in other timber sales, such as the Blackberry Hole Timber Sale of the Upper Willamette Resource Area where false brome was not treated prior to the thinning. The Vaughn area would be subject to weed control prior to thinning, therefore the false brome estimates would be lower. False brome had been largely confined to roadsides, equipment and wildlife trails, as it continues to be in nearby undisturbed areas. Barring disturbance, rates of false brome spread into mature, intact vegetation are often relatively low. Figure 1 compares the acres of treatment areas which may be affected by weeds between the no-action alternative with the action alternatives. Data from the table above were used to compile Figure 1, thus representing the most likely actions within the alternatives. Roads have a disproportionate effect for their area, with between 10% and 34% of total weed coverage being associated with roads, depending on the alternative. Other potential contributors include blackberries in existing young plantations, roadside weeds within young plantations, false brome spread expected from timber sales in the Vaughn area, and weeds expected within ground based logging units. For all the action alternatives approximately 600 to 660 acres of thinning areas may be affected by non-native weeds compared to 50 acres affected by alternative 1.




Longer term trends under the action alternatives would also occur. Newly constructed and renovated/improved natural surface roads on Matrix lands, and newly constructed and non-inventoried roads used for harvest activities on LSR lands would be decommissioned. Newly constructed and renovated/improved roads within late-successional stands that are natural surface or have been rocked to facilitate harvest activities but are not needed for future management on Matrix and LSR lands would also be decommissioned. Roads being decommissioned would eventually contain minimal amounts of weeds due to an increase in shade provided by the increase in canopy closure.

Weed coverage in timber sale units should eventually drop to near zero as canopy cover recovers in possibly 15-30 years. This drop would take longer in more intensively thinned units in alternatives 4 and 5. Exceptions would occur where false brome or other shade tolerant weeds obtain a foothold and possibly hold sites indefinitely. False brome is favored by disturbance opening up habitat, but is shade tolerant and can potentially dominate a forest understory. Another exception would occur in riparian areas, where persistent species such as blackberry, yellow flag iris or knotweeds are introduced by logging equipment or disperse there by other means. Most weeds in most areas would eventually be shaded out, but not before providing a seed source for other newly opened roads and forest management areas, while competing with native early-successional species and seedling trees.

Mitigations and BLM Manual 9015. Mitigations for weeds are included in the design features common to all alternatives. A risk assessment would be incorporated with the use of assessment procedures from BLM Manual 9015 – Integrated Weed Management where feasible. The assessment considers the likelihood and consequences of the spread of weeds and uses a risk rating method (Table 7) to prioritize areas. For areas with a moderate risk rating, BLM Manual 9015 prescribes seeding with native species to occupy disturbed sites, monitoring for at least 3 years, and providing for control of noxious weed infestations. For areas with a high risk rating, seeding with native species, control of existing infestations prior to project activity, 5 years of monitoring and ongoing control of noxious weed populations is prescribed. Areas of high risk rating may be treated according to recommendations from the 9015 manual during the implementation phase.

**Table 7: Weed Risk Assessment for the Long Tom Project Area**

| | Likelihood | Consequence | Risk Rating |
|---|---|---|---|
| Most of the Project Area | Moderate (likely to result in some areas being infested) | Moderate (effects on native plant community likely but limited) | Moderate |
| Thin Vaughn Sections | High (likely to result in weeds throughout much of the project area) | High (adverse effects on native plant community probable) | High |

For the large false brome population near Vaughn, weed control measures have not been included in the analysis, however control measures would be implemented prior to road construction or thinning actions. Hoeing is effective against false brome, sometimes reducing the cover by about 75% per year. Control would take multiple years, after which false brome should be reduced to very small amounts; however, the extent to which this mitigation would lessen false brome in the area is difficult to define. No previous field examples are available (a similar situation has not yet occurred), and the degree to which the weeds would be controlled before project implementation is not defined. False brome also occurs on adjacent private land, and could be spread into newly disturbed thinning areas by other vectors such as wind, wildlife and vehicles.

## LOGGING SYSTEMS

**ISSUE 6: <u>What are the effects of logging systems on the cost of yarding, road construction and road renovation</u>?**

*Each of the action alternatives employs a different combination of logging systems due to design constraints, environmental concerns, and the extent of area treated. Costs of yarding, road construction, and road renovation/improvement would vary by alternative. Analysis of these costs will provide a means to compare cost-effectiveness among alternatives.*

***Measure**: Cost per acre and cost per thousand board feet (MBF).*

The detailed assumptions and calculations used in analyzing costs are available in the project analysis file. For the purposes of analysis, average logging costs per MBF were determined by using the appraised logging system costs for partial harvest projects appraised in the Siuslaw Resource Area between August 2010 and March 2011.

| Ground-based | Cable | Aerial |
|---|---|---|
| $119/MBF | $189/MBF | $445/MBF |

**Table 8: Summary of Yarding and Roading Features and Costs**

| | Alternative | | | |
|---|---|---|---|---|
| | 2 | 3 | 4 | 5 |
| Treatment acres | 8,100 | 9,280 | 8,650 | 7,530 |
| Total unit volume (mbf) | 145,800 | 157,760 | 155,700 | 128,010 |
| Volume per acre (mbf) | 18 | 17 | 18 | 17 |
| Miles of road construction (maximum of estimated range) | 35 | 35 | 35 | 25 |
| Miles of road renovation/improvement (maximum estimated) | 190 | 195 | 195 | 185 |
| Percent yarding system | | | | |
| Ground-based | 27 | 26 | 26 | 28 |
| Cable | 70 | 72 | 72 | 69 |
| Aerial | 3 | 2 | 2 | 3 |
| Cost per acre and MBF | | | | |
| per acre | $4,377 | $4,078 | $4,328 | $4,182 |
| per MBF | $243 | $240 | $241 | $240 |

Ground-based yarding (skidding) is considered the least expensive method; percentages range from 26 to 28, indicating little variation between alternatives. The percentages of cable yarding range from 69 to 72; and the percentages of aerial yarding (the most expensive method) range from 2 to 3.

Differences in cost among the alternatives can be explained by the variations of the volumes and acres offered for harvest and the costs of logging and road construction driven by alternative design. Generally, if the costs remain constant, when more volume is proposed for harvest, the cost per thousand board feet of volume (mbf) decreases. If less volume is proposed, the cost per mbf increases. Similarly, if the costs remain constant, if more acres are proposed for harvest, the cost per acre decreases; if fewer acres are proposed for harvest, the cost per acre increases.

If the volume offered for harvest were to remain constant, a higher proportion of the most expensive logging system (aerial) would drive the cost up. A higher proportion of the least expensive logging system (ground-based, or skidding) would drive the cost down.

The difference between the alternatives in the cost per mbf, with a range of $240/mbf to $246/mbf. The differences in cost per acre are greater, ranging from $4,078/acre to $4,377/acre, a difference of $299. The acres proposed for treatment range from 7,530 to 9,280.

Alternative 2 has the highest estimated cost per acre ($4,377) but offers the highest volume per acre. Alternative 3 has the lowest estimated cost per acre ($4,078) and proposes thinning the highest number of acres and the highest volume, but along with alternative 5, proposes the lowest volume thinned per acre (the LSR treatments consist of thinning from below removing smaller diameter trees, whereas the other alternatives propose to further lower tree densities on LSR lands using proportional thinning). Alternative 4 proposes the second highest number of acres for thinning and the second highest volume. The lower tree densities proposed in this alternative with the variable density thinning and the proportional thinning treatments, contribute to the higher volume. Alternative 5 proposes thinning on the lowest number of acres and produces the lowest volume. Although alternative 5 also includes variable density thinning and proportional thinning treatments, the restriction on new road construction in LSR lands contribute to this result.

For all action alternatives, the cost of aerial logging would undergo detailed evaluation at the time of implementation to ensure fiscal feasibility. It is possible that the areas proposed for helicopter logging would not be harvested, based on this evaluation.

## HAZARDOUS FUELS

**ISSUE 7: <u>How will management activities affect the amount of hazardous fuels in the Wildland-Urban Interface (WUI)?</u>**

*All acres of the planning area are identified as WUI, where wild fire is of particular concern. Proposed management activities in the action alternatives could alter the amount of hazardous fuels within the WUI, thereby affecting the risk of catastrophic loss of property and resources should a fire occur. Analysis of this issue allows for comparison of the fire risk among alternatives.*

***Measure**: Hazardous Fuel Models (FMs) in WUI over time.*

**Alternative 1**
There would be no immediate impact on fuels, but within an estimated 20 to 30 years, increased mortality would begin to occur. This would eventually result in the acreage moving from a FM 8 to a FM 10, increasing the potential for a high intensity stand replacing fire, including crown fires, than if the stands were thinned.

**Alternatives 2, 3, 4 and 5**
For all the action alternatives the forest stands being thinned using ground based yarding and cable yarding methods in Matrix and LSR land use allocations would convert from the current predominantly mixed fuel models 5 & 8 to a fuel model 12 for 1-2 years after harvest (see fuel model descriptions below). After the needles fall off the residual slash in 1-2 years it will become a less volatile fuel model 11 that would persist for another 5-7 years after which it would return to a mixed fuel model 5 & 8. Monitoring of previous helicopter logging of commercially thinned stands shows that such a yarding method usually results in a deeper, more uniform fuel bed. Very little of the slash (tops and limbs) is brought to the landings where it can be piled and burned. Helicopter logging slash can be best described as a persistent fuel model 12 that may last for 5-7 years before returning to a mixed fuel model 5 & 8. All acres being proposed for thinning under the action alternatives are included in the Wildland Urban Interface (WUI).

**Fuel Model Descriptions:**
**Fuel Model (FM) 5** (brush) – Fire is generally carried in the surface fuels, made up of litter, shrubs and the grasses or forbs in the understory. FM 5 can exhibit intense fire behavior under severe weather conditions involving high wind, high temperature and low humidity's.

**FM 8** (closed timber litter) – Fires are slow burning ground fires with low flame lengths, although fires may encounter heavy fuel concentrations that can flare up.

**FM 9** (Hardwood litter) – Fires are generally low intensity surface fires. Hardwood stands tend to not sustain fire in the Oregon Coast Range except under the most severe weather conditions.

**FM 10** (heavy timber litter/understory) – Fires burn in surface and ground fuels with greater intensity than other timber models due to higher fuel loadings. Crowning, spotting and tree torching is frequent in this fuel type.

**FM 11** (light logging slash) – Fires are fairly active in the slash and the intermixed herbaceous material. Relatively light fuel load, overstory shading and rapid aging of the fine fuels generally limit the fire potential. Fuel model 11 while in a red slash' condition generally burns like the heavier FM 12.

**FM 12** (moderate logging slash) resulting in rapidly spreading fires with high intensities that are capable of long range spotting. If a fire starts, it is generally sustained until a fuel break or change in fuel type is encountered.

Fire Behavior Field Reference Guide, PMS 436-4

## CARBON RELEASE AND STORAGE

**ISSUE 8: <u>How will management activities affect the release or storage of carbon?</u>**

*Carbon is the primary component of the two principal greenhouse gases, carbon dioxide and methane. The proposed thinning treatments would result in carbon being released because of harvested wood, slash treatment, biomass recovery and fuel consumption for timber operations, followed by carbon accumulations due to growth of trees and carbon storage (sequestration) in wood products from harvested wood. Analysis of this issue compares the action alternatives with the no action alternative to estimate the amount of carbon released and amount of carbon accumulated and stored as a result of timber harvest. The effects analysis considers net changes in carbon storage from live tree carbon in the short-term and long-term (30 years post-harvest).*

***Measure**: Tonnes of carbon released during timber harvest (in board feet), slash burning, biomass recovery and fuel consumption. Metric tons of carbon accumulated and stored due to tree growth.*

**<u>Analytical Assumptions</u>**
Growth estimated in cubic feet modeled from stand exam data in the ORGANON (Oregon Growth Analysis and Projection) growth and yield model were converted into carbon tonnes. The stands within the 9,280 acres of the project area currently have an estimated 692,320 carbon tonnes in live trees. The environmental effects analysis below considers changes in carbon storage for live tree carbon in the short-term (immediately after timber harvest in the first year) and in the long-term (30 years post-harvest). The temporal scale of 30 years for long-term analysis would be longer than the anticipated duration of net emissions directly or indirectly resulting from the action.

The carbon within harvested wood is calculated based on factors presented in the Western Oregon Plan Revisions EIS (BLM 2008, Appendix C, p. 28), which is incorporated herein by reference.

Because the proposed commercial thinning would maintain the forest stand, the carbon storage in forest carbon pools other than live trees (e.g., understory vegetation, forest floor, soil carbon) is assumed for the purpose of this analysis not to change as a result of thinning harvest, except for pile burning to dispose of slash or biomass recovery. Western Oregon Plan Revisions EIS BLM (2008, p.540; Appendix C, p. 29) analyzed the changes to carbon storage in forests other than live trees and concluded that the amount of carbon stored in forests (other than live trees) generally reflects the structural stage; that analysis is incorporated herein by reference.

The analysis of carbon emissions from harvest operations assumes an average 30 miles haul distance and assumes fuel consumption associated with yarding and hauling logs to the mill at 2.65 gallons of diesel fuel per thousand board feet and 6 pounds of carbon per gallon of diesel fuel.

The analysis of carbon emissions from slash treatment operations assumes an average of 0.5 tonnes of carbon emissions per ton of biomass treated.

**Alternative 1**
Under the no action alternative, continued forest growth over the next 30 years would result in an average annual increase in live tree stand volume of approximately 174 cubic feet per acre, or 1,612,715 cubic feet across the project area. This equates to an increase in storage of approximately 12,828 tonnes of carbon per year. Therefore, forest growth under the no action alternative would result in the storage of an additional 384,852 tonnes of carbon over the project area in the long term compared to current conditions.

**Alternatives 2, 3, 4 and 5**
The following table summarizes the carbon emission and carbon storage analysis for the action alternatives

| Alternative | Average volume (mbf) | Acres treated | Carbon stored in harvested wood in the short term (tonnes) | Carbon emitted in the short term from harvested wood (tonnes) | Carbon stored in harvested wood in the long term (tonnes) | Carbon emitted in the long term from harvested wood (tonnes) | Carbon emitted from yarding and hauling | Carbon emitted from slash disposal and biomass recovery |
|---|---|---|---|---|---|---|---|---|
| 2 | 151,800 | 8,100 | 173,113 | 28,112 | 143,641 | 57,584 | 35,179 | 745 |
| 3 | 156,000 | 9,280 | 177,918 | 28,893 | 59,183 | 59,183 | 36,156 | 829 |
| 4 | 161,700 | 8,650 | 184,506 | 29,963 | 153,094 | 61,374 | 37,494 | 775 |
| 5 | 130,800 | 7,530 | 149,178 | 24,226 | 123,781 | 49,623 | 30,315 | 694 |

For all the action alternatives emissions in the short term would include carbon released from harvested wood, slash disposal, biomass recovery, yarding and hauling. In the long term harvested wood would continue to emit carbon at a predicted rate resulting in cumulative emissions. Trees would continue to grow and sequester carbon at different rates after harvest for each alternative based on prescription types. The table below has the quantifications for each alternative.

Carbon Emission and sequestration values for all alternatives

| Alternative | Short term carbon emissions (tonnes) | Long term cumulative carbon emissions (tonnes) | Avg. Annual Increase in live tree stand volume per acre (cubic feet per acre/yr) | Increase in live tree stand volume (cubic feet) | Long Term Carbon sequestration by live trees (tonnes) |
|---|---|---|---|---|---|
| No action | N/A | N/A | 174 | 1,612,715 | 384,852 |
| 2 | 64,036 | 93,508 | 161 | 1,498,800 | 357,668 |
| 3 | 65,877 | 96,167 | 165 | 1,535,353 | 366,391 |
| 4 | 68,232 | 99,644 | 162 | 1,501,602 | 358,337 |
| 5 | 55,235 | 80,632 | 164 | 1,522,506 | 363,325 |

Total long term (30 years post treatment) carbon storage for all alternatives

| Alternative | Live Tree Carbon Storage (tonnes) | Harvested Wood Carbon Storage (tonnes) | Total Carbon Storage (tonnes) |
|---|---|---|---|
| No action | 1,077,173 | 0 | 1,077,173 |
| 2 | 825,684 | 143,641 | 969,326 |
| 3 | 821,745 | 147,628 | 969,373 |
| 4 | 811,741 | 153,094 | 964,835 |
| 5 | 859,239 | 123,781 | 983,020 |

On comparing the action alternatives with the no action alternative, all the action alternatives have lower live tree carbon storage levels thirty years after thinning harvest treatments than the no action alternative live tree carbon storage level of 1,077,173 metric tonnes. Even when carbon stored in harvested wood is combined with the live carbon stored in trees, the action alternatives would still have lower total stored carbon levels than the no action alternative in the long term.

The stands not being thinned on federal lands would continue to sequester carbon at rates similar to the no action alternative, primarily in stands less than thirty years of age. Stands that are 80 years of age or older would sequester carbon more slowly and respond more to episodic events. Many stands in all age categories

would be left un-thinned due to inaccessibility and would continue to sequester carbon. On adjacent private lands in the watershed, stands would likely be clear cut harvested and then planted with conifers resulting in cycles of increased carbon emissions due to harvest followed by rapid growth of planted seedlings and carbon sequestration. Further analysis of the cumulative effect of reasonably foreseeable actions on BLM-administered lands in Western Oregon can be found in the Western Oregon Plan Revisions EIS (2008, p.537, Chapter 4), incorporated herein by reference.

Despite differences in values for the alternatives, all the alternatives would continue to constitute 1% of the total carbon currently stored in forests and harvested wood in the United States and 0.02% of total carbon currently stored in vegetation, soil and detritus globally. Similar to findings in the Western Oregon Plan Revisions EIS, the difference in carbon storage among the alternatives over time is too small to reveal a difference when placed in the context of nationwide or global carbon storage - Western Oregon Plan Revisions EIS (2008, p.538, Chapter 4).

## CONSULTATION AND COORDINATION

**List of Preparers**

The alternatives were developed and analyzed by the following interdisciplinary team of BLM specialists.

| Name | Title |
|---|---|
| Steve Steiner | Hydrologist |
| Teague Mercer | Hydrologist |
| Karin Baitis | Soil Scientist |
| John Moore | Wildlife Biologist |
| Randy Miller | Wildlife Biologist |
| Dan Crannell | Wildlife Biologist |
| Leo Poole | Fish Biologist |
| Doug Goldenberg | Botanist |
| Mark Stephen | Silviculturist |
| Janet Zentner | Logging systems |
| Peter O'Toole | Planning Forester |
| Jeff Spring | Engineer |
| Dave Reed | Fuels Specialist |
| Eric Johnson | Fuels Specialist |
| Tom Jackson | GIS |

## U.S. FISH AND WILDLIFE SERVICE (USFWS)

**ESA Consultation**

Consultation with the USFWS is required because the Northern Spotted Owl and the Marbled Murrelet are found in the action area. Both are currently federally listed Threatened species. Consultation was initiated with the service and a Biological Opinion for management actions to be implemented under the preferred alternative was issued on March 1, 2011. There are no terms and conditions listed in the Biological Opinion; the service has concluded that reasonable and prudent measures have been taken through incorporation of project design features and management standards to allow this project to go forward.

## NATIONAL MARINE FISHERIES SERVICE (NMFS)

**ESA Consultation**

The proposed actions are located in the 5th field Long Tom River – Hydrologic Unit Code (HUC). There are no listed fish species and designated critical habitat within this HUC, therefore consultation will not be required with the service. Small acres of ridge top areas may be thinned and short portions of haul routes may be used that fall into adjacent watersheds, but these would be implemented using best management practices, to have no effect of listed fish species that may occupy adjacent watersheds.

**Essential Fish Habitat**

The Magnuson-Stevens Fishery Conservation and Management Act requires Federal agencies to consult with the Secretary of Commerce regarding any action or proposed action authorized, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH) under the Act. The proposed alternatives as described and analyzed in this environmental assessment would have "No Effect" on waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

## TRIBAL COORDINATION

The Bureau of Land Management Siuslaw Resource Area consulted with the Confederated Tribes of Siletz, , the Confederated Tribes of the Grand Ronde, and the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians during the scoping period. No response was received.

## CULTURAL RESOURCES

The planning area is located in the Coast Range. Cultural survey techniques are based on those described in Appendix D of the *Protocol for Managing Cultural Resource on Lands Administered by the Bureau of Land Management in Oregon.* Standards followed during post-disturbance surveys are based on slope as defined in the Protocol appendix. These standards mandate surveys only on slopes of 10% or less. Ground disturbing work would be suspended if cultural material is discovered during project implementation until an archaeologist can assess the significance of the discovery.

## OTHER SPECIAL STATUS SPECIES

Under all the action alternatives surveys for other special status species such as bureau sensitive, bureau tracking and other bureau strategic species would be conducted as needed using standard protocols that are applicable at the time of implementation. Known sites would be managed consistent with policies that are applicable at the time of implementation of the project.

## PUBLIC PARTICIPATION

### Scoping

A scoping letter was mailed out on September 15, 2009 to local businesses, groups, government agencies and individuals, announcing that BLM was seeking feedback about issues or concerns regarding thinning projects in the Long Tom Watershed. We received 6 comments. Comments were generally in support of commercial thinning, use of temporary roads or no new roads, economic viability and socio economic benefits, snag creation, adequate stream buffers and variable density thinning. Concerns included weed infestations in more open thinning areas and carbon sequestration analysis.

### EA Review

This Environmental Assessment and preliminary Finding of No Significant Impact statement will be made available for public review and comment for a 30 day period. The EA will be sent to interested groups, businesses, agencies and individuals. In addition the EA will be posted on the Eugene District internet website.

## GLOSSARY

**LUA** - Land Use Allocation
**GIS** - Geographic Information Systems
**Spotted owl nest patch** - The area within 300 meters of a spotted owl nest location (approximately 70 acres).
**Spotted owl known site** - A nest site or activity center where a resident single owl or pair has been confirmed
**Predicted site** - A location where a computer model (USDA & USDI 2008) predicts that a northern spotted owl activity center exists based on habitat conditions and a nearest-neighbor analysis.

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**Table 9: Summary of Management Actions**

| | Alternative 2 | Alternative 3 | Alternative 4<br>Preferred alternative | Alternative 5 |
|---|---|---|---|---|
| Matrix Treatment | Stand age 30-79 | Stand age 30-99 | Stand age 30-99 | Stand age 30-79 |
| | Thin from below, RD mid 30s | Thin from below, RD mid 30s,<br>80 to 99 years RD upper 30s | Thin from below, RD mid 30s,<br>80 to 99 years RD upper 30s | Thin from below, RD mid 30s |
| LSR Treatment | Stand age 30-79 | Stand age 30-79 | Stand age 30-79 | Stand age 30-79 |
| | Proportional thin, RD 26-35 | Thin from below, RD mid 30s | Proportional thin 75% of the stands, RD 26-35. *VDT 25% of the stands, RD 20-30s. | Proportional thin 50% of the stands, RD 26-35. *VDT 50% of the stands, RD 20-30s. |
| Riparian Reserve Treatment | Same as adjacent uplands | Same as adjacent uplands | Same as adjacent uplands | Same as adjacent uplands |
| Oak treatment (Matrix) | Single tree release, approx. ¼ acre opening | Single tree release, approx. ¼ acre opening | Single tree release, approx. ¼ acre opening | Single tree release, approx. ¼ acre opening |
| Stream buffer widths | 60 feet | 60 feet | 60 feet | 60 feet |
| Northern Spotted Owl | No thinning in nest patches of known owl sites in Matrix and LSR.<br>Maintain suitable habitat.<br>Downgrade potentially suitable habitat to dispersal in AOC and all LUAs.<br>Survey all predicted sites during implementation.<br>Maintain dispersal habitat. | Will thin in nest patches of known and predicted owl sites in Matrix and LSR.<br>Downgrade suitable habitat in Matrix.<br>Maintain suitable habitat in LSR and AOC.<br>Downgrade potentially suitable habitat to dispersal in AOC and all LUAs.<br>Maintain dispersal habitat. | No thinning in nest patches of known owl sites in Matrix and LSR.<br>Downgrade suitable habitat in Matrix.<br>Downgrade potentially suitable habitat in Matrix and LSR.<br>Maintain suitable and potentially suitable habitat in AOC.<br>Survey all predicted sites during implementation.<br>Remove (short term) dispersal habitat in 25% of LSR (VDT). | Will thin in nest patches of known and predicted owl sites in Matrix<br>No thinning in known nest patches in LSR and AOC.<br>Maintain suitable habitat in AOC and all LUAs.<br>Downgrade potentially suitable habitat to dispersal in AOC and all LUAs.<br>Survey all predicted sites during implementation in LSR.<br>Remove (short term) dispersal habitat in 50% of LSR (VDT). |
| Marbled Murrelet | Follow Level II guidance | Follow Level II guidance/protocol surveys | Follow Level II guidance/protocol surveys | Follow Level II guidance |
| Noxious weeds | BLM manual 9015 | BLM manual 9015 | BLM manual 9015 | BLM manual 9015 |
| Coarse Woody Debris and Snags | Matrix: Natural Recruitment<br>LSR: CWD-add as needed to reach 120-240 ft/ac; Snags 2.4 to 6.5 sq feet basal area (2 to 6 tpa) based on pretreatment stand QMD. | Matrix: Natural Recruitment<br>LSR: Natural Recruitment | Matrix: Natural Recruitment<br>LSR: CWD-add as needed to reach 120-240 ft/ac; Snags 2.4 to 6.5 sq feet basal area (2 to 6 tpa) based on pretreatment stand QMD. | Matrix: Natural Recruitment<br>LSR: CWD-add as needed to reach 120-240 ft/ac; Snags 2.4 to 6.5 sq feet basal area (2 to 6 tpa) based on pretreatment stand QMD. |
| Logging | Cable, ground, helicopter | Cable, ground, helicopter | Cable, ground, helicopter | Cable, ground, helicopter |
| Roads | Constructed, renovated, improved as needed in all land use allocations | Constructed, renovated, improved as needed in all land use allocations | Constructed, renovated, improved as needed in all land use allocations | Constructed, renovated & improved as needed in Matrix & associated RR; renovated & improved as needed in LSR & assoc. RR; no new road construction in LSR & assoc. RR |

# APPENDIX A: SPECIAL STATUS SPECIES

| Species | Presence in the Eugene District — Habitat Associations | Presence in Project Area and potential effects |
|---|---|---|
| **Federally-listed Threatened, Endangered and Proposed Species** | | |
| Marbled murrelet *Brachyramphus marmoratus* | **Present** – Nests only in structurally-complex conifer forest stands; nesting structure occurs within 50 miles of the coast and below 2,925 ft. in elevation, is one of four species (Western hemlock, Douglas-fir, Sitka spruce or western red cedar), is ≥ 19.1 in. (dbh) in diameter, > 107 ft. in height, has at least one platform ≥ 5.9 in. in diameter, nesting substrate (*e.g.,* moss, epiphytes, duff) on that platform, and an access route through the canopy that a murrelet could use to approach and land on the platform, and it has a tree branch or foliage, either on the tree with potential structure or on a surrounding tree, that provides protective cover over the platform | Present; adverse short-term and beneficial long-term effects from habitat modification and disturbance |
| Northern spotted owl *Strix occidentalis caurina* | **Present** – Occupies young, mature or structurally-complex conifer forest stands with snags and/or downed wood; occupied stands generally have a mean tree diameter of ≥ 11in. and a canopy cover ≥ 40 percent; lives in forests characterized by dense canopy closure of mature and old-growth trees, abundant logs, standing snags and live trees with broken tops; although known to nest, roost and feed in a wide variety of habitat types, prefers older forest stands with variety: multi-layered canopies of several tree species of varying size and age, both standing and fallen dead trees, and open space among the lower branches to allow flight under the canopy; typically, forests do not attain these characteristics until they are at least 150 to 200 years old | Present; adverse short-term and beneficial long-term effects from habitat modification and disturbance |
| **Sensitive Species** | | |
| Salamander slug *Gliabates oregonius* | **Possible** – One record (1959) from Lane County; leaf litter under bushes in mature conifer forest on east side of Long Tom River at 600 feet elevation | Yes; beneficial effects from habitat modification that increases amount of bushes in older stands thinned. |
| Tillamook westernslug *Hesperarion mariae* | **Present** – Inhabits moist, mature forest with deciduous tree/shrub layer; coastal fog forest | Yes; beneficial effects from habitat modification that increases deciduous vegetation. |
| Spotted tail-dropper *Prophysaon vanattae pardalis* | **Possible** – Inhabits mature forest with deciduous layer in the coastal zone; sensitive to logging activities; little known about habitat associations | Yes; short-term adverse from logging and long term beneficial effects from habitat modification that increases deciduous vegetation. |
| | | |
| Roth's blind ground beetle *Pterostichus rothi* | **Possible** – Restricted to cool, moist, closed-canopy conifer forests with well-drained, deep, coarse-crumb structure soils; not found on alluvial soils on floodplains; prefers ground covered by duff; found throughout year under embedded rocks and logs; not found in disturbed sites, meadows or ecotones associated with grassy areas | May occur in project areas appropriate soil conditions may exist and appropriate forest conditions do exist in the project area. Short-term adverse effects could occur |

## APPENDIX A: SPECIAL STATUS SPECIES

| Species | Presence in the Eugene District — Habitat Associations | Presence in Project Area and potential effects |
|---|---|---|
| | | due to drier microclimate for about 5-10 years after thinning. |
| White-tailed kite<br>*Elanus leucurus* | **Present** – Associated with grasslands, typically with deciduous trees for nesting and perching; also frequent agricultural lands; typically occur on valley floor | Yes, beneficial effects from habitat modification that increases amount of deciduous trees near grasslands or agricultural lands. |
| Bald eagle<br>*Haliaeetus leucocephalus* | **Present** – Nest and roost in large trees, late-seral forest stands within 1 mile of lakes, rivers and large streams; nest site selection varies widely from deciduous, coniferous and mixed-forest stands; nest trees are usually large diameter trees characterized by open branching and stout limbs; nests are in dominant or co-dominant trees often located near a break in the forest such as a burn, clearcut, field edge (including agricultural fields), or water; the majority of nest sites are within 1/2 mile of a body of water such as coastal shorelines, bays, rivers, lakes, farm ponds, dammed up rivers (i.e., beaver dams, log jams, etc.) and have an unobstructed view of the water; habitation occurs primarily in undeveloped areas with little human activity; winter foraging areas are usually located near open water on rivers, lakes, reservoirs, and bays where fish and waterfowl are abundant, or in areas with little or no water (i.e., rangelands, barren land, tundra, suburban areas, etc.) where other prey species (e.g., rabbit, rodents, deer, carrion) are abundant; communal roost sites contain large trees (standing snags and utility poles have also been used) with stout lower horizontal branches for perching and may be used at night by three to greater than one hundred bald eagles, as well as during the day, especially during inclement weather; perch trees used during the day possess the same characteristics as roost trees but are located closer to foraging areas; conspicuous birds and most use areas in the Eugene District are known | Yes; minor adverse effects from habitat modification that could remove potential nest trees. However, nest trees are not limited in project areas. |
| Lewis'woodpecker<br>*Melanerpes lewis* | **Present** – Associated with open woodlands including Oregon white oak woodlands, Ponderosa pine woodlands and mixed oak/pine woodlands; more common in woodlands near grassland-shrub communities; winter resident in West Eugene Wetlands | Yes, oak and snag creation treatments could be beneficial. |
| Oregon vesper sparrow<br>*Pooecetes gramineus affinis* | **Present** – Associated with grasslands, fields, prairies and roadsides; not associated with forests | Yes; treatments that increase grasses or forbs would be beneficial, especially on roadsides. |
| Purple martin<br>*Progne subis* | **Present** – Snags in early-seral stands, openings and burns; commonly associated with rivers, marshes and open water, especially when snags are present, both for nesting and foraging | Yes; beneficial effects from snag creation near early-seral areas. |
| Foothill yellow-legged frog<br>*Rana boylii* | **Present** – Perennial, low-gradient, medium-sized streams ($4^{th}$ – $6^{th}$ order) or side channels of larger creeks or rivers with rock, gravel or sand substrate | Possibly; design features for water quality and fish will prevent unacceptable adverse effects. |

## APPENDIX A: SPECIAL STATUS SPECIES

| Species | Presence in the Eugene District — Habitat Associations | Presence in Project Area and potential effects |
|---|---|---|
| Northwestern pond turtle<br>*Clemmys marmorata marmorata* | **Present** – Associated with both terrestrial and aquatic habitats from sea level to 5000 ft.; lentic water (ponds, slow reaches of rivers); nests in open areas within 150 m of water; overwinter within 500 m of live/open water. | Yes; potential for beneficial effects from thinning that increases light and heat to forest floor. |
| Pallid bat<br>*Antrozous pallidus* | **Possible** – Associated with desert areas in Oregon; west of Cascades restricted to drier interior valleys of southern portion of state, including Lane County, where it occurs at low elevations and along the valley floor; usually found in brushy and rocky terrain but has been observed along edges of coniferous and deciduous woods and open farmlands; crevice dweller associated with rock crevices, snags, large hollow trees and human structures used for day roosting | Yes; beneficial effects from increasing snags and deciduous vegetation (prey increased). Adverse effects from thinning without creating snags in Matrix. |
| Townsend's big-eared bat<br>*Corynorhinus townsendii* | **Present** – Cave obligate; day roosts in mines, caves, tree cavities and attics of buildings | Yes; beneficial effects from increasing snags and deciduous vegetation (prey increased) |
| Fisher<br>*Martes pennanti* | **Present** – Forest stands, both conifer and conifer-hardwood mix, with large down logs, live trees and snags for denning; in Oregon fishers occurred historically throughout the Coastal and Cascade mountains; currently the range is severely reduced; despite extensive surveys conducted in forested regions of Oregon, records dating from 1954 to 2001 show that the remaining populations of fishers are in two separate and genetically isolated populations in southwestern Oregon; one in the northern Siskiyou Mountains and one in the southern Cascade Range. Both populations appear to be slowly increasing. | Possible; beneficial effects from increasing quality of forest habitat by increasing the amount of deciduous vegetation and dead wood. |
| *Fringed myotis*<br>*Myotis thysanodes* | **Possible** – Crevice dweller associated with large snags and live trees, abandoned buildings, mines and caves, some bridges; forage in openings, and late- and mid-seral forests | Yes; beneficial effects from increasing snags and deciduous vegetation (prey increased) |
| **Birds of Conservation Concern (not already listed above)** | | |
| Northern goshawk<br>*Accipiter gentilis* | **Present** – Inhabits a wide variety of forest ages, structural conditions and successional stages; for hunting habitat, the northern goshawk prefers the transitional zones from bog to forest and forest to shrubland; riparian zones and mosaics of forested and open areas are also important hunting habitats; uses stands of old-growth forest as nesting sites; nests in both live trees and snags. | Yes; beneficial effects from increasing deciduous vegetation and opening stands enough to provide flight corridors. (see IM OR-2009-018) |
| Black swift<br>*Cypseloides niger* | **Present** – Breeding swifts are restricted to two main habitat features – sea caves and cliffs along the Pacific coast, and adjacent to or near wet cliff sites in montane canyons; inland nests are usually located near dripping water sources, waterfalls, or turbulent water sprays; foraging habitat is poorly known; during warm, clear weather, foraging is presumed to occur at high altitudes where blooms of aerial insects are available, from 1000 to 2000 feet above ground during the day to within 100 feet of the ground during the late afternoon | Possible; beneficial effects from increasing deciduous vegetation (prey increased). Nesting habitat would be protected by design features for water and fish. |

# APPENDIX A: SPECIAL STATUS SPECIES

| Species | Presence in the Eugene District — Habitat Associations | Presence in Project Area and potential effects |
|---|---|---|
| Rufous hummingbird *Selasphorus rufus* | **Present** – Inhabits forest edges near riparian thickets, meadows and other openings; found in forests, on seed-tree harvest units, riparian shrub, and spruce-fir habitats; during the winter it lives wherever flowers are present | Yes, beneficial effects from increasing deciduous shrubs (see IM OR-2009-018) |
| *Olive-sided flycatcher Contopus borealis* | **Present** – Inhabits mixed conifer and hardwood-conifer forests; abundant in landscapes containing fragmented late-seral forests with pronounced ecotones; frequent coniferous forests, especially with tall standing dead trees. They prefer spruce, fir, balsam, pine, or mixed woodlands near edges and clearings, wooded streams, swamps, bogs, edges of lakes or rivers | Yes, beneficial effects from increasing deciduous vegetation. (see IM OR-2009-018) |
| Purple finch *Carpodacus purpureus* | **Present** – Inhabits coniferous and mixed forests, as well as park-like areas, breeding throughout western Oregon; nests are most often found far out on horizontal branches in conifers and are made of concealing material; food consists mostly of seeds, buds, blossoms, and fruit, usually taken from the outer branches of trees and occasionally from the ground; purple finches display strong site fidelity to breeding areas, but in winter, flocks may range widely depending on local food supplies and a wider variety of habitats are used | Yes, beneficial effects from increasing deciduous vegetation and vigor of conifers (see IM OR-2009-018) |

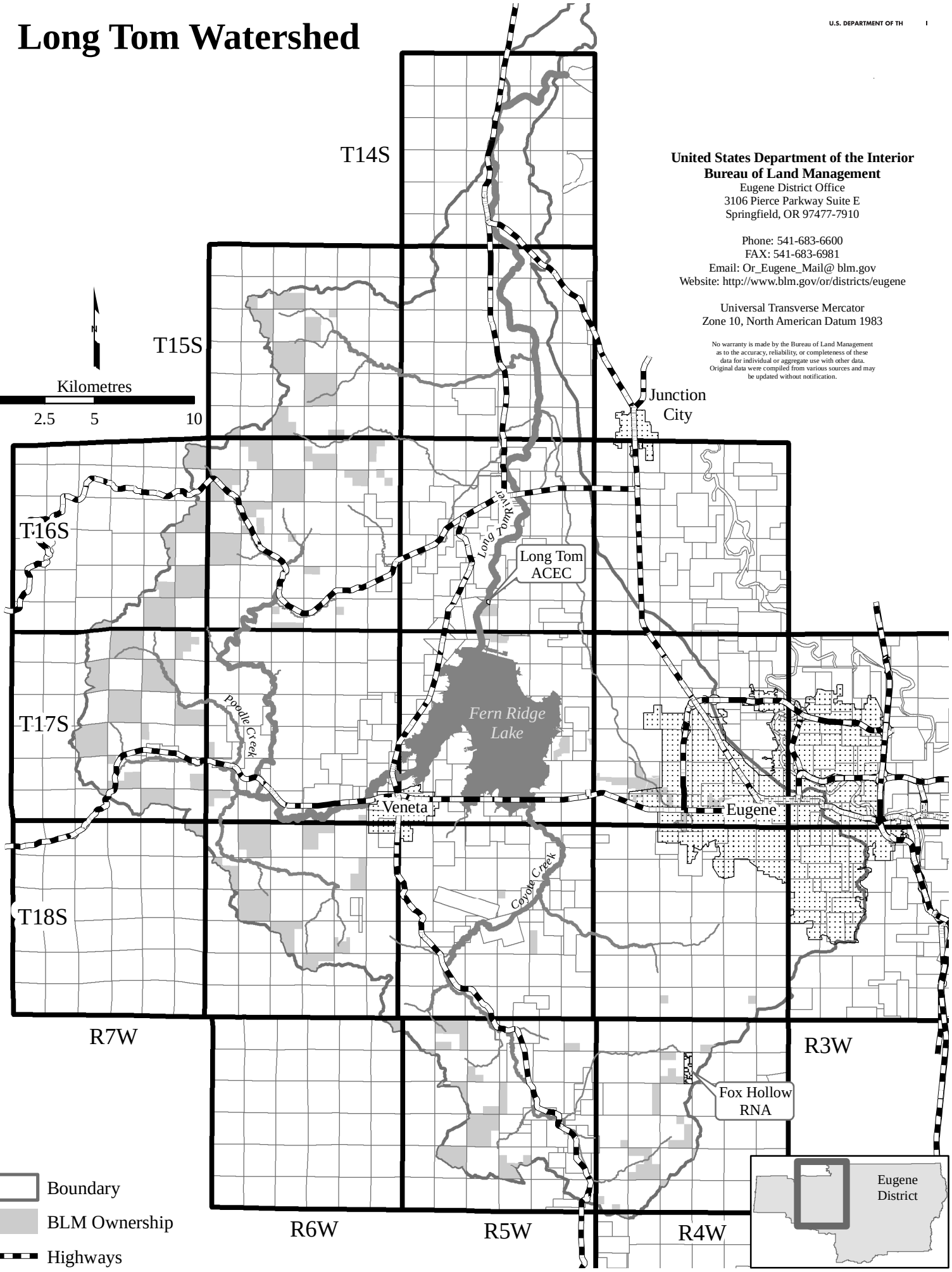
## APPENDIX B: BLM OUTFALL CULVERTS: FISH HABITAT AND ACREAGE ABOVE- KNOWN FISH BARRIER CULVERT SITES ON PROPOSED HAUL ROUTES (ALTERNATIVES 2, 3, 4, AND 5)

| TRS | Stream Name | Potential fish habitat above - Stream feet | Road Number | Acreage above culvert | Mile Post | Comments |
|---|---|---|---|---|---|---|
| 15-6-21 | Pitney Cr. Trib | NA | 15-6-21.1 | 2.5 | 0.4 | |
| 15-6-27 | Unnamed Trib. SF Ferguson | NA | 15-6-26.2 | 9.2 | 0.2 | |
| 15-6-27 | Unnamed Trib. SF Ferguson | 2900 | 15-6-26.2 | 230 | 0.44 | |
| 15-6-27 | SF Ferguson | 3500 | 15-6-26.2 | 395 | 0.65 | Replacement scheduled for 2010 - LTWSC (RAC) |
| 16-6-5 | Long Tom Trib. | 835 | 15-6-33.1 | 52 | 1.78 | Stream Link No. 123438314421530 |
| 16-6-4 | Long Tom River | NA | 16-6-17 | NA | 2.84 & 2.99 | Two Ditch Relief culverts - Shell Road |
| 16-6-5 | Unnamed Trib Long Tom | NA | 16-6-8 | 4.5 | 0.17 | Headwater crossing |
| 16-6-5 | Unnamed Trib Long Tom | NA | 16-6-8 | NA | 0.47 | Ditch Relief |
| 16-6-7 | Unnamed Trib Michaels Cr. | NA | 16-6-7.2 | 6.8 | 0.48 | Headwater crossing |
| 16-6-20 | Unnamed Trib Long Tom | NA | 16-6-20 | 10 | 0.44 | Stream Link No. 123445084416456 - Unnamed Trib of Long Tom Trib paralleling Vik Road |
| 16-6-20 | Ditch Relief | NA | 16-6-20 | NA | 0.62 | Vik Road |
| 16-6-19 | Unnamed Trib Long Tom | 2925 | 16-6-19 | 11 | 0.49 | Stream Link No. 123451214417051 |
| 16-6-19 | Unnamed Trib Long Tom | NA | 16-6-19 | 2.6 & 22 | .91 & .94 | Head Waters of Stream Link No. 123453854416810 |
| 16-6-19 | Ditch Relief | NA | 16-6-20 | NA | 0.75 | Vik Road |
| 16-6-19 | Unnamed Trib Long Tom | 308 | 16-6-20 | 41 | 0.94 | Stream Link No. 123461864416293 |
| 16-7-25 | Unnamed trib Hayes | NA | 16-7-25 | 100 | 0.67 | Stream Link No. 123475834415340 |
| 16-7-25 | Hayes Cr | 3,250 | 16-7-25 | 240 | 1.11 | Major Culvert |
| 17-7-1 | EF Poodle Creek | NA | 17-7-1 | NA | 0.56 | Ditch Relief |
| 17-7-1 | EF Poodle Creek | NA | 17-7-1 | NA | 0.71 | Ditch Relief |
| 17-7-1 | EF Poodle Creek | NA | 17-7-1 | 34 | 0.77 | Stream Link No. 123480334412745 |
| 16-7-36 | EF Poodle Creek | NA | 17-7-1 | NA | 1 | Ditch Relief |
| 17-7-9 | Ditch Relief | NA | 17-7-22 | NA | 3.4 | IP Deeded |
| 17-6-18 | 600 | NA | 17-6-18 | 77 | 0.71 | End Price Road (County) Begin BLM |
| 17-7-13 | Ditch Relief | NA | 17-6-18 | NA | 1.1 | Ridge Top |
| 17-6-30 | Unnamed Trib Poodle Cr. | NA | 17-6-30.1 | 54 | 0.3 | Stream Link No. 123463364405906 |
| 17-7-27 | Ditch Relief | NA | 17-7-27 | NA | 0.24 | Parallels Cedar Creek |
| 17-7-27 | Ditch Relief | NA | 17-7-27 | NA | 0.33 | Parallels Cedar Creek |
| 17-7-21 | Ditch Relief | NA | 17-7-27 | NA | 0.45 | Parallels Cedar Creek |
| 17-7-21 | Ditch Relief | NA | 17-7-27 | NA | 0.78 | Parallels Cedar Creek |

## APPENDIX B: BLM OUTFALL CULVERTS: FISH HABITAT AND ACREAGE ABOVE- KNOWN FISH BARRIER CULVERT SITES ON PROPOSED HAUL ROUTES (ALTERNATIVES 2, 3, 4, AND 5)

| TRS | Stream Name | Potential fish habitat above - Stream feet | Road Number | Acreage above culvert | Mile Post | Comments |
|---|---|---|---|---|---|---|
| 17-7-21 | Ditch Relief | NA | 17-7-27 | NA | 0.85 | Parallels Cedar Creek |
| 18-6-5 | Pasley Cr. | NA | 18-6-5 | 81 | 0.68 | |
| 18-6-5 | Pasley Cr. | NA | 18-6-5 | 37 | 1.54 | Headwater crossing |
| 18-6-5 | Ditch Relief | NA | 18-6-5.3 | NA | 0.2 | |
| 19-6-3 | Elkhorn Cr. Trib | 375 | 19-6-3 | 26 | 0.48 | Coho found above CMP over log culvert |
| 19-6-3 | Elkhorn Cr. Trib | NA | 19-6-3 | 128 | 0.56 | |
| 19-6-3 | Elkhorn Cr. | NA | 19-6-3 | NA | 0.68 | Ditch relief along Elkhorn Cr |
| 19-5-21 | Bear Cr. Trib | NA | 19-5-21.3 | NA | 0.13 | Ditch Relief |
| 19-5-21 | Bear Cr. Trib | NA | 19-5-21.3 | NA | 0.24 | Ditch Relief |
| 19-5-21 | Bear Creek | NA | 19-5-21 | NA | 0.08 | Ditch relief along Bear Cr |
| 19-4-9 | Unnamed Trib Boardtree | NA | 19-4-9.1 | 15 | 0.34 | Headwall- Stream Link No. 123179244392404 |
| 19-4-9 | Unnamed Trib Boardtree | NA | 19-4-9.1 | NA | 0.24 | Headwall |

# Long Tom Watershed





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Universal Transverse Mercator
Zone 10, North American Datum 1983


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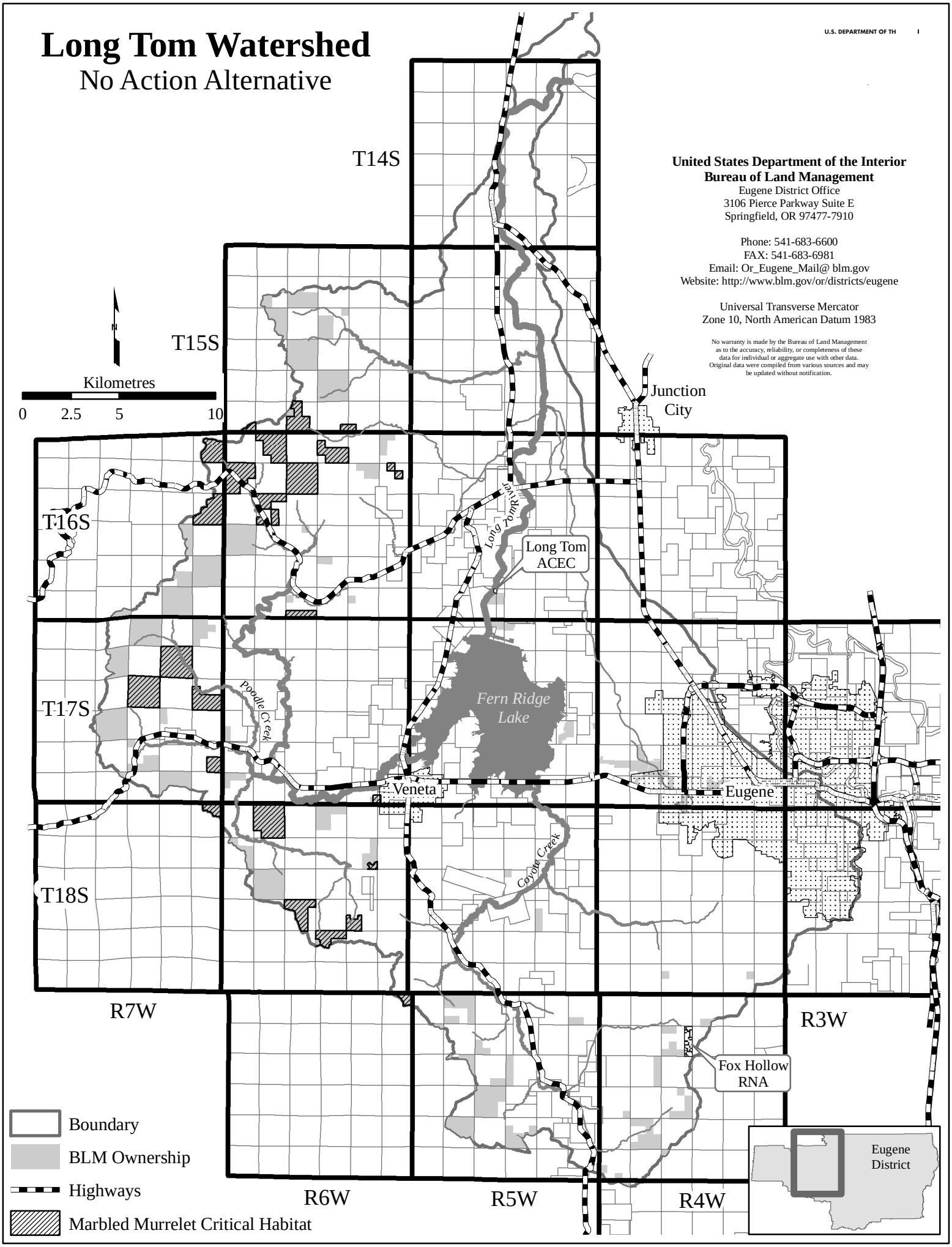
# Long Tom Watershed

## No Action Alternative





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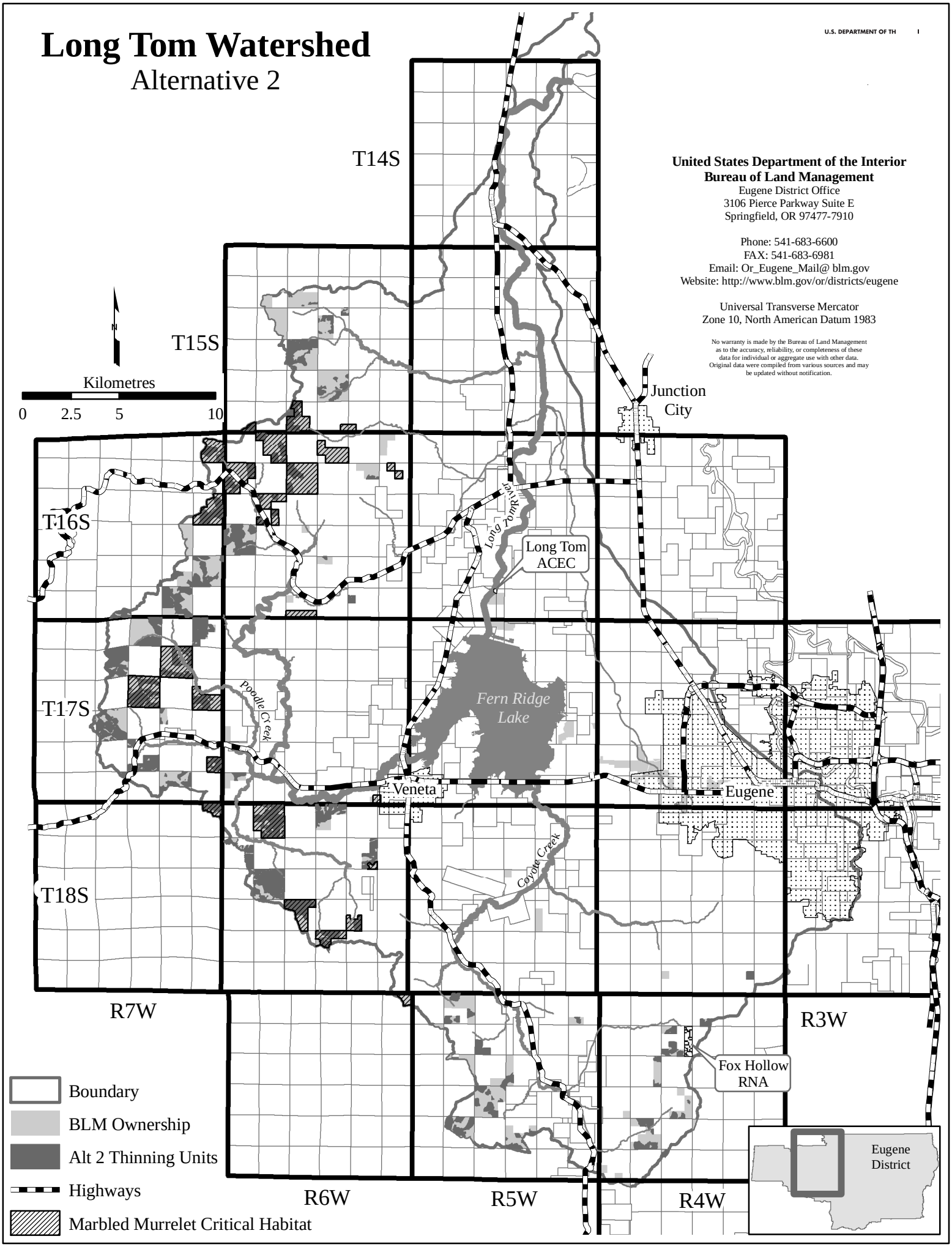
# Long Tom Watershed

## Alternative 2





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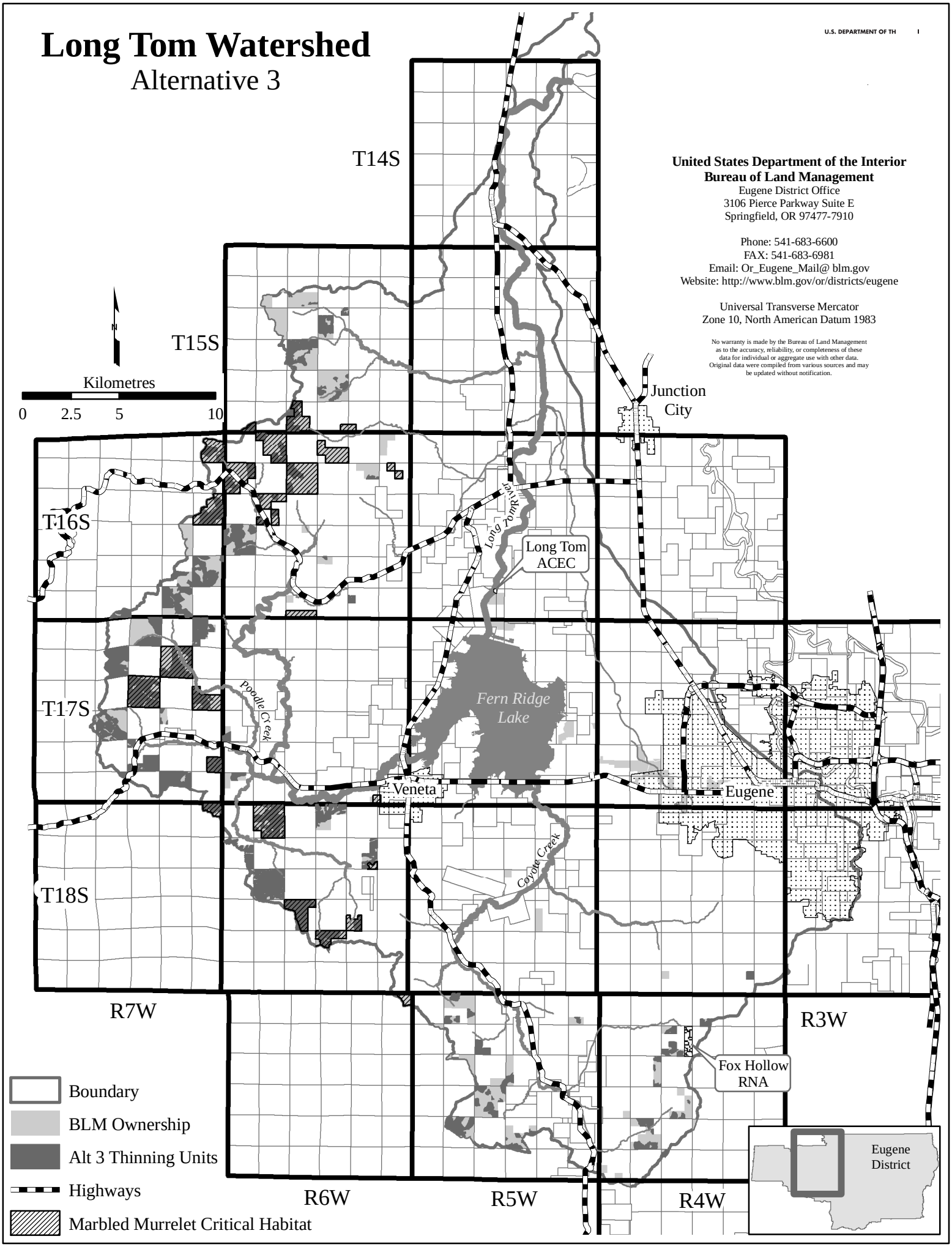
# Long Tom Watershed

## Alternative 3





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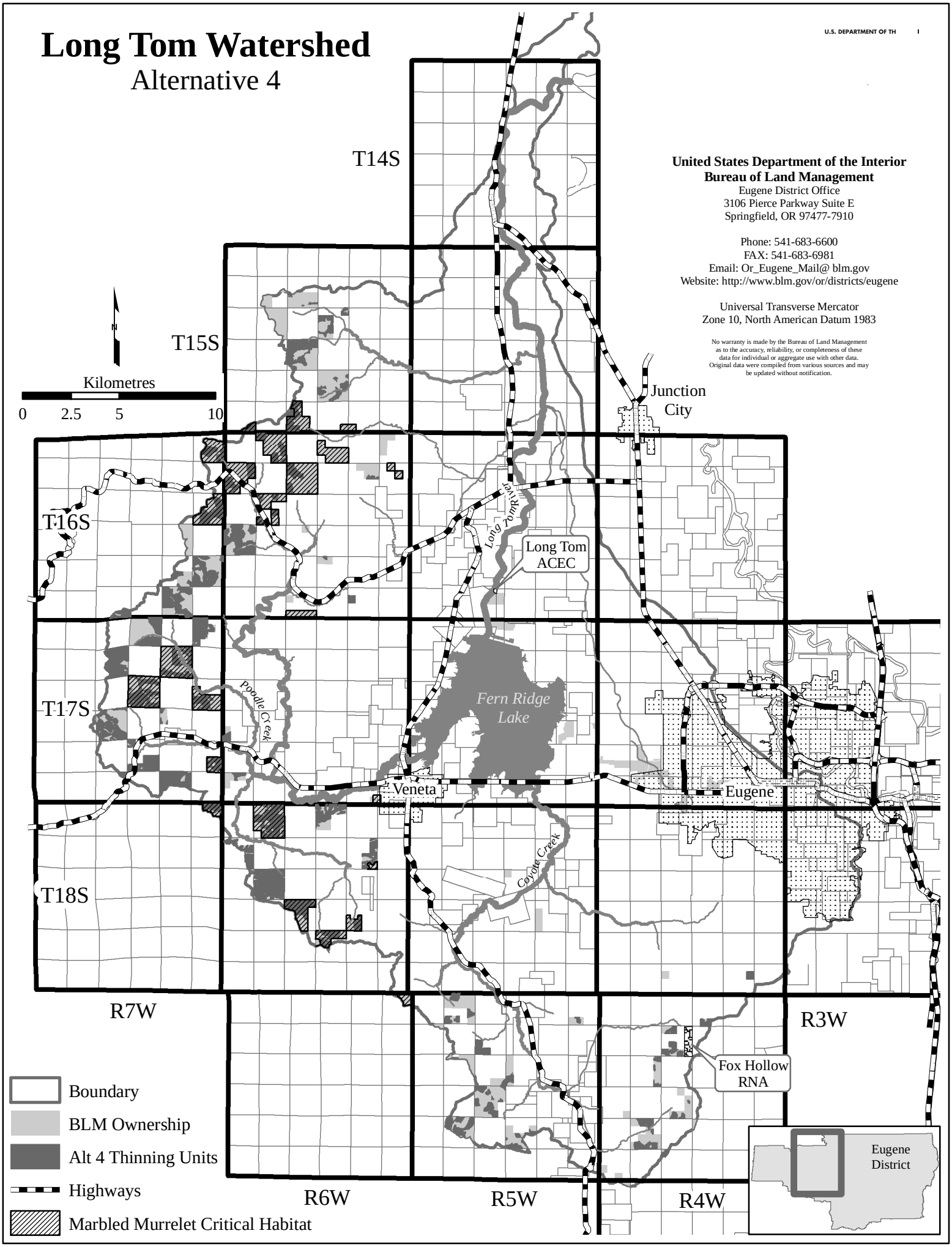
# Long Tom Watershed

## Alternative 4





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# Long Tom Watershed

## Alternative 5

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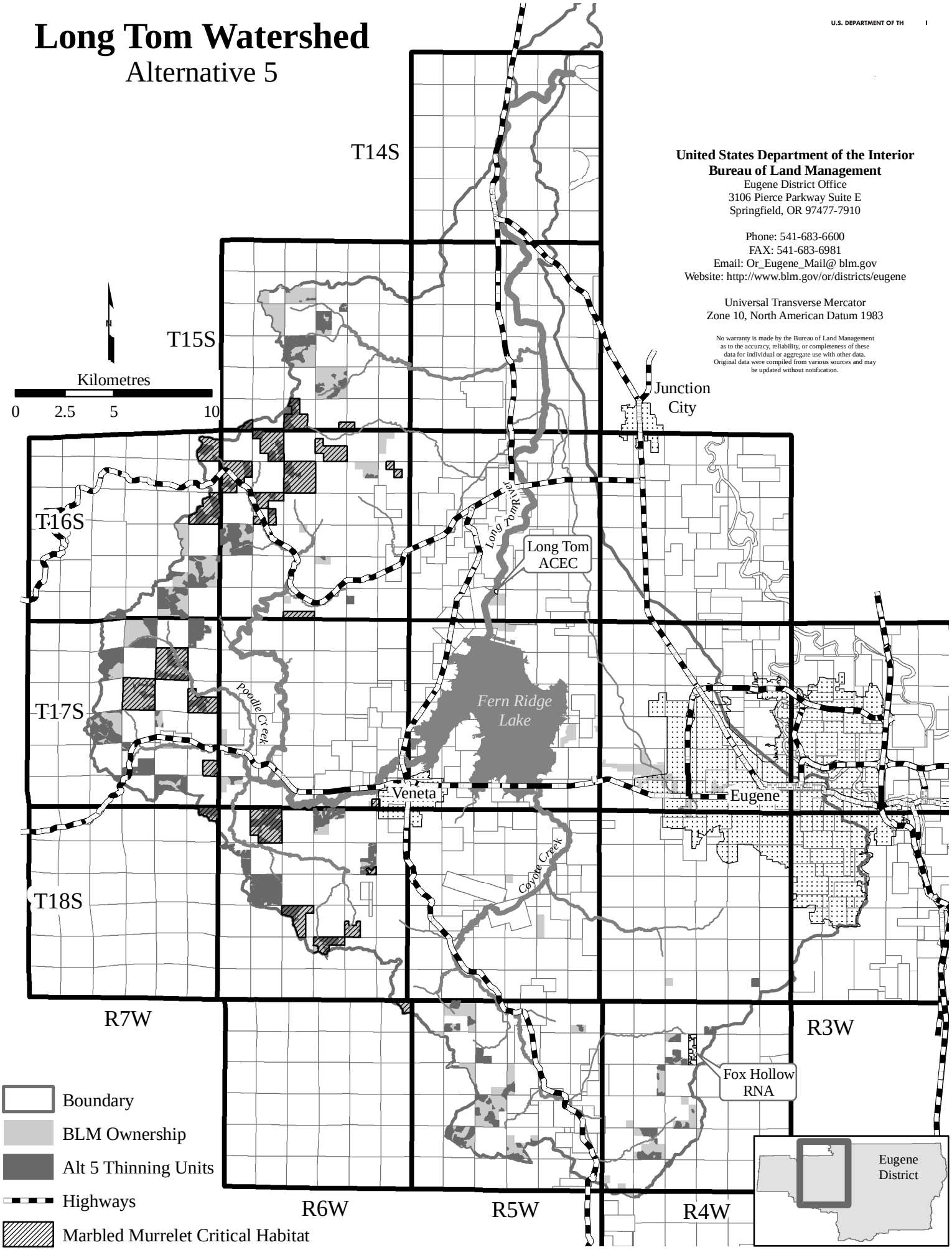
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