United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Eugene District Office
P.O. Box 10226
Eugene, Oregon 97440-2226

IN REPLY REFER TO.

1792A
DOI-BLM-OR-060-2013-0004-EA
Boulder Creek Timber Sale Environmental Assessment

May 13, 2013

Dear Citizen,

The Upper Willamette Resource Area (UWRA), Eugene District BLM proposes to implement commercial thinning and density management harvest on approximately 399 acres in the McKenzie River 5th field watershed (T. 17 S., R. 01 W. Sec. 35, T. 18 S., R. 01 W., Sec. 5). The Land Use Allocations for these acres are Matrix and Riparian Reserve. Project actions include timber harvest, in stream habitat restoration, road construction, road improvements and decommissioning.

This Environmental Assessment (EA) considers in detail two alternatives, the No Action Alternative (Alternative 1) and the Proposed Action (Alternative 2). The Proposed Action was developed to meet the purpose and need to be able to provide commercial opportunities to implement harvest management that increases winter harvest opportunities within the project area.

You have expressed an interest in receiving copies of EAs for district projects. This EA has been provided for your review and any comments. Public notice of this proposed action will be published in the Eugene Register Guard on May 15, 2013. The EA is also available on the internet at http://www.blm.gov/or/districts/eugene/plans/index.php. The public comment period will end on June 14, 2013. Please submit comments to me at the Eugene District Office by mail at 3106 Pierce Parkway, Suite E. Springfield, OR, 97477; or by e-mail at BLM_OR_EU_Mail@blm.gov by close of business (4:30 PM) on or prior to June 14, 2013. If you have any questions concerning this proposal, please call Panchita Paulete at 541-683-6976.

Comments, including names and street addresses of respondents, will be available for public review at the Eugene District Office, 3106 Pierce Parkway, Springfield, Oregon, during regular business hours (8:00 AM to 4:30 PM), Monday through Friday, except holidays, and may be published as part of the EA or other related documents. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses and from individuals identifying themselves as representatives or officials of organizations or businesses will be made available for public inspection in their entirety.

Sincerely,

[Signature]

William O'Sullivan
Field Manager
Upper Willamette Resource Area
1.0 INTRODUCTION
The Upper Willamette Resource Area (UWRA), Eugene District BLM proposes to implement commercial thinning and density management harvest on approximately 399 acres in the McKenzie River 5th field watershed (T. 17 S., R. 01 W. Sec. 35, T. 18 S., R. 01 W., Sec. 5). The Land Use Allocations for these acres are Matrix and Riparian Reserve. Project actions include timber harvest, in stream habitat restoration, road construction, road improvements and decommissioning.

These acres were previously analyzed under the Hills Camp Thinnings Project EA (DOI-BLM-OR-E060-2010-0003-EA) and were selected for implementation in July 2012 under a modified Alternative 3, which was designed to minimize new permanent road construction, through the Boulder Creek Decision Record. The modified Alternative 3 further reduced the construction of 0.3 miles of temporary road from what had been analyzed in the EA to forego a stream crossing over Stream 3 (as labeled in the EA).

The Boulder Creek timber sale was released for bid August 2012. No bids were received on the sale, in spite of the bid being extended to be open for 30 days. The Boulder Creek timber sale as released in August 2012 contained ground based harvest and cable harvest for a volume of 4,620 MBF at an estimated revenue of $573,545 and estimated roadwork costs (construction, reconstruction, and decommissioning) of $217,990. Potential purchasers expressed concern over the commitment to the acres of ground based harvest with soil moisture levels typically only permitting an average of 4-6 weeks of ground based operations. Timber industry has expressed interest in winter cable sales to be offered on UWRA lands to supplement what can otherwise be a slow season because of inaccessibility in other managed forest areas and have expressed that summer-heavy sales are not a priority for bid on UWRA lands. Elevations on the UWRA, in general, allow for harvest activities to occur in winter months when higher elevations are snowed out, and coastal ranges are mudded out. Potential purchasers also expressed concern over roadwork costs.

The Boulder Creek Timber Sale project area is fairly flat (average unit slope is 14-16%). It contains several moderate slopes that could be managed through ground based harvest operations, but would also allow for cable harvest. Approximately 100 acres formerly offered as ground based harvest have been identified for transfer of harvesting season to winter through application of cable logging systems.

Units within the Boulder Creek Timber Sale project area are a mix of Douglas fir (2,984 MBF), Western hemlock (1,491 MBF), grand fir (134 MBF), Western red cedar (11 MBF), and smaller inclusions of hardwoods or other typically non-harvested species. These stands are overstocked (220 BA) and of optimal age (50-60 years old) for release to improve stand growth.

1.1 PURPOSE AND NEED
The purpose of this analysis is to be able to provide commercial opportunities to implement harvest management that increases winter harvest opportunities within the project area. There is a need to present harvest management in a manner that will make implementation feasible.

The purposes of the actions in Matrix are to (1) produce a sustainable supply of timber, and (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 (1995 ROD/RMP, p. 34). Additional direction for road management directs us to provide and manage the road system to serve resource management needs (1995 ROD/RMP, p. 98).

The purposes of the actions in Riparian Reserves are to provide for the conservation of and habitat for Special Status Species as well as other terrestrial species, and to meet Aquatic Conservation Strategy Objectives (1995 ROD/RMP, p. 23).
The need for action for proposed harvest actions in Matrix and Riparian Reserves has been established through the results of field reviews and stand examinations, which indicate that stands (ages 30-70 years) would benefit from thinning or density management release. Currently, the stands are dense, overstocked and uniform in structure. There is a need to remove excess stand density to contribute to a sustainable supply of timber, and improve growth and vigor for habitat.

1.2 CONFORMANCE
This proposed action is in conformance with the Eugene District’s 1995 Resource Management Plan (RMP) as amended.

On December 17, 2009, the U.S. District Court for the Western District of Washington issued an order in Conservation Northwest, et al. v. Rey, et al., No. 08-1067 (W.D. Wash.) (Coughenour, J.), granting Plaintiffs’ motion for partial summary judgment and finding a variety of NEPA violations in the BLM and USFS 2007 Record of Decision eliminating the Survey and Manage mitigation measure. Previously, in 2006, the District Court (Judge Pechman) had invalidated the agencies’ 2004 RODs eliminating Survey and Manage due to NEPA violations. Following the District Court’s 2006 ruling, parties to the litigation had entered into a stipulation exempting certain categories of activities from the Survey and Manage standard (hereinafter “Pechman exemptions”).

Judge Pechman’s Order from October 11, 2006 directs: “Defendants shall not authorize, allow, or permit to continue any logging or other ground-disturbing activities on projects to which the 2004 ROD applied unless such activities are in compliance with the 2001 ROD (as the 2001 ROD was amended or modified as of March 21, 2004), except that this order would not apply to:

A. Thinning projects in stands younger than 80 years old;
B. Replacing culverts on roads that are in use and part of the road system, and removing culverts if the road is temporary or to be decommissioned;
C. Riparian and stream improvement projects where the riparian work is riparian planting, obtaining material for placing in-stream, and road or trail decommissioning; and where the stream improvement work is the placement large wood, channel and floodplain reconstruction, or removal of channel diversions; and
D. The portions of project involving hazardous fuel treatments where prescribed fire is applied. Any portion of a hazardous fuel treatment project involving commercial logging would remain subject to the survey and management requirements except for thinning of stands younger than 80 years old under subparagraph a. of this paragraph.”

Following the Court’s December 17, 2009 ruling, the Pechman exemptions are still in place.

1.3 SCOPING
Scoping information presenting the intent to propose harvest activities within the project area identified in this EA was first provided in the October 2010 Eugene District Planning Update as part of the Hills Camp Thinning Project (DOI-BLM-OR-E060-2010-0003-EA). No scoping comments were received.

1.4 ISSUES CONSIDERED, BUT NOT ANALYZED IN DETAIL
Seven issues were analyzed in detail during analysis for the Hills Camp Thinnings Project (DOI-BLM-OR-E060-2010-0003-EA):

1. What are the effects of the proposed commercial thinning on greenhouse gas emissions?
2. What are the effects of the proposed commercial thinning and proposed road actions on water quality and aquatic resources?
3. What are the effects of the proposed commercial thinning and road actions on attaining and maintaining ACS objectives?
4. What are the effects of the proposed commercial thinning and road actions on soil compaction and displacement?
5. What are the effects of the proposed commercial thinning and road actions on the spread of invasive species?
6. What are the effects of the proposed commercial thinning and road actions on T&E and special status species?
7. What are the effects of logging systems on the cost of yarding, road construction, maintenance and renovation?
The resource concerns related to the issues were analyzed in Section 4.0: Affected Environment and Environmental Consequences. These issues and their analysis are incorporated here by reference.

1.5 ISSUES ANALYZED IN DETAIL
No new issues were identified as new concerns related to resources that had potential of being affected by proposed actions for the Boulder Timber Sale. However, some issues analyzed or portions of issues analyzed for the Hills Camp Thinnings Project (DOI-BLM-OR-E060-2010-0003-EA) would have quantifiable differences to effects measurements to warrant analysis in detail to be re-presented. The resource concerns related to the following issues are analyzed in Section 4.0: Affected Environment and Environmental Consequences.

Issue 1: What are the effects of the proposed commercial thinning and proposed road actions on water quality and aquatic resources?
Issue 2: What are the effects of the proposed commercial thinning and road actions on soil compaction and displacement?
Issue 3: What are the effects of the proposed commercial thinning and road actions on Northern spotted owl habitats?
Issue 4: What are the effects of logging systems on the cost of yarding, road construction, maintenance and renovation?

2.0 ALTERNATIVES
This section describes alternatives identified considered in this analysis. Please refer to Appendix A for maps of the project proposal.

2.1 ALTERNATIVE 1: NO ACTION
Under this alternative no project actions would take place. Commercial thinning, road management, and aquatic habitat restoration actions would not occur within the proposed project area.

2.2 ALTERNATIVE 2: INCREASED WINTER HARVEST
This alternative is designed to allow for increased winter harvest operability within the project area. Overall stand ages range between 50-60 years old. It consists of two commercial thinning areas encompassing approximately 296 upland acres. They are delineated as follows:
- Boulder Creek II 5: 188 acres
- Boulder Creek II 35: 108 acres

Matrix Management
Stands would be thinned from below resulting in a residual basal area ranging from approximately 150 square feet to 160 square feet. Trees selected for harvest would be the suppressed, intermediate, and co-dominant conifer trees, leaving the larger trees. This prescription would result in a stand with a variable spacing of 15 and 35 feet between remaining conifers and hardwoods. All hardwoods and Pacific yew would be retained, except where necessary to accommodate logging systems and for safety.

Riparian Reserve Management
Silvicultural treatments would occur in the outer edges of the Riparian Reserve and would be treated the same as the uplands. Areas of no harvest, in close proximity to streams and wetlands, would vary between 25 feet and 400 feet. Approximately 103 Riparian Reserve acres would be treated and are delineated as follows:
- Boulder Creek II 5: 74 acres
- Boulder Creek II 35: 29 acres

An average of 120 linear feet per acre of coarse wood debris (2 trees/acre) and 3 snags/acre would be created within portions of treated Riparian Reserves.

Logging Systems
Thinning would be accomplished with a combination of cable and ground-based yarding systems. Skyline yarding would be proposed for approximately 168 acres and ground-based yarding would be proposed for approximately 231 acres (see maps in Appendix C).

Roads
See Appendix B for road tables (Tables B1-B5), which detail much of the following information.
Construction, Maintenance, and Improvements
Approximately 2.24 miles of existing BLM controlled roads would be utilized as part of the project. All miles of road would need maintenance including adding crushed rock and culvert replacements. There would be approximately 2.58 miles of proposed temporary road construction and approximately 1.77 miles of proposed permanent road construction. Approximately 1.50 miles of private controlled road would be used for timber and rock haul.

Culvert Replacements and New Installations
Between 1 and 5 stream crossing culverts and 1 to 13 cross drain culverts have been identified for replacement. Approximately 1 stream crossing (1 non-listed fish) culvert and 1 cross drain culvert would be installed on newly constructed roads.

Road Decommissioning
Approximately 0.11 miles of roads, which are not expected to be needed for future management actions within the next 5 years, would be decommissioned. Actions may include entrances barricaded, slopes water-barred, stream and cross drains removed, stream channels restored, and drain dips constructed. Around 2.47 miles of road, which would not be needed for future management actions beyond 5 years, would be fully decommissioned. Actions on roads to be fully decommissioned may include tilling of road bed and/or slash or brush placement, and mulching and planting of native species in disturbed areas.

2.3 Alternatives Considered, but Not Analyzed in Detail

2.3.1 Reduced Permanent Roads & Ground Based Harvest in Riparian Reserves
The Hills Camp Thinning Project analyzed two action alternatives designed to minimize ground disturbance through 1) reducing new permanent road construction and 2) removing ground-based harvest actions in Riparian Reserves. Similar alternatives are not being carried forward for consideration under this EA analysis because they do not meet the purpose and need identified for this project.

Proposed harvest units are comprised of stands in the 50 and 60 year age classes. This harvest is likely to be the last intermediate entry prior to a final entry, regeneration harvest. Thinning of the stands at this time is needed to provide for a vigorous stand at time of final entry. This meets the identified purpose to produce a sustainable supply of timber both now and for the future final entry stand. These stands also clearly meet the need to thin stands of this age class that are overstocked. Reviews of options to reduce permanent roads while also meeting the purpose to increase winter harvest opportunities would require removing stands identified as needing management at this time from available harvest acres. Withdrawal of stands from harvest acres would not meet the above identified purpose or need to thin overstocked stands of these age classes. Helicopter logging was determined to be infeasible for the volume and type of material that would be provided when compared to the cost of harvest operations.

The proposed action has pursued increasing the acres available for winter harvest. Winter harvest in the UWRA is restricted to non-ground based operations due to soil moisture levels. As such, Riparian Reserve acres able to be harvested through alternate means than ground based systems have been converted to cable logging in this proposal. Acres unable to be converted were not considered for withdrawal from this proposal because it would not meet the purpose and need. Riparian Reserve stands are also 50-60 years old and overstocked. Intermediate management would improve tree growth and vigor and meet the purpose to provide for the conservation of habitat and to meet ACS objectives.

3.0 Affected Environment and Environmental Effects

3.1 Issue 1: What are the effects of the proposed commercial thinning and proposed road actions on water quality and aquatic resources?

3.1.1 Affected Environment

Water Quality
This project is located northeast and southeast of Springfield, Oregon and is within the McKenzie watershed (Table 3.1).
Table 3.1. Hydrologic Field, Sale Unit, and Downhill Streams.

<table>
<thead>
<tr>
<th>10th Field Watershed</th>
<th>12th Field Sub-Watershed</th>
<th>Unit Name</th>
<th>Major Stream Below</th>
</tr>
</thead>
<tbody>
<tr>
<td>McKenzie River</td>
<td>McKenzie River-Walterville Canal</td>
<td>Boulder Creek II 5</td>
<td>Cedar Flat Creek</td>
</tr>
<tr>
<td>1709000407</td>
<td>170900040706</td>
<td>Boulder Creek II 35</td>
<td>Boulder Creek</td>
</tr>
</tbody>
</table>

Annual precipitation in the project area ranges from 51 to 73 inches (1,295 to 1,855 millimeters). The project area elevation ranges from 660 to 1,980 feet. This elevation range places all units in the rain dominated zone with no acres in the transient snow zone.

The project area was previously harvested 40-80 years ago. Logging roads and skid trails from past timber harvests have impacted the stream network throughout the project area. Impacts from historic logging activities range from old log culvert stream crossings to skid trails constructed over stream channels. Erosion and sedimentation from these old skid roads have delivered fine sediment to the channels, undercut stream banks, or buried channels with road or skid road related debris. A few of these old roads now carry water during winter storm events, extending the natural stream system and occasionally diverting flow from their natural stream channels.

The McKenzie Watershed has 4.4 miles of road per square mile. Road densities over 3.5 miles of road per square mile are considered “Not Properly Functioning” (FEMAT, 1993). Some stream crossings and ditch relief culverts in this project area are not functioning properly due to rust, mechanical damage, being undersized, or other factors that increase the risk of culvert failure. A few road segments lack ditch relief culverts, increasing flow and sediment delivery to stream crossings and increasing the risk of road or culvert failure. A few roads have degraded surface aggregate resulting in fine sediment being eroded from the road surface. Some roads run parallel to streams, so fine sediment is delivered to streams by way of runoff in wet winter months and dust in dry weather.

Aquatic Resources - Fisheries
Numerous tributaries within the timber harvest area do not have fish within them due to limited flow, steep cascades or natural (waterfall) and manmade (culvert) barriers. There are several anadromous and resident fish species that occur within these watersheds. Cutthroat trout have the widest distribution, followed by steelhead, and then Chinook salmon.

The Upper Willamette River Chinook ESU was listed as threatened under the Endangered Species Act on June 28, 2005 (70FR37160). Chinook salmon occupy the Lower McKenzie, watersheds and are part of the Upper Willamette River Chinook Evolutionary Significant Unit (ESU). Approximately 77 stream miles within the McKenzie watershed are occupied by the Upper Willamette River Chinook salmon.

Increased concentrations of suspended sediment and turbidity can also have direct effects on fish behavior, physiology, and growth (Anderson et al. 1996). The Oregon Department of Fish and Wildlife (ODFW) considers properly functioning substrates to have <20% fines, sands or sediment. In general, all watersheds have elevated levels of sediment. The average level of sediment in streams surveyed within the McKenzie Watershed is 18.6 % with 11 out of 26 streams having sediment levels above 20%.

Connectivity is important for fish production and restoring fish passage is an effective way to increase the availability of habitat (Roní et al. 2002). It is common for fish to move within streams and between stream systems throughout the year (Kahler et al. 2001). A road inventory was conducted in the planning area that included an assessment of road and culvert conditions. Numerous cross drain and stream culverts were assessed and found to be at risk of failure and preventing fish passage.

Aquatic Resources - In stream Woody Debris
The lack of large wood in streams has been identified as a limiting factor for the survival and productivity of anadromous salmonids in western Oregon (FEMAT, 1993) and has been identified as a limiting factor in the recovery planning for ESA-listed anadromous salmonids on the Oregon coast, the Lower Columbia River and the Upper Willamette River (Nicholas et al. 2005, ODFW 2010a, ODFW 2010b). In Western Oregon, ODFW considers the amount of large wood in stream channels to be high if there are more than 48 pieces per mile and low if there are less than 16 pieces per mile (Foster et al, 2001). The average number of pieces of large wood per mile in streams surveyed within the McKenzie Watershed is 19.68 pieces per mile, with only 3 streams out of 26 streams having high levels of large woody debris.
3.2.2 Environmental Effects

**Alternative 1: No Action: Direct & Indirect Effects**

**Water Quality**
Under this alternative, no harvest related actions, road improvement, road decommissioning, culvert replacement, or aquatic habitat restoration would occur. Stream temperatures would remain unchanged for both the long and short term. Fine sediment input into streams would continue due to road related problems at failing, deteriorating, and/or non-functional stream crossing culverts. Road-stream crossings on road 17-1-34 would not be replaced and would continue to be a moderate to high risk of failure. No impacts to peak flows are anticipated since no timber would be removed under this alternative.

No 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.

**Aquatic Resources - Fisheries**
Turbidity in streams adjacent to the project area would continue to have the potential for chronic sediment problems due to failing culverts and road drainage issues. Water quality and impacts to fish bearing habitat would continue to be impacted by road 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 and no blading would occur. As a result, direct sediment delivery to streams via the ditch line from those roads would continue.

Under this alternative road-stream crossings would continue to be partial to total passage barriers to all life stages of fish and other aquatic-dependent species. Due to the culverts being undersized, high and moderate flows would continue to erode downstream channels, thus worsening passage conditions at these sites. Ditch lines that currently drain into area streams would continue to produce chronic erosion at these areas.

The effective shade would be maintained along streams on BLM land, but timber harvesting on private lands would follow Oregon State Forest Practices and would reduce the effective shade zone in those area and increase solar radiation to streams flowing onto BLM lands. This alternative is expected to maintain the current conditions within the project area. The potential to improve aquatic habitat conditions through road decommissioning, replacement of high risk road-stream crossings, road drainage improvements, and increased riparian function from thinning would not occur.

Current fish production within the project areas would continue to be hindered by the following processes: poor road drainage causing increased sedimentation of area streams, decreased movement of fish would continue to limit production within basins due to fish passage barriers which would be replaced under other alternatives, riparian areas would continue to be overstocked and would slowly provide inputs of large wood (smaller suppressed trees would die providing smaller pieces), but riparian stands would not grow larger faster or gain complexity.

**Aquatic Resources - In stream Woody Debris**
This alternative would have no immediate effect on the level or recruitment of in stream large woody debris. The recruitment of large wood to the stream channel would continue by natural processes. Currently overstocked stands have smaller suppressed trees dying and providing wood to riparian areas and streams. 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 be delayed and these stands would not develop until significant mortality occurred within the stand, allowing the remaining trees to grow faster.

Current levels of in-stream large wood within the project area 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 salmonid production.
Alternative 2: Increased Winter Harvest: Direct & Indirect Effects

**Water Quality**

Under this alternative, thinning in the Riparian Reserve is not expected to impact water temperatures since no-harvest stream buffers (ranging from 75 to 400 feet) would be implemented. 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.

There would likely be a pulse of sediment during the construction work of culvert installation, but this is expected to be a short term impact. Typically, fine sediments disturbed by the equipment are flushed out by seasonal fall rains and some erosion occurs until disturbed soils on the inlets/outlets are stabilized by natural vegetation, mulch, or rip-rap. During the short term, there would also be a likely pulse of sediment during the harvest time period due to increased road use. This project allows for year-round timber haul where impacts vary by season of use, whereas dry season use typically results in less sediment production. Log haul would occur over native, gravel and paved road surfaces controlled by BLM and private industry.

A road-related inventory identified that some roads within the project area do not have adequate relief drainage or road surfacing aggregate. Road segments with the potential for delivery would receive additional relief culverts and/or replacements and all new stream crossings on the haul route would receive 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.

New permanent road crossings in Boulder 5 would improve the current condition at two of the three proposed permanent road-stream crossings. Currently, the historic crossing where 18-1-5.5 Seg. A would cross stream #4 was decommissioned without removing the old log culvert. This has resulted in a confined channel with a sediment dam behind the logs. By removing this log culvert and placing a bank-full width culvert, the stream would be able to naturally transport sediment and bed load materials. Natural stream meander would also be better achieved above and below the crossing. The second crossing of stream #4 (upstream) in Boulder 5 would also be an improvement of the existing condition. Currently, there is a historic road crossing with either no culvert or a completely buried log culvert at this location. Currently, the stream is flowing over the historic road fill. There is a 4 to 5 foot tall headwall cut where the stream is currently cutting back the road fill. This is currently a chronic source of sediment delivery to stream #4. Under this alternative, the crossing would be much improved by placing a culvert at the natural gradient of the stream and would stop the chronic source of sediment input from the currently eroding road bed.

In general, long-term decreases in sediment delivery would result from upgrading permanent roads by replacing culverts, adding cross drains, adding aggregate, grading and decommissioning constructed native surface roads.

Best Management Practices and Project Design Features would be used to disconnect the road system from the stream network as much as possible. Culverts placed at all stream crossings would be sized for 100 year flood events. Placement of crushed rock aggregate within the Riparian Reserve on roads 18-1-5.5 Seg.A, 18-1-5.6 Seg. A, and 17-1-36.1 Seg. B would help to prevent sediment delivery from roads to the stream network.

Under the proposed action, commercial thinning is not expected to impact current peak flows. As much of the existing young stands of timber mature in the watershed, an improved condition with regard to channel impacts from peak flows should occur. Harvesting of mature timber on public and private lands may reverse that trend. Renovation of existing roads used for harvesting and hauling would reduce surface runoff from entering nearby streams over the long term. Decommissioning roads no longer needed would also contribute to a reduction in road related runoff being delivered to the stream system and promote infiltration of surface flow in the project area, resulting in reduced sediment delivery.

**Aquatic Resources - Fisheries**

As mentioned above, treatment in the Riparian Reserve is not expected to impact water temperature, thereby protecting habitat conditions for aquatic and riparian-dependent species. Stream crossing culvert replacements may result in the loss of some over story vegetation, but not to the level of affecting stream temperature.

Treated riparian reserves would have no-harvest buffers widths of a minimum of 75 feet. These buffers would provide protection to over-steepened and/or unstable streambanks and headwalls, and filter out potential
sediment transported from skyline and ground-based yarding processes; thus, minimizing sediment-related impacts to nearby streams and fish bearing habitat. Skyline yarding landings are generally located on ridge top topography and outside of the stream influence zone. To minimize adverse effects to stream habitat, relief culvert installation would be installed to reduce direct sediment onto hillsides and not directly into streams. The implementation of project design features would minimize most potential sediment related effects on water quality and aquatic habitat from harvest activities.

The replacement of fish passage barrier culverts would restore the migration corridors of suitable spawning and rearing habitat for various salmonid fish and other aquatic-associated species. Culverts 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. These replacements would also reduce the risk of road failure that would increase sediment levels at each failure site.

The only project elements that are in close proximity to listed fish habitat are haul routes. All haul routes over listed fish are on paved roads or far above listed fish on gravel roads. Therefore these haul routes have no causal mechanism to increase road related sediment where listed fish may reside. As such, Chinook salmon and bull trout would not be expected to have any direct or indirect effects from project actions.

Aquatic Resources - In stream Woody Debris
This alternative would treat 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. The thinned areas would have a small amount of timber blow down or natural mortality from thinning, and the no-cut buffer would continue to supply approximately 90-95% of all LWD to area streams. The increase in LWD potential would have long term benefits to 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. All of these factors would improve fish habitat and production.

Alternatives 1 & 2: Cumulative Effects
The cumulative effects of both alternatives on water quality or aquatic resources within the project area watersheds are not anticipated to be measurable, maintaining current conditions and trends under Alternative 1 and trending towards improved conditions under Alternative 2. The cumulative effects of on-going and future land management within the project area watersheds outside the project area are not anticipated to contribute measurable impacts to water quality or aquatic resources in the project area under either alternative.

Under Alternative 1, cumulative effects would be expected to maintain current watershed conditions. The opportunity though this project to improve aquatic habitat conditions and water quality would be lost or postponed. Cumulative effects from a variety of sources (ditch lines without culverts, etc.) could increase fine sediment into the stream channels and negatively affect downstream fish habitat. Road decommissioning, and road maintenance 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 crossings further deteriorate due to the lack of maintenance. Without additional aggregate surfacing and relief drainage, future road conditions would continue to accelerate sediment delivery and surface runoff to streams.

Implementation of Alternative 2 would be expected to create short term increases of turbidity in the project watersheds at specific stream crossings where culverts would be installed or replaced and new road construction in Riparian Reserves would take place. 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 due to improved road drainage.

Protective streamside buffers on BLM land and the utilization of standard BMPs would maintain existing sediment rates to streams. The addition of potential 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 in the amount of suitable spawning and rearing habitat available for salmonids within the watershed. In addition, replacement of deteriorated and/or underrized stream crossing culverts 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 would protect water temperatures on BLM land. Non-federal timber lands in the project area watersheds would likely continue to be clear cut harvest stands approximately 40 years and older and renovate or construct additional forest roads. Riparian Management Areas are managed in compliance with the Oregon Forest Practices Act, which applies basal area targets based on stream size, use, and occupancy by fish. Small, non-fish bearing streams have no Riparian Management Area management requirements under this act and are often not buffered on non-Federal lands. These harvest methods and reduced riparian buffers would continue to degrade water quality and fish at all scales, including on federal lands. Actions on non-Federal lands that would improve water quality and fish habitat include culvert replacements and road improvements. Most riparian stands would be clear cut harvested approximately every 40 years and would not recover to historical conditions.

3.4 ISSUE 2: WHAT ARE THE EFFECTS OF THE PROPOSED COMMERCIAL THINNING AND ROAD ACTIONS ON SOIL COMPACTION AND DISPLACEMENT?

3.4.1 Affected Environment
Field inspections were conducted during planning to verify Lane County Soil Surveys. Maps are provided in the Analysis file. All sections exhibit some level of impact to soil quality from past harvest, but the current extent of detrimental soil conditions (severe compaction, severe displacement, and/or active erosion) varies in response to different treatment history and soil sensitivity.

**Boulder Creek II 35:**
Peavine soils occupy the greatest acreage in both Boulder Creek II 5 and 35 units. These soils are moderately deep, 30 to 40 inches, and well drained, with silty clay loam topsoil over silty clay and clay subsoils. Peavine silty clay loam is classified as high productivity and high resiliency.

Though difficult to estimate, residual compaction of varied severity is estimated at about 5% of the total acres proposed for treatment in this unit (13 acres where soils exhibit platey structure greater than four inches deep, which is considered severe compaction and 2.5 acres with moderate compaction and 3 acres with light compaction).

**Boulder Creek II 5:**
The history of mass movement has produced broken topography with variable slopes. Short steep slopes in excess of 40% are intermingled with depressional pockets that contain deeper soils, with high water holding capacity.

At present, at least 5% or 7 acres of the total acreage proposed for harvest show some level of soil quality reductions from past activities, primarily machine effects to soil properties and function. Aerial photos taken in 1969 show a dense network of travel ways impacting up to one-third of the soil surface. In 2002 the McKenzie Resource Area (now part of the Upper Willamette Resource Area) decommissioned about 2.5 miles of the heavily used native surface roads.

3.4.2 Environmental Effects

**Alternative 1: No Action: Direct & Indirect Effects**
No additional compaction or displacement would occur as a result of new activities. Residual compaction and excavation in certain areas would continue to impair water storage, natural rates of erosion and soil productivity.

**Alternative 2: Increased Winter Harvest: Direct & Indirect Effects**
The majority of the thinning proposed would occur on sites with high resiliency and intermediate resiliency soils. High resiliency soils can sustain substantial vegetative manipulation and still maintain nutrient capital, natural rates of erosion, and inherent physical and chemical properties. Intermediate resiliency soils may require mitigations and/or design features to reduce the potential for chronic erosion and possible loss of soil productivity.

**Cable Yarding:**
Approximately 168 acres, or 42% of the total acres planned for harvest would be yarded with skyline systems. Direct effects of the cable yarding would be the displacement of surface soils and organic matter, and
discontinuous localized compaction, and erosion within yarding corridors. These effects are typically confined to a
strip less than 12 feet wide. When topography permits, independent corridors spaced approximately 150 feet
apart would be required. Under this design, the bare soil subject to compaction and erosion, would occupy
approximately 3% to 5% of the unit area. Compaction would be deeper and more continuous for areas harvested
in the winter when soils are wet.

After operations, bare soil exposure, soil displacement, and compaction in corridors and associated landings
would occupy about 5% of the skyline portions or approximately 8 acres within the project area. The severity and
duration of these soil conditions depends on soil characteristics, topography, harvest methods, and
implementation of effective mitigations. Full vegetative recovery in skyline corridors, with ground cover at 65% or
more, is expected within five years for the high resiliency soils (Nekia, Peavine, Bellpine). Vegetative recovery on
the coarse textured intermediate resiliency soils is expected in 10 to 20 years (Klickitat, Ritner).

**Ground based Yarding:**
In general, ground based yarding systems are planned on suitable soils where slopes are less than 35%; about
231 acres or approximately 58% of the 399 acre project area. These systems have the potential for more
extensive, deeper displacement of surface soils and more severe compaction than skyline systems because trails
are wider and compaction extends deeper. Where organic matter and topsoils are displaced, long term site
productivity is reduced. Areal extent and severity of compaction would vary considerably depending on the
amount and distribution of surface litter and slash, soil texture and structure, percent of soil moisture, and the
weight and function of the machinery employed by the operator. Utilizing existing skid trails would reduce new
adverse effects and provides the opportunity to treat residual effects in some areas. However, studies have
concluded that after six trips most soil textures will become compacted to the point that bulk density is increased
and soil function is impaired (Steinfeld, D., 1997).

After harvest, about 12% of the ground based acres, or 28 acres would be occupied by skid trails and landings.
To achieve the RMP standard of 2% residual compaction, skid trails would be decompacted with an excavator to
restore infiltration and hasten vegetative recovery.

Anticipated compaction and associated growth loss effects in Boulder 5 may exceed those on typical Peavine
sites. The highly variable topography and soil drainage characteristics of the resident Peavine soils cause a
narrow window for dry soils in many of the sub-units slated for ground based systems.

**Mechanized Felling:**
The mechanized cutters can reach out to approximately 26-33 feet in any distance to harvest trees, but
sometimes must travel off designated trails to collect trees slated for removal outside this reach. Depending on
the soil type, this could result in soil compaction dispersed throughout the site rather than confined to designated
skid trails. Project design features to mitigate these impacts would be implemented if this type of equipment were
to be used, such as requiring that these machines travel over a layer of slash.

**Road Construction:**
Long term soil productivity would be irreversibly lost on approximately 8.4 acres of productive forest land
throughout the project area, due to the proposed construction of approximately 2.1 miles of new rocked roads.

Proposed construction of native surface roads and associated landings for short term use would result in the loss
of topsoil of forest land. Decompaaction with an excavator modified for tillage (full decommissioning) would
improve infiltration and mitigate the potential for long term erosion. Root growth in the loosened soil 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, dependent on the depth
of excavation, soil function and long term soil productivity may still be impaired for 50 to 100 years.

**Alternatives 1 & 2: Cumulative Effects**
Cumulative effects to soils are considered for this project at the project scale. Actions analyzed here combined
with comparable practices on private land may alter water storage and erosion rates on a broad scale, but a data
gap exists at the watershed scale to be able to produce a meaningful comparison.

Under Alternative 1, cumulative effects would be expected to maintain current conditions. Under Alternative 2,
harvest activities would be expected to continue to produce effects similar to those that have occurred in the past.
The spatial extent of severe compaction from ground based equipment that is not ameliorated would accumulate
in individual harvest units with this and subsequent entries. Conifer growth in these units would be reduced for
individual trees, as well as site class for stands at the project scale. Effects to site productivity would not be anticipated at the same levels in cable yarded units. Similar effects to timber lands would be expected by logging systems; however, these total effected acres are unknown.

Road management under Alternative 2 would increase the total miles of road within the project area by approximately 2.1 miles of permanently rocked roads. These roads would add to the overall acres of the landscape converted out of timber production for transportation/access routes. These new permanent roads combined with roads on other ownerships within the watershed would contribute to total watershed road densities; however, the proportional contribution is unknown.

3.5 ISSUE 3: WHAT ARE THE EFFECTS OF THE PROPOSED COMMERCIAL THINNING AND ROAD ACTIONS ON NORTHERN SPOTTED OWL HABITATS?

3.5.1 Affected Environment

Suitable habitat (i.e., nesting habitat) for Northern spotted owls (NSO) provides for all of the species’ live history requirements, and is also called Nesting/Roosting/Foraging (NRF) habitat. Within the landscapes of the Upper Willamette Resource Area, this habitat is generally described as conifer forest greater than 80 years old with at least 60-70% canopy cover and mature or late-seral characteristics such as large diameter trees with nesting structure (i.e., broken tops, cavities, or platforms), large side limbs, multiple canopy layers, large down logs and snags, and a somewhat open understory. Stands that show these characteristics, excepting nesting habitat, and provide for roosting and hunting opportunities are called foraging habitat. Foraging habitat is generally seen in conifer dominated stands at least 40-60 years old. Stands without NRF components, but with sufficient canopy cover and sub-canopy space for NSO movement and short-term roosting are referred to as dispersal habitat. These stands are used to facilitate owl movement at both the site and landscape scale, including juvenile dispersal, and may also provide minimal foraging opportunities if the habitat supports prey species. Dispersal (only) habitat is generally found in stands 40-80 years old.

Proposed harvest units are not in or near critical habitat designated in 2012.

Generally, the proposed units show relatively small tree size, simple structure, high tree density, mostly uniform age distribution, restricted sub-canopy flying room, and no snags. As a result, proposed harvest areas are characterized as dispersal habitat. Roughly half of these areas (especially in Riparian Reserves) are also functioning as moderate to low quality forage habitat due to slightly lower tree densities, slightly larger tree sizes, and some adequate sub-canopy flying space and down wood.

Overall, proposed harvest areas lack nesting structure due to their size, density, and lack of mature-late-seral characteristics. Occasional single large trees, or patches less than one acre, with potential nesting size structure are present in harvest areas, but they are not expected to provide nesting habitat because their crowns are above, and discontinuous with, the main stand canopy and any potential nesting structure is unfavorable exposed. These trees would be reserved from harvest.

Little to no suitable nesting habitat exists on nearby non-federal lands. Most non-federal land habitat is under 50 years old and predominately functions as dispersal and/or lower quality forage habitat. This is likely to be harvested soon due to harvest rotation intervals on these lands. Adjacent BLM lands have suitable habitat near Boulder Creek 35. This habitat is associated with a nearby known site (Osborn Knob) and is considered in the analysis.

3.5.2 Environmental Effects

**Alternative 1: No Action: Direct & Indirect Effects**

No direct or indirect effects to spotted owls or their habitat would occur under this Alternative. Stands would not be modified and no potential for noise disturbance would exist. The area would continue to provide for spotted owl use at current levels, and habitat development would continue along current trajectories. However, attainment of suitable nesting characteristic (i.e., larger trees) in thinned Matrix and Riparian Reserve lands would occur at a slower rate compared to the Action Alternatives.

For Osborn Knob, the site would not experience the adverse effects of degrading dispersal/forage habitat for 10-20 years after thinning. However, the site would not experience any eventual benefits to site habitat in Riparian Reserves.
Alternative 2: Increased Winter Harvest: Direct & Indirect Effects

Direct and Short Term Effects: No nesting habitat would be removed or adversely affected by project actions. Matrix and Riparian Reserve lands would be thinned and result in effects to spotted owl dispersal-only and dispersal-forage habitats due to degrading the quality and/or function of these habitats. Post-harvest canopy coverage is expected to be roughly 40-50%.

Treatments would reduce vertical and horizontal cover due to understory and overstory tree removal, with varying levels of residual tree density and size. Harvest would also damage existing shrub and herb layers, and may also damage or destroy some coarse woody debris and snags. A moderate and diverse shrub layer is favorable to spotted owls for foraging. However, some areas may experience exaggerated or excessive shrub growth after treatment which can actually impede foraging. Spotted owls would theoretically continue to utilize all treated areas as dispersal-only habitat because canopy cover would remain greater than 40%. Roughly half of treated stands are currently dispersal-forage habitat. These treated stands would generally not function as forage habitat until stand canopy and understory tree growth recovers in 10-20 years.

All harvest area sections would retain some untreated Matrix and Riparian Reserve lands which would continue to provide dispersal/forage habitat while treated stands recover.

Adverse effects to nesting behavior due to noise from project actions would likely not occur because: where nesting could occur close enough to project actions to be disturbed (near Boulder Creek 35) there would be seasonal operating restrictions on habitat removal and noise-disturbing actions from March 1 to July 15.

Indirect and Long Term Effects: Overall, thinning would accelerate tree growth and crown development and therefore the subsequent rate treated stands would become nesting or higher quality forage habitat compared to the No Action Alternative. The acres of treated Riparian Reserves would experience this benefit and would be available to spotted owls as improved habitat. However, treated Matrix lands would likely not realize this improvement and or availability to spotted owls as improved habitat because these stands could be regeneration-harvested in as little as 30-50 years. Therefore, at the project level and within Matrix lands, it is likely that the proposed action would contribute little to the long-term conservation needs of the spotted owl.

Alternatives 1 & 2: Cumulative Effects

The amount, location, and timing of reasonably foreseeable actions that could occur on BLM lands in the watersheds are not known at this time. BLM actions would likely be thinning harvest of similar habitats and/or regeneration harvest of mature-late seral stands. Non-federal lands in the watershed mostly provide some short term dispersal or low quality forage habitat because most of these lands are young to mid seral age stands with low amounts of down logs, snags and late-seral characteristics. Habitats on non-federal lands are generally not expected to improve within all temporal and spatial scales.

Effects determinations under ESA consultation are described in Section 5.0.

Effects to Site-Specific Nest Patch, Core Area and Provincial Home Range Habitat and Effects to Nesting due to Disturbance: “Degrading of habitat” due to thinning means that the quality of dispersal-only habitat and the function of dispersal-forage habitat would both be reduced to the lowest quality dispersal-only habitat (i.e., little/no forage qualities). This would persist until treated stands begin to recover in 10-20 years. Nest Patch habitat at any site would not be affected by the Action Alternatives.

For Osborn Knob, this site has two site centers 0.75 mile apart that represent different known pair activity centers for the site. Thinning would degrade no acres in the IDNO 19390 Core Area and 83 acres (19% of existing habitat) in the PHR. In IDNO 1939A, thinning would degrade 37 acres in the Core Area (25% of existing habitat) and 148 acres (23% of existing habitat) in the PHR.

Overall, the site would experience adverse effects to pair occupation or reproduction because:

1) Even before any harvest would occur, both IDNOs are “at risk” for successful pair occupation and reproduction due to low amounts of habitat in their Core Areas and PHRs; and
2) Because harvest areas in Boulder Creek 35 are very close to, and contiguous with, the 1939A location, they probably represent forage habitat that is important to successful reproduction at the site (i.e., foraging habitat for adults, rearing areas for young).

Additionally, on nearby private forest lands, several clear cut harvests have occurred recently and more are likely in the next few years. Overall, private lands are expected to provide little/no habitat for this site.
3.6 **ISSUE 4: WHAT ARE THE EFFECTS OF LOGGING SYSTEMS ON THE COST OF YARDING, ROAD CONSTRUCTION, MAINTENANCE AND RENOVATION?**

3.6.1 **Affected Environment and Methodology**

For this analysis, data includes estimated standing volume and proposed harvest volumes for the project area. The harvest stand map was prepared with ArcMap to compute the stand area to evaluate Net Volume Harvest estimates.

The following factors were used in the analysis:
- The pond values of Douglas fir logs of $440/MBF was used to complete calculations.
- Logging cost estimates from the appraisals of recent area timber sales was used to estimate ground based and cable stump to truck logging costs, ($184/MBF for ground based cost estimate, $296/MBF for cable cost estimate).
- A haul cost appraisal to Eugene, Oregon, was evaluated using BLM/Net Road Cost Estimating and was included as $47/MBF for Alternative 2.

<table>
<thead>
<tr>
<th>Table 3.2. Cost/benefit analysis by unit.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boulder Creek II 5</strong></td>
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<tr>
<td>Ground Based Acres</td>
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<tr>
<td>Ground Based Volume</td>
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<tr>
<td>Ground Based Logging Cost</td>
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<tr>
<td>Cable Acres</td>
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<tr>
<td>Cable Volume</td>
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<tr>
<td>Cable Logging Cost</td>
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<tr>
<td>Total Volume</td>
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<tr>
<td>Other Costs¹</td>
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<td>Road Construction Costs</td>
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<td>Road Renovation Costs</td>
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<td>CMPs/CPPs²</td>
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<td>Road Improvement Costs</td>
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<tr>
<td>Total Road Costs³</td>
</tr>
<tr>
<td>Total Costs</td>
</tr>
<tr>
<td>Total Value</td>
</tr>
<tr>
<td>Total Net Value</td>
</tr>
</tbody>
</table>

¹ Includes haul, road maintenance, decommissioning, and slash treatment.
² CMPs: corrugated metal pipes; CPPs: corrugated plastic pipes.
³ Includes road maintenance and decommissioning.

4.0 **LIST OF INTERDISCIPLINARY REVIEWERS**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Reviews/Contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panchita Paulete</td>
<td>Planning &amp; Environmental Specialist</td>
<td>NEPA</td>
</tr>
<tr>
<td>Mike Blow</td>
<td>Wildlife Biologist</td>
<td>Wildlife</td>
</tr>
<tr>
<td>Rudy Wiedenbeck</td>
<td>Soil Scientist</td>
<td>Soils</td>
</tr>
<tr>
<td>Jessica LeRoy</td>
<td>Engineer</td>
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</tr>
<tr>
<td>Steve Liebhardt</td>
<td>Fisheries Biologist</td>
<td>Fisheries</td>
</tr>
<tr>
<td>Todd Bush</td>
<td>Hydrologist</td>
<td>Hydrology</td>
</tr>
<tr>
<td>Cary Swain</td>
<td>Forester</td>
<td>Logging Design</td>
</tr>
</tbody>
</table>

5.0 **CONSULTATION**

ESA consultation considers effects to general habitat due to habitat modification, and effects to site occupation and reproduction due to habitat modification and nesting behavior due to noise disturbance/disruption. Collectively these considerations result in an overall effects determination of project actions. Consultation was conducted under the two following batched Province BAs:

1. Biological Assessment of NLAA Projects with the Potential to Modify the Habitat and/or Disrupt Northern Spotted Owls Willamette Planning Province - FY 2011-2012, and;
2. Biological Assessment of LAA Projects with the Potential to Modify the Habitat and/or Disrupt Northern Spotted Owls Willamette Planning Province - FY 2011-2012.

Consistent with the above documents, Alternative 1 would result in a no effect determination to spotted owls or their habitat. Alternative 2 would result in a may affect, but not likely to adversely affect determination for Boulder Creek II 5, but would result in a may affect, likely to adversely affect determination for Boulder Creek II 35 due to affects to the Osborn Knob site.

6.0 REFERENCES


APPENDIX A: PROJECT DESIGN FEATURES

HARVEST
1. Retain all incense-cedar, yew, oaks and other hardwoods, except where necessary to accommodate safety and logging systems.
2. Apply seasonal restrictions or suspension of all harvest and road activities that would occur within 1/4 mile (or more) of known nesting great blue herons, 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.
3. Apply reasonable and prudent measures, in consultation with the United States Fish and Wildlife Service, to minimize disruption to Northern spotted owl pair nesting behavior and their progeny, including:
   a. For harvest and related actions in harvest areas Boulder 35 (T17S, R1W, Sec 35) - 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. Post-harvest road decommissioning and hauling are not subject to this restriction.
4. Snag, Down Log, and Large Tree Retention: All snags > 12 inch diameter, all down logs in decay classes 3-4-5, and all large trees (> 28 inch dbh) would be retained undamaged when possible, and would not be cut except those in road construction, landings, and yarding corridors, and those posing a safety hazard.
5. Falling and Yarding Techniques to protect snags, down logs, and large retention trees: Wherever feasible, place cable corridors and skid trails on the landscape to avoid felling or damaging large retention trees, snags and down logs. Utilize, when operationally feasible, falling and yarding techniques for the protection of large retention trees, existing down log and snags, and reserve areas.
6. Snag and Down Log Creation: Within treated portions of Riparian Reserves (depicted on Exhibit A-1) create an average of 120 linear feet/acre of down wood (2 trees per acre) and 3 snags/acre in all harvest areas. Treated trees:
   a. Shall be >18 and < 26" dbh.
   b. Shall be live and not contain visible bird-mammal nests, sloughing bark, cavities, broken leaders, or other notable deformities.
7. Retain conifers greater than 20 inch dbh in treated Riparian Reserves, except where necessary to accommodate safety and logging systems. Cut trees larger than 20 inch dbh would be left on site as coarse woody debris.
8. Down logs and root wads that present a hazard to logging operations or that are needed to close roads may be relocated within the project area.
9. Limit log lengths to 40' in length where necessary to minimize damage to residual trees, snags and coarse woody debris during yarding.
10. Apply the following requirements to skyline yarding areas:
   a. Require one-end suspension of logs while skidding and cable yarding. Intermediate supports may be required to accomplish this objective.
   b. To minimize impacts to residual trees and soils, spacing of cable corridors should be kept to 150 feet apart and limited to 12 feet in width.
   c. As determined by the Authorized Officer, if needed skyline yarding corridors with severe gouging would be left in an erosion resistant condition by the use of hand water barring or placement of wood debris.
11. Mechanized harvesting systems may be approved when:
   a. Movement of cutting equipment off designated skid trails shall be limited to a single pass.
   b. Mechanized harvester shall travel on the cushion of slash created by the harvesting process
   c. Where slopes are less than 45% in Matrix and 35% in Riparian Reserves
   d. When soil moistures are low (<25%) and provides resistance to compaction (typically July 1st – Oct 1st), unless waived by soil scientist.
12. Apply the following requirements to ground base yarding areas:
   a. Require felling of trees to lead of the skid trails and maximize winching distances.
   b. Placement of skid trails would be avoided within 150 feet of streams where feasible. All skidding equipment would remain on the designated skid trails.
   c. Skid trails should be 12 feet wide or less. Average distance between skid trails would be 150 feet or greater where feasible. Use existing skid trails or OHV trails, where possible. Avoid placing skid trails on rocky soils.
   d. Restrict yarding to seasonally dry period when soil moisture content provides the most resistance to compaction. This is usually July 1st and October 1st.
e. Till, where feasible, compacted skid trails, with an excavator to a depth of 18 inches, when soil moisture is appropriate. Other equipment may be authorized if it can accomplish the required depth, lateral shatter of compacted layer, and place woody debris on the decompacted surfaces.

f. Minimize damage to residual tree roots adjacent to trails.

g. To reduce erosion and restore soil productivity, pull slash, logging debris and brush from forest floor onto severely compacted skid trails in consult with the Authorized Officer.

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.

13. Keep a Spill Contamination Kit (SCK) on-site during any operation within the project area; prior to starting work each day, all machinery would be checked for leaks and necessary repairs would be made.

14. Removal, notification, transport and disposal of any diesel, hydraulic fluid, or other petroleum product released into soil and/or water would be accomplished in accordance with all applicable laws and regulations.

ROAD CONSTRUCTION AND USE

15. Limit use of native surfaced roads to the dry season (generally between July 1 and October 1).

16. Waterbars, drain dips, and/or lead-off ditches may be required to create an erosion resistant condition on roads during seasonal closures. Access to such roads shall be blocked during closures.

17. Apply Oregon Department of Fish and Wildlife (ODFW) in-water guidelines to all in stream activities. Work would be done between the dates of July 1st through October 15th.

18. Require the following along perennial streams:
   a. Stream flow would be routed around the 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 worksite.
   e. After installation, the disturbed section would be planted with native seed and mulched with native straw or wood mulch before the first rains

19. Implement the following combination of methods during heavy and/or prolonged rainfall or freezing and thawing periods to minimize sedimentation from the gravel surfaced roads into stream channels:
   a. keep ditch line, cross drains, and leadoff ditches clean and free to flow, while minimizing disturbance to existing ditch line vegetation.
   b. Sediment traps may be installed in ditch lines lacking vegetation and having the potential to deliver sediment to streams.
   c. Prior to and during haul operation, rock surfacing and road maintenance would be assessed throughout the project area and haul route.
   d. If erosion and road degradation occur after freeze and thaw periods, log haul operations may be discontinued.

DECOMMISSIONING

20. Position fill or waste material from road decommissioning in a location that would avoid direct or indirect sediment discharges to streams or wetlands. Pull back stream banks at removed crossings to an angle of natural repose.

21. Till, where road sub grade conditions warrant, compacted road surfaces with an excavator when soil moisture is appropriate (generally July 1 to October 1). 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 the entire length of tilled roadbed to reduce erosion, maintain soil productivity and block access.

22. Block vehicle access where appropriate with earthen barricades with brush and/or slash additions.

23. Remove and dispose of pulled culverts appropriately.

FUELS

24. Cover and burn all landing piles along roads.

25. Pile, cover and burn slash, less than 6" in diameter and greater than 3' in length, within 25 feet of either side of designated (typically permanent) roads within harvest areas.
26. Scatter landing piles, along temporary roads, on top of the road surface to remove the fuel concentrations, deter OHV use and slow erosion. Resulting fuel bed would not be deep and continuous. Piles along temporary roads not scattered on the road surface would be covered and burned.

27. Cover all piles to be burned with plastic in compliance with the Oregon Smoke Management Plan.

**OTHER**

28. Prevent the spread of noxious weeds from other locations, by washing logging, road construction, and tilling equipment prior to entry on BLM lands.

29. Cultural resource surveys would be completed prior to harvest. If sites are found within the project area appropriate actions would be taken to mitigate effects to the sites.
**APPENDIX B: ROADS TABLES**

**Table B-1: Temporary Road Construction.**

<table>
<thead>
<tr>
<th>Road #</th>
<th>Length (miles)</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Spur BC5A</td>
<td>0.2</td>
<td>Native Surfacing</td>
</tr>
<tr>
<td>Spur BC5B</td>
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<td>Spur BC35B</td>
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</tr>
<tr>
<td>Spur BC35C</td>
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<td>Native Surfacing</td>
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<tr>
<td>17-1-36.1 Seg. B</td>
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<td>Rock Surfacing, install 1 temporary stream culvert</td>
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<tr>
<td>17-1-36.1 Seg. C</td>
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<td><strong>Approximate Total</strong></td>
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**Table B-2: Permanent Road Construction.**

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<thead>
<tr>
<th>Road #</th>
<th>Length (miles)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-1-5.4</td>
<td>0.7</td>
<td>4&quot;- 8&quot; rock, install 1 to 6 cross drains and 1 stream culvert</td>
</tr>
<tr>
<td>18-1-5.5 Seg. A</td>
<td>0.2</td>
<td>4&quot;- 8&quot; rock, install 1 to 3 cross drains and 1 stream culvert</td>
</tr>
<tr>
<td>18-1-5.5 Seg. B</td>
<td>0.2</td>
<td>4&quot;- 8&quot; rock</td>
</tr>
<tr>
<td>18-1-5.6 Seg. A</td>
<td>0.4</td>
<td>4&quot;- 8&quot; rock, install 1 to 4 cross drains and 1 stream culvert</td>
</tr>
<tr>
<td>18-1-5.6 Seg. B</td>
<td>0.3</td>
<td>4&quot;- 8&quot; rock</td>
</tr>
<tr>
<td>18-1-5.7</td>
<td>0.1</td>
<td>4&quot;- 8&quot; rock</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Approximate Total</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>1.9</strong></td>
</tr>
</tbody>
</table>

**Table B-3: Road Renovation.**

<table>
<thead>
<tr>
<th>Road #</th>
<th>Length (miles)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-1-32</td>
<td>0.5</td>
<td>Rock, Install 0-3 cross drains</td>
</tr>
<tr>
<td>17-1-34</td>
<td>1.1</td>
<td>Rock, Install 1 cross drain and 1 stream culvert</td>
</tr>
<tr>
<td>17-1-36.1 Seg. A</td>
<td>0.4</td>
<td>Rock, Reopen decomm road, Install 1 cross drain</td>
</tr>
<tr>
<td>18-1-5.1</td>
<td>0.4</td>
<td>Rock, Install 0-3 cross drains</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Approximate Total</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>2.4</strong></td>
</tr>
</tbody>
</table>

**Table B-4: Road Decommissioning (short term < 5 years).**

<table>
<thead>
<tr>
<th>Road #</th>
<th>Length (miles)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-1-36.1 Seg. B</td>
<td>0.2</td>
<td>Barricade, remove stream culvert</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Approximate Total</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>0.2</strong></td>
</tr>
</tbody>
</table>

**Table B-5: Road Decommissioning (permanent).**

<table>
<thead>
<tr>
<th>Road #</th>
<th>Length (miles)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spur BC5A</td>
<td>0.2</td>
<td>Barricade, Till</td>
</tr>
<tr>
<td>Spur BC5B</td>
<td>0.2</td>
<td>Barricade, Till</td>
</tr>
<tr>
<td>Spur BC5H</td>
<td>0.6</td>
<td>Barricade, Till</td>
</tr>
<tr>
<td>Spur BC5M</td>
<td>0.3</td>
<td>Barricade, Till</td>
</tr>
<tr>
<td>Spur BC5O</td>
<td>0.4</td>
<td>Till</td>
</tr>
<tr>
<td>Spur BC5P</td>
<td>0.2</td>
<td>Till</td>
</tr>
<tr>
<td>Spur BC35A</td>
<td>0.1</td>
<td>Barricade, Till</td>
</tr>
<tr>
<td>Spur BC35B</td>
<td>0.2</td>
<td>Barricade, Till</td>
</tr>
<tr>
<td>Spur BC35C</td>
<td>0.1</td>
<td>Barricade, Till</td>
</tr>
<tr>
<td>17-1-36.1 Seg. C</td>
<td>0.6</td>
<td>Barricade, Till</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Approximate Total</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>2.9</strong></td>
</tr>
</tbody>
</table>