SEELEY CREEK PROJECT
UPPER WILLAMETTE RESOURCE AREA
BLM EUGENE DISTRICT
ENVIRONMENTAL ASESSMENT
OR090-EA-08-04

1.0 PURPOSE AND NEED

The Upper Willamette RA, Eugene District Bureau of Land Management (BLM) proposes to implement a commercial thinning project and aquatic habitat restoration on approximately 760 acres in the Mohawk watershed located in T. 15S., R. 01W., sections 7, and 19 and T. 15S., R. 02W., sections 13 and 24. The proposed action is within the Matrix and Riparian Reserve land use allocations. Actions may include timber harvest, instream habitat restoration, and road construction, improvements and decommissioning. Converting roads (constructed for the purpose of harvest) to designated off-highway vehicle (OHV) trails may also be considered.

The need for action in Matrix and Riparian Reserves has been established through the results of field reviews and stand examinations, which indicate that stands would benefit from thinning or density management. Currently, the stands are dense, overstocked and are uniform in structure. This results in reduced tree growth and stand vigor. Also in Riparian Reserves, stand examination show that stands are deficient in late-successional structural components. Treatment would increase stand vigor, growth rates, crown differentiation and complexity. Additional benefits for treating Riparian Reserves would be to acquire desired vegetation characteristics, which would help to attain watershed aquatic conservation objectives.

The purposes of the actions in Matrix are to meet the objectives given in the Eugene District Record of Decision and Resource Management Plan (ROD/RMP). Some listed objectives are to (1) Produce a sustainable supply of timber and other forest commodities to provide jobs and to contribute to community stability; (2) Provide habitat for a variety of organisms associated with both late-successional and younger forests and maintain valuable structural components, such as down logs and snags (pg. 34). Direction for road management is stated on page 98 of the RMP, which directs us to, “manage roads to meet the needs identified under other resource programs.” Additional guidance for recreation management directs us to, “manage Off Highway Vehicle use on BLM administered land to protect natural resources, provide visitor safety, and minimize conflicts among various users (RMP, pg. 80).

The purpose of the actions in Riparian Reserves are to enhance or maintain late-successional forest conditions, acquire or maintain characteristics needed to attain Aquatic Conservation Strategy objectives, and to provide habitat for Special Status Species, and other terrestrial species (RMP, pp. 18, 23).

The purpose of the Aquatic Habitat Restoration actions is to aid in the recovery of aquatic species habitat, riparian habitat, and water quality. Some of the important components of aquatic restoration are the control and prevention of road/trail-related sediment runoff and fine sediment production to the stream network; restore aquatic habitat complexity and spawning and rearing habitat for anadromous and resident fish populations; and reestablishing connectivity within the watershed by eliminating passage barriers to fish and other aquatic-associated species (RMP, pg.44,45)

1.1 CONFORMANCE

This environmental assessment (EA) is consistent with the *Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (April 1994)* and *the Eugene District Record of Decision and Resource Management Plan (June 1995*), Aquatic Conservation Strategy (ACS) Objectives listed

on page B-11 of the *Northwest Forest Plan,* and the Record of Decision for *Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (2001) The Seeley Creek project file contains additional information compiled by the Interdisciplinary Team (ID Team) to analyze effects and is available for review at the Eugene District Office.

1.2 SCOPING

Scoping information about the Seeley Creek Project was first provided in the June 2007 *Eye to the Future.* This was done prior to the formal IDT meetings, which began November of 2007. In addition, a mailing list was compiled by the area recreation lead, listing OHV groups and other interested parties that would be interested in activities in the Seeley Creek Project Area. In October 2007, a letter, which outlined the project location and possible project activities, invited comment from the groups and/or individuals on the mailing list. The information from these scoping activities helped the decision-maker guide what type of project activities the Interdisciplinary Team (ID Team) could consider when designing project alternatives.

1.3 ISSUES

The ID Team brought forward additional concerns related to resources that had potential of being affected by the proposed actions. The resource concerns related to the issues, as well as the Critical Elements of the Human Environment are analyzed in Section 3.0: Affected Environment and Environmental Consequences.

Issues identified:

(1) What would be the effects of project activities on water quality and aquatic resources?

(2) What would be the effects to the designated Shotgun OHV System due to project activities?

2.0 ALTERNATIVES

This section describes alternatives identified by the interdisciplinary team. Please refer to Appendix A for maps of the project proposal.

2.1 ALTERNATIVE 1: NO ACTION

Under this alternative no actions would take place. Thinning, road management, aquatic habitat restoration actions, and designated OHV trail conversions would not occur within the proposed project area. The purpose and need of the project proposal would not be met.

2.2 ALTERNATIVE 2: THINNING

Upland Thinning

This alternative consists of four commercial thinning areas of approximately 760 acres (T.15S. R.01W, Sections 7 and 19 and T.15S. R.02W, Sections 13 and 24.). Thinning would be designed to increase tree size through time, develop windfirm trees, extend the culmination of mean annual increment and capture anticipated mortality. The stands would be thinned from below. Trees selected for harvest would be the suppressed, intermediate, and co-dominant conifer trees, leaving the larger trees. Cut trees would be Douglas-fir and western hemlock. This prescription would result in a stand with variable spacing, between 15 and 25 feet between the Douglas-fir and western hemlock. All Incense cedar, western red-cedar, Pacific yew, and hardwood trees would be retained, except where necessary to accommodate logging systems and for safety. There would be unthinned patches around rock outcrops, shallow soils and wet areas. Leaving the hardwoods, western redcedar, incense cedar and Pacific yew trees would provide species diversity, structural diversity as well as variable density throughout.

Section 07 (248 acres): thinning would reduce the number of trees from approximately 160 trees per acre (TPA) to approximately 80-100 TPA, with an average spacing of 22 feet.

Section 13 (23 acres): thinning would reduce the number of trees from approximately 130 trees per acre (TPA) to approximately 80-100 TPA, with an average spacing of 22 feet.

Section 19 (274 acres): thinning would reduce the number of trees from approximately135 trees per acre (TPA) to approximately 80-100 TPA, with an average spacing of 22 feet.

Section 24 (18 acres): thinning would reduce the number of trees from approximately 125 trees per acre (TPA) to approximately 80-100 TPA, with an average spacing of 22 feet.

Riparian Reserve Management
Silvicultural treatments would occur in the outer edges of the riparian zone and would be treated the same as upland. The approximate riparian acres proposed for treatment for each section are as follows:

Section 07: 65 acres
Section 13: 13 acres
Section 19: 97 acres
Section 24: 24 acres

The no harvest areas in close proximity to the streams and wetlands would vary between 75 feet and 200 feet.

Logging Systems
Thinning would be accomplished with a combination of cable and ground-based yarding systems. Cable yarding would be proposed for approximately 705 acres and ground-based yarding would be proposed for approximately 55 acres (see maps in Appendix A).

Aquatic Habitat Restoration
To enhance aquatic and riparian habitat conditions, approximately 35 trees ranging from 20-32 inches in diameter would be pulled and/or felled from the adjacent riparian area directly into mainstem Shotgun and Seeley Creek. These sites would be supplemented with 30-60 logs that would be brought in from outside of the project area. Approximately 1.6 miles of Shotgun Creek and 1 mile of Seeley Creek would be treated.

Non-designated OHV trails that are negatively impacting water quality and aquatic and riparian habitat conditions would be decommissioned. Non-designated trails are primarily located in Units 7, 13, and 24; however, there may be other such trails that have not yet been identified. Trails would be tilled, slashed with shrub and large wood to discourage use, and blocked from future access. All stream crossings would be restored to a natural condition and re-vegetated and mulched with native material.

The OHV trail crossings on Stream 1 and 11 (Unit 7) would be removed and stream channels and banks restored to a natural condition. OHV trail bridges would be constructed at these sites to accommodate existing and future trail expansion.

Road 15-1-7, which is approximately 0.31 miles in length, would be fully decommissioned. This includes pulling existing stream culverts on streams 1 and 2, tillage of roadbed, and barricading the junction to OHV Trail 18. In addition, the south portion of Road 15-1-30 (outside of road to trail conversion) would be fully decommissioned upon completion of harvest operations.

Deteriorated road and/or fish passage barrier culverts (Table1) have been identified within the project area as needing replacement. All stream crossing culvert replacements (non-fish bearing/fish bearing) would be sized to meet the 100 year flow event criteria. Refer to Project Design Features (PDFs) for additional design and implementation criteria's.

Roads
Approximately 14 miles of existing BLM controlled roads, would be utilized as part of the project. Of that, approximately 5 miles of road would need maintenance including adding crushed rock

surfacing (please see Table 1). There would be approximately 1.8 miles of proposed new temporary road construction and approximately 0.7 miles of new permanent road construction. Approximately 22 stream crossing culverts would be replaced. Approximately 1 mile of Weyerhaeuser Company controlled road would be used for timber and rock haul.

Shotgun OHV Trail System

Approximately, one-third of the existing OHV trails may be temporarily disturbed by logging systems. Approximately 1.1 miles of designated OHV trail may be used for logging systems. However, approximately 0.4 mile of OHV trail would be added to the system as part of the project. What is currently designated as Road 15-1-30 would be converted to OHV trail after logging has been completed, and tied into the new trails proposed in Shotgun Trails II EA (EA-06-04). The southern portion of the road, where it currently connects to road 16-1-5 and beyond the "tie-in point" would be decommissioned.

2.2 ALTERNATIVES CONSIDERED BUT NOT ANALYZED

Based on scoping comments from the OHV community, the team designed three additional alternatives. Two alternatives would have added trail mileage to the designated Shotgun OHV trail system by converting all or a portion (dependent upon the alternative) of road 15-1-28 on BLM administered land. However, upon discussion with the adjacent land owner, these options were not feasible due to existing right-of-way agreements. Therefore, these alternatives were considered but not analyzed. An additional alternative would have placed 25 foot no harvest buffers along designated trails within the project area. Ultimately, it was decided that 25 foot buffers would not necessarily meet the goals of a visual buffer. However, due to the land use allocation increasing the buffer was not a viable option. Furthermore, these buffers would have caused acres to be dropped from the project due to logging infeasibility. The purpose and need of the project would not have been fully met under this alternative considered but not analyzed.

Table 1: Proposed Road Construction and Improvement		
Road Construction – Temporary	**Length**	**Comments**
Spur 7B	0.1 miles	
Spur 7C	0.12 miles	
Spur 19A	0.5 miles	
Spur 19B	0.25 miles	
Spur 19G	0.25 miles	
Spur 19I	0.1 miles	
Spur 24A	0.6 miles	1 cmp - stream crossing
Total	**Approximately 2 miles**	
Road Construction - Permanent		
Spur 19H	0.25 miles	
Spur 19J	0.20 miles	
Spur 7A	0.36 miles	1-3 cross drains To be blocked after haul
Total	**Approximately 1 mile**	
Improvement by Road Number		
15-1-28	2.4 miles	10-15 cross drains 6 cmp replacements
15-1-30	0.40 miles	2-4 cross drains Needs widening and ditching , minor realignment
15-2-13.1A+B Grade -ditch	0.4 miles	6-8" lift rock
15-1-18	0.7 miles	4 cross drains- 5 stream crossing replacements (1 fish); 2 stream restorations
15-1-7.1	0.9 miles	0-3 cross drains
15-1-19.1	2.4 miles	asphalt surface 3-10 cmp replacements (2 fish culverts)
16-1-5	3.4 miles	asphalt surface 2 - 6 cmp replacements (4 fish culverts)
Total	**approximately 11 miles**	
Road Decommissioning		
Spur24A	0.6 miles	ripped
Spur 7A	0.4 miles	blocked after haul
Spur 19G + I	0.4 miles	ripped
15-1-7	0.3	Fully decommissioned
Total	**Approximately 2 miles**	
Trail to Road to Trail Conversion		
Spur 7B	0.1 miles	to Trail 16
Spur 7C	0.1 miles	to Trail 16
Spur 19A	0.4	to Trail 22
Spur 19B	0.1 miles	Segment extending along Trail 26 from landing to Trail 23
15-1-18	0.4	Segment from Stream 1 crossing to end of project boundary to Trail 18.
15-2-13.1B	0.2 miles	
Total	**approximately 1.5 miles**	
Road to Trail Conversion		
15-1-30	**0.30 miles**	Segment between 0.05 miles north of 16-1-5 junction and 0.05 miles south of 15-1-28 junction to Trail 26 or 27

2.3 ACS CONSISTENCY

This section summarized how the no action and action alternatives retard, maintain or enhance the attainment of ACS objectives, as outlined in the 1994 NWFP ROD on page B-11.

Alternative 1: No Action-

Objective 1*: Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.*

Under this alternative, current stream and riparian conditions would be maintained. Small and large wood recruitment to the stream and riparian areas would continue over time. Density induced mortality recruitment of smaller diameter down wood is beginning to slow yet should continue for the next few decades and then generally subside for many decades until tree growth increases and large down logs begin to enter riparian areas due to natural processes such as disease and competition among dominant and co-dominant trees.

Objective 2*: Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include flood plains, wetlands, up slope Areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.*

Current stream and wetland network connections would be maintained. Riparian, off-channel habitat, refugia, and floodplain connectivity would not be affected. Numerous road-stream crossings would continue to be migration barriers to fish and other aquatic-dependent species such as amphibians and aquatic invertebrates. In addition, many stream crossing culverts are undersized, deteriorating, or otherwise at risk of failure in the next decade and drainage network connections could be blocked by fill failures, retarding compliance with ACS Objective 2 in the long term.

Objective 3: *Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.*

The physical integrity of the aquatic system would continue to be compromised under the current conditions. As part of this project, stream crossings or relief culverts would not be replaced, removed or added. Undesignated OHV trail-stream crossings would continue to erode streambanks and channel bottoms. As a result, fill or stream crossing degradations, failures and unauthorized recreation use could further retard the attainment of ACS Objective 3 in the short and long-term.

Objective 4: *Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.*

Based on current conditions, water and streambed qualities would continue to be negatively impacted due to changes in stream substrate composition, and regular inputs of suspended and embedded fine particles. In the long-term, sedimentation could increase and further negatively impact water quality (e.g. reduced oxygen and ability for oxygen diffusion by fish and amphibians) and substrate quality (e.g., embedded fine sediments that reduce the amount and complexity of interstitial spaces and microhabitats requisite for some amphibian and invertebrate species). Negative effects may also be seen in downstream spawning and rearing habitat for fish as existing road and trail stream crossings, relief drainage, and general road/trail conditions potentially deteriorate from lack of repair and maintenance.

Existing shade would remain along streams therefore water temperature would be maintained in the short term.

Objective 5: *Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.*

Due to natural conditions, such as low gradients, and human actions (e.g., undesignated recreations trails, deteriorating culverts, and roads) that many of project area streams are recruiting and maintaining increased levels of sediment. The natural sediment regime would continue to be negatively affected by current conditions. The timing, volume, rate, and character of sediment input could negatively change in the short and long-term due to direct sediment pulses from deteriorating stream crossing culverts, OHV trails, and general road conditions. The road segments and undesignated trails that currently deliver sediment would continue to deliver at the existing rate.

Objective 6: *Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.*

In-stream flows and patterns of sediment routing would be maintained. Existing conditions that affect summer low flows, overall water yield, and peak flow would remain on the current trajectory. There would be no alteration in the factors that influence evapotranspiration and interception.

Objective 7: *Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.*

The existing vegetative cover in the project area would be retained, and no road construction or harvest would occur near floodplains, meadows or wetlands. Therefore, this alternative would maintain the current timing, variability and duration of floodplain inundation. Water table elevation would be maintained in project area wetlands.

Objective 8: *Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distribution of coarse woody debris sufficient to sustain physical complexity and stability.*

Current rates of surface erosion, bank erosion, and channel migration would continue in the short-term. In the long-term, stream crossing failure and OHV stream crossing use could result in channel migration and a degraded condition from associated bank erosion.

Untreated Riparian Reserves would continue to recruit smaller diameter coarse woody debris mostly through density-induced mortality for the next few decades. However, these areas would not realize the accelerated benefits of larger diameter down wood recruitment process that occur in late-seral stands (e.g, windthrow, disease-induced mortality).

Objective 9: *Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.*

Aquatic habitat: Species such as aquatic invertebrates, aquatic salamanders, red legged frogs, western pond turtles, and harlequin ducks, which are obligated to aquatic stream habitats, would continue to experience known and potential negative impacts to water quality as described under ACS objectives 1-7. Further impacts would occur due to increased sedimentation, simplified substrate composition, reduced oxygen diffusion, and potential changes in pH or nutrient composition as described in ACS objective 4. Harlequin ducks could experience negative effects to their aquatic invertebrate prey (e.g., caddisflies) due to effects to water quality.

Terrestrial riparian habitat (Riparian Reserves): Species obligated or associated with riparian terrestrial habitats would not experience any negative short term effects due to soil compaction

and changes in canopy closure and microhabitats (as compared to the Action Alternative). No negative short or long term effects to the terrestrial portion of the Riparian Reserves are expected. However, the terrestrial portion of Riparian Reserves would continue to grow and differentiate at a slower rate when compared to the thinned portions of the Riparian Reserve in the Action Alternative. See ACS objective 8 regarding down wood recruitment.

Alternative 2: Thinning

Objective 1*: Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.*

In this alternative, thinning in the riparian reserves would likely contribute to improving the distribution, diversity and complexity of this landscape feature. Thinning in the riparian reserves would speed the development of late-successional characteristics, such as structural complexity, larger diameter conifer trees, and thereby a future source of instream large woody debris. No-harvest buffers would protect critical shade vegetation to the stream, reduce sediment transport to streams, and maintain a source of small and large woody debris input in the near term.

Stream Channel Enhancement Actions in Seeley and Shotgun Creeks would immediately increase in-stream large woody debris thereby directly increasing the amount of habitat complexity and cover (refuge) for fish and other aquatic-dependent species. Long-term benefits would include an increase in the productive capacity of the stream system for various aquatic and riparian-dependent species.

Objective 2: *Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include flood plains, wetlands, up slope Areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.*

Drainage network connections would be enhanced by installing properly sized and functioning culverts at road-stream crossings. Numerous fish passage barriers would be replaced with stream simulated type culverts thus increasing the amount of spawning and rearing habitat. The decommissioning of Road 15-1-7 and the removal and/or replacement of deteriorating or undersized trail-stream crossings in Section 7 would help restore the spatial and temporal connectivity for aquatic and riparian-dependent species. No new roads would be constructed in riparian reserves that could degrade connectivity for aquatic species. In general, riparian off-channel habitat, refugia, and floodplain habitat would all benefit from these improvements to general network connections.

Over time, the placement of in-stream large wood through aquatic habitat restoration in Seeley and Shotgun Creeks is expected to develop wood-created pools where the current is slower and water is deeper. These large wood structures would dissipate the streams energy, creating lateral connection with the floodplain and side channels and thus forming essential off-channel habitat aquatic species.

Objective 3: *Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.*

Replacing rusted or damaged stream crossing culverts would reduce the risk of fill failures. Permanent culverts would be sized to accommodate 100 year storm events, reducing the risk of failure in major flood events. Removing and/or replacing stream crossing culverts, and adding a temporary stream crossing in Section 24, would produce a temporary pulse of sediment (see ACS Objective 5) but would unlikely affect the physical integrity of the stream channels. There would be a long-term reduction in the risk of fill failures at those sites. Additional cross drains would also reduce the risk of chronic and catastrophic crossing failures, road related landslides, and direct sediment delivery to streams by directing water off the road to stable side slopes. The risk of failure would be eliminated at sites where existing culverts would be removed via road

decommissioning or restoration work conducted on Trail 18 in Section 7. Untreated stream buffers ranging between 75 to 200 feet on either side of stream channels would protect the integrity of stream banks and channels. Aquatic habitat restoration actions in Seeley and Shotgun Creeks would ultimately contribute to enhanced bank stability and an increase in the number of pools.

Objective 4: *Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.*

Stream crossing work would result in a short term increase in sedimentation, followed by continual long term decreases in sedimentation and increases in overall water quality. The addition of relief drainage and road surfacing aggregate would reduce road related sediment production in the long-term and have no direct impact on existing water quality.

Some local erosion is likely to occur from yarding operations; however, sediment transport to streams is expected to be minor because most sediment would be trapped within the no-harvest buffers before it reaches the stream. Aquatic habitat restoration actions in Seeley and Shotgun Creeks would contribute to maintaining and reducing stream temperatures in the long-term.

Water temperature would be maintained because the primary shade zone adjacent to all streams would be left intact and thinning in the secondary shade zone would allow for the retention of at least 50% of the canopy.

Overall, long-term sediment inputs and any corresponding short and long term effects to water temperature, nutrients, pH, conductivity, available dissolved oxygen and oxygen diffusion, and substrate composition should be improved by project actions.

All of the above benefits would also benefit aquatic dependent species such as fish and amphibians.

Objective 5: *Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.*

Short-term sediment increases from activities associated with removing and/or replacing stream crossing culverts, adding temporary equipment crossings, installing cross drains, road renovation, construction or decommissioning would have a minor effect on total sediment delivery to streams due to mitigation measures, quantities, and proximity to streams.

Long-term sediment reduction would correlate to the number of road miles upgraded and number of road or trail-stream crossings removed during the project. Upgrades and reduction of road stream crossings to the existing transportation system would result in less sediment production within the watershed.

Aquatic habitat restoration actions in Seeley and Shotgun Creeks are expected to cause accumulation of additional small and large wood, thereby creating small dams with an upstream area that allows for the deposition and storage of essential substrates.

Objective 6: *Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.*

These harvest areas are at elevations where predominately rain events occur. Commercial thinning operations and road or trail improvement work are not expected to impact the timing and magnitude of peak flows.

Objective 7: *Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.*

Protective buffers adjacent to all streams, springs, and wetlands would protect surface and subsurface hydrology. Improved road and trail drainage measures would minimize related runoff to nearby streams and wetlands so that floodplain inundation and groundwater levels would be protected. Over time, the placement of instream large wood is expected to create greater connection with the floodplain and off-channel habitat.

Objective 8: *Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distribution of coarse woody debris sufficient to sustain physical complexity and stability.*

No timber harvest would occur within 75 to 200 feet of the streams (depending on the stream). Therefore, streamside bank erosion, surface erosion and channel migration would not be impacted by harvesting activities. Road construction, renovation, and decommissioning, and removal of inadequate stream crossings on existing OHV trails would be designed and conducted to mitigate chronic sediment inputs into stream channels.

Unthinned portions of Riparian Reserves would continue to recruit small diameter coarse woody debris through density-induced mortality for several decades and the amount of large wood recruitment would be minimal until these areas begin to enter late-seral stage (at least 100 years).

In Thinned portions of Riparian Reserves, density-induced mortality of coarse woody debris recruitment over the next few decades would be greatly reduced compared to the No Action Alternative (because these trees would be removed for wood products). However, thinning would accelerate growth rates of dominant trees and thereby accelerate the time when these area would begin to provide large coarse woody debris recruitment by natural processes such as windthrow, breakage, and disease-induced mortality, etc. (as compared to the No Action Alternative).

Aquatic habitat restoration actions in Seeley and Shotgun Creeks would immediately increase in-stream large woody debris.

Objective 9: *Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.*

Terrestrial riparian habitat (Riparian Reserves): Within treated portions of Riparian Reserves, species obligated or associated with riparian terrestrial habitats would experience some short term effects due to soil compaction and changes in canopy closure and microhabitats. However, no negative long term effects to these treated areas are expected and they would generally recover in 5-15 years as canopy closures increase. Untreated terrestrial portions of Riparian Reserves would not experience the above short term negative effects but would also continue to grow and differentiate at a slower rate when compared to the thinned portions of the Riparian Reserve in the Action Alternative. See ACS objective 8 regarding down wood recruitment rates in thinned and unthinned portions of Riparian Reserves.

Aquatic habitat: Species such as aquatic invertebrates, aquatic salamanders, red legged frogs, western pond turtles, and harlequin ducks that are highly obligated to aquatic stream habitats would generally continue to experience some of the known and potential negative impacts to water quality as described under ACS objectives 1-7 that are due to natural conditions (e.g., low gradient streams) However, these species would benefit from all of the known/potential benefits described under ACS Objectives 1-8 due to amelioration of human caused influences such as roads and deteriorating culverts. Short and long term impacts would be due to increased sedimentation, decreased substrate composition, reduced available oxygen, and potential

changes in pH, nutrient composition, or water temperature (See ACS Ob. 4).

Harlequin ducks would experience benefits to their aquatic invertebrate prey (e.g., caddisflies) due to benefits to water quality.

Species such as western pond turtles, harlequin ducks, and red legged frogs would realize immediate and long term benefits due to aquatic habitat restoration activities in Seeley and Shotgun Creeks.

2.4 DESIGN FEATURES FOR THE ACTION ALTERNATIVE

Silviculture/Harvesting:

1. Apply seasonal restrictions, or suspension of all harvest and road activities that would occur within 1/4 mile of: known nesting peregrine falcons, bald eagles, spotted owls, great grey owls, accipiter hawks, and other owls, hawks, or raptors if they are located at any time during project activities.
2. For northern spotted owls: Consistent with consultation with the USFWS, apply Reasonable and Prudent Measures to minimize disturbance to spotted owl pairs and their progeny including:
    a. Harvest and Related Actions:
        i. For harvest areas in section 24 and section 19 west of 15-1-19 rd;
        ii. No harvest actions (including felling, yarding, decking) and road work (including construction and pre-harvest renovation) shall occur between March 1 and July 15 in all years the project is active.
        iii. Post-harvest road decommissioning, trail conversion/rehabilitation, and hauling along 16-1-5 and 15-1-19.1 roads, are not subject to this restriction.
3. Quarry Activities:
    a. To avoid disruption during the nesting season of northern spotted owls (and/or bald eagle nesting or midwinter roosting outside of the project area), blasting and/or rock crushing at quarries would not occur during various periods beginning November 15 or March 1 and ending July 15 or August 15. Specific restrictions periods vary by quarry. Restriction dates may be modified by the Area biologist based on specifics regarding the timing and duration of actions at a specific quarry as well as generic considerations noted below.
4. Any of the above restrictions may be waived or modified (reduced or extended) by the Area wildlife biologist based on relevant survey information regarding occupation or nesting activity. The BLM has no current plans to survey the area for spotted owls. If operators wish to survey the area and potentially modify these restrictions, arrangements must be made with the BLM by February 1st in a given year to assure the survey area and methods adequately address these restrictions.
5. Created snags exist within 250 feet of most streams in sections 19 and 24. If felled or inadvertently knocked down, these trees would be left on site for future down log habitat.
6. Log lengths would be limited to 40 feet where necessary to protect residual trees, snags and coarse woody debris during yarding.
7. Cutting and yarding restriction during sap flow is April l through June 15.
8. Directional falling and yarding would be utilized for the protection of retention trees, existing coarse woody debris, snags, and reserve areas.
9. Require one-end suspension of logs where appropriate to reduce the potential for erosion and run-off during yarding. Intermediate supports may be required to accomplish this objective.
10. Place cable corridors on the landscape to avoid felling large remnant trees.
11. Falling with a mechanized harvester system may be approved when:
    a. Capable of directionally falling trees
    b. Traveling on the cushion of slash created by the harvesting process
    c. Where slopes are less than 40%
    d. Soil moistures are low (typically July 1 – Oct 15).

12. All western red-cedar, incense cedar, Pacific yew, and hardwood trees would be retained, except where necessary to accommodate safety and logging systems.
13. Ground-based yarding operations would occur where designated.
14. The following requirements would be applied to ground base yarding areas:
    a. Require felling of trees to lead to the skid trails and maximize winching distances.
    b. Average distance between trails would be a minimum of 150 feet.
    c. Use existing skid trails, where possible, avoiding construction of skid trails in Riparian Reserves when feasible; placement of skid trails would be avoided within 75 feet of no-harvest stream and wetland buffers.
    d. Avoid placing skid trails on rocky soils.
    e. Preplan and designate skid trails to occupy less than 10% of the unit.
    f. Restrict yarding to seasonally dry periods when soil moisture content provides the most resistance to compaction. This is usually July 1st through October 15th
    g. Till all compacted skid trails, with an excavator to a depth of 18 inches, when soil moisture is appropriate. Minimize damage to residual tree roots adjacent to trails. To reduce erosion and restore soil productivity, pull slash, logging debris and brush from the adjacent forest floor onto the skid trails.
    h. If tillage cannot be accomplished the same operating season, all skid trails and temporary native surface roads would be left in an erosion resistant condition and blocked prior to the onset of wet weather. This would include construction of drainage dips, water bars, lead off ditches, and barriers (rootwads or brush piles) to prevent vehicle access until final blockage and/or tilling.
15. Forwarders may be approved:
    a. When slopes are less than 35%
    b. During seasonally dry periods
    c. Average distance between forwarder trails are 150 feet or greater.
16. Special yarding area (T.15S, R2W section 24), as shown on Exhibit A, shall be limited to one equipment crossing and one cable logging corridor across Stream 3. Sufficient number of logs shall be placed in the stream channel at both locations prior to yarding across streams to mitigate damage to streambanks and channel integrity. Upon completion of yarding activity, logs would be dispersed within the channel and riparian area. Disturbed areas shall be mulched and planted with native grass and planted with western redcedar. This harvest area would be restricted to a single season operation, and both stream crossings would be restored within the same season.

Aquatic Habitat Restoration (large wood placement):

17. All in-stream work would occur between August 15 and October 15 to accommodate: Oregon Department of Fish and Wildlife (ODFW) guidelines for in-water work period, and seasonal restrictions to avoid disturbance to nesting birds. The portion of the seasonal restrictions due solely to wildlife (July 15 – Aug 15) may be waived or reduced by the Area wildlife biologist based on relevant survey information regarding occupation or nesting activity of spotted owls and other raptors.
18. Tree felling or pulling on steep and/or unstable streambanks would be avoided.
19. A 25 foot no-treatment buffer would be maintained along the entire project area (Shotgun and Seeley Creek). A Spill Contamination Kit (SCK) would be on-site during any equipment operations, and would be equipped as specified under the Spill Prevention, Control, and Countermeasure Plan (SPCC).
20. Disturbed and exposed soils would be seeded and mulched with native materials.
21. Blackberry, scotch broom and other noxious weeds would be removed and disposed of prior to any equipment activity at project sites.

Noxious Weeds:

22. In order to prevent the spread of noxious weeds from other locations, the purchaser and or contractor shall be required to clean logging, road construction, and tilling equipment prior to entry on BLM lands. The purpose of the cleaning is to remove dirt and plant debris that may contain noxious weed seeds from the undercarriage, tracks and tire treads of the equipment.

Engineering:

23. Oregon Department of Fish and Wildlife (ODFW) in-water guidelines would apply to all in-stream activities. Work would be done between the dates of July 1-October 15. All road construction and reconstruction would occur during the dry season.

Road-Stream Crossing Replacements:

24. Perennial stream crossings would require the following:
    a. Stream flow would be routed around construction activity as much as possible (e.g. temporary flow diversion structure).
    b. Sediment containment structure placed across the channel below the work section (i.e. straw bales) as needed.
    c. Work site would be pumped free of standing water.
    d. Fish and other aquatic species would be removed from the project area and block nets placed above and below the work site.
    e. After installation, the disturbed section would be planted with native seed and mulched with native straw or wood mulch before the first rains.
    f. Fill or waste material would be located outside of the riparian area and positioned in a location that would avoid sediment discharged to streams or wetlands.

Road Decommissioning:

25. On perennial streams sediment containment structure would be placed across the channel below the work section.
26. Fill or waste material would be located outside of the riparian area and positioned in a location that would avoid direct or indirect sediment discharges to streams or wetlands.
27. Stream banks at removed road crossings would have the slope pulled back to an angle of natural repose.
28. Depending on site conditions, road drainage features (drain dips or waterbars) may be constructed on either side of restored stream channels to reduce road sediment delivery.
29. Restored stream banks would be vegetated with native plants, mulched with native straw or wood mulch, and planted with western red cedar where appropriate.
30. Where road subgrade conditions warrant, compacted road surface would be tilled with an excavator when soil moisture is appropriate (generally between July 1 and October 15). If tillage is not possible then waterbars and lead-off ditches would be constructed to reduce sedimentation to streams and wetlands. Logging debris and brush would be placed along roadbed to reduce erosion and block access.
31. Earthen barricades with brush and slash additions would be constructed to block vehicle access.
32. Remove existing stream crossings and cross drains and then remove culverts.

Recreation (For all designated trails impacted by logging systems):

33. Applicable Maintenance Standards and Monitoring described in EA-06-04 (Shotgun OHV Trail System Modifications) would be implemented on designated and newly designated trail segments.
34. Upon completion of harvest, purchaser would be required to restore and/or rehabilitate designated trails. This may require but is not limited to (see implementation file):
    a. Reworking the tread and restoring it back to previous trail condition as determined by Authorized Officers.
    b. Rehabilitation of knicks, turnpikes, rolling grade dips, and microtopography where previously located.
    c. Removing slash from the tread of designated OHV trails within harvest areas.
35. Restoration or rehabilitation work would commence once suitable soil moisture conditions exist.
36. The purchaser would be required to repair any damage that may occur as a result of harvest activities to OHV bridge in 15s 1w sec. 7, utilizing materials consistent with the original construction.

Road to Trail Conversion:

37. Road to Trail conversion would occur following harvest, and when soil moistures allow, in order to establish the trail and minimize unauthorized OHV entry into the newly harvested unit.
38. The construction of water diversion features along designated trail routes would be designed

to route surface water drainage away from streams or the ditchline of the trail.

39. Trail junctions would be improved to reduce sediment delivery to roads by grading the approaches and placing crushed rock aggregate on the trail for a distance of at least 100 feet.
40. If trail width is deemed excessive for designated use, one side of the trail would be tilled, covered with brush, and seeded or planted. If tillage is not possible then water diversion features and lead-off ditches would be constructed to reduce sedimentation to streams and wetlands. To reduce erosion, brush would be placed along the full length of the closed portion.
41. Boulders and/or earthen barricades with brush and slash additions would be constructed to block unauthorized vehicle access.
42. Remove rock from the outside half of the road prism and haul to a designated stockpile area.
43. Hardening materials (aggregate) would be left to provide a stable surface for trails.
44. Drift some of the remaining rock into the ditchline of the road to cover and protect the ditch and provide a continuous hardened surface for trail users, yet provide for future drainage of the trail prism. With an excavator, till outside part of the prism that once had rock on it and pull slash onto the tilled surface.

Fuels Treatment:

45. Landing piles along permanent roads and temporary rocked roads that would coincide with OHV trails would be covered and burned.
46. Slash, less than 9" in diameter within 25 feet of either side of permanent roads and temporary rocked roads coinciding with OHV trails within harvest areas would be piled, covered and burned.
47. Slash concentrations and piles along temporary roads would be scattered on top of dirt road surfaces to remove the fuel concentrations, slow erosion and deter OHV use. Resulting fuel bed should not be deep and continuous. Piles along temporary roads not scattered on the road surface through decommissioning process may be covered and burned.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

3.1 RECREATION

Affected Environment (Recreation):

The Shotgun Off Highway Vehicle (OHV) Trail System is comprised of 2 staging sites and 31 trail segments ranging in length from .20 – 1.72 miles. It is the only OHV trail network managed by the Eugene District BLM and is located within a checkerboard mix of public and private lands. Situated less than 20 miles northeast of Eugene/Springfield metropolitan area, the Shotgun OHV Trail System is the nearest publicly-managed OHV trail system. The next closest riding areas, all managed by the USDA Forest Service, are located between 70-90 miles from Eugene.

Thirty-three percent of the managed trails are located in part, or in their entirety, within the proposed project boundary. Also included within the proposed project boundary are 4 existing trails to be added to the managed trail system and described in the 2006 Shotgun Trails II Environmental Assessment (EA-06-04). These trails range in length from approximately .20 to 1.75 miles. All trails located within the proposed project boundary are connected via a network of paved and graveled roads.

The OHV System is open year round and attracts a mix of visitors seeking varying challenge levels and overall experiences. The Shotgun OHV System receives greatest visitation numbers from nearby rural residents and those of the Eugene/Springfield metropolitan area. Visitation of the Shotgun OHV Trail System is highest during weekends and holidays However because of short driving distances to population concentrations, visitation occurs during the weekdays and usually peaks between the late afternoon and dusk hours.

The OHV System includes 9 miles of trails open to Class I (quad) riders. Outdoor recreation trends documented in the *2003-2007 Oregon Statewide Comprehensive Outdoor Recreation Plan* (SCORP, January 2003) addressed changes in motorized activity participation across the State and in planning regions within the State. The Shotgun OHV System is part of SCORP Planning Region 3. Class I activity increased 71.3% in this region, while 4-wheel driving and motorcycling decreased 13.2% and 0.2 %, respectfully. Field observations of the Shotgun OHV Trail System are consistent with these findings.

Trail maintenance efforts have been, and continue to be, implemented with the purpose of providing a sustainable, motorized recreational opportunity within a forested setting.
The BLM began maintenance of OHV trails within the Shotgun drainage in June, 1996. Since that time, Oregon OHV grant monies have helped the BLM conduct routine annual trail maintenance. In particular, the designated trails in Section 19 have received a higher-than-average percentage of OHV grant monies and maintenance actions. Due to due to their close proximity to the Crooked Creek Staging Site, reduced level of technical difficulty, multi-class management, and relative close concentration to one another, these trails are ridden considerably more than other system trails and consequently sustain relatively greater environmental impacts. For many visitors to the Shotgun OHV Trail System, the OHV trails located in Section 19 constitute the majority, if not the entirety, of their trail riding experience during any given visit.

In addition to routine maintenance, the BLM encourages use of the managed OHV Trail System through the availability of support facilities, signing, coordination with other agency recreation providers, visitor contacts, provision of Shotgun OHV Trail System maps, etc. Nevertheless, use of unauthorized, user-created trails on public and private land is evident. Many of these trails were officially documented in 1995 when the BLM attempted to systematically inventory all trails located in the Shotgun drainage. Since then, some of those trails have been intentionally closed by BLM, obliterated as a consequence of land use activity (e.g., timber harvest, road construction, etc.), re-opened after closure attempt(s) were made, or simply remained on the landscape and continued to be used by riders. Further, new, user-created trails exist on the landscape where riders find opportunities to create them.

The BLM continues to foster partnerships with other public and private entities such as OHV clubs and private landowners. Such partnerships have resulted in additional funding needed to maintain the OHV trail system, provision of heavy equipment, crew labor and timely information feedback.

Environmental Consequences (Recreation):

Alternative 1: No Action

This alternative would retain the current maintenance regimen for the Shotgun OHV Trail System, as well as the current efforts to secure OHV grants to fund these actions. Additionally, efforts would continue to be employed to address resource impacts resulting from the creation and use of unauthorized OHV trails on public lands.

Visitation to the Shotgun OHV Trail System would continue as the managed riding opportunity, which is located close to population centers, would remain fully available.

Trail System modifications described in the 2006 Shotgun Trails II Environmental Assessment (EA-06-04) would continue as planned. It is likely that necessary state OHV grant funding would be secured to implement the proposed improvements.

Alternative 2: Thinning
Direct impacts to the Shotgun OHV Trail System as a result of proposed harvest activities include loss of trail tread via road construction and/or renovation and placement of logging corridors, a 33% temporary reduction of available trail mileage managed for Class III vehicles, a 68%

temporary reduction of available trail mileage managed for Class I vehicles, and the addition of one road-to-trail conversion approximately .3 miles in length. The temporal span during which direct impacts would be realized varies. It may take up to 3 years from the beginning of project activities before some damaged trail is restored. Additional impacts to the OHV trail system are as follows:

- Unauthorized trail construction and/or increased use of existing unauthorized trails on area public and private lands within the boundary of the Shotgun OHV Trail System may accelerate to compensate for trail linkages made temporarily unavailable due to project activites.

- Unauthorized OHV activity outside the boundary of the Shotgun OHV Trail System may amplify on neighboring public and private lands to compensate for displacement from the managed trail system.

- OHV trails that are part of the managed OHV System, but outside of the proposed project boundary, may receive greater use. Therefore, the increase in traffic on these trails may lead to a bigger trail maintenance workload needed to sustain those trails for continued use.

- Trail character may be changed due to project activities. For example, trail width may be widened, trail tread variations that occur over time may be lost, and there may be an increase in use of some trails due to the unavailability of other trails.

- Riders would engage in more trail contact with others as available trail opportunities would be concentrated as some trails are temporarily closed for project activities.

- OHV trails located east of Shotgun Creek Road that have historically been part of competitive OHV events would not be available for use a minimum of 3 years following project activities.

- Efforts to add 8 additional trail segments (EA-06-04) to the managed OHV System east of Shotgun Creek Road would be delayed up to 3 years from the time of the timber sale.

- OHV activity (non-street legal) may increase on forest roads (graveled and paved) due to the temporary closures of some designated trails within the project boundary. This coupled with the possible increase in non-OHV traffic due to proposed road improvements may raise the risk of collision between street legal and non-street legal vehicles.

- Attempts to operate Class I vehicles on Class III only trails may escalate resulting in modification of some Class III trail characteristics (e.g., tread width, tight corners) and increased potential for damage to those trails.

- The utility of the Crooked Creek Staging Site would be diminished because managed OHV trails closest to that facility would not be available for public use during the period of project activity. Consequently, informal staging sites may be created by visitors adjacent to system roads located closer to open OHV trails resulting in sites of congestion, and increased safety risk to visitors and others traveling the forest roads.

Cumulatively, implementation of OHV System improvements (e.g., added trails, new staging site location, etc) that would occur outside the proposed timber harvest boundary and described in the Shotgun Trails II Project (EA-06-04) would ameliorate some of the impacts tied to the proposed action. This is particularly true with regard to loss of trail mileage and the diminished utility of the Crooked Creek Staging Site. However, the extent to which this would occur is currently unknown as the timeline has not been developed, or funding source secured, to realize implementation of those actions beyond a trail design contract currently in effect for proposed new trail

construction/reconstruction west of Shotgun Creek Road.

3.2 VEGETATION

AFFECTED ENVIRONMENT (VEGETATION):

The forests in this project are 45-60 year old stands that regenerated naturally after clearcut harvest, and salvage logging following human caused fires. The stands consist primarily of Douglas-fir, with scattered western hemlock, western redcedar, bigleaf maple, Pacific yew, madrone, chinquapin and red alder. Stand understories consist of salal, bigleaf maple, vine maple, cascara buckthorn, and oceanspray. Current conifer stand density is approximately 125-160 trees per acre. The stands are currently in a stem exclusion phase, and the high overstory density is suppressing the growth of smaller trees and understory vegetation. Stand conditions in the outer portion of the Riparian Reserves are largely similar to the uplands. The immediate riparian zone of many of the streams in the project area are dominated by deciduous trees, mostly red alder, bigleaf maple and scattered cottonwood trees.

Proposed project areas are second growth Douglas-fir forest; most of the stands have been pre-commercial thinned. Past logging left many skids trails, showing evidence of extensive disturbance. The Plant Association is Douglas-fir/dwarf Oregon grape-salal. This association is prone to summer drought affecting conifer growth, seedling survival and under story vegetation. Many of the streams in the project area are low gradient and south/west facing. As a result, plant communities in many of these riparian areas are poorly developed and often similar to upland vegetation.

Surveys for vascular and non-vascular plant special status species were completed in the 2007 field season. No vascular special status species were found. Non-vascular surveys found only *Usnea longissma (beard lichen)*, a former S&M F species that require no mitigation, only documentation. Usnea longissima is arboreal lichen with a pan-boreal distribution, found in Western Europe, Russia, Asia and North America. It has a wide but patchy distribution and is not abundant where it does occur. A few strands of U. longissima were found in oaks bordering a small meadow. This meadow has thin soils requiring a buffer which would incidentally protect the Usnea site.

Special Status fungi may also occur in the project area; surveys were not conducted for fungi as per BLM Information Bulletin No. OR-2004-145. No currently known sites of Special Status fungi are found in the project area.

The Mohawk watershed has a number of weed species present, such as blackberries, scotch broom, false brome and meadow knapweed (section 19). The blackberries and scotch broom have been in this watershed for many years. The knapweed and false brome are new arrivals. Vehicles and roadsides are the main vector for the spread of weeds.

Meadow knapweed has been seen in this watershed since about 1990. The species is spread by seed and primarily occurs along the roadsides. This species can be controlled by manual methods.

Blackberries occur along the roadsides and in the stands. They are seen sporadically in riparian areas, especially in the low gradient streams.

ENVIRONMENTAL CONSEQUENCES (VEGETATION):

Alternative 1: No Action

Under the no action alternative, the project area would remain untreated until the stand reaches minimum age for final harvest. These stands would continue to experience mortality, suppression, and reduced growth from tree to tree competition. Anticipated mortality would not be captured. The stagnant forest conditions develop a dense closed canopy that reduces the understory vegetative growth and species diversity.

- Special status plant species

No special status plant species would be impacted by any of the alternative actions proposed. The no action alternative would allow for the continuation of a mid-seral forest condition.

Many of the special status fungi are late-seral species or occur in specialized habitats (coast dunes, high-elevation), this project is low risk in increasing the need to list any fungi species.

- Weeds

Weeds are and would continue to be on on-going problem in this watershed. Recreational activities such as OHVs and logging on private land would continue to act as vectors for the spread of noxious weeds. OHVs can spread existing weeds by driving through patches and spreading seed. They bring in new species from other areas in the dirt on the OHVs and vehicles used to transport them.

Alternative 2: Thinning treatment

The proposed thinning would reduce stand density, decreasing tree to tree competition and accelerating tree growth resulting in larger trees over time. The reduction in density would also increase species diversity by allowing increased sunlight to penetrate to the forest floor.

- Special status plant species

No special status plant species would be impacted by any of the alternative actions proposed. The no action alternative would allow for the continuation of a mid-seral forest condition. The proposed thinning treatment would not produce dramatic changes in microclimatic or the plant community.

Surveys are not practical for special status fungi and none were done. Many of the special status fungi are late-seral species or occur in specialized habitats (coast dunes, high-elevation), this project is low risk in increasing the need to list any fungi species.

- Weeds

As mentioned above, weeds are on on-going problem in this watershed. Risk of spread would be exacerbated by proposed project activities. However, the risk of new species introduced by logging would be mitigated by project design features such as washing logging equipment.

False brome, blackberry, scotch broom, and knapweeds already occur in the project area. Yarding trees and building roads disturbs the soil, creating open areas where non-native and noxious species can invade. Typically, over story left after thinning is enough to limit the spread of weeds. Not so, with false brome and blackberry, blackberry is present in canopy openings, false brome is scattered in the forest throughout sections 19 and 24. Treating all existing weeds prior to logging is not practical or possible due to the extent of the infestations, especially with out the use of herbicides. Multiple year treatment is needed to reduce weeds and may still not eradicate them. The small infestation of knapweed is scheduled for multiple treatments and may be eliminated. Scotch broom occurs mainly along the roads, treatment may possibly be able to eliminate this species.

3.3 KEY HABITATS

AFFECTED ENVIRONMENT (KEY HABITATS):

Table 2: Down Logs and Snag Data

DOWN LOGS: Avg. Linear Feet / Acre (lf/ac)						**SNAGS: Avg. / Ac. ≥ 15 Ft. Tall**				
	Diameter Range (inches at large end)						**Diameter Range** (dbh)			
Decay Class	**8_15**	**16_19**	**≥ 20**	***Avg Totals***		**Decay Class**	**8 to 15**	**16 to 19**	**≥ 20**	***Avg Totals***
1	35	7	0	**42**		**1**	0.1	0.0	0.0	**0.1**
2	51	0	0	**51**		**2**	2.5	0.0	0.1	**2.6**
3	39	3	132	**175**		**3**	1.1	0.1	0.0	**1.2**
4	77	48	98	**222**		**4**	0.0	0.0	0.0	**0.0**
5	102	42	65	**209**		**5**	0.0	0.0	0.0	**0.0**
Avg Totals	**303**	**99**	**295**	**697**		***Avg Totals***	**3.7**	**0.1**	**0.1**	**3.9**

Decay Classes: 1=hardest, 5=softest
Shaded cells are typical characteristics most preferred or required by most wildlife species.Down Logs 281 lf / ac…….....Snags 0.1 / ac

- *Down Logs*

Down logs are an essential habitat feature for many wildlife species and their prey, including several BLM Special Status Species that could occur in the project area. They often provide key breeding or refuge habitat and travel corridors. They are important to low mobility species with small home ranges (e.g., invertebrates, small mammals, and amphibians). Stand exam data and field review indicate a variety of diameters and decay classes of down logs that are evenly distributed in Riparian Reserves and unevenly distributed in matrix uplands in the project area; with the greatest amounts present in Riparian Reserves.

Proposed project areas contain an average of 697 lf./ac. of down logs greater than 8 inches in diameter. Amounts were similar in sections 7, 13, and 19 (646-931 lf/ac) with lower amounts in section 24 (343 lf/ac). Large, moderately decayed down logs are most important to wildlife and represent currently available wildlife habitat. Proposed harvest areas contain an average of 281 lf/ac of down logs ≥ 20 inch diameter in decay class 3-4. Amounts are similar and higher in sections 13 and 19 (328-442 lf/ac) and similar and lower in sections 7 & 34 (49-158 lf/ac).

Hard logs (especially small diameter) are less important to wildlife and mostly represent potential future wildlife habitat after they decay further (depending on diameter). Proposed harvest area contain an average of 93 lf/ac of decay class 1-2 down logs, with similar amounts seen in sections 7, 19, & 24 (93-147 lf) and none seen in section 13. No decay class 1-2 logs ≥ 20 inch diameter were found anywhere in the project area.

Small amounts of low decay class logs indicate the project area (except section 13) has recruited some of this habitat in the past few decades. However, none of these are greater than 20 inch diameter, and most are small 8-15 inch diameter.

- *Snags*

Snags are an essential habitat feature for snag dependent species and their prey. They are important to primary and secondary cavity nesting birds (songbirds, woodpeckers, owls) and roosting bats. Stand exam data show an average of roughly 4 snags per acre in the project area. However, 95% of these snags are in small diameters (8-15 inches) which decay relatively quickly

and are not useable for many key wildlife life history needs due to their small size and/or short lifespan. Large moderately decayed snags are most important to wildlife. Stand exam data show only 0.1 snag per acre (2% of all snags) at least 16 inches diameter in the project area.

Approximately 1050 snags were created in 1999-2000 within Riparian Reserves in sections 19, 24 and 30 (825 of these within the project area). Most of these were probably not detected during stand exams due to still being live trees or in very early stages of decay

- *Ponds*

Several small ponds of less than one acre exist within the project area. Depending on seasonal water depths, local microclimate, and solar exposure, some of these smaller wetlands, and Wetland 4 (greater than one acre) are suitable breeding and rearing areas for red legged frogs and/or northwestern salamanders. Wetland 4 also has potential to be rearing habitat for Western Pond Turtles that could be present in Shotgun Creek. Red-legged Frogs, Northwestern Salamanders, and Western Pond Turtles – and their habitats - are not expected to be impacted by project actions and would not be analyzed in this EA. All habitat features mentioned above would be adequately maintained or even improved by thinning and would not be analyzed in this EA.

ENVIRONMENTAL CONSEQUENCE (KEY HABITATS):

Alternative 1: No Action

- *Snags and Down Logs*

Compared to the action alternative, existing coarse woody debris habitat would not be physically degraded or removed and would not experience changes in its quality or function due to changes in surrounding microhabitats. Over the next few decades, unthinned areas would continue to recruit comparatively greater amounts of small-medium sized coarse wood mostly through density-induced mortality. However, these stands would not experience as quickly the eventual accelerated benefits of recruiting smaller amounts of larger coarse wood.

Alternative 2: Thinning Treatment

Project design features would physically retain most existing coarse woody debris in thinning areas. However, some snags and down logs could be damaged (particularly those in decay class 4-5), felled for safety reasons, or inadvertently knocked over during harvest. Depending on localized conditions within thinning areas, direct impacts to coarse wood and overall stand conditions due to changes in surrounding microclimates could adversely affect their function and quality as habitat until stand canopy conditions recover in 5-15 years.

Over the next few decades, thinned areas would continue to recruit mostly smaller sizes and amounts coarse wood primarily through density-induced mortality; moderately decayed large snags and down wood (decay class 2-3, greater than at least 16-20 inch diameter) that are required by many wildlife species would continue to decay and decline in amount and function due to natural process. Concurrently, these types of coarse wood habitat would not be replaced by natural stand processes for many more decades, thereby creating a shortage of snag and down log habitat for many decades. The lack of near future down wood recruitment would be due to 1) natural processes e.g., a natural reduction in wood recruitment between the end of stem exclusion in mid-seral stands and the beginning of greater recruitment in late-seral stands many decades layer; and 2) harvest that removes smaller trees most likely to be recruited by the stand for down logs over the next few decades.

Thinning would accelerate the rate that large snags and down wood (from large live trees) would be available as additional habitat (as compared to the No Action Alternative). Roughly 300 acres of untreated Riparian Reserves and Matrix lands, and eventual natural conversion of created snags to down logs (in 15-25 years), would both ameliorate some of the above effects.

3.4 SPECIAL STATUS SPECIES (NORTHERN SPOTTED OWL)

AFFECTED ENVIRONMENT (NORTHERN SPOTTED OWL):

- Nesting habitat

Suitable nesting habitat for spotted owls in the area is generally conifer forests greater than 80 years old with mature to late-seral characteristics such as a dense, multi-story canopy, large down logs and snags, and a somewhat open understory. Except for scattered individual trees and small patches less than one acre, no nesting habitat exists within harvest areas. Roughly 200 acres of nesting habitat exists adjacent to or near (within 0.25 mile) proposed harvest areas in sections 19 and 30.

- Dispersal and Forage habitat

Dispersal habitat in the area is generally 40-80 year old stands with at least 40% -60% canopy cover. These stands mostly provide for landscape and within-site movement and roosting plus varying amounts of forage opportunities. Forage habitat is defined as stands (dispersal or nesting) with some snags or down logs, relatively low brush, lower density, an overall more complex stand structure, and ample room to freely move through the mid-understory canopies. About 90% of harvest areas are dispersal habitat and 50% of these are also forage habitat. Based on the amount, quality, and location of forage habitat in the project area, none of this habitat is critical to providing support for reproduction at known or supposed nesting locations.

- Critical habitat

The project area is not in or near a designated Critical Habitat Unit.

- Surveys and Site Histories

Two sites are within the general project area (1.2 miles). The West Brush Creek site on non-federal land was located in 1990 and was surveyed at least three times annually except for 2007. A pair was present from 1990-1992 and 1994-1996; a single individual was present in 1993, 1999, and 2000; and there were no detections from 2001-2006. Nesting occurred in 1990 and 1995. Much of the habitat surrounding the site on private lands has been cut and it has been declared “abandoned” by Oregon Dept. of Forestry due to lack of owl detections since 2001. Stand characteristics suggest that the site is still suitable for pair occupation.

The Shotgun Creek site is comprised of several site centers located on BLM managed land. It has been surveyed at least three times annually every year since it was located in 1987. A pair was present 13 times, single individuals were present 4 times, and no owls were detected in three (non-consecutive) years. Nesting has occurred 7 times, most recently in 2000, 2001, and 2002. By all measures it is an active site, with ongoing reproduction activity. Most pair activity, including nesting, since 1999 has occurred at least 1.6 miles south of the project area. This may be due to less recreation activity in the southern part of its site center complex. No nest attempts or pair activity centers have occurred in proposed harvest areas. The “north” site center is closest to the project area and the least active since 1999.

- *Site specific Nest Core and Provincial Home Range Habitat*

The USFWS established Nest Core areas of a 0.5 mile radius circle (500 ac.) around site centers, and Provincial Home Ranges (PHRs) of a 1.2 mile radius circle (2895 ac.) around sites in the Cascade Ranges as consistent areas to measure the habitat condition of a site and consult on proposed actions relative to site specific affects to pair occupation and reproduction capability. Table 3 depicts the current and post-harvest conditions of Nest Core and PHR habitat for each action alternative.

When Nest Cores and/or PHRs contain less than 50% nesting habitat, they are considered “at risk” for successful reproduction. In some situations, younger forage habitat mitigates some of the effects of low amounts of nesting habitat sufficient to still allow resident pairs to successfully occupy a site and even reproduce. There are no established standards for further determining the likelihood of nesting or occupancy when Nest Core and/or PHR nesting habitats are less than 50%. When available, survey data, nesting history, and other site- specific considerations often

provide a more refined assessment of potential site occupation or reproduction.

Table 3: Existing & Post-Harvest Condition of NSO Site Nest Cores and PHRs								
	Nest Core Habitat				**Provincial Home Range Habitat**			
	Acres (Ac. as % of 500 ac. Nest Core)			**Acres Degraded by Thinning (a)**	**Acres (Ac. as % of 2895 ac. PHR)**			**Acres Degraded by Thinning (a)**
Shotgun Creek Site *(north site center)*	**Dispersal &/or Forage**	**Nesting**	**Total Habitat**		**Dispersal &/or Forage**	**Nesting**	**Total Habitat**	
Alt. 1 - No Action (existing condition)	**275**	**136**	**410**	none	**1306**	**496**	**1802**	none
	(55%)	(27%)	(82%)		(45%)	(17%)	(62%)	
Alt. 2 - Action (post-harvest condition)	**255**	**136**	**391**	**20**	**951**	**496**	**1447**	**355**
	(51%)	(27%)	(78%)		(33%)	(17%)	(50%)	
West Brush Creek Site								
Alt. 1 - No Action (existing condition)	**42**	**none**	**42**	none	**585**	**82**	**667**	none
	(8%)	(0%)	(8%)		(20%)	(3%)	(23%)	
Alt. 2 - Action (post-harvest condition)	**42**	**none**	**42**	none	**545**	**82**	**627**	**40**
	(8%)	(0%)	(8%)		(19%)	(3%)	(21%)	
(a) Only dispersal/forage acres would be degraded by thinning. All values are for federal lands only.								

ENVIRONMENTAL CONSEQUENCES (NORTHERN SPOTTED OWL):

Alternative 1: No Action

There would be no degradation of northern spotted owl dispersal and/or forage habitat, nor any chance of precluding or disrupting nesting behavior under the No Action Alternative. However, attainment of suitable nesting characteristics in thinned Matrix and Riparian Reserve areas would occur at a slower rate compared to the action alternative.

Alternative 2: Thinning Treatment

- Direct and Short Term Effects (All Habitats):

No nesting habitat would be removed. The few scattered suitable nest trees present within harvest areas probably would not be usable for nesting until surrounding canopy conditions recover in 10-15 years. Seasonal operating restrictions in section 24 and part of section 19 during the critical nesting period of March 1 to July 15 would greatly reduce the chance of precluding or adversely affecting nesting due to noise disturbance if it did occur in the area (in the Shotgun Creek site or other nearby habitat).

Roughly 760 acres (560 Matrix, 200 Riparian Reserve) of dispersal/foraging habitat would be degraded to lower quality dispersal habitat with minimal forage characteristics due to removal of some codominant and intermediate trees, reduction in canopy cover from 80-95% to 60-70%, and a potential increase in brush. Depending on the amount of brush, stand conditions would minimally begin to recover in 5-15 years as canopy closure increases. Within the project area, roughly 290 acres (90 Matrix, 200 Riparian Reserves) would not be thinned and would continue to be available as dispersal/forage habitat.

- Indirect and Long Term Effects (All Habitats):

Thinning in Matrix and Riparian Reserves would improve flying room, and accelerate tree growth

and therefore the subsequent rates these stands become higher quality foraging habitat and nesting habitat compared to the No Action Alternative. However, the future availability of Matrix uplands for nesting is uncertain since these lands are subject to regeneration harvest at 80 years of age (within two decades). ESA consultation determined that project actions may affect, but are not likely to adversely affect spotted owl habitat in general.

- *Site-Specific Nest Core and Provincial Home Range (PHR) Habitat*

West Brush Creek Site:
This site has been abandoned by Oregon Department of Forestry (ODF) due to recent activity but still may have sufficient habitat for future pair occupation. Thinning would degrade no acres in the Nest Core and only 40 acres (6% of existing) within the outermost portion of the PHR (over one mile from the site center). Any effects to the site's potential for pair occupation or nesting due to harvest would be negligible because only a small amount of habitat would be temporarily degraded over one mile from it's site center. Additionally, no nesting habitat would be modified; and none would be disturbed by project actions at any time during the nesting season. Overall, ESA consultation determined, project actions may affect, but are not likely to adversely affect the West Brush Creek site when the type, amount, location, and duration of any potential habitat modification or nesting disturbance effects were considered.

Shotgun Creek Site: All nest activity and most pair activity since 1999 has occurred about 1.6 miles south of the southern-most proposed harvest area (in the "south site centers"); thereby reducing the likelihood of a nest attempt occurring at the north site center near the project area. However, based on habitat, the north site center is still suitable for pair occupation and nesting, and could again be used by the resident Shotgun Creek pair or a separate new pair.

Thinning would degrade 20 acres (4 % of existing) of dispersal/forage habitat within the outer portion of the Nest Core. Effects to Nest Core area habitat would be temporary and minimal because only 20 acres of dispersal/forage habitat are being thinned near its perimeter, and additional untreated habitat of similar or greater quality, just outside of the nest core in Sections 19 and 30, would be available while treated stands recover. Any effects due to treatment are not expected to negatively impact pair occupation or nesting activity within the nest core in the short or long term.

Thinning would degrade about 355 acres (12% of existing) of dispersal/forage habitat within the PHR. Until thinned stands experience minimal recovery in 5-15 years, the capability of the Shotgun creek north activity to provide for pair occupation and nesting would be reduced. However, additional greater amounts of similar untreated habitat would continue to be available in sections 31 and 36 while the habitat in harvest areas recovers. These additional habitats are still within an accessible distance to any nesting pair at the north site center and are much closer and accessible to where pair and nesting activity has actually occurred since 1999 (south site centers). Seasonal operating restrictions from March 1 to July 15 would greatly reduce the chance of precluding or adversely affecting nesting due to noise disturbance if it did occur.

Effects due to harvest may affect, but are not likely to adversely affect pair occupation or reproduction capability at the north site center due to effects to the Nest Core or PHR.

Overall, ESA consultation determined, project actions may affect, but are not likely to adversely affect the Shotgun Creek site (all site centers and the north site center in particular) when the type, amount, location, and duration of any potential habitat modification or nesting disturbance effects were considered.

3.5 OTHER SPECIAL STATUS SPECIES (BLM Sensitive or Assessment)

AFFECTED ENVIRONMENT (OTHER SPECIAL STATUS SPECIES):

Special Status Sensitive Species are analyzed because their habitats are present and they could reasonably be expected to occur in the project. Pre-project surveys are not required for these species and none were conducted. Existing BLM data show no known locations of these species in or near the project area.

- Northern Goshawk (Bureau Sensitive):

This bird prefers to nest in mature to late seral age stands with late seral characteristics such as large trees, dense canopies, down logs and snags, a relatively open understory, a low brush layer, and ample flying room. Most nests located on the Eugene District have been in lower quality mid-seral stands as young as 50 years old that have only some of these characteristics; however, the local significance of such stands, including their likelihood of facilitating successful reproduction, is unknown. Goshawks forage in nesting habitat as well as younger stands with ample flying room and low brush.

Roughly 50 % of proposed harvest units (est. 400 ac.) are low quality suitable nesting habitat. Although characterization of nesting habitat in younger stands in the watershed is difficult and uncertain, this habitat is considered to be low quality due to small tree size, relatively simple tree architecture, and dense-moderately dense spacing, as well as high brush in many areas. Roughly 200 acres of higher quality nesting habitat exist in mature or old growth stands adjacent to or near (within 0.25 mile) proposed harvest areas in sections 19 and 30. The likelihood of nesting activity in parts of all habitats in the area is diminished by routine human noise and line-of-sight disturbance from recreation activities.

- Fringed Myotis (Bureau Sensitive):

This bat roosts in a variety of substrates in coniferous forests, including rock crevices, snags, tall stumps, and the bark or crevices of large live trees. Roosting behavior occurs in different substrates at different times of year and consists of maternity areas, winter hibernacula, and daily rest. Overall the project area contains a very low quality and amount of potential roosting habitat. Within proposed harvest areas there are no suitable rock crevice habitats and the small amount of potential habitat is limited to larger stumps, occasional large or remnant live trees, and very low amount of snags (0.1/acre at least 20 inch diameter). Most of the human created snags are not currently habitat for any bat species. They should provide lower quality habitat for some types of bat roosting within the next 10-15 years depending on their size, slope position, and rate of decay (their quality is limited by generally small 16-24 inch diameters).

- Harlequin Duck (Bureau Sensitive):

Of the roughly 16 miles of streams in the project area, 3 miles of terrestrial nesting habitat exists along suitable aquatic portions of Seeley and Shotgun Creeks based on key indicators such as: 3rd to 5th order size, low to moderate gradients with some down logs, boulders, and forested near-stream nesting habitat. However, routine human recreation activity disturbance in the area probably reduces the likelihood that some of these streams would successfully be used for nesting. Harlequins nest up to 150' away from a stream, although average distances are probably much less. Although individuals show strong fidelity to nesting locations and some acclimation to noise is possible, individuals can nonetheless be very intolerant of noise or visual disturbance to nesting from April-mid July.

- Oregon Slender Salamander (Bureau Sensitive):

Key habitat indicators for this species are moist, cool, high canopy cover, coniferous or mixed conifer/hardwood forests with large well decayed ($\geq$ 20 inch diameter, decay class 3-5) down logs and stumps, bark piles at the base of snags, and uncompacted soil.
Suitable coarse wood habitat exists in low to moderate amounts throughout much of the project area, but is present in greatest quality and quantity for this species in much of the Riparian

Reserves and in roughly half of the Matrix uplands that are also on north aspect slopes or otherwise have moist microhabitat conditions. This salamander has a small home range, very low mobility, and is generally intolerant of changes to habitat.

ENVIRONMENTAL CONSEQUENCE (<u>Other special status species):</u>

Alternative 1: No Action

- Other Special Status Species (Non-T&E):

No short term adverse affects to individuals, reproduction, or their habitats would occur. However, benefits from accelerated rates of tree growth and subsequent recruitment of larger down wood and snags would occur at a slower rate compared to the action alternatives. However, stands not previously thinned would continue to recruit greater amounts of smaller diameter coarse wood due to density induced mortality (i.e., stem exclusion) because these trees would not be removed for wood products. Aquatic species such as harlequin ducks, western pond turtles, red-legged frogs, and other salamanders and invertebrates, would not benefit from stream channel enhancement actions in Seeley and Shotgun Creeks.

Alternative 2: Thinning Treatment

- Northern Goshawk:

Roughly 65 % of the existing low quality nesting habitat for goshawks (est. 300 acres) would be degraded though the reduction of canopy closures. Most retained dominant and codominant trees would remain structurally suitable for nesting and could be used for nesting as soon as surrounding stand conditions sufficiently recover in 5-20 years post harvest (depending on individual tree characteristics and the amount of brush and rate of stand canopy closure increase). Thinning would improve the short and long term quality of nesting and foraging habitat by removing densely stocked understory trees and accelerating growth of dominant and codominant trees. Project actions have the potential to preclude or disrupt nesting behavior) in or near harvest areas where harvest occurs during the nesting season (April to August). Seasonal operating restrictions for spotted owls (March 15 to July 15) would reduce the potential for adverse effects to goshawk nesting in parts of sections 19, 24, 25, and 30.

- Fringed Myotis:

In the short term, retention of many of the very few existing snags and dominant live trees would physically reserve project area habitat for fringed myotis in areas subject to thinning harvest. However, direct detrimental impacts to the quality of roosting habitats could occur due to changes in surrounding microclimate condition (e.g., undesirably cooler, warmer, or less stable temperatures inside roosts). Some impacts to snags and larger live trees may be beneficial (e.g., those that become favorably warmer due to increased solar exposure). Many of these impacts to habitat would again be reduced, or changed in 5-15 years as stand canopy closure increases. Project actions could disturb winter hibernacula or maternity behavior from September through May and daily roosting from spring through fall. This could cause individuals to be displaced from the area. Nearby forage habitat in standing ponds, and streams would not be adversely affected by project actions. Thinning would accelerate the rate that large live trees or subsequent large snags would be available as habitat (as compared to the No Action Alternative).

- Harlequin Duck:

The three miles of stream habitat would have at least a 150 foot no-harvest buffer which would result in no effect to aquatic or terrestrial habitat where harlequins would likely nest. Noise or line-of-sight disturbance to nesting (March-July) is possible but unlikely due to the low amount of habitat in the project area, no-harvest buffer widths, and seasonal restrictions for spotted owl along habitat in Shotgun Creek. Thinning in Riparian Reserves would accelerate the rate large live trees would be available as large down wood in streams or nearby terrestrial habitats (as compared to the No Action Alternative). The proposed Stream Channel Enhancement Actions in Seeley and Shotgun would provide immediate short term and long term benefits to the species due to improvement in cover, logs for loafing, and general improvement to the aquatic and

physical components seen in a natural stream system.

- Oregon Slender Salamander:

In the short term, retention of existing downed logs and snags would reserve most habitats for the species. However, depending on the amount of soil compaction, physical damage to wood by logging, and changes to local moisture conditions, the quality and function of some down log habitat would be eliminated or degraded for at least 5-15 years until stand canopy conditions recover. Individuals could be displaced and local numbers reduced, during the first 1-20 years after harvest. Recolonization of thinned areas from nearby untreated stands is possible but could take several years/decades. Untreated uplands and Riparian Reserves should continue to provide untreated habitat after harvest.

The project area currently contains low to moderate amounts of large, moderately decayed down wood that is currently habitat for the species. However, this habitat would continue to decay and become less functional over the next few decades, and probably would not be replaced by natural stand processes for many more decades; thereby creating a shortage of down log habitat for many decades (See Key Habitats Section). Roughly 300 acres of untreated Riparian Reserves and Matrix lands and eventual natural conversion of created snags to down logs (in 15-25 years) should ameliorate some of the above effects.

3.6 HYDROLOGY AND FISHERIES

AFFECTED ENVIRONMENT (*Hydrology and Fisheries):*

- Hydrology:

The project area is in the Mohawk River 5th Field Watershed a few miles north of Marcola, Oregon. Precipitation in this region is between 45 to 60 inches annually and the majority occurs in the form of rainfall between October and April. All acres proposed for harvest are within the rain dominated precipitation zone.

BLM monitored summer water temperatures on the larger streams adjacent to the project area (Crooked Creek, Shotgun Creek, and Seeley Creek) between the years 2000 to 2002. This data was utilized by the Oregon Department of Environmental Quality as the basis for listing Seeley Creek and Shotgun Creek on the 2004 303(d) Water Quality Limited List for temperature and core cold water habitat (16°C). These streams flow into the Mohawk River, also listed for the same parameters as well as temperature for salmon/steelhead spawning (13°C) and elevated iron levels. The Mohawk River flows into the McKenzie River which is listed for elevated temperatures. During August 2007, field work was conducted along Seeley Creek in Section 19 to measure effective shade. Ten measurements were taken along this section of the creek between it's confluence with Shotgun Creek to the north boundary line of Section 19. Effective shade for that reach was estimated at 87 percent.

About 70 tributary streams exist within or adjacent to the project area. Most of these are perennial and either first or second order streams. A few of those streams are not connected by surface flow to the rest of the system. Several wetlands, ponds, and springs have also been identified. Both ponds (Sections 7 and 15) appear to have been man-made.

Roads and skid roads from past ground-based harvesting have impacted the stream network in several places throughout the project area. Impacts from past logging activities range from old log culvert stream crossings to skid roads constructed on top of stream channels. Erosion and sedimentation from these old roads has delivered fine sediment to the channels, undercut stream banks, and in some cases buried channels with road related debris. A few of these old roads now carry surface runoff during the winter storm events and as such, have extended the natural stream system.

Old roads have also been utilized as recreation trails. Some trails are on a designated system

and subject to maintenance as funding and time permits. Maintenance includes (but is not limited to) grading and adding rock to harden the surface, with priority taken near stream crossings and road/trail junctions. Other trails are not designated for approved use but are kept open by the recreational vehicle users. Those trails that were identified tend to be eroded, and are chronic sources of sediment to nearby streams, or the ditchline of roads. Roadside ditches have potential to deliver sediment to nearby streams, particularly on roads that have not been upgraded with additional relief culverts. Decommissioning these trails is an on-going priority for improving water quality and aquatic and riparian habitat features within the watershed.

Certain stream crossings on existing roads in this project area are not functioning properly due to rust, mechanical damage, being undersized, or otherwise having a risk of failure. Refer to the Fisheries section for a description of the existing sediment routing on haul routes.

- Stream-side slope stability:

In Section 7, both banks of Seeley Creek show signs of instability with old landslide scars and steep banks. These small bank failures appeared to be fairly recent, within the last 10 years or so. Many may have occurred during the notable storm events of 1996 and early 1997.

- *Fisheries:*

Shotgun Creek is a 4th order tributary in the Mohawk River 5th Field Watershed. Several large tributaries flow into mainstem Shotgun Creek, one being Seeley Creek where most of the project area is located.

Shotgun Creek sub-watershed has a drainage area of approximately 17 square miles. The main channel extends approximately 7 miles and has several major tributaries within the system (Seeley, Owl, and Crooked Creek). The mainstem is constrained by hillslopes and/or terraces in a predominately broad valley. Scour pools, riffles, and rapids are the dominate habitat types. Substrate is dominated by gravels (50%). Quantities of instream large wood (key pieces) are low throughout the system (OFDW 2003). The limiting factor for fish populations in Shotgun Creek is the lack of complex pool habitat and deep pools greater than 3 feet in depth.

Seeley Creek is a 3rd order tributary of Shotgun Creek. It has a drainage area of approximately 2 square miles and extends nearly 2.5 miles. It is predominately constrained by moderate to steep hillsopes. Riffles, scour pools, and rapids are the dominate habitat types. Sand/silt, gravel, organic fines, and cobble are the primary substrate types. Quantities of key pieces of large wood are moderate (ODFW 2005). The limiting factors for fish populations in this drainage is the lack of complex and deep pool habitat, and excessive amount of silt/sand in the system which is directly affecting spawning and rearing habitat.

Fish species found in Shotgun and Seeley Creek include: native cutthroat trout (most abundant and widely distributed salmonid species in the sub-watershed), rainbow trout, and potentially steelhead (introduced) and spring chinook (ESA listed). Non-salmonid species such as sculpin, dace, redside shiners, lamprey, and other species may inhabit the lower and mid-portions of these drainages. Besides mainstem Shotgun and Seeley Creek, numerous stream reaches within the project area were determined to be fish bearing.

Several road/stream crossings within the project area and along the log haul route have been identified as partial or total fish passage barriers (Table 4). It is estimated that 5,000 feet of suitable habitat is not accessible to migrating fish due to these culvert barriers.

Table 4: Fish Passage Barrier Culverts

Road Number/ Unit Number/Haul Route	Stream Number	Inaccessible Habitat (Feet)
16-1-5 (Unit 24)	3, 5	1,500
16-1-5 (Unit 13)	7, 10	2,500
16-1-5 (Haul route)	NA	1,000
	Total	5,000

- Endangered Species Act (ESA) Listed Fish Species:

Spring Chinook (ESA Threatened) are native to the Mohawk River Watershed, and are the only ESA listed fish species in the watershed. However, limited information is available as to their historical distribution within the watershed, but it is suspected that they spawned and reared in the mainstem Mohawk and a large portion of mainstem Mill Creek. Due to past habitat degradation (splash dams) and other factors, this spring-run Chinook population is reported to have become extinct by 1910 (Parkhurst et al. 1950; Wouldis et al. 1950). Currently, no sustainable population is known to exist in the Mohawk Watershed. In an effort to re-establish the population, ODFW outplants adult spring chinook and juveniles from the McKenzie Hatchery into the upper portions of the Mohawk River. Spawning surveys conducted in November 2005 found fish spawning in the upper mainstem of the Mohawk just above and below River Mile 21. Juvenile spring Chinook may rear in the lower portions of larger tributaries such as Shotgun and Seeley Creek for up to a year before out-migrating to the ocean.

- Log Haul Route (Road-Related Sediment Delivery Analysis):

Log haul would occur over gravel and paved road surface controlled by BLM and private industry. The majority of log haul in Section 7 would occur on Road 15-1-7.1 (gravel surface) and 15-1-19.1 (paved surface). Both road systems have a well maintained road surface and adequate relief drainage. A few stream crossing culverts have been identified for potential replacement. These road segments pose limited concern for water quality and fish bearing habitat. Log haul from the southeast portion of Section 7 would occur over the 15-1-18. This road has minimal rock surfacing, inadequate relief drainage, and undersized and failing culverts. This is a stream adjacent road that has very high potential for sediment delivery and mass wasting.

In Section 13, log haul would occur over an OHV Trail to Road Conversion (15-2-13.1) and Road 15-1-19.1 (paved). There are no stream crossings on the -13.1 road, and therefore no sediment delivery issues.

The haul route for Section 24 (and the northwest portion of Section 19) would occur on the proposed 24A spur and road 16-1-5 (paved). The -24A spur links to Road 15-1-18.1 in the northwest corner of Section 19 and surface flow of Stream 15 has been buried by a stream crossing constructed at that site many years ago. At the proposed junction of the -24A Spur and Shotgun Creek road, there is only limited hydrologic connection.

The remaining log haul for Section 19 would occur on 15-1-28 and renovated road 15-1-30. The -28 road is in need of surface and ditchline reconstruction, aggregate, and stream and relief culvert replacements. Due to failing log culverts and inadequate relief drainage, this road segment poses a moderate to high risk of mass wasting and sediment delivery to project area streams and downstream fish habitat. The -30 road is currently closed to public and commercial use. The road is predominately an “upland” road with some through-cut construction. There are no stream crossings but it has hydrologic connection to a stream near the lower end of the road due to proximity and connection to the ditchline of Road 15-1-19.1. Portions of this road were impacted and degraded by undesignated OHV use over the years, causing severe rutting and gulling because of lack of aggregate and maintenance. Consequently, it was closed several years ago to avoid direct sediment delivery to Stream 37 or further erosion by undesignated OHV use. Stream 37 is a small perennial stream that has a moderate amount of subsurface flow, potentially altered from past harvest activities. It flows into a large floodplain area of Shotgun Creek.

- Currently Identified OHV Trail Route Restoration Projects (Trail-Related Sediment Delivery Analysis):

As mentioned, numerous undesignated trail-stream crossings were identified in Sections 7, 13 and 24 as being a moderate to high risk to water quality, aquatic life, and riparian habitat functions. Multiple stream crossings are causing erosion and sedimentation delivery at the site level and to downstream fish habitat.

In Section 7, there is a stream that has a deteriorating log culvert on an old road that has been

converted to an OHV trail. This site is progressively eroding and is a chronic source of sedimentation to Seeley Creek.

Other trail route restoration work would be conducted in compliance with the Shotgun Monitoring and Maintenance Plan (EA-06-04) as funding permits.

ENVIRONMENTAL CONSEQUENCES (HYDROLOGY AND FISHERIES):

Alternative 1: No Action

- Peak Flow:

In the short term, peak flows would be maintained on BLM lands in the watershed since no harvest or road work would occur. In the long term, the timing and magnitude of stream flows could be impacted because improperly draining roads or trails may directly route surface runoff to the stream system. The extent of such an impact is unknown.

- Stream Temperature:

No short term changes to stream temperature would be expected, since existing shade in the riparian areas would remain unaltered from current conditions. In the long term, riparian vegetation would continue to grow, providing increased shade to protect stream temperatures.

- Sedimentation:

Turbidity in streams adjacent to the project area could increase because road and trail repairs would not take place. Water quality and impacts to fish bearing habitat would continue to be impacted by road and trail related sedimentation under this alternative. Deteriorating undersized stream crossing culverts could plug, blocking stream flow and the resulting road failure(s) could cause channel scouring downslope from the road. Road related sedimentation could escalate for three reasons: 1) no stream crossing culverts (log or corrugated metal) would be replaced, 2) lead-off ditches or relief culverts would not be properly maintained (or new ones installed), and 3) no additional aggregate would be placed on the local access roads or haul routes. As a result, direct sediment delivery to streams via the ditch line from those roads would continue. Because of the lack of aggregate, any future road maintenance would directly accelerate sediment delivery to streams.

Trail related sedimentation (or mass wasting) could escalate because failing stream crossings in all units would not be replaced, and the undesignated trails that have been identified with stream impacts would not be decommissioned. Conditions on these unauthorized trails could worsen due to lack of any maintenance or closure, resulting in even more sediment delivery to the nearby streams. The opportunity to decommission Road 15-1-7 would be postponed until a later date, and a stream crossing and the old road prism could fail under extreme storm conditions due to lack of appropriate surface water drainage.

- Riparian and Instream Large Woody Debris:

This alternative would have no immediate affect on the level or recruitment of instream large woody debris. The recruitment of large wood to the stream channel would continue by natural processes. However, due to the uniform nature of the riparian stand, the development of large trees and subsequent large woody recruitment to the stream channel would occur at a much slower rate than Alternative 2.

The Aquatic Habitat Restoration proposal would not occur under this alternative. Current levels of in-stream large wood in Shotgun and Seeley Creek would remain at low to moderate levels until modified by natural processes. The lack of habitat complexity, rearing habitat and spawning grounds would continue to be limiting factors for the production of salmonids.

- Fish Passage Barriers:

Under this alternative five road-stream crossings would continue to be partial to total passage barriers to all life stages of fish and other aquatic-dependent species. Nearly 5,000 feet of suitable habitat would continue to be partially or completely inaccessible to migrating fish. Due to

the culverts being undersized, high and moderate flows would continue to erode downstream channels, thus worsening passage conditions at these sites.

- Cumulative Effects:

Cumulative effects from a variety of sources could increase fine sediment into the stream channels and negatively effect downstream fish habitat. Road decommissioning, road maintenance, and the closure of undesignated OHV trails would either not take place, or be postponed until a later date. Water quality degradation and impacts to fish bearing habitat may increase as several road and/or undesignated OHV trail-stream crossings further deteriorate due to the lack of maintenance. Without additional aggregate surfacing and relief drainage, future road conditions could accelerate sediment delivery and surface runoff to streams. Undesignated OHV trails would continue to erode, providing direct delivery of sediment to adjacent streams. The unauthorized trail system could also potentially expand because access would not be restricted.

The effective shade would be maintained along streams on BLM land, but timber harvesting on private lands may be conducted using different standards, possibly reducing the effective shade zone in those area and increasing solar radiation to streams flowing onto BLM lands. Stream channel complexity would improve at a slower rate, therefore the quality of fish habitat, overall biotic production of the system, and the reduction of water temperature due to deeper pools and reduced velocities would take longer to achieve. No improvement to stream temperatures would be expected either, since the addition of large wood to streams would not occur. As a result, deeper pools and time-accelerated channel complexity would be forgone.

This alternative is expected to maintain the current conditions within the Shotgun Creek watershed. The potential to improve aquatic habitat conditions through road decommissioning, undesignated OHV trail closure, replacement of high risk road-stream crossings, road drainage improvements, and increased channel complexity through placement of instream large wood would not occur.

Alternative 2: Proposed Action

- Peak Flow:

Canopy removal could result in higher soil moisture levels due to the reduction of evapotranspiration until the canopy closes in 4 to 5 years. Commercial thinning and road work are not expected to measurably impact current peak flows because most of the harvest area is in the rain dominated zone, protective no-harvest buffers would be retained adjacent to all streams, and road improvements would reduce runoff to streams. It is unknown to what extent undesignated and unmapped OHV trails may impact the timing and magnitude of stream flows.

- Stream Temperature:

Treatment in the Riparian Reserve is not expected to impact water temperature, thereby protecting habitat conditions for aquatic and riparian-dependent species. No-harvest buffers would be left intact and would protect existing effective shade. These buffers range from 25 feet for seeps and springs, 75 feet for small 1st and 2nd order non fish-bearing streams, and 100-150 feet for fish bearing or larger stream channels. The primary shade zone along all streams would be maintained by these no-harvest buffers. Thinning within the secondary shade zone would maintain at least fifty percent canopy closure. Although thinning in the secondary shade zone may slightly increase direct solar radiation penetrating into the primary shade zone, the primary shade zone would provide sufficient shading to maintain stream temperatures. The equipment road and cable corridor across a stream in Section 24 would be minimal in size, and are not expected to impact stream temperature. Stream crossing culvert replacements may result in the loss of some overstory vegetation, but not to the level of affecting stream temperature. The addition of large wood to streams would eventually result in increased pool habitat (backwater and scour pools) and the depth of pools, thus increasing thermal refuges for salmonids during summer low flows.

- Sedimentation:

Treated riparian reserves would have no-harvest buffers widths of 75 to 150 feet. These buffers

would provide protection to over-steepened and/or unstable streambanks and headwalls, and filter out potential sediment transported from cable and ground-based yarding processes; thus, minimizing sediment-related impacts to nearby streams and fish bearing habitat. Cable yarding landings are generally located on ridgetop topography and outside of the stream influence zone, providing added protection to aquatic and riparian habitat features. To minimize adverse effects to stream habitat, site specific mitigation measures would be implemented for landings located in Riparian Reserves (e.g. relief culvert installation to reduce direct sediment delivery). The implementation of project design features would minimize most potential sediment related effects on water quality and aquatic habitat from harvest activities.

Short-term increases in sediment could be caused by removing and/or replacing existing culverts, adding a temporary equipment stream crossing, utilizing one logging corridor across a stream, and renovating or constructing roads. The proposed temporary road construction is not expected to result in detectable road related sedimentation nor impacts to fish-bearing habitat due to predominately ridgetop locations or in areas with little or no direct connection to the stream network. The main sediment impact from road construction would be the adding and removing of stream crossings culverts. Implementation of project design features and on-site design of the crossing sites would minimize most potential impacts to streams and fish bearing habitat.

Long-term decreases in sediment delivery would result from upgrading permanent roads by replacing culverts, adding cross drains, adding aggregate, and also decommissioning one road identified for closure. Typically, fine sediments disturbed by construction activities are flushed out by seasonal fall rains, and some erosion occurs until disturbed soils at the stream crossing inlets/outlets are stabilized by vegetation, mulch, or rip-rap. Replacement culverts sized to accommodate 100-year storm events would reduce the risk of catastrophic failure during major flood events and impacts to downstream spawning and rearing habitat.

Decommissioning Road 15-1-7 would eliminate artificial barriers to sediment transport and reduce the potential for future road/culvert failure. Sediment, bedload materials, and woody debris stored above the stream crossing on that road may mobilize once the culvert is removed. The natural sediment regime would be restored. Decommissioning undesignated OHV trails would reduce direct sediment delivery to streams. Tilling (where feasible) would help restore water infiltration to the soil and reduce the potential of surface runoff reaching nearby streams. For these reasons, road and trail decommissioning would have long-term beneficial effects to riparian areas and downstream fish habitat despite the short-term sedimentation impacts from stream crossing restoration.

Increased road use from timber hauling and related activities could result in short-term increases in sedimentation. This project allows for year-round timber haul where impacts vary by season of use. Existing haul routes are predominately gravel surfaced roads, which if used during the wet portion of the year, could produce increases in sedimentation to project area streams because existing roads route sediment/flow via ditchlines to cross drains and streams. Dry season use typically results in less sediment production. A road-related sediment delivery analysis (BLM 2007) identified that most roads within the project area have a low potential for direct sediment delivery to nearby streams due to adequate relief drainage, road surfacing aggregate and minimal amount of stream crossings. Road segments with the potential for delivery (Roads -28 and -18) would receive additional relief culverts and/or replacements and road surfacing aggregate that would further reduce any road-related sediment delivery to streams. Implementation of project design features would further minimize sedimentation impacts to project area streams.

- Instream Large Wood:

This alternative would treat most of the outer portions of the Riparian Reserves. Thinning is expected to speed the development of large-diameter trees thus resulting in a long-term increase in large woody debris (LWD) levels in streams and riparian areas within the project area.

In addition, this alternative proposes the addition of large wood (>80 pieces) to mainstem Shotgun and Seeley Creek This immediate contribution of LWD would influence stream channel flow and create and maintain spawning and rearing habitat for salmonid fishes. This proposal

would provide refugia habitat (cover), influence the size and location of pools, the formation of deeper pools, creation of backwater and off-channel habitat, and the deposition and sorting of gravels thereby providing suitable spawning habitat.

- Fish Passage:

The replacement of five fish passage barrier culverts would restore the migration corridor to nearly 1 mile of suitable spawning and rearing habitat for various salmonid fish and other aquatic-associated species. Culverts would be sized to meet the 100 year flow event and would be designed as stream simulated which would meet the passage criteria for all life stages of fish. Over the long-term, this type and size culvert would greatly reduce upstream and downstream channel erosion, stabilize existing sites, and would eventually mimic the natural stream channel characteristics.

- Cumulative Effects:

Implementation of Alternative 2 is expected to reduce cumulative effect concerns within the 5th field watershed. This alternative combined with on-going and planned road renovation on BLM and privately owned lands, would result in a long-term reduction of road-related sediment and surface water runoff delivery to streams and fish bearing habitat. No measurable impacts to stream flow are anticipated from harvesting, road related actions, or trail work.

Several trails would be impacted by logging activities. As a result, aggregate would be left on the trail to reinforce the trail subgrade. Although conversion of temporary logging roads back to trails would entail the removal of some rock on roughly half the road prism, the restored trail would retain rock and reduce the risk of erosion and sedimentation, as compared to the current condition.

Protective streamside buffers on BLM land and the utilization of standard best management practices (BMP's) would maintain existing sediment rates to streams. The addition of large wood to the system would help regulate the sediment regime and add to hydraulic complexity. A higher diversity of riffle and pool habitat is expected to develop over time, thus influencing the physical and biological characteristics of the stream system and creating productive habitats for salmonid fish. Large woody debris entering the stream system from BLM lands (either naturally or stream channel enhancement) would be distributed downstream over time by natural processes, thereby providing benefits beyond the project area.

Replacement of fish passage barrier culverts would result in an increase (~ 1 mile) in the amount of suitable spawning and rearing habitat available for salmonids within the watershed. In addition, replacement of deteriorated and/or undersized stream crossing culverts and decommissioning roads of concern to aquatics would greatly reduce the risk of mass wasting and the chronic erosion and sedimentation thus providing benefits to the overall health of the aquatic ecosystem within the watershed.

Maintaining primary shade zones along streams in this 5th Field Watershed would protect water temperatures on BLM land. Such standards are not consistently used on private lands therefore, sediment and temperature increases elsewhere in the watershed could possibly occur.

3.7 SOILS

Affected Environment (Soils):

- Soil Series:

The dominant soil series in all four sections are the Blachly and McCully series. These are the only two soil types mapped by NRCS in Sections 13 and 24. The two clay loams have comparable physical characteristics and management interpretations. The soils are deep and clay rich with minimal coarse content in the soil profile. These characteristics produce slow internal drainage (permeability) which makes the soils particularly prone to compaction. Erosion

hazard can be severe when vegetation is removed and soils are compacted. The fine particle size poses a high risk of sediment delivery as well

Blachly and McCully soils are classified as having high productivity and high resiliency. These sites can sustain vegetative manipulation, and still maintain nutrient capital, inherent physical properties and chemical capabilities, hydrologic function, and natural rates of erosion.

Topography is generally gradual to moderately steep. These soils are available for ground base harvest systems where slopes are less than 35%.

The Kinney soils series is found in Sections 7 and 19. These are deep loamy soils occurring on the upper slopes. Coarse content, both gravels and cobbles, typically exceeds 35 % throughout the soil profile. Kinney soils are classified as both high productivity and high resiliency. Runoff is rapid, and the hazard of water erosion is high. The gravelly loam surface textures are readily detached when vegetation is removed. Sites with Kinney soils can be suitable for ground based harvest systems.

The stony Kilchis soils occur in Section 7, on ridgetops. Kilchis soils are typically less than 15 inches deep with greater than 50% coarse content, gravels and cobbles. Small areas of Kilchis soil occur in association with outcrops in sections 7 and 19. Such small openings are typical, but the ridge site in Section 7 which is stocked with conifer is atypical for this soil type. An area of Kilchis soils as large as 10 acres with rock outcrops, incense cedar with openings, and Douglas-fir, occupies the southwest aspect off the main ridge.
Kilchis is classified as both low productivity and low resiliency. These soils/sites are poorly suited to the production of Douglas-fir. These soils pose a high windthrow hazard due to shallow rooting depth and ridgetop setting.

Cumley soil is the most widespread series mapped in Lane County. Cumley soils are deep silty clay loams. They occur in depressional areas adjacent to streams and wetlands. Cumley soils occur between poorly drained hydric sites and well drained upland soils. They are not available for ground-based systems due to seasonal high water tables.

- Site Conditions:

In Section 7, excavation and severe deep residual compaction from past logging practices are evident. Approximately 5 acres of productive soil are committed to Designated OHV trails. Active erosion and deep ruts/gullies are common on trails with grades over 25%. Though difficult to estimate, about five percent (8 to 11 acres) of the proposed 248 acres proposed for harvest in section 7 exhibit detrimental soil conditions that impair long term productivity. The loss of topsoil and surface organics has most likely reduced both nutrient capital for growth, and soil moisture holding capacity.

Unauthorized OHV use is evident. Trails exhibit severe active erosion, with gullies from eight inches to six feet deep. Soil quality and long term productivity has been impaired on at least five acres of productive forest soils, or about 9% of the 55 acres initially reviewed for treatment.

In Section 19, soil resources have been impacted by past timber management and transportation systems in this section, including designated and non-designated OHV trails. The areal extent of compaction within the 274 acres proposed in this section (discounting roads) is estimated to be five percent at this time.

In Section 24, excavation is less than the other sections because of the gentle topography. Residual compaction is minor, but field surveys suggest that surface soils (A horizon) have been displaced or partially removed. The depth of A horizon is less than the typical intact Blachly soil series. Growth losses have probably occurred due to the loss organic capital.

The current areal extent of severe residual compaction in all four sections, except section 24, exceeds the RMP Standard for insignificant growth-loss effects from compaction of 2% or less after amelioration practices (Eugene District RMP-ROD, pg. 37, 6/95).

- Timber Production Capability Classification System – Withdrawals:

Some sensitive or low resiliency soils were identified during project planning. Unit boundaries have been adjusted to exclude these sites from all harvest and/or road building activities because the soils offer minimal opportunities for manipulation the surface vegetation without impairing inherent properties and processes, and/or accelerating the frequency and magnitude of erosional events.

Environmental Consequences (Soils):

Alternative 1: No Action

No soil compaction or displacement associated with harvest or road building would occur. Trail related soil quality impacts, compaction and accelerated erosion, would continue. The legacy compaction and loss of topsoil associated with past harvest activities would persist for the long term, as would the associated productivity losses on those acres. Time to recover soil function and productivity may vary and could take decades, depending on depth of excavation.

Alternative 2: Thinning

The bulk of the harvest acreage is planned on high resiliency soils. Project design features would minimize the potential for accelerated erosion, as well as the extent and severity of compaction.

- Cable Yarding:

Approximately 705 acres, or 93% of the total project area, would be yarded with cable systems. Direct effects of cable yarding would be displacement of surface soil and organic matter, and discontinuous localized compaction within yarding corridors. These effects tend to be confined to a narrow strip less than four feet wide. Compaction would be deeper and more continuous for areas harvested in the winter when soils are wet. Compaction reduces porosity which is an essential component of site productivity. It is instrumental for water infiltration, water storage, and gas exchange. Soils with good porosity create favorable conditions for root growth, water movement, nutrient uptake by roots, and mychorrizal growth (Amaranthus and others, 1996). Design features would limit the spatial extent of these impacts and the potential for prolonged erosion. After operations, bare soil exposure, and compaction in corridors and associated landings would occupy about three percent of the cabled portions, or 21 total acres. Full vegetative recovery within corridors is expected within five years for the highly resilient soils (Blachly, McCully and Kinney). The steep shallow Kilchis soils in section 7 are the only sensitive soils included within an operative unit. Project design would minimize the number of corridors in this portion to reduce the potential for chronic erosion before vegetative recovery, which may take over 10 years.

- Ground based Yarding:

Ground based yarding is planned for approximately 55 acres, or 7 % of the total project area. Ground based logging systems would have the potential for more compaction than cable systems because trails are wider and compaction extends deeper. Topsoil is typically bladed off or severely displaced which results in long-term effects to soil productivity along trails. A suite of Best Management Practices and other design features would be employed to reduce the spatial extent and duration of these effects. Severity of effects would vary depending on the type of ground based system employed by the operator, and the number of trips on any given trail segment. The residual effects of un-treated historic compaction can persist for 50 years or longer. After harvest, about ten percent of the ground based portions, or six acres, would be occupied by skid trails and/or landings. The dominant soils types planned for ground based harvest (Blachly and Mc Cully series) may not draw down to acceptable moisture contents, resulting in deeper compaction in these areas. Project design features would limit skid trails adjacent to boundaries where the high water table Cumley soils typically occur. After harvest, all skid trails used in this entry that exhibit severe compaction would be tilled. This mitigation would restore infiltration and hasten vegetative recovery. However, productivity impairments would persist for multiple decades depending on the depth of excavation.

Despite project design features to till and place slash on skid trail, it may be difficult to close the skid trails to unauthorized vehicles. This unauthorized use may increase impacts to soils such as

compaction and surface erosion.

- Road Management:

Construction of approximately three miles of road would be surfaced with crushed rock and added to the District's permanent road system. Soil productivity would be irreversibly lost on about 8 acres of forested land.

Construction of approximately two miles of temporary native surface road and associated landings would result in the loss of topsoil and severe compaction on about 4 acres of productive forest land. In general, temporary roads are planned on gradual grades and tillable soils. Tillage would improve infiltration and mitigate the potential for prolonged erosion. Root growth in loosened soil areas would be better distributed and more vigorous, resulting in an accelerated improvement of soil structure and recovery back to a forested condition as compared to leaving untreated compacted surfaces. However, effects to soil function cannot be considered temporary; soil productivity would be impaired for 100 years or longer due to the loss of topsoil, duff, and litter layers

3.7 FUELS

Affected Environment (Fuels):
Currently the stands within the project area are best represented by Fuel Model 8 (closed timber litter). Under Fuel Model 8, fires are slow burning ground fires with low flame lengths although fires may encounter heavy fuel concentrations that can flare up.

Wildland/Urban Interface is present within the Seeley Creek project area. Private industrial forest lands are also present directly adjacent to most stands within the project area.

Environmental Consequences (Fuels):

Alternative 1: No Action
Within a relatively short period if no outside disturbance occurs, the stand would see an increasing amount of mortality as the stand thins itself. This would eventually result in moving from a Fuel Model 8 to a heavy timber litter (Fuel Model 10) with higher potential for a stand replacing, high intensity fire with crown fire potential than if the stand was thinned.

Alternative 2: Thinning
After thinning operations, the fuel bed would not be uniform or continuous slash throughout the harvest unit, resulting in a Fuel Model (FM) 11 condition. Fuel Model 11 (light logging slash) under the site conditions of this project yields low to moderate fire behavior except under extreme weather conditions (90th percentile weather with winds over 20 mph). However, Model 11 fuels would behave like Model 12 (moderate logging slash) fuels, if a fire occurs while the slash is in a 'red slash' condition, usually 1 and no more than 2 years after harvest. Crown spacing after thinning would make the occurrence of a crown fire unlikely even under severe weather conditions. The residual slash would be moved and compacted by the yarding operations resulting in openings in the fuel bed, buried slash, and slash concentrations. A portion of the slash would be brought to and sorted on landings as unmerchantable material. Skid trails and yarding corridors often have light fuels with large sections of bare soil creating fire breaks within the unit but also tend to have concentrations of fuel directly adjacent to them which would burn at higher intensities. Fuel concentrations would also result at multiple small landings which normally occur along the roadways. Landing piles would vary in size depending on site-specific operational factors resulting in varying quantities of unmerchantable material reaching each landing. As the slash breaks down, the live fuels would begin to dominate the site becoming a mixed FM 5 (brush) and FM 8 (closed timber litter) within 7-10 years.

Roadside piling and pile burning would reduce the roadside fuels and eliminate point sources for intense fire behavior and long range spotting that could occur within the project area in event a

wildfire starts or moves into the project area. This would also increase public and firefighter safety.

Smoke emissions from pile burning would be of short duration and in compliance with ODF through daily Smoke Management Instructions. Pile burning would likely occur during the rainy season between November 1 and January 1, when the most favorable emission dispersion conditions are possible and risk of escape is lowest. Pile burning may occur over a several day period. It is not anticipated that the burning of the piles would exceed National Ambient Air Quality Standards (NAAQS) or State Implementation Plan (SIP) for air quality. Additional fuels treatment information is available in the Fuels Treatment Project Plan in the project file.

3.9 Unaffected Resources

The following are either not present or would not be affected by any of the alternatives: Spring chinook critical habitat, Areas of Critical Environmental Concern, prime or unique farm lands, solid or hazardous wastes, Wild and Scenic Rivers, or Wilderness.

3.10 Environmental Justice

To comply with Executive Order 12898 of February 11, 1994, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, the Bureau of Land Management, Eugene District, would ensure that the public, including minority and low income, have adequate access to public information relating to human health or environmental planning, regulations, and enforcement as required by law. The District has not identified any environmental effects, including human health, economic and social effects of Federal actions, including effects on minority populations, low-income populations, and Native American tribes, in this analysis.

3.11 Cultural Resources

Surveys would be conducted in 2008. If sites are found the appropriate mitigations would be taken to preserve sites.

4.0 CONSULTATION

Upper Willamette Spring Chinook (Threatened) ESA Affects Determination/Rationale

Potential rearing habitat for juvenile spring Chinook exists within the project area; therefore, the Eugene District will consult with the National Marine Fisheries Service on the Action Alternative and its' potential effects on ESA listed species (e.g. spring Chinook).

Essential Fish Habitat

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

5.0 LIST OF PREPARERS

THE INTERDISCIPLINARY TEAM

Name	Title	Resource/Discipline
Mike Blow	Wildlife Biologist	Wildlife
Rudy Wiedenbeck	Soil Scientist	Soils
Cheryl Bright	Fuels Specialist	Fuels
Mike Sabin	Engineer	Engineering
Aaron Eklund	Engineer	
Chuck Vostal	Fisheries Biologist	Fisheries
Kris Ward	Hydrologist	Hydrology
Lori Miller	Forester	Logging Design
Jill Williams	Forester	Silviculture
Liz Aleman	Recreation Planner	Recreation
Cheshire Mayrsohn	Botanist	Team Lead
Christie Hardenbrook	Environmental Specialist	NEPA

CITATIONS

Amaranthus, Michael P.; Page-Dumroese, Debbie; Harvey, Al; Cazares, Efren; Bednar, Larry F. 1996. Soil compaction and organicmatter removal affect conifer seedling nonmycorrhizal and ecto mycorrhizal root tip abundance and diversity. Res. Pap. PNW-RP-494. Portland, OR: U.S.

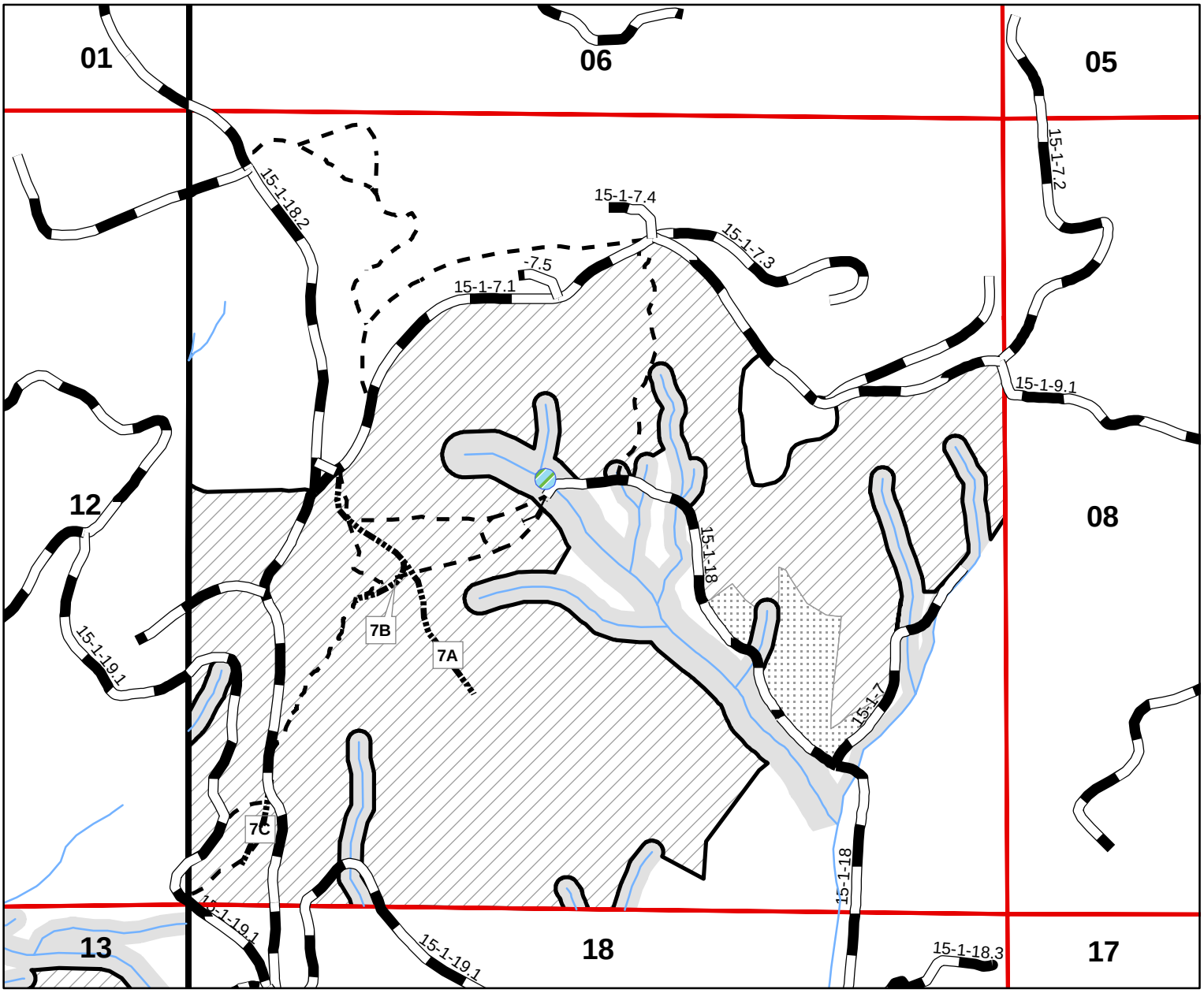
Oregon Department of Fish and Wildlife (ODFW). 2003 and 2005. Aquatic Habitat Inventory Project. Physical Habitat and Fish Surveys. Corvallis, Oregon.

Parkhurst, Z.E., F.G. Nelson. et al. 1950; Wouldis et al.. 1950. Survey of the Columbia River and its Tributaries, Part 2 – Willamette River System. Special Scientific Report No. 36. U.S. Fish and Wildlife Service, Washington, D.C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

E.A.
SHEET 1 of 3

ENVIRONMENTAL ASSESSMENT
SEELEY CREEK T 15 S, R 01 W, SEC 07



Legend

- HARVEST AREA BOUNDARY
- CABLE LOGGING
- GROUNDBASED LOGGING
- SEELEY POND
- FIELD CHECKED STREAMS
- NO RIPARIAN TREATMENTS
- EXISTING ROADS

OTHER ROAD TYPES

- New Construction, temp, dirt
- Proposed OHV Trails (EA 06-04)
- Existing OHV Trails
- TOWNSHIP LINES
- SECTION LINES

0 500 1,000 Feet

1" = 1000'

06/05/2008

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Bureau of Land Management
Oregon State Office
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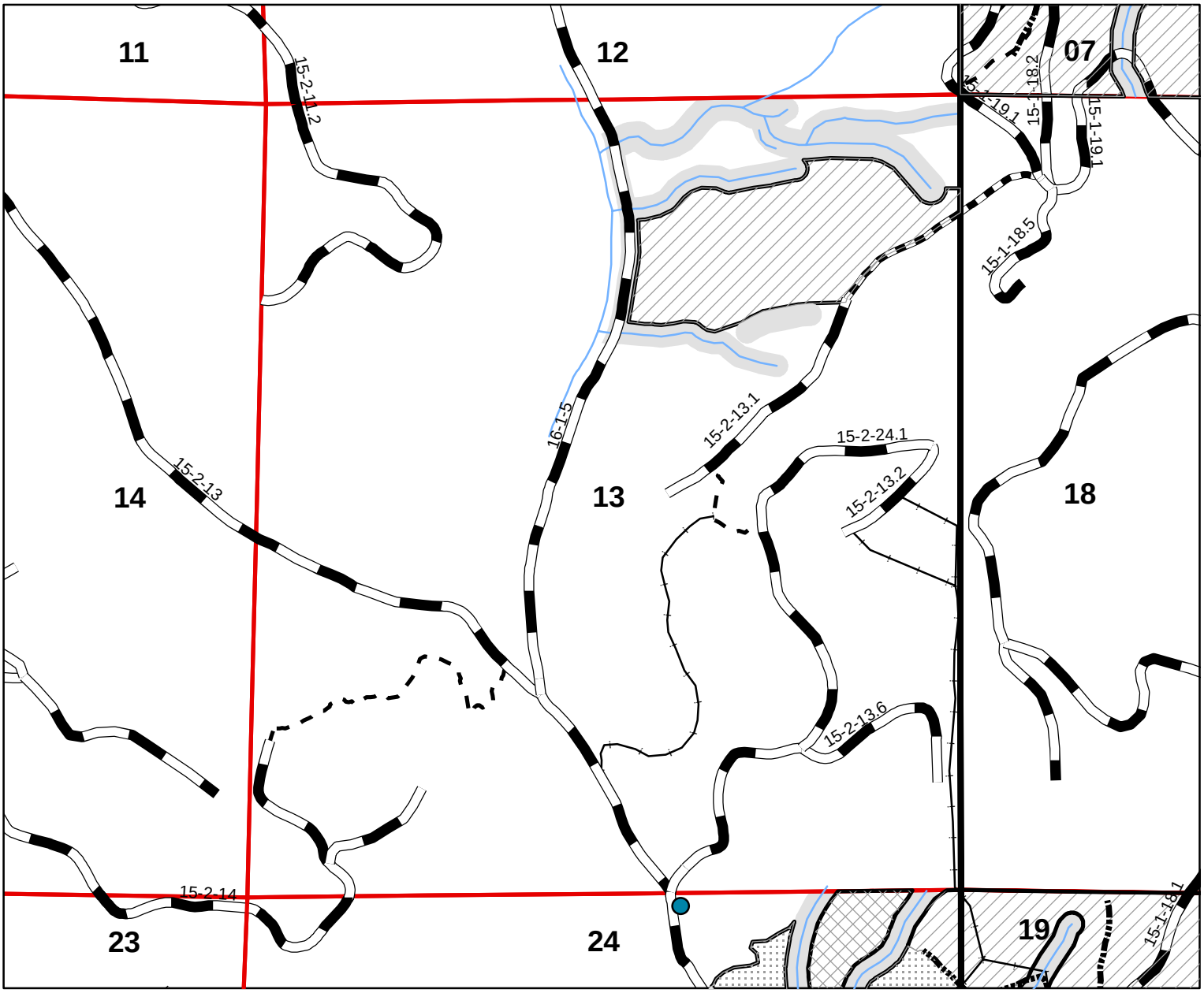
Portland, Oregon 97208-2965

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

E.A.
SHEET 2 of 3

ENVIRONMENTAL ASSESSMENT
SEELEY CREEK T 15 S, R 02 W, SEC 13



Legend

- HARVEST AREA BOUNDARY
- CABLE LOGGING
- GROUNDBASED LOGGING
- SPECIAL YARDING AREA (Groundbased)
- SPRINGS
- SEELEY POND
- FIELD CHECKED STREAMS
- NO RIPARIAN TREATMENTS
- EXISTING ROADS

OTHER ROAD TYPES

- New Construction, temp, dirt
- Proposed Renovation
- Proposed OHV Trails (EA 06-04)
- Existing OHV Trails
- TOWNSHIP LINES
- SECTION LINES

0 500 1,000 Feet

1" = 1000'

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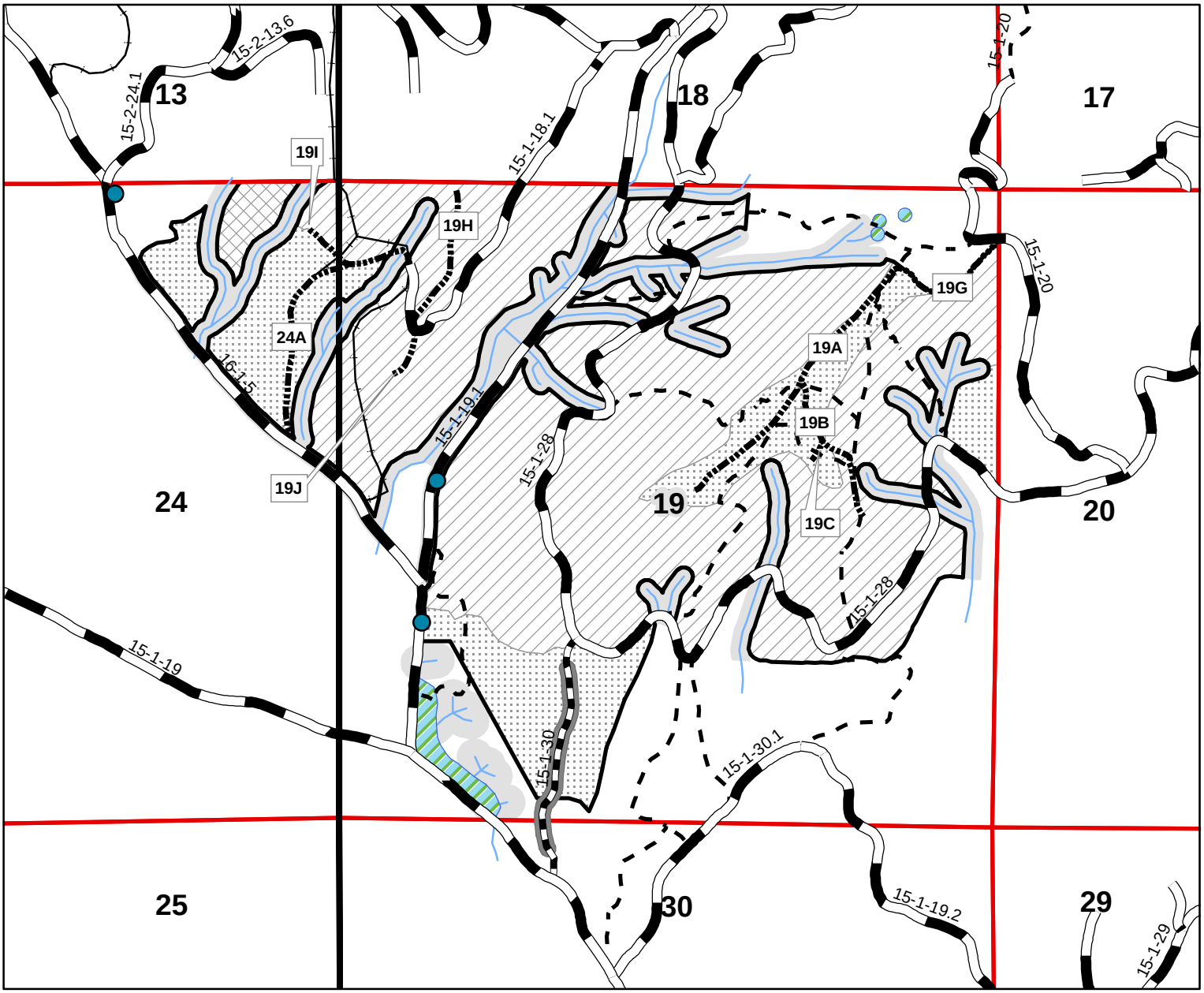
E.A.
SHEET 3 of 3

ENVIRONMENTAL ASSESSMENT

SEELEY CREEK T15 S, R 02 W, SEC 24 AND T 15 S, R 01 W, SEC 19



Legend

- HARVEST AREA BOUNDARY
- CABLE LOGGING
- GROUNDBASED LOGGING
- SPECIAL YARDING AREA (Groundbased)
- SPRINGS
- WETLANDS
- FIELD CHECKED STREAMS
- NO RIPARIAN TREATMENTS
- EXISTING ROADS

OTHER ROAD TYPES

- New Construction, temp, dirt
- Proposed Renovation
- Proposed Renovation & OHV Trail
- Proposed OHV Trails (EA 06-04)
- Existing OHV Trails
- TOWNSHIP LINES
- SECTION LINES

0 500 1,000 Feet

1:15,000

06/05/2008

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UNITED STATES DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT
EUGENE DISTRICT OFFICE
Finding of No Significant Impact
For the Seeley Creek Project
Environmental Assessment No. OR-090-08-04

Determination:

On the basis of the information contained in the Environmental Assessment (OR-090-EA-00-00), and all other information available to me, it is my determination that implementation of the proposed action or alternatives will not have significant environmental impacts not already addressed in the *Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (April 1994)* and *the Eugene District Record of Decision and Resource Management Plan (June 1995*), Aquatic Conservation Strategy (ACS) Objectives listed on page B-11 of the *Northwest Forest Plan.* This project conforms with the 2007 Record of Decision *To Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Bureau of Land Management Resource Plans Within the Range of the Northern Spotted Owl*. Therefore, an environmental impact statement or a supplement to the existing environmental impact statement is not necessary and will not be prepared.

_____ _____

Field Manager, Upper Willamette Resource Area Date