Salem District Aquatic and Riparian Habitat Restoration - Revised

Environmental Assessment and Finding of No Significant Impact (EA)
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Oregon State Office, Salem District
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BLM Salem District

As the Nation's principal conservation agency, the Department of Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering economic use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

BLM/OR/WA/AE-12/015+1614

Cover Photo: Rickreall Creek in the Marys Peak Field Office

Note: EA Section headings containing revised text are highlighted.

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ENVIRONMENTAL ASSESSMENT

1.0 INTRODUCTION

This Environmental Assessment is a revision of the Aquatic and Riparian Restoration EA issued in 2012. The Salem District is revising this EA to incorporate changes to project categories and design features because the National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service issued new Biological Opinions for aquatic restoration in Oregon and Washington, referred to as ARBO II, in 2013. The original EA (see pages 17-18, sections 8.0 and 10.0), identified project design features from an earlier version of the aquatic restoration biological opinions but stated that these design features would be replaced by the design features in the new biological opinions when they were issued. EA sections 8.0 and 10.0 describe the ARBO II project design criteria for the proposed projects.

This EA will analyze the impacts of the proposed project on the human environment. The EA will provide the decision-maker, the Salem District Manager, with current information to aid in the decision-making process. EA section 1.0 provides a context for what will be analyzed in the EA, describes the kinds of actions we will be considering, and identifies the criteria that we will use for choosing the alternative that will best meet the purpose and need for this proposal.

Summary of Proposed Action

The Bureau of Land Management (BLM) proposes to complete a variety of aquatic and riparian habitat restoration activities on BLM-administered lands and non-BLM-administered lands within the Salem District (Figure 1). This Aquatic and Riparian Habitat Restoration Environmental Assessment (EA) addresses a suite of activities to maintain and restore watershed conditions, establishes the scope and sideboards of the activities, and provides an analysis of the environmental consequences of the typical projects. All proposed activities in streams with ESA-listed fish are consistent with actions identified by National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS) in the Biological Opinion for Aquatic Restoration Activities in Oregon and Washington (ARBO II). The USFWS, NMFS and BLM identified these programmatic activities because they have predictable effects to species and habitat regardless of their location of treatment.

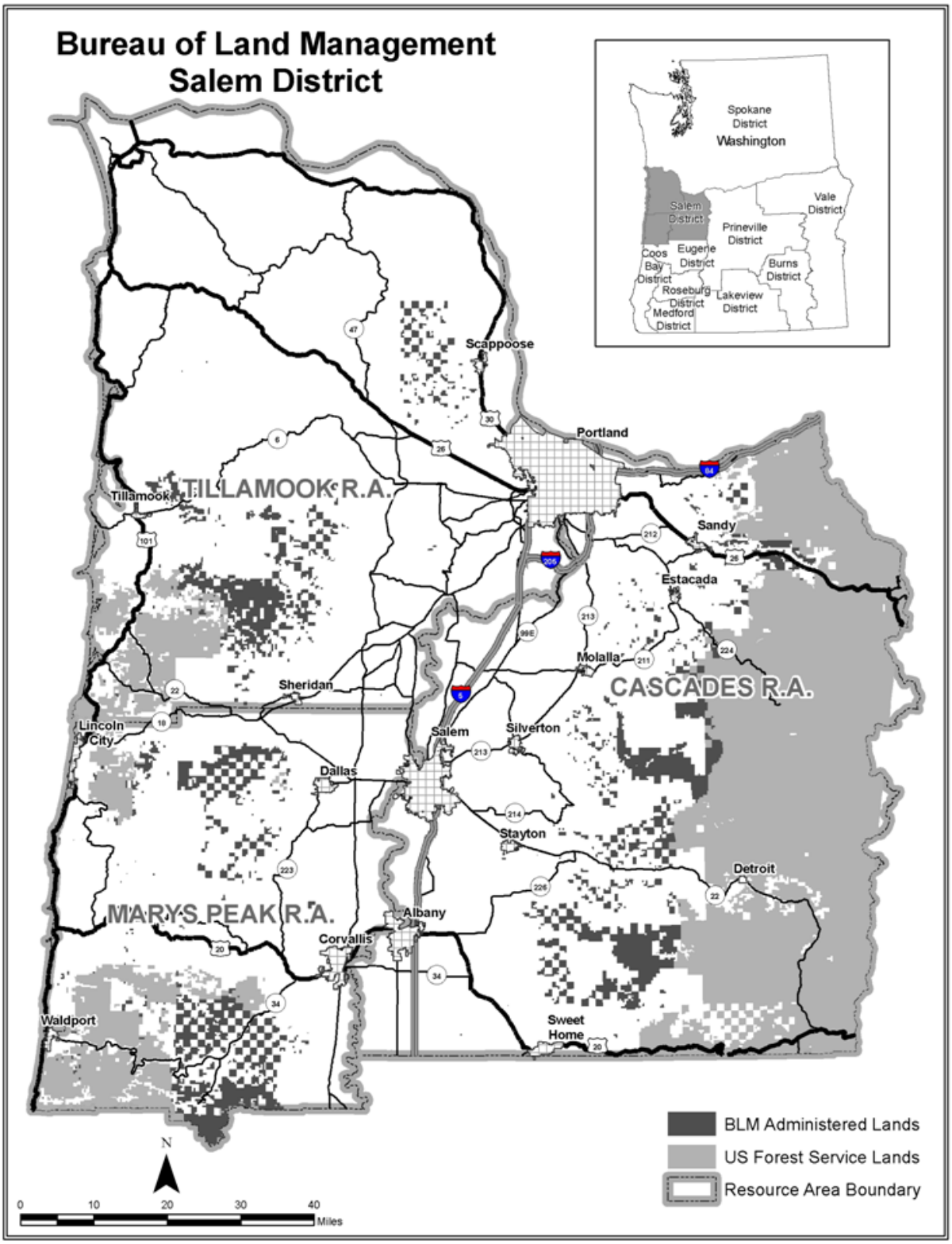
This EA documents the following changes in the proposed action. The revised proposed action now includes:

- Replacing deep culverts with greater than 20 feet of fill material over the culvert.
- Large wood projects in river channels greater than 100 feet wide.

The revised proposed action has dropped non-commercial thinning in riparian because ARBO II does not cover this action. Non-commercial thinning in riparian would need separate NEPA analysis.

EA sections 2.3.2 and 8.0 describe project design features for these actions. EA sections 3.1.2 and 3.2.2 describe the effects of these actions.

Figure 1: Salem District



1.1 Purpose of and Need for Action

The purpose of this action is to use aquatic and riparian restoration activities identified in the National Marine Fisheries Service (NMFS) (2013) and the United States Fish and Wildlife Service (USFWS) (2013) Biological Opinions (NMFS: 2013/NWP-2013-9664; USFWS: 01EOFW00-2013-F-0090) for Programmatic Consultation on Aquatic Restoration Activities in Oregon and Washington (ARBO II) to improve aquatic and riparian habitat on BLM-administered lands and non-BLM-administered lands. Project activities would include:

- Large Wood, Boulder, and Gravel Placement
- Reconnection of Existing Side Channels and Alcoves
- Streambank Restoration
- Fish Passage Culvert and Bridge Projects
- Head-cut Stabilization and Associated Fish Passage
- Riparian vegetation treatments
- Road Treatments

The proposed actions are designed to meet the objectives of the Northwest Forest Plan (NWFP) and the Salem District Resource Management Plan (RMP). This project would implement a number of the riparian-related management objectives in the Salem District RMP.

The following describe the purpose for the action:

- Promote the rehabilitation of at-risk fish stocks and their habitat as directed (RMP p. 27).
- Design and implement fish habitat restoration and enhancement activities in a manner that contributes to attainment of Aquatic Conservation Strategy objectives. (RMP p. 27)
- Rehabilitate streams and other waters to enhance natural populations of anadromous and resident fish. Rehabilitation measures may include, but not be limited to fish passage improvements; instream structures using boulders and log placement to create spawning and rearing habitat; placement of fine and coarse materials for overwintering habitat; and establishment or release of riparian coniferous trees. (RMP p. 27-28).
- Meet Aquatic Conservation Strategy objectives by reconstructing roads and associated drainage structure that pose a substantial risk; and closing and stabilizing, or obliterating and stabilizing roads (RMP p. 62)
- Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams (RMP p. 63).

The need for action has been established through the results of aquatic habitat inventories, monitoring, and watershed analysis which indicate that the current condition of many stream channels and riparian areas on BLM-administered lands and non-BLM-administered lands within the Salem District are not properly functioning. Culvert assessments indicate there are numerous culverts on the Salem District that are undersized for meeting 100 year flow events, are increasingly at risk of failure due to age and deterioration, and are currently passage barriers for anadromous and resident fish.

While the proposed actions would generally be focused on streams with anadromous salmonid species, some actions are also likely to be implemented in stream reaches with only resident fish species.

Stream and rivers on the Salem District provide spawning and rearing habitat for several species of anadromous salmonids listed as 'threatened' under the Endangered Species Act of 1973 (ESA), including Upper Willamette River (UWR) winter run steelhead trout (*Oncorhynchus mykiss*), UWR spring Chinook salmon (*O. tshawytscha*), Lower Columbia River (LCR) steelhead trout, LCR Chinook salmon, LCR Coho salmon (*O. kisutch*), and Oregon Coast Coho salmon. The shortage of high quality aquatic habitat limits recovery of Coho and Chinook salmon and steelhead trout. Coastal cutthroat trout (*O. clarki clarki*), with either resident or anadromous life histories, are also found in most streams.

Given the checkerboard land ownership pattern, restricted ownership in certain watersheds, and limited resources, the BLM recognizes that aquatic restoration cannot be accomplished exclusively by the BLM-administered lands.

As such, the BLM partners with other federal agencies (such as the Forest Service), state agencies (such as Oregon Department of Fish & Wildlife), private timber companies, watershed councils and other non-profit organizations to accomplish watershed restoration. Such partnering may include funding or cost-sharing and/or contributions of expertise, materials, or equipment, and may contribute to aquatic restoration work occurring on non-BLM-administered land. This EA considers projects on BLM-administered lands and projects on private lands where the BLM has provided either full funding or partial funding as a partnering agency.

Need for Revised Actions

Large wood projects in river channels greater than 100 feet wide: Advances in restoration theory and design have made placement of wood in channels greater than 100 feet in width a more commonly accepted practice for enhancement of aquatic habitats. Large wood in these systems function to retain gravels, promote hyporheic flow, connect floodplains, store water, and provide habitat for aquatic organisms. The restoration of these natural processes has been identified as a high priority for the recovery of federally-listed fish species. The Salem District manages several larger rivers that are in need of large wood enhancement to restore these processes. The inclusion of larger streams in the Aquatic Restoration EA would support the District's objective of implementing recovery actions and improving water quality.

Replacing deep culverts with greater than 20 feet of fill material: District resource specialists have observed failing large culverts with more than 20 feet of fill material. Lifting the fill restrictions allows more opportunities to replace at risk culverts with deep fills that pose a potentially greater risk to water quality and aquatic habitat if they were to fail than the at risk culverts with shallower fills. This is due to the sheer quantity of fill material (sediment) that would enter the stream channel. Changing this requirement would also provide more opportunities to address fish passage and upgrade culvert size to meet the 100 year flow requirement. The RMP directs us to replace culverts that impede fish passage with culverts that allow fish passage. Most of the smaller culverts have been replaced. Many of remaining culverts require greater than 20 feet of fill material.

1.2 Decision Criteria/Project Objectives

The BLM will use the following criteria/objectives in selecting the alternative to be implemented. The BLM will select the alternative that would best meet these criteria. The selected action would:

- Meet the purpose and need of the project (EA section 1.1);
- Comply with the Salem District Record of Decision and Resource Management Plan, May 1995 (RMP); and related documents which direct and provide the legal framework for management of federal lands within the project area (EA section 1.3);
- Not have significant impacts on the affected elements of the environment beyond those already anticipated and addressed in the RMP/EIS;
- Provide high quality spawning and rearing habitat and increase aquatic habitat complexity in stream and river side-channels for salmon and steelhead;
- Provide for fish passage at road crossings;
- Facilitate the development of riparian forest and shrub stands to shade stream channels to maintain water quality; and
- Minimize road erosion and sediment impacts to water quality.

1.3 Conformance with Land Use Plan, Statutes, Regulations, and other Plans

The Salem District Aquatic and Riparian Habitat Restoration Project proposal has been designed to conform to the following documents, which direct and provide the legal framework for management of BLM lands within the Salem District:

- *Salem District Record of Decision and Resource Management Plan*, May 1995 (RMP) as amended.
- *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl, April 1994 (the Northwest Forest Plan, or NWFP).*
- *Record of Decision and Standards and Guidelines for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (S&M ROD, January 2001), as amended.*

The 1995 Salem District Record of Decision and Resource Management Plan (RMP), as amended, incorporated the Aquatic Conservation Strategy, a component of the Northwest Forest Plan, to guide the District in meeting watershed restoration objectives, including but not limited to:

- Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

- Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in 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.
- Maintain and restore the sediment regime under which an aquatic ecosystem evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.
- Maintain and restore habitat to support well distributed populations of native plant, invertebrate, and vertebrate riparian dependent species.
- Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability (RMP, p. 5-6).

The RMP also explained that "the most important components of a watershed restoration program are control and prevention of road related runoff and sediment, restoration of the condition of riparian vegetation, and restoration of instream habitat complexity" (p. 7). Management Actions/Directions addressing watershed restoration cited the following priorities: completion of restoration plans prior to restoration activities; focusing restoration on the removal of some roads and, where needed, upgrading remaining roads; applying silvicultural treatments to restore large conifers in Riparian Reserves; and using instream structures to restore stream channel complexity in the short term.

The analysis in the Salem District Aquatic and Riparian Habitat Restoration EA supplements analyses found in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement*, September 1994 (RMP/FEIS), the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl*, February 1994 (NWFP/FSEIS). The RMP/FEIS is amended by the *Final Supplemental Environmental Impact Statement for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, November 2000.

The above documents are incorporated by reference in this environmental analysis and are available for review in the Salem District Office.

Survey and Manage Species Review

On February 18, 2014, the District Court for the Western District of Washington issued a remedy order in the case of *Conservation Northwest et al. v. Bonnie et al.*, No. 08-1067- JCC (W.D. Wash.)/No.11-35729 (9th Cir.). This was the latest step in the ongoing litigation challenging the 2007 Record of Decision (ROD) to modify the Survey and Manage (S&M) Standards and Guidelines.

The remedy order had the result of returning the BLM to the status quo in existence prior to the 2007 RODs.

The prior status quo includes the use of the 2001, 2002, and 2003 Annual Species Reviews (ASRs) (except the change/removal made for the red tree vole), and the "Pechman exemptions" (October 11, 2006). The Pechman exemptions are described as follows.

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.*

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 will remain subject to the survey and management requirements except for thinning of stands younger than 80 years old under subparagraph a. of this paragraph."*

The aquatic and riparian habitat restoration projects meet Pechman exemptions B and C for the following reasons. The projects meet:

- Pechman Exemption B for the projects that replace culverts on roads that are in use and part of the road system, and remove culverts on roads to be decommissioned.
- Pechman Exemption C for riparian and stream improvement projects where the work is riparian planting, obtaining material for placing in-stream, and road decommissioning; and where the stream improvement work is the placement large wood, channel and floodplain reconstruction.

1.3.1 Relevant Statutes/Authorities

This section is a summary of the relevant statutes/authorities that apply to this project. Additional statutes/authorities that apply to this project are shown in Table 4 (EA section 3.6).

- **Federal Land Policy and Management Act (FLPMA) 1976 –** Defines BLM's organization and provides the basic policy guidance for BLM's management of public lands.
- **National Environmental Policy Act (NEPA) 1969 –** Requires the preparation of environmental impact statements for Federal projects which may have a significant effect on the environment.
- **Endangered Species Act (ESA) 1973 –** Directs Federal agencies to ensure their actions do not jeopardize threatened and endangered species.
- **Clean Water Act (CWA) 1987 –** Establishes objectives to restore and maintain the chemical, physical, and biological integrity of the nation's water.
- **The Omnibus Consolidated Appropriations Act of 1997, Wyden Amendment -** Public Law 104-208, Section 124 as amended by Public Law 105-277, Section 136 (16 U.S.C. 1011(a)) provides authority for the Secretary of Interior to enter into cooperative agreements with other federal agencies, tribal, state, and local governments, private and nonprofit entities, and landowners for the protection, restoration, and enhancement of fish and wildlife habitat and other resources on public or private land.

1.4 Scoping

The BLM sent out a scoping letter describing the Salem District Aquatic and Riparian Habitat Restoration project to 41 federal, state and municipal government agencies, tribal authorities, and interested parties on May 13, 2011. One comment (from Oregon Wild) was received on the scoping letter. The comment indicated support for the implementation of aquatic restoration activities on the District.

2.0 ALTERNATIVES

2.1 Alternative Development

Pursuant to Section 102 (2) (E) of the National Environmental Policy Act (NEPA) of 1969, as amended, Federal agencies shall "…study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." No unresolved conflicts concerning alternative uses of available resources (section 102(2) (E) of NEPA) were identified. No alternatives were identified that would meet the purpose and need of the project and have meaningful differences in environmental effects from the Proposed Action. Therefore, this EA will analyze the effects of the "Proposed Action" and the "No Action Alternative" in this project area.

2.2 No Action Alternative

The No Action alternative describes the baseline against which the effects of the proposed action can be compared, i.e. the existing conditions in the project area and the continuing trends in those conditions if the BLM does not implement the proposed project. Under the No Action Alternative, the Salem District would not pursue any of the programmatic enhancement actions proposed in this analysis. There would be no process in place to facilitate and expedite implementation of riparian or aquatic enhancement. NEPA documentation of enhancement projects would continue to rely on individual environmental assessments for each project.

2.3 Proposed Action

Under the proposed action, a range of watershed restoration actions would be undertaken, grouped into the categories described below: instream habitat, roads and culverts, and riparian treatments.

All proposed projects would be consistent with actions identified by National Marine Fisheries Service (NMFS) (Fisheries BO NWP-2013-9664), the United States Fish and Wildlife Service (USFWS) (Wildlife 01EOFW00-2013-F-0090) for Programmatic Consultation on Aquatic Restoration Activities in Oregon and Washington, or, when appropriate, the NMFS Biological Opinion for Programmatic Activities of USDA Forest Service, USDI Bureau of Land Management, and Coquille Indian Tribe in Western Oregon. (NMFS BO No. 2010/02700).

The proposed actions included in this programmatic assessment all have predictable effects regardless of where they are carried out and have been implemented repeatedly in the Salem District.

The proposed action addresses a suite of activities intended to restore watershed conditions. Site specific projects identified in the future would be assessed for consistency with the scope and effects addressed in this EA. To ensure consistency and to examine site specific conditions and effects, the BLM would determine NEPA adequacy prior to any project implementation.

The determination would examine the project location and the proposed activities and identify applicable project design criteria. Projects found to be consistent with the scope and effects of the projects analyzed in this EA would be implemented. Those that do not would be modified to be consistent with the EA, or would require a separate NEPA analysis.

Table 1 identifies the amount of restoration work anticipated to occur under the proposed action. The Typical Year is the average assumed amount of this activity performed in a single year. The Annual Maximum is the assumed limit of activity to be performed in a single year, listed for both the district and any single 5th field watershed. The restoration categories are further described in EA sections 2.3.1 and 2.3.2.

Table 1: Proposed Annual Restoration Work

Restoration Category	Typical Year	Annual Maximum
Instream structure and gravel placement - helicopter placement	1 project for a total of 3 miles	*District:* 15 stream miles *5th Field Watershed:* 5 stream miles
Instream structure and gravel placement - excavator-type placement	2 projects in two 5th fields for a total of 3 miles	*District:* 10 stream miles *5th Field Watershed:* 4 stream miles
Reconnection of existing side channels and alcoves	1 project for a total of 1 mile	*District:* 1 stream mile *5th Field Watershed:* 1 stream mile
Streambank restoration	Not done in a typical year	*District:* 1 stream mile *5th Field Watershed:* 1 stream mile
Head cut stabilization	Not done in a typical year	*District:* 1 stream mile *5th Field Watershed:* 1 stream mile
Fish passage - culvert and bridge replacements	2 projects in two 5th fields for a total of 4 structures	*District:* 10 structures *5th Field Watershed:* 4 structures
Road-sediment treatments	1 project for a total of 1 mile	*District:* 10 road miles *5th Field Watershed:* 5 road miles
Non-commercial riparian vegetation treatments – riparian planting	10 projects in ten 5th fields for a total of 50 acres	*District:* 100 acres *5th Field Watershed:* 20 acres

2.3.1 Proposed Treatments

2.3.1.1 In-stream Habitat Projects

Objective

Stream projects aim to improve aquatic habitat through increased habitat complexity. Through increasing channel complexity and stability, the projects seek to increase spawning gravel retention and form pool habitat for adult holding and juvenile rearing. Project activities are also intended to improve hydrologic function of floodplains and stabilize channel banks.

In-stream structure and gravel placement

Place large wood and/or boulders in stream channels and adjacent floodplains to increase channel stability, rearing habitat, pool formation, spawning gravel deposition, channel complexity, hiding cover, low velocity areas, and floodplain function. Large wood (LW) and boulder projects would be designed to allow fish passage through or over structures at all stream flows. Large wood, boulder, boulder weirs and gravel projects could include the use of log trucks and dump trucks for transport and excavator-type machinery, spyders, cable yarders, draft horses, or helicopters for placement.

The original proposed action included engineered log jams requiring extensive anchoring and excavation in main-stem channels with active channel widths up to 100 feet. ARBO II includes criteria for constructing engineered log jams and does not limit where this technique is allowed. There are streams with active channels greater than 100 feet that are lacking fish habitat structures such as the Sandy River, Salmon River and Molalla River. Therefore the revised proposed action expands the area where engineered log jams requiring extensive anchoring and excavation can take place to include main-stem channels with active channel widths greater than 100 feet. EA sections 3.1.2 and 3.2.2 describe the effects of the expanded widths.

Logs would be placed to imitate natural accumulations of LW throughout the proposed restoration reaches including single logs or log jams. Logs used in the stream channel would be of sufficient diameter and length to resist downstream movement. When available, key logs/trees would meet the ARBO II LW size criteria (EA section 8.0).

When such logs/trees are not available, functionally equivalent logs/trees would be used, i.e., a log or tree that would remain relatively stable and placed in a manner that minimizes downstream movement. Structures that utilize several large key pieces with smaller materials intermixed provide better stability and habitat complexity as opposed to a single large piece. To the extent possible, single logs and log jam structures would be keyed into existing streamside trees or boulders to provide stability and help keep them in place during high flow events. If LW is anchored, it would be anchored consistent with ARBO II criteria (EA section 8.0). Key LW and boulders (footings) may be buried into the streambank or channel.

Trees cut from streamside stands would be felled directly into the channel, some may be repositioned with a come-along or similar device in inaccessible reaches or with heavy equipment in the accessible reaches.

All logs would be placed or felled into the stream channel and floodplain, with some logs extending into or beyond the riparian area. Logs that extend beyond stream habitats, into riparian zones and/or uplands would increase connectivity for riparian-dependent invertebrate and vertebrate species.

Whole trees from the adjacent riparian area or off-site would be used for instream large wood. Logs would be either cut, tipped and yarded from the adjacent riparian stand or transported to the site using helicopters or trucks on established roads. Trees may be removed by cable, ground-based equipment, horses or helicopters.

The action would remove single trees or groups (<5), selected within the first two line of trees adjacent to existing openings such as roads, young stands, and clear cuts. Trees would be felled onto existing roads/skid roads or lined to existing roads. Trees may be felled directly into the stream channel from adjacent forested stands. Trees selected from the riparian area would only be selected from fully stocked riparian stands. Wind-blown down trees adjacent to roads may also be used.

Tree source areas would primarily be from the Riparian Reserve, Late-Successional Reserve or Adaptive Management Area land use allocations. Trees may also be purchased or donated from non-Federal lands or may be derived from other actions on Federal lands that have separate environmental analysis and consultation (if appropriate).

Reconnection of existing side channels and alcoves

Reconnect and/or restore historic side channels and alcoves to increase rearing habitat for juvenile fish. This action includes the removal of artificially created plugs which block water movement through side channels and alcoves. Side channel and alcove improvements include fill removal within channels and alcoves, large wood and/or boulder placement, riparian planting etc. Boulder and LW placement may be used in the main river to stabilize the channel and bring the entrance of the side channel into alignment. New side channels and alcoves can be constructed in geomorphic settings that would accommodate such features. Construction would involve use of heavy equipment, such as excavators, spyders, backhoes, and dump trucks.

Streambank restoration

Activities would include installation of stream bank stabilization structures (e.g., rock vanes, tree revetments, and willow mats) to stabilize stream banks and help riparian vegetation recovery. Stabilization structures would be placed and anchored within the toe and bank areas of stream channels. Streambank excavation may occur to accommodate stabilization structures. Stream banks may be contoured to facilitate planting. Heavy equipment may be used to complete these activities, and may be in the stream channel, on banks, or on the road. Use of dikes, groins, buried groins, drop structures, porous weirs, weirs, riprap, rock toes, and similar structures to stabilize streambanks are not included.

Head cut stabilization and associated fish passage

Stabilize active or potentially active head-cuts to prevent further channel degradation (upstream migration of head-cut) and to promote downstream channel aggradation. Activities would include installation of rock/boulder or log-step-pool structures to prevent head cuts and channel degradation and increase fish passage.

2.3.1.2 Road and Culvert Projects

Objective

Remove or replace existing road-stream crossing structures-culverts and bridges-that restrict fish passage with stream simulation structures to restore up- and downstream passage for all life stages of native fish.

Road improvements aim to reduce existing erosion from road surfaces, cut banks and fill slopes, and reduce probability of failure via improvement of road surface stability and drainage. Culvert removal or replacement seeks to reduce sediment production and increase aquatic and hydrologic connectivity. Project locations would include roads delivering chronic sediment to streams or locations that have road or culvert failure potential.

The objectives of decommissioning include: improve water quality by reducing short and long term road related sediment; restore hydrological processes modified by water routing and compaction; reduce road maintenance cost; and reduce impacts to aquatic and wildlife resources.

Fish passage - Culvert and bridge replacements

Remove or replace existing road-stream crossing structures (culverts and bridges) that restrict fish passage with stream simulation structures to restore up- and downstream passage for all life stages of native fish. Replacement of existing road-stream crossing structures on fish-bearing streams that do not restrict fish passage may occur. This category includes projects where minor realignment of the culvert and stream channel is needed to restore the stream course to its original location. Structure types include closed-bottomed culverts, open-bottomed arch culverts, and bridges. Grade control structures are permitted above, below and through the culvert or underneath bridge. Bridge piers, abutments and concrete footers would not occur in the bankfull width.

Road-Sediment Treatments

Proposed treatments would apply to road segments that impair stream function. Projects may include road segments with structurally failing culverts, culverts with excessive erosion at the inlet or outlet, culverts impairing debris and bedload movement, and road segments delivering sediment to stream channels through ditchlines and/or overland conveyance typically within 200 feet of streams.

This activity includes road treatments, from simple closures and decommissioning to more complex road obliteration and removal, with an overall goal of restoring hydrologic functions. Prior to decommissioning of a roadway, coordination would occur with appropriate right-of-way cooperators and the Association of O&C counties. This category also includes stormproofing roads intended to remain open, thereby hydrologically disconnecting such roads from watershed streams.

Actions such as bridge and culvert removal, removal of asphalt and gravel, installing drainage culverts, constructing road dips, subsoiling or ripping of road surfaces, outsloping, waterbarring, fill removal, sidecast pullback, re-vegetating with native species and placement of large woody material and/or boulders are included.

This category does not include new road construction or routine maintenance.

The original proposed action included removal or replacement of culverts requiring no more than 20 feet of fill material. ARBO II includes criteria for the removal or replacement of culverts that does not limit the depth of the fill material. Therefore the revised proposed action expands the types of culverts to be removed or replaced to include the removal or replacement of culverts with any amount of fill material. An additional Best Management Practice (BMP) is included to reduce the susceptibility of fill failures by incorporating additional design criteria (e.g., rock blankets, buttressing, bioengineering techniques) (BMP R 12). EA sections 3.1.2 and 3.2.2 describe the effects of the expansion in fill depth.

2.3.1.3 Riparian Treatments

Objective

The riparian vegetation treatments seek to improve health and vigor of stands and to increase riparian function to support aquatic species. Specifically, the objectives include increasing structural and species diversity that provide long-term benefits of stream shading, large wood recruitment, organic litter, and root strength for stream bank stability.

Non-commercial Riparian Vegetation Treatments

Conduct non-commercial treatments of vegetation in the riparian area (i.e., Riparian Reserves) as a means to help restore plant species composition and structure that would occur under natural disturbance regimes. Activities would include enhancing openings for planting, creation of planting gaps, planting conifers and deciduous species, and animal damage control to protect seedlings.

Selected riparian areas would be planted with a mix of native tree species including, but not limited to, western red cedar, grand fir, western hemlock, Douglas-fir, red alder, bigleaf maple and cottonwood. Species selection would be based on site specific objectives and site suitability.

For bank stability and the rapid development of shade, hardwood species would be selected. For shade and a long-term source of large woody debris (LWD) recruitment, conifers would be selected.

Species would be selected based on their suitability to site factors such as shade and wet soil. Within these parameters, a mixture of species would be planted to promote stand diversity.

Single trees would be planted in small patches of light or planted in groups in larger openings. Planting areas would generally be existing openings.

A few hardwood trees (<3 per 100 feet), strategically selected to enhance existing openings, may be cut to increase light availability. Removal of 3 trees per 100 feet is expected to maintain overall stream shade. Openings allow for light penetration so that shade intolerant species such as Douglas-fir or riparian associated conifer species such as western red cedar can be planted.

Further site preparation prior to planting may include cutting brush to provide planting spots. Planting spots would be scalped (cleared of vegetation and duff) down to mineral soil. Depending on site conditions and height of planting stock, it may be necessary to cut brush around the trees for several years until they become established.

Trees would be protected from animal damage by tubes (solid or mesh) and/or by fencing. Fencing would be used around groups of planted trees in areas where the potential for damage from animals (particularly beaver and elk) is high. Planted areas would most likely require maintenance including replanting, fence repair, rodent trapping or other similar activities until the trees are well established.

2.3.2 Project Design Features

Project design features (PDF's) are an important component of the proposed restoration actions and are intended to guide project planners and decision makers in reducing impacts to resources. These PDFs are a set of the Best Management Practices (BMPs) identified in the Salem District RMP as well as resource protection measures identified by the EA interdisciplinary team. The following is a summary of the design features that reduce the risk of effects to the affected elements of the environment described in EA section 3.0.

Design Criteria from Restoration Biological Opinions

For projects that "may affect" ESA-listed fish, the relevant Design Criteria and Conservation Measures described in the following biological opinions are *required*:

- *National Marine Fisheries Service Biological Opinion for Aquatic Restoration Activities in Oregon and Washington* (NMFS NWP-2013-9664) (pages 4-54) (ARBO II). See EA section 8.0.

- *National Marine Fisheries Service Biological Opinion for Programmatic Activities of USDA Forest Service, USDI Bureau of Land Management, and Coquille Indian Tribe in Western Oregon.* (NMFS No. 2010/02700). [for fish passage culverts on streams with resident fish only, page 67]. See EA section 9.0.

For projects that "may affect" ESA-listed terrestrial species, the relevant Design Criteria and Conservation Measures described in the *U.S. Fish and Wildlife Service Biological Opinion for Aquatic Habitat Restoration Activities in Oregon and Washington* (01EOFW00-2013-F-0090 (pages 6-68) (ARBO II) are *required*. See EA section 10.0. An exception is that large wood (LW) trees or pieces may come from other actions for which consultation on ESA-listed terrestrial species has been completed.

Common to all project elements

- Adhere to the in-water work window as defined by the Oregon Department of Fish and Wildlife (ODFW) when working within the stream channel. Projects outside of this work window would require waivers from ODFW and National Marine Fisheries Service (NMFS), as appropriate.

  When appropriate, adhere to seasonal restrictions, daily restrictions and applicable disruption distances for ESA-listed wildlife species as identified in USFWS Biological Opinion 01EOFW00-2013-F-0090. See EA section 10.0.

- Limit the season of operation for ground disturbing activities by heavy equipment to the dry season to reduce the degree and area extent of soil impacts in riparian and upland areas. The dry season is generally from May 1 to October 31, or until the onset of regular autumn rains.

- All equipment used for project work would be cleaned and have leaks repaired prior to entering the project area. Equipment needs to be free of external oil and grease, dirt, mud and weeds prior to construction. Thereafter, inspect equipment daily for leaks or accumulations of grease, and fix any identified problems before entering streams or areas that drain directly to streams. (BMP RST 7)

- When using heavy equipment in or adjacent to stream channels during restoration activities, develop and implement an approved spill containment plan that includes having a spill containment kit on-site and at previously identified containment locations. (BMP RST 9)

- Refuel equipment, including chainsaws and other hand power tools, at least 100 feet from water bodies, or as far as possible from the water body where local site conditions do not allow a 150 –foot setback, to prevent direct delivery of contaminants into a water body. (BMP RST 10)

- Designate equipment access routes on existing trails and utilize existing entry points where possible. Minimize equipment entry points between staging area and stream. Identify sensitive areas to be avoided whenever possible.

- When using ground based mechanical equipment for in-channel work, apply erosion control structures to disturbed areas to mitigate the potential for sediment enriched runoff from being delivered to floodplains, wetlands or waters of the state (BMP TH 18). Take appropriate measures to block future access.

- Fully decommission or obliterate project or temporary roads upon completion of project level use (BMP R 83).

- Rehabilitate and stabilize disturbed areas where soil would support seed growth by seeding and planting with native seed mixes or plants, or using erosion control matting. (BMP RST 12)

Fish Habitat Restoration

- In well armored channels that are resistant to damage (e.g. bedrock, small boulder, or cobble dominated), consider conducting the majority of the heavy equipment work from within the channel, during low streamflow, to minimize damage to sensitive riparian areas. (BMP RST 3)
- Design access routes for individual work sites to reduce exposure of bare soil and extensive streambank shaping. (BMP RST 4)
- Limit the number and length of equipment access points through riparian areas. (BMP RST 5)
- Limit the amount of streambank excavation to the minimum necessary to ensure stability of enhancement structures. Provide isolation from flowing water during excavation. Place excavated material above the flood prone area and cover or place a berm to avoid its reentry into the stream during high flows. (BMP RST 6)
- Equipment would not be stored in stream channels when not in use. (BMP RST 8)
- Multi-piece LW structures would utilize several logs that meet key wood size and may have smaller materials intermixed.
- To the extent possible excess dirt would be removed from trees with root wads attached before they are placed in the stream channel.
- Use waterbars, barricades, seeding, and mulching to stabilize bare soil areas along project access routes prior to the wet season. (BMP RST 11)

Tree Removal for Fish Habitat Restoration

- Trees would be selected cooperatively by a wildlife biologist and fish biologist.
- In the tree removal area, heavy equipment travel would be limited to a single pass and treads kept on top of organic material and slash as much as practical to avoid disturbing the mineral soil.
- At least one end of a log would be suspended whenever possible when moving logs to project sites to minimize soil disturbance.
- Heavy equipment used to remove logs or trees from roadside stands would be operated on the existing road surface, or low gradient slopes (≤35%) within 100 feet of road.
- Damage to residual trees (scraping of the boles of leave trees, removal of branches that are hit by falling trees) would be avoided as much as is feasible, and source trees would be directionally felled toward an existing rocked road where practical.
- Trees felled or selected for fish restoration logs would generally not include the largest, dominant trees within a given area, or trees with the fullest crowns and/or largest branches.

- Trees would not be felled on slopes at high risk of mass movement such as areas showing recent movement, slopes greater than 70 percent, inner gorge type topography, and abrupt slope breaks.
- Conifers felled in the riparian areas would come from fully stocked conifer stands. They would not come from riparian areas dominated by hardwoods with scattered conifers.
- Where appropriate, hazard tree removal would be incorporated into project design. Hazard trees would be felled within riparian areas when they pose a safety risk, and would be felled toward the stream or incorporated into LW structures.
- Where appropriate, when pulling or felling trees within 100 feet of a stream, pull or fell trees from the north or east side of a stream rather than the south or west side to minimize the reduction in shade.
- Disturbance of seedlings and understory vegetation would be minimized as much as possible. Where appropriate, disturbed sites would be rehabilitated and planted with planting stock appropriate to the source stands' seed zone and elevation.

Fish Passage Improvement

- In streams that provide habitat for ESA-listed salmonid fish, follow the relevant Design Criteria and Conservation Measures described as part of the Fish Passage Culvert and Bridge Projects section of the NMFS Biological Opinion for Aquatic Restoration Activities in Oregon and Washington (NMFSNWR-2013-9664). See EA section 8.0.
- In streams occupied by only resident fish, but within 1 mile of streams with ESA-listed fish, follow the relevant Design Criteria for Road Maintenance and the Terms and Conditions for Culvert Replacement in the NMFS Biological Opinion for Programmatic Activities in Western Oregon (NMFS BO No. 2010/02700). See EA section 9.0.
- Existing structures would be replaced with structures (bridge or culvert) designed to meet 100 year peak flood events, including allowance for bed load and anticipated floatable debris. (BMP R 11)
- Fish passage culverts would be designed at a minimum to bankfull width conditions. Preferred design conditions would consider up to 1.5 the bankfull width in culvert sizing.
- Minimize fill volumes at permanent and temporary stream crossings by restricting width and height of fill to amounts needed for safe travel and adequate cover for culverts. For deep fills (generally greater than 15 feet deep) incorporate additional design criteria (e.g., rock blankets, buttressing, bioengineering techniques) to reduce the susceptibility of fill failures. (BMP R 12)
- Locate these crossings as close to perpendicular to the streamflow as stream allows. When structure cannot be aligned perpendicular, provide inlet and outlet structures that protect fill and minimize bank erosion. (BMP R 13)
- When appropriate, use stream crossing protection techniques to allow flood water and debris to flow over the top of the road prism without the loss of the fill or diversion of streamflow. This protection could include hardening crossings, armoring fills, dipping grades, oversizing culverts, hardening inlets and outlets, and lowering the fill height. (BMP R 15)

- When replacing culverts, install grade control structures (e.g. large wood, boulder vortex weirs or boulder step weirs) where excessive scour would occur. (BMP R 16 and RST 13)
- Prevent culvert plugging and failure in areas of active debris movement with measures such as beveled culvert inlets, flared inlets, wingwalls or over-sized culverts. (BMP R 17).
- When installing temporary culverts, use washed rock as a backfill material. Use geotextile fabric as necessary where washed rock would spread with traffic and cannot be practicably retrieved. (BMP R 18)
- The area of disturbance for the water diversions would be kept as short as practical to minimize short term disturbance to the streams and long term disturbance to the sites.

Road Treatments

- For road removal projects within riparian areas, recontour the affected area to mimic natural floodplain contours and gradient to the greatest degree possible.
- When obliterating or removing segments immediately adjacent to the stream, consider using sediment control barriers between the project and the stream.
- Dispose of slide and waste material in stable sites located outside wetlands, riparian management areas, floodplains and unstable areas to minimize risk of sediment delivery to waters of the state.
- The excess fill material would be disposed of in a manner that prevents overloading areas which may become unstable. Waste material other than hardened surface material (asphalt, concrete, etc.) may be used to restore natural or near-natural contours.
- Reestablish stream crossings to the natural stream gradient. Excavate side slopes back to the natural bank profile. Reestablish natural channel width and floodplain connection. (BMP R 89)
- Suspend storm proofing, road decommissioning and other ground disturbing activities if projected rainfall forecast would result in the saturation of soils to the extent that there is the potential for the movement of sediment from the roads to wetlands, floodplains and waters of the state (BMP R 65 and R 81).
- Storm proof open roads that receive infrequent maintenance to reduce the potential for sediment enriched runoff from being delivered to wetlands, floodplains and waters of the state (BMP R 80).
- Following culvert removal, and prior to the onset of the wet season, apply erosion control and sediment trapping measures where it is likely that sediment enriched runoff would be delivered to wetlands, floodplains and waters of the state (BMP R 91).

Riparian planting

- Riparian planting would occur where conifers capable of providing future in-stream LWD recruitment or shade to the stream channel are limited or absent.
- Generally, trees (> 5 inch DBH) cut to provide additional sunlight to planted trees would be older individual alders that are not contributing shade to the stream or contributing to bank stability (e.g. located on the north side of the stream and not located directly on the stream bank).
- Planting gaps would be limited to <1 acre.
- Trees cut to provide additional sunlight to planted trees should be directionally felled to avoid damaging remaining trees. Cut trees would remain on site. Cut limbs and brush would be scattered as necessary to provide planting spots.
- The largest stock available would be planted to minimize the need for brush release and to get trees out of the browsing range of deer and elk. Planted trees would be protected with tubes or fences where necessary.
- Fencing would be constructed from eight foot green colored T-posts and woven wire fencing.

Cultural Resources

- Prior to initiating or authorizing a proposed action a cultural resources specialist would review the proposed action to determine whether the action is exempted from, or requires a cultural resource inventory in accordance with the Protocol for Managing Cultural Resources on Lands Administered by the BLM in Oregon (State Protocol).
- If any cultural and/or paleontological resource (historic or prehistoric site or object) is discovered during project activities all operations in the immediate area of such discovery would be suspended until an evaluation of the discovery can be made by a professional archaeologist to determine appropriate actions to prevent the loss of significant cultural or scientific values.

Wildlife

- A wildlife biologist would participate in the design of all projects that may affect Threatened and Endangered species, BLM Sensitive species, or migratory birds of conservation concern. A wildlife biologist would have the following input in all project designs:

  a) The biologist would determine whether there are known listed animals or suitable habitat for listed animals in the project area.

  b) If a known site of a listed animal is within 0.25- mile of the project action area or that suitable or potential habitat may be affected by project activities, then a biologist would conduct a site visit/survey to determine whether listed animals are within the project area. This visit and survey would be conducted at the appropriate time of year to identify the species and determine whether individual listed species or potential habitat are present, and may be adversely affected by project activities. Appropriate management recommendations would be followed or protection measures undertaken to prevent or minimize adverse effects.

- A wildlife biologist would participate in the planning and design of all activities that may affect any special status or survey and manage species and would include surveys to protocol if required. Wildlife clearances would be conducted prior to implementation of specific restoration actions, in accordance with applicable RMPs and associated amendments.
- Special status species or survey and manage sites discovered as a result of clearances or pre-disturbance surveys would be managed consistent with the Special Status Species policy, survey and manage policy, and RMP requirements in place at the time.
- Appropriate management recommendations would be followed or protection measures (such as protection of known sites for survey and manage species) undertaken to prevent or minimize adverse effects.
- Any activity would meet any applicable standards found in the most current Biological Opinion for northern spotted owls and/or marbled murrelets in the appropriate Planning Province in addition to those found in the ARBO II. See EA section 10.0 for the current ARBO II standards.
- Any activity would meet the standards of the Bald and Golden Eagle Protection Act, and associated administrative rules and associated BLM Instruction Memoranda.
- Any activity would meet BLM Special Status Species policy, found in BLM Manual 6840 and associated BLM Instruction Memoranda.
- Any activity would meet the standards of the Migratory Bird Treaty Act and associated BLM Instruction Memoranda.
- No known bald eagle, northern spotted owl, marbled murrelet, or red tree vole nest trees would be removed.
- No activity would disrupt the normal behavior of a peregrine falcon, bald eagle, northern goshawk, harlequin duck, or purple martin at a known nest site during the breeding season, nor would habitat-modifying activities remove nest trees or affect the function of known nest sites for these species.
- No activity would disrupt the normal behavior of fringed myotis, pallid bats, or Townsend's big-eared bat at known hibernacula or roost sites.
- No permanent road would be built in the critical habitat of the northern spotted owl or the marbled murrelet. Temporary road construction or reconstruction in critical habitat would maintain pre-treatment habitat functionality at the stand scale.
- Snags would be reserved except as necessary for human safety. Activities would be relocated away from snags occupied by sensitive species, if feasible. Snags occupied by sensitive species that would be felled and would not be felled when in active use. All felled snags would be left on site as coarse woody debris.
- Existing coarse woody debris and rootwads would be reserved and protected from damage to the extent possible. Coarse woody debris may be moved around project sites to facilitate operations.

Botany and Special Status Plants

- Standards outlined in the applicable letters of concurrence or biological opinions in place at the time of implementation would be followed to prevent or minimize adverse effects to ESA listed botanical species.
- A botanist would have the following input in all project designs:

  (a) Determine whether there are known listed plants or suitable habitat for listed plants in the project area.

  (b) If a known site of a listed plant is within 0.25- mile of the project action area or that suitable or potential habitat may be affected by project activities, then a botanist would conduct a site visit/vegetation survey to determine whether listed plants are within the project area. The botanist would visit the site and conduct the survey at the appropriate time of year to identify the species and determine whether individual listed plants or potential habitat are present, and may be adversely affected by project activities. BLM would follow appropriate management recommendations and undertake protection measures to prevent or minimize adverse effects.
- If one or more listed plants are present and likely to be adversely affected by the project, then consultation with the U.S. Fish and Wildlife Service under Section 7 of the ESA would be initiated before the project is implemented.
- A botanist would participate in the planning and design of all activities that may affect any special status or survey and manage species and would include surveys to protocol if required.
- A botanist would be conduct botanical clearances prior to implementation of specific restoration actions, in accordance with the RMP, as amended.
- Special status species and survey and manage sites discovered as a result of clearances or pre-disturbance surveys would be managed consistent with the Special Status Species policy, survey and manage policy, and RMP requirements in place at the time.
- BLM would follow appropriate management recommendations or protection measures to prevent or minimize adverse effects.

Invasive Plants

- A botanist or invasive plant coordinator would participate in the design of all projects that have the potential to introduce or spread invasive plants.
- Survey areas for invasive plant infestations prior to project implementation.
- Infestations within areas of proposed heavy equipment operation and associated access routes would be treated prior to operation.
- Locate and use weed-free project staging areas.
- Assure that any materials brought into the project area (clean fill, straw, gravel, large wood) are free of invasive plant material(s).

- Assure that all equipment entering and/or leaving project area is clean of invasive plant material(s), mud, or material that could transport seeds or plant material.
- Use genetically appropriate, native plant seed that is free of noxious and invasive weeds, as determined and documented by a seed inspection test by a certified seed laboratory.

Soils

- Conventional ground based equipment would be operationally limited to slopes of less than 35 % and operations would be restricted to periods of low soil moisture when soils have resistance to compaction and displacement. If it is necessary to operate conventional ground based mechanical equipment on slopes greater than 35 percent, monitor use and restrict where water and runoff could channel overland (BMPs TH 12, and TH 15).

Water Quality

- All project level activities would be consistent with established Water Quality Restoration Plans as approved and established by the Oregon Department of Environmental Quality. The Resource Area Fish Biologist would coordinate with the District or Resource Area Hydrologist to determine if the proposed activities would be consistent with the established WQRP.
- Where it is likely that activities would result in the exceedance of TMDL Standards, those project level activities would not be covered by this EA.

Wild and Scenic Rivers

- Minimize disruption to recreational users.
- Protect outstandingly remarkable values of designated wild and scenic river corridors (including those classified as wild, scenic, or recreational).

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

This chapter of the EA presents the affected environment, including existing conditions and future anticipated conditions if the no-action alternative is selected, and the anticipated effects to the environment if the proposed activities are implemented. Given the landscape variability, the following discussions describe conditions across the landscape and acknowledge that site specific conditions vary. Further, given the large geographic scale, data presented represents readily available data.

The environmental effects portion of this chapter considers the anticipated direct, indirect, and cumulative impacts. Because specific actions in specific locations are not identified, the effects determinations represent the typical effects associated with the activity. As site specific projects are planned, they would be individually evaluated to determine if the typical effects described in this EA adequately analyze the site specific project effects.

The elements of the environment affected by the proposed restoration project are Fisheries/Aquatic Habitat, Water Quality, Botany, Invasive Plants, and Wildlife. EA sections 3.1-3.5 describe the current conditions and trends of those affected elements, and the environmental effects of the alternatives on those elements.

3.1 Fisheries/Aquatic Habitat

3.1.1 Affected Environment

Federally Listed Species

Salem District lands provide habitat for six species of anadromous salmonids that are listed as Threatened under the Endangered Species Act (ESA) (Table 2). Critical habitat has been designated for five of these species. Four other fish species protected under the ESA, Columbia River chum salmon, bull trout, green sturgeon and Oregon chub, are found within the Salem District, however none of these species is known to occur on BLM-administered lands.

Table 2: ESA-listed fish on BLM-administered lands within the Salem District

Species	ESU_DPS*	Critical Habitat Status
Chinook Salmon	Lower Columbia River (LCR)	Designated
	Upper Willamette River (UWR)	Designated
Coho Salmon	Lower Columbia River	N/A
	Oregon Coast	Designated
Steelhead Trout	Lower Columbia River	Designated
	Upper Willamette River	Designated
Eulachon	Southern	Proposed

*ESU – Evolutionarily Significant Unit, DPS – Distinct Population Segment

The National Marine Fisheries Service (NMFS) issued results of a five-year review on Aug. 15, 2011 (76FR50448), and concluded that the Lower Columbia River and Upper Willamette River salmonid species should remain listed as threatened. On June 17, 2011, the NMFS completed a five-year review of the Oregon Coast Coho Salmon (76FR35755) and determined it would remain listed as threatened. Limiting factors contributing to the decline of these species which BLM can influence include floodplain connectivity and function, channel structure and complexity, water quality, riparian habitat and large wood recruitment, stream substrate and fish passage.

Recovery planning efforts for the salmon and steelhead has been underway for a number of years. The *Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead* was finalized in August 2011. The *ESA Recovery Plan for Lower Columbia River Coho Salmon, Lower Columbia River Chinook Salmon, Lower Columbia River Chum Salmon, and Lower Columbia River Steelhead* was completed in 2013.

While not technically a recovery plan, the *Oregon Coast Coho Conservation Plan for the State of Oregon* was approved by the Oregon Fish and Wildlife commission in August 2006. The final NMFS recovery plan for Oregon Coast coho salmon is in development. The proposed action would implement management actions identified in these recovery and conservation plans.

The Salem District lands provide important spawning and rearing habitat for six species of ESA-listed salmonids (Table 3). Lower Columbia River and Upper Willamette River Chinook typically spawn in the larger tributaries of the Columbia and Willamette Rivers.

Juvenile Chinook salmon typically migrate downstream soon after emerging from the gravel and rear in the larger mainstem reaches downstream from BLM lands. However, Chinook salmon display several life histories, particularly in the Willamette basin, and some juveniles may rear for several months in the spawning reaches before migrating downstream. Coho salmon and steelhead trout typically spawn in the smaller tributary streams and the juveniles would rear in the natal streams from one to several years before smolting and migrating to the ocean.

Table 3: Miles of habitat for ESA-listed salmonids on Salem District lands

Species	ESU_DPS	Miles of Habitat on BLM	Critical Habitat Miles on BLM
Chinook Salmon	Lower Columbia River	22	10
	Upper Willamette River	29*	35*
Coho Salmon	Lower Columbia River	23	NA
	Oregon Coast	80*	83*
Steelhead Trout	Lower Columbia River	44	13
	Upper Willamette River	80	42
Eulachon	Southern	0.35	0.35

*Discrepancies between miles of habitat and miles of critical habitat are primarily due to differences between BLM and NMFS GIS layers.

Eulachon: Sporadic spawning runs of eulachon are found in the Sandy River as far upstream as Gordon Creek at river mile 13 (NMFS 2010). The only BLM lands in this area are those that are part of Oxbow Park. Eulachon may also spawn in the Yaquina River, but this has not been documented (NMFS 2010). Eulachon historically in years of high population abundance have been found in the lower 13 miles of the Sandy River (upstream to the Gordon Creek confluence), but have not been present in the Sandy River in the last 6 to 8 years (NMFS 2010). From 1929 to 2008, no spawning run of eulachon was recorded in the Sandy River in 48 of the 79 years.

When present, most eulachon were thought to spawn in the lower Sandy River in the vicinity of Troutdale (within 2.5 miles of the confluence with the Columbia River). Peak spawn period in the Columbia River basin is March – April.

There is strong evidence that most, if not all, eulachon in the southern portion of the range (south of about 54° N latitude) die after spawning (NMFS 2010). Eulachon broadcast spawn (eggs are released over the substrate) and prefer coarse, sandy substrates (WDFW and ODFW 2001). It is thought that eulachon eggs may attach to small sediment particles and develop while being actively carried downstream by river currents. Eggs hatch in 30 to 40 days and larvae are swept downstream by river currents within hours of hatching (NMFS 2010).

Thus, although eulachon are not likely present in the lower Sandy River in most years, in years of high population abundance eulachon could be present in the lower Sandy River (upstream to Gordon Creek confluence) until early June. However, no in-channel actions are allowed within the Sandy River basin until July 15, well after all life stages of eulachon have left the river. Post construction sediment movement may occur during late fall freshets but would be stabilized before adults enter the Sandy River for spawning.

Bureau Sensitive Species

Three Bureau sensitive fish species occur on District lands: Lower Columbia River/SW Washington coastal cutthroat trout, Pacific Coast chum salmon and Oregon Coast steelhead trout. Lower Columbia River/SW Washington coastal cutthroat trout includes both the anadromous, or searun, and resident forms. Their distribution is similar to that of the Lower Columbia River steelhead trout; however, because the resident form of cutthroat trout is included, their distribution extends further upstream above barriers to steelhead trout migration. Pacific Coast chum salmon distribution on BLM lands is limited to a few short stream reaches in the lower portions of the Kilchis and Wilson rivers. The distribution of Oregon Coast steelhead trout is similar to that of the Oregon Coast coho salmon.

Essential Fish Habitat

All streams within the Salem District that are inhabited by Chinook and coho salmon are designated as Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act. Habitat utilized by Chinook and coho salmon in the coastal drainages and lower Columbia River is well documented, as is Chinook habitat in the Willamette basin. The distribution of coho salmon in the Willamette basin is not well documented but coho salmon are found in most Willamette basin watersheds on the Salem District.

Aquatic Habitat

The freshwater habitat requirements of Chinook and coho salmon and steelhead and cutthroat trout are similar. They require clean, cold water and clean gravels for spawning. Large wood (LW) is used by adults for protection from predators. Juvenile fish utilize pool and riffle habitats and LW is an important element both for cover and because it can provide lower velocity refugia where juveniles can escape from high velocity flow, particularly during winter freshets. LW influences channel complexity by creating scour and backwater pools and storing sediment and spawning gravels. Coho salmon abundance is particularly dependent on the amount and quality of complex rearing habitat, side channels and floodplain habitats (Roni et al. 2006).

Within the Salem District, past management activities on both public and private lands have also degraded aquatic and riparian conditions and contributed to declines in fish populations.

Stream cleaning and other activities have resulted in a lack of habitat complexity and a decrease in high quality fish habitat throughout the District. Numerous streams lack deep, complex pools that provide cover to juvenile fish from predators and refuge during high winter flows. Bedrock dominated streams typically have warmer stream temperatures, and decreased spawning and rearing habitat.

Habitat surveys completed by the Oregon Department of Fish and Wildlife (ODFW 1994-2010) over the past two decades on the Salem District have found that the amount of LW in most stream reaches is inadequate to form complex stream habitats and provide high quality spawning and rearing habitat. LW was historically removed from many stream reaches as a result of logging and stream cleaning efforts.

The Salem District has implemented instream restoration for over 30 years. Watersheds that have received the most work include the Salmon River (Sandy basin), Eagle Creek (Clackamas basin), Five Rivers/Lobster Creek, Nestucca River, and the Trask River. Other watersheds where restoration has occurred include the Little North Santiam River, Luckiamute River, Upper Alsea, Upper Nehalem River, Dairy Creek and Scappoose Creek. Numerous projects have been cooperative efforts with local watershed councils and private landowners and have included work on non-federal lands.

Riparian Habitat and Condition

The amount of large wood within stream channels is dependent in part on the amount of trees available on the landscape over time that can be delivered to stream channels from riparian mortality, debris flows or from channel migration. Logging in many miles of streamside riparian areas removed large trees that may have otherwise been recruited to the stream channels and replaced these stands with younger trees that would provide little LW input until the stands mature.

Trees in the resultant second-growth forests are generally too small to provide large wood to fish bearing stream channels. Riparian stands that are in the stand establishment structural stage have few trees greater than 20 inches in diameter; whereas riparian stands that are mature and structurally complex contain trees large enough to provide large wood. The Final Environmental Impact Statement for the Revision of the Western Oregon Resource Management Plans (pages 372-384) concluded that approximately 47% of riparian area forests on BLM-administered lands in the Salem District lack large conifers. Data from the Oregon Department of Fish and Wildlife aquatic habitat inventories in several watersheds within the Salem District also indicate that there is generally a lack of conifers greater than 20 inches in diameter within areas that have the potential to deliver large wood to stream channels (ODFW 1994-2010).

Many riparian stands, particularly in the Coast Range Province, are dominated by red alder with an understory of salmonberry. Research (Hibbs and Giordan 1996) has shown that there is almost no tree regeneration occurring in many of these stands. With senescence of the alder, many of these riparian areas may develop into a shrub dominated community.

Roads

There are approximately 2,527 miles of BLM-administered roads in the Salem District and an additional 373 miles of road on BLM land that are controlled by other entities. Approximately 2,300 miles of road have aggregate surfacing. Historically, roads were constructed, improved, and maintained to support timber management activities. In addition to timber management, roads now provide access for removal of other forest products, recreational use and access to rural homes.

Research indicates that roads are a major contributor to fine sediment input into streams. These sources derive from both annual chronic delivery as well as from failures during flooding events. Roads compact soil and have the potential to route surface water and sediment to streams, particularly at stream-road crossings. However, many roads are often isolated by grasses, brush, trees and down logs, greatly reducing surface flow routing.

Fish Passage

Surveys have documented that many culverts on the Salem District are full or partial barriers to fish passage. For example, fish passage surveys conducted across all ownerships in the Nestucca and Neskowin basins identified 338 barrier culverts on fish streams (TEP 2006). Eighty-two (82) culverts ranked as either high or medium priority impeded access to over 89 miles of habitat. Since 1999, the Salem District has replaced 28 culverts with passage-friendly culverts or bridges and improved access to over 25 miles of habitat for salmon and steelhead. Barrier culverts can cause genetic and demographic isolation in resident fish populations that lead to reduced genetic diversity and potentially compromising long-term population persistence (Wofford et al. 2005).

3.1.2 Environmental Effects

3.1.2.1 Alternative 1 - No Action

Under the No Action Alternative, aquatic and riparian restoration actions would continue to occur but some opportunities maybe delayed or not implemented. Partnership and funding opportunities may be lost because projects cannot be implemented until environmental assessments are completed. Thus, the number and extent of enhancement activities would be reduced compared to the action alternative and there would be reduced opportunities to enhance production and survival of aquatic species.

Fish habitat and populations would continue to be dependent upon current trajectories and ecological processes resulting from the current riparian stand conditions.

In-stream habitats and forested riparian stands would retain the current low levels of LW and simplified riparian stand structure. The natural recruitment process for LW into streams would be maintained at its current low level. Stream complexity would remain low, possibly negatively affecting sediment routing and gravel sorting capabilities. Roadways adjacent to streams that are adversely affecting the fish habitat either through adverse sedimentation of the stream bed/channel or fish passage blockage would continue in its present condition and potentially degrade the fish habitat unless mitigated. Quality fish habitat that is currently blocked by culverts would remain inaccessible to fish.

Proposed riparian planting areas would continue to be dominated by a few species of trees and brush with limited potential for future increase in tree species diversity, structural complexity or increasing shade that would come from riparian planting.

3.1.2.2 Alternative 2 – Action Alternative

Implementation of aquatic and riparian habitat restoration actions would be more efficient. Just as the ARBO II consultations improved the efficiency of consultation on individual projects, the Action Alternative would improve the efficiency of NEPA review. It is anticipated that through increased planning efficiencies, partnerships and funding opportunities would also increase.

Partnerships are particularly important for watershed improvements on the Salem District due to the checkerboard ownership pattern. As a result, the Salem District would be in a better position to help facilitate the recovery of ESA-listed salmonids.

Federally Listed Species, Bureau Sensitive Species, Aquatic and Riparian Habitat

Essential Fish Habitat

The NMFS (2013) Essential Fish Habitat consultation determined that the proposed action may adversely affect salmonid EFH due to short-term degradation to water quality (turbidity and temperature) and a short-term reduction in small woody debris. The following sections describe the effects to Fish habitat including Essential Fish Habitat.

In-stream Habitat Projects

Placement of large wood (LW) in main and side channel habitats would increase pool habitat, habitat complexity, and cover for salmon and steelhead (Keim et al. 2002, Beechie and Sibley 1997, Montgomery et al. 1995, Fausch and Northcote 1992, McMahon and Hartman 1989, Bisson et al. 1987). Increased habitat availability and complexity would improve rearing conditions for steelhead, salmon, and resident cutthroat trout resulting in increased juvenile salmonid abundance (Roni et al. 2006; Roni and Quinn 2001). Complex pools and side channels provide overwintering habitat for juvenile salmonids and provide cover from predators during summer low flow periods when predation is at its highest. Studies in Washington have shown that juvenile coho densities were 1.8 to 3.2 times higher in stream reaches with large wood than without (Roni 2001).

Studies on Oregon coastal streams have shown that overwinter survival increased substantially in stream reaches that were treated with wood (Solazzi et al. 2000). Increased LW in pools would improve the distribution and amount of hiding cover for adults. Condition of critical habitat for ESA listed fish would improve in the short and long term as the result of addition of LW to main and side channels.

Increased structure from LW would result in localized reductions in the velocity of high flows (Beschta and Platts 1987), which would result in sorting and increased deposition of smaller bedload materials (McHenry et al. 2007, Bilby and Ward 1989). Retention of sand, gravel, and cobble would improve and create spawning areas for steelhead and salmon (McHenry et al. 2007).

Restoring flows to side channels and the addition of LW would increase the amount and quality of side channel habitat available, thereby increasing juvenile salmonid numbers, particularly those of coho salmon (Rosenfeld et al. 2008, Roni et al. 2006, Roni and Quinn 2001).

Bank stabilization utilizing bioengineering methods such as placement of large woody debris and riparian plantings would increase aquatic habitat through overhead cover for fish and reduce sediment inputs. Indirectly, the stabilization of stream banks would enhance stream complexity over time by providing overhanging banks and in-channel root systems. As roots of vegetation along streambanks increase, the velocity of the stream and erosion decreases (Comfort 2005). Overhanging banks and vegetation both provide shade to the stream system, providing thermal cover, which may help moderate water temperatures. Stream bank stabilization projects would minimize or prevent stream bank erosion and provide stable locations for native plants and shrubs to establish.

Beneficial effects of floodplain connectivity include periodic delivery of water, nutrients, sediment to floodplains, flood attenuation, and reduced stream energy. Ultimately, floodplain reconnection would result in more functional fish habitat. Streams with overhead cover and undercut banks provide protection for juvenile fish. Low width-to-depth ratios provide cool and deep refugia for migrating juveniles.

Healthy riparian plant communities provide primary and secondary productivity that drive the food base that juvenile salmonids consume when rearing and migrating to the ocean.

The acquisition of large wood would have no direct impacts on the conditions of watersheds, because acquisition of materials alone, such as cutting trees, has no mechanism to change stream complexity or stream connectivity.

These activities would indirectly affect watershed and stream conditions by providing materials to accomplish restoration work requiring the use of large wood. In cases where acquisition of restoration materials occurs in riparian areas, individual selection of trees used for restoration purposes would be made in accordance with design features (Tree Removal for Fish Habitat Restoration) to prevent measurable changes to riparian vegetation or habitat functions.

Seasonal restrictions imposed by instream work windows would prevent heavy equipment effects to salmonids such as smothering or crushing eggs and disturbance to spawning adults. The probability of LW placements causing direct mortality to individual fish is possible but unlikely. Juvenile salmonids, and other resident fish species, would be disturbed from their normal feeding and resting behavior during in stream work. Fish would be expected move away from the activity and would reoccupy abandoned feeding and resting areas and resume normal behaviors upon completion of project activities.

Project design features are intended to limit sediment input into streams, but they cannot eliminate it. Heavy equipment use would result in short-term localized increases in suspended sediment to streams due to stream channel and stream bottom disturbance. ARBO II requires the monitoring of instream turbidity during construction activities. If turbidity levels rise above set thresholds, mandatory work stoppage is required until turbidity levels return to base levels.

Increases in suspended sediment or turbidity (a measure of suspended sediment) are expected to occur through the first winter following installation but natural increases in sediment during higher flow events masks the minor increases from the project work.

Summer turbidity plumes have the potential to increase stress levels on juvenile salmonids, but rarely result in mortality. A prolonged increase in stress in salmonids has been shown to decrease growth rates and survival (Suttle et al. 2004). Additionally, juvenile salmonids and adult resident trout would also likely be displaced from instream habitat restoration project sites by elevated turbidity from in stream work and their feeding could be disrupted (unable to see prey items) by the short term increases in turbidity (Bjornn and Reiser 1991).

No long-term adverse effects of the restoration projects on ESA listed fish or their habitat are expected because turbidity levels would return to background levels soon after cessation of in-water work. The downstream extent of the plume can be quite variable depending on stream flow, substrate materials and the length of time the equipment operates in the channel, but generally the plumes would not expected to extend more than about 2,500 feet downstream from the work site. The use of helicopters to place LW substantially reduces turbidity. Experience has shown that placing LW into the stream channel does not measurably increase suspended sediment in the stream channel.

Risk of short-term soil erosion from access routes in adjacent riparian areas would be minimal because project design criteria require stabilizing and seeding/mulching these routes.

While there would be some short term impacts (hours to weeks), the long term effects would benefit fish. Instream structures would provide benefits to fish during the first winter flow and continue to develop more complex habitat each winter.

Juvenile and adult fish populations would be expected to stabilize and increase in areas where restoration projects occur, as instream habitat projects trap gravels and increase the amount of spawning areas. Monitoring in the Trask River (Bio-Surveys 2009) has shown that LW projects have resulted in substantial improvements to overwintering survival for coho salmon.

Monitoring of engineered log jams constructed in the main-stem Salmon River, where average channel widths exceed 100 feet, has shown that these structures have resulted in localized disposition of spawning gravels which are highly sought out by spawning steelhead and salmon. Juvenile fish are attracted to these structures for protection from high freshet flows and predations; monitoring has found that juvenile fish densities in pools with the engineered jams are 5 times higher than in nearby pools without structures (B. Zoellick, personal communication, April 20, 2015).

Road and Culvert Projects

In the long term, the proposed road activities would decrease watershed drainage networks, reduce the number of stream-road crossings, reduce soil compaction, and substantially remove both chronic and episodic sources of sediment.

These beneficial impacts to the landscape would reduce scour-related mortality of eggs and alevins, reduce involuntary downstream movement of juveniles during freshets, and increase substrate interstitial spaces used for refuge by fry. Also decreases in sediment/ turbidity have proven to be correlated with increased survival and growth of aquatic organisms.

Decommissioning and storm-proofing roads in riparian areas would decrease delivery of fine sediment to streams. Eliminating sediment sources would help to increase the diversity and density of aquatic macro-invertebrates, maintain or increase the amount of interstitial cover available, reduce or eliminate suffocation of fry and entombment, and improve feeding abilities through increased light penetration. Removal of roads within floodplains or that encroach upon streams would decrease channel constriction and allow establishment of riparian functions.

Replacing old or undersized stream crossings would prevent road failures, averting the potential for those failures to introduce large amounts of fine sediment to the system, potentially causing stress and mortality to juvenile and adult fish. Replacing undersized stream crossings would improve wood debris routing.

There are several deep-fill culverts on BLM-administered roads on the Salem District. Most of these culverts are nearing the end of their service life and would need to be replaced before the pipes fail. Replacement of culverts requiring more than 20 feet of fill is not expected to change effects to fish or fish habitat from what was described in the original EA for the following reasons.

Removing the 20 foot fill height restriction would reduce the potential for large failures by allowing culvert upgrades or removal at additional road crossing sites. This would result in potentially less sediment being delivered to stream channels and downstream fish habitat.

The required design features and BMP implementation during the projects would meet the desired effects of lowering sediment inputs during the removal/replacement activity.

Removing the fill height restriction has no impact on the actual amount of instream work required to replace the existing structure. The additional fill height requires more consideration to placement of the removed fill material to stable areas outside the drainage area of the work site. Thus there is no expected difference to water quality from this change because of the required BMPs for the project work.

Stream crossing projects usually reduce stream velocities by increasing culvert sizes (diameter) and eliminating flow restrictions that can cause erosion and downcutting of stream channels and banks below undersized culverts.

A limited number of trees adjacent to each stream crossing culvert site may need to be felled. The creation of small openings would be unlikely to degrade existing shade conditions. No more than site level changes to solar exposure of the stream beds would occur. These small openings are unlikely to influence aquatic habitat in the short-term. Growth of understory vegetation overhanging the streambanks would be expected to restore stream shade within a year following the proposed treatments.

When bridge or culvert construction requires concrete footings these would be poured in place and allowed to cure in a dry condition. Bridge footings would not occur within the bankfull width of the channel and footings for culverts would be isolated from the flow so that uncured concrete would not come in contact with flowing water. When bridge or culvert construction replaces an existing culvert the work site would be dewatered and fish would be removed prior to the start of project work. Therefore fish would not be affected by the presence of uncured concrete in the active channel.

Road work would have short-term increase in erosion and sediment deposits. Erosion and sediment would be minimized by project design and would be small in scale and short in duration. Therefore, there would not be any observable detrimental effects to survival.

Fish passage culverts: Stream crossing replacement would directly improve stream connectivity and habitat for aquatic species by immediately restoring access to formerly inaccessible habitats and allow unrestricted movement throughout stream reaches during seasonal changes in water levels (Hoffman 2007). Improved passage for both anadromous and resident fish results in additional available spawning and rearing habitat would result in increased population abundance and productivity and genetic diversity (Wofford et al. 2005). Fish populations that are well distributed spatially are at a lower risk of detrimental effects from stochastic events.

Direct and indirect short-term negative impacts to aquatic habitat and individual fish would occur from replacement of barrier culverts. Resident and over-summering fish would be indirectly negatively impacted as a result of proposed dewatering or displacement due to machinery working in the stream channel.

Dewatering the project sites during construction could limit movement of native fish during project implementation. Dewatering also includes the risk of stranding fish in pools and pocket water through the dewatered reach. Stream channels would be dewatered via an upstream berm and either pumped or piped to around the project site.

Implementing projects during the ODFW in-water work window would minimize the number of fish impacted. Salvaging fish within the project reaches would minimize direct impacts to fish present in the project area during construction. Fish relocation during culvert replacement may result in increased stress and possible mortality for a small number of fish. The stress of relocation would last only a few hours and would only occur once.

Upon completion of the project, the reconstructed stream bed through the culvert sites would simulate natural substrate characteristics. Placement of oversized material as part of stream simulation would reduce risk of increased scour through the pipe and protect upstream bed stability during the first winter freshets. Incorporation of finer sediment into the simulated substrate would accelerate recovery of surface flow thru the culvert. Sediment movement would be expected to recover to background levels after the first winter pulses in flow.

Projects are not anticipated to negatively impair migrating anadromous salmonids as projects would be limited to the summer in-water work period when adults are not present and juveniles have not started their downstream smolt migration.

When used, gravity fed designs for diverting water around the project site would provide downstream passage opportunities for resident and over-summering fish. Providing fish passage around culvert work sites is not always possible. In these cases, passage is typically blocked for a few days to possible a month.

ARBO II requires the monitoring of instream turbidity during construction activities. If turbidity levels rise above set thresholds, mandatory work stoppage is required until turbidity levels return to base levels. Increases in suspended sediment or turbidity (a measure of suspended sediment) are expected to occur through the first winter following installation but natural increases in sediment during higher flow events masks the minor increases from the project work.

Riparian Treatments

Increased large wood would increase shade, hiding cover, pool and gravel bar formation, and stabilized banks; thus, improve habitat for fish. Associated with an improvement of aquatic habitat, survival of yearling and other juveniles is expected to increase by providing appropriate substrate for fry and cover from predators and high flows.

Beneficial effects also include enhanced vigor through and improved reproductive success for adult salmonids because of increased pools, spawning substrate, cover and holding areas. Retention of stream shade would not increase stream temperatures protecting water quality.

Riparian planting areas would increase riparian plant species diversity and increase stream shade. Habitat quality would also be maintained and improved over the long term as the result of increased large wood (LW) production resulting from riparian tree plantings (Beechie et al. 2000). Experience has shown that the small scale of the soil disturbance by hand tools does not measurably increase suspended sediment in the stream channel.

3.1.2.3 Cumulative Effects

The Salem District has been involved with aquatic habitat restoration for over 30 years. Numerous projects have been cooperative efforts with local watershed councils and private landowners and have included work on non-federal lands. During this period there have also been numerous projects similar to those proposed by the Salem District that have been implemented on adjacent Forest Service and private lands.

A cumulative increase in the improvement of habitat conditions and the availability of habitat would be realized with implementation of the proposed action. Research and monitoring has shown that these restoration actions have been successful in improving habitat for fish and have been beneficial for providing access for fish to stream reaches that had been blocked by improperly sized culverts. In the foreseeable future it is expected that restoration actions would continue to be implemented on federal, state and private lands.

The recently completed recovery plan for Upper Willamette River steelhead and Chinook salmon and the conservation plan for Oregon Coast coho salmon have identified aquatic habitat restoration as an important factor for the recovery of ESA-listed anadromous salmonids.

The relatively small amount of habitat provided as a result of individual proposed actions is unlikely to appreciably contribute to changes in fish productivity at the watershed scale. However, cumulatively, the implementation of the proposed action, along with restoration actions on non-BLM lands, could result in beneficial increases in salmonid productivity and aid in the recovery of threatened fish species.

Exposure of fish to sediment and turbidity impacts may occur in the short-term as a result of project implementation; however, these impacts would not be expected to impact survival or productivity. Cumulatively, the implementation of the proposed action, when combined with other restoration actions in a watershed is unlikely to negatively affect fish productivity. Sediment and turbidity impacts would be local in extent. Other restoration actions implemented in the same watershed would likely be both temporally and spatially separated from actions implemented by the BLM.

3.2 Water Quality

3.2.1 Affected Environment

The Salem District contains three different types of climatic/ecological zones: Coastal Zone, Valley Zone and Cascades Zone. Annual precipitation varies dependent on location but ranges from approximately 40 inches in the Willamette Valley to approximately 200 inches at the higher elevations of the Coast Range. The majority of the precipitation is received as rainfall during the fall/winter rainy season (November-March).

There are approximately 65 5th Field Watersheds (HUC's) located on the Salem District. The analysis completed in the 1994 Salem Resource Management Plan FEIS for the existing condition of Watershed Conditions is incorporated by reference. BLM administered lands comprise approximately 7.9% of these affected 5th Field HUC's. Within these 5th Field HUC's there are approximately 4,058 miles of perennial and intermittent streams. The watersheds of the Salem District have a tendency to display a wide range of characteristics. The streams and rivers have a tendency to be heavily armored, but have general lack of coarse or large woody debris (LWD).

From the 1970s to the early 1980s, the Salem District policy was to remove coarse or large woody debris from the stream course. There is a general lack of LWD across the district due to this policy. This has affected the stream complexity and channel bank stability across the district.

Within the Salem District there are eight 4th Field Watersheds that have existing Total Maximum Daily Loads (TMDL's) Orders that have been approved by Department of Environmental Quality/US Environmental Protection Agency. Within these 4th Field HUC's there are approximately 300,000 acres of BLM administered lands. The majority of existing TMDL Orders have identified temperature and sediment as the limiting factors on BLM administered lands.

3.2.2 Environmental Effects

3.2.2.1 Alternative 1 – No Action

Under the No Action Alternative, aquatic and riparian restoration actions would continue to occur but some opportunities maybe delayed or not implemented. Those streams that lack sufficient shade cover to protect temperature regime would continue in that direction. Those streams that lack adequate amount of woody debris to help regulate flow and provide stream complexity would continue to degrade. There would be limited introduction of LW to the streams from natural events such as landslides and natural fall. The rivers would then sort out the placement of the large wood (LW) during periods of high flow.

Roadways adjacent to streams that are adversely affecting the fish habitat either through adverse sedimentation of the stream bed/channel, temperature modification or fish passage blockage would continue in its present condition and potentially degrade the fish habitat. Culverts that are an impediment to fish passage would continue to act as an impediment. Culverts that have compromised fill material that are a sediment source to streams would continue to be a sediment source.

3.2.2.2 Alternative 2 – Action Alternative

In-stream Habitat Projects

This type of activity would potentially include the use of mechanical equipment within the wetted area of the stream course, installation of wood structures in the channel and construction of access routes from a staging area to the stream channel. This type of activity could potentially degrade the bank stability and disturb soils that could potentially lead to an active sediment source being delivered to the stream course.

The following effects to water quality would most likely occur during the in channel stream restoration projects:

Channel bed alteration: The use of mechanical equipment would most likely disturb the stored sediment of the channel bed. This would create additional turbidity. This increased turbidity during mechanical operation would most likely come from disturbing existing sediment pockets already in the channel or stored sediment within the channel. Fines material (clay and silt particles size class) would be suspended in the water column and could be transported distances downstream until the fines are deposited in the channel bed.

The coarse sized particles (sand particles, rubble and cobble) of the channel bed could potentially be disturbed by the mechanical activity. This material could potentially be transported short distances as they move by saltation process rather than suspension.

There are no water quality standards from either federal or state water quality objectives or standards for bed load or saltation transport.

However it could have a downstream effect to the fish habitat as the coarse textured particle size class could be transported into existing pools downstream, but this effect is unlikely, since the work would be done during periods of low flow and ARBO II requires the monitoring of instream turbidity during construction activities. If turbidity levels rise above set thresholds, mandatory work stoppage is required until turbidity levels return to base levels. Increases in suspended sediment or turbidity (a measure of suspended sediment) are expected to occur through the first winter following installation but natural increases in sediment during higher flow events masks the minor increases from the project work.

Over the past 4 years, the Salem District has constructed engineered logjams in the Salmon River, a large main-stem river with widths the can exceed 100 feet. Concerns over structure stability have been found to be negligible for the following reasons. Design and construction practices for engineered logjam structures in the Salmon River have improved over the past 5 years. Impacts to channel conditions and water quality that are similar to those during construction large wood projects in smaller channels. These structures are stable during winter freshets and often entrap trees and debris floated during high flow events, which further add to their stability.

The structures are causing the deposition of gravel bars, important as production sites for stream invertebrates and as spawning habitat, in channel reaches that have not had gravel depositions since the river was channelized nearly 50 years ago. The success of engineered logjams in the Salmon River indicates that this technology can be successful in other rivers on the District where limited habitat quality affects fish production.

Stream bank alteration: The alteration of the existing stream banks would provide a limited amount of new sediment to the stream course. But when it is realized that these stream banks are most likely unstable and prone to be a major sediment source during periods of high flow, it would be one of a short term effect.

Since the alteration of the stream banks would be completed during periods of low flow, the turbidity of the work area would be concentrated. ARBO II requires the monitoring of instream turbidity during construction activities. If turbidity levels rise above set thresholds, mandatory work stoppage is required until turbidity levels return to base levels. Increases in suspended sediment or turbidity (a measure of suspended sediment) are expected to occur through the first winter following installation but natural increases in sediment during higher flow events masks the minor increases from the project work.

Headcut Stabilization: This type of habitat improvement on the Salem District is generally completed either as part of a larger project (in channel structure work or culvert replacement). It is not likely that this work would produce sufficient amounts of sediment that could alter the background levels of in-channel turbidity because ARBO II requires the monitoring of instream turbidity during project activities. If turbidity levels rise above set thresholds, mandatory work stoppage is required until turbidity levels return to base levels.

Staging areas and access roads: The construction and development of staging areas and access roads would most likely result in a certain amount of soil and riparian vegetation disturbance due to the construction of staging areas and access routes.

The probability that these access roads and disturbed soils would become a new sediment source that could be delivered to the stream courses is reduced by the implementation of project design features such as sediment holding features, placement of course woody debris on disturbed areas, and construction of cross drains if required to not allow eroded sediment to reach the stream channel..

It is expected that where disturbance occurs, vegetation would reestablish within two years due to the application of site specific Project Design Features (PDFs) and Best Management Practices (BMPs) such as minimizing the removal of riparian vegetation, replacing ground cover by the application of native mulch, weed free straw, or erosion blankets. Areas of exposed soil would be seeded with native seed mixes or plants. Similarly, bank disturbances would be limited to the site of equipment activity; bank conditions up and downstream of the activity would remain stable.

Plantings, mulch or organic debris, and other sediment trapping material (e.g. straw bales) would be placed on ingress and egress access routes, staging areas, and other disturbed areas prior to the onset of winter rains, thus preventing/minimizing sediment input. Furthermore, actions would occur during low flow or dry conditions when the probability of soil detachment and transport are low.

Instream turbidity and sediment delivery would be minimized and short-term because of the limited area and duration of disturbance, seasonal restrictions, and application of other PDFs and BMPs.

Road Treatments

Roads identified as unnecessary and/or roads causing or having the potential to cause (high risk) adverse impacts to streams would be identified for drainage improvement or decommissioning. Stream crossing replacements would focus on culverts that are at risk of failure, are not properly designed for the stream or are a passage barrier. Roads constructed in close proximity to streams constrain the stream channel and may eliminate the stream's access to its floodplain. Deteriorating or undersized culverts reduce water conveyance, leading to potential road fill failure or stream diversion. In these cases, large volumes of sediment can be introduced into the channel environment.

The following effects discussion applies to culvert replacement of both shallow fills (up to 20 feet) and deep fills (more than 20 feet). Culvert replacement includes the removal of fill material that over lays the culvert and may include head cut stabilization.

A potential effect of culvert replacement is an additional level of sediment being delivered to the stream course during the replacement of the culvert especially if there is water flowing in the culvert that is to be replaced. For culvert replacement or removal in channels with surface flow, the site is typically isolated from the flowing water. These practices effectively prevent turbidity and sediment transport as flowing water is routed around the site and downstream structures (e.g. straw bales) may be used if required to capture any mobilized sediment.

When the water flow through the culvert resumes, there is potential for short term pulse of fines material and turbidity into the water column. Monitoring of project water quality has shown that the increase in turbidity usually last for less than 2 hours and returns to the normal base level within 6 hours. Research on culvert removals suggests that sediment and turbidity would not be transported more than ½ mile downstream from treatment sites (Foltz et al 2008).

A short distance of stream bank on either side of the channel would be disturbed at each culvert location. Rehabilitating disturbed stream banks by seeding native grasses upon completion would accelerate recovery of riparian vegetation and protect bank stability. Banks and riparian vegetation disturbed by construction would stabilize after the first winter.

The depth or volume of fill material to be evacuated during the culvert replacement is one consideration in evaluating the risk for sediment being delivered to the stream course. Experience has shown that water quality can be maintained with proper storage of overburden, even at deep-fill sites. Project Design Features require excess fill be stored or disposed of and stabilized in locations where runoff would not be delivered to wetlands, floodplains or streams.

Replacement of culverts requiring more than 20 feet of fill is not expected to change effects to streams or water quality from what was described in the original EA for the following reasons. Removing the 20 foot fill height restriction would reduce the potential for large failures by allowing culvert upgrades or removal at additional road crossing sites. This would result in potentially less sediment being delivered to stream channels and downstream fish habitat.

The required design features and BMP implementation during the projects would meet the desired effects of lowering sediment inputs during the removal/replacement activity. One additional BMP, (R 12) to help stabilize fills would be used to help mitigate any potential effects of deeper fill projects. Removing the fill height restriction has no impact on the actual amount of instream work required to replace the existing structure. The additional fill height requires more consideration to placement of the removed fill material to stable areas outside the drainage area of the work site. Thus there is no expected difference to water quality from this change because of the required BMPs for the project work.

Roads may provide a pathway for sediment enriched runoff to be delivered to streams when there is hydrologic connectivity of the inside ditch to the stream channels. Native and rocked road beds can potentially produce sediment enriched runoff into the inside ditches and across the road beds during periods of high runoff events. In the long term, road improvements reduce both chronic and episodic erosion and sedimentation. Drainage improvements such as outsloping the road surface and installing rolling dips reduce or eliminate chronic sources of road erosion and fine sediment delivery.

Road closures, particularly during the wet season, prevent road rutting known to deliver sediment to streams. Decommissioning reduces both chronic sediment sources and eliminates or reduces the potential for episodic sedimentation.

Road decommissioning disconnects the roadway from the streams and disperses sediment enriched runoff from the roadway to adjacent hillslopes. Decommissioning restores hillside drainage patterns by removing compacted roadways that can capture and divert subsurface flow.

The activities and timing of road decommissioning and storm proofing of both "system" roadways and project level roads has the potential to add additional sediment to the stream courses. Since these project level activities would be completed prior to the onset of the fall/winter rainy season, the risk of sediment delivery to stream courses would be minimized.

3.2.2.3 Cumulative Effects

Cumulative effects are defined as a synergistic change to geomorphic process and function of the watersheds. This is evidenced by an alteration of the geomorphic stability/equilibrium and results in increased levels of slumps, deep rotational slides and failure of the stream network to maintain its stream power due to increased levels of bulked stream flow and alteration of the rainfall runoff stream flow relationship.

However, for adverse cumulative effects to soil or water quality to occur, there needs to be a triggering mechanism to alter the geomorphic equilibrium that presently exists in these watersheds. That triggering mechanism is often times the removal of large acres of vegetative cover either through timber harvest, wildfire or other natural causes.

Stream restoration projects would not result in large acreages of vegetative cover being removed or altered. Aquatic restoration projects have occurred on BLM administered lands and adjacent lands over the past 30 years. These types of projects are driven by restoration plans that are developed on the federal and state level and are all designed to meet the Endangered Species Act, Clean Water Act and state level recovery plans.

Over the past 10 years similar types of projects have been completed and there has not been a measureable or detectable adverse change to water quality or stream complexity detected. It is reasonable to presume that these types of projects would occur over the next 10 years.

Since the past history and monitoring of these type of projects have shown a net improvement of the complexity and structure of the stream courses, and meet the designated DEQ Water Quality Management Plans, DEQ approved Water Quality Restoration Plans, and ARBO II requirements, there is no evidence that the type of projects included in the proposed action would result in an cumulative adverse effect to water quality.

Under the proposed action, large woody debris would be added to the stream courses to help improve stream complexity and channel stability; a small amount of vegetation cover would be potentially removed from the near stream environment, culverts would potentially be replaced, roadways that have a hydrological connection to the perennial streams would be storm-proofed and or decommissioned and TMDL's would not be exceeded.

Cumulatively, these types of projects would add to the recovery of aquatic habitat, sediment transport regime and functional stream channels. These types projects are not likely to result in measurable direct or indirect effects to channel or wetland function, and all effects are within the range of those disclosed in the RMP, therefore the proposal would be unlikely to contribute to any potential cumulative effects in these watersheds.

Since the proposed action is not likely to result in a detectable direct or indirect effect to peak flow, the proposal would not contribute cumulatively to any existing augmentation of peak flow in these watersheds.

These types of projects would contribute to a long term reduction in turbidity and stream temperature. All of the factors described above should act to reduce the amount of runoff that is being delivered to the stream courses, reduce the potential for an alteration of the storm runoff stream flow relationship, reduce the sediment enriched road runoff from being delivered to the stream courses and maintain a natural stability of the of the affected watersheds.

3.3 Botany

3.3.1 Affected Environment

The native plant communities in the Salem District are diverse and fall within the West Cascades, Coast Range and the Willamette Valley Provinces. Unique landscape features, geology, climate, topography and natural disturbances contribute to the presence and diversity of plant and fungi species on lands administered by the Salem District. Rare species are neither evenly distributed nor predictable across the District, even where suitable habitat exists. Some rare plant and fungi species have fairly well defined habitat requirements but others' are more general.

Field surveys are the best method to determine rare species presence and to increase knowledge of range, distribution and habitat characteristics. An average of more than 5,000 acres per year, over the past fifteen years, have been surveyed for the presence of rare botanical species on the Salem District.

There are five federally listed botanical species suspected to occur on Salem District BLM managed lands: Bradshaw's desert parsley (endangered), golden paintbrush (threatened), Kinkaid's lupine (threatened), water howellia (threatened), and Willamette Valley daisy (endangered). Only one federally listed botanical species, Nelson's checkermallow (threatened) is documented on Salem District managed lands.

The naturally occurring Nelson's checkermallow population at Walker Flat Area of Critical Environmental Concern in Yamhill County has been monitored five times since 1997 with the last monitoring occurring in 2010. Monitoring analysis shows the Nelson's checkermallow population at Walker Flat ACEC to be stable (Guerrant, EO, Jr. 2010).

Within the Salem District, there are over one hundred species of plant, fungus, and lichen that are included on the State Director's Special Status Species list as either Suspected or Documented. More than thirty of these species are Bureau sensitive with documented sites on lands administered by the Salem District, and some of these occurrences are within riparian habitats. Conservation measures for occurrences and habitat of Bureau sensitive occurrences associated with aquatic restoration actions include altering the type, timing, extent, and intensity of the management actions to maintain populations of these species. Bureau sensitive species occurrences would be managed so that aquatic restoration actions would not contribute to the need to list the species under the Endangered Species Act.

Almost seventy botanical survey and manage species are documented on lands administered by the Salem District. Many more botanical survey and manage species are suspected to occur on Salem District managed lands. Known sites for survey and manage species and their habitats would be managed so as to not elevate their status to any higher level of concern.

Although not all of these botanical taxa calling for special management require aquatic or riparian habitats, most have the potential to occur within aquatic restoration project areas.

3.3.2 Environmental Effects

3.3.2.1 Alternative 1 - No Action

Under the No Action Alternative, aquatic and riparian restoration actions would continue to occur but some opportunities maybe delayed or not implemented. For the federal listed, special status and survey and manage botanical species suspected and documented to occur on the Salem District the direct and indirect effects would be identical similar to those described below under the Proposed Action except that fewer actions may be implemented.

3.3.2.2 Alternative 2 – Action Alternative

For the federal listed, special status, and survey and manage botanical species suspected and documented to occur on the Salem District, direct effects would occur from physical disturbance to individual plants and fungi and populations that immediately affect their growth, survival, and or reproduction.

Indirect effects would occur from project-related changes in habitat that affect the plants and fungi through time, and other changes that can influence growth and reproduction (e.g. increases or decreases in competition from other plants, the introduction of invasive species, increasing light to the plants from vegetation treatments, etc.).

A botanist would be involved in the evaluation and planning of aquatic restoration projects to determine if pre-disturbance surveys and management for rare plant and fungi occurrences are warranted.

Surveys, as needed, would have occurred during the growing season prior to implementation of restoration activities.

Should botanical ESA listed species, special status and survey & manage species requiring management occur in habitats which may be affected by the proposed restoration, management actions or protection measures would be followed to prevent or minimize adverse impacts. Project design feature implementation would prevent or reduce direct impacts on the species at the project level.

3.3.2.3 Cumulative Effects

Aquatic restoration projects would impact only a very small percentage of aquatic and terrestrial habitats across the district in any given year and the diffuse nature of these projects scattered across a wide area would cause effects to be negligible across the district, especially when taking the project design features into account.

The same PDFs and protection measures are also applied to other projects throughout the District. Due to these protection measures, listed, sensitive and survey and manage species are protected from potential impacts and project activities and therefore, they would not trend towards extirpation, extinction or the need to place in a higher protection category. The developed PDF's in most cases negate or reduce direct effects to listed, sensitive and survey and manage plant species and fungi. Given the project design features and minimal direct and indirect effects, no cumulative effects are anticipated for botanical species requiring special management.

3.4 Invasive plants (including noxious weeds)

3.4.1 Affected Environment

Invasive plants are non-native plant species whose introduction causes economic or environmental harm or harm to human health. Noxious weeds are a subset of invasive plant species with formal federal or state designations. More than 100 invasive and 25 listed noxious weed species have been documented on lands administered by the District. Invasive plant species' have a wide variety of distribution patterns, spread strategies, and responses to integrated pest management strategies. Some invasive species like Scotch broom and Canada thistle are well distributed throughout the District and others like yellow toadflax are known to occur in very few locations. Species with limited but expanding distributions include false brome, Japanese knotweed, Vinca and English holly. Invasive species which currently do not occur with the Salem District, but which have the potential to invade are considered "Early Detection Rapid Response Species" and there are over a hundred known species to fit this category.

Management activities, particularly those which are ground disturbing like heavy equipment operation can facilitate the spread of invasive plants. Prevention practices are normally included in District management actions to help limit the introduction and spread of invasive plants.

The presence of invasive plant infestations are normally detected through systematic surveys, partnered projects and by way of risk assessments in the course of project planning. Risk assessments have been integrated into all project clearance surveys which have averaged 5,500 acres per year over the last nineteen years. In all, 5,200 acres were inventoried for invasive plants in fiscal year 2015.

The District cooperates with a wide variety of agencies, adjacent landowners and other partners to control infestations. Integrated pest management includes chemical, mechanical, manual, and biological methods. In fiscal year 2015 the District treated 314 acres with herbicides, almost 370 acres with manual control, and 140 acres with mechanical methods.

Available traditional biological control agents have been well distributed throughout the district for more than a decade and non-traditional grazing has been used on occasion in selected sites.

3.4.2 Environmental Effects

3.4.2.1 Alternative 1 - No Action

Under the No Action Alternative, aquatic and riparian restoration actions would continue to occur but some opportunities maybe delayed or not implemented. For the invasive plant species known and suspected to infest lands within the Salem District the direct and indirect effects would be similar to those described below under the Proposed Action except that fewer actions may be implemented.

3.4.2.2 Alternative 2 - Action Alternative

The proposed aquatic restoration actions would result in some soil disturbance in areas with known invasive plant infestations. Increased human, vehicle and heavy equipment traffic in the project sites may spread invasive plant species seeds and reproductive vegetative plant fragments. Project design features to detect infestations on the project site through risk assessments, treat infestations prior to project implementation and implement prevention strategies would minimize the spread of existing invasive plant infestations and the introduction of new ones. Therefore, the proposed action is not anticipated to increase the abundance or spread of invasive plants.

3.4.2.3 Cumulative Effects

Project Design Features for invasive plant surveys, weed prevention and infestation control are standard for management actions across the District and are often matched by adjacent landowners. It is assumed that management activities conducive to the introduction and spread of invasive plants would also occur on adjacent lands. Activities that have the potential to introduce and spread invasive plants include: motor vehicle traffic, timber harvest, restoration project development, recreational activities including OHVs, and road construction are expected to continue or increase. These types of activities could result in new disturbed sites available for infestation establishment. The possibility of introduction of new infestations is similar for both the no action and proposed action alternatives.

Given unpredictable vectors for invasive plant spread, such as vehicle usage by private parties, wildlife behavior, and weather events, it is not possible to quantify with any degree of confidence the rate of invasive plant spread in the future, or even the degree by which that potential would be increased by the proposed actions. However, the proposed action, inclusive of PDFs, would minimize the introduction and spread of invasive plants.
The District, in partnership with the members of the Cooperative Weed Management Areas is working toward a cumulative decrease in the spread of noxious weeds through increased public awareness and seamless invasive plant prevention and control activities.

3.5 Wildlife

3.5.1 Affected Environment

For terrestrial species, riparian vegetation supports nesting, roosting, cover habitat, and food sources (Brown 1985). In western Oregon, riparian habitat with mature trees greater than 21 inches in diameter provides the greatest plant and structural diversity, a high level of animal diversity, and a high level of woody debris (Brown 1985). Mature riparian zones contribute to a high level of aquatic diversity and provide corridors for wildlife species.

Federally Listed Species

The Salem District manages approximately 405,150 acres of land, mostly forested, in a variety of forest age classes. These forests provide habitat for two threatened species, the northern spotted owl (*Strix occidentalis caurina*) and the marbled murrelet (*Brachyramphus marmoratus*).

Northern Spotted Owl: Spotted owls occupy conifer-dominated forest throughout the Salem District. Suitable habitat for the northern spotted owl was described by Thomas et al. (1990:164) as "multi-layered, multispecies canopy dominated by large (greater than 30 inches diameter at breast height) conifer overstory trees, and an understory of shade-tolerant conifers or hardwoods; a moderate to high (60 to 80 %) canopy closure; substantial decadence in the form of large, live conifer trees with deformities (such as cavities, broken tops, and dwarf mistletoe infections; numerous large snags; ground cover characterized by large accumulations of logs and other woody debris; and a canopy that is open enough to allow owls to fly within and beneath it)." Dispersal habitat for the northern spotted owl supports owl movement and survival but not nesting. It is comprised of forest stands with an average diameter at breast height of 11 inches or greater, an average canopy closure of 40 percent or greater and structural components like snags and coarse woody debris that support prey species.

There are about 146,700 acres of suitable habitat on BLM-administered land in the Salem District. Salem District lands support 63 occupied spotted owl sites. Spotted owl habitat in the Salem District is concentrated in the Cascades West and North Coast Range physiographic provinces; negligible amounts occur in the Willamette Valley Physiographic Province. The critical breeding period in the Cascades is considered to be March 1 through July 15. The critical breeding period in the North Coast is considered to be March 1 through July 7.

Northern spotted owls are known to use riparian areas, either as roost locations during hot summer months or for foraging. Northern spotted owls generally nest in the lower third of slopes; therefore some nests could be adjacent to proposed riparian treatment locations.

Marbled Murrelet: Marbled murrelets nest in forested communities with nesting structure within 50 miles of the coast (Coast Range Physiographic Province) between April 1 and September 30. Within this area, Salem District lands support 78,000 acres of suitable nesting habitat or habitat that contains nesting structure.

A tree with nesting structure has the following characteristics:

- It occurs within 50 miles (81 km) of the coast (U.S. Fish & Wildlife Service 1997:32)
- It is a conifer tree (U.S. Fish & Wildlife Service 1997:18);
- It is ≥ 19.1 in. (49 cm) (dbh) in diameter, > 107 ft. (33 m) in height, has at least one platform ≥ 4 in. (10 cm) in diameter, nesting substrate (e.g., moss, epiphytes, duff) on that platform, and an access route through the canopy that a murrelet could use to approach and land on the platform (Burger 2002, Nelson & Wilson 2002:24, 27, 42, 97, 100);
- It has a nest platform ≥ 32.5 ft. (9.9 m) above the ground (Nelson & Wilson 2002, 28); and
- It has a tree branch or foliage, either on the tree with nesting structure or on an adjacent tree that provides protective cover over the platform (Nelson & Wilson 2002:98 & 99).

Any tree that does not meet all of these characteristics is unlikely to support nesting murrelets.

The availability of trees with platforms is critical to habitat suitability for the marbled murrelet (McShane et al. 2004) and forest stands greater than 80 years old would have trees with platforms, but the quality (greater diameter, moss and lichen substrates) and quantity (number of trees with platforms and number of platforms per tree) is more apparent in older stands (>150 years of age).

Currently, 35 murrelet occupied sites are known to occur on BLM-administered lands within the Salem District. Murrelets generally do not occupy BLM-administered lands between October 1 and March 31. The critical breeding period is considered to be April 1 through August 5.

Bureau Sensitive or Survey and Manage Species: Riparian areas throughout the Salem District along streams, rivers and wetlands provide habitat for a variety of BLM sensitive species. Bureau sensitive species known to inhabit or use riparian areas include: bald eagle, harlequin duck, purple martin, red tree vole, Cope's giant salamander, terrestrial snails, and a variety of bat species. Large green trees, snags, coarse woody debris, and talus are often associated in riparian areas and provide key habitat features for these Bureau sensitive species. Riparian habitats also provide a key role in maintaining linkages or wildlife movement corridors between low and high elevation habitats. EA section 11.0 displays bureau sensitive species and their specific habitat requirements.

Land Birds (Neotropical Migrants and Year-Round residents): A number of bird species utilize riparian habitat through the year or seasonally. Many of these species are generalists that also occur as breeders in other habitat types. However, others are obligate or near obligate to riparian habitat. Most species are primarily insectivores that take advantage of the high insect productivity that occurs in riparian habitats.

Other riparian associated bird species are tied to unique features such as nesting cavities provided by snags, nectar of flowering plants in the understory, fruit from berry producing plants in the understory and subcanopy, or a dense, diverse shrub layer. Riparian areas also provide movement corridors for some species. Many species of birds follow drainages during migration (Altman 2000). All neotropical migrants go to Mexico, Central and South America each year. They are addressed here due to widespread concern regarding downward population trends, and habitat declines.

The latest list of "Birds of Conservation Concern 2008" (USDI USFWS 2008d) identifies 37 Bird Conservation Regions (BCR) in North America and the bird species in each region. Thirty two species are identified in BCR 5 (North Pacific Rainforest), the region that includes the Salem District. Seven species (bald eagle, peregrine falcon, marbled murrelet, rufous hummingbird, olive-sided flycatcher, willow flycatcher and purple finch) are documented on Salem BLM administered lands.

3.5.2 Environmental Effects

3.5.2.1 Alternative 1 - No Action

Riparian areas that are currently degraded (lacking down wood in the stream channel, lacking rock and cobble features, lacking pools, or featuring high water velocities or invasive vegetation species) would remain degraded. Riparian areas that lack down wood, a key component (Bisson et al., 1987) of stream system health, would remain at a reduced capacity to afford protection and habitat for birds, amphibians, reptiles, and small mammals (Kauffman et al. 2001).

Federally Listed

Northern Spotted Owl: Management activities would not alter suitable habitat within the project area and habitat would continue to develop along current successional pathways. This would result in spotted owl dispersal habitat remaining at present levels until habitat is modified or removed as a result of future management actions or natural events like tree growth, wind throws, fire, bug kill, etc. Noise from implementation of the proposed activities would not occur, hence, there would be no potential for disturbance from this noise. Noise would remain at the normal levels associated with management activities or the use of forest roads and trails by people.

Marbled Murrelet: Management activities would not remove or alter suitable habitat within the project area and habitat would continue to develop along current successional pathways. This would result in murrelet habitat remaining at present levels until habitat is modified or removed as a result of future management actions or natural events like tree growth, wind throws, fire, bug kill, etc.

Noise from implementation of the proposed activities would not occur, hence, there would be no potential for disturbance from this noise. Noise would remain at the normal levels associated with management activities or the use of forest roads and trails by people.

Bureau Sensitive or Survey and Manage Species

Red Tree Vole: Management activities would not remove or alter suitable habitat within the project area and habitat would continue to develop along current successional pathways.

Bald Eagle: Management activities would not remove or alter suitable habitat within the project area and habitat would continue to develop along current successional pathways. Noise from implementation of the proposed activities would not occur, hence, there would be no potential for disturbance from this noise. Noise would remain at the normal levels associated with management activities or the use of forest roads and trails by people.

Bats: Management activities would not remove or alter habitat within the project area used by a number of bat species.

Land Birds: Management activities would not remove or alter habitat within the project area used by a number of bird species. Riparian habitat would continue to develop along current successional pathways. The development of forest stand conditions would be the same as described above for the northern spotted owl. Degraded riparian habitat would not be restored and would continue to decline in condition, adversely affecting many bird species.

Amphibians and Invertebrates: Management activities would not remove or alter habitat within the project area used by amphibians and invertebrates. Habitat would continue to develop along current successional pathways. Degraded habitat, particularly riparian habitat (invasive species) would not be restored and would continue to decline in condition, adversely affecting many amphibians and riparian associated invertebrates.

3.5.2.2 Alternative 2 - Action Alternative

The proposed aquatic restoration activities only include projects identified and analyzed in the USFWS biological opinion (01EOFW00-2013-F-0090). The BO identifies project design criteria to ensure that covered actions would not adversely affect Federally Listed species and their habitat. Key project criteria to ensure minimal or no effects include:

- Actions would not remove or reduce function of suitable threatened or endangered species habitat.
- No removal of spotted owl, marbled murrelet, or bald eagle nest trees.
- A biologist input on site specific projects, including nest surveys if suitable habitat is present.
- Apply and modify as necessary disturbance and disruption distances for listed species as per Table 7 in Biological Opinion 01EOFW00-2013-F-0090 (EA Table 8).

To further minimize impacts to wildlife species, the project design features outlined in EA section 2.3.2 are included in this environmental analysis.

Generally speaking the proposed activities would modify the current conditions at the project scale. These changes (restoring native plants, increasing gravel, boulder and down woody debris) would change the small and large scale habitat conditions important to over 300 species of wildlife associated or closely associated with riparian areas (Kauffman et al. 2001). Increasing vegetation diversity generally contributes to restoring habitat for a broad group of animal species including bees, other insects, rodents, bats, and birds (Golet et al. 2008). This is especially true at less than ten years after treatment (Golet et al. 2008).

Large wood in the stream channel can greatly influence the biological characteristics (cover, food, nutrient uptake) (Kauffman et al. 2001) in the riparian area. Restoring hydrologic and disturbance regimes can help maintain bird diversity by changing the plant community in riparian and wetland environments (Kauffman et al. 2001).

As such, the proposed action may provide varied benefits to wildlife. For example, the proposed action may increase cover for amphibians, increase shrub species along the flood plains that benefit resident and migrant bird species, increase plant diversity, increase small mammal populations (an important food source for a number of predators including northern spotted owls), and provide longer water availability for wildlife.

Because these projects are relatively small in regards to the amount of habitat treated, changes and benefits should be expected at a localized scale. At the watershed scale, these changes may not be noticeable until enough is done throughout one or many watersheds to create a net benefit to the various systems (hydrology, vegetative, animal).

Northern Spotted Owl

Proposed instream habitat actions and road improvements, such as large woody debris placement in streams, boulder, and gravel placement, and culvert repairs would not affect suitable spotted owl habitat. Tree removal for instream log material and heavy equipment access through riparian areas for culvert replacement, dam removal, and habitat placement would remove some riparian and upland vegetation. However, tree removal in riparian and upland areas would still maintain spotted owl suitable or dispersal habitat and would not remove or downgrade northern spotted owl habitat at the stand scale.

Per the project design features (EA section 2.3.2) and USFWS ARBO II criteria (EA section 10.0), trees felled or selected for fish restoration logs would generally not include the largest, dominant trees within a given area, or trees with the fullest crowns and/or largest branches; thus suitable nest trees and no known nest trees would be removed. As such, no direct effects to individual spotted owls are expected.

Riparian planting may also add habitat complexity by increasing species diversity. Riparian habitat restoration work could further benefit spotted owls. Generally the projects proposed (e.g. bank stabilization, planting native trees and shrubs) would impact spotted owl habitat at the shrub, grass, and forb layers. These kinds of projects tend to make more diverse, multi-species plant communities that could increase the population levels of small mammal species.

Specific research showing a cause and effect relationship between these types of restoration projects and prey species eaten by the spotted owl is lacking. However, research does show that riparian areas are disproportionally important to mammals in Oregon and Washington because of their high structural diversity (many plant species and sizes) (Kauffman et al. 2001). Therefore it is not unreasonable to expect a beneficial long term indirect effect on some of the spotted owl prey base as a result of increasing the plant community diversity within riparian areas.

The potential disturbance effects to spotted owls would be low because of the project design features, including "When appropriate, adhere to seasonal restrictions, daily restrictions and applicable disruption distances for ESA-listed wildlife species as identified in USFWS Biological Opinion 01EOFW00-2013-F-0090." See EA section 10.0.

All project activities with the potential for negative impacts to nesting spotted owls at known sites through noise or smoke would occur beyond appropriate disruption distances or outside of the nesting period. The probability of disruption to unknown nesting spotted owls in unsurveyed suitable habitat is small enough to be disregarded (U.S. Fish & Wildlife Service 2009, p. 15). Therefore, the proposed actions would not cause negative impacts to spotted owls from premature fledging, missed feeding visits, or increased exposure to predation during the breeding season. After the breeding season, spotted owls would be able to distance themselves from disrupting activities.

Marbled Murrelet

Project activities may modify suitable murrelet habitat by treatments to overstory trees, shrubs, and herbaceous vegetation. However, the project design criteria (EA section 10.0) would be implemented to eliminate the potential for murrelet take, protect suitable habitat features, and maintain habitat function. Specific actions would include retaining potential nest trees and maintaining necessary cover and microclimate at nest platforms.

Additionally, individual projects would be well distributed across the landscape, and would occur primarily along existing roads in previously impacted, unsuitable habitat. Consequently, the intensity, scale, and spatial arrangement of habitat effects from any project implemented under this environmental analysis would not negatively impact any murrelet suitable habitat at the stand scale, affect murrelet use of project areas, or cause take.

Per the project design features (EA section 2.3.2) and USFWS ARBO II criteria (EA section 10.0), trees felled or selected for fish restoration logs would generally not include the largest, dominant trees within a given area, or trees with the fullest crowns and/or largest branches; thus suitable nest trees and no known nest trees would be removed. As such, no direct effects to individual marbled murrelets are expected.

The projects would follow project design features, including "When appropriate, adhere to seasonal restrictions, daily restrictions and applicable disruption distances for ESA-listed wildlife species as identified in USFWS Biological Opinion 01EOFW00-2013-F-0090." See EA section 10.0.

All project activities with the potential for disruption to known murrelet nest sites through noise or smoke would occur beyond appropriate disruption distances or outside of the critical nesting period (April 1 to August 5), and those occurring during the late breeding season (August 6 to September 16) would observe daily timing restrictions.

All projects occurring within disruption distances of unsurveyed suitable habitat during the murrelet breeding season would observe daily timing restrictions, and the probability of disruption to unknown nesting murrelets is low enough to be disregarded (U.S. Fish & Wildlife Service 2009, p. 16). Therefore, the proposed actions would not cause negative impacts to murrelets from premature fledging, missed feeding visits, or increased exposure to predation. Nesting at known sites would not be subject to disruption, and nesting in unsurveyed habitat would be unlikely to be adjacent to project sites and would be protected from disruption during the crepuscular (active at dawn and dusk) murrelet activity periods.

Bureau Sensitive or Survey and Manage Species

Red Tree Vole: Proposed instream habitat actions and road improvements, such as large woody debris placement in streams, boulder, and gravel placement, and culvert repairs would not affect red tree voles.

Per the project design features (EA section 2.3.2) and USFWS ARBO II criteria (EA section 10.0), trees felled or selected for fish restoration logs would generally not include the largest, dominant trees within a given area, or trees with the fullest crowns and/or largest branches; and no known nest trees would be removed. It is expected the wildlife biologist would select trees for fish restoration logs that would avoid structures that may be nests. As such, no direct effects to individual red tree voles are expected.

Bald Eagle: Per the project design features (EA section 2.3.2) and USFWS ARBO II criteria (EA section 10.0), known nest trees would not be removed and projects would be designed to minimize negative impacts to bald eagles and maintain or improve riverine habitat function. Consequently, this alternative would not negatively impact this species through habitat modification. Restoration activities would ultimately improve riparian habitats and contribute to increased bald eagle prey availability.

Bald eagles are susceptible to disruption during courtship and nesting, but all project activities would occur outside of the appropriate disruption distance from known nest sites or roosting areas per the project design features (EA section 2.3.2) and USFWS ARBO II criteria (EA section 10.0). Therefore, noise or visual disturbance from projects would not negatively impact bald eagle breeding, feeding, sheltering, or rearing behavior.

Bats: Snags are generally the habitat used by bats most often on Salem BLM lands. However, per the design features in EA section 2.3.2, snags would be reserved except as necessary for human safety. Activities would be relocated away from snags occupied by sensitive species, if feasible. Snags occupied by sensitive species that must be felled would not be felled when in active use. All felled snags would be left on site as coarse woody debris.

Per project design features in EA section 2.3.2, disruption from noise or visual disturbance would be minimized by restricting project activities within disruption distances of known hibernacula or roosts for these species. These restrictions would ensure that proposed actions would not affect breeding, feeding, sheltering, or dispersal behaviors for most bat species.

Aquatic restoration projects could indirectly benefit bats by accelerating the development of more advanced seral habitat conditions and increasing insect prey populations by stimulating growth of riparian vegetation. Adding what amounts to clumps of jack-strawed CWD over and near streams also could benefit bats by providing increased roosting sites near their foraging areas – most likely night roosts. Also small created openings in otherwise closed/dense riparian alder stands would improve bat foraging areas.

Land Birds

A small percentage of bird habitat may be removed within the project area through, single tree removal for instream log material and heavy equipment access through riparian areas for culvert replacement, dam removal, and habitat placement. However, this loss would be negligible due to the large amounts of suitable habitat to be retained on adjacent land and the loss of site specific habitat would be short-term until the disturbed area is revegetated. Additionally, existing large diameter snags and down wood found in older seral stands would be retained in the project area, and would continue to provide nesting, roosting, or foraging opportunities for species dependent on these key habitat structures.

Some individual birds may be displaced during project activities. However, untreated areas adjacent to the treatment areas would provide refuge and nesting habitat, minimizing short term loss of habitat. Activities occurring during active nesting periods could cause some nests to fail. Because of the project design features, including the season of operation for ground disturbing activities by heavy equipment being limited to the dry season which is largely outside the critical nesting period for most birds, the potential disturbance effects would be low.

Should the failure of a nest occur, it would not be expected to reduce the persistence of any bird species in the Salem District because sufficient habitat of all types would be retained throughout the district to support the wide diversity of bird species in the area.

Additionally, even though BLM does not know the precise number of individual birds on the district, the potential failure or loss of some nests would not be measurable at the regional scale because of the small scope of the project in relationship to the regional scale.

Restoring native plants, increasing gravel, boulder and down woody debris would change the small and large scale habitat conditions important to many species of birds associated or closely associated with riparian areas (Kauffman et al. 2001). Increasing vegetation diversity generally contributes to restoring bird habitat (Golet et al. 2008).

Amphibians and Invertebrates

The habitat restoration actions in this alternative would benefit amphibians. For example, replacing perched culverts with fish passable designs would also improve upstream passage to salamanders, frogs, toads, and even garter snakes.

Restoring natural stream flows and timing and maintaining large pieces of wood provides more structurally complex instream and riparian habitat that provides cover, habitat for prey species, and habitat for amphibians in the form of cascades, pools, and dams that slow flow rates. Downed wood also provides nutrients that improve riparian habitat for amphibians (Pilliod and Wind 2008).

Indirect effects, such as changes to habitat are not expected due to retention of canopy closure, which would prevent warming or drying of micro sites. Further, project design criteria include retention of down coarse wood debris and snags, although limited removal may occur for safety or where unavoidable.

Sensitive salamanders and mollusks may be harmed if located within heavy equipment ingress/egress routes to project sites. Similarly, individuals may be affected when fish log logs are dragged over inhabited locations. However, these instances would be rare as project activities are very limited spatially and occurring in isolated patches across the landscape. Additionally per project design features in EA section 2.3.2, it is expected that the wildlife biologist when feasible at the project level, would take steps to avoid key habitat features (talus, coarse woody debris, hardwood patches, etc.).

Therefore, while there may be isolated instances of direct effects to less mobile species such as salamanders and mollusks, the occurrence would be minimal across the Salem District and would not affect species population persistence.

3.5.2.3 Cumulative Effects

Northern Spotted Owl: Consistent with the USFWS findings, these aquatic restoration activities would not likely jeopardize the continued existence of the northern spotted owl. Because of the design features incorporated in the description of the proposed action combined with future foreseeable projects, the aquatic restoration activities anticipated would not preclude spotted owls from dispersing through or nesting within the Salem District.

Marbled Murrelet: Consistent with the USFWS findings, these activities would not likely jeopardize the continued existence of marbled murrelets within the Salem District. Since the proposed action would not remove suitable habitat, even when combined future foreseeable projects, the projects would not preclude marbled murrelets from nesting within the Salem District.

Bureau Sensitive or Survey and Manage Species: The proposed activities are not expected to affect long term population viability of any species known to be in the area or lead to the need to federally list any “Bureau Sensitive wildlife species as a “Threatened or Endangered” species. Actions would not change the function of habitats at the stand level.

Most actions would avoid disturbance to species by establishing seasonal restrictions and/or buffers as in the case of many “Survey and Manage” species.

Continued replacement of culverts with updated “fish and amphibian friendly” designs would aid in widespread dispersal and improved conditions for amphibians and other riparian associated ground dwelling species.
Riparian habitat is expected to continue to improve on federal lands, benefitting most wildlife species, and likely remain in its current state on non-federal lands.

3.6 Other Elements of the Environment Based On Authorities and Management Direction

Table 4: Elements of the Environment to be analyzed based on Authorities and Management Direction

Element of the Environment /Authority	Remarks/Effects
Air Quality (Clean Air Act as amended (42 USC 7401 et seq.)	This project is in compliance with this direction because the project would have no effect on air quality.
Cultural Resources (National Historic Preservation Act, as amended (16 USC 470) [40 CFR 1508.27(b)(3)], [40 CFR 1508.27(b)(8)]	All projects would be reviewed by a cultural resources specialist for the need to conduct cultural resource inventories prior to project implementation, resulting in compliance with this direction. The project would have no effect on this element because appropriate steps would be taken to identify, evaluate, mitigate and/or avoid adverse effects to cultural resources within the proposed project areas.
Ecologically critical areas [40 CFR 1508.27(b)(3)]	The project is in compliance with this direction because any projects within an area of critical environmental concern (ACEC) would be implemented consistent with the management direct for the area.
Energy Policy (Executive Order 13212)	This project is in compliance with this direction because this project would not interfere with the Energy Policy (Executive Order 13212).
Environmental Justice (E.O. 12898, "Environmental Justice" February 11, 1994)	This project is in compliance with this direction because project would have no effect on low income populations.
Fish Habitat, Essential (Magnuson-Stevens Act Provision: Essential Fish Habitat (EFH): Final Rule (50 CFR Part 600; 67 FR 2376, January 17, 2002)	This project is in compliance with this direction and consultation for anticipated adverse effects to EFH has been completed in NMFS’s 2013 Biological Opinion and Essential Fish Habitat consultation. Addressed in text (EA section 3.1).
Farm Lands, Prime [40 CFR 1508.27(b)(3)]	The project would have no effect on this element because no prime farm lands are present on BLM land.
Floodplains (E.O. 11988, as amended, Floodplain Management, 5/24/77)	This project is in compliance with this direction. Addressed in text (EA section 3.1.2.2).
Hazardous or Solid Wastes (Resource Conservation and Recovery Act of 1976 (43 USC 6901 et seq.) Comprehensive Environmental Repose Compensation, and Liability Act of 1980, as amended (43 USC 9615)	The project is in compliance with this direction because the Contractors would be required to have a Spill Containment Kit and a Spill Prevention, Control, and Countermeasure Plan (SPCC) in case the equipment leaks fuel or oil during the project work. The SPCC Plan would be reviewed and accepted by the Contracting Officer prior to initiating project work.

Element of the Environment /Authority	Remarks/Effects
Healthy Forests Restoration Act (Healthy Forests Restoration Act of 2003 (P.L. 108-148)	This project is in compliance with this direction because the project would have no adverse effect on the Healthy forests restoration act.
Migratory Birds (Migratory Bird Act of 1918, as amended (16 USC 703 et seq)	This project is in compliance with this direction. Addressed in text (EA section 3.5).
Native American Religious Concerns (American Indian Religious Freedom Act of 1978 (42 USC 1996)	This project is in compliance with this direction because no Native American religious concerns were identified during the scoping period (EA section 2.3.2).
Noxious weed or non-Invasive, Species (Federal Noxious Weed Control Act and Executive Order 13112)	This project is in compliance with this direction because due to the manner in which material would be transported to, and moved on site, no adverse effect from invasive species is anticipated. Equipment would be washed and inspected prior to entering public lands to insure that no invasive weeds would be transported to the project site. Plant seed used would be free of listed noxious weed seed.
Park lands [40 CFR 1508.27(b)(3)]	No Parklands are present within the project area.
Public Health and Safety [40 CFR 1508.27(b)(2)]	The project would have no adverse concern on public health and safety because all actions would follow established safety procedures for operating equipment, minimizing emissions, and avoiding fuel spills.
Other Special Status Species (BLM Manual 6840)	Fish - The proposal would not contribute to the need to list any special status fish species due to the nature, duration and timing of the project. Addressed in text (EA section 3.1). Plants - The proposal would not contribute to the need to list any special status plant species due to the nature, duration and timing of the project. Addressed in text (EA section 3.3). Wildlife: The proposal would not contribute to the need to list any special status wildlife species due to the nature, duration and timing of the project. Addressed in text (EA section 3.5).
Threatened or Endangered Species (Endangered Species Act of 1983, as amended (16 USC 1531)	*Fish* - This project is in compliance with this direction because all actions seek to improve aquatic conditions and would follow the NMFS guidelines for restoration. Addressed in text (EA sections 2.3, 2.3.2, 3.1, 3.1.2.2 and 8.0). *Plants* - This project is in compliance with this direction because all actions would follow the USFWS guidelines for these types of restoration actions. Addressed in text (EA sections 2.3 and 3.1.2.2) *Wildlife* - This project is in compliance with this direction because all actions would follow the USFWS guidelines for these types of restoration actions. Addressed in text (EA sections 2.3, 2.3.2, 3.5, 3.5.2.2 and 10.0).
Water Quality –Drinking, Ground (Safe Drinking Water Act, as amended (43 USC 300f et seq.) Clean Water Act of 1977 (33 USC 1251 et seq.)	This project is in compliance with this direction. Addressed in text (EA sections 3.2 and 3.2.2).
Wetlands (E.O. 11990 Protection of Wetlands 5/24/77) [40 CFR 1508.27(b)(3)]	This project is in compliance with this direction because no jurisdictional wetlands are in the project area.

Element of the Environment /Authority	Remarks/Effects
Wild and Scenic Rivers (Wild and Scenic Rivers Act, as amended (16 USC 1271) [40 CFR 1508.27(b)(3)]	This project is in compliance with this direction because the project follows direction for management within W&S rivers Addressed in text (EA section 2.3).
Wilderness (Federal Land Policy and Management Act of 1976 (43 USC 1701 et seq.); Wilderness Act of 1964 (16 USC 1131 et seq.)	This project is in compliance with this direction because the project does not take place within Wilderness.

3.7 Compliance with the Aquatic Conservation Strategy

Table 5 shows compliance with the four components of the Aquatic Conservation Strategy for all Action alternatives (1/ Riparian Reserves, 2/ Key Watersheds, 3/ Watershed Analysis and 4/ Watershed Restoration).

Table 5: Compliance of Components of the Aquatic Conservation Strategy

ACS Component	Project Consistency
Component 1 - Riparian Reserves	The project would comply with Component 1 because treatments riparian reserves are expected to improve large woody debris (LWD) function, water quality, sediment regimes and habitat connectivity. The majority of the project area is located within Riparian Reserves. All project components include specific project design features that are intended to avoid or minimize adverse impacts to important Riparian Reserve and aquatic functions (EA sections 2.3.3, 8.0, 9.0 and 10.0). Placement of large wood (LW) would improve physical integrity of aquatic habitat and floodplain functioning. Treatments of roads and culverts would decrease sediment input to streams, improve aquatic connectivity and improve floodplain function. This project would add forest stand structure and complexity by promoting understory development and increased species diversity.
Component 2 - Key Watershed	The proposed action may occur in Key Watersheds. The project would comply with Component 2 because the proposed project has been designed to meet the Tier 1 objective of conserving anadromous and resident fish species.
Component 3 - Watershed Analysis	The project would comply with Component 3 because Watershed Analyses would be used to evaluate existing conditions, establish desired future conditions, and assist in the formulation of appropriate project designs.
Component 4 - Watershed Restoration	The proposed project is a restoration project. The project would comply with Component 4 by improving riparian conditions intended to improve long term aquatic conditions. The restoration objectives of the project are described in EA sections 1.3 and 2.3.1.

This project was reviewed against the ACS objectives at the project scale (IM-OR-2007-60). Table 6 describes the project's consistency with the nine Aquatic Conservation Strategy Objectives.

Table 6: Consistency with the Nine Aquatic Conservation Strategy Objectives

Consistency with ACS Objectives	*Reasoning*
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. *Both the No Action and the Proposed Action Alternatives do not retard or prevent the attainment of ACS objective 1.*	**No Action Alternative:** The No Action alternative would maintain the simplified aquatic habitat that currently exists. Restoration actions would continue to occur however actions would require individual environmental analysis. The current distribution, diversity and complexity of watershed and landscape-scale features would be maintained. **Proposed Action:** The proposed action is designed to restore riparian and aquatic function. The diversity and complexity of aquatic habitat would be enhanced. The aquatic system would be restored to more closely resemble that to which the species, communities and populations are adapted. At the landscape scale, diversity and complexity would be maintained. (EA sections 3.1.2.2 and 3.2.2.2)
2. Maintain and restore spatial and temporal connectivity within and between watersheds. *Both the No Action and the Proposed Action Alternatives do not retard or prevent the attainment of ACS objective 2.*	**No Action Alternative:** Current connectivity within and between watersheds would be maintained. Restoration actions would continue to occur however actions would require individual environmental analysis. **Proposed Action:** Connectivity within the watershed may be improved through improvement of habitat complexity. (EA section 3.0). The proposed action includes the removal of fish passage barriers, and replacement of those barriers with new structures that accommodate passage of aquatic organisms. Therefore, these treatments would restore aquatic connectivity condition at the site scale. At the landscape scale, replacement of multiple barrier stream crossings would result in restored aquatic connectivity. (EA sections 3.1.2.2 and 3.2.2.2)
3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations. *Both the No Action and the Proposed Action Alternatives do not retard or prevent the attainment of ACS objective 3.*	**No Action Alternative:** The current condition of physical integrity would be maintained or improve slightly over the long term. Restoration actions would continue to occur however actions would require individual environmental analysis. **Proposed Action:** The physical integrity of shorelines, banks and bottom configurations would be restored by means of reintroduction of large structural elements and the retention of bedload that currently is routed rapidly through the system. LWD placements would reduce stream flow velocities and increase streambed roughness. Over time, log structures would trap additional wood and sediment moving downstream and increase channel stability and physical integrity of the aquatic system. Short-term impacts to banks and bottom configurations are anticipated; however this action returns the affected sites to a more natural condition. Upgrading culvert sizes would reduce stress on streambanks. (EA sections 3.1.2.2 and 3.2.2.2)

Consistency with ACS Objectives	*Reasoning*
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. *Both the No Action and the Proposed Action Alternatives do not retard or prevent the attainment of ACS objective 4.*	**No Action Alternative:** The current condition of the water quality would be maintained. Restoration actions would continue to occur however actions would require individual environmental analysis. **Proposed Action:** Project design features would ensure that water quality would not be adversely impacted by the proposed actions. Required turbidity monitoring (ARBO II) during project activities would maintain water quality. These PDF's would minimize disturbance to stream channels, prevent and/or minimize project-related sediment from reaching the aquatic system, and minimize the duration and extent of potential elevated turbidities. Therefore, protective PDF's coupled with the short duration of any potential impacts are expected to maintain the existing water quality at the site scale. Placement of LW would improve water quality over the long term by increasing stream shade. Water quality would also be improved by increasing sediment deposition by placing LW to create areas of decreased stream velocities. Roads treatments would reduce erosion and sediment delivery associated with roads by disconnecting hydrologic connectivity. (EA sections 3.1.2.2 and 3.2.2.2)
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. *Both the No Action and the Proposed Action Alternatives do not retard or prevent the attainment of ACS objective 5.*	**No Action Alternative:** It is assumed that the current levels of sediment into streams would be maintained. Restoration actions would continue to occur however actions would require individual environmental analysis. **Proposed Action:** PDF's would minimize disturbance to stream channels and stream banks, prevent and/or minimize project-related sediment from reaching the aquatic system, and minimize the duration and extent of potential elevated turbidities. Required turbidity monitoring (ARBO II) during project activities would maintain water quality. Therefore, protective PDFs coupled with the short duration of any potential impacts are expected to maintain the existing sediment regime at the site scale. The site-scale result of large wood placements, however, would result in retention and storage of stream sediments. Roads treatments would reduce erosion and sediment delivery associated with roads by disconnecting hydrologic connectivity. Road decommissioning would remove roads that encroach on stream channels that result in increased water velocity and erosion potential, and would therefore restore the sediment regime. Throughout the project area the sediment regime would be restored to one more closely resembling that under which the aquatic ecosystems evolved. (EA sections 3.1.2.2 and 3.2.2.2)

Consistency with ACS Objectives	*Reasoning*
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. *Both the No Action and the Proposed Action Alternatives do not retard or prevent the attainment of ACS objective 6.*	**No Action Alternative:** No change in in-streams flows would be anticipated. **Proposed Action:** The project is not expected to change instream flows, however, it would result in localized reductions in the velocities of high flows, and would restore patterns of sediment, nutrient and wood routing. Project components would not reduce canopy closure or increase compacted surfaces to an extent that could potentially influence instream flows at the site scale. Therefore, this treatment would maintain stream flows within the range of natural variability at the site scale. (EA section 3.2.2.2)
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands. *Both the No Action and the Proposed Action Alternatives do not retard or prevent the attainment of ACS objective 7.*	**No Action Alternative:** The current condition of flood plains and their likelihood of inundation, as well as the water table elevations in meadows and wetlands is expected to be maintained. **Proposed Action:** The addition of LWD would likely increase the frequency, and potentially the duration of floodplain inundation, as well as promote floodplain development. (EA sections 3.1.2.2 and 3.2.2.2)
8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability. *Both the No Action and the Proposed Action Alternatives do not retard or prevent the attainment of ACS objective 8.*	**No Action Alternative:** The current species composition and structural diversity of plant communities would continue along the current trajectory. Diversification would occur over a longer period of time. Development of physical complexity and stability would occur over the long term as LW is delivered to the project site from upstream reaches. Restoration actions would continue to occur however actions would require individual environmental analysis. **Proposed Action:** Riparian tree plantings would improve the species composition and structural diversity of riparian plant communities and improve supplies of LW over the long term. Restoration of plant composition would occur faster than under the no action alternative. The proposed project includes PDF's that would prevent the introduction and spread of invasive plant species. (EA sections 3.1.2.2, 3.2.2.2, 3.4.2.2 and 3.5.2.2)

Consistency with ACS Objectives	*Reasoning*
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species. *Both the No Action and the Proposed Action Alternatives do not retard or prevent the attainment of ACS objective 9.*	**No Action Alternative:** The aquatic habitat would remain in a simplified state and less capable of supporting well-distributed populations of native invertebrate and vertebrate populations. Restoration actions would continue to occur however actions would require individual environmental analysis. **Proposed Action:** Habitat functionality for aquatic and riparian habitats would be maintained in the short-term through the use of protective PDFs. Streams and riparian areas would be more capable of supporting well-distributed populations of native invertebrate and vertebrate populations due to increased habitat complexity and diversity. Replacement of fish passage culverts directly restores and supports the distribution of invertebrate and vertebrate riparian (aquatic) species. (EA sections 3.1.2.2 and 3.5.2.2)

4.0 MONITORING

The proposed action has the potential for short-term impacts on turbidity. Project level monitoring for the in channel mechanical activity and stream bank alteration would be consistent with the terms of ARBO II and its associated permits.

5.0 LIST OF PREPARERS

Table 7: List of Preparers

Resource	Original EA	Revised EA
Fisheries/Writer/Editor	Bob Ruediger	Brett Blundon, Scott Snedaker, Bruce Zoellick
Hydrology/ Water Quality/Soil	Peter Adams	Steve Wegner, Patrick Hawe, Douglas Fitting
Botany TES and Special Attention Plant Species	Claire Hibler	
Wildlife TES and Special Attention Animal Species	Roy Price	
Cultural Resources	Heather Ulrich	
Recreation and Wild and Scenic Rivers	Zachary Jarrett	Jeff McCusker
NEPA Review//Writer/Editor	Rich Hatfield	Carolyn Sands

6.0 CONTACTS AND CONSULTATION

6.1 ESA Section 7 Consultation

6.1.1 US Fish and Wildlife Service

Consultation for aquatic restoration projects covered under this environmental assessment has been completed with the U.S. Fish and Wildlife Service. This consultation is documented in the Programmatic Consultation for Aquatic Habitat Restoration Activities in Oregon and Washington (BO 01EOFW00-2013-F-0090), issued on July 1, 2013.

The Biological Assessment determined that the effect call for these types of projects was "may affect, likely adversely affect" for northern spotted owls and marbled murrelets. This call was based on the region–wide projects' potential disturbance from helicopters, heavy equipment, and chainsaws to young northern spotted owls during the critical nesting season (March 1- July 15). In addition, use of type 1 helicopters could disrupt nesting pairs within disruption distances during the entire breeding system. This call is also based on the region-wide projects' potential disturbance to marbled murrelets during critical nesting season (April 5 –August 5) and the late breeding season (August 6 –September 15).

The Salem District proposed aquatic restoration projects would follow the terms and conditions of BO 01EOFW00-2013-F-0090. The BLM developed project design features from the BO terms and conditions (ARBO II described in EA section 10.0) and the project design features described in EA section 2.3.2 that should reduce impacts to the point that the aquatic restoration projects proposed on Salem District are not likely to adversely affect spotted owls or marbled murrelets. The design features include avoiding known sites, following seasonal and daily time restrictions, and involving the local wildlife biologist in the design of the site specific projects to avoid spotted owl and murrelet impacts.

6.1.2 National Marine Fisheries Service (NMFS)

Consultation for aquatic restoration projects covered under this environmental assessment has been completed with the National Marine Fisheries Service (NMFS), and is covered under the following Biological Opinions.

- Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Aquatic Restoration Activities in Oregon and Washington issued by NMFS on April 25, 2013 (NMFS:2013/NWP-2013-9664).
- Biological Opinion for Programmatic Activities of USDA Forest Service, USDI Bureau of Land Management, and Coquille Indian Tribe in Western Oregon. (NMFS No. 2010/02700) for fish passage culverts on fish-bearing streams within one mile of natural barriers to anadromy.

The Biological Assessments determined that the effect call for these types of projects was "may affect, likely adversely affect" for Upper Willamette River (UWR) steelhead trout, UWR Chinook salmon, Lower Columbia River (LCR) steelhead trout, LCR Chinook salmon, LRC Coho salmon, and Oregon Coast Coho salmon.

This call was based on disturbance, minor increases in sediment, turbidity, and injury or death during work area isolation. The projects would follow the terms and conditions for these BOs (ARBO II described in EA sections 8.0 and 9.0) and project design features described in EA section 2.3.2.

Eulachon: The only basin utilized by eulachon where the Salem District would implement the proposed action is the Sandy River basin. Although eulachon are not likely present in the lower Sandy River in most years, in years of high population abundance eulachon could be present in the lower Sandy River until early June. Adults die after spawning and larvae are rapidly carried downstream by the current.

No in-channel actions are allowed within the Sandy River until July 15, well after all life stages of eulachon have left the river. Post construction sediment movement may occur during late fall freshets but would be stabilized before adults enter the Sandy River for spawning. As such, the proposed action would have no effect on eulachon or its designated critical habitat.

6.2 Section 106 Consultation with State Historical Preservation Office

Compliance with Section 106 of the National Historic Preservation Act will be completed according to the Protocol for Managing Cultural Resources on Lands Administered by the BLM in Oregon. In agreement with the State Historic Preservation Office cultural resource surveys will be conducted in accordance with the protocol as necessary.

6.3 EA public comment period

Comment Period for Original EA: EA section 1.4 describes public scoping. The original EA and FONSI was made available for public review March 6, 2012 to March 20, 2012 and posted at the Salem District website at http://www.blm.gov/or/districts/salem/plans/index.php. No comment letters were received during this comment period.

The revised EA will be made available for public review **March 24, 2016 to April 8, 2016.** The EA will be posted on ePlanning website at the following link: http://tinyurl.com/Aquatic-Restoration-EA .

Written comments should be addressed to Kim Titus, District Manager, Salem District, 1717 Fabry Road SE, Salem, Oregon 97306. Emailed comments may be sent to OR_Salem_Mail@blm.gov. Attention: Kim Titus.

7.0 FINDING OF NO SIGNIFICANT IMPACT

Based upon review of the Aquatic and Riparian Habitat Restoration EA and supporting documents, I have determined that the proposed project is not a major federal action and would not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area. No environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27. There are no significant impacts not already adequately analyzed, or no significant impacts beyond those already analyzed, in the RMP/FEIS to which this environmental assessment is tiered. Therefore, supplemental or additional information to the analysis in the RMP/FEIS in the form of a new environmental impact statement (EIS) is not needed. This finding is based on the following discussion:

Context [40 CFR 1508.27(a)]**:** Potential effects resulting from the implementation of the proposed project have been analyzed within the context of the project area boundaries. The proposed project could occur on and within a number of streams, rivers, and riparian areas on the Salem District. There are limitations, however, on the number of projects that could occur on an annual basis. (EA Table 1).

Intensity refers to severity of impact [40 CFR 1508.27(b)]. The following text shows how that the proposed project would not have significant impacts with regard to ten considerations for evaluating intensity, as described in 40 CFR 1508.27(b).

1. The proposed project is unlikely to have significant adverse impacts on the affected elements of the environment [**40 CFR 1508.27(b) (1)**] for the following reasons:

   - Project design features described in EA sections 2.3.2, 8.0, 9.0 and 10.0 would reduce the risk of effects to affected resources. As a result of implementing these design features, any potential effects to the affected resources are anticipated to be site-specific and/or not measurable (i.e. undetectable over the watershed, downstream, and/or outside of the project area).
   - Floodplains and Riparian Areas: The proposed action would have beneficial effects on floodplain habitat and on the river's ability to access its floodplain (EA section 3.1.2.2). Fisheries and Aquatic Habitats: Implementation of project design features and Best Management Practices would to result in minimal effects to fish and aquatic habitat. Effects would be short term and would occur during the in-water window when fish are less likely to be present in the project area. Long term benefits of aquatic restoration projects include reducing chronic impacts to fish and aquatic species habitats (EA sections 3.1.2.2 and 3.6). See also FONSI bullet 7 (Threatened/Endangered (T/E) Fish and Critical Habitat)•
   - Soils: Effects to soils would be unlikely to result in any reduction in soil productivity or disturb normal soil processes. (EA section 3.2).
   - Water Quality and Channel Function: The planned alteration to channel morphology and hydraulics would directly increase habitat diversity, aquatic community complexity and structure, and the diversity of aquatic organisms to the benefit of aquatic species and also improve water quality by stabilizing floodplains. Any increase in turbidity resulting from the project activities is expected to be limited to the location of the disturbance and very short-term (hours) (EA section 3.2).

- Deeper fill culvert replacement or removal in channels with surface flow, requires that the site be isolated from the flowing water during the activity. This practice effectively prevents turbidity and sediment transport as flowing water is routed around the site. In stream monitoring on Salem District has shown that increases in turbidity are short-term because of the limited area of disturbance, seasonal restriction, and the application of BMP's.
- Replacement of culverts requiring more than 20 feet of fill removal is not expected to change the effects to streams or water quality from what was described in the original EA. Removing the 20 foot fill height restriction would reduce the potential for large fill failures by allowing culvert upgrades or removal at additional stream crossing sites where undersized or rusting culverts are buried in deep-fills.
- In the long term, road improvements including culvert replacement or removal, reduce both chronic and episodic erosion and sedimentation. Road improvements such as outsloping the road surface and installing cross drains and rolling dips reduce or eliminate chronic sources of road erosion and fine sediment delivery to stream channels at the replacement sites.
- Required turbidity monitoring (ARBO II) during project activities would maintain water quality during project activities.

- Botany: Surveys, as needed, would have occurred during the growing season prior to implementation of restoration activities. Should botanical ESA listed species, special status and survey & manage species requiring management occur in habitats which may be affected by the proposed restoration, management actions or protection measures would be followed to prevent or minimize adverse impacts. Project design feature implementation would prevent or reduce direct impacts on the species at the project level.

  The proposal would not contribute to the need to list any special status plant species due to the nature, duration and timing of the project (EA section 3.3).

- Invasive Plant Species: Project design features to detect infestations on the project site through risk assessments, treat infestations prior to project implementation and implement prevention strategies would minimize the spread of existing invasive plant infestations and the introduction of new ones. Therefore, the proposed action is not anticipated to increase the abundance or spread of invasive plants. (EA section 3.4)
- Wildlife: The proposal would not contribute to the need to list any special status wildlife species due to the nature, duration and timing of the project (EA sections 3.5). See FONSI bullet 7 (T/E Wildlife).
- Late Successional Stands and Wildlife Habitat Components (snags, CWD): Late successional habitat would be maintained. Adequate amounts of CWD and snags would be maintained on site to meet or exceed Northwest Forest Plan requirements (EA section 3.5).

2. The proposed project would not affect:

- Public health or safety [**40 CFR 1508.27(b) (2)**];
- Unique characteristics of the geographic area [**40 CFR 1508.27(b) (3)**] - There are no, parklands, prime farmlands, wilderness, or ecologically critical areas located within the project area (EA section 3.6).

3. The proposed project is not unique or unusual. The BLM has experience implementing aquatic and riparian restoration projects without highly controversial effects [**40 CFR 1508.27(b) (4)**], highly uncertain, or unique or unknown risks [**40 CFR 1508.27(b) (5)**] (EA section 3.0).

4. The proposed project does not set a precedent for future actions that may have significant effects, nor does it represent a decision in principle about a future consideration [**40 CFR 1508.27(b)(6)**]. No hazardous materials or solid waste would be created in the project area. There would be no reduction in the amount of late-successional forest habitat on federal forestlands (NWFP p. C-44). The proposed project would not retard or prevent the attainment of the ACS objectives (EA section 3.7).

5. The interdisciplinary team evaluated the proposed project in context of past, present and reasonably foreseeable actions [**40 CFR 1508.27(b) (7)**]. Potential cumulative effects are described in the attached EA (EA section 3.0). The proposed project contributes to cumulative effects to the following resources:

   - Water and Fisheries Resource: The proposed project would stabilize floodplains, and facilitate the development of riparian forest stands to shade channels to maintain water quality. In addition, spawning and rearing habitat for threatened anadromous salmonids would improve in reaches downstream of the project as a result of improvement in water quality (EA sections 3.1.2.3).The proposed action is expected to cumulatively improve fisheries habitat and water quality over the long term.

     The proposed habitat restoration actions in conjunction with past and planned future restoration actions would be expected to improve Critical Habitat for T&E fish species, Essential Habitat for coho salmon and Chinook salmon, and water quality (EA sections 3.1.2.2 and 3.2.2.2). No adverse cumulative effects are expected as a result of the restoration actions for the following reasons: 1/ Any sediment increase resulting from in-channel work would be of short duration (hours) and largely restricted to the project area, 2/ the limited magnitude of the likely change in sediment levels resulting from the restoration actions.

     Turbidity monitoring required by the Restoration EA has shown that the same methods used for both shallow and deeper fill culvert replacement projects have resulted in the same effects. There has not been a measureable or detectable adverse change to water quality or stream complexity detected. It is reasonable to presume that these types of projects would continue to occur over the next 10 years. Since the past history of these type of projects have shown a net improvement of the complexity and structure of the stream courses, and meet the designated DEQ Water Quality Management Plans and DEQ approved Water Quality Restoration Plans, there is no evidence that the type of projects included in the proposed action would result in an cumulative adverse effect to water quality.

     These types of projects would contribute to a long term reduction in turbidity and stream temperature.

     All of these factors should act to reduce the amount of runoff that is being delivered to the stream courses, reduce the potential for an alteration of the storm runoff stream flow relationship, reduce the sediment enriched road runoff from being delivered to the stream courses and maintain a natural stability of the affected watersheds.

6. The project would have no effect on historic or cultural resources because appropriate steps would be taken to identify, evaluate, mitigate and/or avoid adverse effects to cultural resources within the proposed project areas including districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places. [**40 CFR 1508.27(b) (8)**] (EA section 3.6).

7. The proposed project is not expected to have significant effects to Endangered or Threatened Species or habitat under the Endangered Species Act (ESA) of 1973 [**40 CFR 1508.27(b) (9)**].

   - Northern spotted owl: The project areas may be located in Critical Habitat, however, no suitable habitat would be removed or downgraded, and suitable habitat would be maintained after individual tree removal for the project (EA section 3.5.2.2). In unsurveyed habitat, adverse effects may include disturbance to young northern spotted owls during activities within the critical nesting season (March 1- July 15), using helicopters, heavy equipment, and chainsaws, and during entire breeding system with Type I helicopters within the disruption distances of nesting pairs (EA sections 3.5.2.2 and 6.1.1).

     These adverse effects are expected to be limited because most actions would be scheduled to occur outside the critical nesting season and most projects would not involve helicopters (EA section 3.5.2.2). Project design criteria (EA section 10.0) are expected to greatly minimize potential impacts to northern spotted owls. ESA Consultation is described in EA section 6.1.1. The potential disturbance effects to spotted owls would be low because of the project design features, including "When appropriate, adhere to seasonal restrictions, daily restrictions and applicable disruption distances for ESA-listed wildlife species as identified in USFWS Biological Opinion 01EOFW00-2013-F-0090." See EA section 10.0.

   - Marbled Murrelet: The project areas may be located in Critical Habitat, however, no suitable habitat would be removed or downgraded, and suitable habitat would be maintained after individual tree removal for the project (EA section 3.5.2.2). Adverse effects may include disturbance while implementing aquatic restoration activities within the murrelet critical nesting season and the late breeding season (EA sections 3.5.2.2 and 6.1.1).

     These adverse effects are expected to be limited because most actions would be scheduled to occur outside the critical nesting season and the late breeding season and most projects would not involve helicopters (EA section 3.5.2.2). Project design criteria (EA section 10.0) are expected to greatly minimize potential impacts to marbled murrelets. ESA Consultation is described in EA section 6.1.1. The potential disturbance effects to marbled murrelets would be low because of the project design features, including "When appropriate, adhere to seasonal restrictions, daily restrictions and applicable disruption distances for ESA-listed wildlife species as identified in USFWS Biological Opinion 01EOFW00-2013-F-0090." See EA section 10.0.

     ESA Fish – OC coho salmon, UWR Chinook salmon, UWR steelhead trout, LCR Chinook salmon, LCR coho salmon, and LCR steelhead trout (EA section 3.1): Adverse impacts of in-channel work required to implement habitat restoration projects would be short term (hours) in duration. Adverse impacts include displacement of juvenile salmonids from near shore habitats and main channel project sites during project construction, disruption of feeding (unable to see prey items) during short term increases in turbidity (EA sections 3.1.2.2 and 3.2.2.2) and potential injury or mortality when fish are removed to isolate work sites (EA sections 3.1.2.2 and 6.1.2).

No long-term adverse effects of the restoration projects on ESA listed fish or their habitat are expected because turbidity levels would return to background levels soon after cessation of in-water work.

Additionally, no sediment is expected to move from access routes to the river long-term because the routes would be revegetated upon completion of the project (EA sections 2.3.2 and 3.2.2.2). Adult ESA fish would not be impacted because restoration work would be conducted during the in-water work period when adult ESA listed fish are absent from the project reach. Habitat quantity and quality for ESA fish would improve over the short to long term as a result of the restoration actions (EA section 3.1.2). ESA Consultation is described in EA section 6.1.2.

Eulachon: The proposed action would have no effect on eulachon or its designated critical habitat due to the timing of eulachon migration and juvenile outmigration and the distance of project activities from their critical habitat (EA sections 3.1 and 6.1.2).

8. The proposed project does not violate any known Federal, State, or local law or requirement imposed for the protection of the environment **[40 CFR 1508.27(b) (10)]**. The alternatives are consistent with other Federal agency and State of Oregon land use. Any permit requirements associated with the implementation of this project would be obtained and complied with. Project design features would assure that potential impacts to water quality would be in compliance with the State of Oregon In-stream Water Quality Standards and thus the Clean Water Act (EA sections 1.3, 3.2 and 8.0). Additionally, the proposed project is consistent with applicable land management plans, policies, and programs (EA section 1.3).

Approved by: Kim M. Titus 3/18/2016
Kim Titus
Salem District Manager
Date

8.0 Project Design Criteria from NMFS ARBO II

Project design criteria from the National Marine Fisheries Service (NMFS) (NWR-2013-09664) for Programmatic Consultation on Fish Habitat Restoration Activities in Oregon and Washington are described in the following sections.

Project Design Criteria (BO NWR-2013-09664, Section 1.3.3)

1. **Fish Passage Culvert and Bridge Projects** (BO NWR-2013-09664, section 1.3.3, # 21/a)

   i. **Culvert Criteria** – Within the considerations of stream simulation, the structure shall, at a minimum, accommodate a bankfull wide channel plus constructed banks to provide for passage of all life stages of native fish species (for more information, reference Chapter 6, page 35 of the USFS Stream Simulation Guide). The following crossing-width guidance applies to specific ranges of entrenchment ratios as defined by Rosgen (1996):

      1. Non-entrenched Streams: If a stream is not fully entrenched (entrenchment ratio of greater than 1.4), the minimum culvert width shall be at least 1.3 times the bankfull channel width. This is consistent with the NOAA Fisheries Anadromous Salmonid Passage Facility Design (section 7.4.2 "Stream Simulation Design") (NMFS 2011), located at: http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish-Passage-Design.pdf However, if the appropriate structure width is determined to be less than 1.3 times the bankfull channel width, processes for variances are listed in "iv" and "v" below.

      2. Entrenched Streams: If a stream is entrenched (entrenchment ratio of less than 1.4), the culvert width must be greater than bankfull channel width, allow sufficient vertical clearance to allow ease of construction and maintenance activities, and provide adequate room for the construction of natural channel banks. Consideration should be given to accommodate the floodprone width. Floodprone is the width measured at twice the maximum bankfull depth (Rosgen, 1996).

   ii. **Bridge Design**

      1. Bridges with vertical abutments—including concrete box culverts, which are constructed as bridges—shall have their stream channels, including width, designed according to culvert guidelines.

      2. Structure material must be concrete or metal. Concrete must be sufficiently cured or dried before coming into contact with stream flow. The use of treated wood for bridge construction or replacement is not allowed under this ARBO II.

      3. Riprap must not be placed within the bankfull width of the stream. Riprap may only be placed below bankfull height when necessary for protection of abutments and pilings. However, the amount and placement of riprap should not constrict the bankfull flow.

iii. Crossing Design

1. Crossings shall be designed using an interdisciplinary design team consisting of an experienced Engineer, Fisheries Biologist, and Hydrologist/Geomorphologist.

2. Crossing structures with widths that exceed 20 feet or with costs that exceed $100,000 shall be reviewed by the USDA Forest Service AOP Design Assistance Team or a BLM equivalent.

3. At least one member of the design team shall be trained in a week-long Aquatic Organism Passage course based on the USDA Forest Service's guide, Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings (USFS 2008) http://stream.fs.fed.us/fishxing/aop_pdfs.html.

4. Bankfull width shall be based on the upper end of the distribution of bankfull width measurements as measured in the reference reach to account for channel variability and dynamics.

vi. Head-cut Stabilization and Associated Fish Passage (BO NWR-2013-09664, section 1.3.3, # 21/a/vi)

1. Stabilize Headcuts

a. In streams with current or historic fish presence, provide fish passage over stabilized headcut through constructed riffles for pool/riffle streams or a series of log or rock weir structures for step/pool channels as described in part ii below.

b. Armor headcut with sufficiently sized and amounts of material to prevent continued up-stream migration of the headcut. Materials can include both rock and organic materials which are native to the area. Material shall not contain gabion baskets, sheet pile, concrete, articulated concrete block, and cable anchors.

c. Focus stabilization efforts in the plunge pool, the headcut, as well as a short distance of stream above the headcut.

d. Minimize lateral migration of channel around headcut ("flanking") by placing rocks and organic material at a lower elevation in the center of the channel cross section to direct flows to the middle of channel.

e. Short-term headcut stabilization (including emergency stabilization projects) may occur without associated fish passage measures. However, fish passage must be incorporated into the final headcut stabilization action and be completed during the first subsequent in-water work period.

f. In streams without current or historic fish presence, it is recommended to construct a series of downstream log or rock weirs as described in part ii below to expedite channel aggradation.

vii. Grade Stabilization to promote Fish Passage associated with Headcut Stabilization BO NWR-2013-09664, section 1.3.3, # 21/a/vii)

1. **NMFS Hydro Fish Passage Review and Approve –** If headcut stabilization and channel spanning non-porous weirs create discrete longitudinal drops > 6", the BLM, FS and BIA will ensure that the action is individually reviewed by the Portland office of the NMFS' Habitat Conservation Division for consistency with criteria in *NOAA Fisheries Anadromous Salmonid Passage Facility Design* (NMFS 2011), located at: http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish-Passage-Design.pdf Refer to section "F" of this chapter.

2. Provide fish passage over stabilized headcut through constructed riffles for pool/riffle streams or a series of log or rock weir structures for step/pool channels. If large wood and boulder placement will be used for headcut stabilization, refer to activity category Large Wood, Boulder, and Gravel Placement (# 2, BO# 22).

3. Construct weirs in a 'V' shape, oriented with the apex upstream, and lower in the center to direct flows to the middle of channel.

4. Key weirs into the stream bed to minimize structure undermining due to scour, preferably at least 2.5x their exposure height. The weir should also be keyed into both banks—if feasible greater than 8 feet.

5. If several structures will be used in series, space the weirs at the appropriate distances to promote fish passage of all life stages of native fish. Incorporate state fish passage criteria (jump height, pool depth, etc.) in the design of weir structures. Recommended weir spacing should be no closer than the net drop divided by the channel slope (for example, a one-foot high weir in a stream with a two-percent gradient will have a minimum spacing of 50-feet [1/0.02]).

6. Include fine material in the weir material mix to help seal the weir/channel bed, thereby preventing subsurface flow and ensuring fish passage immediately following construction if natural flows are sufficient.

7. If a project involves the removal of multiple barriers on one stream or in one watershed over the course of a work season, remove the most upstream barrier first if possible.

2. Large Wood, Boulder, and Gravel Placement and Tree Removal for Large Wood Projects (BO NWR-2013-09664, section 1.3.3, # 22)

a. Large Wood (LW) Projects

i. Place LW and boulders in areas where they would naturally occur and in a manner that closely mimic natural accumulations for that particular stream type. For example, boulder placement may not be appropriate in low-gradient meadow streams.

ii. Structure types shall simulate disturbance events to the greatest degree possible and include, but are not limited to, log jams, debris flows, wind-throw, and tree breakage.

iii. No limits are to be placed on the size or shape of structures as long as such structures are within the range of natural variability of a given location and do not block fish passage.

iv. Projects can include grade control and bank stabilization structures, while size and configuration of such structures will be commensurate with scale of project site and hydraulic forces.

v. The partial burial of LW and boulders is permitted and may constitute the dominant means of placement. This applies to all stream systems but more so for larger stream systems where use of adjacent riparian trees or channel features is not feasible or does not provide the full stability desired.

vi. LW includes whole conifer and hardwood trees, logs, and rootwads. LW size (diameter and length) should account for bankfull width and stream discharge rates. When available, trees with rootwads should be a minimum of 1.5x bankfull channel width, while logs without rootwads should be a minimum of 2.0 x bankfull width.

vii. Structures may partially or completely span stream channels or be positioned along stream banks.

viii. Stabilizing or key pieces of LW must be intact, hard, with little decay, and if possible have root wads (untrimmed) to provide functional refugia habitat for fish. Consider orienting key pieces such that the hydraulic forces upon the large wood increases stability

ix. Anchoring Large Wood – Anchoring alternatives may be used in preferential order:

1. use of adequate sized wood sufficient for stability
2. orient and place wood in such a way that movement is limited
3. ballast (gravel and/or rock) to increase the mass of the structure to resist movement
4. use of large boulders as anchor points for the LW
5. Pin LW with rebar to large rock to increase its weight. For streams that are entrenched (Rosgen F, G, A, and potentially B) or for other streams with very low width to depth ratios (<12) an additional 60% ballast weight may be necessary due to greater flow depths and higher velocities.

b. Engineered Logjams (ELJs) are structures designed to redirect flow and change scour and deposition patterns. To the extent practical, they are patterned after stable natural log jams and can be either unanchored or anchored in place using rebar, rock, or piles. Engineered log jams create a hydraulic shadow, a low-velocity zone downstream that allows sediment to settle out. Scour holes develop adjacent to the log jam. While providing valuable fish and wildlife habitat they also redirect flow and can provide stability to a streambank or downstream gravel bar.

i. **NMFS Hydro Fish Passage Review and Approve –** For non-porous ELJs that occupy >25% of the bankfull area, the BLM, FS and BIA will ensure that the action is individually reviewed by the Portland office of the NMFS' Habitat Conservation Division for consistency with criteria in *NOAA Fisheries Anadromous Salmonid Passage Facility Design* (NMFS 2011), located at: http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish-Passage-Design.pdf Refer to section "F" of this chapter.

ii. ELJs will be patterned, to the greatest degree possible, after stable natural log jams.

iii. Grade control ELJs are designed to arrest channel downcutting or incision by providing a grade control that retains sediment, lowers stream energy, and increases water elevations to reconnect floodplain habitat and diffuse downstream flood peaks.

iv. Stabilizing or key pieces of LW that will be relied on to provide streambank stability or redirect flows must be intact, solid (little decay). If possible, acquire LW with untrimmed rootwads to provide functional refugia habitat for fish.

v. When available, trees with rootwads attached should be a minimum length of 1.5 times the bankfull channel width, while logs without rootwads should be a minimum of 2.0 times the bankfull width.

vi. The partial burial of LW and boulders may constitute the dominant means of placement, and key boulders (footings) or LW can be buried into the stream bank or channel.

vii. Angle and Offset – The LW portions of engineered log jam structures should be oriented such that the forces upon the large wood increases stability. If a rootwad is left exposed to the flow, the bole placed into the streambank should be oriented downstream parallel to the flow direction so the pressure on the rootwad pushes the bole into the streambank and bed. Wood members that are oriented parallel to flow are more stable than members oriented at 45 or 90 degrees to the flow.

viii. If LW anchoring is required, a variety of methods may be used. These include buttressing the wood between riparian trees, the use of manila, sisal or other biodegradable ropes for lashing connections. If hydraulic conditions warrant use of structural connections, such as rebar pinning or bolted connections, may be used. Rock may be used for ballast but is limited to that needed to anchor the LW.

c. Porous Boulder Weirs and Vanes

i. Full channel spanning boulder weirs are to be installed only in highly uniform, incised, bedrock-dominated channels to enhance or provide fish habitat in stream reaches where log placements are not practicable due to channel conditions (not feasible to place logs of sufficient length, bedrock dominated channels, deeply incised channels, artificially constrained reaches, etc.), where damage to infrastructure on public or private lands is of concern, or where private landowners will not allow log placements due to concerns about damage to their streambanks or property.

ii. Install boulder weirs low in relation to channel dimensions so that they are completely overtopped during channel-forming flow events (approximately a 1.5-year flow event).

iii. Boulder weirs are to be placed diagonally across the channel or in more traditional upstream pointing “V” or “U” configurations with the apex oriented upstream.

iv. Boulder weirs are to be constructed to allow upstream and downstream passage of all native fish species and life stages that occur in the stream. Plunges shall be kept less than 6” in height.

v. The use of gabions, cable, or other means to prevent the movement of individual boulders in a boulder weir is not allowed.

vi. Rock for boulder weirs shall be durable and of suitable quality to assure long-term stability in the climate in which it is to be used. Rock sizing depends on the size of the stream, maximum depth of flow, planform, entrenchment, and ice and debris loading.

vii. The project designer or an inspector experienced in these structures should be present during installation.

viii. Full spanning boulder weir placement should be coupled with measures to improve habitat complexity and protection of riparian areas to provide long-term inputs of LW.

d. Gravel Augmentation

i. Gravel can be placed directly into the stream channel, at tributary junctions, or other areas in a manner that mimics natural debris flows and erosion.

ii. Augmentation will only occur in areas where the natural supply has been eliminated, significantly reduced through anthropogenic disruptions, or used to initiate gravel accumulations in conjunction with other projects, such as simulated log jams and debris flows.

iii. Gravel to be placed in streams shall be a properly sized gradation for that stream, clean, and non-angular. When possible use gravel of the same lithology as found in the watershed. Reference the *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organism*s at Road-Stream Crossings (USFS 2008) to determine gravel sizes appropriate for the stream. This manual can be found at the following location: http://stream.fs.fed.us/fishxing/aop_pdfs.html

iv. Gravel can be mined from the floodplain at elevations above bankfull. Crushed rock is not permitted.

v. After gravel placement in areas accessible to higher stream flow, allow the stream to naturally sort and distribute the material.

vi. Do not place gravel directly on bars and riffles that are known spawning areas, which may cause fish to spawn on the unsorted and unstable gravel, thus potentially resulting in redd destruction.

vii. Imported gravel must be free of invasive species and non-native seeds. If necessary, wash gravel prior to placement.

e. Tree Removal for Large Wood (LW) Projects

i. Live conifers and other trees can be felled or pulled/pushed over in a Northwest Forest Plan (USDA and USDI 1994a) Riparian Reserve or PACFISH/INFISH (USDA-Forest Service 1995 ; USDA and USDI 1994b) riparian habitat conservation areas (RHCA), and upland areas (*e.g.*, late successional reserves or adaptive management areas for northern spotted owl and marbled murrelet critical habitat) for in-channel LW placement only when conifers and trees are fully stocked. Tree felling shall not create excessive stream bank erosion or increase the likelihood of channel avulsion during high flows.

ii. Danger trees and trees killed through fire, insects, disease, blow-down and other means can be felled and used for in-channel placement regardless of live-tree stocking levels.

iii. Trees may be removed by cable, ground-based equipment, horses or helicopters.

iv. Trees may be felled or pushed/pulled directly into a stream and/or floodplain.

v. Trees may be stock piled for future instream restoration projects.

vi. The project manager for an aquatic restoration action under ARBO II will coordinate with an action-agency wildlife biologist in tree-removal planning efforts.

3. **Reconnection of Existing Side Channels and Alcoves** (BO NWR-2013-09664, section 1.3.3, #25)

a. **NMFS Hydro Fish Passage Review and Approve –** When a proposed side channel will contain >20% of the bankfull flow, the BLM, FS and BIA will ensure that the action is individually reviewed by the Portland office of the NMFS' Habitat Conservation Division for consistency with criteria in NMFS (2011).

b. **Data Requirements** – Data requirements and analysis for off- and side-channel habitat restoration include evidence of historical channel location, such as land use surveys, historical photographs, topographic maps, remote sensing information, or personal observation.

c. **Allowable Excavation –** Off- and side-channel improvements can include minor excavation (< 10% of volume) of naturally accumulated sediment within historical channels. There is no limit as to the amount of excavation of anthropogenic fill within historic side channels as long as such channels can be clearly identified through field and/or aerial photographs. Excavation depth will not exceed the maximum thalweg depth in the main channel. Excavated material removed from off- or side-channels shall be hauled to an upland site or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity.

4. **Bank Restoration** (BO NWR-2013-09664, section 1.3.3, # 26)

a. Without changing the location of the bank toe, restore damaged streambanks to a natural slope and profile suitable for establishment of riparian vegetation. This may include sloping of unconsolidated bank material to a stable angle of repose or the use of benches in consolidated, cohesive soils.

b. Complete all soil reinforcement earthwork and excavation in the dry. When necessary, use soil layers or lifts that are strengthened with biodegradable fabrics and penetrable by plant roots.

c. Include large wood to the extent it would naturally occur. If possible, large wood should have untrimmed root wads to provide functional refugia habitat for fish. Wood that is already within the stream or suspended over the stream may be repositioned to allow for greater interaction with the stream.

d. Rock will not be used for streambank restoration, except as ballast to stabilize large wood.

e. Use a diverse assemblage of vegetation species native to the action area or region, including trees, shrubs, and herbaceous species. Vegetation, such as willow, sedge and rush mats, may be gathered from abandoned floodplains, stream channels, etc.

f. Do not apply surface fertilizer within 50 feet of any stream channel.

g. Install fencing as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

h. Conduct post-construction monitoring and treatment or removal of invasive plants until native plant species are well established.

5. Road Treatments (BO NWR-2013-09664, section 1.3.3, # 32)

a. Road Decommissioning and Stormproofing

i. For road decommissioning and hydrologic closure projects within riparian areas, recontour the affected area to mimic natural floodplain contours and gradient to the extent possible.

ii. When obliterating or removing segments immediately adjacent to a stream, consider using sediment control barriers between the project and stream.

iii. Dispose of slide and waste material in stable sites out of the flood-prone area. Native material may be used to restore natural or near-natural contours.

iv. Drainage features used for stormproofing and treatment projects should be spaced as to hydrologically disconnect road surface runoff from stream channels. If grading and resurfacing is required, use gravel, bark, or other permeable materials for resurfacing.

v. Minimize disturbance of existing vegetation in ditches and at stream crossings.

vi. Conduct activities during dry-field conditions (generally May 15 to October 15) when the soil is more resistant to compaction and soil moisture is low.

vii. When removing a culvert from a first or second order, non-fishing bearing stream, project specialists shall determine if culvert removal should include stream isolation and rerouting in project design. Culvert removal on fish bearing streams shall adhere to the measures described in the Fish Passage Restoration activity category.

viii. For culvert removal projects, restore natural drainage patterns and channel morphology. Evaluate channel incision risk and construct in-channel grade control structures when necessary.

b. Road Relocation

i. When a road is decommissioned in a floodplain and future vehicle access through the area is still required, relocate the road as far as practical away from the stream.

ii. The relocation will not increase the drainage network and will be constructed to hydrologically disconnect it from the stream network to the extent practical. New cross drains shall discharge to stable areas where the outflow will quickly infiltrate the soil and not develop a channel to a stream.

iii. This consultation does not cover new road construction (not associated with road relocation) or routine maintenance within riparian areas.

6. **Riparian Planting** (BO NWR-2013-09664, section 1.3.3, # 36)

a. Experienced silviculturists, botanists, ecologists, or associated technicians shall be involved in designing vegetation treatments.

b. Species to be planted will be of the same species that naturally occur in the project area. Acquire native seed and/or plant sources as close to the watershed as possible.

c. Tree and shrub species, willow cuttings, as well as sedge and rush mats to be used as transplant material shall come from outside the bankfull width, typically in terraces (abandoned flood plains), or where such plants are abundant.

d. Sedge and rush mats should be sized to prevent their movement during high flow events.

e. Concentrate plantings above the bankfull elevation.

f. Removal of native and non-native vegetation that will compete with plantings is permitted.

g. Exclosure fencing to prevent utilization of plantings by deer, elk, and livestock is permitted.

General Aquatic Conservation Measures (BO NWR-2013-09664, section 1.3.2)

10. **Technical Skill and Planning Requirements**

a. Ensure that an experienced fisheries biologist or hydrologist is involved in the design of all projects covered by this opinion. The experience should be commensurate with technical requirements of a project.

b. Planning and design includes field evaluations and site-specific surveys, which may include reference-reach evaluations that describe the appropriate geomorphic context in which to implement the project. Planning and design involves appropriate expertise from staff or experienced technicians (*e.g.*, fisheries biologist, hydrologist, geomorphologist, wildlife biologist, botanist, engineer, silviculturist, fire/fuels specialists).

c. The project fisheries biologist/hydrologist will ensure that project design criteria are incorporated into implementation contracts. If a biologist or hydrologist is not the Contracting Officer Representative, then the biologist or hydrologist must regularly coordinate with the project Contracting Officer Representative to ensure the project design criteria and conservation measures are being followed.

11. **Climate Change –** Consider climate change information, such as predictive hydrographs for a given watershed or region, when designing projects covered by this opinion.

12. **In-water Work Period –** Follow the appropriate state (ODFW 2008; WDFW 2010) or most recent guidelines for timing of in-water work. If work occurs in occupied Oregon chub habitat, in-water work will not occur between June 1 and August 15. In those few instances when projects will be implemented in California, Idaho, or Nevada, follow appropriate state guidelines. The Action Agencies will request exceptions to in-water work windows through Level 1 NMFS or USFWS representatives as well as essential state agencies.

13. **Fish Passage –** Fish passage will be provided for any adult or juvenile fish likely to be present in the action area during construction, unless passage did not exist before construction, stream isolation and dewatering is required during project implementation, or where the stream reach is naturally impassible at the time of construction. After construction, adult and juvenile passage that meets NMFS's fish passage criteria (NMFS 2011e) will be provided for the life of the structure.

14. **Site Assessment for Contaminants** – In developed or previously developed sites, such as areas with past dredge mines, or sites with known or suspected contamination, a site assessment for contaminants will be conducted on projects that involve excavation of >20 cubic yards of material. The action agencies will complete a site assessment to identify the type, quantity, and extent of any potential contamination. The level of detail and resources committed to such an assessment will be commensurate with the level and type of past or current development at the site. The assessment may include the following:

    a. Review of readily available records, such as former site use, building plans, records of any prior contamination events.

    b. Site visit to observe the areas used for various industrial processes and the condition of the property.

    c. Interviews with knowledgeable people, such as site owners, operators, occupants, neighbors, local government officials, etc.

    d. Report that includes an assessment of the likelihood that contaminants are present at the site.

15. **Pollution and Erosion Control Measures** – Implement the following pollution and erosion control measures:

    a. Project Contact: Identify a project contact (name, phone number, an address) that will be responsible for implementing pollution and erosion control measures.

    b. List and describe any hazardous material that would be used at the project site, including procedures for inventory, storage, handling, and monitoring; notification procedures; specific clean-up and disposal instructions for different products available on the site; proposed methods for disposal of spilled material; and employee training for spill containment.

    c. Temporarily store any waste liquids generated at the staging areas under cover on an impervious surface, such as tarpaulins, until such time they can be properly transported to and treated at an approved facility for treatment of hazardous materials.

    d. Procedures based on best management practices to confine, remove, and dispose of construction waste, including every type of debris, discharge water, concrete, cement, grout, washout facility, welding slag, petroleum product, or other hazardous materials generated, used, or stored on-site.

    e. Procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities. Ensure that materials for

emergency erosion and hazardous materials control are onsite (*e.g.*, silt fence, straw bales, oil-absorbing floating boom whenever surface water is present).

f. Best management practices to confine vegetation and soil disturbance to the minimum area, and minimum length of time, as necessary to complete the action, and otherwise prevent or minimize erosion associated with the action area.

g. No uncured concrete or form materials will be allowed to enter the active stream channel.

h. Steps to cease work under high flows, except for efforts to avoid or minimize resource damage.

16. Site Preparation

a. **Flagging sensitive areas** – Prior to construction, clearly mark critical riparian vegetation areas, wetlands, and other sensitive sites to minimize ground disturbance.

b. **Staging area** – Establish staging areas for storage of vehicles, equipment, and fuels to minimize erosion into or contamination of streams and floodplains.

i. No Topographical Restrictions – place staging area 150 feet or more from any natural water body or wetland in areas where topography does not restrict such a distance.

ii. Topographical Restrictions –place staging area away from any natural water body or wetland to the greatest extent possible in areas with high topographical restriction, such as constricted valley types.

c. **Temporary erosion controls** – Place sediment barriers prior to construction around sites where significant levels of erosion may enter the stream directly or through road ditches. Temporary erosion controls will be in place before any significant alteration of the action site and will be removed once the site has been stabilized following construction activities.

d. **Stockpile materials** – Minimize clearing and grubbing activities when preparing staging, project, and or stockpile areas. Any LW, topsoil, and native channel material displaced by construction will be stockpiled for use during site restoration. Materials used for implementation of aquatic restoration categories (*e.g.*, LW, boulders, fencing material) may be staged within the 100-year floodplain.

e. **Hazard trees** – Where appropriate, include hazard tree removal (amount and type) in project design. Fell hazard trees when they pose a safety risk. If possible, fell hazard trees within riparian areas towards a stream. Keep felled trees on site when needed to meet coarse LW objectives.

17. Heavy Equipment Use

a. **Choice of equipment** – Heavy equipment will be commensurate with the project and operated in a manner that minimizes adverse effects to the environment (*e.g.*, minimally-sized, low pressure tires, minimal hard turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils).

b. **Fueling and cleaning and inspection for petroleum products and invasive weeds**

   i. All equipment used for instream work will be cleaned for petroleum accumulations, dirt, plant material (to prevent the spread of noxious weeds), and leaks repaired prior to entering the project area. Such equipment includes large machinery, stationary power equipment (*e.g.*, generators, canes), and gas-powered equipment with tanks larger than five gallons.

   ii. Store and fuel equipment in staging areas after daily use.

   iii. Inspect daily for fluid leaks before leaving the vehicle staging area for operation.

   iv. Thoroughly clean equipment before operation below ordinary high water or within 50 feet of any natural water body or areas that drain directly to streams or wetlands and as often as necessary during operation to remain grease free.

c. **Temporary access roads** – Existing roadways will be used whenever possible. Minimize the number of temporary access roads and travel paths to lessen soil disturbance and compaction and impacts to vegetation. Temporary access roads will not be built on slopes where grade, soil, or other features suggest a likelihood of excessive erosion or failure. When necessary, temporary access roads will be obliterated or revegetated. Temporary roads in wet or flooded areas will be restored by the end of the applicable in-water work period. Construction of new permanent roads is not permitted.

d. **Stream crossings** – Minimize number and length of stream crossings. Such crossings will be at right angles and avoid potential spawning areas to the greatest extent possible. Stream crossings shall not increase the risk of channel re-routing at low and high water conditions. After project completion, temporary stream crossings will be abandoned and the stream channel and banks restored.

e. **Work from top of bank** – To the extent feasible, heavy equipment will work from the top of the bank, unless work instream would result in less damage to the aquatic ecosystem.

f. **Timely completion** – Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible. During excavation, stockpile native streambed materials above the bankfull elevation, where it cannot reenter the stream, for later use.

18. Site Restoration

a. **Initiate rehabilitation** – Upon project completion, rehabilitate all disturbed areas in a manner that results in similar or better than pre-work conditions through removal of project related waste, spreading of stockpiled materials (soil, LW, trees, *etc.*) seeding, or planting with local native seed mixes or plants.

b. **Short-term stabilization** – Measures may include the use of non-native sterile seed mix (when native seeds are not available), weed-free certified straw, jute matting, and other similar techniques. Short-term stabilization measures will be maintained until permanent erosion control measures are effective. Stabilization measures will be instigated within three days of construction completion.

c. **Revegetation** – Replant each area requiring revegetation prior to or at the beginning of the first growing season following construction. Achieve reestablishment of vegetation in disturbed areas to at least 70% of pre-project levels within three years. Use an appropriate mix of species that will achieve establishment and erosion control objectives, preferably forb, grass, shrub, or tree species native to the project area or region and appropriate to the site. Barriers will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

d. **Planting manuals** – All riparian plantings shall follow Forest Service direction described in the Regional letter to Units, Use of Native and Nonnative Plants on National Forests and Grasslands May 2006 (Final Draft), and or BLM Instruction Memorandum No. OR-2001-014, Policy on the Use of Native Species Plant Material.

e. **Decompact soils** – Decompact soil by scarifying the soil surface of roads and paths, stream crossings, staging, and stockpile areas so that seeds and plantings can root.

9.0 Project Design Criteria from NMFS WOP

Project design criteria from the National Marine Fisheries Service (NMFS) (Fisheries BO No. 2010/02700) for Programmatic Activities in Western Oregon (WOP)

Culvert Replacement

Design Criteria

1. For fish-bearing stream culverts within 1 mile of LFH, replace culverts in a manner that is consistent with the stream simulation methods described in NMFS (2008), or more recent version if available.[1] Replacements using hydraulic designs, culverts with external fishways, and baffled culverts within 1 mile of LFH are not covered by this consultation. These activities are subject to individual consultation under section 7 of the ESA.

2. When replacing any existing culvert, completely excavate and move all overburden (road fill material) to a suitable stockpiling area. Employ suitable erosion control measures (*e.g.*, tarping, silt fences, hay bales) to ensure that the stockpiled material does not erode into streams or wetlands in the event of precipitation. After replacing the culvert, move any excess overburden material to a stable site away from riparian areas and floodplains

[1] The PDC require using stream simulation methods for all fish-bearing streams that are not above natural barriers, but do not require following NMFS (2008). The NMFS does not intend to discourage the use of stream simulation methods greater than 1 mile upstream of LFH, but only to ensure that its particular methods in NMFS (2008) are followed within 1 mile of LFH.

10.0 Project Design Criteria from USFWS ARBO II

Project design criteria from the U.S. Fish and Wildlife Service Biological Opinion for Aquatic Habitat Restoration Activities in Oregon and Washington (01EOFW00-2013-F-0090).

Project Design Criteria ((01EOFW00-2013-F-0090, section 1.3.3)

1. **Large Wood, Boulder, and Gravel Placement and Tree Removal for Large Wood Projects** (BO 01EOFW00-2013-F-0090, section 1.3.3, #22/e)

   i. Live conifers and other trees can be felled or pulled/pushed over in a Northwest Forest Plan (USDA and USDI 1994b) Riparian Reserve or PACFISH/INFISH (USDA-Forest Service 1995; USDA and USDI 1994a) riparian habitat conservation areas (RHCA), and upland areas (*e.g.*, late successional reserves or adaptive management areas for northern spotted owl and marbled murrelet critical habitat) for in-channel LW placement only when conifers and trees are fully stocked. Tree felling shall not create excessive stream bank erosion or increase the likelihood of channel avulsion during high flows.

   ii. Danger trees and trees killed through fire, insects, disease, blow-down and other means can be felled and used for in-channel placement regardless of live-tree stocking levels.

   iii. Trees may be removed by cable, ground-based equipment, horses or helicopters.

   iv. Trees may be felled or pushed/pulled directly into a stream or floodplain.

   v. Trees may be stock piled for future instream restoration projects.

   vi. The project manager for an aquatic restoration action will coordinate with an action-agency wildlife biologist in tree-removal planning efforts.

   vii. In Northern Spotted Owl and Marbled Murrelet habitat, meet the following requirements:

   viii. The following Project Design Criteria applies to tree removal within the range of marbled murrelets and the spotted owl in Douglas-fir dominated stands less than 80 years old that are not functioning as foraging habitat[2] within a spotted owl home range and which do not contain murrelet nesting structure. It does not apply to tree selection in older stands or hardwood-dominated stands unless stated otherwise. The purpose of these criteria is to ensure that there would be no removal or undesirable modification of suitable habitat for marbled murrelet or spotted owl.

      a. A wildlife biologist must be fully involved in all tree-removal planning efforts, and be involved in making decisions on whether individual trees are suitable for nesting or have other important listed bird habitat value.

[2] This applies in spotted owl provincial home ranges where the levels of NRF are so low that spotted owls rely on dispersal habitat as their primary foraging habitat. Site-specific determinations should be made by the unit wildlife biologist.

b. Outside of one site potential tree height of streams (see BO Table 5 for riparian restrictions), trees can be removed to a level not less than a Relative Density (RD) of approximately 35 (stand scale), which is considered as fully occupying a site. This equates to approximately 60 trees per acre in the overstory and a tree spacing averaging 26 feet. Additionally 40% canopy cover would be maintained when in spotted owl or marbled murrelet CH, when within 300 feet of occupied or unsurveyed murrelet nesting structure, and when dispersal habitat is limited in the area

c. Trees to be removed can be live, hazard trees, or killed through fire, insects, disease, blow down and other means. Down trees and snags should only be removed if the stand will retain NWFP standards post removal.

d. Trees may be removed by cable, ground-based equipment, horses or helicopters, felled or pushed/pulled directly into a stream. Trees may be stock piled for future instream restoration projects.

e. Tree species removed should be relatively common in the stand (i.e., not "minor" tree species).

f. Snags and trees with broad, deep crowns ("wolf" trees), damaged tops or other abnormalities that may provide a valuable wildlife habitat component should be reserved.

g. No gaps (openings) greater than 0.5 acre will be created in spotted owl CH. No gaps greater than ¼ acre will be created in murrelet CH. No gaps shall be created in Riparian Reserves that contain ESA-listed fish habitat.

ix. The following Project Design Criteria applies to tree removal within the range of marbled murrelet and the spotted owl in Douglas-fir dominated stands greater than 80 years old (or stands under 80 years old that are functioning as primary foraging habitat) within a spotted owl home range, and/or do contain marbled murrelet nesting structure.

a. Individual trees or small groups of trees should come from the periphery of permanent openings (roads etc.) or from the periphery of non-permanent openings (e.g., plantations, along recent clear-cuts etc.). Groups of trees greater than 4 trees shall 1) not be within marbled murrelet suitable stands or stands buffering (300 ft.) MM suitable stands, 2) not be buffering (300 ft.) individual trees with marbled murrelet nesting structure. A minimum distance of one potential tree height feet should be maintained between individual or group removals.

b. Trees up to 36" dbh may be felled in any stands with agreement from a wildlife biologist that the trees are not providing marbled murrelet nesting structures or providing cover for nest sites. No known spotted owl nest trees or alternate nest trees are to be removed. Potential spotted owl nest trees may only be removed in limited instances when it is confirmed with the wildlife biologist that nest trees will not be limited in the stand post removal.

c. In order to minimize the creation of canopy gaps or edges, groups of adjacent trees selected should not create openings greater than ¼ acre within 0.5 miles of marbled murrelet occupied habitat or when within murrelet CH. Within spotted owl critical habitat, stands greater than 80 years old or within stands providing foraging habitat to spotted owl home ranges, gaps will be restricted to 0.5 acre openings or less. Gaps shall not be created in Riparian Reserves where ESA-listed fish occur.

General Conservation Measures and Project Design Criteria for All Terrestrial Species (BO 01EOFW00-2013-F-0090 section 1.4)

1. The following CMs apply to all ESA-listed terrestrial species for all programmatic activities:

a. Aquatic restoration actions will not remove or downgrade suitable habitat (on either public or private land) for any listed terrestrial species.

b. Effects of danger tree removal will be either discountable or insignificant to ESA-listed terrestrial species and their critical habitat.

c. All restoration activities must have the unit's botanist and terrestrial wildlife biologist input/analysis of the project design and their site-specific species assessment to proceed. This includes a plant survey and nest analysis (or survey if suitable habitat is known to occur within the project prior to project implementation).

d. There will be no disturbance allowed from blasting activities as they are not part of the proposed action.

e. The unit wildlife biologist is responsible for ensuring that the correct effects determination is made for each project. The unit wildlife biologist may increase or decrease disturbance distances according to the best available scientific information and site-specific conditions. Refer to Tables 9-10. For instance, if a known NSO site is surveyed to protocol and the owls are determined to be non-nesting, the unit biologist may determine that no disturbance or disruption would occur and lift the associated restrictions on activities within disruption distances during the year of survey.

Table 8: Disturbance Distances and Time Periods When Disturbance (and Possibly Disruption) May Occur for Terrestrial Species.* (BO Table 7)

Species	Disturbance Distance (in miles)	Time Period Applicable
Northern spotted owl (nesting)	See BO Table 9	Mar 1 – September 30
Marbled murrelet (nesting)	See BO Table 10	Apr 1 – Sept 15***
All Plants	0.25**	Jan 1 – Dec 31
*See CMs below for additional details. **If project is within 0.25 mile of a listed plant, then measures must be taken to minimize threats to NE or NLAA the species to be covered by this programmatic consultation. ***General Conservation Measure MM1 requires daily timing restrictions. The first work restriction stops two hours after sunrise and the work restriction starts again 2 hours before sunset.		

2. **Plants** (BO 01EOFW00-2013-F-0090 section 1.4, #3): For threatened or endangered plant species that may occur in project areas within the scope of this ARBOII, the following criteria will be applied for all listed plant species:

   i. **PL1**: A unit botanist will have the following input in all project designs: (a) the botanist will determine whether there are known listed plants or suitable habitat for listed plants in the project area; (b) If a known site of a listed plant is within 0.25-mile of the project action area, or that suitable or potential habitat may be affected by project activities, then a botanist will conduct a site visit/vegetation survey to determine whether listed plants are within the project area. This visit and survey will be conducted at the appropriate time of year to identify the species and determine whether individual listed plants or potential habitat are present and may be adversely affected by project activities (see BO Table 8, EA Table 9).

   ii. **PL2:** If one or more listed plants are present and likely to be adversely affected by the project, then the project is not covered by this ARBOII II and consultation with the FWS under Section 7 of the ESA must be initiated. If a project will have no effect or is NLAA listed plants it is covered under this ARBOII II. Project design criteria should address both the critical life cycle of listed plant species as well as the effective biotic and abiotic environmental factors sustaining rare plant taxa.

   iii. **PL3:** Due to soil disturbance that may occur during aquatic restoration activities and use of heavy equipment that could carry seeds and plant parts into project areas, all appropriate prevention measures will be incorporated into contract or equipment rental agreements to avoid introduction and establishment of invasive plants and noxious weeds into project areas.

Table 9: Optimal Survey Times for Flowering Periods of Salem District Suspected and Documented Listed Plants (Derived from BO Table 8)

Species	Optimal Survey Time Period*
Bradshaw's Lomatium	April to mid-May
Golden Paintbrush	April to September
Kincaid's Lupine	May through June
Nelson's Checkermallow	Late May to Mid-July
Water Howellia	June through August
Nelson's Checkermallow	Late May to Mid-July
Willamette Daisy	Mid-June to early July

*This is a guideline. The site botanist will survey when the time is appropriate.

3. **Insects** (BO 01EOFW00-2013-F-0090 section 1.4, #4)

   a. **Fenders Blue Butterfly**

   i. **FBB1**: No project included in this assessment will remove or disturb Kincaid's lupine, spur lupine *(Lupinus laxiflorus = L. arbustus)* or sickle-keeled lupine *(L. albicaulis*) within the range of the butterfly.

ii. **FBB2**: No project included in the assessment will remove habitat including the following nectar sources: wild onion (*Allium amplectans*); cat's ear mariposa lily (*Calachortus tolmiei*); common camas (*Camassia quamash*); Oregon sunshine (*Eriophyllum lanatum*); and rose checkermallow (*Sidalcea virgata)* within the range of the butterfly.

4. **Birds** (BO 01EOFW00-2013-F-0090 section 1.4, #6): ARBOII II attempts to minimize or avoid adverse effects to listed birds by implementing aquatic restoration actions outside of critical nesting period windows and/or outside of disturbance or disruption distances from occupied habitat. However, some aquatic restoration activities must occur within a listed bird critical nesting period or within a disturbance or disruption distance. A limited number of aquatic restoration activities that adversely affect listed birds will therefore occur under this proposed action.

   a. Conditions common to all programmatic activities that will be applied to avoid disturbance or disruption of listed bird species include:

      i. The proposed activities included in this document are consistent with the Northwest Forest Plan (USDA and USDI 1994) and FS Land and Resource Management Plans and BLM Resource Management Plans as amended by the Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines, USDA Forest Service and USDI BLM (USDA and USDI 2001, USDI 2008 as amended by the 2011 agreement).

      ii. The proposed activities do not include those that would result in loss of suitable habitat (on either public or private land) for the identified ESA-listed species.

      iii. The proposed activities must have wildlife biologist input/analysis to proceed.

      iv. As a general rule, a disruption site is defined as approximately 100 meters radius around the project site. However, the unit wildlife biologist has the discretion to adjust disturbance distances, based on site-specific conditions.

   b. **Northern spotted owl**

      i. **NSO1**: To reduce adverse effects to NSO, projects will not generally occur between March1 – July 15 (July 7 for the Oregon North Coast Planning Province [ONCPP]) if there is an active known owl site, predicted owl site (as determined through an approved modeling process, such as ITS), RPO (Reference Point Owl) and/or occupied habitat within the disruption distance of the project area. Projects should (a) be delayed until after the critical breeding season (unless action involves Type I helicopters, which extend critical nesting window to September 30); (b) delayed until it is determined that young are not present.

      ii. **NSO2**: The unit wildlife biologist may extend the restricted season based on site-specific information (such as a late or recycle nesting attempt).

      iii. **NSO3**: BO Table 9 shows disruption distances applicable to the equipment types proposed in the ARBO II. These distances can be locally altered based on current information (EA Table 10).

iv. **NSO4**: No activity within this BO will cause adverse effects to spotted owl critical habitat when analyzed against the appropriate local scale as determined by the unit wildlife biologist.

v. **NSO5**: For LW projects follow project design as outlined within section [Tree removal guidelines above]

vi. **NSO6:** No hovering or lifting within 500 feet of the ground within occupied spotted owl habitat during the critical breeding season by ICS Type I or II helicopters would occur as part of any proposed action addressed by this assessment.

Table 10: Disturbance, disruption (harass) and/or physical injury (harm) distance thresholds for Spotted Owls- Distances are to a known occupied spotted owl nest tree or suitable nest trees in unsurveyed nesting habitat. (BO Table 9)

Project Activity	**No Effect** **(Mar 1 – Sept. 30)**	**NLAA** "may affect" disturbance distance **(Mar. 1 – Sept. 30)**	**LAA – Harass** early nesting season disruption distance **(Mar. 1– Jul. 15[11])**	**LAA – Harass** late nesting season disruption distance **(July 16[11]– Sept. 30)**	**LAA – Harm** direct injury and/or mortality **(Mar. 1 – Sept. 30)**
Light maintenance (e.g., Road brushing and grading) at campgrounds, administrative facilities, and heavily-used roads	>0.25 mile	>0.25 mile	NA[1]	NA	NA
Log hauling on heavily-used roads (FS maintenance levels 3, 4, and 5)	>0.25 mile	>0.25 mile	NA[1]	NA	NA
Chainsaws (includes felling hazard/danger trees)	>0.25 mile	66 yards to 0.25 mile -	≤ 65 yards[2]	NA	NA
Heavy equipment for road construction, road repairs, bridge construction, culvert replacements, etc.	>0.25 mile	66 yards to 0.25 mile -	≤ 65 yards[2]	NA	NA
Pile-driving (steel H piles, pipe piles) Rock Crushing and Screening Equipment	>0.25 mile	120 yards to 0.25 mile	≤ 120 yards[3]	NA	≤ 5 yards(injury)[3]
Blasting	>1 mile	0.25 mile to 1 mile	≤ 0.25 mile[4]	NA	≤ 100 yards (injury)[4]
Helicopter: Chinook 47d	>0.5 mile	266 yards to 0.5 mile	≤ 265 yards[5]	≤ 100 yards[6] (hovering only)	NA
Helicopter: Boeing Vertol 107, Sikorsky S-64 (SkyCrane)		151 yards to 0.25 mile	≤ 150 yards[7]	≤ 50 yards[6] (hovering only)	NA
Helicopters: K-MAX, Bell 206 L4, Hughes 500	>0.25 mile	111 yards to 0.25 mile	≤ 110 yards8	≤ 50 yards6 (hovering only)	NA

Project Activity	**No Effect** (Mar 1 – Sept. 30)	**NLAA** "may affect" disturbance distance **(Mar. 1 – Sept. 30)**	**LAA – Harass** early nesting season disruption distance (**Mar. 1– Jul. 15**[11])	**LAA – Harass** late nesting season disruption distance (**July 16**[11]**– Sept. 30**)	**LAA – Harm** direct injury and/or mortality (**Mar. 1 – Sept. 30)**
Small fixed-wing aircraft (Cessna 185, etc.)	>0.25 mile	111 yards to 0.25 mile	≤ 110 yards	NA	NA
Tree Climbing	>0.25 mile	26 yards to 65 yards	≤ 25 yards9	NA	NA
Burning (prescribed fires, pile burning)	>1 mile	0.25 mile to 1 mile	≤ 0.25 mile10	NA	NA

NLAA = "not likely to adversely affect." **LAA** = "likely to adversely affect" **≥ is greater than or equal to, ≤ is less than or equal to.**

Table 9 (Spotted Owl) Footnotes:
1. NA = not applicable. Based on information presented in Tempel and Gutiérrez (2003, p. 700), Delaney et al. (1999, p. 69), and Kerns and Allwardt (1992, p. 9), we anticipate that spotted owls that select nest sites in close proximity to open roads either are undisturbed by or habituate to the normal range of sounds and activities associated with these roads.
2. Based on Delaney et al. (1999, p. 67) which indicates that spotted owl flush responses to above-ambient equipment sound levels and associated activities are most likely to occur at a distance of 65 yards (60 m) or less.
3. Impulsive sound associated with pile-driving is highly variable and potentially injurious at close distances. A review compiled by Dooling and Popper (2007, p. 25) indicates that birds exposed to multiple impulses (e.g., pile driving) of sound at 125 dBA or greater are likely to suffer hearing damage. We have conservatively chosen a distance threshold of 120 yards for impact pile-driving to avoid potential effects to hearing and to account for significant behavioral responses (e.g. flushing) from exposure to loud, impulsive sounds. Based on an average maximum sound level of 110 dBA at 50 ft for pile-driving, exposure to injurious sound levels would only occur at extremely close distances (e.g., ≤5 yards).
4. Impulsive sound associated with blasts is highly variable and potentially injurious at close distances. We selected a 0.25-mile radius around blast sites as a disruption distance based on observed prairie falcon flush responses to blasting noise at distances of 0.3 – 0.6 miles from blast sites (Holthuijzen et al. 1990, p. 273). Exposure to peak sound levels that are >140 dBA are likely to cause injury in the form of hearing loss in birds (Dooling and Popper 2007, pp. 23-24). We have conservatively selected 100 yards as an injury threshold distance based on sound levels from experimental blasts reported by Holthuijzen et al. (1990, p. 272), which documented peak sound levels from small blasts at 138 – 146 dBA at a distance of 100 m (110 yards).
5. Based on an estimated 92 dBA sound-contour (approximately 265 yards) from sound data for the Chinook 47d presented in Newman et al. (1984, Table D.1).
6. Rotor-wash from large helicopters is expected to be disruptive at any time during the nesting season due the potential for flying debris and shaking of trees located directly under a hovering helicopter. The hovering rotor-wash distance for the Chinook 47d is based on a 300-ft radius rotor-wash zone for large helicopters hovering at < 500 above ground level (from WCB 2005, p. 2 – logging safety guidelines). We reduced the hovering helicopter rotor-wash zone to a 50-yard radius for all other helicopters based on the smaller rotor-span for all other ships.
7. Based on an estimated 92 dBA sound contour from sound data for the Boeing Vertol 107 the presented in the San Dimas Helicopter Logging Noise Report (USDA-Forest Service 2008b, chapters 5, 6).
8. The estimated 92 dBA sound contours for these helicopters is less than 110 yards (e.g., K-MAX (100 feet) (USDAForest Service 2008b, chapters 5, 6), and Bell 206 (85-89 dBA at 100 m)(Grubb et al. 2010, p. 1277).
9. Based on Swarthout and Steidl (2001, p. 312) who found that 95 percent of flush responses by spotted owls due to the presence of hikers on trails occurred within a distance of 24 m.
10. Based on recommendations presented in *Smoke Effects to Northern Spotted Owls* (USFWS 2008e, p. 4).
11. The exact dates are variable by physiographic province, and differences by locality. Work with the USFWS to select the proper dates when planning or implementing projects.

c. **Marbled Murrelet**

i. **MM1:** Projects will not occur within the applicable disruption and disturbance distances for marbled murrelets within their critical nesting period (Table 10), unless a protocol survey determines marbled murrelets are not present. Otherwise the project would be LAA and either delayed until August 6 (with 2-hr timing restrictions) or until it is determined that young are not present or counted toward the limited number of LAA projects covered under this programmatic (with 2-hr timing restrictions).

ii. **MM2:** Projects within the applicable disruption and disturbance distances for marbled murrelets implemented between August 6 and September 15 would not begin until 2 hours after sunrise and would end 2 hours before sunset.

iii. **MM3:** No suitable, potential, or critical marbled murrelet habitat is to be removed or downgraded as part of this action.

iv. **MM4:** Garbage containing food and food trash generated by workers in project areas is secured or removed to minimize attraction of corvids, which have been identified as predators of murrelet eggs and young.

v. **MM5:** BO Table 10 shows marbled murrelet disruption distances that are applicable to the proposed actions under this BO. Distances and times can be locally revised based on current information (EA Table 11).

vi. **MM6:** For LW projects follow project design as outlined within [Tree removal guidelines above]

Table 11: Disturbance, disruption (harass) and/or physical injury (harm) distance thresholds for Marbled Murrelet during the nesting season (April 1 to September 15). Distances are to a known occupied marbled murrelet nest tree or suitable nest trees in unsurveyed nesting habitat (BO Table 10).

Action	Action Not Likely Detected Above Ambient Levels	Action Likely Detected By Breeding Murrelets Disturbance Distances	Disruption Distances	Direct Physical Injury And / Or Mortality
Light maintenance (e.g., Road brushing and grading) at campgrounds, administrative facilities, and heavily-used roads	>0.25 mile	≤ 0.25 mile	NA	NA
Log hauling on heavily-used roads (FS maintenance levels 3, 4, and 5)	>0.25 mile	≤ 0.25 mile	NA	NA
Chainsaws (includes felling hazard/danger trees)	>0.25 mile	111 yards to 0.25 mile	≤ 110 yards[2]	Potential for mortality if trees felled contain platforms
Heavy equipment for road construction, road repairs, bridge construction, culvert replacements, etc.	>0.25 mile	111 yards to 0.25 mile	≤ 110 yards[2]	NA

Action	Action Not Likely Detected Above Ambient Levels	Action Likely Detected By Breeding Murrelets Disturbance Distances	Disruption Distances	Direct Physical Injury And / Or Mortality
Pile-driving (steel H piles, pipe piles) Rock Crushing and Screening Equipment	>0.25 mile	121 yards to 0.25 mile	≤ 120 yards[3]	≤ 5 yards(injury)[3]
Blasting	>1 mile	0.25 mile to 1 mile	≤ 0.25 mile[3]	100 yards (injury)[4]
Helicopter: Chinook 47d	>0.5 mile	266 yards to 0.25 mile	≤ 265 yards[5]	100 yards[6] (injury/mortality)
Helicopter: Boeing Vertol 107, Sikorsky S-64 (SkyCrane)	>0.25 mile	151 yards to 0.25 mile	≤ 150 yards[7]	50 yards[6] (injury/mortality)
Helicopters: K-MAX, Bell 206 L4, Hughes 500	>0.25 mile	111 yards to 0.25 mile	≤ 110 yards[8]	50 yards[6] (injury/mortality)
Small fixed-wing aircraft (Cessna 185, etc.)	>0.25 mile	111 yards to 0.25 mile	≤ 110 yards	NA
Tree Climbing	>0.25 mile	111 yards to 0.25 mile	≤ 110 yards[9]	NA
Burning (prescribed fires, pile burning)	>1 mile	0.25 mile to 1 mile	≤ 0.25 mile[10]	NA

1. NA = not applicable. We anticipate that marbled murrelets that select nest sites in close proximity to heavily used roads are either undisturbed by or habituate to the sounds and activities associated with these roads (Hamer and Nelson 1998, p. 21).
2. Based on recommendations from murrelet researchers that advised buffers of greater than 100 meters to reduce potential noise and visual disturbance to murrelets (Hamer and Nelson 1998, p. 13, USFWS 2012d, pp. 6-9).
3. Impulsive sound associated with pile-driving is highly variable and potentially injurious at close distances. A review compiled by Dooling and Popper (2007, p. 25) indicates that birds exposed to multiple impulses (e.g., pile driving) of sound at 125 dBA or greater are likely to suffer hearing damage. We have conservatively chosen a distance threshold of 120 yards for impact pile-driving to avoid potential effects to hearing and to account for significant behavioral responses (e.g. flushing) from exposure to loud, impulsive sounds. Based on an average maximum sound level of 110 dBA at 50 ft for pile-driving, exposure to injurious sound levels would only occur at extremely close distances (e.g., ≤5 yards).
4. Sound associated with blasts is highly variable and potentially injurious at close distances. We selected a 0.25-mile radius around blast sites as a disruption distance based on observed prairie falcon flush responses to blasting noise at distances of 0.3 – 0.6 miles from blast sites (Holthuijzen et al. 1990, p. 273). Exposure to peak sound levels that are >140 dBA are likely to cause injury in the form of hearing loss in birds (Dooling and Popper 2007, pp. 23-24). We have conservatively selected 100 yards as an injury threshold distance based on sound levels from experimental blasts reported by Holthuijzen et al. (1990, p. 272), which documented peak sound levels from small blasts at 138 – 146 dBA at a distance of 100 m (110 yards).
5. Based on an estimated 92 dBA sound-contour (approximately 265 yards) for the Chinook 47d (Newman et al. 1984, Table D.1).
6. Because murrelet chicks are present at the nest until they fledge, they are vulnerable to direct injury or mortality from flying debris caused by intense rotor wash directly under a hovering helicopter. Hovering distance is based on a 300-ft radius rotor-wash zone for large helicopters hovering at < 500 above ground level (from WCB 2005, p. 2 – logging safety guidelines). We reduced the hovering helicopter rotor-wash zone to a 50-yard radius for all other helicopters based on the smaller rotor-span for all other ships.
7. Based on an estimated 92 dBA sound contour from sound data for the Boeing Vertol 107 the presented in the San Dimas Helicopter Logging Noise Report (USFS 2008, chapters 5, 6).
8. The estimated 92 dBA sound contours for these helicopters is less than 110 yards (e.g., K-MAX (100 feet) (USDAForest Service 2008b, chapters 5, 6), and Bell 206 (85-89 dbA at 100 m)(Grubb et al. 2010, p. 1277).
9. Based on recommendations from murrelet researchers that advised buffers of greater than 100 meters to reduce potential noise and visual disturbance to murrelets (Hamer and Nelson 1998, p. 13, USFWS 2012d, pp. 6-9).
10. Based on recommendations presented in *Smoke Effects to Northern Spotted Owls* (USFWS 2008d, p. 4).

11.0 Special Status Mammals, Birds and Invertebrates

Table 12: Special Status Mammals, Birds and Invertebrates known to occur on Salem BLM Administered Lands (as of 3/2012)

Name	Habitat Associations	Carried forward for evaluation?
Federally-listed Threatened Species		
Marbled murrelet *Brachyramphus marmoratus*	Nests in structurally-complex conifer forest stands; nesting structure occurs within 50 miles of the coast, is a conifer tree, is ≥ 19.1 in. (dbh) in diameter, > 107 ft. in height, has at least one platform ≥ 4 inches in diameter, nesting substrate (*e.g.*, moss, epiphytes, duff) on that platform, and an access route through the canopy that a murrelet could use to approach and land on the platform, and it has a tree branch or foliage, either on the tree with potential structure or on a surrounding tree, that provides protective cover over the platform.	Yes; possible effects from habitat modification and disturbance
Northern spotted owl *Strix occidentalis caurina*	Suitable habitat consists of forested stands used by spotted owls for nesting, roosting and foraging. Generally these stands are conifer-dominated, 80 years old or older and multi-storied in structure, and have sufficient snags and downed wood to provide opportunities for owl nesting, roosting, and foraging. The canopy cover generally exceeds 60 percent, Spotted owls live in forests characterized by dense canopy closure of mature and old-growth trees, abundant logs, standing snags and live trees with broken tops; although known to nest, roost and feed in a wide variety of habitat types, prefers older forest stands with variety: multi-layered canopies of several tree species of varying size and age, both standing and fallen dead trees, and open space among the lower branches to allow flight under the canopy; typically, forests do not attain these characteristics until they are at least 150 to 200 years old.	Yes; possible effects from habitat modification and disturbance.
Sensitive Species		
Townsend's big-eared bat *Corynorhinus townsendii*	Cave obligate; day roosts in mines, caves, tree cavities and attics of buildings.	No; unlikely to occur in project areas or to be affected by proposed activities.

Name	Habitat Associations	Carried forward for evaluation?
Red tree vole	Red tree voles are the most arboreal mammals in the Pacific Northwest (Carey 1996) and are endemic to moist coniferous forests of western Oregon and extreme northwest California. Their distribution is patchy and limited to coniferous forests west of the crest of the Cascade Mountains. Red tree voles depend on conifer tree canopies for nesting sites, foraging, travel routes, escape cover, and moisture (Carey 1991). Douglas-fir (Pseudotsuga menziesii) needles provide the primary food and building materials for nests. The vole is important prey for the threatened northern spotted owl	Yes; possible effects from habitat modification
American peregrine falcon *Falco peregrinus anatum*	Nest on cliffs; forages along river corridors and over wetlands where bird prey reside and feed; nests unlikely to be directly affected by proposed activities.	No; unlikely to occur in project areas or to be affected by proposed activities.
Bald eagle *Haliaeetus leucocephalus*	Nest and roost in large trees, within 1 mile of lakes, rivers and large streams; nest site selection varies widely from deciduous, coniferous and mixed-forest stands; nest trees are usually large diameter trees characterized by open branching and stout limbs. Habitation occurs primarily in undeveloped areas with little human activity; winter foraging areas are usually located near open water on rivers, lakes, reservoirs, and bays where fish and waterfowl are abundant. Communal roost sites contain large trees (standing snags and utility poles have also been used) with stout lower horizontal branches for perching and may be used at night by three or more bald eagles, as well as during the day, especially during inclement weather. Perch trees used during the day possess the same characteristics as roost trees but are located closer to foraging areas.	Yes; possible effects from habitat modification and disturbance.
Harlequin duck *Histrionicus histrionicus*	In the Salem District, known to breed along the Molalla River and Quartzville Creek from March to August; winters in the ocean.	Yes; possible effects from habitat modification and disturbance.
Lewis' woodpecker *Melanerpes lewis*	Associated with open woodlands including Oregon white oak woodlands, Ponderosa pine woodlands and mixed oak/pine woodlands; more common in woodlands near grassland-shrub communities.	No; unlikely to occur in project areas or to be affected by proposed activities.
Purple martin *Progne subis*	Snags in early-seral stands, openings and burns; commonly associated with rivers, marshes and open water, especially when snags are present, both for nesting and foraging.	Yes; possible effects from habitat modification and disturbance.
Evening fieldslug *Deroceras hesperium*	Evening fieldslugs have been detected at six wet meadows in the Cascades Resource Area.	No; unlikely to occur in project areas or to be affected by proposed activities.

Name	Habitat Associations	Carried forward for evaluation?
Cascade axetail slug *Carinacauda stormi*	A newly described species previously thought to be the Salamander slug (Gliabates oregonius). This species has been detected at more than 50 localities at elevations ranging between about 1,800 to 3,570 feet in Clackamas, Marion, Linn, and Lane counties, Oregon. Twelve sites are known on BLM lands in the Cascades Resource Area. Individuals were found in Douglas-fir–Western Hemlock forests where needle litter was almost exclusively Douglas-fir at the microsite. Forest age class did not seem to be a factor in detecting this species; detections occurred in forests 25 years to over 150 years in age. Areas where down wood retained pockets of moisture and where vine maple leaves formed a layer to hold moisture are preferred habitats (Leonard et al 2011).	No; unlikely to occur in project areas or to be affected by proposed activities.
Crowned Tightcoil *Pristaloma pillsbryi*	Documented in the Tillamook Resource Area.	No; unlikely to occur in project areas or to be affected by proposed activities.
Puget Oregonian Snail *Cryptomastix devia*	Documented in the Tillamook Resource Area near McMinnville.	No; unlikely to occur in project areas or to be affected by proposed activities.
Roth's blind ground beetle *Pterostichus rothi*	Restricted to cool, moist, closed-canopy conifer forests with well-drained, deep, coarse-crumb structure soils; not found on alluvial soils on floodplains; prefers ground covered by duff; found throughout year under embedded rocks and logs; not found in disturbed sites, meadows or ecotones associated with grassy areas	No; unlikely to occur in project areas or to be affected by proposed activities.
Haddock's rhyacophilan caddisfly *Rhyacophila haddock*	One known site at a small mountain stream in the subalpine zone on Marys Peak.	No; unlikely to occur in project areas or to be affected by proposed activities.
Birds of Conservation Concern (not already listed above)		
Rufous hummingbird *Selasphorus rufus*	Inhabits forest edges near riparian thickets, meadows and other openings; found in forests, on seed-tree harvest units, riparian shrub, and spruce-fir habitats; during the winter it lives wherever flowers are present.	No; proposed activities unlikely to affect a local or regional population (see IM OR-2009-018).

Name	Habitat Associations	Carried forward for evaluation?
Olive-sided flycatcher *Contopus borealis*	Inhabits mixed conifer and hardwood-conifer forests; abundant in landscapes containing fragmented late-seral forests with pronounced ecotones; frequent coniferous forests, especially with tall standing dead trees. They prefer spruce, fir, balsam, pine, or mixed woodlands near edges and clearings, wooded streams, swamps, bogs, edges of lakes or rivers.	No; proposed activities unlikely to affect a local or regional population (see IM OR-2009-018).
Purple finch *Carpodacus purpureus*	Inhabits coniferous and mixed forests, as well as park-like areas, breeding throughout western Oregon; nests are most often found far out on horizontal branches in conifers and are made of concealing material; food consists mostly of seeds, buds, blossoms, and fruit, usually taken from the outer branches of trees and occasionally from the ground; purple finches display strong site fidelity to breeding areas, but in winter, flocks may range widely depending on local food supplies and a wider variety of habitats are used.	No; proposed activities unlikely to affect a local or regional population (see IM OR-2009-018).
Willow flycatcher *Empidonax trailii brewsteri*	Willow and alder thickets along streams or bogs. Dense shrub habitat prefers the wettest sites.	No; proposed activities unlikely to affect a local or regional population (see IM OR-2009-018).
Survey and Manage Species (not already listed above)		
Oregon megomphix snail *Megomphix hemphilli*	Locally common. A category F species that does not require pre-disturbance surveys or known site management. Not obligated to riparian habitats.	No; locally common and unlikely to be affected by proposed activities.

Table 13: Birds of Conservation Concern (BCC) - From U.S. Department of the Interior, Fish and Wildlife Service. 2008d. Birds of conservation concern. Division of Migratory Bird Management, Arlington, Virginia. 87 pp. Table 6 BCR 5 (Northern Pacific Forest U.S. portions only) *BCC 2008* list[8]

8 (a) ESA candidate, (b) ESA delisted, (c) non-listed subspecies or population of Threatened or Endangered species, (d) MBTA protection uncertain or lacking, (nb) non-breeding in this Bird Conservation Region (BCR)

Species	Category from BCC 2008 List
Yellow-billed Loon (nb)	Non breeding in this BCR
Western Grebe (nb)	Non breeding in this BCR
Laysan Albatross (nb)	Non breeding in this BCR
Black-footed Albatross (nb)	Non breeding in this BCR
Pink-footed Shearwater (nb)	Non breeding in this BCR
Red-faced Cormorant	
Pelagic Cormorant (*pelagicus* ssp.)	
Bald Eagle (b)	ESA delisted
Northern Goshawk (*laingi* ssp.)	
Peregrine Falcon (b)	ESA delisted
Black Oystercatcher	
Solitary Sandpiper (nb)	Non breeding in this BCR
Lesser Yellowlegs (nb)	Non breeding in this BCR
Whimbrel (nb)	Non breeding in this BCR
Long-billed Curlew (nb)	Non breeding in this BCR
Hudsonian Godwit (nb)	Non breeding in this BCR
Marbled Godwit (nb)	Non breeding in this BCR
Red Knot (*roselaari* ssp.) (nb)	Non breeding in this BCR
Short-billed Dowitcher (nb)	Non breeding in this BCR
Aleutian Tern	
Caspian Tern	
Arctic Tern	
Marbled Murrelet (c)	Non-listed subspecies or population of Threatened or Endangered species
Kittlitz's Murrelet (a)	ESA candidate
Black Swift	
Rufous Hummingbird	
Allen's Hummingbird	
Olive-sided Flycatcher	
Willow Flycatcher (c)	Non-listed subspecies or population of Threatened or Endangered species
Horned Lark (*strigata* ssp.) (a)	ESA candidate
Oregon Vesper Sparrow (*affinis* ssp.)	
Purple Finch	

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