ENVIRONMENTAL ASSESSMENT

Elkhorn Creek Density Management Thinning, Wildlife Habitat Enhancement, and Fish Habitat Enhancement Projects

Environmental Assessment Number OR-086-05-01

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United States Department of Interior
Bureau of Land Management
Oregon State Office
Salem District
Tillamook Resource Area
Tillamook County, Oregon

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Abstract: The Bureau of Land Management proposes to conduct three different projects in the Adaptive Management Area and Riparian Reserve land use allocations. The first project is a density management thinning of approximately 1853 acres. The second project is a wildlife habitat enhancement treatment on approximately 150 acres. The third project is a fish habitat enhancement treatment on 1/2 mile of Cruiser Creek, and 1.5 miles of Elkhorn Creek. These action would occur on federal land in portions of T1S R6W sec 25 and 34; T1S R5W sec 31; T2S R5W sec 7; T2S R6W sec 4, 5, 8, 10, 16 and 19 Willamette Meridian.

This environmental assessment discloses the predicted environmental effects of two alternatives: Alternative 1 (Proposed Action) and Alternative 2 (No Action). The Proposed Action would be implemented through five commercial timber sales in 2006 through 2009; and service contracts.

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CHAPTER 1.0 PROJECT SCOPE

1.1 Project Location

The project area is approximately 22 miles east of the town of Tillamook, Oregon, in the upper parts of the Trask River fifth-field watershed. A small area lies in the upper parts of the Scoggins Creek and North Yamhill fifth-field watersheds. (Please refer to Figure 1). The project area includes T1S R6W sec 25 and 34; T1S R5W sec 31; T2S R5W sec 7; T2S R6W sec 4, 5, 8, 10, 16 and 19 Willamette Meridian. A part of the project area lies within a Tier-1 Key Watershed (T2S R6W sections 16, 4, 5, and 8 Willamette Meridian. The proposed project area is located on O&C lands (Oregon and California Railroad Land), and includes the Adaptive Management Area (AMA) and Riparian Reserve (RR) land-use allocations as identified in the Salem District Record of Decision and Resource Management Plan (RMP).

1.2 Project Objectives

By comparing existing resource conditions to desired resource conditions and the management objectives contained in the RMP, Trask Watershed Analysis (WA), Late-Successional Reserve Assessment (LSRA) and the Northern Coast Range Adaptive Management Area Guide (AMA Guide), the Interdisciplinary Team (IDT) identified several management opportunities. The following objectives were developed to address those opportunities:

1. Provide for a stable timber supply and social/economic benefits to local communities (RMP p. 19; AMA Guide p. 14);
2. Accelerate the development of some late-successional forest habitat characteristics (LSRA, pp. 86-87; AMA Guide p.49; WA pp. 6-4; RMP p. 19);
3. Rehabilitate and protect at-risk fish stocks and their habitat (RMP p. 27; WA p. 6-1);
4. Reduce existing road mileage within key-watersheds (RMP, p.63); and
5. Minimize sediment delivery to streams from roads (RMP, p.11)

1.3 Purpose of and Need for Action

1.3.1 Density Management

The proposed project area is a part of the historic Tillamook burn. In the late 1940's through the early 1960's the project area was extensively salvage logged. Today the area is overstocked with a dense, single-storied conifer forest, dominated by Douglas-fir that is approximately 35 to 65 years old. The growth and vigor of these stands is beginning to slow as a consequence of overcrowding and competition for the available site resources. The overstory canopy closure generally exceeds 70%, and the average stand diameters are between 10 and 18 inches. Although the total coarse woody debris (CWD) levels are

generally relatively high, the great majority of it is in the more advanced stages of decay.

The desired condition is one in which the following objectives are met: (1) accelerate the development of some late-successional forest structural features, including large trees (some with large limbs, and long and wide crowns), gaps in the canopy, large snags and down logs, various levels of overstory tree densities, and various levels of understory development; (2) enhance the overall level of diversity in the area; (3) develop stand windfirmness and stability (indicated by the height:diameter ratio) so that future density management treatments could continue this process, if such treatments were determined to be necessary at that time; (4) increase stand resilience to the impacts of Swiss needle cast disease on Douglas-fir by promoting the development of mixed-species stands where possible, and retaining the most apparently needle cast-tolerant Douglas-fir trees; (5) increase stand resilience to the impacts of *Phellinus weirii* root rot by retaining less susceptible tree species already present on site and by planting infection centers of one-acre or larger with less susceptible tree species; and (6) maintain post-treatment canopy closure in Unit 16-1 at or above 60% to maintain habitat suitability for the northern spotted owl.

1.3.2. Fish Habitat Enhancement

Analysis of data collected on Cruiser Creek and Elkhorn Creek in 1994 by the Oregon Department of Fish and Wildlife noted deficiencies in pool area, large wood pieces and an almost total lack of refuge habitat typified by off-channel or isolated pools. A road runs directly adjacent to Cruiser Creek in T2S R6W section 5 and is negatively impacting stream function and habitat value for salmonid spawning and rearing.

The desired condition is one in which fisheries habitat is improved. Specifically, the stream has a greater amount of large wood and other structures within it, and more quality pools. The 2-5-10 road, which is no longer needed by the BLM for administrative purposes, would have actions taken along its length to increase the streams ability to access and build flood plains and provide for a more natural functioning of Cruiser Creek.

1.3.3. Wildlife Habitat Enhancement

Because of the fire history of the Tillamook burn, there are a number of stands in the project area that are lacking in late-successional habitat characteristics, but for various reasons are not proposed to be treated at this time with density management. These stands vary in age from about 34 to 65 years old. In some riparian areas, conifers are either under-represented or are experiencing extremely slow growth beneath a hardwood understory. Some older and younger stands are lacking in both standing and down CWD. In some older stands there is a lack of structural diversity and features such as large limbs and forked tops that would be used for nesting and roosting.

The desired condition of the younger stands in riparian areas is to have a more diverse forest canopy, and allow for the faster development of individual selected conifers. These trees will provide for more structural diversity in the short term and provide for a

source or larger CWD in the future. In older stands, the girdling of individual trees and the creation of snags will allow the stand to more quickly develop those features that are desirable to wildlife.

1.4 Conformance with Land Use Plans, Policies and Programs

The proposed action would be in conformance with the Salem District RMP, May 1995 and tiers to the Salem District Proposed Resource Management Plan/Final Environmental Impact Statement, September 1994 (FEIS).

The proposed action would also be 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 and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl, April 1994 (Northwest Forest Plan); Trask Watershed Analysis, August 2003; Northern Coast Range Adaptive Management Area Guide, January 1997; Late-Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area, January 1998 (LSRA); Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, January, 2001 Record of Decision Amending Resource Management Plans for Seven Bureau of Land Management Districts and Land and Resource Management Plans for Nineteen National Forests Within the Range of the Northern Spotted Owl, Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy, March 2004; Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl, March 2004 (S&M) Coastal Zone Management Act of 1974, as amended and Endangered Species Act of 1972, as amended (ESA).

1.5 Permits and Approvals Required

Permits from the Army Corps of Engineers and Division of State Lands may be required for the fish habitat enhancement work in and adjacent to Cruiser Creek.

Proposed haul routes are covered by existing road use permits. New construction on private land and on ODF land will require the approval of crossing plats. Preparation and approval of License Agreements will be needed for use of non-BLM controlled roads.

1.6 Decision to be Made

The Tillamook Field Manager is the official responsible for deciding whether or not to prepare an environmental impact statement (EIS), and whether to approve the density management thinning, fish habitat enhancement project, and wildlife enhancement project, as proposed, not at all, or to some other extent.

CHAPTER 2 ALTERNATIVES

Since there were no unresolved conflicts concerning alternative uses of available resourced identified by the interdisciplinary team, there was no procedural requirement to develop additional action alternatives (Appendix 1). As such, the alternatives that will be analyzed in detail in this EA include the 'proposed action' and 'no-action' alternatives.

2.1 Alternative 1 (Proposed Action)

The proposed action would consist of density management thinning on approximately 1853 acres, wildlife habitat enhancement on 150 acres, a fish habitat enhancement project on Cruiser Creek and Elkhorn Creek. The locations of these actions are shown on Figure 2.

2.1.1 Density Management Thinning

In order to meet project objectives 1,2 and 4 above, the BLM proposes to perform density management thinning, using five commercial timber sales on approximately 1853 acres, located in ten different sections, within the AMA and RR land-use allocations. The proposed action is anticipated to be implemented from 2006 to 2012. The density management treatments are summarized in Table 1. A combination of ground-based, cable and helicopter yarding would be used. In addition, approximately 5.1 miles of road would be constructed, and 5.0 miles would be reconstructed. All of the newly constructed and reconstructed roads, and constructed landings would be decommissioned at project completion. At the completion of the density management thinning there would be a net decrease of 3.2 miles of road in the project area. In addition, 7.8 miles of existing, rocked road would be stabilized and improved through the completion of the density management projects.

Table 1. Treatment Area Summary. This table summarizes the treatment area information associated with the Density Management proposal. Information is based on treatment area examination and existing stand inventory information, and the acres estimates are approximate.

Sections/Unit	Total Density Management Acres	Yarding System	Acres AMA	Acres Riparian Reserve
4-1	683	cable and ground-based	411	272
5-1	72	cable and ground-based	48	24
5-2	205	cable	131	74
7-1	38	cable	15	23
8-1	169	cable, ground-based and helicopter	72	97
8-2	102	cable	69	33
10-1	53	cable and ground-based	29	24
16-1	123	cable and ground-base	77	46
19-1	100	helicopter and ground-	40	60

		based		
25-1	17	ground-based	13	4
31-1	188	cable and ground-based	106	82
31-2	7	ground-based	7	0
34-1	38	cable	26	12
34-2	58	cable and ground-based	45	13
Totals	1853		1089	764

Timber harvest and associated road actions will be conducted in such a manner as to assure that associated impacts will not exceed those allowed under the Best Management Practices identified in the Salem RMP (Appendix C-1 through C-6).

Density Management Thinning

The stands are proposed to be thinned in a *variable-spaced* manner by removing about 30 to 55% of the basal area and approximately 50 to 75% of the trees per acre. To encourage variability in density throughout the units as well as select those Douglas-fir trees that appear most tolerant to Swiss needle cast disease. Thinning shall be done primarily from the Douglas-fir component since it is by far the most abundant species, and other conifers and hardwoods in the stands will be retained to encourage *mixed-species* stands. In places where species other than Douglas-fir are dominant, however, some of the other conifer species will be thinned to end up with a mixture of species. All hardwood trees are to be retained and counted toward achieving the recommended basal area target levels. Existing western hemlock and western redcedar understory trees are to be retained. Large trees with deformities are to be retained at least in proportion to their occurrence in the stand. The unit-specific diameter (dbh) cutting limits along with a more detailed description of the proposed treatments are shown in silvicultural prescription for this project. Trees *greater than or equal to* the diameter cutting limits shall be reserved from harvest. If trees *greater than or equal to* the diameter cutting limits are cut, they shall remain on site for coarse wood enhancement. (project record, 51, page 30)

In general, the larger-diameter conifers with relatively high live crown ratios and healthy appearing crowns, even at the expense of spacing will normally be retained. These trees will respond most favorably to the thinning and will also be more windfirm. This recommendation applies to all but one unit, where thinning is to be done proportionately from all crown classes to release existing mid-story western redcedar and accelerate the development of a multi-storied stand. A 50-foot "no-cut" buffer is to be established around any existing old-growth trees (there appear to be two old-growth Douglas-fir trees in Unit 31-1 and one in Unit 34-2).

Because of the presence of Swiss needle cast in the area, Douglas-fir trees (Swiss needle cast only affects Douglas-fir) are to be selected for retention based on foliage retention (3 years or more is desirable), crown density, foliage color, and diameter. In many cases, the largest-diameter Douglas-fir trees are those trees which are able to grow well in the presence of Swiss needle cast (they are apparently the most disease tolerant individuals).

Treatment of P. weirii root disease centers
No reforestation treatments are recommended for small scattered areas less than one-acre in size that are infested with *P. weirii*.

Well-defined root disease pockets exceeding one acre may be reforested with disease-tolerant conifers such as western redcedar, western white pine, or hardwoods such as red alder or bigleaf maple (all hardwoods are immune to *P. weirii* root rot).

Handpiling, and burning the piles may be necessary in *Phellinus* pockets where slash loads severely limit reforestation efforts. Slash will be piled away from the leave trees.

Root disease centers will *not* be treated within Riparian Reserves.

<u>The following design features will be incorporated into the proposed action:</u>

To protect water quality:
A minimum 50 foot "no-harvest" buffer will occur along both sides of non-fish-bearing streams and a minimum 100 foot "no-harvest" buffer along both sides of fish-bearing streams and at a minimum, to the outer ripararian vegetation of wetlands less than one acre. If there are unstable and potential unstable areas (including earth flows) or steep inner gorges present, these can be used to define "no-harvest" buffers as long as the minimum widths are maintained.

Logs will be fully suspended off the ground within 25 feet over water and adjacent banks of any designated stream.

New roads, skid trails and ground-based equipment will generally be located outside of Riparian Reserves. Ground-based equipment would be allowed to enter to within 100 feet of an intermittent stream in Unit 25-1.

Restrict yarding in riparian areas to corridors that are perpendicular to streams (or as close as possible to 90 degrees).

Yarding
In areas designated as ground-based logging, cable or helicopter logging systems can be used. In areas designated as cable logging, helicopter logging systems can be used.

Use existing skid roads to the extent possible. Confine ground-based activities to designated skid roads. Skid trails will generally be 12 feet in width and located 150 feet apart.

The purchaser may elect to use mechanized low ground pressure, cut-to-length systems provided that the following measures are met:

> Machines that drive up to each individual tree, such as feller bunchers, will not be permitted because of the excessive amount of soil compaction that will occur.

Excavator-based fellers or harvesters will have a ground pressure rating of 8.0 psi (pounds per square inch) or less and will have an articulating boom with an operating radius of at least 20 feet. The equipment will be either rubber tire or tracked mounted and have rear tires or tracks greater than 18 inches in width.

Excavator-based fellers or harvesters will be limited to no more than 2 passes over the same piece of ground. Trails should be spaced about 40 to 50 feet apart and have a width of less than 15 feet.

Forwarding or skidding equipment will be restricted to designated trails approved by the Authorized Officer prior to felling and yarding operations. Trails will average 12 feet or less in width and will be located, on average, 100 feet apart.

The harvester would be required to place slash in front of the machine tracks or tires in order to reduce compaction. The forwarder or skidder would operate on a nearly continuous layer of slash, minimum of 6 inches thick.

One-end suspension on all logs is required in cable logging areas, and where feasible in ground-based logging areas.

Skyline corridors on spans that are less than 1200 feet will generally be 12 feet in width and located 150 feet apart at one end. Skyline corridors on spans that are greater than 1200 feet will generally be 20 feet in width and located 150 feet apart at one end.

Log lengths would be limited to 44 feet (40 feet plus trim) to reduce damage to the reserved trees during yarding operations. If determined necessary by the Authorized Officer, log lengths would be reduced on specific corridors to achieve full-suspension over water courses.

Desirable habitat features and stand diversity.
Retain and protect existing CWD (includes down wood and snags). Any snags that are cut (safety hazard) or are knocked over during logging operations will be left on-site for coarse wood enhancement.

Where possible, protect and retain green trees with characteristics desirable to wildlife (broken or forked tops, hollow cavities, large limbs) in proportion to their current levels in the stands.

In section 34, the trees that are larger than 24” inches that will need to be cut for the landing would remain on site to augment the existing levels of cwd.

The clumps of larger trees in the ground-based areas in section 34 would not be thinned.

One and a half snags and one down log per acre, will be created after harvest in the density management units as part of the timber sale contract.

Special Protections
No potentially suitable murrelet, northern spotted owl or bald eagle nest trees will be felled as a part of the Elkhorn Creek project and where possible, no openings will be created within one tree length surrounding a potential murrelet nest tree.

Any newly discovered (as per the Pacific Seabird Group Marbled Murrelet Technical Committee protocol) marbled murrelet site will be protected by a 0.5 mile radius buffer on all contiguous existing and recruitment federal habitat.

Prior to entering the sale area each work season, or before returning to the watershed after leaving it, any heavy machinery (with the exception of log trucks and pick-up trucks used for daily personnel travel) will have all dirt and adhering vegetation cleaned from it.

Survey techniques for cultural resources 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*. Post-project survey would be conducted according to standards based on slope defined in the Protocol appendix. Ground disturbing work would be suspended if cultural material is discovered during project work until an archaeologist can assess the significance of the discovery.

Seasonal Restrictions
Felling and yarding operations should be restricted during the peak bark-slip period (generally May 1 to July 15) if excessive leave tree damage occurs, as determined by the Authorized Officer.

The use of ground-based equipment would be restricted to periods of low soil moisture; generally June 1st through October 15. This season could be adjusted if unseasonable conditions occur (e.g., an extended dry season or wet season). Operations would be suspended during periods of heavy precipitation if resource damage would occur.

In general, helicopter logging can occur year-round.

If spotted owls are present in Section 16 then helicopter activity would not occur within ½ mile of Section 16 during the critical nesting period (March 1 to July 7th.) If no owls are found during protocol surveys in Section 16, there will be no seasonal restriction on noise generation from helicopter operations within ½ mile due to spotted owl concerns.

Road and landing construction and decomissioning
The number of landings and their size would be kept to a minimum required to reasonably harvest the units. Landings will be located by the purchaser and approved by the BLM.

Each helicopter landing would be approximately ¼ to ½ acre in size and at least a part of it would be rocked if logging operations occur during wet weather.

Road decommissioning will consist of decompacting, water barring, seeding or planting with native species, and restricting OHV use. Restricting OHV use may include the strategic placement of boulders or root wads, or types of earthen barriers.

Except for small areas of spot-rocking, rock will not be placed on new temporary roads.

All natural surface roads would be water barred and seeded with a native grass.

Road decommissioning would occur during the dry season (generally August through September).

As determined necessary, by the silviculturist and soil scientist, some of the primary skid trails would be decompacted by subsoiling.

Hauling

Hauling on the Toll road towards Tillamook can occur throughout the year. Parts of the Flora and Fauna mainline road will not available for hauling in wet weather.

To limit the potential of sediment associated with haul from the proposed action, from reaching fish or their habitat, road maintenance would occur. This would include spot rocking on haul routes where the subgrade is soft, ruts are developing, and near stream crossings. This spot rocking would occur prior to and during periods of haul. Frequent inspections should be done to plan prompt maintenance of areas generating visibly turbid water, ruts or rock wear to the point subgrade is visible. There are 10 road crossings of larger streams that should be evaluated for maintenance prior to and during haul.

On road 2-6-6 (leading west from unit 5-1), the period of haul would be limited to the driest part of the summer, generally June through September. While not eliminating the potential of sediment entering the stream crossings along this route, it should reduce them to a negligible level.

Table 2. Haul Route Summary

Road	Season of Haul
Toll Road west towards Tillamook	Year-round
Rest of project roads	June through October (dry weather, good
Road 2-6-6	June through September

Slash disposal

Burning would be conducted under good atmospheric mixing conditions to lessen the impact on air quality in designated areas.

To further mitigate fire risk, logging roads in the project area would be *posted* 'closed' to all off road motor vehicle use during the "closed" fire season the first year following harvest activities, while fuels are in the "red needle" stage. These designated areas should be monitored for the need of additional closures during subsequent years during periods of high fire danger.

Landing piles should be located as far as possible from green trees to minimize damage.

Hand piles would be covered to facilitate the consumption of fuels during the high moisture fall/winter burning periods.

Hand piles should be located at least 10 feet from green trees, where possible, to minimize damage.

Lopping and scattering of fuels may be incorporated in areas where fuel loading is relatively heavy but not heavy enough to warrant hand piling or burning.

Pullback of fuels may be incorporated in areas where fuel loading is relatively light (especially along roads) and not heavy enough to warrant hand piling or burning.

2.1.2 Wildlife Habitat Enhancement

In order to meet objectives 1 and 2 as described above, the BLM proposes to do wildlife habitat enhancement on approximately 150 acres, located in four different sections. The work will be in the AMA and Riparian Reserve Land-use allocations. The acres of wildlife habitat enhancement work is summarized in Table 3.

The project is expected to utilize a number of techniques of creating CWD including the felling of green trees, girdling green trees at the base as well as in the crown. Other design criteria which may be considered include mimicking bark beetle pockets by treating some of the trees in small clumps of up to five trees; locating clumps of treated trees in association with existing hemlock understory as to potentially promote understory development; and using CWD creation in such a way as to release individual overstory trees. Power tools may be used. The project would likely be implemented between 2005 and 2010.

Table 3. Treatment Area Summary. This table summarizes the treatment area information associated with the Wildlife Habitat Improvement proposal.

Section	Treatment Acres	Stand Birth Date
4	20	1950
8	24	1960 and 1940
34	68	1920
31	38	1950
Total	150	

2.1.3. Fish Habitat Enhancement

In order to meet project objective 3 and 4 as stated above, the BLM is proposing to place trees in a one-half mile stretch of Cruiser Creek and 1.5 mile stretch of Elkhorn Creek (Refer to Figure 2). .

At Cruiser Creek the trees would be placed at an approximate density of 40 large logs (greater than 24” diameter), and 40 smaller logs (less than 24” diameter). In addition

boulders from on-site or off-site locations would be placed into the stream channel. Where suitable conditions exist, off-channel habitat would be created by removing portions of the existing Elkhorn Road (2-5-10) road bed adjacent to Cruiser Creek. This would occur in approximately four sites of 15 to 30 feet in length. The road fill material will be placed along the adjoining hillside. The in-stream work would be accomplished using an excavator. Other equipment needed to move materials may include dump or log trucks. Trees for this project would likely originate from ODF lands, or be purchased by the BLM. It is anticipated that this project would be a part of a coordinated, cooperative effort with the Oregon Department of Forestry, along a two-mile stretch of Cruiser Creek. This work would most likely occur in 2005 to 2008.

At Elkhorn Creek approximately 120 logs would be placed in the creek, using a helicopter. A minimum of 80 logs would be larger than 24" diameter, and the other 40 trees would be a minimum of 18" diameter. This work would occur between July 7th and September 15, in 2006, 2007 or 2008. It should take approximately two days of helicopter time to place the logs. Trees for this project would likely originate from ODF lands, or be purchased by the BLM. If the trees did come from BLM land, they would require further NEPA analysis, and abide by the terms and conditions of the habitat modification BO for the northern spotted owl in effect at the time. The helicopter would use existing landings that are at least ½ mile from unsurveyed suitable northern spotted owl habitat, if the project occurs before August 15th.

2.2 Alternative 2 (no-action)

The BLM would not implement the density management thinning project, wildlife habitat enhancement, fish habitat enhancement projects at this time. The plant and animal communities would continue to be dependant on ecological processes that are in place now.

CHAPTER 3 AFFECTED ENVIRONMENT

In accordance with law, regulation, executive order and policy, an interdisciplinary team reviewed the elements of the human environment to determine if they would be affected by the alternatives described in Chapter 2.0 (Appendix 2). Those elements of the human environment that were determined to be affected define the scope of environmental concern. This chapter describes the current condition and trend of those affected elements.

For a full discussion of the physical, biological and social resources of the Salem District, refer to the FEIS. The discussion in this environmental assessment is site-specific and supplements the discussion in the FEIS.

3.1 Invasive, Non-Native Plant Species

Past and current logging practices and associated road building has allowed an influx of invasive/non-native weed infestations into disturbed areas adjacent to the proposed density management treatment units. *Cirsium vulgare***,** *Cirsium arvensis, Hypericum perforatum, Ilex aquifolium, Rubus discolor, Rubus laciniatus, Senecio jacobaea,* and *Cytisus scoparius* are noxious weed species found in the vicinity of the project areas. All of these species are designated Priority III (established infestations) on the Oregon Department of Agricultures (ODA) noxious weed list. These species are commonly found throughout Western Oregon tending to occupy areas of high light. As long as there is an existing seed source, any ground-disturbing activity offers opportunity for the introduction of noxious weeds and/or invasive non-native plant species. Some degree of noxious weed / non-native invasive plant species introduction or spread is probable as management activities occur in the project areas. Yarding corridors, landings, and road decommissioning would be the most likely places for weed establishment.

3.2 Threatened or Endangered Fish Species or Habitat

Fish distribution surveys have been completed for all of the streams that originate within the project area. Upper Willamette Steelhead or Upper Willamette chinook salmon or potential habitat for these species are not located near the proposed action. Within the Tualatin drainage a small portion of harvest in unit 25-1 is over 2 miles above a barrier falls (Haines Falls) which ends anadromous fish distribution in this tributary of the Tualatin River. The portion of unit 31-1 that is located in Turner Creek is a tributary to the North Yamhill River. It is approximately 4 miles above anadromous fish distribution.

Hauling from harvest units within the Trask, Tualatin and Yamhill Watersheds will occur on gravel roads well above habitat occupied by Upper Willamette steelhead on Turner Creek Road and on the Toll Road. There is only one stream crossing directly over habitat occupied by Upper Willamette steelhead on these two haul routes prior to reaching paved roads. The road segment from Hessler Bypass to the East is a ridge top road with stream

crossings that are small or dry most of the year with one exception, a cement bridge over the lower end of Fairchild Creek that provides spawning and rearing habitat for Upper Willamette Steelhead. Along this 4.9 mile route there are 17 stream crossings and all but 1 (the bridge) are non-fish bearing. Thirteen of these crossings are first order channels, 3 are second order and one is a bridge over Fairchild Creek. The distance above anadromous fish use on stream crossings above the bridge varies from 0.7 miles to 1.5 miles. Due to the current condition of the road near this bridge crossing this site is a direct source of road sediments during periods of rain.

The last recorded incidence of steelhead spawning in the North Yamhill was in 1990 however steelhead juveniles were found in Fairchild Creek in 1993 by ODFW. Surveys in Turner Creek the same year found no juvenile steelhead (North Yamhill WA 1997)

Current conditions in the North Yamhill Watershed have been negatively influenced by past fires, and splash damming to move logs. Simplified channels with a moderate width to depth ratio, and low amounts of CWD (no key pieces were found in Cedar Creek and the North Yamhill River) are now the norm on the major stream channels within this watershed. A survey of Fairchild Creek was conducted in 2000 by ODFW using their Aquatic Inventory methodology. This survey noted moderate to good amounts of CWD (records indicate only one splash dam in the lower portion of this stream and there are currently 75 key pieces of CWD), low bank erosion in all but two of the eight reaches, and high amounts of fines in riffle habitat. Stream shade was generally high and the numbers of mass failures noted in this survey are similar to other streams in the watershed. A large debris torrent that occurred in 1996, that was over 0.4 mile in length, may be the source of much of the fines, found in the riffle habitat downstream.

3.3 Fish Species with Bureau Status and Essential Fish Habitat

The Pacific lamprey is a Bureau Assessment species; Oregon Coast cutthroat trout are Bureau Tracking and Oregon Coast steelhead are a Federal candidate for listing under the Endangered Species Act. Oregon Coast chinook salmon and Oregon Coast coho salmon are included in the Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat) provisions as are populations of Upper Willamette chinook salmon and introduced populations of coho within Willamette Basin above Willamette Falls. Coho salmon are proposed for listing under the Endangered Species Act within the Oregon Coast ESU. All of these species are known to occur in all or portions of these Watersheds. The Elkhorn Tier 1 Key watershed falls within the project area. Most of the snag and CWD creation, a large percentage of the density management and the entire fish habitat enhancement project is proposed to occur within the key watershed.

Cutthroat trout have the greatest distribution of any species within the project area. They are often found in second order tributaries, and many populations are isolated above barriers to anadromous salmonids. Chinook salmon have the least extensive distribution, being mainly restricted to the lower portions of the larger streams. Steelhead, coho salmon and Pacific lamprey tend to occupy habitat lower in the stream system than the upper extent of cutthroat trout distribution. Coho and chinook salmon and summer and

winter steelhead runs are located within 100 feet of proposed treatment areas along of Cruiser Creek and Elkhorn Creek.

All of these species have similar habitat requirements for spawning (cool water, gravel substrates) and any changes to these habitat elements may affect spawning or rearing success. The life history of these species is quite variable; chinook salmon spend very limited time in the watersheds while cutthroat may spend their entire life there. Pacific lamprey differ from the salmonids in that they have the longest juvenile stage (4-6 years) and rear in sediment rich portions of the streams.

Fish distribution surveys have been completed for all of the streams that originate within the project area. Coho and steelhead distribution varies from immediately adjacent to portions of units 4-1, 5-2, 8-1, 8-2 in the Elkhorn Drainage of the North Fork of the Trask River. Five units are located in the headwaters of Middle fork of the North Fork of the Trask above Barney Reservoir, which is an impassable barrier to anadromous salmonids (units 7-1, 10-1, 25-1, 31-1, 31-2). A portion of unit 25-1 is located in the Tualatin Basin over 2 miles above a barrier falls to anadromous salmonids. The only other portion of a harvest unit (31-1) that is located outside of the Trask Watershed is in the headwaters of Turner Creek, a tributary to the North Yamhill River. Most of the proposed action area falls within the Middle Fork of the North Fork of the Trask River sixth field watershed. For each of these five sixth field watersheds, there are seventeen fish habitat indicators that are ranked according to three categories, "Properly Functioning", "At Risk" or "Not Properly Functioning" (NOAA Fisheries; Matrix of Factors and Indicators for the Coast Range Province- Interim Version July 20, 1998). Of these indicators turbidity, large woody debris (LWD), stream substrate, pool area and quality, off channel habitat, road density and disturbance history have the potential to be affected by these proposed actions. Coho, steelhead, chinook and cutthroat occur in Cruiser Creek and Elkhorn Creek on BLM and ODF managed lands.

3.4 Threatened and Endangered and Bureau Status Wildlife Species

Northern Spotted Owl – FT (Federally Threatened)

There are no known spotted owls in the project area. The nearest active owl site is approximately 3.5 miles SE of Section 16, and 7 miles south of Section 34. This site has not produced any young since 1994. The northern extent of the Kutch-Panther Reserve Pair Area is approximately one mile south and east of the project area. Due to the relatively young age of the stands and lack of structural diversity, the majority of the proposed project area is spotted owl dispersal habitat. Approximately 80 acres in Section 16 is low-quality suitable owl habitat. The project acres does not contain spotted owl designated critical habitat.

Marbled Murrelet – FT

There are no known marbled murrelets within the project area. The nearest known murrelet site is approximately ten miles to the west. None of the project area is within marbled murrelet designated critical habitat. With the exception of one suitable murrelet nest tree in Section 34 and two suitable nest trees in Section 31, there is no other murrelet

habitat in the proposed project area. The tree in Section 34 is 27 miles from the coast and is an old-growth remnant from the previous stand. There are other mature trees in the vicinity that are approximately 90 years old, but are not of a character to be considered suitable habitat. The trees in section 31 are also old-growth remnants, but are surrounded by 40 year-old trees that do not offer any beneficial attributes to the suitable trees. Because of the intensity and repeated nature of the Tillamook Burns and the subsequent salvage, there is extremely little marbled murrelet habitat for miles around the project area.

Bald Eagle – FT

There are no known bald eagles in the project area. The older stands adjacent to the proposed density management units in Section 34 contain potential bald eagle roosting and possibly nesting habitat, especially in light of its nearness to Barney reservoir which could supply foraging opportunities. There is no other potential eagle habitat in the rest of the proposed project area.

Northern Goshawk – Bureau Sensitive Species

Breeding goshawks are quite rare in the coast range with less than five records, but they do use coast range habitat more frequently during migration. The nearest known breeding sites are in the central coast range south of the project area in the Yachats and Siuslaw river drainages and a newly discovered site on ODF land in the Salmonberry River drainage approximately 25 miles NNW of the project area. With known breeding sites north and south of the project area, it is not unreasonable to expect that there could be breeding goshawk sites closer to the project area where good habitat exists.

Mollusks – Bureau Sensitive Species

The two sensitive species found during surveys are *Hesperarion mariae* and *Prophysaon vanatte pardalis*. The Elkhorn area provides good habitat for some of these species, especially *Hesperarion mariae,* which was found regularly during surveys. The other slug, *Propysaon vanatte pardalis* was also found during surveys but only one individual was confirmed; however there may have been others not recorded. The other sensitive mollusk species were not located and based on many previous surveys throughout the Resource Area, were not expected to be found.

Columbia Torrent Salamander – Bureau Sensitive Species

Torrent salamanders live along the splash zone of small permanent streams but they may also occupy seep and spring areas at the heads of streams. Some of these streams may only be 1-2 feet wide. The proposed action area contains many of these types of streams. Surveys have not been done for Torrent Salamanders in the project area, and none have been found. However they have been found 5 miles south in the Nestucca watershed, and it is likely that they also occur in the Trask watershed.

Wildlife Habitat

For a complete discussion of the forest vegetation aspect of the terrestrial wildlife affected environment also refer to section 3.5. Much of the down wood that remains in the project area today results from salvage logging and snag felling after the Tillamook

burns. The down wood is mostly in the two to four foot size class, and in decay class 4 (~95%). There is little coarse wood in the more recent decay classes represented and what is there, is quite small. Large coarse wood is an important ecological component of forests. Not only does it provide habitat for a myriad of species including mollusks and amphibians some of which are sensitive species, it also acts as a substrate for moss and lichen colonies and, when decayed enough, a rooting platform for conifer seedlings above the brush layer. Large down logs also play an important role in moderating warm temperature and low humidity in the forest environment during the summer by soaking up moisture during the wet season and doling it out slowly during the dry season.

With the Exception of Section 34 there are very few quality snags within the entire project area. Snag densities by unit range from 2 to about 23 per acre but with an average diameter of only about 10 inches. Snags of this small size do not provide much in the way of habitat for cavity dependant species and do not persist as snags in the long term. In Section 34 there are quite a few large high quality snags adjacent to the density management units in riparian areas and in the adjacent older stands.

3.5 Forest Vegetation

According to the stand exam data collected in 2002, the majority of the proposed treatment area supports relatively dense 34- to 65-year-old Douglas-fir-dominated stands. The average stand age is about 47 years. Other conifers, including western hemlock, western redcedar, Port Orford cedar (Unit 4-1), and/or noble fir (Units 4-1, 16-1, and 19-1) occur in varying proportions among some units. Hardwoods, particularly red alder, occur in varying amounts in the units and are most common in riparian areas or are associated with areas that have been disturbed in the past, such as old skid roads and landings. Portions of some of the units were pre-commercially thinned, which increased the average tree diameter and enhanced the ability of the trees to respond favorably to density management at this time. Unit 16-1 is low quality suitable habitat for the northern spotted owl. The overall overstory quadratic mean diameters for the units range from about 10 to 18 inches, the mean crown ratios vary from 35 to 49%, the overall average overstory canopy closure is 72% (range 61 to 79%), and the relative density index values (indices to the level of competition among the trees within a stand) range from about 56 to 75%. Above a relative density index of about 55%, Douglas-fir stand growth and vigor declines and mortality of the smaller-sized trees begins because of strong tree-to-tree competition for the available site resources. In addition, 93% of the units (Unit 10-1 was divided into Units 10-1C and 10-1D because of differing stand conditions, and Unit 10-1C has a height:diameter ratio of 75) have height:diameter ratios of 81 or more when calculated from the quadratic mean diameter for the overstory Douglas-fir stand component and the height of the 40 largest trees per acre. The height:diameter ratio is an index to stand stability. Wonn and O'Hara (2001) reported that stability for several conifer species in western Montana, including Douglas-fir, decreases because of susceptibility to damage from wind and snow above a height:diameter ratio of about 80.

The site-potential tree heights for determination of Riparian Reserve widths vary from

180 to 240 feet among the proposed treatment units.

There is considerable variation in the number and the species composition of seedlings among the units. Overall, western hemlock seedlings appear to be the most abundant. Douglas-fir, western redcedar, and noble fir understory seedlings are also common depending upon the particular unit.

Except where laminated root rot, caused by the fungus *Phellinus weirii*, has caused various-sized openings or areas of lower density, most of the proposed treatment areas have relatively dense overstory canopies, which limit the amount of light reaching the forest floor, and therefore, understory development. Where there is sufficient light reaching the forest floor, the most abundant understory species include swordfern, vine maple, dwarf Oregon grape, salal, red huckleberry, and bracken fern. There is, however, considerable variation in the abundance of particular understory species among and often within the units.

Forest health

There are no major threats to forest health in proposed density management treatment area. Laminated root rot, caused by the fungus *Phellinus weirii,* is a native root pathogen that is a natural part of many forest ecosystems (Thies and Sturrock 1995). *P. weirii* probably affects about 10% of the proposed project area on the average. The rate of *P. weirii* infection among the units in the project area varies from 0 to 31%, according to the stand exam data collected in 2002. Units 25-1, 31-1, and 34-1 have infection levels of 20% or more. The levels of infection in Units 4-1, 5-1, and 10-1 are 12, 13, and 10%, respectively.

Douglas-fir and grand fir are highly susceptible to *P. weirii*, (they are readily infected and killed by it); western hemlock is intermediately susceptible; western redcedar is tolerant or resistant; and all hardwoods are immune (Hadfield et al. 1986). *P. weirii* kills trees directly or makes them prone to windthrow because the disease decays their root systems (Figure 2). Diseased stands usually contain twice as many infected trees as those that are dead or exhibiting crown symptoms (Thies 1984). Tree-to-tree spread is through root contacts with infected trees or stumps (Hadfield et al. 1986). Disease centers are believed to expand radially at the rate of about one foot per year (Nelson and Hartman 1975). *P. weirii* attacks susceptible hosts regardless of tree size, age, or vigor.

Tree killing by *P. weirii* also can create openings in the canopy where shrubs, hardwoods, or shade- and disease-tolerant conifer species may occupy these various-sized gaps (Thies and Sturrock 1995). Because infected trees are windthrown or die standing, the disease can be a source of down wood and snags. Most disease centers appear to be less than ¼-acre size and appear to be increasing the level of diversity within the stands. There are, however, infection centers exceeding one-acre in size in portions of Units 4-1, 25-1, and 31-1. The northern portion of Unit 31-1 contains some particularly severe and extensive *P. weirii* infection centers.

Fresh down Douglas-fir trees encourage the build-up of Douglas-fir beetle populations,

which subsequently attack and kill Douglas-fir trees. Douglas-fir trees weakened by root disease infection are more likely to be attacked by the Douglas-fir beetle (Hadfield 1985). When the number of windthrown Douglas-fir trees greater than 12 inches in diameter is three or more per acre, the numbers of beetles produced is sufficient to cause infestation and mortality of standing live Douglas-fir trees (Hostetler and Ross 1996). Based on past windthrow events, they estimate that the number of live standing trees infested and killed by Douglas-fir beetles will be approximately 60% of the number of infested down trees. Observed Douglas-fir mortality attributable to Douglas-fir beetle attack as a result of leaving Douglas-fir logs greater than 12 inches in diameter on site for coarse wood enhancement in two project areas in and around the Nestucca watershed in the northern Oregon Coast Range, however, was much less than expected.

Swiss needle cast was observed on Douglas-fir in these stands. The disease severity level tends to vary within and among the stands, and among trees within stands. Because of the differences in apparent disease tolerance among the Douglas-fir trees, there is an opportunity to select the most tolerant Douglas-fir trees along with other non-host conifers and hardwoods during density management treatment (only Douglas-fir is affected by Swiss needle cast). Trees showing the greatest degree of symptoms usually seem to occur on ridgetops and southern exposures (Figure 3). According to the Annual Swiss Needle Cast Aerial Surveys flown by the Oregon Department of Forestry from 1999 - 2003, no Swiss needle cast was observed in the proposed units in 2002 or 2003. In 2001, the Douglas-fir trees in the southwest portion of Unit 8-1, a small portion of Unit 8-2, and most of Unit 19-1 were mapped as having symptoms of heavy Swiss needle cast infection. In 2000, about ½ of Unit 19-1 was mapped as having moderate Swiss needle cast symptoms. In 1999, a small portion of Unit 19-1 was also mapped as having moderate Swiss needle cast symptoms. Relatively heavy Swiss needle cast symptoms were observed in Douglas-fir stands about four miles west of the western boundary of the proposed project area. Overall, the level of Swiss needle cast disease in the project area appear to range from mostly low (2.6 to 3.5 years or more of foliage retained) to moderate (1.6 to 2.5 years of foliage retained).

Coarse wood

In general, the total course wood volume for the units is relatively high, but the vast majority (89% on the average) occurs in the more advanced decay classes. There is considerable variation in the amount of down wood, snags, and total coarse wood volume among the units. As an overall average weighted by acres, there are 2,568 cubic feet per acre of total coarse wood in the proposed treatment units, according to the forest survey data collected in 2002. This level of total coarse wood falls within the high range (1,980 to 3,800 cubic feet per acre for Oregon Coast Range stands 25 to 49 years old and 1,980 to 4,840 cubic feet per acre for stands 50 to 79 years old), according to the Late-Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area (USDA Forest Service and USDI Bureau of Land Management 1998). Approximately 94% of the total coarse wood volume, however, is from down wood, and only 6% is from snags. About 6% of the down wood volume is in decay classes 1, 2, and 3, and about 94% is in decay classes 4 and 5. A major source of much of the relatively large-diameter, more advanced decay class down wood appears to be old-growth snags

that were felled for fire prevention following the Tillamook burn. The source of the more recent decay-class down wood seems to be smaller trees that have died as a result of suppression or have been windthrown, with some occurring as a result of *P. weirii* root rot infection. The total weighted average down wood volume is 2,413 cubic feet per acre.

There is a weighted average of nearly 10 conifer snags per acre that average about 12 inches dbh and about 55 feet in height. Approximately 80% of the snag volume is in decay classes 1, 2, and 3 and many appear to be smaller-sized Douglas-fir trees that have died as a result of suppression. Some snags have been created as a result of root disease infection. Bears have girdled the live crowns of some Douglas-fir trees in places, creating snag-topped living trees. About 20% of the snag volume is in decay classes 4 and 5. The total weighted average snag volume is 155 cubic feet per acre. In addition, there is an average of just over 5 broken-topped trees per acre that most likely occurred as a result of ice and snow damage. These trees average only about 8 inches dbh, however.

3.6 Soils

Elevations range from 1,400 feet to 3,000 feet. The topography is mountainous highlands dominated by moderate to very steep hillslopes and gently to moderately sloping "benchy" mid-slopes. Slopes lengths and aspects are highly variable.

The predominant soils are Hembre, Kilchis, and Klickitat series. They are usually moist, and are dry for less than 45 days a year. Most of the proposed ground-based yarding would occur on Hembre soils. Hembre soils are moderately deep (40 to 60 inches), nearly gravel-free silt loam or silty clay loam with low bulk density and high organic matter. The main management concern for this soil is its severe soil compaction and rutting risk. To reduce the risk of compaction and rutting, a number of Best Management Practices would be implemented (Salem RMP, Appendix C-2). Most of the proposed cable yarding and helicopter logging would occur on Kilchis and Klickitat soils. These soils have loam or clay loam textures with high amounts of gravel or cobbles. Kilchis soils are shallow, very gravelly, and are frequently found on the steeper slopes associated with rock outcrops. Klickiat soils are 40 to 60 inches thick. Also present are inclusions of deep, poorly drained soils which formed from alluvium found in headwater swales on benches and rounded hilltops.

Site index, the most common method used to measure potential productivity for trees, ranges from highly productive (Hembre- II/173) to moderately productive (Kilchis - IV/110) rated on a Douglas-fir, 50 year basis. Soils are recovering from past effects of natural and human-related disturbances (e.g., Tillamook Burn, salvage and commercial logging and road building). There remain many compacted former roads and skid trails. Overall, it is estimated that about 15% of the ground-based areas and about 5% of the proposed cable and helicopter areas are covered by skid trails and roads. Most residual disturbance on secondary trails is limited to light compaction and discontinuous patches of displaced topsoil. The heaviest disturbance, heavy compaction and exposed subsoils, remain in the primary skid trails and roads. Both the areas of lighter and heavy disturbance are covered by an understory of forbs, and scattered small shrubs and trees,

predominantly alders. Little erosion is presently occurring on these surfaces. Many roads and skid trails are being used by off-road vehicles.

3.7 Water

The project areas is primarily within the upper Trask River 5th field watershed, an area covering approximately 175 square miles and containing about 81 miles of mainstem streams. Average annual precipitation ranges from 85 to over 155 inches, most of it falling as rain during October through March. Approximately 1,350 acres of the proposed timber treatment area is located within a Key Watershed (Elkhorn). About 50 acres are located in the Scoggins Creek and North Yamhill 5th field watersheds on mostly ridgetops and benches and are drained by small headwater streams. For these reasons, the analysis will focus primarily on the Trask River watershed.

There are approximately 80 streams adjacent to proposed timber harvest units. Most of them are small intermittent, headwater streams. The primary perennial streams draining the project area are lower Cruiser Creek, middle Elkhorn Creek, and the Middle Fork of the North Fork of Trask River.

The Tillamook Burn (1933 to 1951) and subsequent salvage commercial logging, and associated road building dramatically altered conditions in the watershed. Since then much of the watershed has been in the process of recovering. Water quality data seem to indicate that conditions in the forest uplands are "generally good for most parameters of interest" and appear to be improving (Trask WA, p. 4-9 and 3-34 & 3-35). Portions of the Trask River watershed are identified as water quality limited in the 1998 and 2002 ODEQ (Oregon Department of Environmental Quality), Section 303(d) for temperature and dissolved oxygen impairment. The nearest listed waterbody to the project area is for high temperature located about 9 miles downstream at the confluence of North Fork Trask River and Bark Shanty Creek. In 2001, ODEQ, with USEPA approval, assigned TMDL (Total Maximum Daily Load) targets for temperature for all lands with intermittent or perennial streams that drain into the Tillamook Bay including the Trask watershed.

The ODEQ has listed the Trask River as a waterbody of concern for sediment and turbidity from M.F. of the N.F Trask River to Tillamook Bay. Turbidity measurements made on the Trask River watershed from 1960 to 2002 found that only 2.7% of the water samples exceeded 50 NTU, a level at which fish feeding might be affected. All of those samples which exceed 50 NTU were collected in the lower Trask (Trask WA, p. 3-31 and 3-33). Based on field observations, suspended sediment and turbidity are generally quite low in the project area except for short periods, primarily during first large fall storms and very large winter storms.

Streams are generally well shaded. Streams draining the proposed treatment appear to have temperatures within state and federal standards. However, based on 1994 ODFW (Oregon Department of Fish and Wildlife) surveys on Cruiser Creek and Elkhorn Creek and personal observations, streams are in not properly functioning condition: they have

excessive sediment in their channels, unstable stream banks (especially in the upper reaches on private and state land), inadequate quantities of large woody debris (LWD) and associated structural elements, and lack quality and frequency of pools. In addition, on lower Cruiser Creek, approximately 3,000 feet of road is impinging its floodplain.

The most sensitive beneficial uses in the watershed are resident fish and aquatic life, salmonid spawning, rearing, and migration, and muncipal and domestic water supply. Approximately 280 acres in proposed timber harvest units drain into Barney Reservoir. Approximately 19 acres in proposed timber harvest units drains into a small municpal reservoir on Turner Creek. The nearest harvest unit (Unit 4-1) to domestic water intake is at least 10 miles. (For more detail, see project record #50)

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

4.1 Invasive, Non-Native Plant Species

4.1.1. Alternative 1. Direct and Indirect Effects – All projects

Soil disturbing activities such as road construction, reconstruction and decommissioning; tractor skid trail development, landing use and haul road maintenance are the most likely activities that could produce conditions conducive to noxious weed establishment. Project design features that require seeding or planting highly disturbed areas with native species would allow natural plant succession to proceed therefore reducing the potential for invasion of non-native species. In time, non-native species are expected to return to low levels as native vegetation becomes re-established and crown closure of the residual stand reduces available light to the under-story. Because of the limited alteration of habitat associated within the wildlife habitat enhancement units, and fish habitat enhancement projects, there is not expected to be any increase in noxious weed populations.

4.1.2 Alternative 1. Cumulative Effects - All projects

The analysis area for cumulative affects to noxious/non-native invasive plant species is in the Northern Oregon Coast Range approximately 22 miles east of the town of Tillamook. Examples of forest management activities within the affected area are regeneration harvest, commercial and pre-commercial density management thinning, young stand maintenance, new road construction, road decommissioning, road maintenance, culvert replacements, and helicopter landing zones. Activities that don't necessarily create disturbance but influence the spread of weed seeds are recreational hiking, biking, horseback riding, fishing, and hunting. Other sources of seed dispersal are from wildlife that are either passing through or frequent the area, water movement, and wind. Many past and present management activities tend to open dense forest settings and disturb soils therefore provide opportunities for widespread weed infestations to occur. Many, if not all of the weed species identified as Priority III (established infestations) on the Oregon Department of Agricultures (ODA) noxious weed list are present throughout the area. Because they are present in the project area, seed is readily available for dispersal. Most non-native weed species are not shade tolerant and will not persist in a forest setting as they compete for light when tree canopies close and light to the under-story is reduced.

In the near future, Alternative 1 will allow for a slight, short term increase of weed populations in the area. The various design features that are incorporated into this project such as: planting native plant species on disturbed sites; blocking access to vehicular traffic on decommissioned roads; implementing a roadside maintenance program on the main roads; and washing equipment prior to entering the project area, will all help ensure that there are not any longer term increases in weed populations.

4.1.3. Alternative 2. Direct and Indirect Effects – All projects

Because no ground disturbing activities will occur and canopy closure will be maintained at a level of low light to the forest floor, no appreciable increase in noxious weeds and/or invasive non-native plant species is expected to occur. Populations that exist now are not expected to expand but will continue to persist at background levels, thus maintaining a seed source at the site.

4.1.4. Alternative 2. Cumulative Effects – All projects

State and Private Timber extraction is occurring within the analysis area at high levels. Because noxious and non-native invasive plant species have populations commonly found throughout the watersheds an increase of plant populations can be expected on those lands and the road systems that adjoin them. An increased seed bank will provide the opportunity for invasion to any disturbed site in this general location. Examples of forest management activities within the affected area are regeneration harvest, commercial and pre-commercial density management thinning, young stand maintenance, new road construction, road decommissioning, road maintenance, culvert replacements, and helicopter landing zones. Activities that don't necessarily create disturbance but influence the spread of weed seeds are recreational hiking, biking, horse back riding, fishing, and hunting. Other sources of seed dispersal are from wildlife that are either passing through or frequent the area, water movement, and wind. Many past and present management activities tend to open dense forest settings and disturb soils therefore provide opportunities for widespread weed infestations to occur. Many, if not all of the weed species identified on the Priority III (established infestations) on the Oregon Department of Agricultures (ODA) noxious weed list are present throughout the area. Because of their presence in the project area, seed is readily available for dispersal. Most non-native weed species are not shade tolerant and will not persist in a forest setting as they compete for light when tree canopies close and light to the under-story is reduced.

4.2. Fish

4.2.1 Alternative 1. Direct and Indirect Effects. Density Management Thinning: Threatened and Endangered Fish Species

Hauling from harvest units within the Trask, Tualatin and Yamhill Watersheds will occur on gravel roads generally well above habitat occupied by Upper Willamette steelhead on Turner Creek Road and the Toll Road. The haul from these units is planned during the portion of the year when roads are in good condition to haul (generally June through mid November). The use of roads for timber haul could produce a small, short-term increase in sedimentation and turbidity into local streams. Most fine sediments generated that are delivered to these small tributary streams are likely to travel short distances before being trapped. During periodic, high flow events, some of the sediment trapped in these channels will move downstream into larger perennial streams as suspended sediment. Specific data on the size of streams distance to major channels and ESA listed or selected

Special Status Species is included in the project record # (55).

The haul route from BLM road 2-5-10 to Turner Creek was evaluated by direct observation; and the transmission of road related sediment would be negligible near culverts # 8, 15 and 35 (project record # 55).

All stream crossing sites that have been identified will be brought up to BLM hauling standards, and will be maintained in a condition to prevent sediment inputs.

The potential of impacts from timber hauling to Upper Willamette Steelhead or their habitat, will be minimal. The following rationale explains this reasoning:

1. The road system is designed for all season-use
2. The road system would be used during the period that it would be in the best condition to haul without producing excessive sediment
3. Total production of fine sediments should be low (assume that the road would be in good shape to haul i.e. durable surfacing, adequate cross drains)
4. Most of the stream channels are lower order and most likely dry or have very low volume during the period of haul. Therefore, any road related sediment that enters these stream channels should be stored during the period of haul.
5. The suspended sediment portion that moves out of these stream channels should move with the first major storm events when background levels are higher and prior to the arrival of adults for spawning.
6. Sediments moving into major stream channels are anticipated to be prior to the arrival of spawning adults. Since these sediments will be suspended, there should be no functional change to spawning gravels.

Since, suspended sediment is not the main component found to infiltrate spawning *substrates* its movement through the portions of Yamhill Drainage which provide spawning and rearing habitat for Upper Willamette Steelhead should not have impacts to spawning habitat. (Lisle et al., 1989)

In summary, juvenile Upper Willamette steelhead rearing in these stream segments are not anticipated to be directly affected by the suspended sediment that arises from this proposed action. The amount of suspended sediment is anticipated to be a negligible portion of the current suspended sediments or bedload within stream segments in the Upper Yamhill Watershed.

4.2.2 Alternative 1. Cumulative Effects. Density Management Thinning: Threatened and Endangered Fish Species

Road sediment. Since the proposed haul road is used extensively year-round for hauling, there is a potential of cumulative effects that may be additive to those of the proposed action. Haul occurring at the same time as the proposed action will generate the same fine sediments with the minimal potential of transmission into occupied steelhead habitat. Haul on this road system during the wet season has the potential to deliver sediments in

greater amounts due to increased volume of water, seasonal loss of ditch and stream vegetation, and breakdown of the road surface or sub surface. Grading the road surface during wet weather has been shown to greatly increase sediment yield. Due to the distinct break between dry and wet season haul (Luce and Black, 2001), the proposed action would be expected to contribute a very minor portion of the total sediment contribution.

Road density. With the current increase in harvest activity road densities are anticipated to rise within the North Yamhill and Tualatin watersheds. As there are no new roads to be constructed within the North Yamhill and only a short spur in the Tualatin which will be in place three years or less. Alternative 1 will have no long term cumulative effects to road density within either of these watersheds.

4.2.3 Alternative 1. Direct and Indirect, and Cumulative Effects. Fish Habitat Enhancement. Threatened and Endangered Fish Species

Since none of the instream restoration actions will occur within the ESU for either Upper Willamette steelhead or Chinook, there are no direct or indirect effects to these species.

There are no actions that may be considered cumulative to the fish habitat enhancement for species listed under the Endangered Species Act.

4.2.4 Alternative 1. Direct and Indirect, and Cumulative Effects. Wildlife Habitat Enhancement. Threatened and Endangered Fish Species

As none of the Snag and CWD Creation project actions will occur within the ESU for either Upper Willamette steelhead or chinook there are no direct or indirect effects to these species.

There are no actions that may be considered cumulative to the Snag and CWD Creation project for fish species listed under the Endangered Species Act.

4.2.5 Alternative 2. Direct and Indirect, and Cumulative Effects. Threatened and Endangered Fish Species. All projects

The effects to T and E species are the same as those to described to Bureau Sensitive Fish Species in section 4.2.12.

4.2.6 Alternative 1. Direct and Indirect Effects. Density Management Thinning: Bureau Sensitive Fish Species and Essential Fish Habitat.

There is a low probability of increased sediment delivery into streams from timber harvest conducted by either helicopter, ground-based or cable yarding methods. Road construction and decommissioning is anticipated to introduce small amounts of sediment into streams. Timber hauling is anticipated to introduce small amounts of road related sediment. There will be a short term loss of potential CWD in some harvest units between 50 and 80 feet from small, non-fish bearing channels during and after project

implementation. Road densities will increase in the short term. In the long-term, the net road density will decrease as result of this action. There will be some new activities such as road and landing construction that will occur on previously undisturbed ground.

Sediment has the potential of affecting salmonids directly by altering behavior, and indirectly by changing important habitat components such as the physical makeup of spawning gravels. The potential of any direct or indirect effects occurring are low as all non-fish bearing streams will have 50 foot no-harvest buffers, and all fish bearing streams will have 100 foot no-harvest buffers. Design features that have been incorporated to reduce affects include: full suspension of logs over all stream channels, and 25 feet on either side; "no harvest" buffers on all streams; cable yarding on slopes over 35% slope; and dry-season operation for all road construction and ground-based and cable harvest.

Harvesting trees within the Riparian Reserve would directly remove a potential source of small wood to stream channels. This small wood is recognized to be an important element in both sediment routing and nutrient cycling processes for the aquatic system. The short term loss of small but functional wood in 9 of the 14 harvest units[1] adjacent to non fish bearing streams is not anticipated to alter any of the sediment storage and routing processes. A detailed description of CWD by unit is included in the fisheries project report (project record # 49).

If density management occurs using a helicopter during the wet season (November 16 – June 14), the Toll Road going west will be the specified haul route. This will be done to reduce the potential of road related sediment. This specified haul route has very few stream crossings due to its ridge top location which will minimize sediment inputs during the time of year when sediment has the greatest potential to enter streams. The potential of impacts to fish species are anticipated to be low from the harvest of timber with a helicopter. Haul during the wet season has a greater potential of increasing the input of fine sediments but should not change any streams physical habitat features needed to support fish at the 5^{th} or 6^{th} field watershed scale.

Cutthroat trout have the greatest potential of impacts from road related sediment. Any possible impacts are predicted to be well below any lethal threshold. However, the potential of some behavioral changes i.e. avoidance, suspension of feeding, loss of territoriality are greater due to their proximity to the project area. There are several specific areas where gravel roads cross larger order streams with known or predicted cutthroat use. These areas are identified in the haul road analysis (project record, 55).

Since the populations of salmonids are generally found downstream of cutthroat, the potential of direct impacts from this project to other salmonids, decreases with increasing distance downstream. The distance of density management units from populations of coho and steelhead in the Trask Watershed vary from as close as 100 feet to over 4 miles. Units 7-1, 10-1, 25-1, 31-1 and 31-2 are all above Barney Reservoir, a complete barrier to anadromous fish. Due to the size of this reservoir (~20,000 acre feet) there are no

[1] Oregon Department of Fish and Wildlife minimum size criteria for wood is 15 cm in diameter by 3 meters in length

anticipated impacts from road construction, harvest or haul to fish species or habitats below this reservoir from actions occurring within its drainage area.

Within the Tualatin drainage, harvest in unit 25-1 is approximately 2 miles above Haines Falls, which ends anadromous distribution in this tributary of the Tualatin River. A portion of unit 31-1 is located in Turner Creek, a tributary to the North Yamhill River approximately 4 miles above anadromous fish distribution. Since the proposed action contains relatively few acres in the Tualatin and Yamhill watersheds, and the distance to any fish or their habitat or their habitat is large, there are no impacts anticipated from density management activities within these two watersheds.

As discussed in the section 4.2.1 there is a low potential of impacts to fish from timber hauling within the Upper Willamette drainage, and there are no anticipated changes to current habitat conditions. Due to the greater distribution area of cutthroat, some short term behavioral changes may occur as a result of turbidity related to haul.

Within the Coast Range Basin the majority of the haul roads are not anticipated to have any adverse impacts to populations or habitat for any of the Magnusen Stevens Act (MSA) or Special Status Species (SSS).

These density management projects should not have impacts to any salmon, steelhead or other fish populations. Small amounts of sediment input are anticipated from harvest, road decommissioning and timber hauling, however there is a low potential to affect individual fish or their habitat. There are a few exceptions to this that are outlined below. These potential impacts are likely to be of short duration (i.e. during the first substantial rains and within a year or two of the action occurring). Any impacts would occur at the site scale, an example being the input of road sediment at a stream crossing via the roadside ditch. Inputs of fine sediments would occur during the wet season when background levels of turbidity are naturally higher. There would be no additional behavioral changes anticipated by any of the MSA or SSS with the potential exception of cutthroat (discussed above). The amount of fine sediments delivered to stream channels is anticipated to be small, and separated in both time and space. Functional changes in spawning or rearing habitat for MSA or SSS fish are not anticipated in the Trask, Tualatin or Yamhill Watersheds.

4.2.7 Alternative 1. Cumulative Effects. Density Management Thinning: Bureau Sensitive Fish Species and Essential Fish Habitat.

The analysis area for cumulative effects to fish and fish habitat is the Middle Fork of the North Fork of the Trask River, East Fork of the South Fork of the Trask River, Upper Tualatin River and Turner Creek. Potential cumulative effects include: 1) sediment from harvest or hauling from multiple timber sales in the area and, 2) the loss of CWD from riparian zones. Other known actions in the area include other ongoing reciprocal Rights of Way agreements with the State of Oregon, and private timber owners that permit the hauling of timber on BLM roads in the analysis area. Sediment associated with log hauling from the various actions in the analysis area is generally not anticipated to

increase noticeably on any of the major haul routes from the current condition. The various actions would occur in the watersheds on different haul routes, during different time periods; there is however some potential for overlap. Where hauling from multiple actions occurs during the wet season on one route, the amount of road related sediments would be anticipated to increase proportionally. The greater the amount of use of a specific road during the wet season the greater the potential for an aversion response from individual fish.

Across the Trask Watershed CWD inputs to streams are anticipated to be slightly reduced during the next 40 years. This is primarily due to high levels of anticipated harvest on ODF and private lands. Since trees will be removed from riparian areas on these ownerships, it is anticipated that CWD levels will decline in the short term. The proposed action will harvest some trees from Riparian Reserves on Federal land. On Federal land the Riparian Reserves are designed to promote the growth of late-succssional trees near stream channels. The other active BLM timber sale in the Trask Watershed[2], is not anticipated to reduce CWD levels. As all the federal actions in the area are located on stable slopes, and there is a low potential for landslides that would contribute CWD to streams. In general, CWD inputs are likely to originate from trees falling into the stream, and not likely to be associated with landslides. With the current amount of CWD at a level determined to be Not Properly Functioning, further decreases in CWD have the potential of reducing the rearing potential of streams for anadromous salmonids. This decrease in rearing potential is primarily related to loss of the primary pool forming element in coast range streams.

Recent and future culvert replacements within the Trask, Tualatin and Yamhill Watersheds should be providing better fish passage. Since, the amount of harvest activity is increasing, the amount of road maintenance is increasing as well. One of the road maintenance items that often directly benefits fisheries resources is the replacement of fish barrier culverts or the removal of culverts not needed in the road system. Multiple culverts have been replaced in these watersheds in recent years by ODF and private industrial ownerships. Several other culverts planned for replacement by ODF provide direct access to habitat valuable to steelhead, coho, and cutthroat.

4.2.8 Alternative 1. Direct and Indirect Effects. Fish Habitat Enhancement: Bureau Sensitive Fish Species and Essential Fish Habitat.

The placement of logs and boulders and the addition of alcove habitats within Cruiser Creek and along Elkhorn Creek are anticipated to directly alter the current condition of the aquatic system. The matrix indicators for LWD, pool area, pool quality, and refuge habitat will improve directly; while the substrate conditions should improve indirectly due to the addition of these channel forming elements.

Direct effects to fish from the proposed action could include an aversion response and the chance of direct mortality. Placement of these logs and rocks directly into the stream channel will result in localized turbidity. It is not anticipated that this would exceed 2

[2] 40 acres of the ReBear Timber Sale is in the Trask watershed.

hours in any 24 hour period. These actions will be implemented consistent with the Project Design Criteria contained in NOAA fisheries Biological Opinion dated February 25, 2003 for 10 programmatic actions occurring in NW Oregon.

Indirect effects related to these activities are not anticipated to occur until streams in the area rise to or near to bankfull stage. The indirect effects are anticipated to be both beneficial and adverse. As the streams in the area begin to rise during large winter storm events, sorting and routing processes of instream substrates will begin to occur. With the addition of large wood and boulders, removal of culverts in roads to be decommissioned and the creation of alcove areas the transport of gravels within this stream segment will change. The greatest change anticipated is the trapping and aggradation of the stream channel upstream and adjacent to structures placed within the stream channel. Short term pulses of substrate (all sizes) in culvert removal areas will occur as the streams establish a new channel where they had been entrained within a culvert.

4.2.9 Alternative 1. Cumulative Effects. Fish Habitat Enhancement: Bureau Sensitive Fish Species and Essential Fish Habitat.

The proposed action will likely occur during the same season that a cooperative BLM and ODF stream improvement project will occur. This project would include replacing 3 culverts to provide fish passage, decommissioning 3.2 miles of roads, and implement 1.5 miles of instream restoration. Road decommissioning activities will include sidecast pullback, non-drivable waterbars, removal of live stream culverts and the blocking of the road to prevent vehicle use. All of these actions have the potential to create localized turbidity as many of the actions will occur in live streams. The direct beneficial effects of these actions in this watershed will include improved fish access to approximately 1.5 miles of habitat and increases in LWD, pool area and quality, improved substrate storage and routing processes. Other actions likely to be occurring within the watershed would include road maintenance, culvert replacements (fish passage and non fish passage) and other instream restoration projects done by ODF and ODFW. These other projects are designed to maintain or restore water quality and fish habitat, in areas where other management actions are occurring. The cumulative effects of multiple projects of this type are anticipated to directly adversely affect individual fish in the short term, but provide benefits to populations and their habitat over time.

4.2.10 Alternative 1. Direct and Indirect Effects. Wildlife Habitat Enhancement: Bureau Sensitive Fish Species and Essential Fish Habitat.

Since several of the wildlife treatment units are adjacent to streams that may be occupied by anadromous salmonids, the addition of CWD into or adjacent to the stream has the potential of being both beneficial to habitat, and adverse to individual fish. Snag and CWD creation activities are likely to result in small, localized benefits to riparian and aquatic habitat by accelerating the growth of conifer trees and potentially increasing the amount of CWD. There is a possibility of sediment delivery if any trees are felled into or near streams. Any increase in sediment and turbidity would be small, of short duration, and localized. These actions will be implemented consistent with the Project Design

Criteria contained in NOAA fisheries Biological Opinion dated February 25, 2003 for 10 programmatic actions occurring in NW Oregon.

4.2.11 Alternative 1. Cumulative Effects. Wildlife Habitat Enhancement: Bureau Sensitive Fish Species and Essential Fish Habitat.

Snag and CWD creation activities would have a minimal effect on fish habitat in the analysis area. As these activities are only associated with federal lands the area of beneficial or adverse effects are negligible.

4.2.12 Alternative 2. Direct and Indirect, and Cumulative Effects. Density Management Thinning: Bureau Sensitive Fish Species and Essential Fish Habitat.

No action would occur under this Alternative, therefore no direct or indirect effects would occur to fish or fish habitat. Adverse impacts from sediment related to harvest or haul, and loss of potential CWD would be avoided as would any change in disturbance history. Foregoing road maintenance and eventual decommissioning will maintain more miles of road and increase the potential of impact on individual fish or habitat if these culverts or roads fail.

Due to the limited potential of effects from alternative 2, little difference would be noted within the analysis area.

4.2.13 Alternative 2. Direct and Indirect, and Cumulative Effects. Fish Habitat Enhancement: Bureau Sensitive Fish Species and Essential Fish Habitat.

No action would occur under Alternative 2, therefore no direct effects would occur to fish or fish habitat. This stream system would continue to provide fish habitat at its current potential and change through time with natural events. The time frame for major contributions of wood from riparian areas adjacent to this area is estimated at 100 years.

As other projects planed by ODF would continue, habitat conditions for anadromous salmonids should improve but only on ODF managed land. Projects planned by ODF include instream restoration of a mile of Cruiser Creek, 3 culvert replacements for fish passage and 1-2 miles of road decommissioning. As these projects will limit access to the lower portion of Elkhorn Creek and Cruiser Creek, instream restoration and road decommissioning on BLM managed land downstream would become more difficult and expensive to implement in the future.

4.2.14. Alternative 2. Direct and Indirect, and Cumulative Effects. Wildlife Habitat Enhancement: Bureau Sensitive Fish Species and Essential Fish Habitat.

No action would occur under Alternative 2 therefore no direct effects would occur to fish

or fish habitat. This stream system would continue to provide fish habitat at its current potential and change through time with natural events. The time frame for major contributions of wood from riparian areas adjacent to this area is estimated at 100 years.

As this type of action is not implemented on other ownerships within these watersheds no cumulative effects are anticipated to fish or fish habitat.

4.3 Wildlife

This section describes the anticipated impacts to only those terrestrial wildlife species , both Threatened and Endangered and Bureau Sensitive, whose status by either law or policy require evaluation, and for which there may be affects resulting from the implementation of either Alternative 1 or 2. More detailed information concerning which species were considered for evaluation is contained in the Biological Evaluation for Terrestrial Species (project record 48).

4.3.1 Alternative 1. Direct and Indirect Effects. Density Management Thinning.

Northern Spotted Owl

The spotted owl could potentially be affected by this project in two ways; through habitat modification of suitable habitat (Section 16) and dispersal habitat (everywhere else); and through disturbance. The potential impacts, through either habitat modification and/or disturbance are notable enough to warrant formal consultation with the U.S. Fish and Wildlife Service. Consultation will be completed programmatically in the 2005-2006 Habitat Modification BA (Light to Moderate Thinning), and the 2004-2005 Disturbance BA (wildlife tree creation, fish enhancement with the use of heavy helicopters, and road decommissioning). For projects where the Decision (Notice of Sale) is later than the dates for the current Programmatic Biological Assessments consultation will be carried into the future Programmatic consultation package and all Terms and Conditions from the Biological Opinions will be adhered to.

Habitat Modification

In all density management units the prescription entails variable density thinning that will generally remove the smaller trees from the stand. In Section 16 (80 acres of suitable habitat) the canopy closure will average not less than 60% post harvest and would continue to function as suitable owl habitat; whereas in the other units the canopy closure may vary between 40-60% after harvest, but would still function as dispersal habitat.

The conditions that keep younger more structurally simple stands from being good suitable habitat for owls are the lack of nesting substrate, such as large sheltered platforms or large cavities, and the lack of habitat for a suitable prey base, which is primarily the northern flying squirrel in this area.

Alternative 1 is expected to eventually result in a more structurally diverse stand, both vertically and horizontally that may provide for better owl foraging and nesting

opportunity. However, one drawback of the action is that the natural development of snags would be halted for the next 20-30 years (Carey 1991). The resultant loss of the future snag potential coupled with the direct loss of some of the few snags that currently occur in the project area through logging operations will have a negative impact on woodpecker populations and the secondary cavity users that depend on woodpeckers to provide shelter. A secondary cavity user that is of particular importance to the spotted owl is the northern flying squirrel.

Throughout the range of the northern spotted owl, flying squirrels are of primary importance as a food source for the owl. In the northern part of the range where there are few if any woodrats, the flying squirrel can make up over 60% of the diet of spotted owls (Carey 1991, Forsmen et. al. 1991). Flying squirrels have been found to be about twice as abundant in late-seral and old-growth stands as in younger seral stands and their presence is positively correlated to the abundance of large snags (Carey 1991, Corn and Bury, 1991). Carey finds that flying squirrels apparently play a major role in determining the carrying capacity of Douglas-fir and western hemlock landscapes for spotted owls; he also notes that most cavities used by flying squirrels seem to be abandoned woodpecker holes, thus reasoning that the presence of woodpeckers may be essential for high populations of northern flying squirrels (Carey, 1991).

The proposed action would create an average of 1.5 snags and one down tree per acre in the density management units (~1850 acres) after harvest. The creation of these snags should provide a modest amount of woodpecker habitat for the next 5-10 years and will help offset the negative affect of the thinning. A model developed by Thomas and later updated by Neitro et. al. estimated that 1.8 snags per acre would support 60% of potential woodpecker population for the area. Since the proposed action area is early to mid-seral, the availability of large trees for the creation of high quality large snags is low. By creating snags now in the 15-20 inch size range, the action area may be able to support 50-60% of the potential woodpecker population and therefore keep the cavity creating process active while the stands age. At such time that the trees are considerably larger, more snags could be created at a later date. By maintaining woodpecker populations, it is hoped that there will be sufficient cavity habitat in the near term (next 5-20 years) to maintain a sustainable population of flying squirrels to support dispersing spotted owls. At such time that the stand becomes suitable for nesting and foraging, in perhaps 30 years, it is hoped that a suitable prey base will be intact when the natural snag creating process starts to become active again (Neitro et. al.1985, Salem District FEIS 1994). All told there will be ~1770 acres of spotted owl dispersal habitat modified and ~ 80 acres of low quality suitable habitat modified by Alternative 1. All acres would technically continue to function in their respective capacities after treatment but possibly at a lower potential in the near term (5-15 years) and at an improved capacity in the longer term.

Disturbance

In total there is about 170 acres of suitable habitat within ¼ mile of the proposed density management units, including the 80 acres proposed for treatment in Section 16 that may experience noise at a level that could cause adverse impacts to spotted owls. If no owls are found during protocol surveys in Section 16 there will be no seasonal restriction on

noise generation from helicopter operations within ½ mile due to spotted owl concerns. Beyond the potential for disturbance in Sections 16 and 34, there would be no disturbance issues associated with hauling logs, rock and equipment since there is no suitable habitat within 100 yards (a disturbance standard distance included in the Programmatic Endangered Species Act consultation Biological Assessment) of any of the haul routes. If harvest operations in Section 34 occur before July 7, then there could be more appreciable impacts to undiscovered owls in the adjacent suitable habitat. It is assumed that disturbance to owls occurring during the critical period between March 1 and July 7 would have more potential to cause nest failure than later in the breeding season when adults have invested more energy in the reproductive process and juveniles and are able to move away from potentially disturbing activities (USFWS 2003-2004 Disturbance BO North Coast Province). The snag and CWD creation aspect of Alternative 1, would occur after the harvest operations and most likely later in the summer to reduce the potential for unacceptable additional tree mortality from bark beetle infestation. Where this activity occurs in Section 34 adjacent to the unsurveyed suitable owl habitat, there is the potential to disturb undiscovered owls from chainsaw use. This impact is expected to be minimal since later in the summer, juvenile owls have the ability to move away from disturbing events.

Marbled Murrelet

Activities proposed under Alternative 1 will not modify the current condition of the three suitable habitat trees found in the total project area. These trees will retain their physical characteristics after the density management operations. Since these trees are so isolated and are a relatively great distance from the coast, there is almost no possibility that they are being used by murrelets. Alternative 1 will employ option 3 for the management and protection of potential structure found within the *Policy for the Management of potential Structure within Younger Stands,* Issued by the Level 2 Team for the North Coast Planning Province, Oregon, March 26, 2004. Option 3 will include maintaining a 50 foot radius buffer around the suitable trees and maintaining at least a 60% canopy closure out to a distance equal to one site potential tree height, and there will be no gaps created. With the very remote possibility that murrelets could be using the suitable trees, daily time restrictions limiting noise generating operations to the hours between two hours after sunrise and two hours before sunset during the April 1 through September 15 breeding season, within ¼ mile of the trees will reduce the potential disturbance to a low enough level that the possibility of successful breeding could still occur.

Bald Eagle

The only possible impact could be the slight chance that noise generated by harvest activity or snag and coarse wood creation could cause a foraging eagle to avoid the area of the reservoir closest to the project area.

Mollusks

The density management project can be expected to have negative impacts to terrestrial mollusks in general. The thinning of the canopy to 40-60% cover would result in a modest increase in temperature and lower humidity at the ground level. Some of the large coarse wood would be disturbed and a small amount may be destroyed by

harvesting operations. Disturbance to the duff layer may also impact mollusks. Results from studies of microclimate changes between various thinning densities compared to unthinned stands seem to indicate that, although thinned stands are warmer and dryer than unthinned stands, there is considerable overlap in conditions between them suggesting that these stands provide a wide range of microclimates (Chan et. al. July 2004). Considering that even in unthinned stands there are long periods in a given year when the climate is unsuitable for terrestrial mollusk activity, it stands to reason that there may only be a slight change in the average time when conditions in the thinned stands are unsuitable for mollusk activity compared with the unthinned stand condition; presumably on the cusps of the dry weather in the early summer and later fall; and if there is a change, it may be within the range of natural variability. Also, considering the history of the stands proposed for treatment, i.e. the catastrophic fires, it appears that the mollusk species that are in the area have a fair amount of resiliency to disturbance. Since the vast majority of the features conducive to good mollusk habitat (large coarse wood, duff layer, low vegetation layer etc) will remain at the completion of the project it is not expected that Alternative 1 will result in any change in the status of these mollusks or in their population viability.

Northern Goshawk

Currently the project area provides only marginal foraging habitat for goshawks due to the young stand age, high tree density, and lack of vertical structural diversity. Due to the marginal nature of the habitat it is not expected that goshawks would be nesting in the project area, but without conducting extensive surveys it is impossible to rule out. The reduction of tree density while maintaining and increasing stand diversity would benefit the goshawk over time as stand level complexity increases. Alternative 1 would not result in a negative trend toward changing the status of the goshawk, or in loss of population viability.

Columbia Torrent Salamander

Columbia torrent salamanders live within a narrow ecological niche and are sensitive to humidity changes within their habitat. The density management treatment would maintain “no-harvest” buffers along all streams and this design feature should provide adequate protection of the riparian habitat. However there will be cases where cable yarding corridors will be cut through some “no-harvest” buffers thus impacting short stretches of the creeks. It is expected that the yarding corridors would be less than 20 feet wide and not closer than 150 from each other. In the areas cut through the buffers there will be a small increase in solar radiation on the stream resulting in a small amount of drying. The trees that are cut will be retained within the riparian area and may help provide shade at the micro site level to the open area. The resulting impacts are expected to be small, affecting probably less than 5% of the total stream buffer areas throughout the project area. The vast majority of suitable Columbia torrent salamander habitat within the project area will not be impacted therefore the proposed action is not expected to result in any change in the status of these salamanders or their population viability.

4.3.2 Alternative 1. Direct and Indirect Effects. Wildlife Habitat Enhancement

Northern Spotted Owl

As with the snag and CWD creation aspect of the density management, there is a small possibility of disturbance to undiscovered owls in Section 34. If this activity is done during the critical part of the breeding season, then the impacts could be more deleterious to breeding owls than if the disturbance occurred later in the season (after July 7). In the long term (greater than 25 years), the creation of snags would benefit owls by creating a more diverse forest structure that is more conducive to nesting and foraging activities; and could provide improved habitat for prey species such as the northern flying squirrel.

Marbled Murrelet

The wildlife habitat enhancement project will not negatively affect murrelet habitat since none of the work would be done near the few habitat trees that occur in the project area. There is the extremely small possibility that if the work were done during the breeding season that there could be an impact to an undiscovered murrelet using the suitable habitat tree in section 34. However with daily time restrictions in place between April 1 and September 15, notable adverse impacts can be reduced substantially.

Bald Eagle

As with the density management project, noise generated in the portion of Section 34 where the suitable eagle habitat occurs has a remote chance of disturbing foraging or roosting eagles. The predicted impact if it did occur would be inconsequential and would not result in any long term affects to eagles.

Mollusks

The felling of some trees and girdling of others would have no perceptible affect on mollusk species. It is possible that falling trees could impact a few individuals, but there would not be any appreciable change in habitat and the loss of a few individuals over approximately 150 acres of treatment area would not have any impact on these species as a whole.

Northern Goshawk

The wildlife enhancement project would not adversely affect goshawks and much like the density management project may improve habitat over time by introducing additional stand complexity.

Columbia Torrent Salamander

The wildlife habitat enhancement project may have an extremely minor impact on torrent salamanders if some of the trees selected for felling to create down coarse wood were to fall in a small stream. The introduction of wood to the stream would be beneficial but it is possible that individuals could be directly impacted. The chance of impact is very small therefore any impact would not change the status of Columbia torrent salamanders.

4.3.3 Alternative 1. Direct and Indirect Effects. Fisheries Habitat Enhancement

Northern Spotted Owl

The placement of logs in Cruiser Creek and Elkhorn Creek will not cause any modification of spotted owl habitat per se, however the procurement of the logs may cause modification of suitable habitat from sources other than federal land. The procurement of the logs is not analyzed in this Environmental Assessment. Log placement in Cruiser Creek will not cause any disturbance to breeding owls since the activity would not be occurring within or near suitable habitat. However, log placement in Elkhorn Creek within Section 8 is proposed to be done with a large helicopter. Two of the proposed landings for the helicopter are in Section 17 within ½ mile of the suitable habitat in Section 16. The suitable habitat will be surveyed to protocol and if no owls are found which is what would be expected based on the quality and quantity of the habitat, then there would be no affects to owls. If owls are found to be using the suitable habitat, the project would either wait until the breeding season is over or would use alternate landings further than ½ mile from the suitable habitat. Either way potential disturbance to spotted owls would not occur from the fish enhancement project.

Marbled Murrelet

No aspect of the fish habitat enhancement project will impact murrelets. There is no habitat near any of the fish project areas or the helicopter landings that may be used for the projects.

Bald Eagle

Indirectly the fish habitat enhancement project could benefit eagles by improving foraging opportunities in the Elkhorn and Cruiser Creek drainages. There would not be any habitat loss and there would not be any disturbance expected as a result of this project.

Mollusks

As will the wildlife project there is a small chance that a few individuals could be impacted by the work along the streams but the overall impact to the species would be imperceptible.

Northern Goshawk

The fisheries enhancement project would not impact goshawks.

Columbia Torrent Salamander

The operation of heavy equipment along the edges of Cruiser Creek could have impacts on torrent salamanders that may inhabit small streams near the confluence with the main creek. The chances of impact are very small to the point that there would be no change in the status of Columbia torrent salamander.

4.3.4 Alternative 1. Cumulative Effects. All projects.

This cumulative effects discussion for Alternative 1 is a general analysis encompassing the potential effects of all of the projects associated with Alternative 1, density management, wildlife and fisheries habitat enhancement and watershed restoration, and

their relationship to other past, present and reasonably foreseeable future projects, on wildlife habitat. Of particular interest are those habitat features common to older forests such as snags and down wood.

The cumulative effects analysis area for this project is generally the Trask river drainage above the confluence of the North and South Forks; and the upper extent of the North Yamhill River, including Fairchild creek, an area of approximately 116,000 acres. The Oregon Department of Forestry manages about 51% of the analysis area with Weyerhaeuser Corp., and BLM at about 14% apiece, Stimson Lumber Co. 12%, Green Diamond (formerly Simpson Resources) about 7% and the remaining 2% in miscellaneous ownership.

The Elkhorn project falls within the Buffer/early seral and Corridor/early seral landscape zone and cells as defined within the Northern Coast Range LSRA. Management goals for these areas include maintaining and creating late-successional habitat connectivity between LSR's, late seral habitat on State lands, and Reserve Pair Areas.

Other than the Elkhorn project, the BLM does not have any other harvest projects planned in the analysis area within the foreseeable future. There may be additional fisheries or wildlife enhancement projects, that are yet unplanned. The BLM lands are expected to continue to progress toward late successional forest at various rates depending on local conditions. With the lack of snags within the cumulative effects analysis area, there is a concern that a regular thinning program could have wide ranging negative effects on the production and availability of snags for both primary cavity excavators and secondary users such as the northern flying squirrel. Current plans for Oregon Department of Forestry lands within the Trask drainage are to clearcut harvest approximately 14,000 acres[3], and thin 400 acres by 2011. With the exception of some isolated patches, it is not expected that ODF lands will, within the foreseeable future, provide suitable habitat for species requiring older forest habitat. Private industrial landowners in the area (primarily Weyerhaeuser Corp. and Stimson Lumber Co. in the eastern part of the analysis area) are expected to continue to clearcut harvest on a 35-50 year rotation (see section 4.4.3 for more details.). The private lands will most likely never provide older forest habitat. In addition, clearcut areas on State and private lands will also negatively impact sensitive species that require a forest canopy, although not necessarily old forest, such as terrestrial mollusks and salamanders. With the current trend it can be expected that the BLM lands within the North and South Fork Trask and upper North Yamhill River systems, will be the only lands with trees older than 50 years, within much of the analysis area, perhaps as much as 40% in very early seral age class (0-15 yrs).

Due to past salvage and fireproofing actions, such as snag felling, the current condition of quality snag habitat is extremely poor. ODF and private industry generally leave the requisite wildlife trees in association with their clearcut harvesting (2 trees per acre), some of which die and become snags. However, compared with the number of harvested acres coupled with the loss of many recent snags for safety concerns during harvesting

[3] Approximately 25% of the ODF ownership in the Trask drainage.

operations, this amount contributes little to the overall snag condition on the landscape. Alternative 1 of the Elkhorn project would create some snags in relatively young forest stands, but that amount is expected to only offset some of the projected loss of recruitment potential associated with density management. There will continue to be the recruitment of some smaller, lower quality snags from mortality caused by *Phellinus weirii*, but in general this amount is low from a landscape perspective.

The BLM and Oregon Department of Forestry will both conduct fisheries enhancement projects within the analysis area. In general, effects to wildlife are minimal from a fisheries enhancement project, with the possible exception of noise disturbance during breeding seasons of sensitive species, and some potential destruction or degradation of suitable spotted owl habitat in other areas associated with procurement of large logs for placement in streams.

4.3.5. Alternative 2. Direct and Indirect Effects. All projects

See section 4.4.4, for a description of the expected impacts to the forest vegetation component of wildlife habitat.

Spotted owl suitable and dispersal habitat would be unaffected, and there would be no potential for disturbance impacts to undiscovered owls. There would not be any potential for disturbing murrelets that, however remote the chance, may be using the potential habitat trees that are contained within the proposed project area. There would be no potential for disturbing eagles that may be using Barney reservoir.

Habitat for Special Status Species would be unaffected. There would not be any disturbance to riparian areas from yarding corridors; neither would there be any potential for increased drying of the terrestrial environment that may otherwise result from a thinned canopy, which could affect terrestrial mollusks and salamanders. The marginal habitat potential for goshawks would be maintained and would eventually improve, but potentially at a slower rate compared with the rate of potential improvement that could occur with intervention. The status and population trend of these species would continue on their current trajectory.

4.3.6. Alternative 2 Cumulative Effects. All projects.

By not implementing Alternative 1, there may be some negative cumulative affects while at the same time avoiding others. With the very real prospect of much of the surrounding landscape being converted to early seral stage forest, the BLM lands in the area may provide the only reasonably extensive contiguous canopy cover for a great distance. If Alternative 1 is not implemented then the currently dense stands would continue to mature but most likely would not develop the more diverse structure that is expected to develop with management, for a much longer time, thus potentially delaying the development of good spotted owl and marbled murrelet habitat. On the other hand, snag development resulting from tree-to-tree competition would continue and perhaps accelerate in the coming decades, thus providing good habitat for the smaller

woodpeckers which in turn could result in greater abundance of secondary cavity users such as the northern flying squirrel. In the future, BLM lands in the North Yamhill drainage to the east may have some density management projects occur, some of which could occur within the cumulative affects analysis area. Those projects would have similar direct and indirect affects as described for this project.

With the prevalence of current and planned clearcut operations in the analysis area, which will negatively impact terrestrial mollusks and salamanders, Alternative 2 would better maintain healthy populations of these sensitive species in the vicinity of BLM lands than would Alternative 1. It is unclear what the long term prognosis will be for mollusks and salamanders without density management as the stands begin to self thin and potentially become unstable. With some of these species being somewhat common and occurring in fairly young stands that developed after catastrophic events, they may well be adaptable to changing conditions regardless of the implementation of Alternative 1.

4.4 Forest Vegetation

4.4.1 Alternative 1. Density management thinning

Thinning the units in a *variable-spaced* manner and *retaining a mixture of species* by removing about 30 to 55% of the basal area and approximately 50 to 75% of the trees per acre is expected to put the stands on a trajectory toward development of some late-seral forest conditions. Immediately after thinning, the overstory canopy closure is expected to average between 40-60%, but is not expected to fall below 40%. Table 5 shows the range of estimated changes in stand characteristics. The expected post-treatment average canopy closure in Unit 16-1, however, is expected to be 60% or more to maintain habitat suitability for the northern spotted owl.

As a result of thinning, the average stand diameters are expected to increase, crown ratios and limb development of the residual trees should increase, growth of understory trees, shrubs, and herbs should be stimulated, windfirmness and stability (indicated by the height:diameter ratio) of the residual trees would increase, mortality of the smaller-sized trees would decrease (little competition-related mortality is expected for at least the next 20 years following thinning). By thinning in a *variable-spaced* manner, some trees would be given more room to grow and others would be given less. This should increase overstory canopy heterogeneity and result in a more uneven pattern of understory development. By encouraging *mixed-species* stands and retention of Douglas-fir trees that demonstrate a relatively greater degree of tolerance to Swiss needle cast, the stands should be more resilient to the affects of this disease. Encouraging species other than Douglas-fir (and grand fir) will also reduce current and future impacts from *P. weirii* root rot. Thinning primarily from the Douglas-fir component to increase the relative proportion of the other species will also increase the general diversity of the units. In the long term (>30 years) the larger-sized trees would result in higher quality down logs and snags as the trees eventually die or are converted to snags or down logs through planned management actions.

Table 4. Range of estimated changes in stand characteristics from the current condition to the condition immediately after thinning and to the condition 25 years after thinning for the stands proposed for density management thinning**.**

Overstory stand characteristic	Approximate range		
	Current condition	Immediately after thinning	25 years after thinning
Trees per acre	132 – 343	46 – 106	44 – 121
Basal area per acre (sq ft)	180 – 242	100 – 160	188 – 235
Quadratic mean diameter (in.)	10 – 18	11 – 24	17 – 30
Relative density index (%)[1]	56 – 75	32 – 43	49 – 59
Live crown ratio (%)	35 – 49	42 – 62	29 – 42
Height:diameter ratio	75 – 118	61 – 76	60 – 78

[1]Percentage of maximum Stand Density Index for Douglas-fir (Reineke 1933).

Bailey and Tappeiner (1998) compared the effects of thinning in 40- to 100-year-old Douglas-fir stands in the Coast and Cascade ranges of western Oregon. Thinned stands had higher tree seedling density and frequency, understory tree density, tall shrub density and frequency, and low shrub cover (%) than unthinned stands. Thinned stands were also similar to old-growth stands in tree seedling density and frequency, understory tree density, and density of tall shrubs. They concluded that the findings in their study were strong evidence that thinning, even when done primarily to manage overstory/crop tree spacing (thinnings done for commercial wood production), promotes tree regeneration, shrub growth, and multi-storied stand development. They further concluded treatments designed to purposely incorporate retention of legacy structures such as large remnant trees, snags, and down wood, and/or retention of overstory hardwoods would further accelerate the development of old-growth characteristics. Canopy disturbances that thinned the canopy periodically were noted during the development of an old-growth Douglas-fir stand in the western Cascade Range in southern Washington (Winter et al. 2002). One drawback of density management thinning, however, is that it generally removes trees from below, thus short-circuiting the snag development process that results from tree-tree competition (Carey 1991). The network of "no-harvest" riparian buffers along with any reserved clumps of trees will provide unthinned areas where some suppression-related mortality (creation of smaller-sized snags and down logs) would continue to occur.

4.4.2 Alternative 1. Wildlife Habitat Enhancement, Fisheries Enhancement, Project.

Creating coarse debris through felling of live trees, and girdling live trees at the base as well as in the crown will help to improve wildlife habitat on the 150 acres planned for treatment outside of the area planned for density management thinning. The overstory trees adjacent to those selected to create coarse wood should temporarily increase their rate of growth as well as their crown size. Creating coarse woody debris in clumps

centered around patches of shade-tolerant conifer regeneration in the understory through felling or girdling at the base of the trees should also help to increase the growth of these understory trees, and therefore help to increase the structural complexity of the live-tree component of the treated stands. Down logs added to the sites will eventually decay and should provide a seedbed for additional regeneration of shade-tolerant conifers, particularly western hemlock. Because the number of trees per acre planned for coarse wood creation is so small, little, if any, additional Douglas-fir mortality is anticipated as a result of attack by the Douglas-fir beetle. Treatment effects are estimated to be rather short term (probably 10 years or less).

There are no anticipated direct or indirect effects to vegetation from with the fisheries enhancement project.

4.4.3 Alternative 1. Cumulative Effects. All projects

The analysis area is the upper Trask watershed. The area includes approximately 61,400 acres. The land ownership pattern is shown in Table CE-1. Oregon Department of Forestry is the dominant land owner, controlling 58% of the land in the analysis area. Large industrial timber companies (Weyerhaeuser and Stimson) together own about 22% of the lands, with Weyerhaeuser being the largest private industrial forest land owner. The Bureau of Land Management controls only about 8% of the land within the analysis area.

Table 5 shows the approximate seral-stage distribution of the stand in the analysis area. Younger-age-class stands clearly dominate the area, with approximately 61% of the supporting stands less than 50 years of age and 88% of the area supporting stands less than 80 years of age. Only 5% of the area supports stands greater than or equal to 80 years of age. (ODF and BLM, 2003).

Table 5. Approximate seral-stage distribution in the upper Trask watershed.

Seral stage	Acres	Seral stage (%)
Pioneer and very early (0 to 24 years)	11,453	19%
Early (25 to 49 years)	19,798	32%
Early/mixed conifer and hardwoods (25 to 49 years)	5,866	10%
Mid (50 to 79 years)	10,195	17%
Mid/mixed conifer and hardwoods (50 to 79 years)	6,101	10%
Late (=80 years)	869	1%
Late/mixed conifer and hardwoods (=80 years)	2,455	4%
Pure hardwood	1,901	3%
Unknown	2,762	4%
Total	61,400	100%

Within the analysis area, it is expected that lands managed by the Bureau of Land

Management will be managed to have a continuous canopy through density management thinning to various degrees. Clearcut harvest of Douglas-fir stands severely infested with Swiss needle cast will likely be the timber harvest emphasis on lands managed by the Tillamook District of the Oregon Department of Forestry (western portion of the analysis area). Because Swiss needle cast is not a significant issue on the Forest Grove District of the Oregon Department of Forestry (eastern portion of the analysis area), the bulk of the timber harvest is expected to come from partial cutting (thinning). It can be reasonably assumed that merchantable stands of timber managed by private industry will be clearcut before they reach about 50 years of age. This trend in management among the various land owners is anticipated to continue for the foreseeable future.

The proposed density management thinning and any partial cuts proposed to be done by the Oregon Department of Forestry or other land owners should help put the treated stands on a trajectory to acquire some older-forest characteristics (larger-diameter trees with larger crowns—some of which could be used as a source of larger down logs and snags in the future, and release and/or establishment of understory trees and shrubs) at a faster rate than without thinning. However, since thinnings generally remove the smaller-sized trees in the stand that would normally have died as a result of competition, the production of smaller-sized snags and down wood would be very much reduced for at least 20 years following thinning. As a result of implementing this proposed density management project on BLM land, approximately 3% of the analysis area is expected to be on a trajectory to develop some late-seral forest characteristics at an accelerated rate over the 25-year period following treatment. In addition, these stands should be more resilient to the impacts of *P.weirii* root disease and Swiss needle cast disease.

The anticipated cumulative impacts of implementing the proposed wildlife habitat enhancement treatment (addition of coarse wood through creation of snags and felling trees) should be a slight short-term (probably 10 years or less) increase in the structural diversity of the treated stands. This treatment is expected to affect only about 0.5% of the analysis area.

4.4.4 Alternative 2. Density management thinning

According to stand development projections using the ORGANON growth and yield model (Hann et al. 2003), the relative density index of the units will continue to increase to very high levels over the next 25 years without thinning. Development toward late-successional forest conditions in these stands is expected to continue to slow unless some form of disturbance occurs that creates openings in the units to permit accelerated growth of some overstory trees and provides an opportunity for understory trees, shrubs, and herbs to increase their growth rates. As the level of competition among the trees remains high, crown development (live crown ratio, crown expansion, and branch growth) will decrease, diameter growth rate can be expected to decline, competition-related mortality will increase resulting in coarse woody debris additions mainly from the smaller-diameter trees that slowly die from suppression (except in areas where *P. weirii* infection has resulted in windthrow of larger-sized Douglas-fir trees). Although small snags do not support stable populations of the areas largest primary excavator, the pileated

woodpecker, they are nevertheless an important habitat feature for smaller woodpeckers and secondary cavity users for foraging and denning substrate. Understory development will also be limited. The few conifers which exist in the understory of some stands can be expected to decline in vigor and exhibit a very slow growth rate or fall out of the stands because they are no longer able to survive under the increasingly dense overstory shade.

The units generally are expected to remain relative unstable because of susceptibility to wind and snow damage as indicated by height:diameter ratios over 80 (Wonn and O'Hara 2001). Based on growth projections by ORGANON (Hann et al. 2003), after 25 years without thinning, 86% will have height:diameter ratios of 84 and 64% will have height:diameter ratios above 90 when calculated from the quadratic mean diameter for the Douglas-fir stand component and the height of the 40 largest trees per acre.

Table 6. Range of estimated changes in overstory stand characteristics from the current condition to the condition 25 years from present without thinning for the stands proposed for density management thinning.

Overstory stand characteristic	Approximate range	
	Current condition	25 years from present without thinning
Trees per acre	132 – 343	111 – 199
Basal area per acre (sq ft)	180 – 242	276 – 340
Quadratic mean diameter (in.)	10 – 18	17 – 22
Relative density index (%)[1]	56 – 73	73 – 94
Live crown ratio (%)	35 – 49	23 – 36
Height:diameter ratio	75 – 118	76 – 105

[1]Percentage of maximum Stand Density Index for Douglas-fir(Reineke 1933).

Stands would also be less resilient to the affects of Swiss needle cast should infection levels increase because a higher proportion of individual Douglas-fir trees that are less tolerant to the disease would remain in the stands and species other than Douglas-fir would represent a lower proportion of the species composition of the stands. Impacts to Douglas-fir from *P. weirii* root rot would continue to increase as disease centers expand radially at the rate of about one foot per year.

4.4.5 Alternative 2. Wildlife habitat Enhancement

The quality of wildlife habitat on 150 acres outside of the area planned for density management thinning would not be improved through coarse wood enhancement (felling of live trees, and girdling live trees at the base as well as in the crown). Release of shade-tolerant conifers by felling or girdling trees at the base around patches of shade-tolerant conifer regeneration, and therefore, helping to increase the structural complexity of the live-tree component of the treated stands in the short term would not occur.

4.4.6 Alternative 2. Cumulative effects. All projects.

Without the proposed density management thinning on BLM lands, partial cuts proposed to be done by the Oregon Department of Forestry or other land owners should help put the treated stands on a trajectory to acquire some older-forest characteristics (larger-diameter trees with larger crowns—some of which could be used as a source of larger down logs and snags in the future, and release and/or establishment of understory trees and shrubs) at a faster rate than without thinning. However, since thinnings generally remove the smaller-sized trees in the stand that would normally have died as a result of competition, the production of smaller-sized snags and down wood would continue. As a result of not implementing the proposed density management project on Bureau of Land Management-administered land, approximately 3% of the analysis area is expected to remain in a relatively dense, closed canopy condition and make little progress toward attainment of late-seral forest characteristics for the foreseeable future (25 years or more). In addition, these stands should be more susceptible to the impacts of *P.weirii* root disease and Swiss needle cast disease.

The anticipated cumulative impacts of not implementing the proposed wildlife habitat enhancement treatment (addition of coarse wood through creation of snags and felling trees) should be quite small because the treatment is expected to affect only about 0.5% of the analysis area. The untreated area should remain somewhat less structurally diverse for at least the next 25 years or so.

4.5 Soils

4.5.1. Alternative 1. Density Management Thinning

Ground-Based Logging. The proposed action would cover about 7-10% of the aerial extent in skid trails and landings within each harvest unit. If low ground pressure, cut-to-length systems are used (e.g., harvesters), it will result in more surface disturbance (about 20 to 25%), however, a majority of the disturbance would be lighter and less damaging. Some of the disturbance would occur over existing trails, roads and landings with residual compaction. It is anticipated that new and old disturbance of large enough to cause loss of growth of adjacent trees (moderate and heavy compaction and mineral soil displacement) would cover less than 10% of the ground-base area. Compaction and displacement could reduce the soil productivity and decrease its ability to absorb surface water (infiltration). Compaction recovery for these soils is likely take several decades, with most of the potentially growth reducing effects to residual trees occurring in the first decade**.**

While ground-based equipment will generally operate outside of RRs, a small amount (approximately 2 acres) of new disturbance would occur in the outer margins of the RRs. The most likely areas include the northwest corner of Unit 4-1, Unit 1-1, Unit 31-1, and Unit 34-2.

Cable Logging. Cable yarding about 1,370 acres would result in about 5%, mostly light, disturbance (68 acres). Disturbance would be confined to less then 4 feet width in skyline corridors (mostly light compaction and a small amount of displacement). About half of the landings would be located outside roadbeds, totaling about 0.5% of the harvest area (7 acres). These areas would receive moderate to severe soil disturbance (compaction and surface displacement). Landing areas will be ripped to lessen compaction and increase infiltration after they are used.

Helicopter Logging. Helicopter logging about 182 acres would result in about 1%, mostly light, disturbance (2 acres). Approximately 3 acres of soil would be severely disturbed (severe compaction and high surface displacement) for use as log landings and service area(s). The landings would be built on flat ridgetops, often on existing disturbed sites. At least a part of the landings would be rocked if logging operations occur during wet weather. Landing areas will be ripped to lessen compaction and increase infiltration after they are used.

Road Building and Reconstruction. Constructing 5.1 miles of new roads and reconstructing 5.0 miles of existing roads would result in about 14 acres of severe soil disturbance. These roads would be natural surface and located on gentle sloping benches and ridgetops. It is anticipated the project will require three ~100 foot temporary spur roads with associated landings to be built in RRs in the northeast corner of Unit 4-1. One spur would be on a ridge top along the outer edge of the RR. The second spur would extend onto a gently sloping spur ridge above an existing road paralleling a small perennial stream. The third spur would be built onto an raised piece of ground off an existing road approximately 150 feet or more from a stream channel. Following completion of timber harvest, all new roads used in the project will be decommissioned (ripped, seeded, water barred and blocked). This will result in a net decrease of 3.2 miles of roads in the project area. Ripping would increase water infiltration and prepare a more favorable environment for plants and soil organisms. Very gradually (probably taking many decades) soils on these natural surface roads would recover their soil productivity.

Fuel Treatments/Slash Disposal. Since burning would be confined to landings, *Phellinus* pockets, or high fuel hazard areas, soil impacts would be limited to small, scattered, localized areas. Burning during moist soil conditions would result in moderate soil impacts in the upper soil layer (loss of surface organic material, killing of soil organisms, altering physical properties, erosion).

4.5.2 Alternative 1. Wildlife Habitat Enhancement

Implementation of this project would result in minimal, light soil disturbance and no moderate or severe disturbance. Felling a small number of trees across the landscape would add a small amount of organic matter to the forest floor. This addition would have a slight beneficial affect on soil productivity at the site scale and immeasurable effect at the project level and watershed scale. Current soil processes and conditions would continue to occur based on current conditions. Soils impacted from prior disturbance would continue to recover their productivity through natural restoration processes.

4.5.3 Alternative 1. Fish Habitat Enhancement

Implementation of this project would result in minimal soil disturbance and no loss in long-term soil productivity. Most actions would take place in areas previously disturbed by management activities or over rocky stream channels. A small amount of new soil disturbance (<1/4 acre) would result from pulling a few small culverts, building a few short, temporary access trails and creating a few off-channel habitats. All newly compacted areas would be ripped and all exposed soils would be seeded with native plants to reduce the potential for soil erosion and noxious/invasive weed growth.

4.5.4 Alternative 1. Cumulative Effects. All projects

High amounts of logging are currently occurring on private lands and is expected to increase greatly in the near future on state lands. Soil disturbance from management activities from this alternative (yarding and roads) would have a minimal additive effect upon soil productivity at the watershed scale (less than 100 acres of severe and moderate disturbance in a 112,000 acre watershed).

Ground-based yarding has the highest risk of causing cumulative effects. Given the slow rate of natural recovery from compaction for these soils, if the ground-based harvest units are re-entered in less than 10 to 25 years, there is a strong likelihood that there would be a cumulative (additive) effect, especially if the routes of heavy equipment (e.g., roads and skid trails) are not reused.

Wildlife Habitat Enhancement, Fish Restoration Since there would be very little or no ground disturbance, the proposed action would not have a cumulative additive effect upon soil productivity. Soils would continue to slowly recover their native productivity through natural restoration processes.

4.5.5 Alternative 2. Density Management Thinning

This alternative would not cause effects on the soil resource over and above the existing condition. The main direct effect would be that there would be no additional soil disturbances from road building, road decommissioning, logging and yarding of trees. Soil properties such as soil structure or porosity would not be altered which could lead to losses in long-term soil productivity. A indirect effect would be that current soil processes such as recovery of soil compaction would not be interrupted and would continue to occur based on current conditions. The main direct effect would be that there would be none of the minor soil disturbances that would occur from placing structures into streams and creating off-channel habitats.

4.5.6 Alternative 2. Cumulative Effects for all Projects

There would be no additive cumulative disturbance from the implementation of this

alternative. Soils would continue to slowly recover. Soil disturbances from private and state management activities (primarily timber harvesting and road building) on adjacent land will continue.

4.6 Water

4.6.1. Alternative 1. Density Management Thinning

Sediment and Turbidity

Timber harvesting. There is a low risk that thinning operations would measurably increase sediment delivery into streams. Logging would not occur on steep, unstable slopes where there is high potential for mass wasting. Most surface flows would not be channilized. Non-channilized flows of these soils are usually less than 30 feet, rarely less than 100 feet unless the ground is compacted. All harvest units will have at a minimum a 50 foot no-harvest buffer around non-fish bearing streams and 100 foot no-harvest buffer around fish bearing streams. Helicopter logging would result in mostly light soil disturbance. Heavy disturbance on landings would occur on stable ridgetops or benches far away from streams. During cable yarding, logs will be fully suspended off the ground within 25 feet over water and adjacent banks of any designated stream. Ground disturbance from ground-based equipment will be located sufficient distances away so that very little sediment will reach streams.

While ground-based equipment will generally operate outside of RRs, a small amount (approximately 2 acres) of new ground disturbance would occur in the outer margins of the RRs. The most likely areas include northwest corner of Unit 4-1, Unit 1-1, Unit 31-1, and Unit 34-2. Yarding these areas is unlikely to result in sediment delivery because equipment would operate from gently sloping ridgetops at sufficient distances to make sediment delivery unlikely.

Road building. There is a low risk that building approximately 5.1 miles of new roads would deliver sediment to streams. Most roads would be built on mostly stable ridgetops and benches located far away from streams. All new road construction, would be restricted to periods of low rainfall and runoff.

Road reconstructing. With three possible exceptions, reconstructing roads is unlikely to increase sediment and turbidity because they are ridgetop roads located far away from streams. 1) Reconstructing the existing road that accesses the central and western portion of Unit 31-2. This road would require the installation of a small culvert and its removal after the unit is harvested. 2) Reconstructing the 2-6-4 road which parallels a stream for about 800 feet. 3) Reconstructing the short un-named railway spur road off the 2-6-4 road that travels within about 100 feet of a stream origin in the northwest portion of Unit 4-1. These actions may result in a small, short-term increase in sediment and turbidity. To minimize the potential for excessive sediment releases, road work would be limited to the dry season and sediment and erosion control measures would be implemented during construction activities. All of these streams have very low gradients, are non-fish bearing, and are likely to be dry or nearly dry when the roads are worked on. Any

sediment released into these streams, therefore, is likely to naturally drop out in a short distance.

The only new road construction anticipated within Riparian Reserves would be three ~100 foot spurs each with a landing approximately 60 ft in diameter in the northeast corner of Unit 4-1. One spur would be on a ridge top along the outer edge of the RR, the second spur would extend onto a gently sloping spur ridge above an existing road paralleling a small perennial stream; the third spur would be built onto an raised piece of ground off an existing road approximately 150 feet or more from a stream channel.

Timber hauling. Increases in sediment and turbidity as a result of timber haul of this alternative are expected to be small, short-term for the following reasons: 1) Most hauling will occur over well maintained, low gradient, gravel-surfaced forest roads that will be dry; 2) Most haul roads are on or near mountain ridgetops, are outsloped, lack drainage ditches, and are located away from streams; 3) Most stream crossings are small, low gradient, headwater streams that will likely be dry or nearly so when hauling; 4) While timber haul for helicopter operation could take place any time of the year, the amount of logs is small, few truck loads are expected, and the road is nearly all ridgetop with few streams.

There are approximately 10 places where haul roads cross larger order streams. The most likely areas for road generated sediment to enter streams is along 1) the 6.5 miles road segment linking Unit 5-1 to the Toll Road crossing one 4th order, a 3rd order, and a larger 2nd order stream draining into Cruiser Creek and Bark Shanty Creek (4th order) which drains into the North Fork Trask River; 2) Toll Road where it crosses a cement bridge over Fairchild Creek; and 3) Elkhorn (2-5-10) Road where it crosses Turner Creek , located a little downstream of the Turner Creek Reservoir and 2.5 miles upstream of the Turner Creek muncipal water intake.

There is very low risk that this alternative would affect the water quality at Barney Reservoir or the Turner Creek Reservoir. The nearest ground disturbance to Barney Reservoir would be from cable yarding Unit 34-2, about 800 feet upstream. The nearest ground disturbance to Turner Creek Reservoir would from ground-base yarding Unit 31-1, about 3,500 feet upstream.

In conclusion, timber hauling may have short-term impacts to turbidity, but there would be no substantial change in stream sediment levels. Channel conditions are expected to be maintained. Most fine sediment generated from forest management activities will travel short distances before it is trapped into ephemeral and intermittent streams. There it will stay stored until a periodic, high flow event occurs and moves it as suspended sediment below deposited gravel downstream into larger perennial streams.

Large Woody Debris

There is a small risk that thinning RRs would affect current and future LWD recruitment to local streams. Treated RRs would have a 50 foot no-harvest buffers on non-fish bearing streams and a 100 foot no-harvest buffers on fish bearing streams. Most of the

risk would be associated with thinning RRs along non-fish bearing streams. About 70% of the source of LWD in stream channel comes from within 50 feet of the streambank compared to about 90% coming from within 100 feet. Field observations indicated most of the small streams adjacent to harvest units (mainly non-fish bearing streams) have fairly abundant small and medium size wood pieces (6 to 24 inches in diameter).

In the long-term, thinning trees in the RRs would increase the quality and volume of LWD in the area most likely to contribute large wood to stream channels and shorten the time that LWD would be delivered to and interact with streams.

Stream Channel Morphology

Except for upgrading a culvert in an existing road, there would be no alteration of any stream because all ground disturbances would be at least 50 feet away, therefore the implementation of this alternative would not result in any direct alteration of any stream channel or wetland morphological feature. Channel stability and channel morphology conditions should improve on BLM land as streamside trees mature and additional structural material is added to the channel area.

4.6.2. Alternative 1. Wildlife Habitat Enhancement

There are no anticipated effects to water from the wildlife habitat enhancement project.

4.6.3. Alternative 1. Fish Habitat Enhancement

Sediment and Turbidity

Placement of large wood and boulders in Cruiser Creek and Elkhorn Creek and creation of off-channel habitats on Cruiser Creek along portions of Elkhorn Road (2-5-10) would result in some small, localized, short-term mobilization of sediment and increases in turbidity. Work would be restricted to in-stream work window, when stream flows are at the lowest levels, and limited to the degree practical to minimize stream bed disturbance. Tracked excavators would stay primarily on rocky/cobbly stream channels, roads and other areas previously disturbed areas. Turbidity levels are likely to exceed natural background levels for up to 2 hours in any 24 hour period in the vicinity of construction work. Except for the off-channel areas, sediment created during this work would be localized and not expected to persist beyond the first winter and spring following project completion. For short pulses during large storm events, sediment (mostly larger sized particles) in the off-channel areas would be released and transported downstream.

In the long-term, adding large wood and boulder would reduce stream energy and velocity thereby allowing the channel to aggrade and help reconnect the channel with riparian zone in areas where the channels are currently confined and downcut such as along the the 2-5-10 road. Removal of culverts would improve hydrologic function. In time the quantity and depth of pools will increase and there will be more cover and improved habitat.

4.6.4. Alternative 1. Cumulative Effects. All projects.

The proposed project is unlikely to contribute to cumulative effects to hydrology (peak flows, sedimentation, LWD, or increases of stream temperature. A preliminary analysis using Hydrologic Condition Assessment in the Oregon Watershed Assessment Manual found that there is a low probability that the proposed action will contirube to peak flows (Hydrology Report, pgs 14-16). The proposed action will maintain the current canopy and shade over streams and is therefore unlikely to result in measureable increases in stream temperaures (Hydrology Report, p. 9). There will likely be small, short-term localized increases in stream turbidity and sedimentation primarily from timber hauling and short-term loss of smaller LWD from timber harvest in non-fish bearing streams. Considering the relatively large amount of new disturbance that is expected to occur from other land (See Alternative 2 Cumulative Effects for a baseline), the risk for this alternative to contribute cumulative effect to sediment and LWD recruitment is minimal. In the long-term, LWD recruitment potential would increase.

With the Fish Habitat Enhancement project hydrologic function and habitat condition are expected to improve on about 2 miles of streams. Additional fish habitat and watershed restoration actions on state lands would also be occuring adjacent to the proposed treatment area and throughout the Trask watershed. Locally they include decommissioning 3.2 miles of roads, including 3 culverts, and adding structures to streams. This may result in some sediment be transported to streams on BLM land within the project area. It would also add LWD, increase pool area and quality, and help restore the sediment and flow regime. Other actions in the watershed include road maintenance and improvement on BLM and ODF lands and additional fish habitat restoration projects.

Considering that there are about 1,070 miles of streams in the Trask River watershed, the hydrologic effect from these project actions viewed at the watershed scale would be small.

4.6.5. Alternative 2. All projects

Under this alternative, there would be no timber harvesting, road construction, or timber hauling which could increase sediment and turbidity levels, decrease LWD, or change stream channel morphology. Long-term reduction in sediment would not occur from stabilizing and upgrading 7.8 miles of existing road. The sediment regime and stream channel conditions would continue their current condition and trends as described by this report and the Trask River Watershed Analysis, 2003.

Since no fish habitat enhancement project would occur, the hydrologic effects would be limited to those that occur naturally. Hydrologic and sediment processes would continue to occur based on current conditions. Under this alternative, streams and aquatic habitat are likely to take much longer to recover than if Alternative 1 was implemented. It estimated that it will be another 40 to 100 years before riparian trees grow large enough to become important in providing LWD to streams. Streams in the project area would continue to function below desired LWD levels as they have in the recent past.

4.6.6. Alternative 2. Cumulative Effects. All projects

The vast majority of the Trask River watershed is used for forest use (91%). A little more than half of the watershed is owned and managed by the State of Oregon and about a third is owned by the private sector, the majority of which are private industrial. BLM manages about 8% of the lands. The proposed density management treatment areas covers approximately 3 square miles (1.7%) of the 175 square mile watershed.

The potential for cumulative effects on sediment increases as the area affected by timber harvest increases (Rhodes and McCullough, 1994). High amounts of logging are presently occurring on private lands. Within the next 10 years, a majority of the 24,044 acres of private lands will be at the desirable age for harvesting, and will probably be clearcut. The rate of logging has begun to increase in on ODF managed lands. The state is anticipating to harvest about 1,000 acres of partial cut and 15,000 acres of clearcut between 2003 and 2011 (project record, 32). It is assumed that all logging on state and private lands will be subject to the Oregon Forest Practice Act. The Forest Practice Act will help minimize disturbance, but increases in sediment yields are likely. The Act does little to assure that stream banks, and long-term recruitment of LWD are protected in small, non-fish bearing streams. The majority of streams in the watershed are small, mostly non-fish-bearing streams. Most of the main roads are in place, and have been recently improved and upgraded.

CHAPTER 5 LIST OF PREPARERS

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Kurt Heckeroth	Botanist
Andy Pampush	Wildlife biologist, Logging Systems Specialist
Steve Bahe	Wildlife Biologist
Dennis Worrel	Soils and Water
Debra Drake	Outdoor Recreation and Visual Quality
Kent Mortenson	Fuels
Walt Kastner	Silviculturist

CHAPTER 6 PUBLIC INVOLVEMENT AND CONSULTATION

6.1 Public Scoping and Notification

Please see Appendix 4.

6.1.1 30-day Public Comment Period

The Environmental Assessment and Finding of No Significant Impact will be made available for a 30-day public review period. Notification of the comment period will include: the publication of a legal notice in the *Headlight Herald* newspaper of Tillamook, Oregon; a letter to be mailed to those individuals, organizations, and agencies that have requested to be involved in the environmental planning and decision making processes for proposed timber sales; and posting on the Internet at http://www.or.blm.gov/salem/html/planning/index.htm under Environmental Assessments. Comments received in the Tillamook Resource Area Office, 4610 Third Street, Tillamook, Oregon 97141, on or before the end of the 30-day comment period will be considered in making the final decision for this project.

6.2 Consultation

6.2.1 United States Fish and Wildlife Service

In accordance with regulations pursuant to Section 7 of the Endangered Species Act of 1973, as amended, formal consultation with the USFWS concerning the potential impacts of the five timber sales described in the Elkhorn Density Management Project, fish habitat enhancement project and Wildlife Habitat Enhancement project upon the spotted owl, marbled murrelet and bald eagle will be completed by included the appropriate project within the annual programmatic habitat modification biological assessment

prepared by the interagency Level 1 Team (terrestrial subgroup) for the North Coast Province. The alternative 1 is consistent with definitions for *light to moderate thinning* as found in the programmatic BA. Should the project not be implemented within FY 2006-9 as currently planned but rather in a subsequent year, the project(s) would likely be resubmitted for inclusion in the next appropriate programmatic consultation. If the project is determined to not be in compliance with the standards of the programmatic consultation, the project would be changed to be in compliance with the programmatic consultation or a project-specific consultation would be conducted. In either case, all of the appropriated Terms and Conditions of the appropriate Biological Opinion would be incorporated.

Any ESA consultation with USFWS required on the subsequent maintenance of trees planted as a part of this project, (such as in root disease centers or on landings) would likely be accomplished by inclusion of the maintenance work within the appropriate Programmatic Biological Assessment for Activities in the North Coast Province which might disturb bald eagles, northern spotted owls or marbled murrelets which is prepared by the North Coast Province Interagency Level 1 Team.

6.2.2. NOAA Fisheries (National Marine Fisheries Service)

In accordance with regulations pursuant to Section 7 of the Endangered Species Act of 1973, as amended, formal or informal consultation concerning the potential impacts of the proposed action on Upper Willamette steelhead is anticipated to be initiated in 2006. Conferencing for Oregon Coast Coho salmon will be requested if needed in 2006.

Formal or informal consultation under the Magnuson-Stevens Fishery Conservation and Management Act is anticipated to occur for populations of coho and chinook that are located within the project area. This consultation for Essential Fish Habitat would likely occur concurrently with Section 7 consultation or conferencing.