United States Department of Agriculture

Forest Service

AQUATIC RESTORATION

ENVIRONMENTAL ASSESSMENT

Umatilla National Forest

Counties: Umatilla, Grant, Columbia, Morrow, Wallowa, Union, Baker, Garfield, Asotin, Wheeler, and Walla Walla Counties in Oregon and Washington

August 2018

For More Information Contact:

Katie Richardson
Forest Environmental Coordinator
Phone: 541-278-3869
Email: katherinerichardson@fs.fed.us

Kathy Ramsey
Forest Fish Biologist
Phone: 541-278-3933
Email: kramsey@fs.fed.us

Umatilla National Forest Service
Supervisors Office
72510 Coyote Road
Pendleton, Oregon 97801

Front Page Picture: Granite Creek Instream Restoration – Alli Johnson USFS

Summary

This Environmental Assessment (EA) was prepared to determine whether the effects of the proposed activities may be significant enough to prepare an environmental impact statement. By preparing this environmental assessment, we are fulfilling agency policy and direction to comply with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. For more details of the proposed action, see Chapter 2 Proposed Action and Alternatives.

In 2013 a Biological Assessment (BA) describing effects of aquatic restoration activities was prepared by the U.S. Forest Service, Pacific Northwest Region, Bureau of Land Management (Oregon State Office) and the Bureau of Indian Affairs. The document, a re-initiation of a 2007 BA, is titled "Fish Habitat Restoration Activities Affecting ESA-Listed Animal and Plant Species and their Designated or Proposed Critical Habitat and Designated Essential Fish Habitat under MSA found in Oregon, Washington and parts of California, Idaho and Nevada", and describes the effects of funding or carrying out aquatic restoration activities in Oregon and Washington (ARBA II)

Subsequently, updated Biological Opinions (BOs) were issued in response to ARBA II. On April 25, 2013 the National Marine Fisheries Service (NMFS) issued the Endangered Species Act – Section 7 Programmatic Consultation Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for Reinitiation of Aquatic Restoration Activities in States of Oregon and Washington (USDC NMFS 2013). In addition, on July 1, 2013 the US Fish and Wildlife Service (FWS) issued the Endangered Species Act – Section 7 Consultation Programmatic Biological Opinion for Aquatic Restoration Activities in the States of Oregon, Washington and portions of California, Idaho and Nevada (USDI FWS 2013). These two Biological Opinions are collectively known and will be referred to as "ARBO II".

Examples of projects completed on the Umatilla National Forest (Umatilla) under ARBO II include riparian planting, stream restoration augmenting with large wood, culvert replacement for fish passage, and livestock exclosures.

When projects are implemented on the Umatilla within the categories of activities described in ARBA II, and the requirements and site-specific project design criteria and the terms and conditions of ARBO II are followed, further ESA Section 7 consultation for threatened or endangered and is not required. Pre-project notifications are required (see section 2.2.4).

The categories of activities and their site-specific project design criteria approach are the basis of this Environmental Assessment. This provides each Umatilla National Forest administrative unit with a consistent methodology to design, implement, monitor, and document watershed and aquatic restoration activities.

The proposed project categories and activities, with their specific project design criteria (Appendix A), as defined in ARBA II and ARBO II, are predictable as to their effects to Endangered Species Act listed species and Magnuson Stevens Act essential fish habitat. This incorporation by reference to ARBA II and ARBO II, includes program administration and general aquatic conservation measures, in addition to the project design criteria. Eighteen project categories are covered by this environmental assessment, with the omission of 'invasive plant treatments', which was analyzed in a separate NEPA document, and 'sudden oak death treatments', which is not applicable to the Umatilla National Forest.

ARBA II and ARBO II provide the basis for consistent implementation and effects analysis for the project categories and activities at the forest and site-specific scale, and the agreement between the Forest Service

and the US Fish and Wildlife Service and National Marine Fisheries Service on their effects provides an efficient approach to environmental analysis and future implementation for those projects that meet the design criteria on the Umatilla National Forest and on adjacent private lands with willing partners and projects that benefit public lands.

Proposed aquatic restoration activities would be consistent with the Umatilla Land and Resource Management Plan (Forest Plan) (1990) as amended by PACFISH (1995). Restoration actions would be implemented through the use of project specific design criteria using a consistent methodology to design, implement, monitor, and provide documentation including pre-project notifications as outlined in ARBO II.

Overall, it is assumed that the temporary and short-term effects from restoration activities would not compromise the benefits of restoration. Water quality (sediment and temperature) across the Forest is expected to improve as projects are implemented to restore healthy, functioning watersheds and their associated aquatic ecosystems. Alternative 2, in combination with forest management actions taken under the Forest Plan, will continue to have positive impacts on aquatic habitat and species.

Table of Contents

TABLES

Figures

CHAPTER 1 PURPOSE AND NEED

1.1. Background

A series of human uses during the last 150 years has altered watershed conditions and aquatic habitats across the Pacific Northwest. These uses include mining, logging, agriculture, water diversions, flood control, wildfire suppression, grazing, road construction and maintenance, and hydro-electric development. The alteration of vegetation conditions, increased erosion, and changes in the rates and magnitude of watershed runoff has affected the ability of watersheds to function properly. The resulting degradation and fragmentation of aquatic and riparian habitats has contributed to widespread decline or outright extinction of many resident and anadromous fish stocks and the listing of several fish stocks under the Endangered Species Act (ESA) in the 1990s.

Restoration of watersheds and aquatic habitats has been ongoing on the Umatilla National Forest (Umatilla) since the mid-1990's consistent with the Umatilla Land and Resource Management Plan (Forest Plan) (1990) as amended, proceeding project by project within impacted stream systems. Although restoration continues to be a focus on the Umatilla, remaining high-quality aquatic habitats on and off Federal lands are often fragmented or disconnected from other high-quality habitats, reducing the ability of aquatic species to access or move between habitats. The quality and types of available habitats may no longer encompass the range that existed historically and may not, in some cases, be sufficient to support the full range of life histories of affected aquatic species. The existing high-quality habitats are critical to the continued survival of anadromous and resident fish.

Beginning in the early 1990s Columbia River bull trout, Snake River Basin (SRB) Chinook salmon and steelhead and Middle Columbia River (MCR) steelhead have been listed under the Endangered Species Act. Associated with listing a species under the ESA is development of a recovery plan describing goals and actions needed to eventually remove the species from the ESA. The State of Oregon, National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (FWS) and Northwest Power and Conservation Council developed large-scale recovery plans that include areas of the Umatilla. These plans identified elements that are impeding the recovery of watershed function and address limiting factors. Examples included altered hydrology and sediment routing, along with degraded floodplains, riparian communities, stream channel structure, and water quality (temperature).

Recovery plans help guide restoration actions in identified watersheds. Recovery plans have been developed for ESA listed aquatic species on the Umatilla: Middle Columbia River steelhead (NMFS 2009), Snake River steelhead and chinook salmon (NMFS 2016) and bull trout (FWS 2015). Restoration actions have been identified on federal lands, including the Umatilla, to restore threatened and endangered species so they return to a self-sustaining element of their ecosystems.

The 2011 Watershed Condition Framework (WCF) (USDA Forest Service 2011) is a comprehensive approach implementing integrated restoration on priority watersheds by establishing a consistent methodology for condition assessment, and targeting activities on those watersheds identified as priorities for restoration. The WCF identified 40 percent of the subwatersheds across the Forest as impaired or functioning at risk. Impaired or functioning at risk subwatersheds receive ratings based on reduced conditions for parameters including water quality, aquatic habitat, riparian vegetation, and roads and trails indicators.

1.2 Proposed Action Location

This analysis covers aquatic restoration projects that would occur within the administrative boundaries of the Umatilla and adjacent lands where restoration activities would aid in the recovery of threatened and endangered species and impaired water bodies, and achieve Forest Service aquatic restoration goals.

Contained within the geographic area, site-specific action areas are located in fish and non-fish bearing streams, riparian areas, and uplands that have a direct link to restoration of aquatic habitat and watershed function.

Approximately 1.4 million acres are managed by the Umatilla and comprise the project area for this Environmental Assessment (see Figure 1).

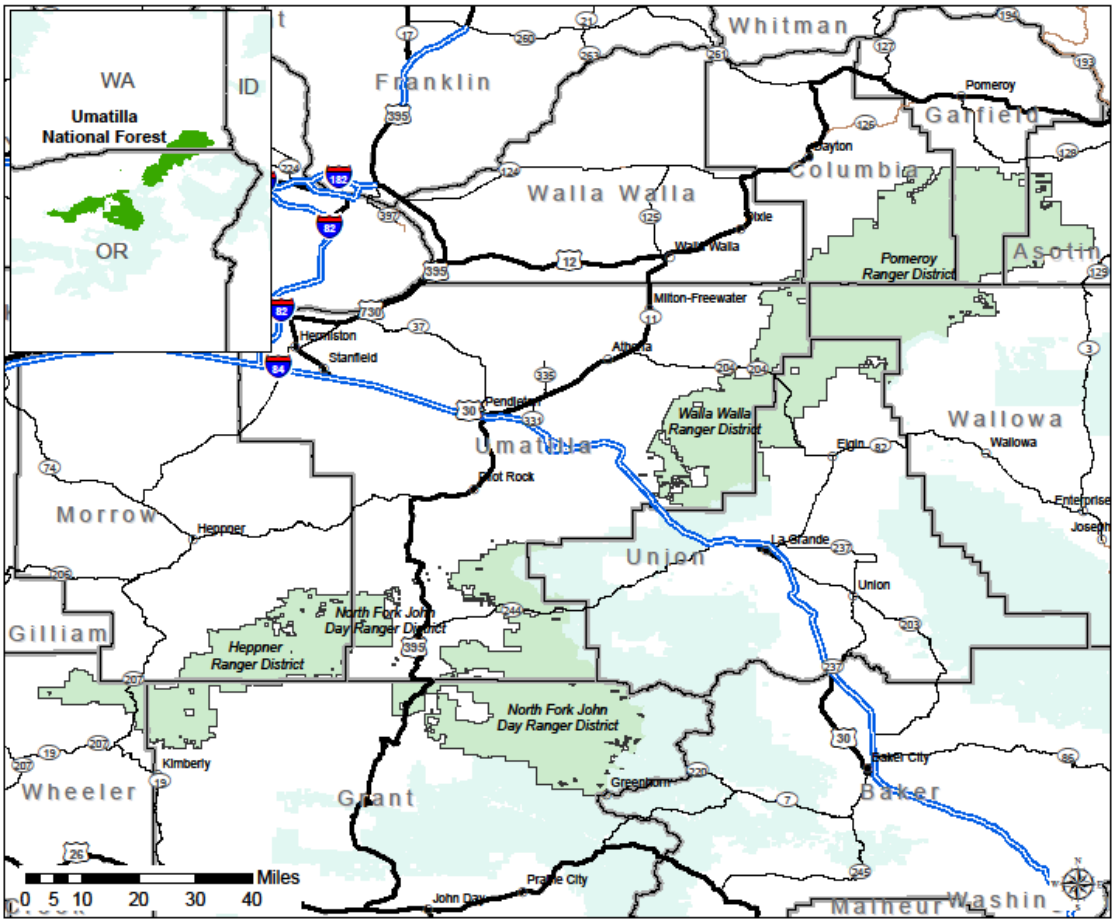

Figure 1: Aquatic Restoration project Area – Umatilla National Forest

1.3 Purpose and Need

The purpose of this project is to maintain or enhance watershed health and promote species recovery and diversity as required by the Land and Resource Management Plan for the Umatilla National Forest (1990), as amended by PACFISH (1995).

There is a need to continue restoring the key ecological processes and functions responsible for the creation and maintenance of self-sustaining aquatic and riparian ecosystems. There is also a need to increase the pace and scale of aquatic ecosystem restoration by providing a more efficient process for implementation of projects that would aid in the recovery of threatened and sensitive fish species, their associated habitats, watershed health, and water quality.

Aquatic restoration management intent associated with the purpose and need include:

- Provide the necessary habitat to maintain or increase populations of aquatic management indicator species: steelhead and redband trout, and ESA-listed species including but not limited to SRB Chinook salmon and steelhead, MCR steelhead and Columbia River bull trout.
- Cooperate and coordinate with regional tribes, Federal and State agencies, and other individuals and groups to collaboratively develop partnerships that achieve the following objectives:
- Develop instream habitat improvement projects for anadromous and resident species with emphasis on cooperative projects with regional tribes, the Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, watershed councils and other individuals and organizations as appropriate.
- Manage the composition and productivity of key riparian vegetation to protect or enhance riparian-dependent resources.
- Plan, design and implement riparian habitat improvement activities to upgrade riparian areas that are not in a condition to meet management objectives or the desired condition.
- Improve the rate of recovery in riparian areas that are not in a condition to meet management objectives by eliminating or reducing the impacts of management activities that may slow riparian recovery.
- Maintain or enhance water quality and/or fish habitat through instream or riparian improvements. Implement instream activities outside of the spawning and egg incubation period.
- Provide for input of large, woody debris into all classes of streams and evaluate to determine if objectives are being met. Remove material that causes unacceptable channel and/or bank damage.
- Improve or maintain non-stream associated riparian areas (ground water-dependent ecosystems) such as: seeps, springs, bogs and wallows together with their associated vegetative structure.

1.4 Public Involvement

Concerns and potential issues for the Aquatic Restoration Project were identified through public scoping and internal input from project resource specialists. Full details of the proposed action, including detailed project design criteria, were posted on the Umatilla public planning site for public review during the 30 day scoping comment period. Letters were sent on July 12, 2016 to public mailing lists providing an overview of the proposed action, and directed interested parties to the detailed description of the project online, which included maps of proposed project areas in addition to narrative details. The Forest received three comment letters during the 30 day scoping comment period. All comments received related to this project were reviewed, discussed by the interdisciplinary team and responses to each of these comments were recorded (Appendix G)

The draft EA was made available for a 30 day comment period starting on June 15th, 2018. We received seven comment letters which are summarized in Appendix H. The full text letters are available in the project record.

1.5 Tribal Consultation

Letters were sent on July 12, 2016 to the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), the Confederated Tribes of the Warm Springs Indian Reservation (CTWS) and the Nez Perce Tribe providing an overview of the proposed action, with direction to the detailed description of the project online, which included maps of proposed project areas in addition to narrative details. The project was also presented as part of the Umatilla NF 2017 and 2018 Program of Work (POW) package to the three tribes.

Follow-up meetings with CTUIR occurred on three separate occasions during which the POW projects were presented and discussed. These included Staff to Staff meeting between Umatilla staff and CTUIR staff on May 30, 2017, a meeting between Umatilla staff and the Fish and Wildlife and Cultural Resources

committees from CTUIR on August 8, 2017 and a meeting between Umatilla NF Forest Supervisor and Staff, and the Board of Trustees for the CTUIR on September 6, 2017. Although these meetings were not solely for this project, it was presented and discussed.

The follow-up meeting with the Nez Perce Tribe consisted of one meeting in which it was presented as part of the Umatilla NF 2017 POW. The Forest Supervisor and Staff met with staff from the Nez Perce Tribe on March 29, 2017. The Nez Perce staff did not have any concerns at that time. The project received a letter of support for the "forest-wide approach for aquatic restoration projects on the Umatilla National Forest" on behalf of the Nez Perce Tribe's Department of Fisheries Resources Management dated August 3, 2016.

Additional POW meetings continued in 2018. All three tribes were also consulted prior to release of the draft EA for public comment and notified of the objection period.

1.6 Issues

Potential issues were identified through public scoping and internal input from project resource specialists. Similar items were combined into one statement where appropriate. Key issues are defined as those directly or indirectly caused by implementing the proposed action; however, the effects cannot be reduced by normal best management practices or project design criteria. Usually an alternative is developed to address key issues. After reviewing the public and resource specialists comments received during scoping, no key issues were identified by the Responsible Official.

1.6.1 Issues Eliminated from Detailed Study

After reviewing the public comments received during scoping, two issues were received but were eliminated from detailed study by the Responsible Official. As stated in the ARBA, the projects and activities proposed are predictable as to their effects to ESA and MIS listed aquatic species and consistent with broad-scale aquatic conservation strategies and the best available science. The programmatic ARBO acknowledges the short-term impacts of heavy equipment and temporary road construction but concludes that these are outweighed by the long-term beneficial effects to ESA-listed fish, and their habitat from these restoration activities. The actions all have predictable effects regardless of where on Federal lands in the action area they are carried out (ARBO II).

Elimination of Heavy Equipment in Inventoried Roadless Areas and Within Riparian Areas

The use of heavy equipment is addressed in the project design criteria, the Inventoried Roadless Rule, and Forest Plan. Compliance with the Forest Plan and the Inventoried Roadless rule are addressed in the analysis of effects and compliance verification of the environmental assessment. Effects of the project to riparian areas is addressed in the analysis issues under Fish and Aquatic Habitat. Heavy equipment would 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) (General Aquatic Conservation Measures #10, ARBA II, pg 24). Project design criteria addresses the use of heavy equipment to mitigate for these concerns.

Temporary and Road Relocation Construction

Project design criteria are designed to mitigate effects of temporary access roads and travel paths. Not allowing for temporary road construction would prevent implementation of projects required to meet restoration objectives of the purpose and need as some crucial project categories would not be implementable without temporary roads. Construction of new permanent roads will not be permitted under this decision with the exception of road relocations to move a segment of open road away from a

stream and out of the floodplain. These road relocation would not increase the drainage network and would be constructed to hydrologically disconnect it from the stream network to the extent possible. Project design criteria covers temporary access roads and travel paths and minimizes effects to riparian areas. Per design criteria existing roadways would be used whenever possible and impacts mitigated.

1.7 Regulatory Framework

Shown below is a partial list of federal laws pertaining to project-specific planning and environmental analysis on federal lands. Disclosures and findings required by these laws and orders are contained in Chapter 3 for this environmental assessment.

National Environmental Policy Act (NEPA) of 1969 (as amended)

36 CFR 220.7 Environmental Assessments and Decision Notice

National Forest Management Act of 1976 (NFMA)

Clean Water Act of 1972 (CWA)

Endangered Species Act of 1973 (ESA)

Magnuson-Stevens, Fishery Conservation and Management Act, Public Law 94-265 (as amended through October 11, 1966)

1.8 Umatilla Forest Plan Consistency

Management direction is found within the resource prescriptions of the Land and Resource Management Plan for the Umatilla National Forest (USDA 1990). Chapter 4 in the Umatilla Forest Plan contains a detailed description of each management area. This analysis was developed in consideration of the best available science and is consistent with the Forest Plan, as amended.

Management direction contained in the Umatilla Land and Resource Management Plan (1990) is the basis for the protection and recovery of water quality. The 1995 PACFISH amendment to Umatilla Forest Plan established goals for water quality, watersheds, riparian areas and associated fish habitats. The "Management Direction" and the "Standards and Guidelines" in the management plan identify the types of activities appropriate within each land use allocation. The Forest plan includes specific riparian management direction to protect water quality and many of the Standards and Guidelines effectively serve as general best management practices (BMPs) to prevent or reduce water pollution to meet the goals and requirements of the federal Clean Water Act.

The Land and Resource Management Plan can be viewed on the web at the following location: https://www.fs.usda.gov/main/umatilla/landmanagement/planning

1.9 Project Record Availability

This environmental assessment hereby incorporates by reference the Project Record. The Project Record contains Specialist Reports, Biological Evaluations and other technical documentation used to support the analysis and conclusions in this environmental assessment. These are for the Wildlife, Soils, Hydrology/Fisheries, Range, Botany, Recreation, Silviculture, Fire/Fuels and Heritage resource areas. Relying on specialist reports and the Project Record help implement the Council on Environmental Quality (CEQ) Regulations' provision that agencies should reduce NEPA paperwork (40 CFR 1500.4). The objective is to furnish enough site-specific information to demonstrate a reasoned consideration of

the environmental impacts of the Proposed Action and how these impacts can be mitigated, without repeating detailed analysis and background information available elsewhere.

The Project Record is available for review at the Umatilla National Forest Supervisors Office, Pendleton, Oregon. This document is also posted on the Umatilla National Forest webpage at the following location: https://www.fs.usda.gov/project/?project=47428

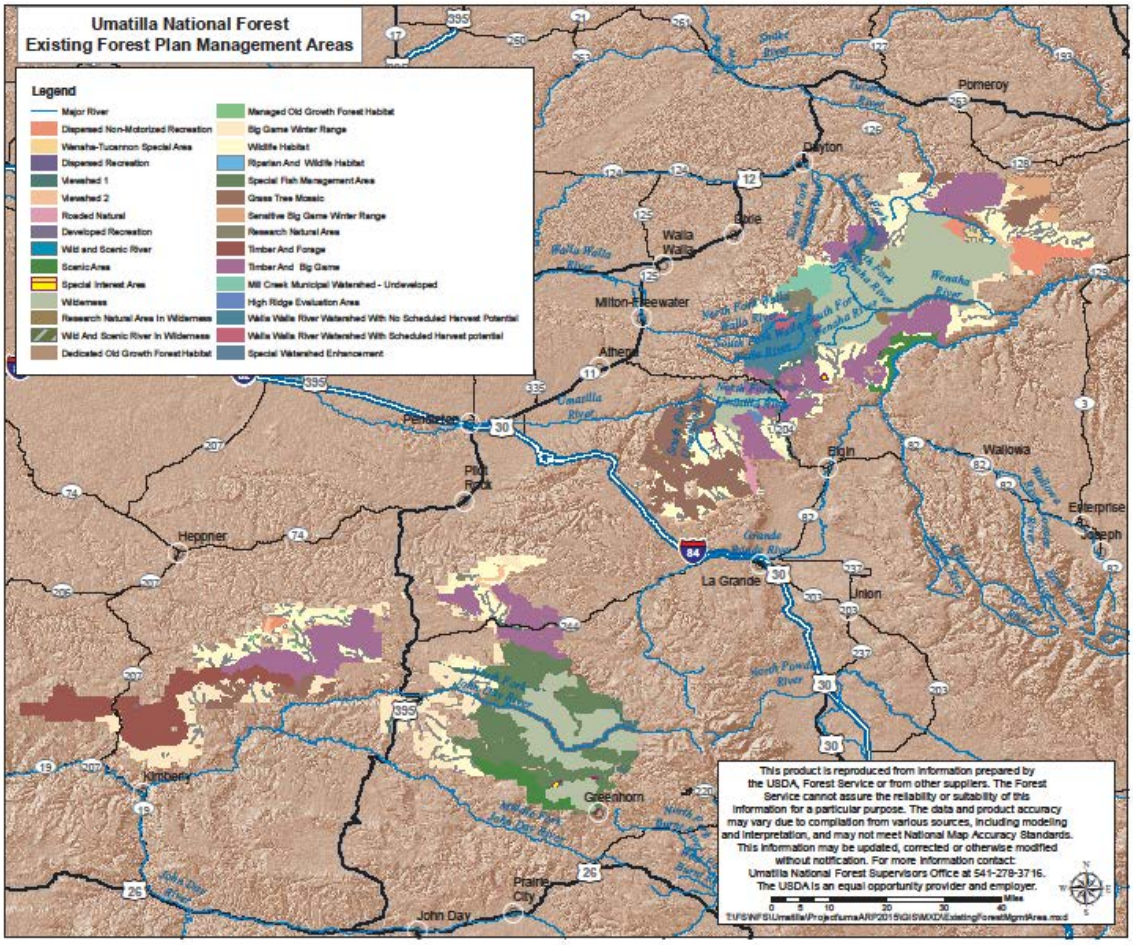

Figure 2: Existing Forest Plan management areas for the Umatilla National Forest.

CHAPTER 2 ALTERNATIVES

2.1 Alternative 1 – No Action

The Umatilla would likely continue to plan and implement aquatic restoration projects at the current rate of approximately three per year. Districts would independently identify projects and complete analysis on an individual basis, reproducing multiple biological evaluations/assessments, design criteria, and NEPA documents for actions in previously identified locations. The Forest would have reduced ability (because of the length and expense to complete individual project NEPA) to take advantage of the funding opportunities currently available to implement essential projects that would aid in the recovery of threatened and sensitive fish species located on the Forest, their associated habitats, and overall water quality.

Restoration opportunities to improve watershed and fish habitat conditions have been identified across the Forest. Under the Alternative 1, fish passage barrier culverts would be replaced at a slower rate, treatment of miles of roads negatively impacting water quality would be lower, and other restoration actions would continue at a slower and more expensive pace.

2.2 Alternative 2 – Proposed Action

The Umatilla National Forest proposes aquatic restoration on national forest system lands and on private lands, within and adjacent to the Umatilla National Forest, where we have cooperating landowners and where these restoration activities would aid in the recovery of aquatic species and impaired water bodies. Up to fifteen restoration actions would occur annually.

The proposed action would include the project categories identified in the Aquatic Riparian Biological Assessments and Biological Opinions (ARBA II and ARBO II). Aquatic restoration activities would be accomplished through the use of project specific design criteria using a consistent methodology to design, implement, monitor, and document watershed and aquatic restoration activities. Forest Service Pacific Northwest Regional aquatic restoration goals and objectives would be achieved when administered by following guidelines within the following aquatic restoration categories:

Fish Passage Restoration (Stream Simulation Culvert and Bridge Projects; Headcut and Grade Stabilization; Fish Ladders; Irrigation Diversion Replacement/Relocation and Screen Installation/Replacement)
Large Wood, Boulder, and Gravel Placement (Large Wood and Boulder Projects; Engineered Logjams; Porous Boulder Weirs and Vanes, Gravel Augmentation; Tree Removal for Large Wood Projects)
Dam, Tide gate, and Legacy Structure Removal
Channel Reconstruction/Relocation
Off- and Side-Channel Habitat Restoration
Streambank Restoration
Set-back or Removal of Existing Berms, Dikes, and Levees
Reduction/Relocation of Recreation Impacts
Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering
Piling and other Structure Removal
In-Channel Nutrient Enhancement
Road and Trail Erosion Control
Juniper Removal
Riparian Vegetation Treatment (controlled burning)
Riparian Vegetative Planting
Bull Trout Protection

Beaver Habitat Restoration
Fisheries, Hydrology, Geomorphology, Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration

Detailed descriptions of restoration activities are included in Appendix A.

2.2.1 Implementation Locations

Figures 3 through 7 display where actions could occur by project category. Some categories are grouped as the actions would occur in the same locations.

Riparian Habitat Conservation Areas are where various aquatic restoration activities and improvements including: large wood, boulder and gravel replacement; legacy structure removal; channel reconstruction/relocation; off- and side- channel habitat restoration; streambank restoration; set-back or removal of existing berms, dikes and levees; reduction/relocation of recreation impacts; livestock fencing, stream crossings and off-channel livestock watering; piling and other structure removal; riparian vegetation treatment (controlled burning); riparian vegetative planting; and beaver habitat restoration (Figure 4).

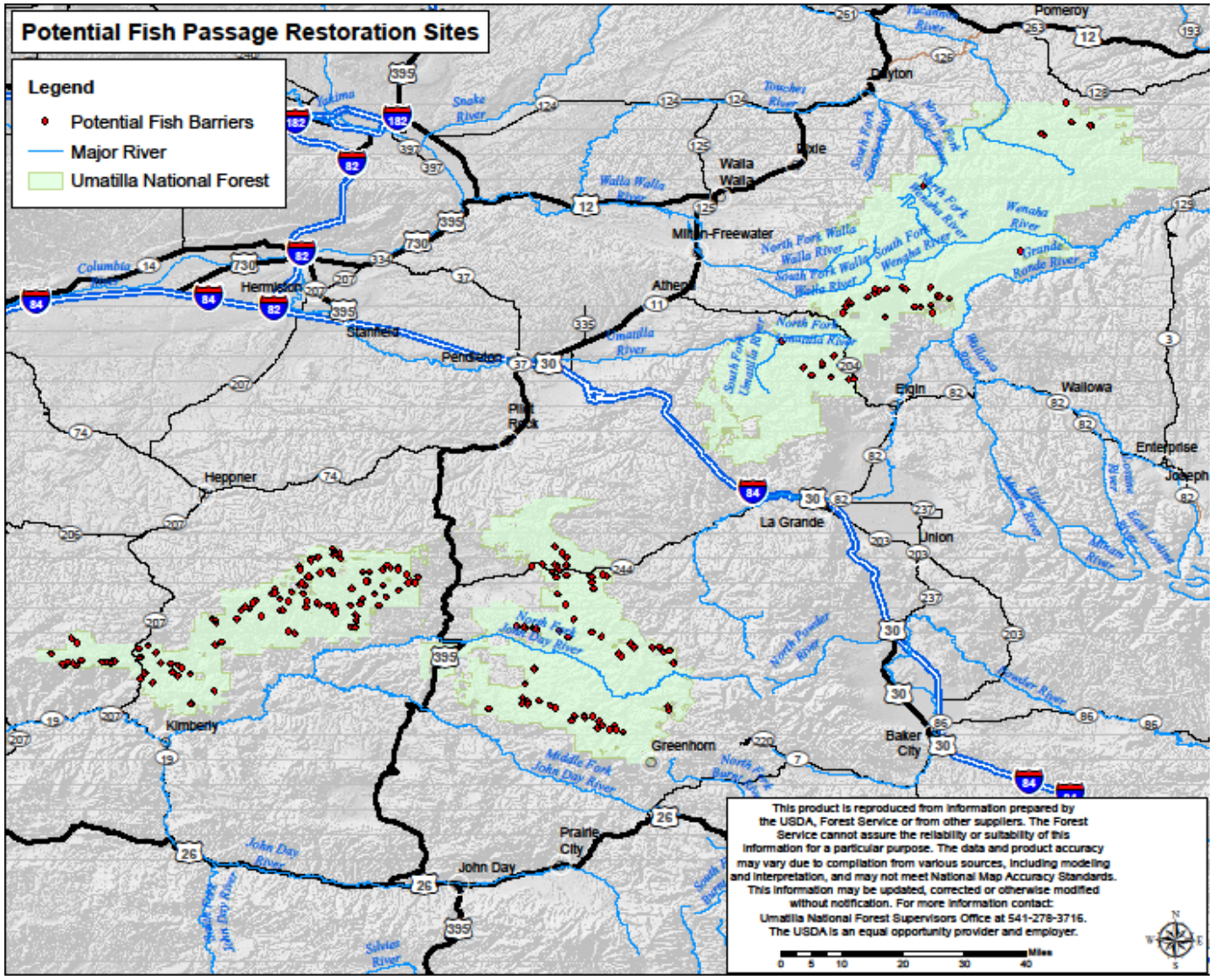

Figure 3: Existing Culverts in the project area that provide potential Fish Passage Restoration Projects.

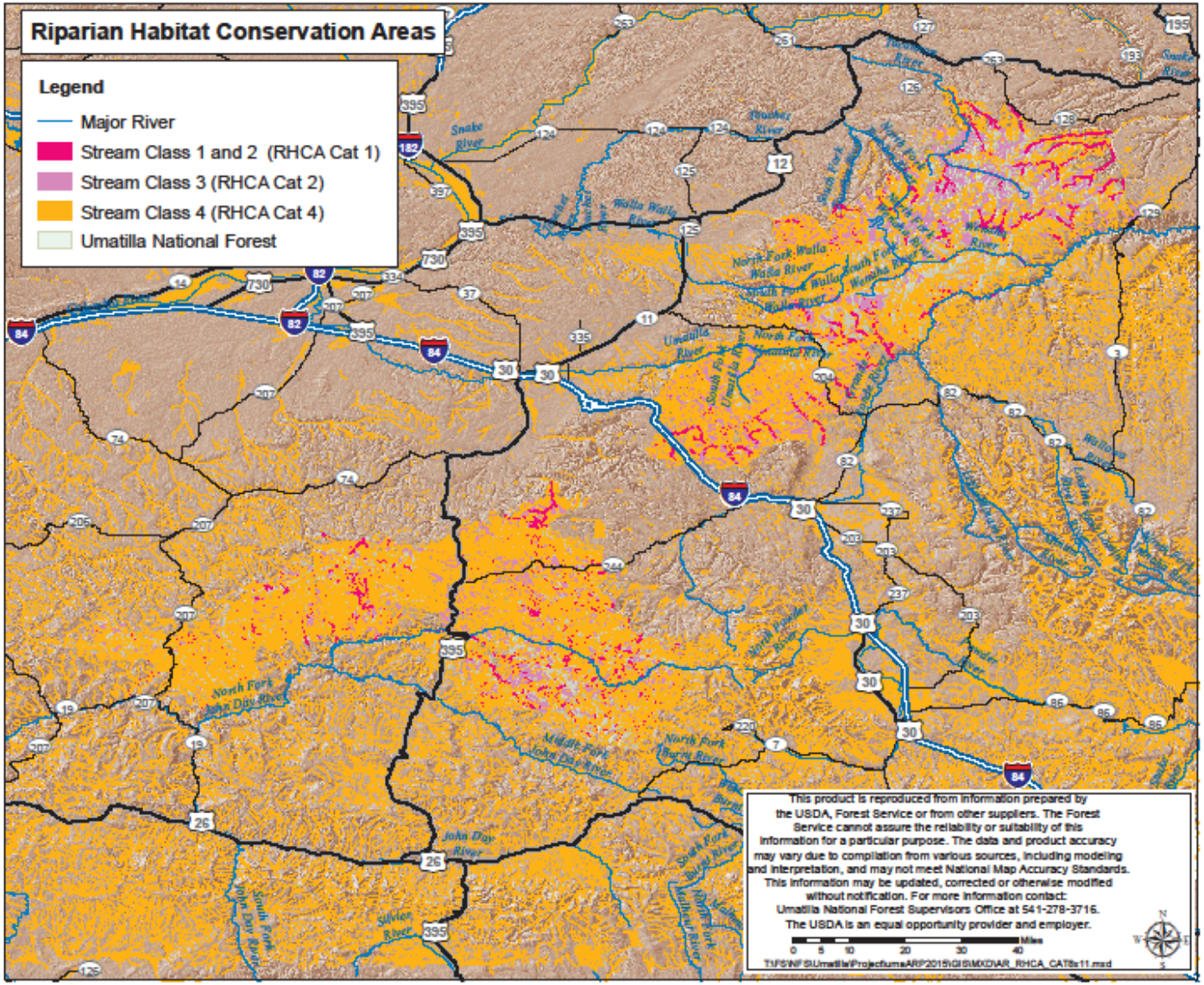

Figure 4: Riparian Habitat Conservation Areas.

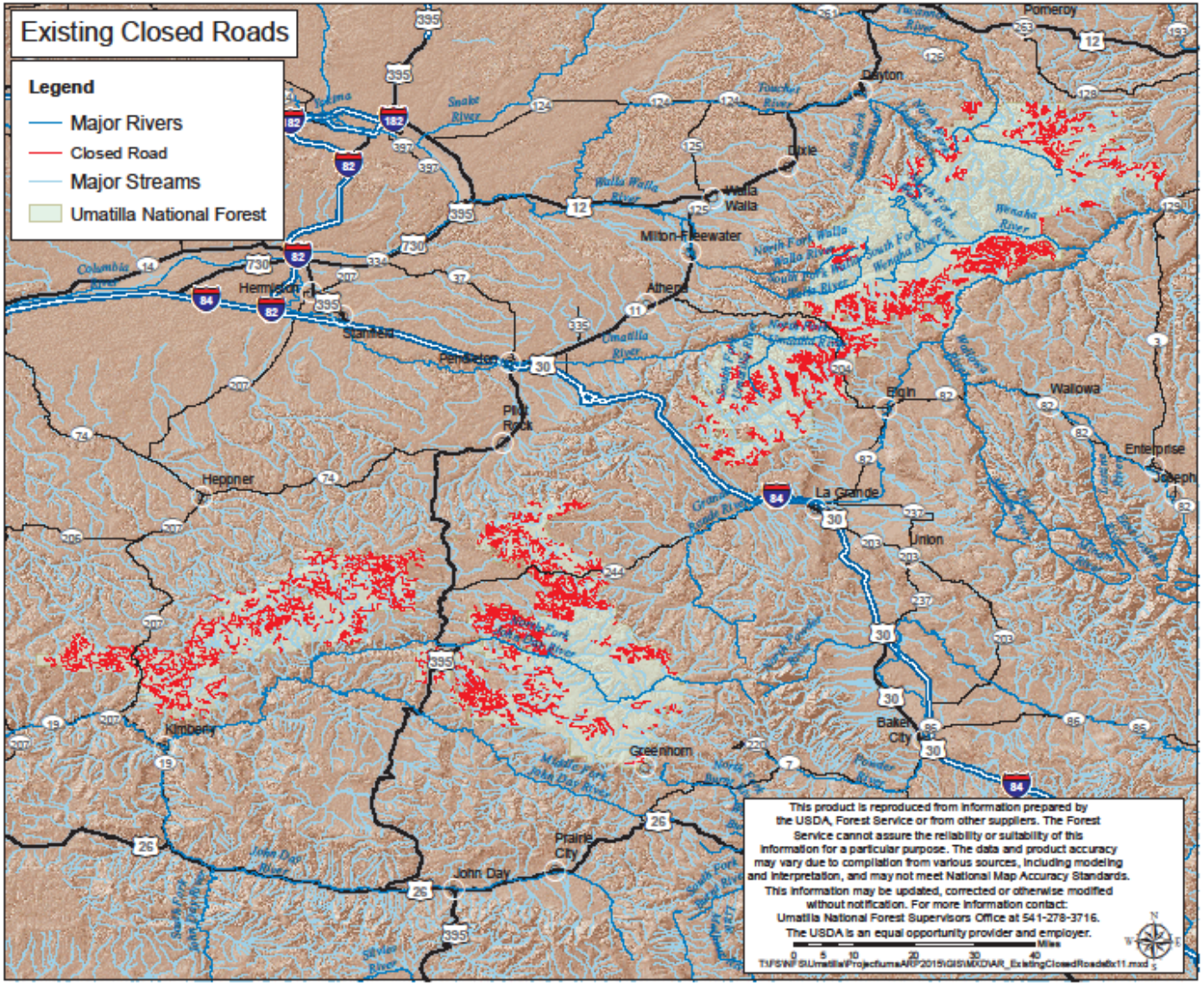

Figure 5: Potential road restoration sites.

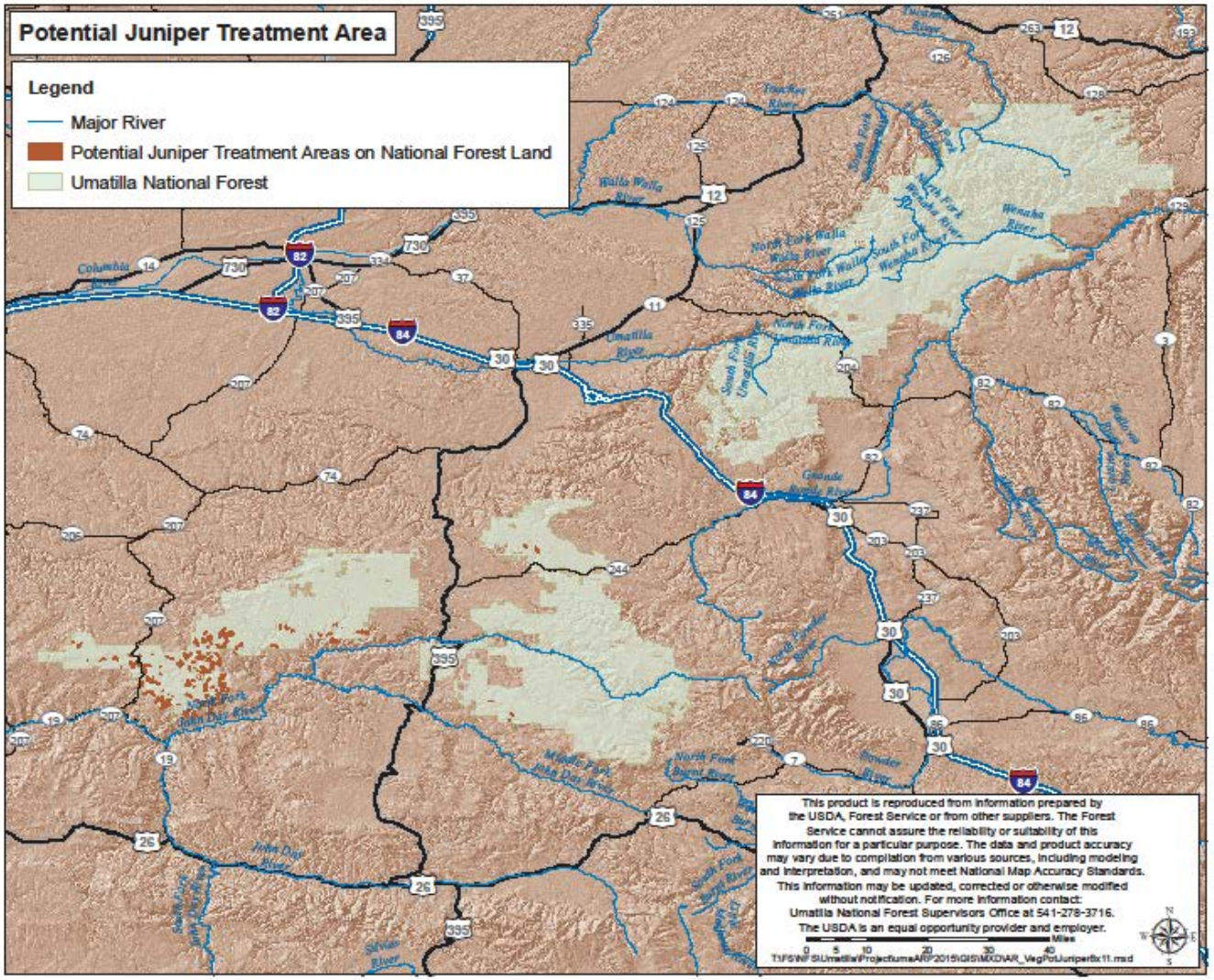

Figure 6: Potential juniper removal treatments.

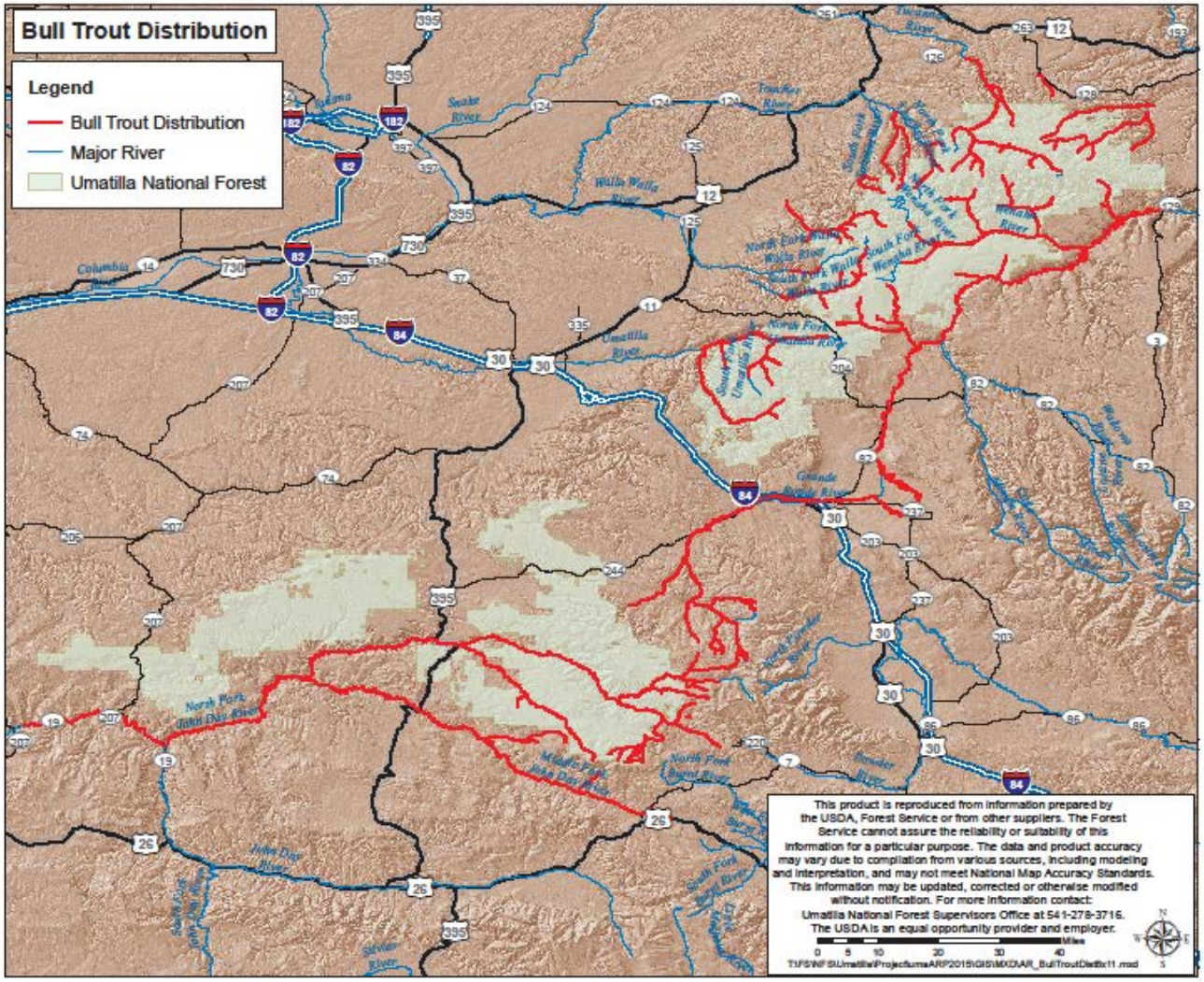

Figure 7: Bull trout protection areas.

2.2.3 Project Prioritization

The 2011 Watershed Condition Framework (WCF) is a comprehensive approach for proactively implementing integrated restoration on priority watersheds on national forests and grasslands. The WCF was implemented across all National Forests to improve the Forest Service approach to watershed restoration by establishing a consistent methodology for condition assessment, and targeting activities on those watersheds identified as priorities for restoration (USDA 2011). The national priority subwatersheds and regional focus watersheds have been identified on the Forest utilizing the Regional Aquatic Restoration Strategy (2007) and the national WCF (USDA 2011)[1].

For the purpose of this Aquatics Restoration EA, the WCF will be utilized to develop and implement the watershed restoration program in a structured, efficient and effective manner. The selected priority subwatersheds focus the Umatilla's aquatic restoration program in identifying upcoming projects. The proposed action provides flexibility to improve aquatic habitat in the priority subwatersheds identified in the WCF, as well as, allowing opportunistic restoration outside these areas where there is benefit to water quality and aquatic habitat. While restoration will be focused in these priority subwatersheds, the Umatilla NF proposes aquatic restoration across the Forest and on private lands, within and adjacent to the Umatilla NF, where we have cooperating landowners and where these restoration activities would aid in the recovery of aquatic species and impaired water bodies.

Priority Subwatersheds on the Umatilla National Forest

The watershed scale is considered a strategic scale for analysis and long term restoration planning, whereas the subwatershed scale is considered an operational scale for near term (3-5 year) investment in completion of essential projects. The National Forests reviewed existing WCF priorities and selected subwatersheds for near-term (3-5 year) focused investment, and identified 'essential projects' to maintain or improve watershed conditions detailed in 'Watershed Restoration Action Plans (WRAPs) (see Table 1). Essential projects are defined as actions and treatments that are implemented as an integrated suite of on-the-ground management activities focused primarily on restoring watershed function and thereby improving watershed condition class.

Table 1: Watershed Restoration Action Plans for priority subwatersheds on the Umatilla NF.

Priority Subwatershed (6th field HUC)	12-digit Hydrologic Unit Code	Watershed Restoration Action Plan Developed
Clear Creek	170702020204	2011
Upper Big Wall Creek	170702020805	2011
Cummings Creek	170601070604	2012
Little Lookinglass	170601041002	In Progress
Little Tucannon	170601070603	In Progress

WRAPs are based on these process-based principles and an assumption that complete restoration of a watershed is often socially, economically, and/or politically impossible because road systems and other infrastructure will remain intact due to public demands. Therefore, the removal of all disruptions and returning an entire landscape to a natural disturbance regime is not possible for most watersheds. Consequently, WRAP projects strategically address anthropogenic disruptions that are not precluded by social, economic, and/or political constraints. As such, disruptions can be eliminated (e.g., road

[1] The Watershed Condition Framework can be found online at http://www.fs.fed.us/publications/watershed/Watershed_Condition_Framework.pdf

decommissioning) or modified (e.g., culvert replacement) to better accommodate natural processes at the reach or watershed scale.

Primary emphasis is placed on aquatic and terrestrial processes and conditions that Forest Service management activities can influence. The approach is designed to promote integrated watershed assessments; target programs of work in watersheds that have been identified for restoration; enhance communication and coordination with external agencies and partners; and improve reporting and monitoring of program accomplishments.

Once WRAP actions are completed, a sub-watershed will be transformed into one that has been moved closer to a natural, reference condition. Over time, however, economic, social, and/or political constraints may change, allowing additional projects to be implemented and moving the watershed even closer to natural reference conditions. From there, action agencies will direct efforts to complete additional WRAPs in other priority watersheds with an ultimate objective of creating a network of restored watersheds throughout evolutionary significant units (ESU), distinct population segments (DPS), or interim recovery units (IRU). Thus, WRAPs have and continue to serve as the primary means to deliver scarce resources to priority watersheds for the restoration of fish stocks and water quality. However, these additional projects must conform to the restrictions provided under this environmental assessement, otherwise further NEPA review will be required.

2.2.4 Project Development, Consultation and Collaborative Process

This environmental assessment has been prepared to document the effects associated with implementing aquatic restoration projects as described in ARBO II and listed in Appendix A. After this decision, additional steps will ensure compliance with applicable laws and regulations. These steps include the use of a project specific checklist (Appendix C), pre-implementation surveys where required, and public notification to ensure all project issues have been addressed.

Project Development:

Restoration projects will be identified and prioritized annually.

All projects will be designed to comply with the general aquatic conservation measures and design criteria applicable to the ARBO II activity category (Appendix A) as well as the additional PDCs identified by the forest in Appendix B.

The project NEPA Compliance and Implementation Checklist (Appendix C) will be used to ensure each activity is consistent with the analysis and the decision. This will be documented in a project letter to the file signed by the Forest Supervisor.

Consultation:

Pre-implementation surveys will be conducted for threatened species (in compliance with ESA), sensitive species, invasive species, and cultural resources. If threatened or sensitive species, invasive speices, culturally significant plants (for local treaty tribes), or cultural sites are found during the pre-implementation surveys or during activity implementation the appropriate mitigation will be incorporated into the activity design.

Any cultural resource findings will be coordinated with the State Historical Preservation Office and follow our current programmatic agreement or 36 CFR part 800, whichever is most appropriate.

All projects will follow pre- and post-project notification processes identified by the interagency working group (Forest Service, Bureau of Land Management, National Marine Fisheries Service and US Fish and Wildlife Service) for implementation of ARBO II to meet ESA Section 7 consultation obligations.

http://fswebgstc.gsc.wo.fs.fed.us/services/data_management/Oregon/index.php (accessed September 2017).

Collaboration Period:

The NEPA Compliance and Implementation Checklist for each project will be signed by the Forest Supervisor and posted on the Forest's website at least 60 day prior to implementation of any activity notifying the public of the planned restoration project.

All required regulatory agencies will receive a pre-project notification (see Appendix D) at least 60 days prior to implementation of any activity.

Activities may be discussed with collaborative groups, working groups, local and state governments, and private stakeholders based on potential interest as determined by District Rangers or Forest Supervisor.

2.2.5 Project Monitoring

Monitoring would be conducted as appropriate for a specific action, both during and after a project, to track effects and compliance with this analysis and ARBA II. (ARBA II - General Aquatic Conservation Measures #12, pg 25)

During Project Implementation:

Visually monitor to ensure effects are not greater (amount, extent) than anticipated and to contact Level 1[2] representatives if problems arise.

- Fix any problems that arise during project implementation.
- Coordinate as needed to ensure a biologist or hydrologist is always present on site during activities to ensure a contractor is following all stipulations of a contract.
- Coordinate as needed to ensure a biologist or hydrologist is present or informed during activities performed by Forest Service personnel.

To minimize short-term degradation to water quality during project implementation, follow current 401 Certification provisions of the Federal Clean Water Act for maintenance or water quality standards as described by the Oregon Department of Environmental Quality and Washington Department of Ecology.

After Project Implementation:

A post-project review shall be conducted after winter and spring high flows.

- For each project, conduct a walk through/visual observation to determine if there are post-project affects that were not considered during consultation.
- For fish passage and re-vegetation projects, monitor in the following manner:
- Fish Passage Projects – Note any problems with channel scour or bedload deposition, substrate, discontinuous flow, vegetation establishment, or invasive plant infestation.
- Revegetation – For all vegetative treatment projects, including site restoration, monitor for and remove invasive plants until native plants become established.

In cases where remedial action is required, such actions are permitted without additional consultation if they use relevant project design criteria and aquatic conservation measures, and the effects of the action categories are not exceeded.

Post-project notification would be posted on the Forest's web site and reported to all required regulatory agencies.

[2] Level 1 – Umatilla interagency ESA Section 7 working group comprised of representatives from the Umatilla, NMFS, FWS and Bureau of Land Management

2.3 Alternatives Considered but Eliminated from Detailed Study

The alteration of range allotment practices was brought forward during scoping as an alternative to the proposed action. Range management activities are authorized under other authorities and are outside the scope of the analysis. Stakeholders have the opportunity to be involved in these projects during scoping, notice and comment periods, and objection periods as well as various other times throughout the range management NEPA process.

CHAPTER 3 ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter analyzes the environmental consequences or impacts that could occur as a result of implementing each of the two alternatives. Impact topics have been selected for this analysis based on their potential to affect important resources and other key issues identified during planning. Where possible, site specific impact analyses within the clearly defined, geographically and specially bound area of the proposed action, are quantitative. However, because of the inherent uncertainty involved with adaptive management strategies, assessments in this chapter will also be of a qualitative nature as based on review of scientific literature and information collected by the Forest Service and provided by other agencies.

3.1.1 Potential Impact Terminology Defined

Potential impacts of all alternatives are described in terms of type (beneficial or adverse, direct and indirect); context; duration (short- or long-term); and intensity (negligible, minor, moderate, major). Definitions of these descriptors include:

- Beneficial—a positive change in the condition of the resource or a change that moves a resource toward its desired condition.
- Adverse—a negative change in the condition of the resource or a change that moves a resource away from its desired condition.
- Direct—an effect that is caused by and occurs at the same time and place as a vegetation control or restoration activity.
- Indirect—a reasonably foreseeable effect that is caused by vegetation control or restoration activity, but occurs later in time or farther removed in distance.
- Context – the affected environment within which an impact would occur such as a site-specific impact which would encompass relatively small areas in the Forest that are centered on where the restoration activity takes place or forest-wide which could span across the forest. Context is variable and depends on the circumstances and the resource affected.
- Intensity – Because definitions of impact intensity (negligible, minor, moderate, and major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed.

3.1.1 Past, Present and Future Foreseeable Actions on the Umatilla National Forest

The Council on Environmental Quality, which is responsible for implementing the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), requires the cumulative impacts to be assessed in the decision-making process for federal projects. A cumulative impact is defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7).

To determine the cumulative impacts of each alternative, it was necessary to identify other ongoing or reasonably foreseeable at Umatilla National Forest, and, as relevant, the surrounding region to include private and state lands. The Forest Service R6 considers reasonably foreseeable actions to be those on a project priority list and/or having funding. A current list of present and future foreseeable actions is available on our Schedule of Proposed Actions (SOPA) webpage: https://www.fs.fed.us/sopa/forest-level.php?110614.

Past actions on the Umatilla National Forest involve a long history of human use, fire suppression, timber harvest, tree planting, non commercial thinning and prescribed fire. Present actions include domestic

grazing, fire suppression, firewood cutting, recreation, road and facilities maintenance and prescribed fire. The following list presents future foreseeable actions under development or likely to be implemented in the near future.

- Four Corners Timber Sale will commercially harvest up to 70 acres while promoting forage production and reducing fuel loading.
- Switchback Timber Harvest will reduce overstory density to promote grass and forage in the Dale horse pasture.
- Upper Touchet Vegetation Management Project will harvest timber around the Bluewood Ski Resort to enhance recreational opportunities.
- Glass Restoration project will harvest timber to remove off-site plantation pine and move the landscape towards the Historical Range of Variation.
- Blue Mountains Forest Resiliency project will consider thinning and burning on three forests, including the Umatilla, to move dry forest landscape towards the Historical Range of Variation and decrease risk of wildfire events.
- Bull Prairie Fuel Reduction will reduce fuel loading around the Bull Prairie Campground.
- Godman Thin will reduce tree densities in areas at risk of insect and disease infestations.
- Mountain Top Defensible space will remove vegetation to increase sight distance from two fire lookouts and protect those structures.
- Sunrise Vegetation and Fuels management will use harvest and prescribed fire to move conditions towards the Historical Range of Variability.
- Willoughby Urban Interface Project will remove vegetation to protect firefighters and values at risk.
- Kahler Dry Forest Restoration will restore the Kahler watershed, managing the vegetation with harvest and prescribed fire.
- Ellis Integrated Vegetation will increase forest resiliency to wildfire and insect and disease infestations through timber.
- Little Phillips Creek will remove a culvert on road 3734, decommission .07 miles of FR 3734 and open one mile that is currently closed

3.2 Aquatic Resources – Hydrology and Fisheries

The Fisheries Biological Evaluation (Fish BE) and Hydrology report located on the project website are summarized in this section and analyzes a number of individual actions that, when grouped together, represent Aquatic Restoration proposed activities and projects that may occur across the Umatilla National Forest. This analysis approach provides the Umatilla National Forest with a consistent methodology to design, implement, monitor and document aquatic restoration activities.

3.2.1 Relevant Laws, Regulations, Policies, Guidance, and Plans

PACFISH (USDA and USDI 1995) and INFISH (USDA Forest Service 1995a) were implemented in response to the potential listing under the Endangered Species Act of several anadromous and resident fish species in the Snake River and interior portions of the Columbia River basin and included measures that were intended to halt further degradation of the habitats of these species on federal lands. Only PACFISH applies to the Umatilla NF due to the presence of anadromous fisheries. Adherence to the Standards and Guidelines of the Forest plan as amended by the PACFISH strategy includes the designation and protection of riparian habitat conservation area (RHCAs). PACFISH includes goals and objectives for management of RHCAs, and standards and guidelines for land management activities, among other requirements.

Subsequently, the Forest Service developed the Aquatic and Riparian Conservation Strategy (ARCS 2007) and updated in 2016 (USDA 2016) as guidance intended to provide a regionally consistent approach to the management of watersheds and riparian and aquatic habitats. The rationale for the ARCS was based on lessons learned from 25 years of successful implementation of PACFISH, INFISH, and the Northwest Forest Plan.

Federal agencies involved in the conservation and restoration of aquatic species and watersheds recognized the need of a strategic process that consistently implemented categories of restoration of projects on FS and BLM lands. The Aquatic Restoration Biological Assessment ARBA II and associated Aquatic Restoration Biological Opinions (ARBO II) were originally prepared in 2007, then updated in 2013, to facilitate restoration of aquatic habitats and watersheds on National Forest System (NFS) and Bureau of Land Management (BLM) lands in Oregon and Washington.

These plans and guidances provide the support and framework to accelerate the pace of restoration on the Umatilla NF. These documents are discussed in more detail below.

PACFISH

PACFISH is a broad conservation strategy developed to address declining populations of fish populations and establish characteristics of healthy, functioning watersheds, riparian areas, and associated fish habitats. Since the quality of water and fish habitat in aquatic systems is inseparably related to the integrity of upland and riparian areas within the watersheds, the strategy identifies several goals for watershed, riparian, and stream channel conditions.

The three components of PACFISH; Goals, Riparian Management Objectives (RMOs) and Riparian Habitat Conservation Areas (RHCAs) are designed to work in concert to protect and improve conditions for watersheds and aquatic species. A brief description of Goals, RMOs and RHCAs follows, for a more complete description see PACFISH.

The Goals establish an expectation of the characteristics of healthy, functioning watersheds, riparian areas, and associated fish habitats. Since the quality of water and fish habitat in aquatic systems is inseparably related to the integrity of upland and riparian areas within the watersheds, the strategy identifies several goals for watershed, riparian, and stream channel conditions.

Riparian Management Objectives provide criteria to help assess attainment of aquatic and riparian goals. RMOs provide a characterization of the existing condition of the watershed, riparian and stream channel processes that can be used to guide management. Riparian Habitat Conservation Areas are portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines.

Aquatic and Riparian Conservation Strategy (ARCS)

The 2018 Blue Mts. Aquatic and Riparian Conservation Strategy (ARCS) is a further refinement of PACFISH and is Regional direction for National Forests revising their land management plans. The ARCS is designed to maintain and restore the ecological health of watersheds and aquatic and riparian ecosystems on National Forest System (NFS) lands in the Pacific Northwest Region.

ARCS integrates and refines the PACFISH/INFISH strategies building upon prior successes, reflecting new science and policy, incorporating lessons learned, and addressing ongoing issues and new needs. The ARCS combines ecosystem and landscape perspectives to provide a management strategy focusing first and foremost on broad-scale aquatic resource conservation and protection, coupled with strategically-focused active restoration in priority areas (USDA 2018).

Aquatic Restoration Assessment and Biological Opinion, and Matrix of Pathways and Indicators

The programmatic approach of ARBA II and ARBO II allows a streamlined ESA consultation approach using a required set of design elements and project design criteria. This approach results in a predictable and consistent set of effects from project implementation, and a consistent approach to project design and implementation. ARBA II and ARBO II provides a unified approach to identifying programmatic activity categories, project design criteria, and reporting within and amongst action agencies, resulting in improved communication and project implementation. The streamline consultation approach reduces the planning costs which allows for more on-the-ground restoration.

Each of the ARBA II aquatic restoration categories in the Proposed Action may have varying degrees of direct and indirect effects to aquatic and terrestrial ESA-listed species and their Critical Habitat (CH) and Essential Fish Habitat (EFH). Effects of most concern under this programmatic consultation are those resulting from short-term habitat removal or degradation or impacts that cause changes to listed species' growth, reproduction, and survival. The aquatic conservation measures and project design criteria listed in Chapter II are intended to minimize potential adverse direct and indirect project effects to ESA/MSA listed species, CH, and EFH.

3.2.2 Methodology

The effects of restoration activities on individual fish, CH, and EFH are described in context of the Matrix of Pathways and Indicators (MPI) developed by the FWS and NOAA Fisheries (1999 and 1996). The objective of this process is to integrate biological and habitat conditions to arrive at a determination of the potential effects of land management activities on a proposed or listed species.

The protocol looks at a suite of indicators ranging from in-channel to watershed-scales that are known to influence habitat quantity and quality for fish and associated aquatic species, where the species of interest is known to be present. Effects of project activities are then assessed to determine whether the project would have a negative, neutral or positive effect on individual indicators, that would shift resulting indicator conditions to change to a new value that would place the indicator into a new category as a result of the project, resulting in a measurable effect to the listed species in question.

The effects of the programmatic actions will be analyzed using the Matrix of Pathways and Indicators (MPI) (as descrbied in ARBO II). The following Pathways (***Italic Bold***) and their indicators were used in this analysis:

Water Quality: 1) Temperature; 2) Turbidity; 3) Chemical Contamination/Nutrients
Habitat Access: 1) Physical Barriers
Habitat Elements: 5) Substrate/Sediment; 6) Large Wood; 7) Pool Frequency and Quality, 8) Off-Channel Habitat; 9) Refugia
Channel Condition and Dynamics: 10) Width/Depth Ratio; 11) Streambank Condition; 12) Floodplain Connectivity
Flow/Hydrology: 13) Changes in Peak/Base Flows; 14) Increase in Drainage Network
Watershed Condition: 15) Road Density and Location; 16) Riparian Reserves; 17) Disturbance History
Fish: 18) Fish Population Characteristics

A variety of information was used to describe distribution and life history of the aquatic organisms included in this analysis. ESA listed species distribution surveys are documented through stream surveys and project level surveys. Distribution of other species is less well known. The analysis will tier to and rely heavily on the analysis of the ARBA II and ARBO II to support conclusions and lay the framework for implementation. Currently there are no significant data gaps that would impede this analysis and or the implementation of this project.

3.2.3 Affected Environment – Hydrology

During the last 150 years, watershed conditions in the Blue Mountains have been altered by a series of human uses, including mining, logging, agriculture, water diversions, flood control, wildfire exclusion, grazing, road construction and maintenance, and hydro-electric development. The combined impacts of past land uses include, but are not limited to changes in vegetative conditions, simplification and loss of aquatic habitats, increases in sediment delivery to streams, and degradation of riparian and floodplain functions (McIntosh et al. 1994a, Wissmar 2004). The resulting degradation and fragmentation of aquatic and riparian habitats and impacts to water quality contributed to declines or outright extinction of many resident and anadromous fish stocks, the listing of several fish stocks under the Endangered Species Act, and the listing of many streams as water quality impaired beginning in the early 1990s.

Exceedance of State water quality temperature standards is the most common water quality issue. High water temperatures adversely affect salmonid metabolism, growth rate, and disease resistance, as well as the timing of adult migrations, fry emergence, and smoltification[3]. Many factors can cause high stream temperatures, but they are primarily related to land-use practices rather than point-source discharges. Some common actions that cause high stream temperatures are the removal of trees or shrubs that directly shade streams, water withdrawals for irrigation or other purposes, and warm irrigation return flows. Loss of wetlands and increases in groundwater withdrawals contribute to lower base-stream flows that, in turn, contribute to temperature increases. Activities that create shallower streams (e.g., channel widening) also cause temperature increases.

Chemical use in state, federal, and private forest lands have resulted in the introduction of pollutants to headwater stream segments. The three major categories of forest chemical used are pesticides, fertilizers, and fire retardants. While pesticide use in all forest ownership types was extensive during the 1970's and 1980's, application rates on National Forest System lands peaked in the mid 1980's, and have decreased considerably since.

[3] Smoltification is the series of physiological changes where juvenile salmonid fish adapt from living in fresh water to living in seawater.

Water quantity problems are also a significant cause of habitat degradation and reduced fish production. Irrigation is a widespread practice in Southeast Washington and Eastern Oregon. Although some of the water withdrawn from streams eventually returns as agricultural runoff or groundwater recharge, crops consume a large proportion of it. Withdrawals affect seasonal flow patterns by removing water from streams in the summer (mostly May through September) and restoring it to surface streams and groundwater in ways that are difficult to measure. Withdrawing water for irrigation and other uses increases temperatures, smolt travel time, and sedimentation. Return water from irrigated fields can introduce nutrients and pesticides into streams and rivers. Deficiencies in water quantity have been a problem in the major production subbasins for some fish stocks that have seen major agricultural development over the last century. Water withdrawals can lower summer flows and thereby profoundly decreased the amount and quality of rearing habitat.

On the landscape scale, human activities have affected the timing and amount of peak water runoff from rain and snowmelt. Forest and range management practices have changed vegetation types and density that, in turn, affect runoff timing and duration. Many riparian areas, floodplains, and wetlands that once stored water during periods of high runoff have been destroyed by development that paves over or compacts soil, thus increasing runoff and altering natural hydrograph patterns.

Land ownership has also played its part in the area's habitat and land-use changes. Federal lands are generally forested and situated in upstream portions of the watersheds. While there has been substantial habitat degradation across all land ownerships, including Federal lands, in general, habitat in many headwater stream segments is in better condition than in the largely non-federal lower portions of tributaries. In the past, valley bottoms were among the most productive fish habitats. Today, agricultural and urban land development and water withdrawals have significantly altered the habitat for fish and wildlife in these valleys and lower elevation areas. Streams in these areas typically have high water temperatures, sedimentation problems, low flows, simplified stream channels, and reduced riparian vegetation.

Water Quality

Water produced within the Umatilla National Forest is generally of high quality. Monitoring programs include a network of stream temperature sensor sites and sediment sampling in selected streams as part of project and/or long-term effectiveness monitoring. The most persistent and widespread water quality concern is high stream temperatures during low stream flows in summer. High summer air temperatures, changes in stream surface shading caused by legacy Forest Service management activities, and low flows are important factors contributing to warmer water. Sediment levels in streams vary significantly with stream flows, with the highest levels during winter and spring runoff. Some stream reaches show evidence of sediment accumulation from varying sources, such as local stream bank erosion or contributing watershed conditions (e.g., high sediment-producing geology and roads close to streams). Sediment accumulation is a natural function in lower gradient streams, but some areas show evidence of sediment accumulation from past and ongoing management activities. Other water quality concerns that have been observed include nutrient and bacteria sources from livestock, wildlife, and recreation uses. Impacts generally occur during times of concentrated use (at concentrated use areas).

Water quality has improved in recent years as a result of changes in management motivated by direction in PACFISH and INFISH, implementation of water quality best management practices (BMPs), direction in the Regional Aquatic Restoration Strategy, fish recovery plans, and through partner investments. Examples include increased emphasis on protecting streamside areas to reduce impacts to shade producing vegetation, and repairing and removing unstable roads. At the project level, Forest Service staff design and implement a wide variety of BMPs as part of land management activities. Monitoring occurs on a sample of practices to determine BMP implementation and effectiveness and need for adjustment.

Monitoring of road decommissioning and stabilization conducted by the Rocky Mountain Research Station since 2008 has assessed treatment effectiveness in reducing impacts to aquatic ecosystems. Monitoring results indicated treatments reduced erosion and sediment delivery and lowered risk to aquatic ecosystems.

Impaired Waters

Water bodies on the Umatilla support designated beneficial uses[4], which include domestic and agricultural, cold-water fisheries, recreation, domestic livestock, and wildlife uses. Maintaining the quality of these waters is becoming increasingly important as the demand for clean water resources increases and the timing and volume of surface runoff changes in responses to climate change. Water quality criteria designed to protect the designated uses and are used to assess the general health of surface waters.

Section 303(d) of the 1972 Federal Clean Water Act requires the identification of water bodies that violate water quality standards and thereby fail to fully protect beneficial uses. Streams that do not meet water quality standards and thereby do not protect designated beneficial uses are referred to as impaired and are included on state 303d lists. The law requires that states develop total maximum daily loads (TMDLs) for these waters that address the sources of pollution and identify actions needed to improve water quality. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards. TMDLs establish load allocations that are expected to provide conditions that meet state water quality standards over time.

The maintenance of the 303(d) list is an ongoing process and is updated periodically based on new information. Oregon Department of Environmental Quality (ODEQ) submitted Oregon's 2012 Integrated Report and 303(d) list to EPA in November 2014. EPA approved most of the submitted 303(d) listings and delistings in December 2016. The approved 303(d) list with EPA's modifications is currently effective for Oregon. ODEQ will update the searchable database when EPA has completed final action to add other impaired waters to Oregon's 303(d) list. The approved 2012 303(d) list is currently effective for Clean Water Act purposes within Oregon[5]. The 303d list of impaired waterbodies for Oregon and Washington can be found in Appendix E (Feb 2018). The current water quality assessment and 303(d) list of impaired waterbodies for the state of Oregon can also be obtained from the following website: http://www.deq.state.or.us/wq/assessment/rpt2012/search.asp

The Environmental Protection Agency (EPA) approved Washington Department of Ecology's (DOE) submittal of the latest 303(d) list on July 22, 2016. The current water quality assessment and 303(d) list of impaired waterbodies for the state of Washington can be obtained from the following website: https://fortress.wa.gov/ecy/approvedwqa/ApprovedSearch.aspx

The most common water quality impairment on Umatilla National Forest is for exceedance of stream temperature standards criteria. Because the concentration of dissolved oxygen in water is temperature dependent, streams with high water temperatures often have correspondingly low dissolved oxygen levels, which is detrimental to beneficial uses (cold water fish species). Sources of temperature impairment identified in TMDLs by ODEQ include loss of stream shade, changes in channel morphology,

[4] Beneficial uses for waterbodies within the state of Oregon are located at http://www.oregon.gov/deq/wq/Pages/WQ-Standards-Uses.aspx. Washington state beneficial uses can be found at http://www.ecy.wa.gov/programs/wq/swqs/desig_uses.html.

[5] Pending judgement on litigation and EPA's final action on Oregon's 2012 303(d) list have implications to water quality status on NFS lands (Northwest Environmental Advocates v. U.S. Environmental Protection Agency). This report is based on the current status of temperature 303(d) listings, TMDL, WQRP, FS programs, plans and actions intended to protect water and restore water quality. For purposes of NEPA the 2012 list is the effective list at this time. It is anticipated that under this ruling TMDLs, WQRPs and planning documents will be updated to be compliant with the resulting judgement. TMDLs affected by this litigation on the UNF include the John Day River basin, Willow subbasin, and Lower Grande Ronde subbasin.

loss of floodplain and shallow groundwater connection, and changes in streamflow. ODEQ recognizes that stream shade provided by riparian vegetation has the most widespread achievable effect on reducing stream temperatures by reducing direct solar radiation. This emphasis on shade shows the importance of restoring healthy communities of riparian vegetation. The agencies recognize that changes in channel morphology are often more costly and take longer to achieve results. ODEQ has administrative procedures for transferring water rights from out-of-stream uses to instream flows for benefit of water quality, aquatic species, and recreation uses.

The US Forest Service is recognized by the states as the land manager with authority to manage and regulate sources of pollutants on the Umatilla National Forest lands. As the designated management agency, the Forest Service is responsible for developing water quality restoration plans that outline the BMPs and restoration strategies needed to restore water quality in impaired waters and reduce pollution to surface waters in National Forest System lands. The Forest Service has contributed to the development of TMDLs by providing relevant data and technical assistance for streams within the Umatilla National Forest and has participated in technical and stakeholder groups (Table 1).

Table 1: Status of total maximum daily loads (TMDLs) and water quality restoration plans (WQRPs)

State		TMDL Date	Water quality Parameters	Implementation Plan
Oregon	John Day Basin https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Basin-John-Day.aspx	2010	Temperature, Bacteria, Dissolved Oxygen	WQRP completed in 2014
	Upper Grande Ronde Subbasin https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Basin-Grande-Ronde.aspx	2000	Temperature, Bacteria, DO, pH, Ammonia, Sedimentation	Federal lands included in WQMP
	Lower Grande Ronde Subbasin https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Basin-Grande-Ronde.aspx	2010	Temperature, Bacteria	Federal lands included in WQMP
	Umatilla Basin – Umatilla Subbasin https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Umatilla-Basin.aspx	2001	Temperature; Sediment; Aquatic Weeds, Algae and pH; Nitrate, Ammonium, Bacteria	Federal lands included in WQMP
	Umatilla Basin - Walla Walla Subbasin https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Umatilla-Basin.aspx	2005	Temperature	FS lands included in TMDL. WQRP submitted in 2008.
	Umatilla Basin - Willow Subbasin https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Umatilla-Basin.aspx	2007	Temperature, pH, Bacteria	FS lands included in TMDL
Washington	Tucannon River and Pataha Creek http://www.ecy.wa.gov/biblio/1010019.html	2010	Temperature	FS not included in TMDL, management requirements
	Walla Walla Watershed Multiparameter http://www.ecy.wa.gov/programs/wq/tmdl/WallaWallaTMDL.html	2007	Temperature	FS not included in TMDL, management requirements

The Tucannon and Walla Walla TMDLs do not address the national forests in the Washington State TMDL implementation plans, however, they do recognize the Forest Service as a DMA (Designated

Management Authority) and acknowledge the programs and progress towards improving water quality including Forest Plan management requirements under PACFISH, coordinated monitoring and restoration activities. ODEQ does address the Umatilla National Forest in the Walla Walla Subbasin within Oregon.

Watershed Condition Framework Ratings

On the Umatilla, there were 127 subwatersheds included in the assessment. National forest ownership within subwatersheds ranged from 5-100 percent (watersheds with less than 5 percent national forest lands were not rated). Assessment data came from the national forests so ratings apply only to the national forest lands in the watershed (Table 2).

Table 2: Overall Subbasin Watershed Condition Ratings on the Umatilla NF

Subbasin Watershed	*Subbasin HUC #*	*Number of Subwatersheds*		
		Good Functioning Properly	Fair Functioning at Risk	Poor Impaired Function
Upper Grande Ronde	17060104	4	5	0
Lower Grande Ronde	17060106	21	1	0
Lower Snake - Asotin	17060103	4	1	0
Lower Snake - Tucannon	17060107	3	3	0
Walla Walla	17070102	6	4	0
Umatilla	17070103	12	5	0
North Fork John Day	17070202	18	27	0
Middle Fork John Day	17070203	2	0	0
Lower John Day	17070204	4	4	0
Willow	17070104	2	1	0

A rating of "good" indicates the subwatershed has a high geomorphic, hydrologic and/or biotic integrity relative to the natural potential condition and suggests the watershed is functioning properly with respect to that indicator. In contrast, a rating of "poor" suggests that the subwatershed has impaired function. WCF "properly functioning", "functioning-at-risk", or "impaired function" descriptions are equivalent to "functioning appropriately", "functioning-at-risk" and "functioning at unacceptable risk" categories within the previously described MPI used by FWS and to "properly functioning" or "at-risk" or "not properly functioning" categories within the MPI used by NMFS.

Overall Watershed Condition

Overall watershed condition on the Umatilla was rated "good" in 76 watersheds (60%) and "fair" in 51 watersheds (40%). None of the evaluated watersheds was rated in "poor" condition.

Ratings for most individual indicators show varying distributions of functioning properly, functioning at risk, and impaired function. Four indicators most relevant to water quality and fisheries are discussed in more detail; water quality, aquatic habitat, riparian/wetland vegetation, and roads & trails (Table 3).

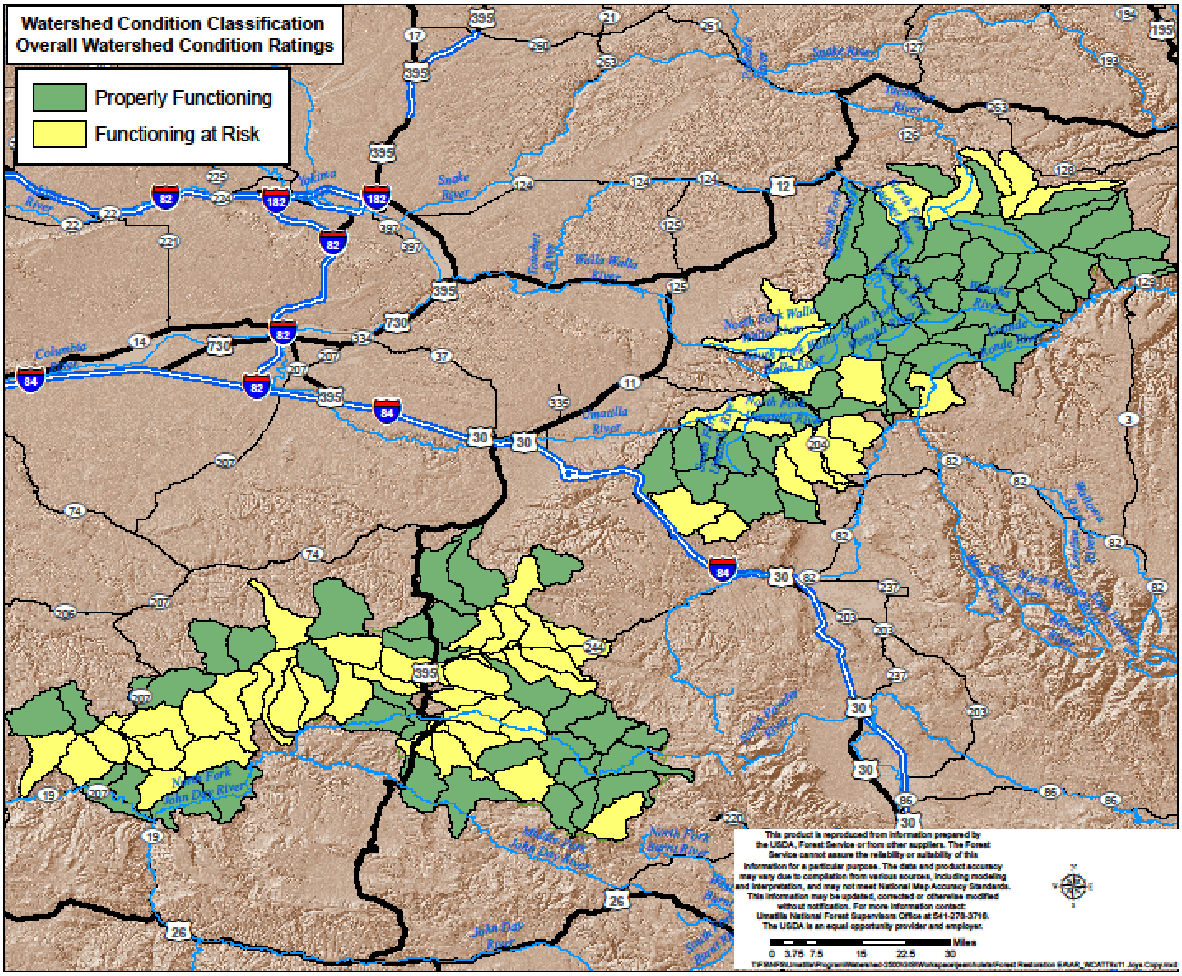

Figure 8: Overall Watershed Condition Class for subwatersheds on the Umatilla NF

Water Quality

The water quality indicator assesses the impairment to beneficial uses of water bodies in the subwatersheds. For water quality, 111 subwatersheds were rated good, 14 fair, and 2 were rated in poor condition (Figure 9). When a Total Maximum Daily Load (TMDL) is established for a pollutant, a Water Quality Management Plan (WQMP) is developed to identify management actions to address the pollutant and improve water quality. This attribute rating is based on 303(d) status during the 2015 reassessment of the WCF and reflects listings not covered under a current TMDL/WQRP.

Aquatic Habitat

The aquatic habitat indicator rating reflects whether the subwatershed supports large continuous blocks of high-quality habitat and high-quality stream channel conditions. Seventeen subwatersheds rated poor condition based on habitat quality, fragmentation and stream channel condition. Watersheds in "poor condition" for aquatic habitat largely reflect legacy (past) land uses (i.e. grazing, mining, logging), including fragmentation by roads, lack of large wood in channels, and altered channel morphology. Many of these conditions continue to persist long after the original impact. There were 52 subwatersheds rated in fair condition and 58 in good condition. Seventeen are in poor condition.

Riparian Vegetation

The riparian vegetation indicator addresses the function and condition of native riparian vegetation. Twenty subwatersheds were rated poor based on relative condition and departure from potential. As with aquatic habitat, riparian conditions also reflect legacy land uses no longer active or allowed (such as streamside logging). There were 32 subwatersheds rated in fair condition and 75 in good condition.

Roads and Trails

Impacts of roads and trails were rated based on factors that include open road density, maintenance investment, proximity to water, with 44 rated good, 65 fair, and 18 watersheds rated poor condition. Road management is an ongoing agency emphasis, with national direction for transportation analysis to identify a "sustainable" (economic, social, and ecological) road system, and years of investment to reduce road impacts. Ongoing challenges include desire for public access for various purposes, needs for access for resource management and protection, and diminished funding for maintenance and storage or decommissioning of unneeded roads.

Table 3: Watershed Condition Framework (WCF) Indicator Ratings

WCF Indicators	*Number of Subwatersheds*		
	Good ***Functioning Properly***	**Fair** ***Functioning at Risk***	**Poor** ***Impaired Function***
Water Quality	111	14	2
Aquatic Habitat	58	52	17
Riparian Vegetation	32	75	20
Roads and Trails	44	65	18

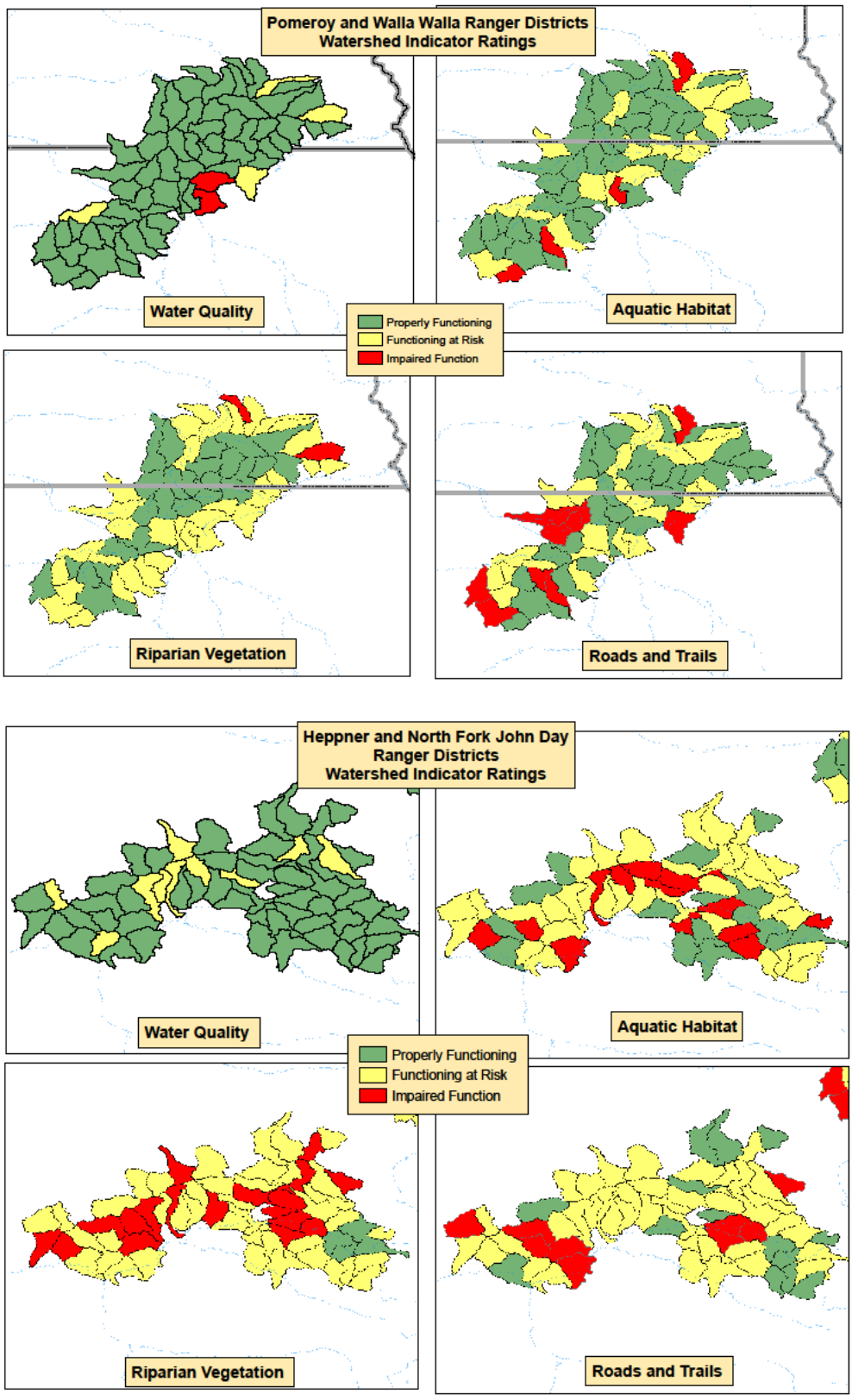

Figure 9: Watershed Condition Framework indicator ratings for the Umatilla.

3.2.4 Affected Environment – Fisheries

Federally Listed Fishes and their Designated Critical Habitat

Distribution of anadromous fish on the Umatilla are described by the two major watersheds that divide the Umatilla; the Snake River basin (SRB) and Middle Columbia River basin (MCR). The acronyms SRB and MCR are used extensively in the following descriptions.

STEELHEAD

Two Distinct Population Segments (DPS) of steelhead, MCR and SRB, are found within the analysis area (Figure 10). See ARBA II for a description of the species life history. In 2015 and 2016 NMFS published status reviews of both DPS, and overall both DPS populations are stable (versus declining or improving). Recovery plans have also been completed. Table 4 summarizes steelhead distribution and their Designated Critical Habitat (DCH) in the analysis area on the Umatilla.

Table 4: Miles of Steelhead distribution and miles of steelhead DCH.

Distinct Population Segments	Habitat Miles
SRB steelhead distribution	322 miles
SRB steelhead Designated Critical Habitat	284 miles
MCR steelhead distribution	445 miles
MCR steelhead Designated Critical Habitat	**647 miles**

The MCR steelhead DPS consists of three Major Population Groups (MPGs): the Umatilla, Walla Walla and John Day, all located in the Middle Columbia portion of the Columbia River Basin (Table 5).

Hatchery stock produced by the Umatilla River and Touchet River hatchery programs are considered part of this DPS. Habitat concerns exist throughout the range of the MCR steelhead DPS particularly in regards to water quality, water quantity, and riparian condition.

Table 5: Middle Columbia River Steelhead Status of Major Population Groups

MPG	Population	Population Current Condition
Umatilla/Walla Walla	Umatilla	Moderate risk/ Maintained
Umatilla/Walla Walla	Walla Walla	Moderate risk/ Maintained
Umatilla/Walla Walla	Touchet	High risk
Umatilla/Walla Walla	Willow Creek	Extinct
John Day	North Fork John Day	Low-Very Low Risk/Highly viable
John Day	Lower Mainstem John Day	Moderate risk/Maintained
John Day	Middle Fork John Day	Moderate risk/Maintained

The Umatilla and Walla Walla River MPG consists of three extant populations geographically located in the Umatilla and Walla Walla subbasins respectively. The Walla Walla River population straddles the Oregon/Washington state boundary. Stream temperature, altered sediment routing, degraded channel structure and seasonal low instream flows are major habitat-related limiting factors for the Umatilla/Walla Walla/Touchet MPG (NMFS 2011, NMFS 2017):

The John Day River MPG occupies the John Day River drainage. The MPG contains five extant populations, three of which are represented in the analysis area: Lower Mainstem John Day, North Fork

John Day and Middle Fork John Day. Steelhead in these populations are exclusively summer steelhead. The MPG is one of the few remaining summer steelhead groups in the Interior Columbia basin with minimal influence from introduced hatchery steelhead. The MPG is classified as strong or healthy. Spawning is widely distributed across tributary and mainstem habitats.

The population in the North Fork John Day River is considered “highly viable”. In comparison, the other two populations are still considered at “Moderate risk”. Major limiting factors for the John Day River MPG include degraded channel structure and complexity (habitat quantity and diversity), altered sediment routing, altered hydrology and low flows, elevated water temperatures, and impaired fish passage.

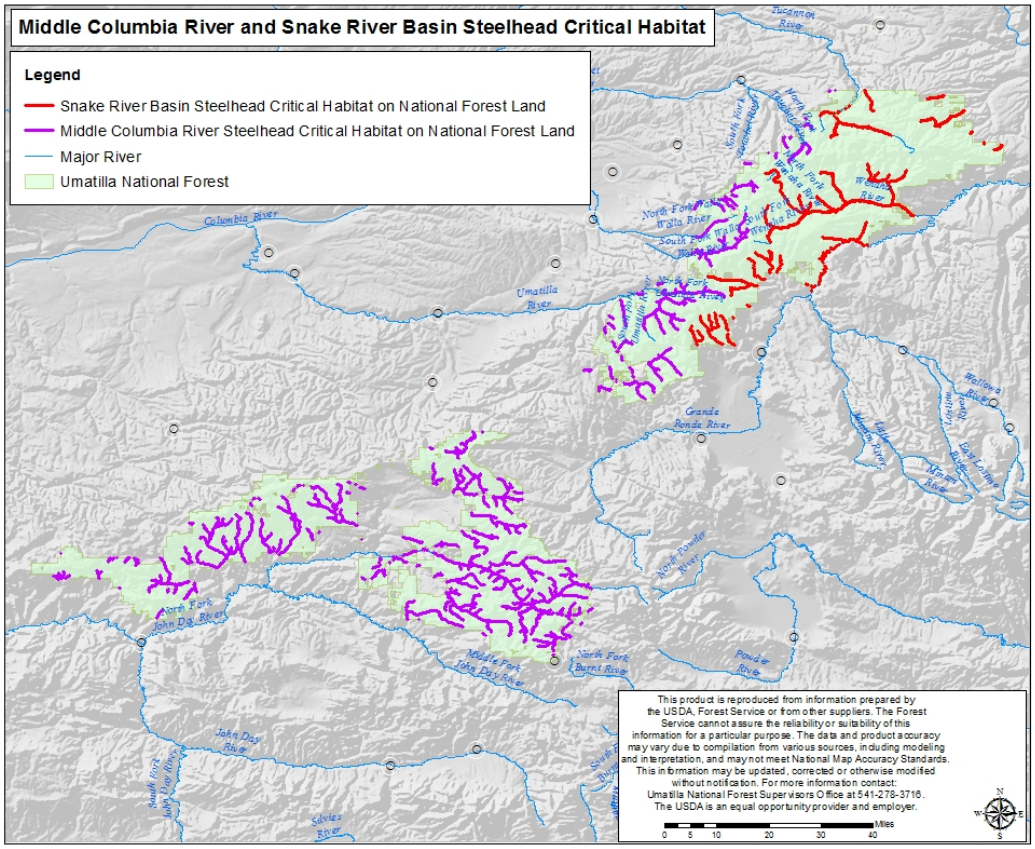

Figure 10: Mid-Columbia River and SRB Steelhead Critical Habitat Distribution on the Umatilla.

The Snake River Basin (SRB) steelhead DPS is comprised of five extant MPGs and one functionally extinct MPG. Two of the extant MPGs, Grande Ronde River and Lower Snake River, are represented in the analysis area (Table 6).

Table 6: Snake River Basin steelhead MPG status

MPG	Population	Current Risk Status
Lower Snake	Tucannon	Maintained/High Risk
Lower Snake	Asotin	Maintained/Moderate risk
Grande Ronde	Lower Mainstem Grande Ronde	Maintained/Moderate risk
Grande Ronde	Upper Mainstem Grande Ronde	Viable (tentative)/

The following are major habitat-related limiting factors for SRB steelhead for the Tucannon, Asotin, Lower Mainstem and Upper Mainstem Grande Ronde populations in the Lower Snake MPG (NMFS 2014b, 2016a): habitat quantity (including impacts of summer low flows), habitat diversity, elevated sediment in some watersheds, barriers in some watersheds, and elevated water temperatures (may not be limiting factors in all watersheds).

SPRING/SUMMER CHINOOK SALMON

Spring/summer chinook salmon are listed as ESA threatened in the SRB (Table 7) and are not listed on the ESA in the MCR. Hatchery stocks are produced in subbasins in the MCR and SRB regions. Spawning and rearing habitats for chinook and steelhead overlap within Umatilla boundaries, although steelhead distribution is more extensive in certain watersheds (Figure 11). See ARBA II for a description of the species life history.

Table 7: ESA listed spring/summer Chinook salmon distribution of habitat

Evolutionary Significant Units/Stocks	Habitat Miles
SRB spring/summer Chinook salmon distribution	46 miles
SRB spring/summer Chinook salmon Designated Critical Habitat	284 miles

MCR Spring Chinook salmon in the Umatilla basin are protected by the MSA. Habitat used by spring Chinook salmon consists of main rivers and major tributaries. These Chinook salmon populations are not listed under the Endangered Species Act.

The SRB spring/summer Chinook salmon ESU is comprised of five Major Population Groups (MPG), two of which are represented in the analysis area: Lower Snake River and Grande Ronde/Imnaha (NMFS 2011, NMFS 2016a). Risk status is presented in Table 8.

Table 8: Population's viability as of 2016 for SRB spring/summer chinook.

MPG	Subbasin	Population	Current Risk Status
Lower Snake	Tucannon	Tucannon	High Risk
Grande Ronde/Imnaha	Lower Main Grande Ronde	Wenaha	High Risk
Grande Ronde/Imnaha	Upper Grande Ronde	Upper Mainstem Grande Ronde	High Risk
Grande Ronde/Imnaha	Upper Grande Ronde	Lookingglass	Functionally extirpated

Two populations of SRB spring/summer chinook, the Tucannon River population and the Wenaha population in the Lower Grande Ronde subbasin, are found in the analysis area.

Managers of the Chinook salmon hatchery at the mouth of Lookingglass Creek, a major tributary to the Grande Ronde River, began allowing excess returning adult hatchery salmon to pass the hatchery diversion weir upstream into the upper watershed in recent years, allowing for limited amounts of natural reproduction in the drainage.

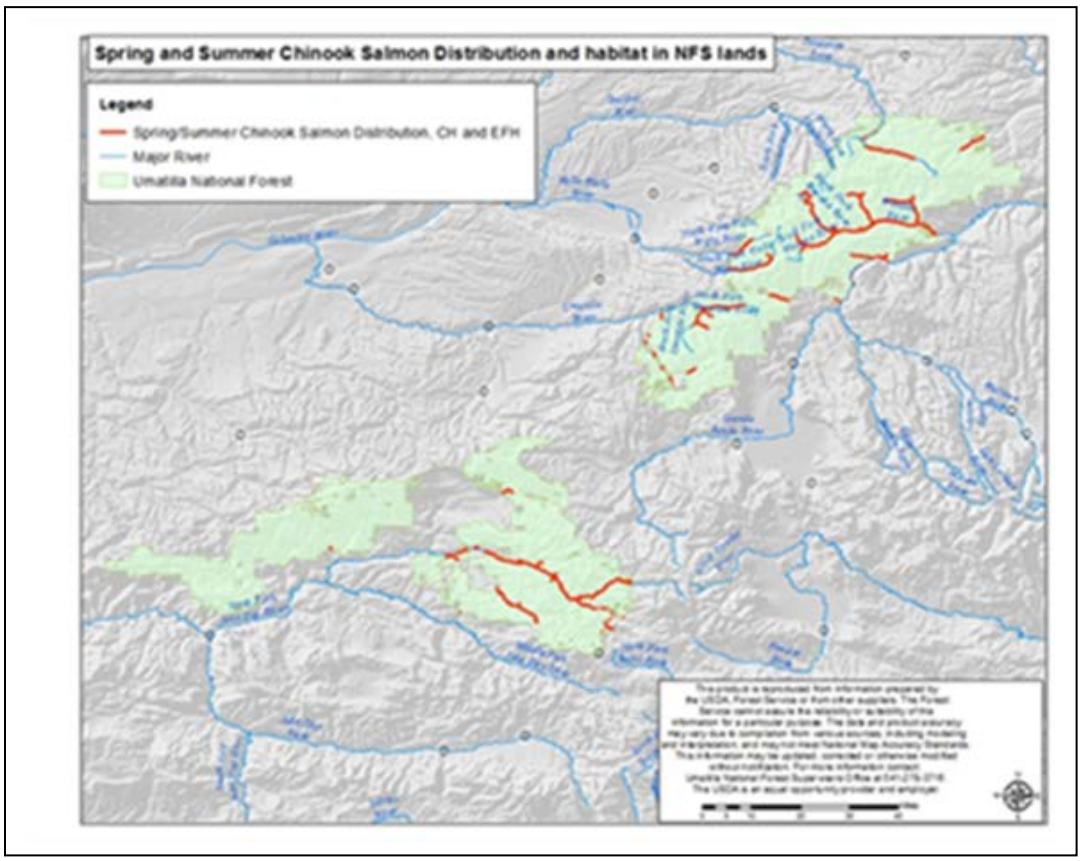

Figure 11: Chinook salmon distribution and habitat on the Umatilla National Forest.

Major habitat-related limiting factors for SRB spring/summer Chinook salmon in the Lower Snake MPG (NMFS 2011, NMFS 2017) and Grande-Ronde/Imnaha include loss of riparian trees, confinement of the floodplain and lack of channel meander, excessive fine sediments, reduced stream flows; lack of habitat quality and diversity and high summer water temperatures.

FALL CHINOOK SALMON

Critical Habitat has been designated for fall chinook salmon and is found adjacent and downstream of the Umatilla NF. Fall chinook CH is entirely encompassed by spring and summer chinook CH. For document readability, effects discussion to spring/summer chinook CH also applies to fall chinook CH.

BULL TROUT

Information on Bull trout ESA Recovery Unit by the FWS is found in Table 10. See ARBA II for additional bull trout life history.

Bull trout populations in the analysis area are found in Mid-Columbia Recovery Unit (FWS 2015). Six Recovery Unit core areas lie within or partially within the Umatilla National Forest. Those core areas are predominantly defined by subbasin boundaries (Table 9).

Designated critical habitat for Columbia River Bull trout on and adjacent to the Umatilla National Forest (Figure 12) consists of spawning and rearing tributaries, as well as main rivers used for foraging, migration and overwintering (FMO) habitat. On the Umatilla FMO habitat are relatively large streams and mainstem rivers where subadult and adult migratory bull trout forage, migrate, mature, or overwinter. This habitat is typically downstream from bull trout spawning and rearing habitat.

Table 9: Bull trout distribution and habitat on the Umatilla National Forest

Recovery Unit	Subbasin	Core Area	Number of local Populations	Spawning and rearing (UNF miles)
Lower Mid-Columbia	North Fork John Day	North Fork John Day River	7	42
	Umatilla	Umatilla River	1	8
	Walla Walla	Walla Walla River	3	37
		Touchet River	3	18
Lower Snake	Tucannon	Tucannon River	5	27
	Asotin	Asotin Creek	1	8
	Upper Grande Ronde	Lookingglass/Wenaha	4	57
	Lower Grande Ronde			
Middle Columbia Recovery Unit	UNF subbasins only	UNF core areas only	24	147

Declines in bull trout distribution and abundance are the results of combined effects of the following: habitat degradation and fragmentation, the blockage of migratory corridors, poor water quality, angler harvest and poaching, entrainment and introduced nonnative species. Some threats to bull trout are the continuing effects of past land management activities.

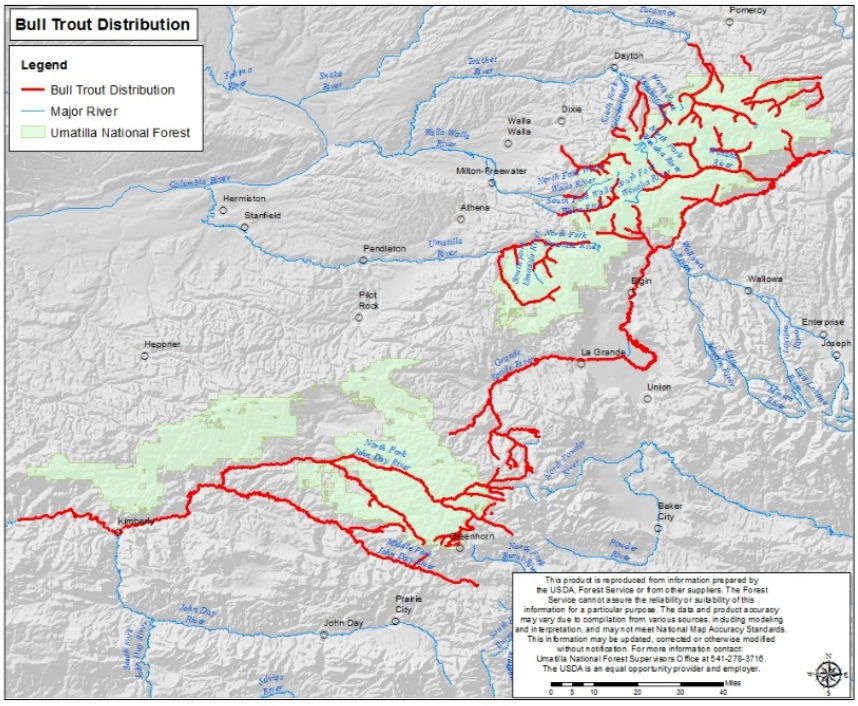

Figure 12: Columbia River bull trout distribution and DCH in and adjacent to the Umatilla National Forest. DCH overlaps with bull trout distribution.

REDBAND TROUT – RFSSL AND MIS

Redband trout are currently on the Region 6 USFS regional forester's sensitive species list (RFSSL), and are also considered a MIS species on the Umatilla National Forest. Management Indicator Species (MIS) are defined in the Umatilla Forest Plan as "A species selected because its welfare is presumed to be an indicator of the welfare of other species using the same habitat…" Habitat conditions in the forest are managed for MIS species. On the Umatilla the aquatic MIS are Middle Columbia River steelhead *Oncorhynchus mykiss* and the resident life history of *O. mykiss* redband trout.

Redband are a resident form of steelhead trout, and exhibits habitat preferences similar to those for steelhead. Redband trout may migrate within river systems, but do not migrate to the ocean. Redband populations are often found above barriers to steelhead migration (

Figure 10).

Redband trout populations are widely distributed in streams within the Umatilla National Forest. Because steelhead and redband trout are the same species expressing two different life histories, redband trout are presumed present in smaller numbers wherever adult steelhead occupy habitat. Redband are known to extend their distributions upstream into small, colder headwater tributaries at higher elevations or barriers to adult steelhead (Carmichael 2007).

Magnuson-Stevens Fishery Conservation and Management Act

Magnuson-Stevens Fishery Conservation and Management Act (MSA revised 2014) was established for stocks managed under a Federal Fishery Management Plan with protections for Essential Fish Habitat. On the Umatilla this includes Chinook salmon habitat found in the Umatilla and Tucannon River and Lookingglass Creek. Consultation and coordination under MSA for EFH is consolidated with ESA processes to avoid duplication and improve efficiency. MSA was addressed in ARBA II, which is available for viewing in the project record. Analysis will not be repeated here.

Table 10 presents a summary of all aquatic species listed under the Endangered Species Act found in the project area and included in this assessment.

Table 10: Federal ESA fish listing, critical habitat and listing dates.

Species	Federal Status	Date Listed or confirmed	Critical Habitat	Recovery Plan	Ecologically Significant Unit (ESU) or Distinct Population Segment (DPS)
Steelhead *O. mykiss*	Threatened	1999; 2006	Designated 2005	Final 2009	Middle Columbia River[6]
Steelhead *O. mykiss*	Threatened	1997; 2006	Designated 2005	2016	Snake River Basin
Chinook salmon *O. tyshawytscha*	Threatened	1992; 2005	Designated 1999	2016	Snake River Spring/ Summer runs
Chinook salmon *O. tyshawytscha*	Threatened	1992; 2005	Designated 1993	2016	Snake River Fall runs (not found on UNF but present downstream in Grande Ronde/Snake River)
Bull Trout *Salvelinus confluentus*	Threatened	1998	Designated 2010	Final 1999; Revised 2015	Columbia River

Regional Forester's Special Status Species

A number of Regional Forester sensitive invertebrate and aquatic vertebrate species[7] are known or suspected on the Umatilla National Forest, and their known or suspected presence across the Umatilla are described below. Location information is summarized in Table 11. Extensive life history information for each species is found in Fact Sheets on file on the Umatilla NF.

WESTSLOPE CUTTHROAT TROUT

Westslope cutthroat trout are on the Region 6 Regional Forester special status sensitive species list (USDA FS 2015). They have a relatively localized distribution within the analysis in the North Fork John Day River.

Westslope cutthroat trout are found in small mountain streams, main rivers, and large natural lakes. Westslope cutthroat trout requires cool, clean, well-oxygenated water. In rivers, adults prefer large pools and slow velocity areas and often occurs near shore in lakes. Juveniles of migratory populations may spend 1-4 years in their natal streams, then move (usually in spring or early summer, and/or in fall in some systems) to a main river or lake where they remain until they spawn. Many fry disperse downstream after emergence. Juveniles tend to overwinter in interstitial spaces in the substrate. Larger individuals congregate in pools in winter.

Westslope cutthroat habitat is characterized as a zone of habitat with qualities intermediate between the steelhead and bull trout habitat preferences described above. That intermediate habitat zone is available and used by westslope cutthroat and steelhead-cutthroat hybrids in the upper North Fork John Day River and a handful of high-elevation tributaries in the Granite Creek and Desolation Creek watersheds.

[6] Also designated Management Indicator Species as resident form O. mykiss Redband Trout SRB and MCR

[7] Conclusions from the analysis for fishes will be used to qualitatively estimate effects for invertebrates since the aquatic species utilize the same habitat, and detailed distribution and habitat requirements are not well known for the invertebrates.

PACIFIC LAMPREY

Lampreys belong to a primitive group of fishes, eel-like in form and without the jaws and paired fins of true fishes. Pacfic lamprey spawn in habitat similar to salmon, in gravel bottom streams above the habitat suitable for young larvae (ammocoetes). Pacific lamprey may live 2 -7 years in fine substrates where they burrow and filter feed before emigration to the ocean. Pacific lamprey are widely distributed and documented in numerous locations across the Umatilla (FWS fact sheet on file).

SHORTFACE LANX

Fisherola nuttalli is a small pulmonate (lunged) snail in the family Lymnaeidae. It inhabits cold, unpolluted, medium to large streams with fast-flowing, well-oxygenated water and cobble/boulder substrate, and is generally found at the edges of rapids. It was historically present throughout much of the Columbia River drainage in Washington, Montana, Oregon, Idaho, and British Columbia, but most populations were extirpated due to habitat loss resulting from dams, impoundments, water removal, and pollution. Currently, large populations of F. nuttalli persist in only four streams: the lower Deschutes River in Oregon; the Okanogan River and the Hanford Reach of the Columbia River in Washington; and the Snake River in Oregon and Idaho. Shortface lanx have not been documented on the Umatilla, but are suspected to, or could occur within the analysis boundary and are therefore considered in this analysis.

COLUMBIA CLUBTAIL

The Columbia clubtail is a member of the Anisoptera sub-order, which includes all North American dragonflies. Nymphs will burrow into the silt or mud, leaving only their head and tail-end exposed. The streams that provide suitable habitat for Columbia clubtail are threatened by continued water drainage and diversion for irrigation and development purposes, as well as stormwater run-off containing pesticides. Oregon sightings of Columbia clubtail include locations along the John Day River (PacificBio 2013). Columbia clubtail have not been documented on the Umatilla, but are suspected to, or could occur within the analysis boundary and are therefore considered in this analysis.

WESTERN RIDGED MUSSEL

The western ridged mussel (*Gonidea angulata*) is widely distributed from southern British Columbia to southern California, and can be found east to Idaho and Nevada. *G. angulata* inhabits cold creeks and streams from low to mid-elevations. Little is known about the fish species that serve as hosts for this mussel throughout other parts of its range. *Gonidea. angulata* is sedentary as an adult and probably lives for 20-30 years, and thus can be an important indicator of habitat quality. *G. angulata* is a filter feeder that consumes plankton and other suspended solids, nutrients and contaminants from the water column. Western ridged mussels have been documented in the Middle Fork and North Fork John Day River drainages, the Umatilla River drainage and the Walla Walla River drainage (Jepsen et al. 2012).

PRISTINE SPRINGSNAIL

Habitats supporting this snail tend to be small cold springs or seeps which are in a pristine condition and contain coarse gravel/cobble substrate, or in larger springs or areas of small streams which are affected by springs. Plants commonly found in association with the species include *Rorippa*, *Mimulus* and bryophytes. Sites tend to occur at low-medium elevation and are in semiarid sage scrub. Colonies are scattered through the Colombia and Snake River basins into western Idaho.

Table 11: Regional Forester's Special Status Sensitive Species List – July 2015

Common Name And Species	Status	UMA Forest	Ranger District (Documented (D) or Suspected (S))					Nearest Documented locations
			NFJD (OR)	Heppner (OR)	Walla Walla (OR)	Walla Walla (WA)	Pomeroy (WA)	
Forest Wide								
Columbia Clubtail ***Gomphus lynnae***	SEN	S	S	S	S	S	S	John Day River (Grant/Wheeler); Spokane BLM
Pacific Lamprey ***Entosphenus tridentatus***	SEN	D	D	D	D	D	D	Multiple Locations on UNF
Inland Columbia Basin redband trout ***Oncorhynchus m. gairdneri***	SEN	D	D	D	D	D	D	Multiple Locations on UNF
Oregon Only								
Western Ridge Mussel ***Gonidea angulata***	OR-SEN	D	D	D	D			Uma River, Ryan, Thomas; NF/MF John Day River; Birch, Butter McKay
Shortface Lanx ***Fisherola nuttalli***	OR-SEN	S			S			Grande Ronde R. in Washington 3 sites,
Westslope cutthroat trout ***Oncorhynchus clarkii lewisi***	OR-SEN	D	D					Granite and Desolation Watersheds
Washington Only								
Pristine Springsnail ***Pristinicola hemphilli***	WA-SEN	D				S	D	Tucannon River

Umatilla MPI Watershed Summary Ratings

The MPI used to assess conditions at a watershed scale. For the Aquatic Restoration EA the MPI was used to evaluate an aggregated summary of baseline conditions for subbasins within the Umatilla National Forest and is presented in Table 12 (original table from draft Blue Mt. Forest Plan Revision 2017, copy on file at Umatilla NF Pendleton, OR). The MPI crosswalks with the WCF; the WCF categories of "properly functioning", "functioning-at-risk", or "impaired function" descriptions are equivalent to "functioning appropriately", "functioning-at-risk" and "functioning at unacceptable risk" categories MPI. Ratings are for non-wilderness portions of these subbasins only. The wilderness portions are all considered to be functioning appropriately.

Table 12: Summary of Baseline Conditions for all Subbasins within the Umatilla NF.

Subbasin	Pathway						
4th level HUC and Name	Water quality	Habitat Access	Channel conditions and dynamics	Flow/ Hydrology	Integration of species and habitat conditions	Population Characteristics (for bull trout only)	Watershed conditions
17060103 Lower Snake-Asotin	FR	FR	FR	FR	FR	FUR	FR
17060106 Lower Grande Ronde	FR	FUR	FR	FR	FR	FUR	FR
17060107 Lower Snake-Tucannon	FR	FR	FR	FR	FR	FR	FR
17070102 Walla Walla	FA	FR	FR	FA	FR	FR	FR
17070103 Umatilla	FUR	FR	FUR	FUR	FUR	FUR	FUR
17070202 North Fork John Day	FR	FR	FR	FA	FR	FA	FR
17070203 Middle Fork John Day	FUR	FUR	FR	FUR	FUR	FUR	FR

FR = functioning at risk; FA = functioning appropriately; FUR = functioning at an unacceptable risk

3.2.5 Alternative 1 – Environmental Effects - Aquatic Resources

Alternative 1 - Direct and Indirect Effects

The no-action alternative (Alternative 1) is required by NEPA (36 CFR 220) to provide a baseline for comparison of effects of action alternatives. If no action were selected for this project, federal and non-federal actions are likely to continue affecting water quality, water quantity and listed fish habitat and individual aquatic species. Existing watershed degradation and associated loss of habitat would continue to maintain degraded baseline conditions that would continue to stress fish populations in most subbasins.

This alternative would continue current management, which includes a mix of protection strategies and ongoing watershed and vegetation management. Watershed and aquatic restoration would proceed at current levels, though watershed restoration is not the primary focus of forest plan direction as amended by PACFISH.

Current management direction includes forest and regional strategies for watershed protection and passive restoration. The emphasis on watershed protection and restoration would be less than it would be for the action alternative. Under Alternative 1, watershed conditions would be maintained or improved at current rates. Restoration would occur at a slower rate (fewer watersheds in improving condition) compared to

the action alternative and its accelerated restoration levels (amount and intensity of projects would be more). Although the Umatilla would continue to implement the current aquatic restoration program, Alternative 1 would limit the opportunities for the aquatic restoration program to be integrated into the Umatilla's upland restoration. The Umatilla would also not be prepared to take advantage of many of the funding opportunities currently available to implement essential watershed restoration projects that would aid in the recovery of TES species and habitat and put watersheds back on an improving trajectory.

The level of risk associated with watershed conditions, species and habitats would be higher with this alternative since the amount and intensity of aquatic restoration would be less. Furthermore, bull trout would also be at a higher risk of extirpation (climate change, low viability, degraded baseline conditions, threats from brook trout hybridization and competitions) as it is assumed that less aquatic restoration would occur with the Alternative 1. Similar impacts would affect other ESA listed species including steelhead. Some examples are below and there would be similar outcomes by not implementing other restoration categories.

Not implementing any management activities addressed in the proposed action, including non-commercial thinning in conjunction with juniper removal and prescribed burning, could potentially lead to degredation within subwatersheds compared to current conditions. This is due to increasing high canopy densities; juniper encroachment; and lack of fire, which result in decreased shrub and grass density decreasing soil cover and infiltration rates. Decreased soil cover and infiltration rates often result in increased overland flow and soil erosion. Therefore, there is a potential decrease of stream flow during dry summer months due to unusually high amounts of water that are lost to overland flow and/or evapotranspiration due to high canopy densities and encroaching juniper. If current conditions degrade in upland areas, then habitat for aquatic species could also degrade, not meeting the need of protection and improvement of aquatic and terrestrial habitat. Furthermore, perpetuating unusually high stand densities increases the probability for catastrophic fire. A catastrophic fire has the potential to decimate aquatic resources by leaving no shade adjacent to the streams (increased stream temps), and denuding subwatersheds of vegetation thereby leaving exposed soils (increased sediment in streams).

By not decommissioning closed roads, the drainage network of a stream significantly increases. Roads directly affect the channel morphology of streams by accelerating erosion and sediment delivery and by increasing the magnitude of peak flow. Indirectly, if conditions degrade then habitat for aquatic species will also degrade. The more roads and stream crossings there are, the higher the probability of sediments delivery to streams, negatively affecting the hydrologic function. In addition, roads affect the hydrograph and drainage density, increasing peak flows and decreasing low flows. This alternative does not meet the need for protection and improvement of aquatic habitat.

By implementing fewer management activities addressed in the proposed action there is potential for the current conditions to degrade. Riparian vegetation, bank stability and therefore stream type could degrade because of high tree and road densities. Riparian vegetation would reflect conditions that are suited towards a dryer climate such as grasses and sage. Grass and sage species have less root mass than riparian species and therefore do not have the ability to stabilize the incised streambanks.

Consequently, Alternative 1 would have short and long-term moderately negative impacts to the aquatic habitat and aquatic species. Impacts would vary by subwatershed, and be of greater magnitude in those with multiple low function indicators, or where past actions and catastrophic fire have occurred. If current conditions degrade, then habitat for aquatic species will also degrade.

Alternative 1 – Cumulative Effects

By selecting the Alternative 1 there is a potential to have long-term negative impacts to aquatic resources in comparison to the action alternative. (See Alternative 1 Direct and Indirect) However, there are no

significant direct or indirect effects expected. Overall, the Umatilla will continue to be managed under the Forest Plan as amended by PACFISH, which will include some aquatic restoration management and protection. The No Action, in combination with ongoing management actions under the plan, will have slight positive cumulative impacts to Watershed and Fisheries resource indicators.

3.2.6 Alternative 2 – Environmental Effects - Aquatic Resources

The majority of the effects and indicator descriptions that follow were taken directly from the Region 6 ARBA II. The effects of restoration activities are described in context of the Matrix of Pathways and Indicators (MPI) developed by FWS (1999) and NOAA Fisheries (1996).

Alternative 2 - Direct and Indirect Effects

This alternative would allow acceleration of aquatic restoration across the Umatilla. It would also facilitate increased integration with the Umatilla's upland restoration program. The Umatilla would also be better prepared to take advantage of many of the funding opportunities currently available for essential watershed restoration projects. These projects would aid in the recovery of TES species and habitat and put watersheds back on an improving trajectory.

Each of the aquatic restoration categories listed within the proposed action may have varying degrees of direct and indirect effects to aquatic Endangered Species Act-listed species and their critical habitat and essential fish habitat as well as to Forest sensitive and management indicator species. Effects of most concern under this analysis are those resulting from short-term habitat removal or degradation or impacts that cause changes to species' growth, reproduction, and survival. The aquatic conservation measures and project design criteria are intended to minimize potential adverse direct and indirect project effects to Endangered Species Act/Magnuson-Stevens Act listed species, critical habitat, and essential fish habitat, sensitive species and management indicator species. Each action will be carefully designed and constrained by comprehensive design criteria and BMPs such that the proposed activities will have short-term, localized minor effects. Long-term, these actions will contribute to reducing many of the factors limiting the recovery of these species, particularly those factors related to fish passage, degraded floodplain connectivity, reduced aquatic habit complexity, and riparian conditions, and improve the currently degraded environmental baseline, particularly at the site scale (ARBO II).

EFFECTS OF THE PROPOSED ACTION ON THE RESOURCE INDICATORS

The following discussion presents the effects of the proposed activities on individual indicators and were taken directly from ARBO II pages 220 to 238. All of these actions may result in some degree of short-term adverse effects to fish or their habitat.

WATER QUALITY PATHWAY

Indicator Description

The description of the following three pathway indicators provides the ways in which they serve as essential ecological functions necessary for the overall viability of fish stocks: Water Temperature, Sediment/Turbidity, and Chemical Contamination/Nutrients.

Water Temperature

Water temperatures affect the survival and production of fish throughout all life stages. For instance, a study of Chinook salmon survival from fertilization to hatching demonstrated that those eggs incubated at 15.0˚C had a 23% survival rate while those incubated at 9.9 and 11.4˚C had a 49 and 50% survival rate, respectively (Garling and Masterson 1985). In Chum salmon, embryo survival was demonstrated to be highest at 11˚C (Murry and McPhail 1988), hatching success of rainbow trout reaches its maximum at 10-12˚C (McCullough 1999), and preferred temperatures for bull trout ranges are 2-4˚C (McPhail and Murray 1979). Next, changing water temperatures affect juvenile fish. Cairns et al. (2005) documented

that increased temperatures in an Oregon stream resulted in higher neacus-type trematode infestations of juvenile salmonids. Further, juvenile (fry, fingerling, parr) Chinook demonstrate optimum growth between 10.0-15.6˚C (Armour 1990), while growth drastically declines or ceases at 19.1˚C (Armour 1990) and is accompanied by decreased feeding, increased stress, and warm water diseases. Juvenile bull trout are usually found in water temperatures below 12˚C (Goetz 1994). Finally, at a certain point, temperatures become lethal for all fish. McCullough (1999), citing numerous studies, stated that temperatures above 21˚C equal or exceed incipient lethal temperatures for Columbia River Chinook stocks and steelhead stocks migrating during the summer season. The best bull trout habitat in Oregon streams seldom exceeded 15˚C (Buckman et al. 1992; Ratliff 1992; Ziller 1992). Modoc suckers are typically found in streams with relatively cool (59-72° F) summer temperatures (Moyle 2002), and the Warner sucker spawns most frequently when stream temperatures range between 14-20˚C (USDI 1998c)

Turbidity

Increased levels of sedimentation often have adverse effects on fish habitats and riparian ecosystems. Fine sediment deposited in spawning gravels can reduce egg survival and developing alevins (Everest et al. 1987; Hicks et al. 1991) by reducing the availability of dissolved oxygen in the gravel. Primary production, benthic invertebrate abundance, and thus, food availability for fish may be reduced as sediment levels increase (Cordone and Kelley 1961; Loyd et al. 1987) due to reductions in photosynthesis within murky waters. Social (Berg and Northcoate 1985) and feeding behavior (Noggle 1978) can be disrupted by increased levels of suspended sediment. Pools, which are an essential habitat type, can be filled by sediment and degraded or lost (Kelsey et al. 1981; Megahan 1982). Robichaud et al. (2010) documented that sediment influxes into streams, which create turbidity, were lower in natural (undisturbed) forests relative to disturbed sites created by land management activities. Reeves et al. (1995) describe that sediment influxes and resulting turbidity occurs through naturally occurring landslides in western Oregon.

Chemical Contamination/Nutrients

Aquatic ecosystem perturbations related to chemical contamination include thermal pollution, toxicity due to organic compounds and heavy metals, organic wastes and resulting changes in dissolved oxygen, acidification, and increased eutrophication. Sources of these chemical inputs commonly result from industry, urban development and agriculture. It is clear from the growing body of literature that salmon may influence the food webs, trophic structure, nutrient budgets, and possibly the productivity of freshwater and terrestrial systems, although the effect varies widely between systems and is contingent upon timing, scale, retention mechanisms, alternative nutrient sources, and baseline limiting factors (Gende et al. 2002). Reduced inputs of salmon-derived organic matter and nutrients (SDN) may limit freshwater production and thus establish a negative feedback loop affecting future generations of fish. Restoration efforts use the rationale of declining SDN to justify artificial nutrient additions, with the goal of reversing salmon decline. Biological responses to this method have also been documented (Roni et al. 2002). Elevated primary production and density of invertebrates have been associated with carcass additions (Wipfli et al. 1999). Kohler et al. (2012) documented that invertebrate productivity and fish growth increased after a carcass analog treatments in several Columbia River Basin streams. While evidence suggests that fish and wildlife may benefit from increases in food availability as a result of carcass additions, stream ecosystems vary in their ability to use nutrients to benefit salmon. Moreover, the practice may introduce excess nutrients, disease, and toxic substances to streams that may already exceed proposed water quality standards (Compton 2006).

Long-term Benefits of the Proposed Action to the Water Quality Pathway

The ARBA II Team (BLM, FS, BIA, FWS, NMFS) determined that numerous ARBA II activity categories will provide immediate and long-term benefits to Water Quality conditions: Large Wood, Boulder, and Gravel Placement; Dam, Tidegate, and Legacy Structure Removal; Channel

Reconstruction/Relocation; Off- and Side-Channel Habitat Restoration; Streambank Restoration; Set-back or Removal of Existing Berms, Dikes, and Levees; Reduction/Relocation of Recreation Impacts; Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering; Piling and other Structure Removal; Road and Trail Erosion Control and Decommissioning. Other ARBA II activity categories may not provide immediate benefits but will provide long-term benefits to Water Quality conditions: Juniper Removal; Riparian Vegetation Treatment (controlled burning); Riparian Vegetative Planting; Beaver Habitat Restoration.

In general, the aquatic restoration categories listed above will improve or restore one or more of the following: stream structure/complexity, stream sinuosity and length, bank stability, floodplain connectivity, and riparian vegetation structure and diversity. Such results will promote conditions that maintain or decrease stream temperature (via increased shading and hyporheic flow), reduce turbidity (via stable banks, improved sediment retention through increased channel structure, riparian areas, and floodplains), and improved nutrient input (via increased riparian allocthonous sources) and retention (via increased channel structure, sinuosity, and floodplain areas).

Short-term Negative Impacts of the proposed activities to the Water Quality Pathway

As described above, ARBA II activity categories are expected to benefit the Water Quality Pathway. In acquiring these benefits, short-term negative impacts are expected. Such effects will be minimized by incorporating Aquatic Conservation Measures (ACM) and Project Design Criteria (PDC) described above and can also be found ARBA II in Chapter II; project design, implementation, and monitoring.

The ARBA II Team determined that all activity categories (except Fisheries and Hydrology, Geomorphology Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration categories) are known to increase short-term sediment loads into a stream channel during project implementation. Increased sediment loads would result from the use of large equipment within or near a stream channel and soil exposure through controlled burning, causing soil disturbance and transport within the stream system. The ARBA II Team also concluded that these activities are unlikely to have negative impacts to stream temperatures because only minimal amounts of vegetation will be removed. For instance, Riparian and Upland Juniper Treatment (non-commercial), and Riparian Vegetation Treatment (controlled burning) will result in reduced shade on a limited basis and in such a manner as to have discountable impacts to water temperature; these impacts will be ameliorated through growth of desired riparian vegetation. Further, the ARBA II team determined that the General Aquatic Conservation Measures will minimize or prevent chemical contamination to action area waters. Therefore the following analysis will focus on activity impacts to the Turbidity Indicator.

Short-term inputs of sediment could result from instream structure placement, opening of side channels, road treatments, and other projects that occur inside the bankfull channel. Other sources of sediment will arise from disturbed and exposed ground adjacent to stream channels created by heavy equipment use and moderate-severity controlled burns. The sediment plume will be most concentrated in the immediate project vicinity and should dissipate within a few hours. The amount, extent, and duration of fine sediment inputs and turbidity are related to the following: type and duration of heavy machinery used in or near a bankfull channel; soil type; the amount of soil disturbance; the sensitivity of the channel banks to erosion and other disturbances; the amount of time it takes for disturbed areas to re-vegetate and stabilize; and the probability of precipitation events before disturbed areas are re-vegetated or stabilized.

The increased stream turbidity may deposit fine coats of sediment on channel substrate a short distance downstream, encourage fish to move downstream, and alter fish behavior patterns for a short time. Because the work will be conducted during the in-water work periods (a time when spawning is not expected and after emergence of fry), the project should not interfere with spawning, egg development,

and the sac fry life stage. In cases of fall-spawning fish, the fine layer of sediment deposited on channel substrate will be cleared away as the fish construct redds. It is anticipated that all project related sediment will be flushed out during the first fall/winter/spring high flows after project completion, and site restoration conservation measures are expected to prevent future project related sediment inputs into the stream. Therefore, long-term impacts to turbidity and spawning gravels are not expected.

HABITAT ACCESS PATHWAY

Indicator Description

The description of the following pathway indicator provides the ways in which it serves as an essential ecological function necessary for the overall viability of fish stocks: Physical Barrier.

Physical Barriers

Human constructed physical barriers within the stream channel, such as culverts, headcuts, irrigation weirs, and dams can impair sediment and debris transport, migration routes, life history patterns, and population viability. First and second order streams, which generally include permanently flowing non-fish bearing streams and seasonally flowing or intermittent streams, often comprise over 70 percent of the cumulative channel length in mountain watersheds in the Pacific Northwest (Benda et al. 1992). These streams are the sources of water, nutrients, wood, and other vegetative material for streams inhabited by fish and other aquatic organisms (Swanson et al. 1982; Benda and Zhanag 1990). Decoupling the stream network (through physical barriers) can result in the disruption and loss of functions and processes necessary for creating and maintaining fish habitat. Further, physical barriers prevent the movement of fish in their fulfillment of life history functions. Culverts, for instance, prevent juvenile fish from reaching rearing habitats (Furniss et al. 1991) and have blocked significant amounts of historical anadromous salmonid habitat (Roni et al. 2002; Sheer and Steel 2006). Even more, barriers restrict the expression of various life history forms within a species. Migratory movements of fluvial or adfluvial forms of bull trout, for example, can be restricted or prevented, and such a loss of life history forms restricts the full potential of fish production. Finally, strong populations rely on unimpeded access between watershed reserves, those areas of high quality habitat occupied by viable subpopulations, for dispersion and genetic interchange (Noss et al. 1997).

Long-term Benefits of ARBA II Activities to the Habitat Access Pathway

Two ARBA II activity categories, both of which contain subcategories, will restore fish passage into previously occupied habitat for all life stages of native fish. The Fish Passage Restoration category contains four sub-categories: Fish Passage Culvert and Bridge Projects; Headcut Stabilization and Associated Fish Passage; Fish Ladders; Irrigation Diversion Replacement/Relocation & Screen Installation/Replacement. The Dam, Tidegate, and Legacy Structure Removal category contains two subcategories that will target fish passage restoration: Dam and Tidegate removal. The resulting benefits include uninhibited stream access for migrating and rearing fish, restored or improved continuous paths for wood, nutrients, sediments, and other vegetative material essential for quality fish habitat.

Short-term Negative Impacts of ARBA II Activities to the Habitat Access Pathway

As described above, ARBA II activity categories are expected to benefit Habitat Access. In acquiring this benefit, short-term negative impacts are expected. Such effects will be minimized by incorporating Aquatic Conservation Measures (ACM) and Project Design Criteria (PDC) described above and can also be found in the Aquatic Restoration Biological Assessment II (January 28, 2013) in Chapter II; project design, implementation, and monitoring.

The ARBA II Team determined that the aforementioned activities described above may temporarily restrict habitat access during project implementation. Coffer dams and water bypass systems associated with these activities may temporarily block (few weeks) fish movement up and/or downstream through

the construction area. Up and downstream fish movement will be permitted with ditch bypass systems, downstream fish movement is provided with plastic-culvert bypass structures, and no fish movement is provided with pump bypass systems. Because road crossings, dams, irrigation diversions, tidegates, and headcuts to be repaired serve as existing fish-passage barriers, coffer dams and diversion structures may not be any more of a barrier than the pre-restoration baseline. The remaining activity types are not expected to result in barriers to fish movement during any life stages and will therefore have no negative impacts to this indicator.

HABITAT ELEMENTS PATHWAY

Indicator Description

Descriptions of the following five indicators provide the ways in which each indicator serves as an essential ecological function necessary for the overall viability of fish stocks: Substrate/Sediment; Large Wood; Pool Frequency and Quality; Off-channel Habitat; Refugia.

Substrate/Sediment (excerpts from Rieman and McIntyre 1993)

This indicator is similar to "Sediment" in that it addresses fines and their effects on fish habitat. Unlike "Sediment," which addresses spawning and incubation, the substrate indicator assesses fines and their effects on rearing habitat within channel substrate. The NMFS (1996) notes that rearing capacity of salmon habitat decreases as cobble embeddedness levels increase, resulting from increased sedimentation. Furthermore, over wintering rearing habitat within substrate may be a limiting factor to fish production and survival, and the loss of this over wintering habitat may result in increased levels of mortality during rearing life stages. Likewise, when the percent of fine sediments in the substrate was relatively high, rearing bull trout were also less abundant.

Large Wood (LW)

Large wood in streams is an important roughness element influencing channel morphology, sediment distribution, and water routing (Swanson and Lienkaemper 1978; Bisson et al. 1987). Common sources of large wood include falling of dead trees, wind-throw and breakage, and landslides (Johnston et al. 2011). Latterell and Naiman (2007) observed that the primary source of in-stream wood on the Queets River in Washington was from channel meandering and bank erosion through riparian areas. Large wood influences channel gradient by creating step pools and dissipating energy (Heede 1985), lengthens streams by increasing sinuosity (Swanston 1991), and serves as an important agent in pool formation (Montgomery et al.1995; Reeves et al. 2011). In low order streams, in particular, LW collects sediment and larger substrates during high flow events (Keller et al. 1985) and can account for 50% of the sediment/substrate storage sites (Megahan 1982). Further, LW is instrumental in nutrient retention by capturing and storing salmon carcasses (Cederholm and Peterson 1985; Strobel et al. 2009) and allochthonous materials, a primary energy source for smaller rivers and streams (Gregory et al. 1991). The resulting effect of LW on fish habitat is significant. Crispin et al. (1993) noted increased salmon spawning activity in an area where gravels accumulated behind LW. Bjornn and Reiser (1991) cited several studies that documented an increase in fish densities with higher levels of LW, and Fausch and Northcote (1992) documented that Coho salmon and cutthroat trout production was greater in LW-dominated streams, where pools, sinuosity, and overhead cover were greatest. The role of LW decreases as streams become larger, because greater currents will carry LW out of the active channel and onto the banks (Murphy and Meehan 1991).

Pool Frequency and Quality

Pools are considered to be one of the most important habitat elements and are the preferred habitat type by most fish (Bestcha and Platts 1986), offering low velocity refuges, cooler stream temperatures during summer months, and overwintering habitat (Reeves et al. 1991). Salmonid density is positively correlated to pool volume and frequency; pool loss reduces the production capability of salmonid habitat (Everest et

al. 1985; Sedell and Everest 1990; MacDonald et al. 1991; Nickelson et al. 1992a; Fausch and Northcote 1992; Reeves et al. 2011).

Availability of pools during summer low flow periods can be a limiting factor in survival and production of salmonids (Reeves et al., 1990). In reference to spawning, pool tailouts, where gravel is deposited, are important areas for redd construction, and the pool bodies provide rearing habitat for juveniles and holding habitat for adults (Bjornn and Reiser 1991). Further, Sedell et al. (1990) describes pools as being important refuges from drought, fire, winter icing, and other disturbances. When pool numbers, volume, depth, and complexity increase, the stream's capacity to support a diversity of species and life stages increases (Bisson et al. 1992; Bjornn and Reiser 1991). In general, pool quality is directly related to decreased surface area and increased depth, overhead cover (Fausch and Northcote 1992), presence of LW, and undercut banks, especially in lower gradient streams. Further, pools of all shapes and sizes are needed to accommodate the various life history stages of fish, thereby allowing for juveniles to occupy pools absent of larger predatory fish (Bestcha and Platts 1986).

Off-channel Habitat

Off-channel habitats—comprised of alcoves, side channels, freshwater sloughs, wetlands or other seasonally or permanently flooded areas—are important rearing sites for juvenile fish (Roni et al. 2002). Roni et al. (2002) noted that most off channel habitat research focused on coho salmon, noting that juveniles are much more reliant on this habitat type for over-winter rearing and growth than other salmonids, such as cutthroat trout and Chinook salmon. In an Oregon coastal stream, Reeves et al. (2011) noted that side channels comprised 5% of the total habitat but contained 20-60% of the coho fry in the study area.

Refugia

Refugia, or designated areas providing high quality habitat, either currently or in the future, are a cornerstone of most species conservation strategies. Although fragmented areas of suitable habitat may be important, Moyle and Sato (1991) argue that to recover aquatic species, refugia should be focused at a watershed scale. Naiman et al. (1992) and Sheldon (1998) noted that past attempts to recover fish populations were unsuccessful because the problem was not approached from a watershed perspective. Noss et al. (1997) provides additional information, listing several principals that should be considered when evaluating reserves (refugia). First, refugia should be well distributed across a landscape, the idea being that widely distributed subpopulations will not experience catastrophic or adverse impacts across its entire range. Some subpopulations will escape the impact, eventually re-colonize the affected area, and sustain the population as a whole. Second, large reserves are better than small ones, because there is a greater opportunity for habitat diversity and larger population size. As a result, genetic variability within a population will be optimized, promoting increased adaptability to environmental change. Thirdly, refugia that are closer together are better than those farther apart. A short distance between refugia promotes dispersion and genetic interchange. If enough interchange occurs between refugia, fish are functionally united into a larger population that can better avoid extinction.

Long-term Benefits of ARBA II Activities to the Habitat Elements Pathway

The following activity categories will provide immediate and long-term benefits to one or more of the Habitat Element indicators: Fish Passage Restoration; Large Wood, Boulder, and Gravel Placement; Dam, Tidegate, and Legacy Structure Removal; Channel Reconstruction/Relocation; Streambank Restoration; Set-back or Removal of Existing Berms, Dikes, and Levees; Reduction/Relocation of Recreation Impacts; Piling and other Structure Removal; Road and Trail Erosion Control and Decommissioning. Other ARBA II activity categories may not provide immediate benefits but will provide long-term benefits: Juniper Removal; Riparian Vegetation Treatment (controlled burning); Riparian Vegetative Planting; Beaver Habitat Restoration.

For instance, large wood and boulder placement will enhance habitat elements described in the Large Wood indicator, while Reconnection of Existing Side Channels and Alcoves will increase adult and juvenile rearing habitat as described in the Off-channel Habitat indicator above. Headcut stabilization, bank restoration, and road treatment projects will decrease direct sediment inputs into the stream channel, thereby enhancing conditions for juvenile rearing within channel substrate. Fish Passage Restoration projects will provide access to refugia while all restoration actions within the proposed action will enhance the quality of such refugia.

Short-term Negative Impacts of ARBA II Activities to the Habitat Element Pathway

As described above, restoration activity categories are expected to benefit Habitat Element indicators. In acquiring these benefits, short-term negative impacts are expected. Such effects will be minimized by incorporating Aquatic Conservation Measures (ACM) and Project Design Criteria (PDC) described above and can also be found in the Aquatic Restoration Biological Assessment II (January 28, 2013) in Chapter II; project design, implementation, and monitoring.

The ARBA II Team determined that negative impacts would occur to Substrate/Sediment. Further, the Team determined that all activity categories are known to increase short-term sediment loads into a stream channel during project implementation. Increased sediment loads would result from the use of large equipment within or adjacent to a stream channel, causing soil disturbance and transport within the stream system. The ARBA II Team also concluded that these activities are unlikely to have negative impacts to the remaining indicators of this pathway as ARBA II projects are intended to enhance such indicators. Therefore the following analysis will focus on activity affects to the Substrate/Sediment indicator.

Short-term inputs of sediment could result from instream structure placement, opening of side channels, road treatments, and other projects that occur inside or near the bankfull channel. The sediment plume from activities will be most concentrated in the immediate project vicinity and should dissipate throughout a stream channel within a few hours. The amount, extent, and duration of fine sediment inputs and turbidity are related to the following: the type and duration of heavy machinery used within or near a bankfull channel; soil type; the amount of soil disturbance; whether restoration is in or out of the wetted channel; the sensitivity of the channel banks to erosion and other disturbances; the amount of time it takes for disturbed areas to re-vegetate and stabilize; and the probability of precipitation events before disturbed areas are re-vegetated or stabilized.

The increased stream turbidity may deposit fine coats of sediment on channel substrate a short distance downstream, encourage fish to move downstream, and alter behavior patterns for a short time. Because the work will be conducted during the in-water work periods (a time when spawning is not expected and after emergence of fry), the project should not interfere with spawning, egg development, and the sac fry life stage. In cases of fall-spawning fish, the fine layer of sediment deposited on channel substrate will be cleared away as the fish construct their redds. It is anticipated that all project related sediment will be flushed out during the first fall/winter/spring high flows after project completion, and site restoration conservation measures are expected to prevent future project related sediment inputs into the stream. Therefore, long-term negative impacts to Substrate/Sediment are not expected.

CHANNEL CONDITIONS AND DYNAMICS PATHWAY

Indicator Description

The descriptions of the following three pathway indicators provide the ways in which each indicator serves as an essential ecological function necessary for the overall viability of fish stocks: Width/Depth Ratio; Streambank Condition; Floodplain Connectivity.

Width/Depth Ratios

The width to depth ratio is an index value that helps describe the shape of a stream channel, and is the ratio of bankfull width to mean bankfull depth (Rosgen 1996). Both measurements are based on bankfull flow or its indicators. In short, bankfull flow is the channel forming flow that transports the bulk of available sediment over time. In another way, bankfull flows are those that transport sediment from upstream reaches, forming and removing channel bars, doing the work that forms the morphological characteristics of a channel (Dunne and Leopold 1978). Relatively small width/ depth values are indicative of stream stability, and Rosgen (1996) suggests that width to depth ratios can be used as a surrogate to stream stability. Finally, Bestcha and Platts (1986) state that as width to depth ratios increase, the stream becomes shallower and may result in a loss of pools.

Streambank Condition

Streambank condition is related to its ability to dissipate stream power. For many stream channels, riparian vegetation with woody root masses, along with instream debris, serve as physical barriers to erosive and downcutting forces of stream power (Bestcha and Platts 1986). Further, the stems of herbaceous and woody plants, residing on the stream bank, provide additional roughness to dissipate stream power and capture suspended sediments (Elmore and Bestcha 1987). When these roughness elements are removed, however, a streambanks ability to withstand stream power is decreased, resulting in bank erosion, relatively higher width to depth ratios, and possible channel incision. Even if streambanks are in good condition, increased peak flows can damage banks and cause channel incision. Finally, streambanks that are in good condition can provide quality fish habitat through undercut banks and overhanging vegetation (Bestcha and Platts 1986; USDI 1998c).

Floodplain Connectivity

Leopold (1994) defines a floodplain as a level area near a river channel, constructed by the river in the present climate and overland flow during moderate flow events. When a stream can readily access its floodplain during high flow events, the stream will overflow its banks and spread across the floodplain, dissipating stream energy, depositing sediments, accessing side channels. Bestcha and Platts (1986) suggest that for a floodplain to be effective in sorting and capturing flood-born sediment it must have roughness elements, such as trees and other debris. Floodplains or riparian areas adjacent to stream channels serve as water storage sites—water collected from flooding and precipitation—which can increase subsurface flow to the stream channel (Elmore and Bestcha 1987), especially important to augmentation of low stream flows during summer months. Likewise, Tonina and Buffington (2009) note that floodplains that are connected to stream channels result in hyporheic exchange of water, resulting in increased nutrient distribution and increased inundation of floodplain habitats, such as side channels, a habitat type offering refuge to juvenile salmonids during high flow events (Roni et al. 2002).

Long-term Benefits of ARBA II Activities to the Channel Condition and Dynamics Pathway

All projects will enhance one or more of the indicators under the Channel Condition and Dynamics Pathway. Each of these projects will occur within the bankfull channel and/or immediate floodplain area and are intended to restore channel, bank, and floodplain areas to more natural conditions. As a result, ARBA II projects are expected to decrease width/depth ratios, improve streambank condition, and/or increase floodplain connectivity.

Short-term Negative Impacts of ARBA II Activities to the Channel Condition and Dynamics Pathway

As described above, restoration activity categories are expected to benefit Channel Conditions and Dynamics. In acquiring these benefits, the ARBA II Team determined that activity categories will not result in negative impacts to any of the three pathway indicators as no projects will increase width/depth ratios, decrease streambank condition, and disconnect floodplains.

FLOW HYDROLOGY PATHWAY

Indicator Descriptions

The descriptions of the following two pathway indicators provide the ways in which each indicator serves as an essential ecological function necessary for the overall viability of fish stocks: Changes in Peak/Base Flows and Increase in Drainage Network.

Changes in Peak/Base Flows

Many riparian wetlands, such as wet meadows, have been damaged by grazing, mining, road construction, and logging in the analysis area as consistently indicated by field reviews (Beschta et al., 1991). This loss of wetland function has probably contributed to a reduction in summer low flows relative to historic conditions. Although data are sparse, peakflows may occur a week or two earlier in the year in some managed watersheds year than in unmanaged watersheds. McIntosh (1992) found that the annual peakflows currently occur about 2 weeks earlier in the Grande Ronde than historically. Some heavily logged drainages may have increased summer low flows; summer low flow has increased in the some parts of the Grande Ronde over the past 50 years (McIntosh, 1992). However, the increases in low flows do not appear to have improved salmonid survival because the water quality is so poor and stream habitats have been heavily degraded due to upstream logging, grazing, and road construction (Anderson et al., 1993; McIntosh et al., 1994).

Increase in Drainage Network

Wemple et al. (1996) documented that 57% of a road system within a watershed, located in the western Cascades of Oregon, was hydrologically connected to the stream network by roadside ditches draining directly into streams and roadside ditches draining into relief culverts with gullies below their outlets. Thus, an increase in road densities led to an associated increase in drainage density by up to 50%. High-density road systems have been linked to changes in the hydrograph or magnitude and timing of flow events. For instance, in an Oregon Coast Range watershed, Harr et al. (1975) showed that peak flows increased significantly after road building converted at least 12% of the area to road prisms. The causal effects were attributed to increased surface compaction, which reduces water infiltration, resulting in excess water being carried down the road, drainage ditches, and relief culverts into the stream network. Jones and Grant (1996) documented that peak flows increased by 50% in a watershed within a five year period following road construction and logging. The longevity of the hydrologic changes are as permanent as the roads, and until a road is removed and natural drainage patterns are restored, the road will continue to affect the routing of water through a watershed.

Long-term Benefits of ARBA II Activities to the Flow/Hydrology Pathway

Numerous ARBA II activity categories will provide immediate benefits to the Flow/Hydrology Pathway: Large Wood, Boulder, and Gravel Placement; Channel Reconstruction/Relocation; Off- and Side-Channel Habitat Restoration; Set-back or Removal of Existing Berms, Dikes, and Levees. Each of these projects will enhance floodplain connectivity, thereby addressing wetland functions described under Peak/base Flows above. Road and Trail Erosion Control and Decommissioning will provide additional benefits in that they will reduce the drainage network, thus addressing issues discussed in the Drainage Network category above.

Short-term Negative Impacts of ARBA II Activities to the Flow Hydrology Pathway

As described above, restoration activity categories are expected to benefit Peak/base Flows and Drainage Network categories. In acquiring these benefits, the ARBA II Team determined that activity categories will not result in negative impacts to any of the two pathway indicators as no projects will not disrupt natural peak/base flow patterns or increase the drainage network.

WATERSHED CONDITION PATHWAY

Indicator Description

The descriptions of the following three MPI Indicators provide the ways in which each indicator serves as an essential ecological function necessary for the overall viability of fish stocks: Road Density and Location, Riparian Reserves, and Disturbance History.

Road Density and Location

Available information consistently indicates that roads are one of the greatest sources of habitat degradation in managed watersheds, especially when they are within riparian zones (Geppert et al., 1984; Furniss et al., 1991). Roads significantly elevate on-site erosion and sediment delivery for the life of the road (Geppert et al. 1984). Studies consistently indicate that roads increase the frequency of mass failures in mountainous terrain (Dunne and Leopold, 1978; Geppert et al., 1984; Furniss et al. 1991). Mass failure volumes from roads are orders of magnitude greater than from undisturbed areas on a per unit area basis (Dunne and Leopold, 1978; Geppert et al., 1984; Furniss et al., 1991). Road crossings cause extreme increases in sediment delivery (Fowler et al., 1987). Roads also disrupt subsurface flows (Megahan, 1972). Roads increase peakflows (King and Tennyson 1984). Roads within riparian zones reduce shading and disrupt LWD sources for the life of the road. These effects of roads degrade habitat by increasing fine sediment levels, reducing pool volumes, increasing channel width and exacerbating seasonal temperature extremes.

Riparian Areas

The following discussion was adapted from FEMAT (1993). Riparian areas are those portions of watersheds that are directly coupled to streams and rivers, the portions of watersheds required for maintaining hydrologic, geomorphic, and ecological processes that directly affect streams, stream processes, and fish habitats. The network of Riparian Reserves—comprised of all stream orders both intermittent and perennial—allow for connectivity of the aquatic ecosystem within a watershed. Riparian areas are shaped by disturbances characteristic of upland ecosystems, such as fire and windthrow, as well as disturbance processes unique to stream systems, such as lateral channel erosion, peakflows, deposition by floods and debris flows. The near-stream riparian areas—floodplains—may contain an increased diversity of plant species and extensive hydrologic nutrient cycling interactions between groundwater and riparian vegetation. This vegetation, ranging from conifers to deciduous hardwoods, provides allochthonous (organic debris) to stream channels and associated aquatic invertebrate communities. Further, riparian vegetation moderates light levels and stream temperature, helps armor stream banks with extensive root systems, and contributes large wood into the stream channel.

Disturbance History

Information for this section was acquired from Reeves et al. (1995). Even though the article was directed at anadromous salmonids, the discussion can readily apply to most PNW fish stocks. Riverine-riparian ecosystems within the PNW used by anadromous salmonids naturally experience periodic catastrophic disturbances, which then moved through a series of recovery states over a period of decades to centuries, resulting in a landscape that varies in suitability for salmonids. Disturbance can be categorized as being pulse or press disturbances. A pulse disturbance is one that allows an ecosystem to recover to pre-disturbance conditions, and a press disturbance is one that prohibits an ecosystem from rebounding to pre-disturbance conditions. The dominant pulse disturbances in which the PNW salmonids are adapted to include natural fire regimes, fire related landslides, and floods, all working in concert in a manner that produce habitat patches, varying in quality and quantity. In short, fires would burn through an area, landslides would then transport wood and sediment into the streams, and floods would distribute the sediment and debris throughout stream networks. In the Oregon coast range, the amount of sediment and large wood found in streams could be correlated to occurrence of the last stand replacement fire. This

pulse disturbance regime, or varying forms thereof, was altered with the onset of fire suppression and extensive timber harvest. The resulting effects are different from the natural pulse regime in that sediment is transported in the system without wood, the interval between disturbances has been drastically reduced in most cases, and harvest and road construction is widely distributed, resulting in chronic sedimentation across a larger landscape.

Long-term Benefits of Restoration Activities to the Watershed Condition Pathway

Several activity categories are expected to provide immediate and long-term benefits to the Watershed Condition Pathway: Dam, Tidegate, and Legacy Structure Removal; Channel Reconstruction/Relocation; Off- and Side-Channel Habitat Restoration; Streambank Restoration; Set-back or Removal of Existing Berms, Dikes, and Levees; Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering; Road and Trail Erosion Control and Decommissioning. Other ARBA II activity categories may not provide immediate benefits but will provide long-term benefits: Juniper Removal; Riparian Vegetation Treatment (controlled burning); Riparian Vegetative Planting; Beaver Habitat Restoration.

All of these activities will promote growth of riparian vegetation, thus improving riparian conditions as described under the Riparian Area category. Road treatment projects will reduce the potential for negative impacts as described in the Road Density and Location category as well as restoring processes that would occur under a more natural disturbance regime. Riparian Vegetation Treatment (controlled burning) is intended to mimic and promote the recovery of fire-based natural disturbance regimes, while Road and Trail Erosion Control and Decommissioning projects will help transform disturbance regimes from a press to a pulse regime.

Short-term Negative Impacts of ARBA II Activities to the Watershed Conditions Pathway

Proposed action activity categories are expected to benefit Watershed Condition indicators. It is anticipated that no adverse effects are expected to occur to the three indicators as no projects will increase road density, increase press disturbance regime processes, or degrade riparian conditions.

Consequently, Alternative 2 would be have short-term negative impacts but moderate, postive long term impacts to the aquatic habitat and aquatic species when compared to Alternative 1. Impacts would vary by subwatershed, and be of greater magnitude in those with multiple low function indicators.

Alternative 2 – Cumulative Effects

Cumulative effects are the result of incremental impacts of the proposed actions/alternatives when added to other past, present, and reasonably foreseeable actions, both on National Forest System lands and adjacent federal, state, or private lands (40 CFR 1508.7). The baseline for cumulative effects analysis is the current condition as described in the affected environment section above.

All restoration activity categories (except for In-Channel Nutrient Enhancement, Fisheries, Hydrology, Geomorphology Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration activity categories) will result in negative impacts to the Turbidity and Substrate/Sediment Indicators in proximity to RFSSL species, MIS, ESA listed fish species and within designated CH. The sediment plume from restoration activities will be most concentrated in the immediate project vicinity and should dissipate in the stream channel within in a few hours. The increased stream turbidity may deposit fine coats of sediment on channel substrate a short distance downstream. It is anticipated that all project related sediment will be flushed out during the first fall/winter/spring high flows after project completion, and site restoration conservation measures are expected to prevent future project related sediment inputs into the stream. Therefore, long-term impacts to turbidity and substrate/sediment, including spawning gravels, are not expected.

A list of forest wide projects are scheduled to occur 2018 and beyond that will be concurrent with the proposed action. These projects include but are not limited to: prescribed burning, commercial timber harvest, plantation thinning, small diameter thinning, replacing road culverts, road maintenance, road decommissioning, recreational mining, aspen release, juniper thinning, toilet replacement, gate replacement, fencing and grazing and other various and related activities.

Based on this analysis and professional judgment, potential project effects would represent a very small percentage of the total (cumulative) from all actions combined. Natural background seasonal fluctuation along with sediment/turbidity effects from other actions (e.g., roads, timber harvest, grazing) exceeds any potential production from the proposed restoration activities. Sediment production from project actions could add to sources derived from other actions on National Forest System lands, tribal lands, state and county lands, private forestry lands, rangelands, utility corridors, road rights-of-way, and private property.

The purpose of the Aquatic Restoration Project is to improve riparian function across the Umatilla National Forest. There is a limit of fifteen projects per year, and based on the previous five years of activity (due to funding and personnel limitations) the actual number of projects will probably be less than ten per year. Even if fifteen projects per year were to be implemented the positive impact is a not a significant effect. Projects are spread across the four Ranger Districts of the 1.4 million acres of the Umatilla NF and generally implemented within different watersheds. Over time there will be improved conditions, but the magnitude of beneficial and improvement conditions is not significant.

Within specific 6th field sub-watersheds where project-related sediment/turbidity effects could potentially exceed the “discountable” threshold, effects are low magnitude and short term. Streams listed (303(d)) (See affected environment) for sediment and biological criteria within the Umatilla National Forest are not expected to incur any detectable long-term sediment additions from project activities; spatially isolated short-term sediment effects would be limited to low-magnitude turbidity increases. These effects are also not of a type or extent that would combine with ongoing human activities or foreseeable projects on the Forest and produce long-term, cumulative impacts.

Overall, it is assumed that the temporary and short-term effects from restoration activities would not compromise the benefits of restoration, and thus, water quality (sediment and temperature) across the Forest is expected to improve as projects are implemented to restore healthy, functioning watersheds and their associated aquatic ecosystems. Alternative 2, in combination with forest management actions taken under the Forest Plan, will continue to have positive impacts on aquatic habitat and species.

3.2.7 Summary of Environmental Effects - Aquatic Resources

FEDERALLY LISTED FISHES AND THEIR DESIGNATED CRITICAL HABITAT

For federally listed species (chinook, steelhead and bull trout) and essential fish habitat (Chinook salmon), the potential for adverse effects was determined to exist for the Resource Indicator Sediment. Although effects (sediment/turbidity) from these activities are expected to be minor and short term, they could exceed the “discountable” threshold, and are therefore likely to adversely affect fish and their designated habitat. Consultation was completed with U.S. Fish and Wildlife Service and the National Marine Fisheries Service in 2013 for all of the proposed restoration project categories. Both with the National Marine Fisheries Service (Issued Aquatic Restoration Biological Opinion April 25, 2013) and US Fish and Wildlife Service (Issued Aquatic Restoration Biological Opinion July, 2013) have been consulted with.

Additional Section 7 ESA consultation will occur with the local Umatilla Level 1 Section 7 ESA team and through the pre-notification database Aquatic Restoration Regulatory Reporting System (ARRRS). The Level 1 review and ARRRS electronic pre and post project notification are requirements and assure

projects included in the Umatilla National Forest Aquatic Restoration EA will meet ESA Section 7 obligations.

FOREST SERVICE REGIONAL FORESTER SPECIAL STATUS AND SENSITIVE SPECIES (RSSSL)

Forest Service Sensitive species (Columbia clubtail, Pacific Lamprey, redband trout, western ridge mussel, Shortface lanx, westslope cutthroat trout and Pristine springsnaill) exhibit largely overlapping ranges and similar vulnerability to effects with the federally listed fishes; therefore, the following determination applies: "May impact individuals, but is not likely to cause a trend toward federal listing or loss of viability within the planning area" (Table 13). This determination is based on monitoring of previous ARBO II projects (on file Supervisor's Office, Pendleton Oregon) and general findings that the localized nature of instream projects such as culvert replacements, which have direct effects to instream habitat with the magnitude of the effect high (localized turbidity increases) but the duration is short and limited (episodic over two to three weeks with downstream effects of generally less than a few hundred feet) as allowed under the ARBO II water quality permits.

FOREST SERVICE MANAGEMENT INDICATOR SPECIES

Forest Service Management Indicator Species (MIS) redband trout overlap the distribution of federally listed fishes, and exhibit similar vulnerability to effects. In summary, there would be no reduction in quantity (miles) of stream habitat due to project actions. Habitat quality may be slightly reduced in the short-term due to post-implementation sediment input resulting from restoration activities. This potential effect would occur within a fraction of available habitat; therefore, the following determination applies: "May impact individuals, but is not likely to cause a trend toward federal listing or loss of viability within the planning area." In the long term, near-stream conditions would be improved as restoration actions are completed.

Table 13: Summary Determination of Effects on Aquatic Species and Designated Critical Habitat for ESA, RSSL and MIS Species.

Species	Listing Status	Effects Determination	
		Alternative 1	Alternative 2
Columbia River Bull Trout and DCH	ESA T	NE	LAA
MCR Steelhead and DCH	ESA T	NE	LAA
SRB Spring/summer Chinook and DCH[8]	ESA T	NE	LAA
SRB steelhead and DCH	ESA T	NE	LAA
Inland Columbia Redband Trout	MIS and RFSSL	NI	MIIH
Westslope cutthroat trout	RFSSL	NI	MIIH
Pacific Lamprey	RFSSL	NI	MIIH
Western Ridged Mussel	RFSSL	NI	MIIH
Shortface Lanx	RFSSL	NI	MIIH
Westslope Cutthroat Trout	RFSSL	NI	MIIH
Columbia clubtail	RFSSL	NI	MIIH
Pristine springsnail	RFSSL	NI	MIIH

NE-No Effect;; **LAA**-May Effect, Likely to Adversely Affect; **NI-**No Impact

MIIH-May Impact Individuals or Habitat, but Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species;

[8] Determination for Chinook salmon waters designated Essential Fish Habitat is NI for Alternative 1 and No Adverse Impact for Alternative 2.

3.3 Wildlife

This section incorporates by references the Umatilla Aquatic Restoration Wildlife Biological Evaluation for Threatened, Endangered, Proposed and Sensitive Species and Terrestrial Wildlife Report located in the project file. This report contains the data, methodologies, and analysis that the specialist relied on to reach the conclusions discussed in this section.

An endangered species is an animal or plant species listed under the Endangered Species Act that is in danger of extinction throughout all, or a significant portion, of its range. A threatened species is an animal or plant species listed under the Endangered Species Act that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

A sensitive species is an animal or plant species identified by the Forest Service Regional Forester for which species viability is a concern either a) because of significant current or predicted downward trend in population numbers or density, or b) because of significant current or predicted downward trends in habitat capability that would reduce a species existing distribution.

Threatened, Endangered and Sensitive Species addressed in the Umatilla National Forest include those that have been documented from a valid, recorded observation, or suspected as likely to occur based on available habitat to support breeding pairs/groups. Whether these species may occur in the project analysis area is determined by observation records, vegetative and wildlife species inventory and monitoring, published literature on the distribution and habitat utilization of wildlife species, information provided by the U.S. Fish and Wildlife Service.

Additional species that are not Threatened, Endangered, Proposed, or Sensitive were considered in the analysis of the effects. The effects to management indicator species (MIS) and landbirds including Neotropical migratory birds are disclosed in sections 3.4.2 and 3.4.3, respectively.

3.3.1 Relevant Laws, Regulations, Policies, Guidance, and Plans

The three principle laws relevant to wildlife management are the National Forest Management Act of 1976 (NFMA), the Endangered Species Act of 1973 (ESA), and the Migratory Bird Treaty Act (MBTA) of 1918. Direction relative to wildlife follows:

NFMA requires the Forest Service to manage fish and wildlife habitat to maintain viable populations of all native and desirable non-native wildlife species and conserve all listed threatened or endangered species populations (36CFR219.19).

ESA requires the Forest Service to manage for the recovery of threatened and endangered species and the ecosystems upon which they depend. Forests are required to consult with the US Fish and Wildlife Service (FWS) if a proposed activity may affect the population or habitat of a listed species.

MBTA established an international framework for the protection and conservation of migratory birds. This act makes it illegal, unless permitted by regulations, to “pursue, hunt, take, capture, purchase, deliver for shipment, ship, cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird.”

Forest Service Manual Direction provides additional guidance: identify and prescribe measures to prevent adverse modifications or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened, and proposed species (FSM2670.31 (6)). This manual directs the Regional Forester to identify sensitive species for each National Forest where species viability may be a concern.

Forest Plan Amendment # 2 (“Eastside Screens”) established interim wildlife standards for old growth, old growth connectivity, snags, large down logs, and northern goshawks. The Regional Forester has periodically distributed letters clarifying direction in Amendment #2 (Regional Forester, October 2, 1997; October 23, 1997; June 11, 2003).

Additional management direction is provided for conservation of migratory landbirds. This direction is consolidated in the Forest Service Landbird Strategic Plan and further developed through the Partners in Flight Program. The Oregon-Washington Partners in Flight Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington (Altman 2000) identifies priority bird species and habitats for the Blue Mountains in Oregon.

Regional Forester’s Sensitive Species List (Update): Sensitive species are those identified by the Pacific Northwest (Region 6) Regional Forester as needing special management to meet Forest Service Manual direction, Department regulations, and National Forest Management Act obligations and requirements (USDA 2011). In July 2015, Regional Forester Jim Pena, released the current Sensitive Species list that includes federally listed, federally proposed, and sensitive species lists.

3.3.2 Methodology

The following sources of information have been reviewed to determine which TES species, or their habitats, occur in the project area (forestwide) and may be effected by the proposed action:

Regional Forester’s Sensitive Species List (2015) and associated species fact sheets

Forest Service database (NRIS)

GIS layers

No population surveys specific to this project were conducted. Species presence/absence determinations were based on habitat presence, relevant life history, past wildlife surveys, recorded wildlife sightings, observations, species fact sheets, and published research and literature. Incomplete or unavailable information, scientific uncertainty, and risk are disclosed where applicable. Field reconnaissance of individual projects will be performed during individual project planning as needed.

3.3.3 Affected Environment - Wildlife

Threatened, Endangered, Proposed, and Sensitive Species

The U.S. Department of Fish and Wildlife Service provides a list of threatened, endangered, proposed, and sensitive species that have the potential to occur in the project area. There are two terrestrial wildlife species that are federally listed as threatened and endangered that occur or are suspected on the Umatilla National Forest, the Canada lynx (threatened) and the gray wolf (endangered west of HWY 395).

There are 35 species, including Canada lynx and gray wolves, on the 2015 Regional Forester’s Sensitive Species list (terrestrial) that occur on the Umatilla National Forest. Twenty-nine of these species are either known to occur or are suspected to occur in the project area, and suitable or potential habitat is present or may be present in the project areas. These species include: gray wolf, North American wolverine, Preble’s shrew, little brown myotis, fringed myotis, Townsend’s big-eared bat, bald eagle, American peregrine falcon, upland sandpiper, northern goshawk, Lewis’s woodpecker, white-headed woodpecker, great gray owl, mountain quail, Columbia spotted frog, Rocky Mountain tailed frog, fir pinwheel, Columbia Gorge Oregonian, western bumble bee, Johnson’s hairstreak, shiny tightcoil, Poplar Oregonian, blue mountainsnail, intermountain sulphur, thinlip tightcoil, humped coin, meadow fritillary, and lustrous

copper. The western ridged mussel, Columbia clubtail, shortface lanx, and pristine spring snail are analyzed in the aquatics section.

The following are federally listed or sensitive species that have the potential to occur in the project area.

GRAY WOLF (CANIS LUPUS)

LIFE HISTORY AND HABITAT

The gray wolf is a habitat generalist inhabiting a variety of plant communities, typically containing a mix of forested and open areas with a variety of topographic features (Verts and Carraway 1998). Wolves can occupy a variety of habitat types provided adequate prey exists (Keith 1983, Fuller 1989, Haight et al. 1998) and human activity is minimal (Oakleaf et al. 2006, Belongie 2008). The primary prey species of gray wolves are large native ungulates (Haight et al. 1998, Fuller et al. 2003). Gray wolves are typically sensitive to human disturbance near den and rendezvous sites. The entire Forest is considered suitable habitat for gray wolves.

DISTRIBUTION

The first pack documented in Oregon was in 2008 and since the wolf population has increased and expanded. There were 5 established wolf packs in Oregon and one pack in Washington on the Umatilla National Forest at the end of 2015. There are 2 additional pairs of wolves on the Forest that were not known to breed in 2015.

STATUS:

Federal – Endangered west of HWY 395; delisted east of HWY 395
State – Delisted in OR; Endangered in WA
Region 6 – Sensitive

NORTH AMERICAN WOLVERINE (GULO GULO)

LIFE HISTORY AND HABITAT

Wolverines are strongly associated with remote mountainous wilderness habitats (Beauvais and Johnson 2004). They inhabit high elevation, alpine and subalpine conifer forest types. The presence of avalanche chutes, boulder fields, and/or large piles of down logs are also important habitat features. Open areas are generally avoided and the most critical habitat component is the absence of human activity or development (Ruggiero et al. 1994, Wolverine Foundation (TWF) 2015). Wolverines will forage in lower elevation forested habitat. In Oregon, the wolverine's diet consists mainly of elk and deer carrion. Wolverines are extremely mobile travelling great distances within large home ranges. The project's proximity to open roads and remote areas of high elevation reduces its potential to be occupied habitat, but suitable dispersal and foraging habitat for wolverines may exist in project areas.

DISTRIBUTION

Wolverines are found in higher elevations of Oregon and Washington, including the northern Blue Mountains and the Cascade Mountains. The nearest known area of confirmed activity is in the Wallowa Mountain Range. There are no documented sightings of wolverine on the Umatilla but numerous unconfirmed sightings have occurred.

STATUS:

Federal – Proposed for listing;
State – Threatened in OR; Species of Concern in WA
Region 6 – Sensitive

PREBLE'S SHREW (SOREX PREBLEI)

LIFE HISTORY AND HABITAT

Observations of the Preble's shrew in Washington occurred in dense lodgepole pine, subalpine fir/lodgepole pine, and grand fir/Engelmann spruce forests between 5,000 and 6,000 feet. These habitats are atypical of the habitats in which these shrews are found in other states (Johnson and Cassidy 1997). In Oregon, the Preble's shrew has been found in a wide variety of habitats including marshes, along streams, dry bunchgrass, and wet, alkaline habitat. Grasses and sagebrush were common to most habitats. There is very little known about the diet of the Preble's shrew (Verts and Carraway 1998).

DISTRIBUTION

In Washington, the Preble's shrew is known only to occur in the Blue Mountains. Most specimens have been found in Garfield County (Johnson and Cassidy 1997).

STATUS:

Federal – Not listed
State – Species of Concern in OR/ State Candidate in WA
Region 6 – Sensitive

LITTLE BROWN MYOTIS (MYOTIS LUCIFUGUS)

LIFE HISTORY AND HABITAT

The little brown myotis inhabits a wide variety of habitat types including conifer and hardwood forests, along edges of dense forests, in open areas among trees, and most often near a lake, pond, or stream (Verts and Carraway 1998). Foraging habitat is often associated with water. The little brown bat feeds primarily on flies. Human-made structures seem to be the primary sites for maternity colonies. Less frequently, maternity colonies are known to occur in caves, beneath bridges, or in hollow trees. Snags provide summer day roosting sites.

DISTRIBUTION

Widely distributed and the most common bat in Washington.

STATUS

Federal – Not listed
State – None (OR and WA)
Region 6 – Sensitive

FRINGED MYOTIS (MYOTIS THYSANODES)

LIFE HISTORY AND HABITAT

The fringed myotis is well adapted for foraging within the forest as well as forest edge habitats. Its diet consists mainly of beetles and moths but also may prey on non-flying taxa, suggesting it gleans prey from vegetation in addition to capturing its prey on the wing. Roosts occur in buildings, underground mines, rocks, cliff faces, and bridges although in the western U.S. and Canada large decadent trees and snags are used as well. Fringed myotis have been documented roosting in a wide variety of tree species and it is likely that structural characteristics (e.g. height, decay stage) rather than tree species play a greater role in selection of a snag or tree as a roost.

DISTRIBUTION

In Oregon, fringed myotis are rare, with most records of the species occurring west of the Cascade Mountains in southwestern Oregon and the northeastern corner of the state (Csuti et al 2001).

STATUS:

Federal – Not listed
State – Sensitive/ Vulnerable in OR; none in WA
Region 6 – Sensitive

TOWNSEND'S BIG-EARED BAT (CORYNORHINUS TOWNSENDII)

LIFE HISTORY AND Habitat

The Townsend's big-eared bat occurs in a wide variety of habitat types ranging from sea level to 3,300 meters. Habitat associations include: coniferous forests, mixed meso-phytic forests, deserts, native prairies, riparian, and active agricultural areas. Distribution is strongly correlated with the availability of caves and cave-like roosting habitat, including abandoned mines. The Townsend's big-eared bat is a moth specialist, foraging within wooded areas, along edge habitats and near streams.

DISTRIBUTION

In Oregon, the Townsend's big-eared bat has been collected throughout most of the state except in parts of the Blue Mountain Province and in the western part of the Basin and Range Province (Verts and Carraway 1998).

STATUS:

Federal – Not listed
State – Sensitive/ Critical in OR; Species of Concern/ State Candidate in WA
Region 6 – Sensitive

BALD EAGLE (HALIAEETUS LEUCOCEPHALUS)

LIFE HISTORY AND HABITAT

Preferred habitat for the bald eagle occurs near large bodies of water (rivers, lakes, etc.) that support an adequate food supply. In the Pacific Northwest recovery area, preferred nesting habitat for bald eagles is predominately uneven-aged, mature, coniferous stands (ponderosa pine and Douglas-fir) or large black-cottonwood trees along riparian corridors). Eagles usually nest in mature conifers with gnarled limbs that provide ideal platforms for nests. The nest tree is characteristically one of the largest in the stand and usually provides an unobstructed view of a body of water. Important prey species include fish, birds, mammals, and carrion (NatureServe 2016).

DISTRIBUTION

The bald eagle is fairly common and widely distributed in Oregon and Washington.

STATUS:

Federal – Delisted due to recovery
State – None in OR; Sensitive in WA
Region 6 – Sensitive

AMERICAN PEREGRINE FALCON (FALCO PEREGRINUS ANATUM)

LIFE HISTORY AND HABITAT

Suitable habitat for the peregrine falcon includes various open habitats from open grasslands to forested stands in association with suitable nesting cliffs (NatureServe 2016, Marshall et al. 2003). The falcon often nests on ledges or holes on the face of rocky cliffs or crags. Ideal locations include undisturbed areas near water with a wide view and close to plentiful prey. Foraging habitats of woodlands, open grasslands, and bodies of water are generally associated with the nesting territory.

DISTRIBUTION

Peregrines are fairly rare to uncommon in Oregon and Washington and occur as resident and migratory populations throughout the states.

STATUS:

Federal – Not listed
State – Sensitive/ Vulnerable in OR; Sensitive in WA
Region 6 – Sensitive

NORTHERN GOSHAWK (ACCIPITER GENTILIS)

LIFE HISTORY AND HABITAT

Northern goshawk are habitat generalists but are often associated with old forest and unmanaged young forests in montane, lower montane, and riparian woodland communities. Important habitat attributes of goshawk prey species include snags, down logs, woody debris, large trees, openings, herbaceous and shrubby understories and an intermixture of various forest structural stages (Wisdom et al. 2000). During winter some goshawks may travel short distances to lower elevations and more open habitats in all upland woodland types (Wisdom et al. 2000). In general, goshawk nest areas are unique in structure, with large trees, dense canopies, and high canopy closure. Goshawk nesting habitat in eastern Washington and Oregon is generally composed of mature and older forests (McGrath et al. 2003).

DISTRIBUTION

Northern goshawks are permanent residents of forested portions of the Cascades, Olympic, and Blue mountains.

STATUS:

Federal – Not listed
State – Species of Concern in OR; State Candidate in WA
Region 6 – Sensitive

GREAT GRAY OWL (STRIX NEBULOSA)

LIFE HISTORY AND HABITAT

The great gray owl is an uncommon to rare inhabitant of forests adjacent to openings above 3,000 feet in the Cascade, Blue, and Wallowa mountains. Habitat of the great gray owl consists of mature mixed conifer forests of Douglas-fir, western larch, and ponderosa pine or mature subalpine forests or Englemann spruce, subalpine fir, and lodgepole pine adjacent to forage habitats in forest openings and meadows, with quaking aspen often present (Wahl et al. 2005). They most frequently are found in old-growth forests on north-facing slopes (Csuti et al. 1997). This species nests in broken-top snags, mistletoe brooms, and nests of other species.

DISTRIBUTION

Great gray owls are year-round residents in north central Washington and in the Blue Mountains and eastern side of the Cascade Mountains in Oregon.

STATUS:

Federal – Not listed
State – None
Region 6 – Sensitive

UPLAND SANDPIPER (BARTRAMIA LONGICAUDA)

LIFE HISTORY AND HABITAT

Upland sandpiper habitat is primarily restricted to open tracts of grassland habitat with water or intermittent creeks nearby. This includes large montane meadows and prairie-grasslands (1,000-30,000 acres), usually surrounded with trees (lodgepole pine and some ponderosa pine), or in the middle of sagebrush communities, and generally at elevations from 3,400 to 5,000 feet (Csuti et al. 1997, NatureServe 2016, and Marshall et al. 2003). Taller grassy areas are preferred for nesting and brood cover (NatureServe 2016). Foraging occurs in open meadows (Csuti et al. 1997, NatureServe 2016, and Marshall et al. 2003).

DISTRIBUTION

Upland sandpipers are rare breeders in large meadows within forests of eastern Oregon. They are almost never observed away from breeding areas in Oregon. Observations of the species have occurred near the town of Ukiah (not on the National Forest).

STATUS:

Federal – Not listed
State – Sensitive/ Critical in OR; Endangered in WA
Region 6 – Sensitive

LEWIS'S WOODPECKER (MELANERPES LEWIS)

LIFE HISTORY AND HABITAT

Lewis's woodpeckers inhabit primarily open forest and woodlands; it is distinguished from other woodpecker species by its unique flycatching behavior and distinctive plumage (Marshall et al. 2003). Nesting habitat consists of three distinct types in eastern Oregon: riparian areas with large cottonwoods, and open canopied old forest in ponderosa pine, or burned old forest in ponderosa pine (Wisdom et al. 2000). Home ranges are 2.5 to 15 acres in size (Johnson and O'Neil 2001). In burned areas, ponderosa pine snags greater than 16 inches dbh are chosen for nesting. Similar diameter cottonwood snags in riparian areas are selected (Galen 1989). Post-fire habitats for species such as the Lewis's woodpecker occur periodically in random fashion across the Umatilla National Forest. Very little salvage logging occurs on the forest.

DISTRIBUTION

Lewis's woodpeckers breed in eastern Washington and Oregon along the east slope of the Cascades and the Blue Mountains (Marshall et al. 2003). They are locally common in the transition zone between ponderosa pine and shrub-steppe habitats. They were formerly common in far-eastern Washington, but numbers in Spokane County have declined dramatically, and populations appear to be extirpated in Walla Walla and Columbia Counties, although there may still be a lingering breeding colony in the Blue Mountains.

STATUS

Federal – Species of Concern
State – Sensitive/ Critical in OR; Species of Concern/ State Candidate in WA
Region 6 – MIS, Sensitive
Management Indicator Species - Primary Cavity Excavator

WHITE-HEADED WOODPECKER (PICOIDES ALBORARVATUS)

LIFE HISTORY AND HABITAT

White-headed woodpeckers are associated with open canopy forests with large mature and over mature ponderosa pine; and less frequently mixed ponderosa and Douglas-fir stands (Burleigh 1972, Ligon 1973, Cannings, 1995, Buchanan et al. 2003). This species relies almost exclusively upon the seeds from large ponderosa pine cones for foraging and eats insects gleaned off ponderosa pine trees. White-headed woodpeckers prefer large ponderosa pine snags for nesting; however other species are used including grand fir, Douglas-fir and aspen.

Past harvest activities have concentrated on removing the large overstory ponderosa pine, western larch and Douglas-fir trees and snags, setting many stands back to younger structural stages. Fire suppression has increased stocking of understory trees shifting stand structure from old forest single structure to old forest multi structure. The areas being considered for aquatic restoration in the warm dry biophysical environments may have the appropriate tree species and composition to be used by white-headed woodpeckers, although these riparian sites are not likely as preferred.

DISTRIBUTION

White-headed woodpeckers are found in the Blue, Ochoco, and Wallowa mountains, as well as the east side of the Cascades. Loss of mature ponderosa pine habitat has resulted in a severe decline of this species in the Blue Mountains of Oregon (Csuti et al. 2001). Formal white-headed woodpecker monitoring was conducted on the Umatilla National Forest in 2011 through 2015. There were no verified observations of white-headed woodpeckers in 2011 and 2012. White-headed woodpeckers were detected in 2013, 2014, and 2015.

STATUS

Federal – Species of Concern
State – Sensitive/ Critical in OR; State Candidate in WA
Region 6 – Sensitive;
Management Indicator Species - Primary Cavity Excavator

MOUNTAIN QUAIL (OREORTYX PICTUS)

LIFE HISTORY AND HABITAT

Mountain quail inhabit very dense brush cover, shrubby vegetation including clear-cuts, in forested areas and in riparian habitats (Wahl et al. 2005). It prefers open forests and woodlands with an ample undergrowth of brushy vegetation. The species also inhabits thickets of chaparral and riparian woodland, meadow edges in forests, and brushy undergrowth following timber harvest. Mountain quail winter at lower elevations (Csuti et al. 1997).

DISTRIBUTION

Mountain quail are uncommon year-round residents on southwest Olympic Peninusula and adjacent Puget Trough, in the Cascades of southcentral Washington through westerm Oregon and in the Blue Mountains in southeast Washington and Oregon.

STATUS

Federal – Not listed
State – None
Region 6 – Sensitive

COLUMBIA SPOTTED FROG (RANA LUTEIVENTRIS)

LIFE HISTORY AND HABITAT

Columbia spotted frogs are highly aquatic and rarely found far from permanent water, but they can also utilize intermittent streams and meadows in the spring. They occupy the sunny, vegetated margins of streams, lakes, ponds, spring complexes, and marshes. Columbia spotted frogs are mobile; they seasonally move between hibernacula (overwintering sites), breeding habitat, and wet meadow/riparian foraging areas (Bull and Hayes 2002). Some Columbia spotted frogs will remain and overwinter in breeding habitat if conditions are ideal. Hibernacula are typically ponds, slow-moving streams, and springs where water surrounding the frog does not freeze and oxygen levels are adequate (Tait 2007, Bull2005). Breeding occurs in shallow (<60 cm) emergent wetlands such as riverine side channels, beaver ponds, springheads, and the wetland fringes of ponds, small lakes, and livestock ponds. Water levels must persist until eggs are hatched and tadpoles transform.

DISTRIBUTION

In Washington and Oregon, Columbia spotted frogs occur east of the Cascades.

STATUS

Federal – Not listed
State – Sensitive/Critical in OR; State Candidate in WA
Region 6 – Sensitive

ROCKY MOUNTAIN TAILED FROG (ASCAPHUS MONTANUS)

LIFE HISTORY AND HABITAT

The Rocky Mountain tailed frog differs from other frogs found on or adjacent to the Umatilla National Forest by selecting cold, high gradient, boulder and cobble dominated streams for breeding. Streams with dense overstory shade are preferred. Froglets and adults are closely associated with the streams, often hiding in gravel and cobble substrates.

DISTRIBUTION

The distribution of this species in Oregon is relatively restricted to the northeast corner of the state.

STATUS

Federal – Not listed
State – Sensitive/ Vulnerable in OR; Species of Concern/ State Candidate in WA
Region 6 – Sensitive

FIR PINWHEEL (RADIODISCUS ABIETUM)

LIFE HISTORY AND HABITAT

Most often found in moist and rocky Douglas-fir forest at mid-elevations in valleys and ravines (Frest and Johannes 1995a). Often this species is found in or near talus of a variety of rock types or under fallen logs (Pilsbry 1948, Brunson and Russell 1967, Frest and Johannes 1995b). Moist sites are preferred, low on slope or near persistent water sources, but outside of floodplains. Feeds on organic detritus and microorganisms on leaf surfaces, such as molds and bacteria.

DISTRIBUTION

The fir pinwheel is known from the Blue Mountains in extreme northeastern Oregon (above Weston, Umatilla Co.); in Washington, on the Colville Ranger District of the Colville NF, Stevens County.

STATUS

Federal – Not listed
State – None
Region 6 – Sensitive

COLUMBIA GORGE OREGONIAN (CRYPTOMASTIX HENDERSONI)

LIFE HISTORY AND HABITAT

The Columbia Gorge Oregonian is herbivorous, feeding on the decaying remains of herbaceous plants as well as algae from wet surfaces at the edge of streams and seeps (Applegarth and Duncan 2005). This species prefers dry, exposed taluses, most frequently basalt (Frest and Johannes1995a, b). The site where this taxon was recently collected in Washington (Joseph Canyon) was at the mouth of a canyon and consisted of a rocky area that appeared to be the dry bed of an ephemeral creek (Jepsen et al. 2012).

DISTRIBUTION

The Columbia Gorge Oregonian occurs in southeastern Washington and northeastern Oregon (Jepsen et al. 2012, Burke 2013), as well as west-central and northern Idaho.

STATUS

Federal – Not listed
State – None
Region 6 – Sensitive

WESTERN BUMBLE BEE (BOMBUS OCCIDENTALIS)

LIFE HISTORY AND HABITAT

Western bumble bees are generalist and forage on a variety of flowering plants. The habitat for this species is described as open grassy areas, urban parks and gardens, chaparral and shrub areas, and mountain meadows (Williams et al. 2014).

DISTRIBUTION

Populations of the western bumble bee in Oregon and Washington have mostly disappeared. Recent survey efforts have detected some western bumble bees in the Blue Mountains but they are rare.

STATUS

Federal – Not listed
State – None
Region 6 – Sensitive

JOHNSON'S HAIRSTREAK (CALLOPHRYS JOHNSONI)

LIFE HISTORY AND HABITAT

ohnson's hairstreak habitat is almost entirely restricted to cool, moist, old-growth conifer forests of the Pacific Northwest (Miller and Hammond 2007). Caterpillars feed on dwarf mistletoes that grow on various conifers while adults feed on nectar from various flowering plants (Miller and Hammond 2007).

DISTRIBUTION

This species is found in conifer forests throughout the Pacific Northwest west of the Cascade Mountains. However, there is a disjunct population of Johnson's hairstreak in the Hell's Canyon region of northeast Oregon and adjacent Idaho (Miller and Hammond 2007). The current known geographic distribution of Johnson's hairstreak occurs on the neighboring Wallowa-Whitman National Forest.

STATUS

Federal – Not listed
State – None
Region 6 – Sensitive

SHINY TIGHTCOIL (PRISTILOMA WASCOENSE)

LIFE HISTORY AND HABITAT

Pristiloma species graze on microscopic periphyton (bacteria, fungi, yeasts and other microscopic organisms) found on moist surfaces of wood, green and decaying vegetation, and rocks (Gowan and Burke 1999). Most sites for this species are in ponderosa pine (Pinus ponderosa) and Douglas fir forests at moderate to high elevations (Frest and Johannes 1995). The eastern Washington record is from a relatively moist, shaded basalt cliff and with talus and Populus cover (Frest and Johannes 1995b). Burke and Leonard (2009, draft) describe the habitat as primarily under deciduous trees, particularly quaking aspen and red alders.

DISTRIBUTION

It is known from the Washington and Oregon Cascades (Branson 1977, Frest and Johannes 1999, Branson 1980). It is also reported from the Blue Mountains in Oregon (Wallowa Valley above Wallowa Lake in Wallowa County).

STATUS

Federal – Not listed
State – None
Region 6 – Sensitive

POPLAR OREGONIAN (CRYPTOMASTIX (BUPIOGONA) POPULI)

LIFE HISTORY AND HABITAT

The biology and ecology of this species are incompletely understood. This taxon is found mostly in moderately xeric, rather open and dry, large-scale basalt taluses. It is usually found at lower elevations on steep, cool (generally north or east-facing) lower slopes in major river basins. Talus vegetation may include Celtus, Artemisia, Prunus, Balsamorrhiza, grasses, Seligeria, and some bryophytes. The surrounding vegetation is generally sage scrub (Frest and Johannes 1995a).

DISTRIBUTION

Most known colonies occur at slope bases along major river corridors, including the Snake River and Salmon River. The range includes Wallawa County in Oregon and may extend down the Snake River to Clarkston, Washington (Frest and Johannes 1995a). According to Frest and Johannes (1995a), several years ago it was believed that the Poplar Oregonian was much more widespread. It was probably once comparatively frequent in the areas underlain by the Grande Ronde and Columbia River basalts, Snake River, Salmon River, and lower Clearwater River. It now occurs as isolated colonies in relatively undisturbed portions of its original distribution.

STATUS

Federal – Not listed
State – None
Region 6 – Sensitive

BLUE MOUNTAINSNAIL (OREOHELIX STRIGOSA DELICATA)

LIFE HISTORY AND HABITAT

The life history of this subspecies is mostly unknown. The blue mountainsnail browses on plants and rock surfaces for detritus, microscopic fungi, plants and animals. This species generally occurs in open forested areas and sometimes in riparian areas where it may be found in forest floor litter, under shrubs, ori in rock talus (Burke 2013). Specimens collected along the South Fork Walla Walla River in 2012 were found on rock outcrops and in talus with small seeps (Jepsen et al 2012).

DISTRIBUTION

All known sites are located in the Walla Walla River Canyon in northeast Oregon. Current distribution of this subspecies is not well known. It is likely this subspecies is restricted to the Blue Mountains.

STATUS

Federal – Not listed
State – None
Region 6 – Sensitive

INTERMOUNTAIN SULPHUR (COLIAS OCCIDENTALIS PSEUDOCHRISTINA)

LIFE HISTORY AND HABITAT

Depending on seasonal conditions, adults of this subspecies fly mostly in late May (e.g. Asotin Co. Washington, 3400 ft.), but individuals have been collected at higher elevations through late June (Minam River, 3000 ft.) and early July (upper Imnaha River, 4400 ft.). The flight periods of C. occidentalis are from May-September, peaking in June through July. This species inhabits open woodland from 1036 to 1524 m (3400 to 5000 ft.), including meadows, roadsides, and open forest. Members of this subspecies are most often found on steep sunny slopes at the ecotone between forest and shrubsteppe or grassland habitats (Warren 2005).

DISTRIBUTION

The subspecies is found from the eastern Blue Mountains in Washington, through the Blue and Ochoco Mountains in Oregon. Numerous locations in northeast Oregon, in the Ochoco, Aldrich, Blue, and Wallowa mountains.

STATUS:

Federal – Not listed
State – None
Region 6 – Sensitive

THINLIP TIGHTCOIL (PRISTILOMA IDAHOENSE)

LIFE HISTORY AND HABITAT

Pristiloma species graze on microscopic periphyton (bacteria, fungi, yeasts and other microscopic organisms) found on moist surfaces of wood, green and decaying vegetation, and rocks (Gowan and Burke 1999). This species is somewhat mesophilic, generally occurring at rather low elevations in ponderosa pine (Pinus ponderosa) and Douglas fir (Pseudotsuga menziesii) forests (Frest and Johannes 1995a), as well as in cedar (Cedrus) and hemlock (Tsuga) forests (Burke 2009, pers. comm.). In general, moist valley, ravine, gorge, or talus sites are preferred, i.e. low on a slope and near permanent or persistent water, but not normally subject to regular or catastrophic flooding (Frest and Johannes 1995a).

DISTRIBUTION

The thinlip tightcoil occurs in Pend Oreille County of northeastern Washington (mostly east of the Pend Oreille River) (Hendricks and Maxell 2005; Burke and Leonard 2009, draft). There is one historical record of this species from the Blue Mountain region in Umatilla County, Oregon (Baker 1932).

STATUS

Federal – Not listed
State – None
Region 6 – Sensitive

HUMPED COIN (POLYGYRELLA POLYGYRELLA)

LIFE HISTORY AND HABITAT

Humped coin feed by scraping algae, yeast, bacteria and diatoms from rock and woody surfaces. Frest and Johannes (1995a) describes habitat as partly open forested talus with rich understory, and diverse forbs, mosses and deciduous shrubs. Moist sites are preferred, low on slope or near persistent water sources, but outside of floodplains. The 2009 site along the Touchet River in the Umatilla NF is in streamside debris, in a forest of grand fir, Douglas-fir, and Sitka spruce.

DISTRIBUTION

The humped coin has been located in the Blue Mountains (15 miles east of Walla Walla) in WA and east of Milton, 2-3 miles up north fork of Walla Walla River in Umatilla Co., Oregon. Recent attempts to relocate Oregon sites have not been successful. In Washington, a site was located in spring 2009 in the Umatilla National Forest, along the Touchet River.

STATUS

Federal – Not listed
State – None
Region 6 – Sensitive

MEADOW FRITILLARY (BOLORIA BELLONA)

LIFE HISTORY AND HABITAT

Larvae feed on Viola (violet) species (Pyle 2002). The butterfly occurs in more natural habitats such as moist meadows, streamsides, aspen parklands, pine woods, and prairies. Adults fly at 600 to 1,500 m (2,000 to 5,000 ft) (Pyle 2002). Records from Oregon indicate an association with moist riparian habitat dominated by Salix sp. and surrounded by coniferous forest (Warren 2005).

DISTRIBUTION

This species was once known from Okanogan, Ferry, Spokane, Whitman, Columbia Counties, but southeastern populations are believed to be extirpated (Pyle 2002). Aside from a colony found on the Loup Loup Road in Okanogan County, recent records of B. bellona in Washington are all from between the northern Okanogan and Columbia rivers (Pyle 2002). Boloria bellona is known from an area around Lehman Springs in the Blue Mountains, Umatilla County. This population has not been seen since 1984, and may be extirpated, although undiscovered populations in this area may also exist. This species is suspected from Baker, Grant, Morrow, Union, and Wallowa Counties (Warren 2005).

STATUS

Federal – Not listed
State – None
Region 6 – Sensitive

LUSTROUS COPPER (LYCAENA CUPREUS)

LIFE HISTORY AND HABITAT

Adults fly erratically and in small numbers at elevations of 1400 to 2600 m (4500 to 8500 ft.). This species has one flight between late May and late August, depending on the altitude and snowmelt (Pyle 2002). The lustrous copper is found along alpine ridges and rockslides; mid-elevation talus slopes, mountain meadows, sagebrush flats, and roadsides (Opler et al. 2011, Pyle 2002). L. cupreus is also sometimes found along streams (NatureServe2011).

DISTRIBUTION

This species has been recorded only at the far northern edge of the state of Washington but in Oregon it is found at high elevations in the Blue, Steen, and Warner Mountains (Pyle 2002). It is documented from Crook, Deschutes, Grant, Harney, Klamath, Lane, Lake, Wallowa, and Wheeler Counties. It is suspected in Baker, Douglas, Jefferson, Malheur, Morrow, Umatilla, and Union Counties.

STATUS

Federal – Not listed
State – None
Region 6 – Sensitive

Management Indicator Species (MIS)

The National Forest Management Act (NFMA) directs the Forest Service to provide habitat to maintain viable populations of existing native and desired non-native vertebrate species. Management Indicator Species (MIS) were selected for emphasis in planning, and are assessed during forest plan implementation in order to determine the effects of management activities on their populations and the populations of other species with similar habitat needs. The amount and quality of habitat is used as a proxy for determining the effects of projects on MIS. All of these Management Indicator Species could be present in the project area (Table 14).

Table 14: Management Indicator Species (MIS) on the Umatilla National Forest

MIS Species	Representing	Habitat Requirements	Habitat Present in Analysis Area
Rocky Mountain Elk	General forest habitat and winter ranges	Forests, meadows, mountain valleys, and foothills	Yes
American Marten	Mature and old growth stands at high elevations	Mature, mesic coniferous forests, with high structural diversity in the understory	Yes
Pileated Woodpecker	Dead/down tree habitat (mixed conifer) in mature and old growth stands	Extensive areas of dense coniferous forests with tall closed canopy, high basal area and large diameter snags	Yes
Northern Three-toed Woodpecker	Dead/down tree habitat (lodgepole pine) in mature and old growth stands	Higher elevation (above 4,500ft) lodgepole pine and mixed conifer forests with a lodgepole component	Yes
Primary Cavity Excavators	Dead/down tree (snag) habitat	Mature higher-elevation coniferous forests for nesting and feeding	Yes

This project is consistent with the 1990 Umatilla National Forest Plan,. The effects to MIS and the rationale for effects determinations follow.

Rocky Mountain Elk (*Cervus elaphus*) is used to represent impact to general forest habitat and winter ranges. The Forest Plan identifies three MIS for old growth, primarily Old Forest Multi-stratum (OFMS)

structured stands: pileated woodpecker, American (pine) marten and three-toed woodpecker. By providing old growth habitat for these species, it is assumed that habitat for other old growth obligate species will be provided as well. Primary cavity excavators as a group were selected to represent dead/down tree (snag) habitat that a wide array of species depend on for reproduction and/or foraging.

GENERAL FOREST MIS - ROCKY MOUNTAIN ELK (CERVUS ELAPHUS)

The proposed action would occur in all seasonal ranges of Rocky Mountain elk on the Umatilla National Forest. Big game management on the Umatilla National Forest is a cooperative effort between the Forest Service, Oregon Department of Fish and Wildlife (ODFW), and Washington Department of Fish and Wildlife (WDFW). The agencies cooperate by managing big game and their habitat according to pre-established Management Objectives (MOs) that are based on social and biological factors for each Big Game Management Unit. Currently MOs are being met or close to being met on several units on the Umatilla.

OLD GROWTH MIS - AMERICAN MARTEN (MARTES AMERICANA)

In Oregon and Washington, American marten are found in montane forests of the southern Oregon Coast Range, Siskiyou Mountains, Cascade Mountains, Blue Mountains, Olympic Peninsula, and northeast Washington (Marcot et al. 2003). American marten are typically associated with late-seral coniferous forests with closed canopies, large trees, and abundant snags and down wood (Zielinski et al. 2001). The forest fish and wildlife database includes 41 recorded sightings of American marten. Currently there are roughly 100,000 acres of source habitat for American marten on the Umatilla National Forest.

OLD GROWTH MIS - PILEATED WOODPECKER (DRYOCOPUS PILEATUS)

Pileated woodpeckers prefer late successional stages of coniferous or deciduous forest, but also use younger forests that have scattered, large, dead trees (Bull et al. 2007). In northeastern Oregon, pileated woodpeckers selected unlogged stands of old-growth grand fir with closed canopies (Bull and Holthausen 1993) and in some cases open stands with high densities of large snags and logs (Bull et al. 2007). . These woodpeckers are rarely found in stands of pure ponderosa pine (Bull and Holthausen 1993). They use large-diameter snags or living trees with decay for nest and roost sites, large-diameter trees and logs for foraging on ants and other arthropods, and are usually in dense canopy to provide cover from predators (Marshall et al. 2006). The forest fish and wildlife database includes about 304 recorded sightings of pileated woodpeckers. Currently there are roughly 200,000 acres of source habitat for pileated woodpecker on the Umatilla National Forest.

OLD GROWTH MIS - THREE-TOED WOODPECKER (PICOIDES TRIDACTYLUS)

The three-toed woodpecker prefers stands where lodgepole pine is either dominant or co-dominant, and uses mostly trees 9” dbh and greater for both nesting and foraging (Bull et al. 1980, Goggans et al. 1987). Suitable habitat is tied to existing levels of diseased and decaying trees with heart rot for nesting and roosting, as well as decaying substrate to provide a prey base for wood-boring insects (Goggans et al. 1987). In particular, three-toed woodpeckers are attracted to areas with high concentrations of beetles, such as habitats created by stand replacing burns or blowdown. The forest fish and wildlife database includes 10 recorded sightings of three-toed woodpecker. Approximately 170,000 acres of source habitat for three-toed woodpecker occurs on the Umatilla National Forest.

PRIMARY CAVITY EXCAVATORS MIS

Primary cavity excavators represent snags and down wood habitat on the Umatilla National Forest. Four woodpecker species including Lewis’s woodpecker, white-headed woodpecker, pileated woodpecker, and three-toed woodpecker have been analyzed previously in this report (see Threatened, Endangered, Proposed, and Sensitive Species and MIS sections). Other primary cavity excavators occur in the project area.

Landbirds

The Northern Rocky Mountains Bird Conservation Plan (Altman 2000) identifies priority habitat types in the Blue Mountain of Eastern Oregon important for landbird species conservation. The project area falls in the riparian woodland and shrub forest type, one of three priority habitats (excluding unique habitat types) identified in the plan.

Altman identifies conservation issues associated with riparian woodland and shrub including but not limited to:

Habitat degradation from livestock overgrazing which can widen channels, raise water temperatures, reduce overstory cover, etc.
Fragmentation and loss of large tracts necessary for area-sensitive species.

3.3.4 Alternative 1 - Environmental Effects - Wildlife

Direct, Indirect, and Cumulative Effects

Under Alternative 1, current management actions would continue, which includes a mix of protection strategies for aquatic resources and ongoing watershed and vegetation management. Watershed and aquatic restoration would be maintained or improved at current rates; slower than rates compared to the action alternative. Furthermore, not only would the Forest continue to implement aquatic restoration at a slower rate, it would miss out on opportunities for the Aquatic Restoration Program to be integrated into larger vegetation projects as they are implemented across the landscape. The Forest would also not be prepared to take advantage of many of the funding opportunities currently available to implement essential watershed restoration projects that would aid in the recovery of aquatic TES species, provide benefits to riparian associated wildlife species, and put watersheds back on an improving trajectory. Potential impacts to terrestrial wildlife species under the Alternative 1 will be similar to the Proposed Action alternative in terms of species affected (Table 15 and Table 16); however, potential impacts would occur at a slower rate and would depend on the scope and scale of the project. Poor aquatic function can act as an environmental stressor for many wildlife species, especially those closely associated with aquatic, riparian, and meadow habitats. Therefore, Alternative 1 could have a minor, indirect negative impact on species health/fitness but will not likely result in a loss of viability, nor lead to a trend toward federal listing for any wildlife species.

Overall, the Umatilla will continue to be managed under the Forest Plan as amended, which will include some aquatic restoration management and protection. Alternative 1, in combination with ongoing management actions under the plan, will have slight positive cumulative impacts to many wildlife species.

3.3.5 Alternative 2 - Environmental Effects - Wildlife

Species dependent on snags could be affected by removing danger trees at specific work sites however this is expected to be a minimal number of snags removed. One of the goals of restoration is to maintain trees and snags in riparian zones as these provide shade and future wood inputs to the stream. Wildlife and invertebrate species that depend on down wood, snags, dwarf mistletoe brooms, dense forest with abundant saplings and small poles, and closed canopy forests for survival and reproduction, will not be detrimentally affected by these projects. Some of the proposed action may occur in old forest stands. In-stream projects will not fragment or decrease connectivity for old growth dependent species.

Direct and Indirect Effects to Threatened, Endangered, Proposed and Sensitive Species

GRAY WOLF

Determination of Effects and Rationale - Wolves may be disturbed or temporarily displaced by proposed activities during implementation. Wolves denning in the area may be disturbed, may abandon their den

site and move their pups to a different location by some of the activities depending on proximity, topography, seasonality of implementation, and the nature of the activity.

The proposed project may affect but is not likely to adversely affect the gray wolf. The rationale for this determination is as follows:

No den or rendezvous sites have been identified west of HWY 395
No risk of direct effects
Indirect effects are discountable and/or insignificant because wolves are wide-ranging, habitat generalist. Prior to specific project activities (west of HWY 395), surveys and coordination with Oregon Department of Fish and Wildlife (ODFW) and US Fish and Wildlife Service (FWS) should be initiated by the Wildlife Biologist. If wolves become established west of HWY 395 and active den and rendezvous sites are identified before or during project implementation, project activities will be consistent with the ARBA II PDCs for protection of ESA-listed wolves and conservation measures will be implemented as appropriate. Wildlife Biologists will refer to "Status and trend of gray wolves and forest management on the Umatilla National Forest" (Berkley and Hickman 2015) white paper to determine appropriate conservation measures in addition to the PDC in ARBA for den and rendezvous sites (i.e., no projects/activities within 1 mile of den or rendezvous sites scheduled to occur between April 15 and June 30). The white paper identifies April 1 through July 15 for activity restrictions around den sites based on local ODFW data in the analysis area. The additional timeframe for avoidance of disturbance will further ensure that effects will remain at the NLAA determination as indicated by FWS concurrence in ARBO II.

NORTH AMERICAN WOLVERINE

Determination of Effects and Rationale - Project areas associated with the proposed action could be used by wolverines as dispersal or foraging habitat. There is potential for increased habitat fragmentation and human presence associated with activities in the project area.

The proposed project would have **no impact** on the North American wolverine. This determination is based on the following reasons:

No known populations currently occupy the Forest
No natal denning habitat within proposed project areas
Habitat suitability would not be affected by the proposed thinning activities. Treated dispersing and foraging habitat would remain dispersing and foraging habitat following implementation.
While highly unlikely, any wolverines potentially encountered will likely be dispersing individuals and will not remain in the area.
If any evidence of wolverines is discovered during project implementation, conservation measures will be implemented as appropriate.

PREBLE'S SHREW

Some activities associated with this project that involve the use of heavy equipment, primarily road relocation, and riparian vegetation treatments **may impact** potential Preble's shrew habitat and individuals but will not likely result in a loss of viability, nor lead to a trend toward federal listing. The majority of proposed activities are outside of preferred Preble's shrew habitat.

BATS (LITTLE BROWN MYOTIS, FRINGED MYOTIS AND TOWNSEND'S BIG-EARED BAT)

The activities associated with the proposed action may impact potential roosting habitat (snags) for the little brown myotis, fringed myotis and Townsend's big-eared bat. Snags will be preserved unless identified as a safety hazard. Some trees may be removed from upland and riparian sites in order to introduce large wood to project streams. However, the amount of area altered as a result of removing a few trees for instream placement is inconsequential. Important roosting habitat in the form of caves,

rocks, abandoned mines, and buildings will not be altered. Bridges will not be altered until after site assessment takes place to determine presence of roosting bats.

Implementation of the proposed action **may impact** individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability for the little brown myotis, fringed myotis, and Townsend's big-eared bat for the following reasons:

The potential exists for the possible removal of snags if deemed a hazard.

RAPTORS (BALD EAGLE, AMERICAN PEREGRINE FALCON, NORTHERN GOSHAWK, GREAT GRAY OWL)

The activities associated with this project will have **no impact** the bald eagle, peregrine falcon, northern goshawk, or great gray owl or their preferred habitat. This determination is based on the following reasons:

Pre-treatment, site specific surveys and project design criteria will be implemented to protect known and discovered nests as appropriate.
Ability to move away from disturbance during project implementation.
The amount of area impacted is inconsequential compared to the total habitat area.

UPLAND SANDPIPER

Past surveys conducted in upland sandpiper habitat suggests the species is not present on Forest Service lands. All historical sites are on adjacent private lands. For these reasons, the proposed project activities would have **no impact** on the upland sandpiper.

LEWIS'S WOODPECKER

Potential hazard tree removal and road relocation activities associated with this project **may impact** preferred Lewis's woodpecker habitat but will not likely contribute to a trend towards federal listing or loss of viability. This determination is based on the following reasons:

The species is known to nest in riparian areas (mainly cottonwood trees).
The potential exists for the possible removal of snags if deemed a hazard. Snag removal may impact potential nesting trees, but the amount of area impacted is inconsequential compared to the total habitat area.
The majority of proposed activities are outside of Lewis's woodpecker habitat.

WHITE-HEADED WOODPECKER

Potential hazard tree removal and road relocation activities associated with this project **may impact** preferred white-headed woodpecker habitat but will not likely contribute to a trend towards federal listing or loss of viability. This determination is based on the following reasons:

The potential exists for the possible removal of snags if deemed a hazard. Snag removal may impact potential nesting trees, but the amount of area impacted is inconsequential compared to the total habitat area.
The majority of proposed activities are outside of white-headed woodpecker habitat

MOUNTAN QUAIL

Proposed activities affecting understory, shrubby vegetation within riparian areas **may impact** mountain quail and their preferred habitat, but will not likely contribute to a trend towards federal listing or loss of viability. This determination is based on the following reasons:

The potential exists for the possible impact to preferred habitat.

COLUMBIA SPOTTED FROG

Implementation of the proposed action **may impact** individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability for the Columbia spotted frog for the following reasons:

The potential exists for possible disturbance to preferred habitat.
Activities using heavy equipment may impact individuals.

ROCKY MOUNTAIN TAILED FROG

Implementation of the proposed action **may impact** individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability for the Rocky Mountain tailed frog for the following reasons:

The potential exists for the possible disturbance to preferred habitat.
Instream activities and activities using heavy equipment may impact individuals.

WESTERN BUMBLE BEE, INTERMOUNTAIN SUPHUR, MEADOW FRITILLARY, AND LUSTROUS COPPER

Some of the proposed project activities **may impact** individuals or habitat of the western bumble bee, intermountain sulphur, meadow fritillary, and lustrous copper but will not likely contribute to a trend towards federal listing or loss of viability for any of these species. This determination is based on the following reasons:

The potential exists for the possible disturbance to preferred habitat (mainly meadows).
Activities using heavy equipment and riparian vegetation treatments (i.e. prescribed fire) may impact individuals.

JOHNSON'S HAIRSTREAK

Habitat important for Johnson's hairstreak will not be reduced due to any aquatic restoration projects. Aquatic restoration activities will not cause reductions in timber or any dwarf mistletoe present. Implementation of the proposed action would have **no impact** on the Johnson's hairstreak for the following reasons:

Timber harvest is not a planned activity with these projects.
The amount of area altered by this proposed action is inconsequential.
This project does not include the removal of any potential dwarf mistletoe habitat.

FIR PINWHEEL, COLUMBIA GORGE OREGONIAN, BLUE MOUNTAINSNAIL, THINLIP TIGHTCOIL, AND HUMPED COIN

Some of the proposed project activities **may impact** individuals or habitat of the fir pinwheel, Columbia Gorge Oregonian, blue mountainsnail, thinlip tightcoil, and humped coin but will not likely contribute to a trend towards federal listing or loss of viability for any of these species. This determination is based on the following reasons:

Potential exists for the possible disturbance to preferred habitat
Activities using heavy equipment may impact individuals

SHINY TIGHTCOIL AND POPLAR OREGONIAN

The proposed action would have **no impact** on the shiny tightcoil and the Poplar Oregonian because potential activities would not occur in preferred habitat and these species have not been documented on the Forest.

Table 15: Summary table of threatened, endangered, and sensitive species, habitat, and effects determinations.

Species	Status	Occurrence	Habitat	Habitat presence in project area	Effect/ Impact
Lynx Canadensis Canada lynx	Threatened	Suspected	Dense Forest	Potential, no critical habitat	No Effect
Canis lupus Gray wolf	Endangered	Documented	Generalist	Suitable habitat	May Affect
Gulo gulo North American wolverine	Proposed Threatened	Suspected	Forests, high elevation, snowpack	Potential foraging habitat	No Effect
Oreamnos americanus Mountain goat (WA only)	Sensitive	Documented	Cliffs, ridgetops	No habitat	No Impact
Ovis Canadensis Rocky Mtn bighorn sheep (WA only)	Sensitive	Documented	Open, rocky slopes, cliff bands	No habitat	No Impact
Sorex preblei Preble's shrew (WA only)	Sensitive	Documented	Open, grass, shrubs, wet	Potential habitat	May Impact
Myotis lucifugus Little brown myotis (WA only)	Sensitive	Documented	Patchy trees, lakes, streams	Potential habitat	May Impact
Myotis thysanodes Fringed myotis (OR only)	Sensitive	Documented	Forests, forest edges, cliffs, caves, snags	Potential habitat	May Impact
Corynorhinus townsendii Townsend's big-eared bat	Sensitive	Documented	Mixed forests, caves, mines, riparian	Potential habitat	May Impact
Haliaeetus leucocephalus Bald eagle	Sensitive	Documented	Lakes, rivers, mature trees, snags	Potential habitat	No Impact
Falco peregrinus anatum American peregrine falcon	Sensitive	Suspected	Open habitat, cliffs, near water	Potential habitat	No Impact
Accipiter gentilis Northern goshawk (WA only)	Sensitive	Documented	Mixed forests, dense, mature trees	Potential habitat	No Impact
Strix nebulosi Great gray owl (WA only)	Sensitive	Documented	Mixed forests, mature trees, meadows, snags	Potential habitat	No Impact
Bartramia longicauda Upland sandpiper (OR only)	Sensitive	Suspected	Open grassland, meadows	Potential habitat	No Impact
Melanerpes lewis Lewis's woodpecker	Sensitive	Documented	Open forests, riparian, snags, burns	Potential habitat	May Impact

Species	Status	Occurrence	Habitat	Habitat presence in project area	Effect/ Impact
Picoides albolarvatus White-headed woodpecker	Sensitive	Documented	Open pine forests, large trees, snags	Potential habitat	May Impact
Pipilo chlorurus Green-tailed towhee (WA only)	Sensitive	Documented	Open, shrubby slopes	No habitat	No Impact
Oreortyx pictus Mountain quail (WA only)	Sensitive	Documented	Shrubby slopes, mixed forests, riparian	Potential habitat	May Impact
Rana luteiventris Columbia spotted frog (OR only)	Sensitive	Documented	Ponds	Potential habitat	May Impact
Ascaphus montanus Rocky Mountain tailed frog	Sensitive	Documented	Perennial rocky streams	Suitable habitat	May Impact

Table 16: Summary Table of Threatened, Endangered, and Sensitive Invertebrate Species, Habitat, and Effects Determinations.

Invertebrate Species	Status	Occurrence	Habitat	Habitat presence in project area	Effect/ Impact
Forestwide					
Radiodiscus abietum Fir pinwheel	Sensitive	Documented	Moist, rocky forests, ravines, water	Suitable habitat	May Impact
Cryptomastix hendersoni Columbia Gorge Oregonian	Sensitive	Documented	Grasslands, open riparian	Suitable habitat	May Impact
Bombus occidentalis Western bumble bee	Sensitive	Documented	Forest edges, meadows	Potential habitat	May Impact
Callophrys johnsoni Johnson's hairstreak	Sensitive	Suspected	Mixed forests w/ dwarf mistletoe	Potential habitat	No Impact
Pristiloma wascoense Shiny tightcoil	Sensitive	Suspected	Mixed forests, deciduous trees, moist, talus	Potential habitat	No Impact
Oregon Only					
Cryptomastix populi Poplar Oregonian	Sensitive	Suspected	Talus slopes, brushy draws, major river basins	Potential habitat	No Impact
Oreohelix strigosa delicate Blue mountainsnail	Sensitive	Suspected	talus, rock outcrops, open forests, riparian	Potential habitat	May Impact
Colias christina pseudochristina **Intermountain sulphur**	Sensitive	Suspected	Open forests, meadow, roadside	Potential habitat	May Impact

Invertebrate Species	Status	Occurrence	Habitat	Habitat presence in project area	Effect/ Impact
Washington Only					
Pristolma idahoense Thinlip tightcoil	Sensitive	Documented	Moist forests, ravines, talus	Potential habitat	May Impact
Polygyrella polygyrella Humped coin	Sensitive	Documented	Moist forests, riparian, water	Suitable habitat	May Impact
Helicodiscus salmonaceus Salmon coil	Sensitive	Suspected	Talus, rocky	No habitat	No Impact
Boloria Bellona Meadow fritillary	Sensitive	Suspected	Moist meadows, open aspen, pine, riparian	Suitable habitat	May Impact
Lycaena cupreu Lustrous copper	Sensitive	Suspected	Montane meadows, roadside, talus	Potential habitat	May Impact
Speyeria egleis Great Basin fritillary	Sensitive	Documented	Meadows, rocky ridges	No habitat	No Impact
Callophrys gryneus barryi Barry's hairstreak	Sensitive	Documented	Juniper woodland, openings	No habitat	No Impact

Direct and Indirect Effects to Management Indicator Species (MIS)

Management Indicator Species (MIS) are utilized to determine the effects of management activities on their populations and the populations of other species with similar habitat needs. The amount and quality of habitat is used as a proxy for determining the effects of projects on MIS.

GENERAL FOREST MIS – ROCKY MOUNTAIN ELK

In general, elk could be temporarily impacted by the proposed activities of this project. Projects could occur on all seasonal ranges. In either case, elk will likely be temporarily displaced from the area during the active period and return during night time hours and upon project completion.

The potential exists to cause disturbance to elk and other big game during the vulnerable winter season if restoration activities are conducted when big game occupies winter range. Generally, aquatic restoration activities don't take place during the winter, however juniper removal activities and/or burning could occur during the winter months. In order to minimize big game disturbance, winter range activities will not take place during periods of big game occupation (see PDCs). Juniper removal over time will improve winter range by allowing increased production of forage and provide for higher ground water flows due to less draw on groundwater from juniper trees.

There will be no impact on forestwide elk population trends, viability, or habitat by the proposed project for the following reasons:

The small size of project areas.
Activities in big game winter range will only be scheduled during periods when big game are not present on the winter range (see PDCs).

OLD GROWTH MIS

The proposed action would not result in any changes or additions to the designated old growth network. There may be some existing old growth habitat adjacent to some project sites.

While some trees may be felled in the riparian area for use for large wood placements in the streambed, the goal is to maintain healthy stands of riparian trees for stream shading and future wood inputs to the stream. If additional large wood is needed for the streambed, it will be moved down from upland sites as approved by a wildlife biologist.

Wildlife and invertebrate species that depend on down wood, snags, dwarf mistletoe brooms, dense forest with abundant saplings and small poles, and closed canopy forests for survival and reproduction, will not be detrimentally affected by the proposed action. Habitat types will not be fragmented or connectivity will not be decreased for old growth dependent species. Therefore, old growth dependent species, will not be negatively impacted as a result of aquatic restoration activities. The proposed activities will not contribute to a negative trend in populations or viability on the Umatilla National Forest for American marten, pileated woodpecker, or three-toed woodpecker.

PRIMARY CAVITY EXCAVATORS MIS

Project activities are not expected to have negative impacts on primary cavity excavators or their habitat with the exception of potential removal of hazard trees but the number would be inconsequential and will not impact forest-wide viability. The project activities are expected to have a negligible impact to snags or down wood and will not result in any changes and/or additions to designated old growth. Project activities will be consistent with the Forest Plan as amended.

Direct and Indirect Effects to Landbirds

The proposed action will aid in the restoration of riparian sites due to the placement of large wood, replacement of damaged or inadequate culverts and the establishment of riparian vegetation. The goal of the project is to work to allow streams to normally interact with the floodplain, allow channels to narrow and deepen, and minimize siltation. This action will not likely impact neotropical migratory birds at the population level and will improve riparian habitats over the long term.

Cumulative Effects - Wildlife

There are no direct effects expected to the gray wolf and indirect effects are expected to be discountable and/or insignificant and not likely to adversely affect wolves from the proposed project. No cumulative effects are expected for gray wolves.

All of the activities considered in this EA have been considered for their cumulative effects on sensitive species with may impact determinations. Past activities including, but not limited to; timber harvest, grazing, recent timber sales, thinning and fuels reduction projects, firewood cutting, and plantation maintenance, have impacted the quantity, quality, and distribution of habitat with some species benefitting and others not in the short term. The proposed project area has experienced habitat fragmentation as a result of past activities and the small area impacted as a result of the aquatic restoration project will not likely have cumulative effects to these species. Future projects that allow prescribed fires to back into riparian areas may have cumulative effects of some sensitive species if implemented within the short term but would not likely lead to a trend towards federal listing. Long term impacts will be positive for these species and most wildlife, as the goal of this project is to restore and improve aquatic habitats and stream hydrology. The effects of project activities on wildlife species when added to all other past, present, and reasonably foreseeable future activities, are expected to have no negative cumulative effects due to the small area impacted, with the exception of potentially allowing prescribed fires to back into riparian areas as mentioned above for some invertebrate species in the short term. There is likely to be beneficial cumulative effects to wildlife species due to the restorative results expected in aquatic, riparian and meadow habitats.

3.4 Botany

The botany report is located on the project website and is summarized in this section of the EA. This section describes sensitive plant species, culturally significant plant species, and invasive plants potentially found in the planning area. Project design criteria (PDC) are proposed to help protect known sensitive plant populations, and to protect potential sensitive plant habitat. PDCs that require protection of special habitats such as lithosols and riparian areas will help to sustain populations of culturally significant plants. Additional PDCs have been developed to discourage introduction and spread of invasive species (Appendix B).

3.4.1 Relevant Laws, Regulations, Policies, Guidance, and Plans

The Endangered Species Act of 1973 (ESA) mandates all Federal departments and agencies to conserve listed species and to utilize their authorities in furtherance of the purposes of the ESA. Section 7(a) (2) directs all Federal agencies to insure that any action they authorize, fund, or carry-out does not jeopardize the continued existence of an endangered or threatened species or designated or proposed critical habitat. The Umatilla National Forest has one listed Threatened plant, Spalding's Catchfly (*Silene spaldingii*). In addition, whitebark pine (*Pinus albicaulis*) is a candidate for federal listing.

Forest Service manual 2672.1 sensitive species management directs that sensitive native plant and animal species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing. There must be no impacts to sensitive species without an analysis of the significance of adverse effects on the populations, its habitat, and on the viability of the species as a whole.

Forest Service manual 2672.4 outlines the required biological evaluation process. The Forest Service shall review all planned, funded, executed, or permitted programs and activities for possible effects on endangered, threatened, proposed, and sensitive species. The objectives of the biological evaluation process are:

To ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native plant, or contribute to a trend towards Federal listing of any species.
To comply with the portion of the Endangered Species Act that requires that actions of Federal agencies not jeopardize or adversely modify critical habitat of federally listed species.
To provide a process and standard by which to ensure that threatened, endangered, proposed, and sensitive species receive full consideration in the decision making process.

Forest Service Manual 2070.2 addresses native plants policy objectives. The objectives of the Forest Service native plants policy are:

- Maintain, restore or rehabilitate native ecosystems so that they are self-sustaining, resistant to invasion by non-native invasive species and/or provide habitat for a broad range of species including, threatened, endangered, and rare species.
- Maintain adequate protection for soil and water resources, through timely and effective revegetation of disturbed sites that could not be restored naturally.
- Promote the use of native plant materials for the revegetation, rehabilitation and restoration of native ecosystems.

Forest Service Region Six revegetation policy directs that:

- Use local native plant species to meet management objectives.
- Follow appropriate seed and plant movement guidelines.

The Umatilla NF Land and Resource Management Plan (USDA Forest Service, 1990) includes the goals, standards and guidelines for ecosystem diversity, threatened and endangered and sensitive species (TES), and wildlife habitat resources.

3.4.2 Methodology

Effects analysis determinations for sensitive plants follow definitions as outlined in Forest Service Manual 2672.42. There is no formal process for analysis of culturally significant plants. Therefore, the discussion of existing condition and potential effects to these species is fairly general. The Umatilla National Forest has been implementing the Umatilla National Forest FEIS Invasive Plants Treatment Project since 2010. The effects discussion for invasive plants tiers to the process outlined in that document.

The list of information sources used to determine which species, and their respective habitats, may occur within, or adjacent to, the Umatilla National Forest are located in it the botany report (see botany report). These information sources were also used to analyze effects to sensitive plants, culturally significant plants, and invasive species.

Botanical surveys have not been done specifically for this project. Project design criteria direct that as specific projects are proposed, botanical surveys will be conducted. Sensitive plants, culturally significant plants, and invasive plants will all be searched for and documented as part of these botanical surveys.

There are very few empirical studies on the impacts of disturbance to most sensitive plant species. The strategy for management of known populations has generally been avoidance of activities that may impact populations. Therefore, all discussion of potential impacts to sensitive plant populations and habitat is based upon general experience and inferred responses based upon observations and studies of more common species.

Although there are some species of plants commonly known to be culturally significant to local tribes, the Umatilla NF does not possess a complete list of species which are important to local tribes. The Forest does not map or track specific populations of culturally significant plants. For this reason, general effects to all habitats have been extrapolated to include impacts to the respective culturally significant species that occur in each habitat.

Rather than evaluate effects to species individually, this analysis places species into major habitat groups. Effects are then discussed in relation to these habitat analysis groups. Sensitive species lists are dynamic and changes to the lists occur every few years as new information is obtained. Using habitat analysis groups to evaluate effects to sensitive species will thus cover potential impacts to sensitive species that are currently on the list, as well as those rare species that may be designated as sensitive in the future. Thus, this analysis does not evaluate effects to specific sensitive species.

The spatial context for this analysis is the Umatilla National Forest. Since plants do not generally move over large areas quickly, and no downstream effects are anticipated, it is not necessary to analyze effects to sensitive plants outside of the Umatilla NF boundary.

The temporal context for effects analysis includes short term and long term effects. Short-term effects are considered to be one to two years after project implementation. These would generally be from direct effects such as destruction due to ground disturbance from heavy equipment, and incineration from burning. Long term effects for this analysis are considered to be more than two years after implementation of all activities. These effects would generally be from indirect effects such as changes in sunlight, erosion rates, hydrologic regimes, and changes in animal grazing patterns and intensity.

The spatial boundary for analyzing cumulative effects to botanical resources is the Umatilla NF. This is because plants do not move across the landscape to any significant extent. The temporal scale for cumulative effects analysis begins around 1860, which is when mining and sheep grazing began to alter the area. It spans through current time to about 30 years into the future. It is thought that the 30-year timeline into the future should account for the potential of increasing temperatures and reduced moisture that are expected to occur if climate change proceeds as predicted.

It is recommended that implementation monitoring of known sensitive plant populations in activity areas is done. Monitoring would largely consist of site visits before and after implementation with the collection of photo points and updated population information. This monitoring would provide assurance that project design criteria as they relate to botanical resources are implemented as planned. Monitoring would also allow an opportunity to confirm that the assumptions used for development of the PDCs are correct. For example, a revisit to areas buffered a certain distance from activities would confirm is the distance is sufficient to prevent blow down, or unacceptable changes in hydrology or sunlight.

3.4.3 Affected Environment - Botany

Federally Listed, Proposed, and Candidate Species

SPALDING'S CATCHFLY (*SILENE SPALDINGII*)

The only documented federally listed plant species on the Umatilla NF, Spalding's catchfly is currently listed as Threatened under the Endangered Species Act. This is defined as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (FWS, 1973). Spalding's catchfly is found at scattered locations in southeastern British Columbia, eastern Washington, northeastern Oregon, and east to northern Idaho and western Montana. It occurs in open grasslands in areas with mostly deep soils. Sometimes it is found in open ponderosa pine and dry Douglas fir forests, and on shrubby slopes within grasslands. On the Umatilla NF, it is known only from the low elevation grasslands on the Pomeroy Ranger District. There is no habitat for this species on any of the other districts of the Umatilla NF.

WHITEBARK PINE (*PINUS ALBICAULIS*)

This species is a candidate for listing under the Endangered Species Act. Candidate species are plant and animal taxa considered for possible addition to the List of Endangered and Threatened Species. These are taxa for which the Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposal to list, but issuance of a proposed rule is currently precluded by higher priority listing actions. Whitebark pine grows in cold high elevation settings on shallow rocky soils. There are several documented stands of whitebark pine present in the high elevation areas in the southern portion of the North Fork John Day Ranger District. There is no habitat for this species on any of the other districts of the Umatilla NF.

Forest Service designated sensitive plant species

There are 46 species of Washington listed Region Six designated sensitive plants species suspected to occur on the Washington portion of the Umatilla National Forest. Of these, eleven species have been documented on the Washington portion of the Umatilla NF. Twenty seven of the suspected and documented species are found in habitats where aquatic restoration activities may be implemented.

There are 96 species of Oregon listed Region Six designated sensitive plants suspected to occur on the Oregon portion of the Umatilla National Forest. Of these, 22 species have been documented on the Oregon portion of the Umatilla NF. Sixty five of the suspected and documented species are found in habitats where aquatic restoration activities may be implemented. See botany specialist report located in the project file for sensitive plant occurrence and effects calls for a complete list of sensitive plant species

for the Washington and Oregon portions of the Umatilla National Forest. This list also identifies which species are documented, and which habitat types each occupies.

Culturally Significant Plant Species

Culturally-significant plants include many important plants that are collected and used by Native American tribal members and/or the general public as food, medicine, or in ceremonial or traditional activities. These species occur in various habitats across the Forest, and include a variety of mushrooms, berries, roots, herbs, twigs, and leaves. It is conceivable that almost any species has some potential use to humans. How much of any particular species is currently collected is impossible to quantify.

Invasive plant species

Invasive plants are defined as non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human health. Invasive plants have the potential to displace native plant communities, increase fire hazards, negatively affect fish and wildlife habitat, degrade rangeland forage, compete with rare and culturally significant plants, increase soil erosion, and adversely affect scenic beauty and recreational opportunities. Because of their competitive abilities, invasive plants can spread rapidly across the landscape, unconstrained by administrative or ownership boundaries.

Often the terms “invasive plants” and “noxious weeds” are used interchangeably; however, there are subtle differences in meaning. Noxious weeds are invasive or otherwise undesirable plants that have been designated by the State of Oregon as being injurious to public health, agriculture, recreation, wildlife, or any public or private property. Species which are identified as invasive, and which are also designated by the state as being noxious weeds, are the target species for treatment and monitoring on the Forest. Here, the terms “invasive plants” and “noxious weeds” are essentially used interchangeably.

Invasive plants tend to colonize disturbed ground along and around developments such as roads, highways, utility (powerline) corridors, cattle watering and loafing areas, logging landings, recreational residences, trails, campgrounds, and quarries. These are all places where native vegetation has been removed and disturbance has created areas for invasive plants to establish. The susceptibility of plant communities to invasion can also be influenced by community structure, and the biological traits of the various invader species.

Sensitive Plant Habitat

The wide-ranging elevation and precipitation zones of the Umatilla National Forest support a wide diversity of plant species and communities. This diversity includes wet to dry grasslands, coniferous forests, sagebrush dominated steppe, wet meadows and diverse riparian areas. Trees adapted to various moisture and temperature regimes define the various forest habitat types. Virtually every habitat may potentially support one or more Forest Service sensitive plant species. Presented below is a general discussion of these habitats. It is not practical to try to quantify how many acres of each habitat type are in the project area.

Owing to the large number of sensitive plant species that may be found within the project area, it is efficient to talk about the broad habitat types (and indirectly the species that occur in those habitat types) most likely to be encountered within the area. For this analysis, plant communities and special habitats are grouped into broad habitat associations. Only the potential vegetation groups present within the planning area are included in the following discussion.

Each sensitive plant species has been assigned to one, or more, of each of the described habitat groups (Botany Report, project file). It is assumed for the purposes of the effects analysis that all plants growing

in a particular habitat would have similar responses to activities. Potential project impacts will be discussed in regards to the habitat type affected.

Most areas that do not support trees are described simply as "non-forested" or "shrub land" in the Forest Service existing vegetation database, and associated GIS layers. There is generally no further distinction for various shrub and grassland types. Due to this generalization, it is not possible to quantify how many acres of various non-forested habitat types are present in the project planning area. Habitat types that occur in the project planning area that conform to the potential vegetation classification system will be briefly discussed, as will special habitats that are not covered by the classification system (e.g. fens).

UPLAND HABITATS

Upland habitats include those areas that are classified as non-wetlands which are generally at a higher elevation than adjacent wetlands, riparian areas, and wetland/riparian zones transition zones (Table 17). Upland habitats occupy the vast majority of acreage on the Forest.

Table 17: Upland Habitat Analysis Groups

Upland Habitat Analysis Group	General Habitat Description (Dominant and Climax Species in Parentheses)	Most Common Plant Association Groups (PAGs)
Upland Forests	**Cold Upland Forests -** Primarily moderate to high elevation conifer forests in the cold montane and subalpine zones (subalpine fir, whitebark pine, Engelmann spruce, lodgepole pine, grouse huckleberry, mountain juniper, pinemat manzanita, and elk sedge).	cold moist UF cold dry UF cool dry UF
	Moist Upland Forests - Moist mixed conifer forests at moderate to high elevations (grand fir, subalpine fir, lodgepole pine, Douglas-fir, Engelmann spruce, Rocky Mountain maple, Pacific yew, big huckleberry, twin-flower, queens' cup bead-lily, and heartleaf arnica)	cool wet UF cool moist UF warm moist UF
	Dry Upland Forests - Primarily fire-adapted conifer forests at low to moderate elevations; this is the most common type on the south half of the Forest (ponderosa pine, Douglas-fir, grand-fir, bitterbrush, snowberry, pinegrass, elk sedge)	warm dry UF hot dry UF
Juniper Woodlands	Here, woodlands are exclusively characterized as areas where western juniper is the dominant climax species. These communities are found most extensively on the southern half of the Forest. (western juniper, mountain mahogany, sagebrush, Idaho fescue, blue bunch wheatgrass)	hot dry UW hot moist UW
Upland Shrub lands	Includes upland ecosystems with little or no tree cover; primarily sagebrush steppe and related habitats, but also includes many other less common shrub land systems (big sagebrush, mountain mahogany, bitterbrush, snowberry, shrubby cinquefoil, basin wild rye, Idaho fescue, blue bunch wheatgrass, prairie June grass)	cold moist US warm moist US hot moist US warm dry US
Lithosols (Scablands)	Often referred to as scablands, lithosols are habitats with very shallow soils on poorly weathered bedrock. Lithosols are often found as small inclusions within a larger matrix of grassland, shrub lands, and woodlands (stiff sagebrush, low sagebrush, Sandberg's bluegrass)	warm dry US
Grasslands and Upland Herb lands	Grassland habitats are generally dominated by bunchgrasses; this group also includes dry meadows dominated by introduced perennial grasses or native forbs (Idaho fescue, blue bunch wheatgrass, needle grasses, Great Basin wild rye, and Sandberg's bluegrass).	cool moist UH warm moist UH warm dry UH hot dry UH
Alpine and Subalpine Herb lands (Fellfields and Parklands)	This habitat group is found in the highest elevation areas, such as mountain tops and ridges at or above timberline. Fellfields are alpine communities that are characterized by rocky soils that support sparse vegetation. Subalpine parklands are treeless plant communities at or immediately below the timberline (alpine sedges, grasses, and forbs).	cold moist UH cold dry UH
Cliffs, Rock Outcrops, and Talus	Cliffs and rock outcrops have vertical faces where very few plants are able to survive. Talus and scree are accumulated boulders, cobbles, and gravel at the base of cliffs or on steep slopes (mosses, lichens, and sparse low-growing vascular plants).	dry UH

UF = upland forest, UW = upland woodland, US = upland shrub land, UH = upland herb land

RIPARIAN/AQUATIC HABITATS

Riparian and aquatic habitats are those that are characterized by a substantial presence of water and/or soil moisture. Aquatic habitats are defined by the persistent presence of flowing or standing water (Table 18). Lakes, streams, marshes and their respective substrates are types of aquatic habitats. The interface, or transition zone, between aquatic and upland systems are classified as riparian habitats.

Table 18: Riparian and Aquatic Habitat Analysis Groups

Riparian/Aquatic Habitat Analysis Group	General Habitat Description (Dominant and Climax Species in Parentheses)	Most Common Plant Association Groups (PAGs)
Riparian Forests and shrub lands	This group includes all riparian areas dominated by woody vegetation. These are usually riverine areas along perennial and intermittent streams. ***Cold Riparian Forests and shrub lands-*** Primarily moderate to high elevation riparian conifer forests in the cold montane and subalpine zones (subalpine fir, Engelmann spruce, lodgepole pine). ***Warm Riparian Forests and shrub lands-*** This is the most common riparian habitat group on the Forest; it includes the vast majority of actively-managed riparian areas at low to moderate elevations, which have the potential to be dominated by woody vegetation (willows, alder, aspen, black cottonwood, hawthorn, red-osier dogwood, pacific yew, Rocky Mountain maple, grand fir, Douglas-fir, birch, currants).	cold high SM RF/RS cold moderate SM RF/RS cold low SM RF warm high SM RF/RS warm moderate SM RF/RS warm low SM RF/RS hot moderate SM RF/RS hot low SM RF/RS
Aquatic Habitats	This group includes habitats that are entirely within flowing or standing or water. This includes lakes, ponds, streams, marshes, and flarks (pondweed, milfoil, creeping spikerush, cattail, torrent sedge, mosses).	high SM RH undescribed PAGs
Moist Meadows and Vernal Swales	Moist meadows and vernal swales are saturated in the spring and early summer, but by late summer the water table has significantly fallen below the soil surface yet still retains enough moisture for wetland species to dominate (Nebraska sedge, Baltic rush, meadow sedge, false hellebore).	warm moderate SM RH
Groundwater-Dependent Ecosystems (GDEs)	Groundwater-Dependent Ecosystems (GDEs) are typically small, but well distributed on the Forest. They often exist as relatively small inclusions in most other habitat types or form larger complexes with other aquatic, alpine, and wet meadow habitats (many obligate and facultative wetland sedges, grasses, mosses, and shrubs). ***Springs-*** GDEs where groundwater emerges and flows into a channel and are often developed for off-site watering of livestock. ***Seeps-*** GDEs where groundwater emerges but does not produce perennial flow. These often do not produce enough water for effective off-site water developments. ***Peatlands and Fens-*** Peatlands are GDEs that accumulate partially decayed plant matter (peat) over hundreds to thousands of years. Peat (histic soil) is partially decayed plant material that accumulates under saturated conditions where there is little oxygen to facilitate decomposition. Fens are the primary type of peatlands on the Forest.	high SM RF high SM RS high SM RH
Wet Meadows	Wet meadows are flooded or saturated throughout the growing season with the water table at or slightly below the soil surface. These areas are typically dominated by obligate wetland species and are characterized by wetland soil types. Often they are features of larger wetland, riparian, or GDE complexes (bladder sedge, aquatic sedge, tufted hair grass, Holm's Rocky Mountain sedge). Marshes	cold high SM RH cool high SM RH warm high SM RH
Dry and Degraded Riparian Meadows and Floodplains	This group includes highly altered and degraded riparian habitats. These areas are characterized by low soil moisture due to lowered water tables and are often dominated by introduced exotic grass species or encroaching conifers (Kentucky bluegrass, meadow foxtail, orchard grass, lodgepole pine, sagebrush, shrubby cinquefoil, sulfur cinquefoil)	cold low SM RF hot low SM RF warm low SM RS hot low SM RS warm low SM RH

SM = soil moisture, RF = riparian forest, RW = riparian woodland, RS = riparian shrub land, RH = riparian herb land

3.4.4 Alternative 1 – Environmental Effects - Botany

Under Alternative 1, new restoration work would only occur after each project went through site-specific development under the NEPA process. Current management would continue. Ongoing activities such as cattle grazing, wildfire suppression and/or containment, firewood cutting, recreation, and road maintenance (including danger tree removal) would continue. It is expected that many riparian areas and aspen stands would continue to decline without active restoration measures. Conifers would continue to encroach upon aspen stands and meadows, potentially shading out sensitive plant habitat, changing hydrological patterns, and decreasing potential for aspen recruitment. These processes and ongoing activities may potentially continue to increase aquatic and riparian habitat degradation, and retard recovery of federally listed and Forest Service sensitive species. Invasive plants would continue to be treated under the Forest Plan, but continued impacts to aquatic and riparian areas may contribute to increased introduction and spread of invasive plants. Negative ongoing impacts to culturally significant plant habitat will also continue under Alternative 1. While the restoration projects may still ultimately be accomplished under Alternative 1, the time needed until implementation would be significantly increased.

By definition, direct and indirect effects (40 CFR 1508.8), and cumulative effects (40 CFR 1508.7) result from the proposed action, and thus are not germane to Alternative 1. Therefore, if Alternative 1 is selected, there would be no direct, indirect, or cumulative effects to sensitive plant populations, or potential habitat. If Alternative 1 is selected, it would lead to an effects call of No Effect (NE) for all federally listed, proposed, or candidate species, and No Impact (NI) for all sensitive plant species. In addition, by not initiating activities there will be no new effects beyond those due to ongoing activities to culturally significant and invasive plants.

3.4.5 Alternative 2 – Environmental Effects - Botany

Direct and Indirect Effects to Federally Listed, Proposed, and Candidate Plants

Spalding's catch-fly is found in dry upland environments; it is unlikely that any may occur in areas where aquatic restoration activities will be implemented. The main activity that may occur in dry uplands is juniper reduction treatment. There is no significant juniper growing in the same area where Spalding's catchfly occurs, so there is no threat to the species due to juniper reduction treatments. Pre-implementation surveys will be done to ensure that no Spalding's catchfly populations are present in aquatic restoration action areas. If any populations are found, they will be protected from negative impacts during implementation of the project. Therefore, implementation of the proposed action will have no effect (positive or negative) to Spalding's catchfly populations or habitat.

Whitebark pine is found in high elevation, dry, upland environments. The main activity that may occur in dry uplands is juniper reduction treatment. There is no juniper growing in the same areas where whitebark pine occurs, so there is no threat to the species due to juniper reduction treatments. There is a slim chance that a few trees may occur in high elevation riparian zones. These areas are in places where restoration activities are unlikely. If any whitebark pine is found during surveys before project implementation, mitigations will be implemented to protect the trees. Therefore, implementation of the proposed action would have no effect (positive or negative) to whitebark pine populations or habitat.

Direct and Indirect Effects to Documented Sensitive Plant Populations

All documented sensitive plant populations will designated as "areas to protect" on all implementation documents. Populations will be buffered from ground disturbing activities during project layout. In the short term, there should be no impact to all documented sensitive plant populations. Improvements in water table levels, streambank stability, and natural hydrologic regimes would improve habitat for documented populations of sensitive plants. This will lead to a long term beneficial impact to documented sensitive plant populations.

Direct and Indirect Effects to Sensitive and Culturally Significant Plant Habitat and Invasive Plants

All sensitive species effects calls are based upon potential impacts to their respective habitats. The discussion that follows here addresses each major habitat group. See botany report located in project file for the complete list of sensitive species and their associated effects calls. Calls are made for both short-term and long-term effects.

UPLAND HABITATS

The vast majority of the Forest's lands will be unaffected by the proposed action. This includes the following habitat types: upland forests, upland shrub lands, lithosols, grasslands, upland herb lands, alpine and subalpine herb lands, cliffs, rock outcrops, and talus. In general, there will be no effects to these habitats, as virtually no proposed activities will occur in these habitats. The only exceptions would be potential effects from establishing staging areas, fence construction, and relocation of recreational impacts. However, due to the insignificant footprint of these activities relative to the land base of these habitats, the effects to these habitats would be immeasurable. Botanical surveys before implementation would ensure that newly discovered sensitive plant populations would be documented and protected. Since no new disturbance will occur, there should be no change in the status of culturally significant, or invasive plants in these habitats. While there may be some negligible yet undetectable effects to these habitats, the project design criteria assure that there will be no impact to sensitive plant populations, and no measurable impact to culturally significant species. In addition, there would be no increased threat of invasive plant introduction and spread into these habitats.

JUNIPER WOODLANDS

Fire exclusion, historic overgrazing, and climate change have facilitated the growth and expansion of juniper in hot dry, shallow-soiled areas. This habitat analysis group is comprised of any areas where juniper has the potential to dominate, including all upland areas where juniper encroachment is considered to be an issue. However, degraded floodplains where juniper is currently, or historically encroaching, is discussed in the dry meadow and floodplains section below.

There are several sensitive, culturally significant, and invasive species that occupy juniper woodlands. Potential sensitive species include Cordilleran sedge (*Carex cordillerana*), Henderson's rice grass (*Achnatherum hendersonii*), woven spore lichen (*Texasporium sancti-jacobi*), and arrow leaf thelypody (*Thelypodium eucosmum*). Habitat for these species may be affected by the proposed action (specifically category 12, juniper removal).

It is assumed that any hand thinning methods of juniper would not cause any disturbance that would promote or spread invasive species or negatively affect sensitive, or culturally-significant species. However, ground-disturbing activities, such as removal of juniper with heavy equipment, coupled with removal of the over story canopy and subsequent greater light infiltration can be expected to disturb sensitive and culturally significant species habitat. PDCs direct that all newly discovered populations of sensitive plant populations would be excluded from any ground-disturbing activities. This would assure that there would be no impact to sensitive plants in the short-term. In the short-term, some habitat for culturally significant plants could be impacted by ground disturbance. However, some root-crop plants actually thrive in highly disturbed areas. In the long-term, sensitive and culturally significant plant habitat may actually be beneficially impacted due to the restoration of historic canopy conditions and water relationships.

Key invasive species in juniper woodlands include knapweeds, Dalmatian toadflax, and the winter annual grasses such as medusa head rye, cheat grass and other annual bromes, and North Africa grass. In many juniper woodlands, these invasive grasses have a strong presence. Once these species infest an area, they can have a strong negative effect on ecosystem function, forage productivity, and fire regimes. In

addition, they are almost impossible to eradicate once they gain a presence in the area. Thus, in this habitat group, the primary environmental management concern is an invasives control issue. For this reason, PDCs prohibit heavy equipment operation and other ground-disturbing activities in areas where invasive annual grasses are present. This PDC would reduce the chances that the proposed action would increase invasive species presence and extent.

RIPARIAN, WETLAND, AND AQUATIC HABITATS

Riparian and wetland habitats are those that are characterized by the substantial presence of water, with riparian areas characterized by their location within the transition zone between aquatic and upland riverine systems. Wetlands are areas that are saturated with water permanently or seasonally, and are not subject to riverine processes. Aquatic habitats include areas with standing water at least part of the year. These include ponds, lakes, streams and rivers The Umatilla NF has many types of riparian, wetland, and aquatic ecosystems that provide unique habitat for a large percentage of its sensitive plant species. Almost all of the sensitive mosses, liverworts, fungi, and lichens are found exclusively in these habitats. The specific habitat types which may experience impacts from the proposed action include riparian forests and shrub lands, moist meadows and vernal swales, aspen forests, wet meadows, ground water dependent ecosystems (GDEs), and aquatic areas.

These habitat types have had some of most significant historical impacts across the Umatilla NF. This degradation has occurred due to a combination of past management actions that include logging, grazing activities, mining, road building, and recreational activities. Many of these areas have been seeded with persistent non-native forage species such as meadow fox-tail and Kentucky bluegrass.

It is expected that the majority of proposed restoration projects will occur in these habitat types. Proposed activities in these areas include placement of woody debris, channel and streambank restoration, spring development and protection, juniper reduction, and road rehabilitation.

Some acute ground disturbance will be involved in the management activities within this habitat group. However, there will be no direct impact from the proposed action to known populations of sensitive species. Several design criteria outline steps to survey for and protect populations, as well as special habitats. This should essentially eliminate any risk to sensitive plants in these areas. The action alternative will have long-term beneficial effects to riparian and aquatic habitats and their associated sensitive species. This is because additional habitat will be created or restored as a result of this project. Because of the relatively large scale of this habitat type and the amount of management action that will take place within it, there may be minimal negative short-term impacts to potential habitat during implementation but long-term impacts will be beneficial. Therefore, the proposed action will have no impact in the short term, and beneficial impact in the long term for sensitive plant species that occur in riparian and aquatic habitats.

The proposed action would help to reduce the infestation and spread of invasive plants. This is because management actions would support the recovery of the native plant communities within these ecosystems. There are several project design criteria that minimize or eliminate risk of invasive plant infestation during and after project implementation. Additional PDCs prescribe the revegetation of areas disturbed during project activities. These PDCs would assure that the proposed action would not lead to new introductions or spread of invasive plants.

Because there are no design criteria specifically protecting culturally significant plant species, there may be some short-term negative impacts to individual plants, and their habitats from project implementation in areas where there would be use of heavy machinery or where other ground disturbance may occur. However, there will be long-term benefits due to the restoration of currently degraded habitats that have

the potential to support these species. Populations of culturally significant riparian species should benefit in the long term from any restoration activities that improve stream and wetland function.

DRY AND DEGRADED RIPARIAN MEADOWS AND FLOODPLAINS

This habitat group is the one that is most in need of restoration. It includes areas that have been heavily altered and degraded by decades of natural and human activities. These meadows are often heavily grazed by native and domestic ungulates. Head-cuts, down-cuts and other changes to hydrology have lowered water tables in these areas and transformed them from wet or moist meadow habitats into dry meadows or rocky floodplains. These areas were historically often converted to non-native perennial forage grasses. When these areas are disturbed by mechanical activities, or heavy grazing, they are often easily colonized by non-native and invasive plant species. In some cases, changes in potential vegetation to forested or woodland vegetation types have occurred due to conifer or juniper encroachment.

These degraded meadow types are generally no longer suitable habitat for many sensitive plant species they once may have supported. However, a few sensitive plant species have been found to inhabit areas of historic disturbance where mineral soil was once exposed. These include Bolander's spikerush (Eleocharis bolanderi), adder's tongue (Ophioglossum pusillum), and several moonwort (Botrychium) species. The distribution and vigor of sensitive species in these areas before historic impacts began are unknown. Historic grazing practices have resulted in loss of potential habitat for these species through general trampling and herbivory, as well as accelerated erosion processes that have altered local surface hydrology.

Project design criteria outline steps that would reduce potential impacts to these habitats. However, pre-implementation surveys should allow projects to be implemented in ways that will not detrimentally impact newly discovered populations. In the short term there should be No Impact (NI) to sensitive plants and habitats in dry degraded riparian meadows. Over the long term, proposed activities would restore appropriate habitat for sensitive species by raising the water table. Therefore would be a long-term beneficial impact (BI) on those species that are found in degraded wet and moist meadow systems.

Degraded meadows and floodplains often experience weed invasions that can overtake the original plant community. Restoring degraded systems using appropriate project design criteria to reduce invasive introductions and to provide revegetation will actively and passively promote the recovery of native species. Therefore, implementation of the proposed action will have direct and indirect beneficial impacts to native plant communities and their resilience to invasions.

Dry and degraded meadows historically provided large areas of habitat for culturally significant root crops. As these meadows have dried up, those habitats have been less productive and less suitable for those species. Because there are no design criteria specifically protecting culturally significant plant species, there may be some short-term negative impacts to individual plants, and their habitats from project implementation in areas where there would be use of heavy machinery or where other ground disturbance may occur. However, there will be long-term benefits due to the restoration of currently degraded habitats that have the potential to support these species. Populations of culturally significant riparian species should benefit in the long term from any restoration activities that improve dry and degraded meadows.

Cumulative Effects - Botany

Cumulative effects are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions" (40 CFR 1508.7)

It is highly likely that historical activities, particularly intensive cattle and sheep grazing, timber harvest, mining activities, road construction, and fire suppression have destroyed populations, and altered habitats for sensitive and culturally significant plants. Since records of rare plant populations have only been kept for the last thirty years, historical effects are not quantifiable. Similarly, since culturally significant plant populations have not been tracked, it is not possible to quantify changes in time to those species populations. It is likely however, that due to habitat degradation (especially riparian, wetland, and aquatic habitats), that populations of culturally significant plants have declined over the last 100 years.

Changes in climate influence vegetation, water, and disturbance frequencies, and these changes, in turn, influence one another. A change in one aspect may cause a cascade of responses that in some cases counteract, and in others may magnify the initial change. Such interactions make prediction of the likely effects of climate change difficult at the scale of the analysis area even if the nature of climate change at the local scale were known.

Logically the species most at risk in a rapidly changing climate regime are those with small geographic ranges (e.g., local endemics, locally rare species), narrow habitat tolerances, limited dispersal abilities, strong interspecific dependencies, low genetic diversity, and those that have recently experienced, or are actively experiencing population declines. Species that are already on mountain tops at high elevations are especially vulnerable. They don't have the option of moving up the mountains to more favorable temperatures. Attempts to quantify the degree of change would be largely speculative at this point.

Since 1990, protection and management of sensitive species and their habitats in the form of project design features, avoidance, or other mitigations have been included in nearly all projects. This is in accordance with forest planning documents and policy set forth in FSM 2670. These policies have reduced the potential of cumulative effects to sensitive plant and culturally significant plant populations and their supporting habitats. All activities will comply with Forest plan standards and RNA Management plans.

Direct and indirect effects to sensitive plant populations and potential habitat have been described above. The determination of either No Impact (NI) or Beneficial Impact (BI) were made for known populations, and potential habitat of sensitive plants in and immediately adjacent to the project planning area. In addition, it was determined that implementation of the proposed action would have very little negative short-term impacts and long-term beneficial effects to habitat for culturally significant species. Project design criteria would ensure that project activities would not lead to increased introduction or spread of invasive plants. Since these determinations indicate that there would be minor or no impact to these resources, there should be no cumulative effects to those resources resulting directly from project activities. It is intended that projects such as this ultimately provide a beneficial impact to sensitive plant, culturally significant plant habitats in the long run, and may even enhance sensitive plant resiliency over time.

3.4.6 Summary of Environmental Effects to Botany

The United States Forest Service biological evaluation (BE) process was completed by a supervisory botanist. This process included a pre-field review of existing habitat and documented population information. USFS and United States Department of Interior, U.S. Fish and Wildlife Service (USDI-FWS). Records were consulted in order to determine which rare plant species and potential habitat may occur in the planning area. Potential direct, indirect, and cumulative effects to habitat types that support sensitive plants were analyzed. The effects calls for each habitat were applied to the respective species that may occur in each of those habitat types.

Alternative 1 does not propose any new activities. Therefore there would be no direct or indirect impacts to sensitive plants, sensitive plant habitat, or federally listed, proposed, or candidate species. In addition, there would be no direct or indirect effects to culturally significant plants and their associated habitats. Nor would there be a change from the baseline condition in the risk of invasive species introduction and spread. Because no management would occur, there would be no proposed action effects to add to ongoing or future actions that would contribute to cumulative effects.

To reduce the risk of detrimental impacts to sensitive plant populations and habitats, project design criteria were incorporated into the proposed action. All documented populations of sensitive plants will be designated as areas to protect for all ground disturbing project activities. As specific projects are planned, botanical surveys would be conducted, and any newly discovered populations would be analyzed for protection or mitigation. Therefore, there will be no impact (NI) to currently documented populations of sensitive plants due to implementation of the proposed action. The proposed action also includes additional project design criteria to protect potential sensitive plant habitat. These project design criteria would also reduce the change of negative impacts to culturally significant plants and their habitat. Additional project design criteria would reduce the risk of new introduction and spread of invasive plants.

All sensitive and culturally significant species that are found in dry upland habitats would not be impacted by potential activities in the proposed action. There would be no short-term or long-term effects since virtually no activities would occur in those areas. The only potential impact would be due to parking equipment or decking logs or other materials in lithosol habitats. There is a PDC that prevents these activities, so any risk of negative impacts to those habitats has been mitigated. Therefore, the effects calls for all sensitive species that are restricted to dry upland habitats is No Effect (NE) for both short-term and long-term impacts.

All sensitive and culturally significant species that are found in degraded meadows, riparian, aquatic, and wetland habitats may potentially be in areas where activities may occur. Pre-implementation surveys and PDCs to protect all sensitive plant populations should effectively protect those sensitive species. Culturally significant species may be negatively impacted by ground disturbance in the short-term. Improved riparian habitat conditions that will be achieved by these projects will ultimately have a beneficial impact (BI) to any sensitive and culturally significant plant species that may occur in project areas. Therefore, the effects calls for all sensitive species that occur in all degraded meadows, riparian, aquatic, and wetland habitats is No Effect (NE) for the short-term, and Beneficial Effect (BE) for the long-term. Since these determinations indicate that there would be minor or no impact to these resources, there should be no cumulative effects to those resources resulting directly from project activities.

Invasive plants will continue to be inventoried and treated in all habitats across the Umatilla NF. PDCs in the proposed action would help to reduce the introduction and spread of these species in the activity areas. The improvement of vegetation conditions and hydrologic processes should result in a reduction of invasive plants in both the short and long terms.

3.5 Soils

The intent of this section is to report if the alternatives comply with relevant laws, regulations, policies, and plans. Many proposed activities will be implemented with heavy machinery use, although other activities that could impact soil are also considered. This soils analysis focuses on erosion and other detrimental soil impacts.

The desired condition is for all activity areas to be left in a conditions that are capable of vegetative growth, water infiltration and stable mineral soils. These desired conditions will be accomplished by maintaining less than 20% detrimental soil conditions (DSCs) impacts on the Umatilla NF. Detrimental impacts include erosion, compaction, puddling, displacement, and detrimental burning. Detrimental soil impacts are at a practical minimum.

3.5.1 Methodology

The project categories are restoration oriented projects that may take place across the Umatilla NF. All projects have specific BMPs to minimize the risk of elevated erosion, puddling, rutting and compaction. Erosion and other detrimental soil impacts including compaction, puddling, and displacement will be the resource indicator for this analysis.

The basis of the effects analysis is the observations and professional judgment of the project soil scientist developed through 18 years of observation of Forest Service projects.

This section concerns only soil outside of stream channels. See the Hydrology and Fisheries sections for discussions of conditions within stream channels.

The spatial boundaries for analyzing the cumulative effects on soil are within 50 feet of the stream channel, except the boundaries would extend further when and where heavy machinery goes further from the stream channel. These boundaries were chosen because they include the area where effects (direct and indirect) may be caused by the proposed activities (FSH.1909.15, 15.2a).

The desired condition is for all activity areas to be left in a conditions that are capable of vegetative growth, water infiltration and stable mineral soils. These desired conditions will be accomplished by maintaining less than 20% detrimental soil conditons (DSC). Detrimental impacts include erosion, compaction, puddling, displacement and detrimental burning. Detrimental soil impacts are at a practical minimum.

3.5.2 Affected Environment - Soils

Effects to the soil resource will be discussed in terms of erosion and other detrimental soil impacts including compaction, puddling, and displacement in this analysis.

EROSION

Soils in riparian areas are highly variable with few consistent soil charateristics due to differences in parent material, topography and erosion history. Soil loss into streams is not limited to any particular particle size. This variety of soil textures will lead to a similar variety of infiltration rates in stream soils. Where silts and clays are present, erosion that may lead to elevated sediment with human activity. Appropriate erosion control can mitigate soil loss and sedimentation. The primary constant for riparian areas is the availability of moisture which provides for quick revegetation after ground disturbance. Additionally, the abundant vegetation makes riparian area soils more resilient for recovering from most human activities.

Roads and livestock are the two main activities that could cause accelerated out-of-channel erosion. Livestock and livestock trailing may cause erosion within riparian areas in dry non-forest. Overall accelerated erosion from human activity is low in the anaylsis area with the following localized exceptions as a partial list: undercut meadows, some stream bank segments, or some regulated and unregulated road segments. Typically these exceptions to low erosion and sediment outputs are the areas targeted for restoration. Sediment from erosion may be deposited on soil before it reaches a stream channel, though some sediment does reach stream channels from roads.

OTHER DETRIMENTAL IMPACTS

The same soil moisture that produces abundant plant growth in riparian areas also makes the soils relatively susceptible to other detrimental soil impacts - compaction, puddling, and displacement. The amount of these impacts, as well as detrimental burning in riparian areas, is variable.

Some causes of high impacts near streams include past concentrated railroad logging, agricultural use prior to becoming part of the National Forest system, livestock concentration, and some dispersed camping. Off highway vehicles may cause compaction, but the only observed case of soil impacts related to them was on tracks created along fences, which likely exist for fence maintenance and may also get use by antler hunters.

About 10% of upland areas of the forest have relatively high impacts to soil. The impacts mostly result from heavy equipment use during past logging and fuels control. In regard to areas within 50 feet of streams, there are probably fewer instances of relatively heavy impacts than in upland areas (fewer than 10%) because of protective measures taken during past activities.

3.5.3 Alternative 1 – Environmental Effects - Soils

No reduction of existing Detrimental Soil Conditions DSCs (i.e. Compaction, and/or Displacement) would occur. Locations left in these detrimental states would continue to have reduced vegetative growth. Another factor of these detrimental conditions is lowered infiltration, this will also induce diminished vegetative growth. With diminished infiltration comes an elevated risk of erosion, with surface run-off or RHCA sites, this condition may lead to chronic erosion conditions. Therefore, this alternative may have a minor negative impact as areas which have already been impacted may continue to deteriorate.

3.5.4 Alternative 2 – Environmental Effects - Soils

Direct and Indirect Effects -Soils

EROSION

Some project activities are expected to never increase out-of-channel erosion. They are: riparian vegetative planting; bull trout protection; and surveys in support of aquatic restoration. These activities do not use heavy machinery or otherwise remove ground cover or cause water concentration.

Most of the other activities may use heavy machinery. Erosion from heavy machinery use would be minimized by General Aquatic Conservation Measures as well as PDCs (see EA Appendices A & B) and by minimizing compaction and puddling, and thus rutting.

Livestock stream crossings and off-channel watering facilities, road and juniper removal effects would be minimized by PDCs (see EA Appendices A & B). It is possible that juniper removal would increase ground cover within a few years, and thereby reduce erosion.

Prescribed (controlled) burning (including for disposal of slash after juniper removal) can involve only low and moderate severity fire, and erosion from fire lines would be minimized, so erosion from

prescribed burning would not be significant. Erosion would be at a maximum during activities, and would decrease to zero by about three years as erosion control measures take effect.

The road and trail erosion control restoration category would reduce areas of chronic erosion by improving drainage and stabilizing road surfaces. Relocating roads out of riparian areas would reduce sediment routing to streams. Reducing fire risk through controlled burning would also reduce the probability of erosion from wildfire.

As noted in the existing condition section, most soils in analysis area tend to have low erodibility. This low erosion is mostly a combination of amounts of effective ground cover and the low precipitation in the analysis area. Because erosion would be kept to a minimum, and because of the low erodibility of most soils, erosion is not expected to significantly affect soil productivity or to introduce a significant amount of sediment from outside channels into channels.

OTHER DETRIMENTAL IMPACTS

Implementation of the restoration activities utilizing heavy equipment may create areas of compaction, puddling, and displacement. These impacts would be minimized by General Aquatic Conservation Measures. They would also be minimized by project design criteria that minimize erosion (see project design criteria by resource listed in appendix B).

Upland timber sales during dry periods detrimentally impact about 10% of an area. Factors that are different for aquatic restoration are as follows:

Soils in aquatic restoration would typically be moister, and therefore more compactable.
Machinery in aquatic restoration is not limited to skid trails, and therefore may affect a larger proportion of the area. On the other hand it is possible aquatic restoration machinery would affect a smaller proportion of the area, because the machinery needs to reach fewer points. Additionally equipment commonly used (excavators) have the ability to rehabilitate their travel corridors, therefore detrimental impacts can be restored before equipment leaves the site.
The area impacted by aquatic restoration machinery would be impacted less, because there would be fewer passes, and the machinery may have less ground pressure than logging machinery.

Consideration of these factors suggests that aquatic restoration machinery would detrimentally impact about 4% of the activity area. Depending upon equipment used, it may be possible to leave less than 1% of the area with a detrimental soil impact. The potential for reducing detrimental soil impacts to this level is if preexisting impacts are restored when found within a planned restoration project with the available equipment.

None of the activities are likely to detrimentally burn soil, because any prescribed (controlled) burning would be kept to low or moderate severity.

Generally, negative impacts to soils are expected to be minimal and short-term. There may be minor, positive long-term impacts to soils as riparian health improves.

Cumulative Effects - Soils

The effects of past and present actions were described previously under the Affected Environment. Past actions that may affect erosion and other detrimental impacts include roads, extensive logging, and in a very few areas, livestock grazing. Past, present, and reasonably foreseeable activities or actions include livestock management, camping, use of off-road vehicles, and limited logging in riparian areas.

Conditions resulting from foreseeable actions are expected to be similar to current conditions. Some soil would recover from past and present actions, but this recovery would be offset by new impacts from foreseeable actions. The effects of the proposed activities would add to the effects of the past, present, and reasonably foreseeable actions.

EROSION

The main past, present, and foreseeable future sources of out-of-channel erosion are roads. The expected increase in out-of-channel erosion from the proposed activities is small, and when added to erosion from roads, is not expected to be measurably greater than erosion from roads alone. Therefore there are no identified cumulative effects to erosion.

OTHER DETRIMENTAL IMPACTS

Detrimental impacts from this project could add to past and present impacts. Detrimental impacts are expected to be minimal and overlap of project effects in time and space would be rare. Cumulative impacts are averted by the project design criteria developed for the soils resource (see Appendices A & B).

3.6 Silviculture

The intent of this section is to report if the alternatives meet required standards and comply with laws, regulations, policies and plans that govern vegetation management. Proposed vegetation treatments would be implemented only for restoration of riparian resources. The composition and productivity of key riparian vegetation would be managed to improve or protect riparian-dependent and/ or ground water-dependent resources.

3.6.1 Relevant Laws, Regulations, Policies, Guidance, and Plans

The vegetation management projects that would be implemented would comply with the Forest Plan as amended, and be designed in accordance with the guidance of the Forest Service Handbook (FSH) 2409.17 Silvicultural Practices Handbook.

The silviculture treatments developed for the projects that would be implemented within riparian habitats and ground water-dependent ecosystems would meet the requirements for the National Forest Management Act. Vegetation treatments would be chosen to enhance riparian-dependent resources and ground water-dependent ecosystems by managing vegetation species composition, density, and structure through time. Best Management Practices (BMPs) and Project Design Criteria (PDC) would be followed so there would be no permanent impairment to these ecosystems as a result of treatments.

3.6.2 Methodology

The projects that would be implemented would be restoration oriented and would not be for the purposes of providing commercial wood products. The basis of the effects analysis is the professional judgement developed over 18 years and studies conducted across the western United States including the Umatilla National Forest.

The spatial analysis area used to develop existing vegetative conditions and to assess direct, indirect, and cumulative effects to riparian vegetation includes the area encompassed by the Umatilla National Forest boundary. The Forestwide Aquatics Restoration Project Area is used for all measures because it encompasses complete watersheds that can be used to assess effects to riparian vegetation at both mid-scale landscape and fine-scale stand.

The temporal scale of the analysis is approximately 20 years. Effects to vegetation can be modeled for longer time frames but confidence in the modeled outputs decline beyond 20 years because the accumulation of assumptions and unknowns. Between year 20 and 100, general estimations about tree growth can be made, but calibrating the model to estimate real-world parameters becomes difficult.

3.6.3 Affected Environment - Silviculture

The condition of the riparian vegetation across the forest is as diverse as the vegetation itself. In some instances the vegetation is within the range of variation and providing the necessary nutrients, shade and large woody debris essential for riparian and stream health. Other areas are outside the desired range of variation due to encroachment and overabundance of conifers. A lack of natural disturbance such as fire with natural recovery, and historically high grazing pressure have factored into the changes in some riparian vegetation (Batchelar, 2015; Van de Water, 2010).

Van de Water and North along with others have studied historical fire in riparian areas. They have noted that in lower elevations the fire return interval and fire severity is very similar to the upland forest. Hunsaker and Long highlighted Fisk et al's work which noted that lower order streams also burned similar to the upland forest (2014). In the higher elevation the fire return interval is longer and more severe than the upland forest. They speculate the reason for this is that the higher elevation riparian areas have greater moister content and lower temperatures may have acted as buffers to fire movement under

non-drought conditions. Conversely, these higher elevation riparian areas would accumulate higher fuel loads because of their high productivity and then burn at higher severity under extreme drought conditions (Van de Water, 2010). Halofsky and Hibbs noted that plant association was the strongest predictor of riparian overstory fire severity (2008). All this documentation establishes that fire is an integral process in the health of riparian areas and the lack of fire within the historic fire return interval would cause changes within these highly productive areas.

Treatments to improve or maintain vegetation associated with ground water-dependent ecosystems would focus on western juniper removal. Western juniper have the ability to affect the output of ground water like springs because of their ability to continue to take up water, and therefore transpire, in soil temperatures of 40°F which would cause greater winter soil water loss (Miller, 2005). Miller et al also modeled soil water depletion rates of both dry years and wet year and determined that regardless of whether the year was wet or dry, juniper would shorten the growing season on sites, and in some uncut stands of juniper the growing season could be reduce by 6 weeks (2005). Several reports have noted an increase in the density and range of western juniper after 1870. Miller et al suggests that 1870 is the separation between pre- and post-settlement and is the approximate time when the fire regimes changed do to the arrival of livestock with first settlers in eastern Oregon, Idaho, and northeastern California (2005). The increase in western juniper density and range could adversely affect the availability of water in these ground water-dependent ecosystems.

The desired condition is to have healthy, sustainable riparian vegetation within the range of variation capable of providing sustainable large woody debris to the stream courses and micro and macro nutrients to the riparian system. Additionally, the desired condition of ground-water ecosystems is to have healthy, sustainable vegetation that is within the range of variation for species composition, density, and structure capable of supporting these ground-water ecosystems through time.

3.6.4 Alternative 1 – Environmental Effects to Silviculture

There would be no changes in vegetation species composition, structure, or density within riparian areas or ground water-dependent ecosystems would occur from aquatic restoration activities. Over time species composition would shift more towards conifers as deciduous trees and shrubs become shaded out. Tree density would also increase through time and trees would compete for sunlight and nutrients. Only a natural disturbance such as flood, fire, or insects would alter the current trajectory of the riparian vegetation. Since there is no anticipated direct or indirect change to the species composition, structure, or density there will be no impacts to silviculture if no action is taken. Compared to Alternative 2, this alternative would have minor negative long-term impacts.

3.6.5 Alternative 2 – Environmental Effects - Silviculture

Restoration activities would be variable based on the desired condition. In some instances, there could be a reduction of tree density or a complete change species composition and structure from conifer trees (true firs, pines, Douglas-fir, spruce, western larch, etc.) to deciduous trees and shrubs (aspen, cottonwood, willow, alder, etc.).

Direct and Indirect Effects - Silviculture

A reduction in tree density would increase the growing space of residual trees providing more available moisture, nutrients, and light. This would improve the residual trees' health and increase growth helping some trees to achieve large-tree status in a shorter period of time. Other trees such as aspen and cottonwoods would grow into the space providing opportunities for ground vegetation.

Reduction of juniper densities within its home range would improve the availability of ground water allowing for more robust growth of residual vegetation and improve the overall health of the ecosystem

and restore the area to its natural range of variability. Additionally, the influx of additional ground water into the system would also allow for more water to be available for wildlife and domestic animals.

Projects addressing these issues would have moderate positive impacts to silviculture.

Cumulative Effects - Silviculture

The existing condition is the culmination of the past and present activities. The effects of proposed activities on riparian vegetation and ground water-dependent ecosystems would improve the overall health, species composition, density, and structure of the residual vegetation while restoring these areas to their range of variation.

3.6.6 Summary of Environmental Effects

All proposed treatments comply with relevant laws, regulations, policies, and the Forest Plan. The treatments proposed would improve the health of the residual vegetation and move areas into the desired range of variation, resulting in moderate positive cumulative impacts.

3.7 Fire and Fuels

The fire and fuels analysis focuses on potential changes as they relate to activity categories #13 Juniper Tree Removal and #14 Riparian Vegetation Treatment (prescribed fire) adjacent or near stream channels. It is unlikely that individual prescribed fires will occur within riparian corridors without also including the adjacent uplands. Discussing the upland areas is outside of the scope of this analysis but would be addressed in a separate and complementary NEPA document. Implementing the two activities would result in changes in fuel characteristics. These changes will impact fire behavior and fire severity within these riparian habitats and connected uplands. This section will also analyze potential impacts to fire and fuels if the proposed Action is not implemented.

Best Management Practices (BMPs) and Project Design Criteria (PDC) would be followed so there would be no permanent impairment to these ecosystems as a result of treatments.

3.7.1 Relevant Laws, Regulations, Policies, Guidance, and Plans

The Umatilla National Forest Land and Resource Management Plan 1990 as amended (FOREST PLAN) provides standards and guidelines for fire and fuels management. Other regulations and policies considered in this analysis include:

- National Forest Management Act
- National Fire Plan
- National Cohesive Wildland Fire Management Strategy

3.7.2 Methodology

The basis of the effects analysis is the observations, experience, and professional judgment of the Fire and Fuels Specialist, in conjunction with best available science. The scale of the analysis is the riparian habitat corridor areas in dry forest types, fire regimes one and two, within the bounds of the Umatilla National Forest.

This report will use Fire Regime Condition Class (FRCC) to indicate the effect the above treatments will have on the natural fire regime. FRCC will be measured by acres treated in two types of treatments; restoration and maintenance. The ecological diversity of riparian ecosystems is maintained by natural disturbance regimes (Naiman, 1993), including fire and fire-related flooding, debris flows and landslides. Moving the landscape towards its natural fire regime would bring back vegetative diversity and the landscapes ability to endure future disturbance events.

3.7.3 Affected Environment – Fire and Fuels

Throughout the Umatilla National forest, wildland fire processes have been altered due to fire exclusion, timber harvest, climate change, and grazing. As a result, fires are now larger and more severe than historic levels, especially in the dry forest types (Quigley & Arbelbide, 1997). Forest structure has been altered. Juniper forests in a 1936 study covered only 420,000 acres in eastern Oregon but today cover 2.2 million acres (Gedney, Azuma, Bolsinger, & McKay, 1999). Juniper encroachment has increased more than 500% in the Blue Mountains since the 1930s (Gedney, Azuma, Bolsinger, & McKay, 1999).

With this increase in juniper across the landscape it is important to understand its fire ecology. As the crown of an established western juniper expands over time, herbaceous production declines from the combined effects of shading, litter accumulation, and soil moisture. Trees create their own fine fuel break, so these stands may be virtually "fireproof" except under the most severe burning conditions. Often mature open stands can be used as fuel breaks. Many western juniper woodlands have advanced to a point where prescribed fire is no longer a viable management option. For example, in extremely dense stands,

prescribed burning would be both hazardous and expensive (Tirmenstein, 1999). These mature stands also limit the effectiveness of wildfire ever being a change agent to reset the plant communities. Western juniper first becomes dominant 30 to 50 years after fire. Young western junipers have thin bark and are readily killed by surface fires. Reoccupation of a site occurs relatively slowly through dispersed seed. These systems need recurring fire to be maintained and or mechanical removal of juniper to restore historic species composition.

Studies have specifically shown hardwood tree and shrub-dominated riparian zones to have declined since the mid-1800s (Lee, Sedell, & Rieman, 1997); (Wisdom, 2000) throughout the Blue Mountains. Many of these areas succeeded into dense stands of fir where shade intolerant shrubs may be absent or in decline (Liquori, 2001). Ultimately, these changes have created a set of systems that are less resilient in the wake of disturbances, such as periodic native insect infestations or recurring wildfires. The overabundance of conifers into riparian areas has changed the ground water and vegetation dynamics within these ecosystems, see hydrology and fish specialist reports.

Riparian areas frequently differ from adjacent uplands in microclimate, and fuel characteristics. These features may contribute to different fire environments, fire regimes, and fire properties (frequency, severity, behavior, and extent) in riparian areas relative to uplands. Moisture content within the fuels can be considerably higher due to factors like relative humidity, available groundwater, topography, and shading. Riparian areas can be impediments to fire spread and fire refugia. Fire refugia are areas with lower effects than the surrounding area, where biota can persist and expand from during and after a fire event. The reduction of riparian habitat and the encroachment of conifers into these systems have blurred the lines between how a fire may effect upland and riparian ecosystems.

FIRE REGIMES

Fire regimes are the classification of the historic combined conditions for fire severity, intensity, and frequency for a particular environment (Agee J. , 1993); (Hann, 2001). They are a cornerstone for describing the natural range of variability within a system. In certain forested riparian areas, fire frequency has generally been lower, and fire severity has been more moderate than in adjacent uplands, but in other areas, fires have appeared to burn riparian areas with comparable frequency (Dwire, 2003).

The regime that is addressed in the two action items is predominately Fire Regime I. In these drier forest types, fire return intervals were generally similar in upland and riparian stands, indicating that fires typically burned the riparian areas with comparable frequency (Olson, 2000). Fire Regime 1 is characterized by low fire return intervals and low-mixed severity fire (less than 75% of dominant over story vegetation replaced). Based on fire history studies by Heyerdahl and Agee (1996) in the Blue Mountains, and Olson (2000) within riparian habitats in these landscapes, fire return intervals were 13-36 years. Because these forests had more frequent fire return intervals, with the advent of fire suppression these portions of the forest tend to be the furthest departed from the Historical Range of Variation (HRV). Condition Class is a way to express this departure from HRV.

CONDITION CLASS

Fire regime condition classes reflect the current conditions' degree of departure from modeled reference conditions. FRCC assessments measure departure in two main components of ecosystems: 1) fire regime (fire frequency and severity) and 2) associated vegetation. Recent analyses have classified the Umatilla National Forest by condition class (Table 1).

Table 19: Existing condition class for the Umatilla National Forest.

Condition Class	Existing Condition (acres)	Existing Condition (percent)
1	415,000	29%
2	279,000	20%
3	684,000	49%

Condition Class 1 represents ecosystems with low (<33 percent) departure; Condition Class 2 indicates ecosystems with moderate (33-66 percent) departure; and Condition Class 3 indicates ecosystems with high (>66 percent) departure. 69% of the Umatilla National Forest is in CC2 and CC3. Condition classes also represent increasing levels of risk from uncharacteristic wildland fire behavior and effects.

DESIRED FUTURE CONDITION

The desired future condition is that all riparian zones would be in and maintained in condition class 1. Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression). Composition and structure of upland and riparian vegetation and fuels characteristics are similar to the conditions that existed under the historical fire regime. Risk of loss of key ecosystem components is reduced.

3.7.4 Alternative 1 – Environmental Effects - Fire and Fuels

There would be no changes in vegetation species composition, structure or density within riparian areas from aquatic restoration activity. No juniper removal would be implemented, therefore juniper encroachment into riparian areas would continue. No prescribed fire would be introduced into riparian areas, so restoration of dry forest riparian species would not occur. Vegetative stands would continue to succeed towards Condition Class III, allowing for increased chance of severe fires and reduction in plant diversity across the Forest. Both would result in continued degradation of riparian zones.

On the Umatilla National Forest, other vegetation management projects may occur and include PDCs #13 and # 14 type activities in riparian areas. However, there are no known or reasonably foreseeable future projects that overlap with the Proposed Action for this project and other projects on the Umatilla National Forest.

3.7.5 Alternative 2 – Environmental Effects - Fire and Fuels

The effects of implementing activities # 13 and # 14 will be described as either restoring or maintaining the riparian ecosystems within a historic range of variation.

Direct and Indirect Effects – Fire and Fuels

Treatments in areas classified as condition class 2 or 3 would have an effect of restoring fuels conditions back to historic variability. Treatment objectives would be to reduce surface fuel loads and kill above ground vegetation redistributing resources (light and water) toward the growth of riparian plant communities. Killing vegetation whether by saw, masticator or prescribed fire redistributes fuel. A short term decrease in 0-3 inch fuels will occur as these surface fuels are consumed. Fire killed conifers will begin to increase surface fuels over time. To meet forest standards and prescribed fire objectives a thinning or piling treatment may be needed pre burn. Snags will be created. In the long term large woody debris (boles of trees) would increase do to decomposition. Standing snags will convert to down woody debris over the long term. The availability or increase in groundwater would return a microclimate in which fire behavior (intensity and severity) would be more in line with historic conditions.

Treatment areas classified as condition class 1 would have an effect of preserving the fuels conditions or rather simulating the effects of a natural fire return interval. Riparian species exhibit a range of adaptations to disturbance that contribute to the rapid recovery of streamside habitats following fire. These include adaptations that facilitate the survival of plants on site, such as sprouting and thick bark, and those that contribute to recolonization of burned sites, including wind and water dispersal, reproductive responses, and the capacity to establish in post fire environments (Stickney, 1986); (Kauffman J. , 1990); (Miller, 2000). As was discussed earlier, these systems experienced 12 year mean fire return intervals. Carefully applied prescribed fire may be the most appropriate treatment in riparian areas that historically burned frequently ((Kauffman J. B., 1997); (Agee J. K., 1999); (Everett, 2003)).

The effect of both treatment types above will be commensurate to the amount of acres treated. The more acres treated the greater the effect they will have. Furthermore the percentage of acres treated within a watershed the greater the effect the treatment will have on that watershed.

Cumulative Effects- Fire and Fuels

The existing condition is the culmination of past and present activities. The effects of proposed activities, reduction of juniper and introduction of prescribed fire, would be an overall improvement of fuel characteristics. Potential for uncharacteristically severe and system damaging fires would be decreased.

3.7.6 Summary of Environmental Effects – Fire and Fuels

Proposed treatments comply with relevant laws, regulations, policies, and Forest Plan. Present conditions show that significant changes have occurred in the fuel characteristics at the landscape level. Prescribed fire and juniper removal and their related design criteria will improve the fuel characteristics within riparian areas. Changing these characteristics will allow the system to respond within the natural range of variation with future disturbances, not eliminate them. In fact the goal would be for disturbances, specifically wildland fire, to continue to play a role in these systems.

3.8 Air Resource

The air resource analysis focuses on potential change as they relate to activity category #14 Riparian Vegetation Treatment (prescribed fire) adjacent or near stream channels. It is unlikely that individual prescribed fires will occur within riparian corridors without also including the adjacent uplands. Discussing the upland areas is outside of the scope of this analysis.

Implementing prescribed fire would result in production of smoke into the air and impact the production of smoke in future wildland fires. This section will analyze potential short or long term impacts to air quality.

3.8.1 Relevant Laws, Regulations, Policies, Guidance, and Plans

The Umatilla National Forest Land and Resource Management Plan 1990 as amended (FOREST PLAN) provides standards and guidelines for air quality management. Other regulations and policies considered in this analysis include:

Federal Clean Air Act (Public Law 95-95)
National Ambient Air Quality Standards
State of Oregon and Washington Smoke Management Plans
Smoke Management Guide for Prescribed and Wildland Fire
Interagency Prescribed Fire implementation Guide

3.8.2 Methodology

Smoke production will indicate the effect prescribed burning will have on air quality. Air quality will be measured by the amount of particulate emissions, tons/acre. Air Quality regulations within the Clean Air Act guide the production of smoke through human management actions.

3.8.3 Affected Environment – Air Resource

As an ecological process, wildland fire is essential in creating and maintaining functional ecosystems and achieving other land use objectives. As a decomposition process, wildland fire produces combustion byproducts that are harmful to human health and welfare.

Smoke is a mix of particulate matter and gases. These include nitrogen dioxide, ozone, carbon monoxide, polycyclic aromatic hydrocarbons and volatile organic compounds. The major pollutant of concern in smoke from wildland fire is fine particulate matter, both PM10 and PM2.5. Eighty to ninety percent of wildland fire smoke is within the fine particle size class (PM2.5), making public exposure to smoke a significant concern, especially for sensitive populations. For example the elderly, young and people with preexisting conditions. Particles can irritate the eyes, nose, throat and respiratory system, and can be inhaled into the deepest part of the lungs. Once smoke enters the atmosphere, its concentration at any one place or time depends on mechanisms of transport and dispersion.

Air Quality is the composition of air with respect to quantities of pollution therein; used most frequently in connection with standards of maximum acceptable pollutant concentrations. Air quality is a measure of the direct effect of smoke.

Table 20: National amibient air quality standards for particle pollution.

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Particle Pollution	PM2.5	primary	1 year	12.0 µg/m3	annual mean, averaged over 3 years

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
		secondary	1 year	15.0 µg/m3	annual mean, averaged over 3 years
		primary and secondary	24 hours	35.0 µg/m3	98th percentile, averaged over 3 years
	PM10	primary and secondary	24 hours	150 µg/m3	Not to be exceeded more than once per year on average over 3 years

Visibility & Haze are impacted by smoke production and must be considered in the management of smoke. Many factors impact visibility within an airshed and it can be difficult to correlate effects of prescribed fire. Clean Air Act (1977 amendment) established the goal of "the prevention of any future, and remedying of any existing, impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution" (Public Law 95-95). Visibility impairment is the indirect effect of smoke.

No Class I Airsheds lie within the bounds of the Umatilla National Forest. There are however three Class I airsheds that are relatively adjacent to the Umatilla National Forest; they are, Eagle Cap Wilderness. Strawberry Mountain Wilderness and the Hells Canyon National Recreation Area.

The surrounding communities of Pendleton, Enterprise, La Grande, and Baker City are listed in the Oregon State Smoke Management Plan as Smoke Sensitive Receptor Areas and thus protected by the highest standards in the plan. Washington State Management Plan describes sensitive areas but does not list them. Sensitive areas in Washington are areas of heavy recreational use and population centers outside designated areas. Population centers that prescribed fire emissions may in pact in Washington are Walla Walla/College Place, Waitsburg, Dayton, Pommeroy, and Clarkston.

On the Umatilla some generalities can be observed about weather patterns. The prevailing winds are from the southwest and west. During the day air is forced up valley and up slope. During the night, air flows down drainages. Inversions are typical and can trap smoke in low lying areas. Smoke managers must consider these and localized weather conditions to minimize the impact to smoke sensitive areas. Prescribed fire within riparian areas would emit smoke at lower elevations and smoke dispersion would be effected by the above mentioned terrain influences.

Several management techniques would be implemented to limit air quality impacts. The use of prescribed fire in this area would create a short-term smoke impact. Prescribed burns would be planned so that factors such as wind direction and air mass stability would help limit the effects of smoke (e.g. smell, eye irritation) on local residents, campers, or the general public. A Prescribed Fire Plan will be developed prior to ignition and will adhere to the Interagency Prescribed Fire Planning and Implementation Procedures Guide. Prescribed burning in the Glass project area would follow smoke management forecasts obtained prior to ignition. Smoke forecast direction would be followed during implementation of prescribed fires. Smoke management forecasts are available daily during normal prescribed fire seasons in the spring and fall, and information and direction is available to implementation personnel by calling the smoke management forecaster.

The following prescribed burning techniques could be used, where appropriate, to minimize smoke emissions and assure that emission objectives are met:

(a) Avoid burning when air stagnation advisories are in effect, during pollution episodes, or when temperature inversions exist
(b) Design burning activities to utilize climatic conditions which favor rapid smoke dispersion
(c) Burn under favorable moisture conditions, utilizing guides developed by PNW Forest Fire Science Library
(d) Accomplish mop-up quickly to reduce residual smoke
(e) Design ignition method and firing technique to aid dispersion
(f) Use smoke models to predict impacts including plume trajectory

Prescribed fires wholly within riparian areas would likely be relatively small. For example a .25 mile segment of a stream with a buffer of 300 feet on either side would be approximately 18 acres in size. Unit's total emissions would therefore be relatively low.

3.8.4 Alternative l- Environmental Effects - Air Resource

Wildfire burning under the existing and future conditions could have the potential to produce smoke levels that exceed visual and health standards. Local research found PM10 smoke production was twice as high for wildfires as for prescribed fire. This is due to wildfires generally occurring during the driest periods of the year in which there are low fuel moistures. Lower fuel moistures means there is more fuel available for combustion.

Research in the Grande Ronde River Basin found the following levels of PM10 smoke emissions (Huff, et al., 1995):

- Wildfire: 0.318 tons or 635 pounds per acre
- Prescribed Burning: .167 tons or 334 pounds per acre

Emissions and smoke from wildfires would most likely occur in patterns similar to current conditions. During the 2017 fire season, parts of Oregon experienced Hazardous levels of smoke. In all, about 160 days reached a level considered unhealthy for sensitive groups.

It is important to note that while wildfire events have the potential to degrade air quality they are not regulated. Under alternative 1 there would be no production of smoke so there would be no impact to air quality.

3.8.5 Alternative 2- Environmental Effects – Air Resource

Air quality will be temporarily directly affected through prescribed burns. It is unknown the scale of impacts. Size of prescribed fire units, location of units, fuel loadings, fuel moistures and atmospheric conditions within those units are unknowns at this time. However, it is reasonable to conclude that meeting project design features, including development of burn plans and requirements, that low-severity burns and limited moderate severity burns used will decrease emissions.

There are two general approaches to managing the effects of wildland fire smoke on air quality:

1. Use techniques that reduce emissions produced for a given area treated.

2. Redistribute the emissions through meteorological scheduling and by sharing the airshed.

Emission reduction techniques must be prescribed to the localized area and in project level prescribed fire plans. Effects are expected to be localized. National, state, and local policies regarding prescribed fire implementation, including smoke management, will be met.

Cumulative Effects- Air Resource

The air resource is shared at a large scale. The effect of one management action such as prescribed fire is cumulative in nature. The smoke produced from an event combines with many other sources of air pollutants. In the west many managers are looking at similar time frames and weather parameters to carry out prescribed fires. These inevitabilities are managed at the state level. State agencies look at weather conditions, where burns are planned, and how much smoke is likely to be produced. They then give a go no go decision for each prescribed fire. Each land manager must accurately depict the amount of emissions there action is likely to produce and get that data to the regulatory agency.

3.8.6 Summary of Environmental Effects - Air Resource

Fuel treatments under Alternative 2 would have a short-term reduction in air quality. At the same time the reduction of fuels and the increase in riparian vegetation has the potential to decrease the amount of smoke produced by future unplanned or planned ignitions. Smoke can be managed. A well thought out prescribed fire plan can communicate burn objectives and estimations of emissions.

3.9 Range

The range analysis focuses on potential changes in vegetation composition and/or vegetation densities by livestock herbivory as a result of implementation of proposed activities in and adjacent to stream channels. This section will also analyze potential short or long term impacts to upland vegetative resource by livestock herbivory if Proposed Action is implemented, or not.

3.9.1 Relevant Laws, Regulations, Policies, Guidance, and Plans

The Umatilla National Forest Land and Resource Management Plan 1990 as amended (Forest Plan) provides standards and guidelines for rangeland management. Where consistent with other multiple use goals and objectives, there is Congressional intent to allow grazing on suitable lands through: Multiple Use Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Policy and Management Act of 1976, and National Forest Management Act of 1976.

3.9.2 Methodology

The basis of the effects analysis is the observations, experience, and professional judgment of the Rangeland Management Specialist, in conjunction with best available science.

Implementing the proposed actions would result in changes of forage availability to livestock, require changes in pasture rotation or rest, alter livestock water sources, and increase maintenance costs.

Measures include: available forage per acre, timing and duration of livestock in pastures, distance to available water, and management time and cost. Resource indicators for grazing management concerns, or Forest Plan standards and measures will be utilized to compare alternatives (Table 21).

Table 21: Resource indicators for grazing management concerns or Forest Plan standard and measures for assessing effects

Activities Proposed under Alternative 2	Grazing Management Resource Indicator	Measure/Mitigation
Prescribed fire in Riparian	Forage availability Pasture rest/ rotation	Available tons/acre Timing of pasture use
Fencing of Stream channels	Water availability Forage availability Pasture rotation Fence maintenance Changed use pattern	Livestock distance to water Available tons/acre Frequency of rotation/moves Cost, management time Change in rotation
Off-channel water development	Water availability Changed use pattern	Number & location of developments Management time
Riparian planting	Pasture rest/ rotation Fence maintenance Forage availability	Timing of pasture use Cost, management time Available tons/acre
Stream crossings	Water availability	Livestock distance to water
Juniper density thinning	Forage availability Changed use pattern	Available tons/acre Management time
All other projects	Time of proposed activity and allotment management overlap	Days

3.9.3 Affected Environment - Range

Native grass and forb species are predominant in the dry forest type, however some areas have been mixed with non-native species (intermediate wheatgrass and Kentucky bluegrass), introduced to stabilize soils along roads, skid trails, and logging landing sites. Some of these same disturbed locations now host populations of invasive plants. Riparian zones consist of meadows with obligate wetland species including native grasses, sedges and rushes, riparian hardwoods and structurally diverse shrublands.

The Umatilla National Forest administers 35 grazing permits on 33 active allotments. Allotment management is reviewed annually prior to the use season. All permits contain structural improvements that are maintained by grazing permittees and the Forest Service. Structural improvements include allotment boundary and pasture fences, small exclosure fences, and watering troughs and ponds. Fences are maintained annually, troughs and ponds are maintained on an as needed basis but typically at least every 5 years. Management activities include herding and trailing of livestock and placing salt blocks throughout the allotments. Management activities occur throughout the grazing season using pick-ups, ATVs, horseback and on foot. Cattle, horses, and sheep are moved on and off of the forest for the grazing season via truck or trailing.

Forage availability is variable across the forest and from year to year based on climatic conditions. The forest currently uses prescribed burning and juniper thinning to reduce fuel loads and encroachment, also resulting in overall increase in forage availability for livestock. The forest currently has adequate forage availability to support ongoing livestock operations of about 46,000 animal unit months or 169,000 tons of dry matter forage (Countryman, 2011).

Tremendous variation often exists among riparian areas of a stream network, and fire behavior and effects will depend on local conditions and position in the watershed (Dwire, K and Kauffman, J.B) Studies have specifically shown hardwood tree and shrub-dominated riparian zones to have declined since the mid-1800s (Lee 1997, Wisdom 2000) throughout the Columbia Basin. Current palatable vegetation in riparian zones consists of hydric and upland grasses as well as palatable shrubs such as willow and alder. It is anticipated that prescribed burning in riparian zones will significantly alter herbaceous and browse species in the long run.

Encroachment and expansion of trees in uplands has reduced herbaceous vegetation in part due to reduction in water infiltration and increased runoff as well as reduction of sunlight dependent grasses, forbs and shrubs. Local studies that compared cut and uncut treatments reported significant increases in herbaceous cover and biomass when juniper trees were removed (Bates 2000).

Generally, cattle will travel about 1 mile to seek water, whereas sheep will travel about 2.5 miles to seek water.

In most cases, livestock have access to aquatic (riparian) vegetation until allowable forage utilization levels are met. Riparian forage utilization standards and the range goals found in the Forest Plan (1990) are the principal management tools used in achieving desired vegetation conditions. Some aquatic (riparian) reaches are excluded completely from livestock grazing by fencing or natural barriers. Occasionally, utilization standards or other impacts are exceeded beyond acceptable levels.

After fencing, water is one of the most frequently used tools for affecting cattle distribution (Ganskopp 2001). Livestock are very habitual and will often preferentially utilize water sources that they have experience with and that they know are safe; often travelling long distances, even passing unknown water sources to use their preferred sites (Holecheck et al. 1995).

Cost of troughs, pipelines and fence maintenance, repair and replacement are incurred annually by grazing permittees. Costs of herding and salting are also incurred annually by grazing permittees.

DESIRED CONDITIONS (FOREST PLAN)

Riparian vegetation will be dense and diverse, contributing shade for water temperature control, stable streambanks and controlled sediment, and complex fish habitat along the banks. Large diameter standing dead and live trees will provide a long-term supply of large woody material for instream fish habitat and channel stability. A variety of other habitats including dead and down tree habitat and satisfactory cover for big game will be found within the riparian area. Forest wildlife species will continue to use riparian habitat areas disproportionately more than any other habitat type. Evidence of streambank trampling from livestock will be less common. Dispersed recreation activities of all types will be abundant and available for a variety of users. Quality riparian management will assist in meeting anadromous and resident fish productivity goals.

Intensive range management, including intensive grazing systems, will be practiced to protect and improve riparian vegetation and anadromous fish and wildlife habitats. Range management techniques that control livestock distribution and timing of use will be used to meet riparian goals. Periods of extended rest may be utilized in some situations where necessary to allow re-establishment of desired shrub communities. Grazing systems utilizing riparian pastures may be required to maintain water quality and protect riparian vegetation. Improvements should be located to encourage livestock use away from the riparian areas. Riparian corridor fencing should be considered on a very limited basis for special applications.

Within 8 years of revision of allotment management plans (AMP's), recovery of hardwood and shrub vegetation will be at least 75 percent of the expected achievement based on riparian classification and inventory.

Range management techniques that control livestock distribution and timing of use will be used to meet riparian habitat goals. Range improvements that maintain or enhance riparian habitat goals will be permitted. Improvements should be located to encourage livestock use away from the riparian areas.

3.9.4 Alternative 1 – Environmental Effects - Range

Desired riparian habitat conditions would not be achieved as quickly as would under the Proposed Action without additional restoration activities, even though the majority of riparian areas with listed ESA fish have been fenced to exclude livestock grazing and access.

Grazing Management Resource Indicators (Table 22) would remain the same as existing condition, due to the numerous existing constraints on the livestock grazing, and the majority of riparian areas with listed ESA fish being fenced to exclude livestock grazing and access.

Potential changes in vegetation composition and/or vegetation densities by livestock herbivory are not expected to vary from the existing condition, nor will there be additional impacts to the upland vegetative resource because nearly all of the allotments are managed under current NEPA where the effects have been analyzed and mitigated.

3.9.5 Alternative 2 – Environmental Effects - Range

The Aquatic Restoration activities proposed would provide a consistent methodology to design, implement, monitor, and document restoration activities such as re-configuring livestock fencing and off-stream water developments to influence more favorable grazing utilization patterns. Thinning and prescribed fire in uplands should enhance and increase favorable herbaceous vegetation. Although less is

known and more variability occurs in riparian area burning, it is likely to positively influence herbaceous and woody browse species (Dwire, K and Kauffman, J.B, 2003).

Table 22: Range resource indicators and measures

Alternative 2 Activities	Grazing Management Indicator	Alternative 1 Existing Condition	Alternative 2 Proposed Action
Prescribed fire in Riparian	Forage availability	600 lbs/acre	Post fire would reduce forage availability in short term (generally 1 year) but increase available forage in longer term. Post fire likely will cause temporary exclusion of livestock in riparian area thus increasing utilization in upland pasture(s).
	Pasture rest/rotation	Variable across forest	Pre fire may require exclusion of livestock to provide more fine fuels to increase rate of spread
Fencing of Stream channels	Water availability	Currently utilizing water from stream	Site specific water availability would generally be lost if excluding livestock from riparian area
	Forage availability/limit	Generally available, not fenced	Site specific forage availability would generally be lost if excluding livestock from riparian area
	Pasture Rotation	Rotation based on forage utilization	Total exclusion of livestock could require a chanced rotational schedule
	Changed use pattern	Distances to upland water limit grazing in suitable area	Total exclusion of livestock could require a changed rotational schedule.
	Fence maintenance	Herding, salting used as distribution tools, few riparian fences currently	Additional fences would require additional funds and maintenance.
Off-channel water development	Water availability	Limited undeveloped spring sources in most areas forest wide	Upland water development generally has positive effects to forage by decreasing areas of overutilization and increasing areas of underutilization.
	Changed use pattern	Distances to upland water limit grazing in suitable areas	Use pattern change will have effect of more even forage utilization throughout allotment.
Riparian planting	Pasture rest/ rotation	Usually fenced, limited	Total exclusion of livestock could require a changed rotational schedule.
	Fence maintenance	Few riparian fences	Additional fences would require additional funds and maintenance.
	Forage availability	Generally available	Fencing of plantations could limit access to riparian forage and water
Stream crossings	Water availability	Currently utilizing water from stream, few fences to limit access	Fencing could limit access to riparian forage and water, increasing use at site
Juniper density thinning	Forage availability	Forage production in lbs/acre limited due to high juniper densities.	Juniper thinning is likely to have effect of substantially increasing forage availability as perennial grasses displace areas where juniper was dominate vegetation type
	Changed use pattern	Search for forage elsewhere	Areas of juniper encroachment will be opened up, allowing for increased trailing
All other projects	Time of proposed	Adjust as needed	Adjust as needed

Alternative 2 Activities	Grazing Management Indicator	Alternative 1 Existing Condition	Alternative 2 Proposed Action
	activity and allotment management overlap		

The cumulative effects analysis area for this report is considered to be the entire grazing allotment in which activities occur. Resoration activities, such as fence installation, have the potential to affect livestock distribution patterns across the entire grazing allotment. These effects are considered for the short term, which would be the next 1-5 years, and the long term, which for the purposes of this report will be the next 25 years. These timeframes are chosen because of changes in management strategies, the need to reevaluate the project periodically, and because of the uncertain effects of varying climatic patterns.

In addition to the proposed action the Forest has other activities that effect grazing management and available forage and water. Projects currently in the planning stages that would affect water sources used by livestock grazing include forest wide vegetation/fuels reduction or restoration activities that include tree thinning and removal. These activities generally have positive effects to herbaceous vegetation as the canopy opens and grasses increase in growth until the canopy closes again, and the forest floor becomes shaded and grass decreases. No anticipated cumulative effect.

Other activities that could affect forage for livestock include prescribed, naturally occurring, and human caused fires. These projects would reduce forage availability in the short term, 1-3 years and overall increase in forage. With tree canopy, an overall increase in forage will occur as the canopy opens and grasses increase in growth, until the canopy closes again and the forest floor becomes shaded and grasses decrease. This generally takes 20-30 years. These other activities combined with similar types of projects in the proposed action will likely result in an increase of grasses and forbs.

Ongoing management and use patterns include salting, fence maintenance, herding, and general allotment management (time spent keeping livestock distributed properly). Although an increase in fences increases fence maintenance costs, it conversely is likely to reduce labor significantly since much of time spent herding is to remove livestock from riparian areas that are not fenced. More fences means more gates, hence, gates can be left open by hunters and other recreationists. This situation can increase the time permittees and grazing managers spend monitoring livestock movement to ensure standards and plans are being met.

3.10 Heritage Resources

The Umatilla National Forest is located in the northern Blue Mountains. The Blue Mountains are the ancestral homeland of people representing the northern Great Basin and the southern Columbia Plateau cultural traditions (Burtchard 1998). Culturally important plant species, such as biscuit root, bitter root, camas, huckleberry and chokecherry, are locally abundant. A variety of wild game and fish, including deer, elk, antelope, trout and salmon, provided additional food resources. Thirteen geochemically distinct natural obsidian deposits provided tool stone which was widely traded out of the area for over 8,000 years can be found south of the Umatilla National Forest on the Malheur National Forest.

The discovery of gold deposits in 1862 led to a rapid displacement of native people by Euro-American and Asian miners and settlers. The gold deposits were largely worked out by 1920, and ranching, which began in the 1860s, became the dominant economic activity. The commercial timber industry prospered as areas of the Forest were opened to timber harvest.

3.10.1 Relevant Laws, Regulations, Policies, Guidance, and Plans

Antiquities Act (1906)
National Historic Preservation Act (NHPA) (1966, amended 2000)
Historic Sites Act (1935)
National Environmental Policy Act (NEPA)
Archaeological and Historic Preservation Act (1974)
American Indian Religious Freedom Act (1978)
Archaeological resources Protection Act (1979, amended 1988)
Native American Graves Protection and Repatriation Act3.11.2 Methodology (1990)

Since 1978 the Forest has actively conducted surveys for cultural resources as mandated by Section 106 of the National Historic Preservation Act. These surveys are generally done to identify cultural resources which could be negatively affected by project activities such as logging, cattle grazing and road construction. Since then over 2,442 inventories have been conducted leading to the identification of about 4,000 archaeological sites and historic features.

3.10.2 Methodology

In 2004 the Forest Service signed a programmatic agreement with the Oregon State Historic Preservation Office (SHPO) which allows for streamlined compliance with the National Historic Preservation Act for numerous undertaking with limited potential to negatively affect cultural resources (Oregon SHPO 2004). As displayed in Table 23 the majority of the aquatics restoration project work covered by this analysis falls under the criteria of undertakings which can receive National Historic Preservation Act clearance using the streamlined procedures.

Table 23 below displays the approach to National Historic Preservation Act compliance which would be used for each of the project categories listed in chapter 2 and fully described in the appendix A.

By following the terms of the 2004 Programmatic Agreement with the Oregon State Historic Preservation Office, cultural resources would be identified and evaluated before any ground disturbing activities which could potentially negatively impact these resources are authorized. Cultural resource sites would either be avoided or any potential impacts would be mitigated following processes developed in consultation with the Oregon State Historic Preservation Office.

Table 23: Common National Historic Preservation Act compliance strategies for aquatic restoration activities. Aquatic restoration project categories are described in more detail in appendix A. National Historic Preservation Act clearance categories are taken from the Oregon SHPO 2004.

Aquatic Restoration Project Category	National Historic Preservation Act clearance categories under the 2004 Preservation Act
1. Fish Passage Restoration (Stream Simulation Culvert and Bridge Projects; Headcut and Grade Stabilization; Fish Ladders; Irrigation Diversion Replacement/Relocation and Screen Installation/Replacement)	Culverts- A-27; Bridge design- Full Inventory; Crossing design- A-20; Head cut and Grade stabilization- A-20 or B-21; Fish Ladders- Full Inventory; Irrigation diversion- A-20 or Full Inventory
2. Large Wood (LW), Boulder, and Gravel Placement (LW and Boulder Projects; Engineered Logjams; Porous Boulder Weirs and Vanes, Gravel Augmentation; Tree Removal for LW Projects)	Large wood and boulder- A-20; Engineered Logjams- A-20, B-21 or Full Inventory; Porous Bolder Structures- A-20; Gravel Augmentation- A-20; Tree removal by felling- B-16; Tree removal by pulling/pushing- Full Inventory
3. Dam, Tide gate, and Legacy Structure Removal	A-28 or Full Inventory
4. Channel Reconstruction/Relocation	Full Inventory
5. Off- and Side-Channel Habitat Restoration	Full Inventory
6. Stream bank Restoration	A-2, A-3, A-4, A-20, C-11, C-34, Full Inventory
7. Set-back or Removal of Existing Berms, Dikes, and Levees	Full Inventory
8. Reduction/Relocation of Recreatiovn Impacts	B-5, B-7, B-8, B-12, B-13, Full Inventory
9. Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering	Livestock fencing- A-1, C-6; Stream crossings- A-1, B-2, B-6, Full Inventory; Off-channel watering facilities- B-6 or Full Inventory
10. Piling and other Structure Removal	A-28, C-25
11. Road and Trail Erosion Control	Road decommissioning and storm proofing- A-27, B-3, B-4, B-5, B-7, B-8, C-4, C-34; Road relocation- Full Inventory
12. Juniper Removal	A-15, B-16, Full Inventory
13. Riparian Vegetation Treatment (prescribed burning)	Burning- B-17; Non-commercial thinning- A-15, B-16
14. Riparian Vegetative Planting	A-1, A-2, A-3, A-4, A-5, A-16, B-1, B-16, C-2, C-9, C-11, C-34
15. Bull Trout Protection	C-7, C-9
16. Beaver Habitat Restoration.	In-channel structures- A-20, C-7, C-9; Habitat restoration- A-2, A-3, A-4, A-8, A-15, A-16, B-1, B-16, B-17, C-6, C-7, C-9, C-11,
17. Fisheries, Hydrology, Geomorphology Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration	C-26

3.10.3 Affected Environment - Heritage

The 3,999 cultural resource sites documented on the Forest as of 2016 include a mix of prehistoric Native American sites, historic period sites, and traditional cultural properties.

Prehistoric sites on the Forest are dominated by a variety of stone tools and tool fragments as well as the waste flakes associated with the manufacture of stone tools. These sites range from very small lithic scatters, indicative of expedient tool manufacture or reworking, to large sites with heavy lithic concentrations or stratified deposits of cultural materials, which suggest heavy and long-term use. Additional prehistoric site types include rock art, stacked rock features, cambium peeled trees, plant

gathering and processing sites, and hunting camps. Human use of the area is believed to span the Late Pleistocene through the Holocene Epochs, a period of up to 14,000 years.

Most prehistoric sites are not directly associated with streams or riparian areas. They tend to be located in areas of drier ground sometimes near these locations but rarely in direct association. Most prehistoric sites would not be impacted by instream work but there can be conflicts in the adjacent drier areas if those are included in the proposed activity area.

Historic sites are primarily related to livestock grazing, timber harvest, mining, and Forest Service administration. Site types include cabins, mining camps, logging camps, refuse dumps, ditches, mine tailings, log watering troughs, lookouts, guard stations, railroad grades, bridges, wagon roads, trails and aspen carvings.

Many historic sites are not directly associated with streams or riparian areas although they may be located in areas of drier ground adjacent to these locations. Historic placer mining features including tailings, ditches, and holding ponds are a major exception and often require mitigation for aquatic restoration work. Historic railroad grades, trestles, and bridges also are sometimes in conflict with stream restoration projects.

Identified traditional cultural properties consist of plant gathering locations important to local Native American tribes. This may include significant patches of huckleberry, choke cherry, willow, biscuit root and bitter root. Traditional cultural properties are rarely in conflict with aquatics restoration projects.

3.10.4 Alternative 1 – Environmental Effects - Heritage

As no project activites would occur under the no action alternative, existing cultural resources would not be impacted. Therefore there would be no direct, indirect or cumulative effects to cultural resources under this alternative, other than the ongoing effects of time and exposure.

3.10.5 Alternative 2 – Environmental Effects - Heritage

By complying with Section 106 of the NHPA using the processes outlined in the 2004 Programmatic Agreement with the Oregon State Historic Preservation Office there would be no significant direct, indirect or cumulative effect to cultural resources under this alternative.

Most work conducted under the proposed project is of a nature that has very limited potential to effect cultural resources. These are exempt from case-by-case review under appendices A, B, and C of the 2004 Programmatic Agreement. Those cleared under appendix B in that document would be inspected or monitored as required under the 2004 Programmatic Agreement.

Most aquatic restoration work to be implemented under this project would have positive effects on traditional plant and animal resources valued by Native American tribes including significant treaty resources such as salmon, steelhead, and lamprey.

3.11 Recreation

The recreation opportunities available on National Forest lands broadly benefit users. For many Americans, public lands provide the only means of experiencing outdoor recreation. The settings and experiences of these lands are important to an overall healthy lifestyle of the American public. Managing recreation resources includes the analysis of projects in regard to how the activities will affect developed and undeveloped recreation sites, uses and activities, as well as recreation settings, and visual quality in which the user experience is presented. This report address the existing situation and potential project effects to, General Forest Areas, Wilderness, Wild and Scenic Rivers, Scenic Areas, Inventoried Roadless Areas (IRAs), and Potential Wilderness Areas (PWAs) and visual resources.

3.11.1 Relevant Laws, Regulations, Policies, Guidance, and Plans

The Umatilla Forest Land and Resource Management Plan (Forest Plan) also establishes goals related to specific resources by management area. The forest goal for recreation resources is "In coordination with and awareness of recreational opportunities on other lands, provide a wide variety of recreation opportunities in an attractive setting, and make those opportunities available to all segments of society".

WILDERNESS

A wilderness area is designated by congressional action under the Wilderness Act of 1964 and other wilderness acts. Wilderness is undeveloped Federal land retaining primeval character and influence without permanent improvements or human habitation (Forest Plan, page GL-45).

Forest Goal – Wilderness - Preserve, protect and improve the resources and values of the Forest's wilderness areas.

WILD AND SCENIC RIVERS

Those rivers or sections of rivers designated as such by congress as Wild, Scenic or Recreational under the 1968 Wilde and Scenic Rivers Act as supplemented and amended. (Forest Plan, page GL-46).

Forest Goal – Wild and Scenic Rivers - Protect and enhance the outstandingly remarkable values and free flowing condition of the Wild and Scenic Rivers.

Wild River – Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with the watershed or shorelines essentially primitive and waters unpolluted.

Scenic River – Those rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

Recreational River – Those rovers or segments of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and may have undergone some impoundment or diversion in the past.

SCENIC AREAS/SCENIC BYWAYS

Places of outstanding or matchless beauty which require special management to preserve these qualities. (Forest Plan, page GL-36).

INVENTORIED ROADLESS AREAS (IRAS)

These areas were identified in the 2001 Roadless Area Conservation Rule in a set of inventoried roadless area maps, contained in Forest Service Roadless Area Conservation Final Environmental Impact Statement, Volume 2, dated November 2000, which are held at the National headquarters office of the Forest Service, or any subsequent update or revision of those maps (36 CFR 294.11). These areas were set aside through administrative rulemaking and have provisions, within the context of multiple use management, for the protection of IRAs. Most IRA boundaries are substantially identical to those

identified as “Roadless Areas” referred to in the 1982 planning rule (36 CFR 219.17) and identified by the Forest Plan, FEIS, Appendix C; however some localized, minor differences in boundaries may exist.

All roadless area acres were allocated to various management area strategies as disclosed in the Forest Plan, Appendix C and described in the Record of Decision (page 6-9) for the FEIS. Some management area strategies were intended to retain the undeveloped roadless character of the roadless area and some management area strategies were intended to develop the lands with timber harvest and road building activities; thus forgoing roadless character.

The purpose of IRA analysis is to disclose project scale impacts to IRAs and determine whether the impacts would substantially alter the undeveloped character of the IRA.

POTENTIAL WILDERNESS AREAS (PWAS)

The Umatilla National Forest conducted a Potential Wilderness Area (PWA) inventory for forest plan revision and updated the inventory in 2010 (2010 PWAs) consistent with agency policy at that time. Only acres of land inventoried as PWA were carried forward into the forest plan revision evaluation and wilderness recommendation process. The forest plan draft EIS was released in 2014 and the 2010 PWA inventory was used to evaluate, analyze, and recommend wilderness in the alternatives.

The purpose of the PWA analysis is disclose project scale impacts to PWAs and determine whether or not the impacts would substantially alter the undeveloped character of the PWA, disclose possible impacts to future forest plan revision wilderness recommendations, and consistency with the Forest Plan.

RECREATION OPPORTUNITY SPECTRUM

The Forest Service uses a nationally recognized classification system called the Recreation Opportunity Spectrum (ROS) to describe different recreation settings, opportunities and experiences to help guide recreation management activities (USDA Forest Service 1986). The Forest Plan has recognized the importance of recreation settings. Each Management Area (MA) is assigned a desired ROS.

“The Recreation Opportunity Spectrum offers a framework within which to explicitly vary situation attributes (access, density, etc.) to produce different recreation settings”. (Recreation Opportunity Spectrum, p. 7) The classification primarily considers vehicular travel mode, and the type of facilities provided within an area.

The ROS classes found in this project area include: Wilderness Primitive, Wilderness Semi-Primitive, Wilderness Transitional, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, and Roaded Modified.

SENSE OF PLACE

Sense of place is addressed to display how the area is perceived by the public, and to display the physical setting in which the project area lies. The Umatilla NF uses the Sense of Place definition:

> *“The identity of a place created by people’s social meanings and attachments, including valued scenery and recreation settings, cultural and spiritual values, economic, social and biophysical characteristics.”*

Managers using the concept of sense of place must define a specific framework for the definition and use of sense of place.

The Forest Service has developed the Recreation NICHE process for recreation facilities analysis. This process was developed to define the particular recreation niche the forest could provide for the public. The Forest defined spatial units that had particular characteristics which could support a defined set of

recreational experiences. The Umatilla NF conducted a recreation facilities analysis which characterized the forest and defined spaces in terms of use and sense of place. (Umatilla Recreation Niche paper-2007).

The project area lies primarily within the Blue Mountains. The Umatilla Forest Niche Statement for this area is as follows:

> *This scenic country rests on the northern edge of the John Day Valley to the Palouse where solitude and tradition are a way of life. For centuries this wild landscape has provided sustenance for Native Americans, early settlers, miners and modern day explorers creating a human connection with the land that cannot be denied. The Umatilla National Forest is known nationally for its quality big game viewing and hunting. With growing cities and small communities surrounding the forest, it's a place to teach and maintain traditional values and recreation activities (hunting, fishing, horseback riding, hiking, gathering, viewing, and winter sports). The forest emphasizes ways for non-traditional visitors to enjoy these activities. Rustic facilities showcasing a rich heritage capture the traditional spirit and connect new and old generations to this timeless landscape.*

FOREST-WIDE SETTINGS, SPECIAL PLACES, AND VALUES

The forest is a vast landscape that spans the Blue Mountains of southeast Washington and northeast Oregon. From rugged mountain ridges and forested hills to sage brush plains, this forest is home to over 300 different wildlife species including one of the largest elk herds in the nation. Wild and Scenic Rivers, Wilderness Areas and other undeveloped areas form the core of this wild landscape. Ranching, logging and grazing are an integral part of this place and have shaped the culture and the land. Freedom, solitude and scenery abound contributing to a quality of life that draws people to this place. Easy access and well located facilities provide incredible settings on this broad landscape.

Concentrated Recreation

Key high recreation use corridors on the forest where more developed facilities will be concentrated. Opportunities exist to connect new visitors to the land and for use to be dispersed out to more remote settings.

Hunting/Dispersed

General forest areas where more rustic facilities support hunting and other traditional recreation activities such as OHV riding, horseback riding and hiking.

Wilderness/Backcountry

Designated Wilderness, Wild and Scenic Rivers and other undeveloped areas that are remote and provide a high degree of solitude with an emphasis on self-reliance.

FOREST-WIDE ACTIVITIES/OPPORTUNITIES/EXPERIENCES

The Forest offers a mix of day-use and overnight facilities in support of traditional activities including hunting, fishing, winter sports, gathering and viewing. Exceptional hunting is the major recreation draw for the forest. Overnight facilities are common, small, and rustic supporting day-use activities. The Area's rich history is showcased as an integral part of the recreation program to further the connection to the land with new visitors.

Concentrated Recreation

Focus higher developed recreation in this setting with key activities of viewing, hiking, picnicking and camping. Work with local communities to define the new/non-traditional visitor demands and focus the outcome in this setting.

Hunting/Dispersed

Focus hunting opportunities in this setting with other traditional activities: OHV riding, horseback riding, backcountry skiing, snowmobiling, gathering and viewing.

Wilderness/Backcountry

Focus on opportunities requiring more self-reliance including, hunting, fishing, horseback riding, hiking and backpacking.

3.11.2 Methodology

Several methods were used to identify primary recreational uses of the Umatilla NF by the public. A nationally recognized classification system called the Recreational Opportunity Spectrum is used to describe different recreation settings, opportunities, and experiences that help guide recreation management decisions and activities on National Forest system lands (USDA Forest Service 1986). The scale of the analysis for the project planning area is the Umatilla National Forest

The Forest's geographic information system (GIS) was used to analyze the proposed activities in regard to recreation use and facilities, dispersed recreation sites, and the recreation opportunity spectrum classes within the analysis area. The recreation analysis considered the area within the proposed project area, unless otherwise noted. GIS was also used to identify Wilderness, Wild and Scenic Rivers, Scenic Areas and Scenic Byways, Inventoried Roadless Areas (IRAs) and Potential Wilderness Areas (PWAs).

Activities associated with any proposed aquatic restoration activities that occur in riparian areas located near or adjacent to developed recreation sites or trailheads, or on or alongside/adjacent to forest roads that access those recreation sites, may cause temporary loss of access or delays of access for the recreating public. Dispersed (user-created) camp sites that may be temporarily or permanently inaccessible if located in, or within close proximity to, riparian areas

The indicators that are used to measure effects to recreation resources are the following:

Developed and Dispersed Camping - Recreation experience and availability (See Forest Plan recreation goals A2, and A6)
Access and Dispersed Recreation Activities - Travel Access, Safety, and Desired Use (See recreation goal A2)
Recreation Opportunity Spectrum - Level of development and settings
Sense of Place - Characteristics consistent with Recreation Niche Statement

The indicators that are used to measure effects on Wilderness and Wild and Scenic Rivers are compliance with the site specific management plans standards and guides for each of these areas.

3.11.3 Affected Environment – Recreation

The existing condition for recreation resources is considered in terms of facilities, travel and access, recreation opportunity spectrum and sense of place.

DEVELOPED RECREATION

The forest manages more than 160 developed recreation sites across the four Ranger Districts which include 41 campgrounds, 2 organization camps, 13 cabin rentals, winter warming shelters, viewpoints, picnic areas, 70 trailheads and several winter warming shelters.

There are approximately 1,400 miles of trail on the forest. The trail system includes the full range of trail class from Trail Class I (least developed) to Trail Class 5 (most developed-typically wheelchair accessible interpretative trails). There are about 400 miles of trail located in the wilderness areas. Some 60% of the trail system is managed for pack and saddle use while many of these trails are also open to motorized travel. The trail system includes about 270 miles are Groomed snowmobile routes. The forest

accomplishes maintenance on approximately 400 miles of trail annually. Trail maintenance activities are focused on user safety and meeting environmental objectives.

UNDEVELOPED CAMPSITES (AKA DISPERSED SITES)

There is not a comprehensive inventory of ***undeveloped campsites*** on the forest; however there are a hundreds of traditional dispersed campsites scattered throughout. A generic description of a dispersed campsite consists of a user-made area that is generally adjacent to a developed road. The site often has a meat pole in the trees, a rock fire ring and a hardened parking/camping surface for one to three families. Dispersed camping has traditionally been a popular activity in the area, particularly during big game hunting season. Some dispersed sites have been regularly used by the same families or group for generations. Other sites are less well used additional opportunities to seek solitude.

WILDERNESS

There are three congressionally designated Wilderness areas on the forest; the 177,000 acres Wenaha-Tucannon Wilderness located on the Pomeroy ranger District, the 20,000 acre North Fork Umatilla Wilderness located on the Walla Walla Ranger District and the 121,000 acre North Fork John Day Wilderness located on the North Fork John Day Ranger District. There is a management plan in place for each wilderness area. These plans identify goals, desired conditions and contain standards and guides for management of the areas.

WILD AND SCENIC RIVERS

There are three congressionally designated Wild and Scenic Rivers; the Wenaha (Pomeroy RD), Grande Ronde (Walla Walla RD) and the North Fork John Day (North Fork John Day RD). There is a comprehensive river management plan in place for each of the rivers. The river plan identify specific outstanding remarkable values that are to be protected and enhanced.

SCENIC AREAS/SCENIC BYWAYS

The Blue Mountains Scenic Byway was established in 1989 under the National Scenic Byway Program. The 130 miles Byway is oriented east/west from the Columbia River near Arlington to Baker City, Oregon. It winds its way for approximately 45 miles through the Heppner and North Fork John Day Ranger Districts.

The 35,000 acre Vinegar Hill/Indian Rock National Scenic Area is located on the southernmost portion of the forest adjacent to the North Fork John day Wilderness on the NFJD RD (22,000 acres) and on portions of the Malheur NF (13,000). Known for its spectacular vistas, Vinegar Hill is the highest point on the forest at an elevation of 8,100 feet.

RECREATION OPPORTUNITY SPECTRUM

Currently the recreation opportunity is classified as shown in the table below. The classifications provide an understanding of the recreation setting in terms of access, remoteness, naturalness, facilities, social encounters, visitor impacts and visitor management. The area is divided into ROS classifications primarily by the available roads, facilities and expected social encounters.

Table 24. Recreation Opportunity Spectrum (ROS) Classification on the Umatilla National Forest

ROS Classification	Acreage	Percent of Total
Wilderness Primitive	117,601	9
Wilderness Semi-Primitive	185,094	13
Wilderness Transitional	1,538	<1
Semi-Primitive Non-Motorized	51,292	4

ROS Classification	Acreage	Percent of Total
Semi-Primitive Motorized	142,698	11
Roaded Natural	442,555	33
Roaded Modified	385,885	29
Total	**1,336,664**	**100**

SENSE OF PLACE

The sense of place is envisioned in the forest recreation niche statement, description of forest wide settings, values and special places, and forest wide activities, opportunities and experiences described above.

INVENTORIED ROADLESS AREAS

There are 24 IRAs are identified on the forest totaling approximately 275,000 acres. These areas are managed per direction in the Forest Plan and per the 2001 Roadless Conservation Rule. Some roadless areas allow motorized use on trails and cross-country snowmobile use. (See maps 1 and 2).

POTENTIAL WILDERNESS AREAS

The 2010 Umatilla National Forest Potential Wilderness Area (PWA) inventory identified 26 PWAs across the forest totaling approximately 300,000 acres. They range in size from 5 to 67,120 acres and typically substantially overlap IRAs. Like IRAs, PWAs are substantially undeveloped and appear natural. For example, signs of development- like the presence of stumps, change in canopy from harvest activities is not readily apparent to the casual observer. Maintenance level 2 or higher roads and are not present though maintenance level 1 roads may be present. These areas were carried forward into forest plan revision evaluation and wilderness recommendation process.

VISUAL RESOURCESS

The visual resource is defined as the scenery as seen by a viewer from a given location, or a travel way like a road or trail. Umatilla National Forest Land and Resource Management Plan direction is to continue to emphasize visual resource quality across the forest through visual management practices. Forest Wide Standards and Guidelines direct the forest to follow direction given in the Forest Service Visual Management System. This system identifies visual quality objectives for different areas (VQOs). The VQO system visual quality objectives in five classes from Preservation to Maximum Modification. Visual Quality Objectives are identified in Forest Plan Management Areas (MAs). The five classes are:

Preservation: Provides for ecological changes only.
Retention: In general means man's activities are not evident to the casual forest observer.
Partial Retention: Man's activities may be evident but must remain subordinate to the characteristic landscape.
Modification: Man's activities may dominate the characteristic landscape, but must, at the same time, utilized naturally established form, line, color and texture. It should appear as a natural occurrence when viewed in foreground or middleground.
Maximum Modification: Man's activities may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.

3.11.4 Alternative 1 – Environmental Effects – Recreation

Direct and Indirect Effects - Recreation

Direct, indirect and cumulative effects on recreation - The Alternative 1 would perpetuate the existing management of the setting, facilities and access.

Developed and dispersed site campers and cabin renters would remain undisturbed by noise, smoke, traffic or other aquatic restoration activities. Dispersed campsite use patterns would remain the same. The forest trail system would not be affected.

There would be no impacts to Wilderness areas, Wild and Scenic Rivers the Blue Mountains Scenic Byway or the Vinegar Hill/Indian Rock Scenic area.

The Recreation Opportunity Spectrum would not be affected by the Alternative 1.

The sense of place would see no effects by the Alternative 1.

There would be no impacts to IRAs or PWAs.

The no action alternative would perpetuate the existing management setting. Visual resources across the landscape would remain unchanged as aquatic restoration activities would occur. Visual resources would continue to be affected by natural process and other activties.

Over time it would be expected that soil erosion, soil compaction, increased stream sedimentation, impaired hydrologic function, dewatered wetlands, and displaced riparian wildlife may cause unwanted impacts to riparian vegetation associated with ongoing activities. Therefore, Alternative 1 would have minor negative long-term impacts.

3.11.5 Alternative 2 – Environmental Effects - Recreation

Direct and Indirect Effects – Recreation

DEVELOPED AND DISPERSED RECREATION

Under Alternative 2 aquatic restoration activities would be implemented within riparian areas as prescribed in the project design criteria for the proposed restoration project. In regard to recreation resources implementing the proposed action Forest-wide there is the potential to engage in aquatic restoration activities at up to 53 developed recreation sites (which includes16 campgrounds and 25 trailheads), and a number of dispersed recreation sites. There are approximately 315 miles of motorized and non-motorized trail, in over 750 trail segments, located in riparian areas outside of designated wilderness areas. Restoration projects could also include activities outside of riparian areas-such as road or trail decommissioning and relocation that has the potential to affect some dispersed camping sites or recreational access.

The campgrounds, rental cabins and disperse campsites could also be affected by smoke from prescribed burning. This could coincide with some of the more popular camping periods (fall hunting season) because conditions during late fall area generally the best times for conducting prescribed burning. Late fall campers (primarily hunters) would be most likely affected.

Some recreationists could be displaced from their desired dispersed campsite, but the effects would be limited to a small number of sites at one time and would cease as soon as project activities are complete. Hunters may be displaced from their favorite dispersed camping site for one season during the prescribed burning window. Numerous alternative dispersed campsites would continue to be available. Project design criteria would include seeking opportunities to conduct burning activities outside of hunting seasons to the extent practicable. Media releases, and signing at trailheads and campgrounds would take place to notify visitors well in advance of proposed activities.

Restoration activities could reduce or eliminate some dispersed sites located in riparian areas. Some dispersed camping opportunities may be lost but generally there are numerous other areas on the forest that could replace lost opportunities for dispersed camping.

Other concerns would occur during project implementation when equipment is working on and along roads. Forest standard operating procedures would include signing of activity along associated roadways.

WILDERNESS AND WILD AND SCENIC RIVERS-WILD SEGMENTS

Mechanized or motorized equipment is prohibited by the 1964 Wilderness Act and will not be used. Proposed exemptions to use prohibited prohibited/mechanized equipment in Wilderness will be analyzed and documented in a site specific Minimum Requirements Analysis (MRA). The interagency Minimum Resource Decision Guide (MRDG) would be utilized to facilitate the analysis and a decision by an authorized officer. All project activities would be in compliance with the Wilderness Act and to the wilderness specific management plan standards and guides and the Forest Plan.

Projects located within Wild and Scenic River corridors will be designed to protect or enhance the outstandingly remarkable values for which the river was designated. Project activities will be in compliance with river specific Comprehensive River Management Plans.

IRAS

Projects will be designed to protect the undeveloped character of the area. Project activities involving road construction or reconstruction and the cutting, sale or removal of timber in inventoried roadless areas are not allowed unless authorized by the Chief of the Forest Service. All projects would be in compliance with the 2001 Roadless Conservation Rule. There is no proposed road construction in IRAs.

PWAS

Projects will be designed to protect the undeveloped character of the area. Proposed project activities that may result in lasting evidence of development (such as more than the incidental presence of stumps from tree cutting activities or disturbance from road construction) that may reduce the number of acres meeting PWA criteria would need to be analyzed is a site specific document. The analysis would need to disclose the effects of actions that could affect future wilderness decisions associate with forest plan revision.

Aquatic restoration projects would generally have positive long term effects on Wilderness, W&SRs, IRAs, PWAs and Scenic Areas in that activities that result in improved watershed conditions help meet management goals identified for these areas.

TRAVEL AND ACCESS

Some open roads or portions of open roads may be temporarily closed during project activities and would be re-opened as soon as possible after restoration work is completed, especially during hunting season.

Generally, there would be no changes to the existing travel system as a result of restoration activities, though there is a potential for restoration activities to include relocation of roads or trails that are open to the public. Existing roads and trails that are open to the public would continue to be available. Increased vehicle traffic during project activities may deter localized recreational user activities.

TRAILS

Restoration activities would take place near or adjacent to many portions of the trail system. Restoration activities may deter localized recreational user activities during implementation. The trail system would continue to be available during and after restoration activities. Generally, there would be no changes to the trail system though some trail segments may be decommissioned and relocated.

RECREATION OPPORTUNITY SPECTRUM

The restoration activities do not propose actions that would alter effects to the Recreation Opportunity Spectrum in any appreciable way. Some undeveloped campsites may be altered by treatment but these changes would not alter the opportunities to a degree that would change the ROS classifications.

SENSE OF PLACE

The project is not expected to make any significant effects that are inconsistent with the Forest niche statement that describes the desired sense of place. The usage and settings are expected to remain consistent.

VISUAL RESOURCES

Visual resources could be impacted both negatively and positively by aquatic restoration activities. Mitigation measures that are needed to meet Forest Plan VQOs for a project area would be identified in project design criteria. There may short term effects to visual resources as a result of restoration activities, such as the presence of freshly disturbed soil or unnaturally appearing openings. However, it is expected that VOQs for the area would be met after a period of 2-5 year as mitigating activities such as replanting native vegetation as prescribed in project design criteria take hold.

Overall, Alternative 2 would have some minor negative short-term impacts.

Cumulative Effects - Recreation

The past, present and reasonably foreseeable activities that would contribute to the accumulation of effects in conjunction with this project would be those that would alter the set of recreation opportunities, and experiences that are currently available to the public. Proposed aquatic restoration activities would be designed to be in compliance with Forest Plan forest-wide standards and guidelines and with Management Area specific VQOs for managing the visual resources. Applicable site specific Wilderness, W&SR, and Scenic Area management plans, and IRA management per the 2001 Roadless Area Conservation Rule limit the magnitude of potential effects. Any cumulative impacts would be limited and of short duration.

3.12 Relevant Laws, Regulations, Policies, Guidance, and Plans

National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires federal agencies to consider and disclose the effects of proposed actions that significantly affect the quality of the human environment. This EA analyses two alternatives and displays the effects in conformance with the Act (40 CFR 1500 to 1508 and FSH 1909.15). The FONSI statement is available within the Decision Notice.

National Forest Management Act

This Project is consistent with the standards and guidelines, goals and objectives, and desired future conditions of the 1990 Umatilla Land and Resource Management Plan as amended, required by the National Forest Management Act.

Endangered Species Act

This decision is compliant with the legal requirements set forth under section 7 of the Endangered Species Act (16 U.S.C. 1536 (c)). The final EA discloses potential impacts to federally listed, proposed and candidates species as described below. No proposed or federally-listed botanical or invertebrate species exist or have been identified within the Aquatic Restoration project area.

The Aquatic Restoration EA tiers to two Biological Opinions: the April 25, 2013 National Marine Fisheries Service (NMFS) document "Endangered Species Act – Section 7 Programmatic Consultation Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for Reinitiation of Aquatic Restoration Activities in States of Oregon and Washington (USDC NMFS 2013); and the July 1, 2013 US Fish and Wildlife Service (FWS) document "Endangered Species Act – Section 7 Consultation Programmatic Biological Opinion for Aquatic Restoration Activities in the States of Oregon, Washington and portions of California, Idaho and Nevada (USDI FWS 2013)". Effects to species implementing the project activities listed on the ESA on the Umatilla NF are included in these Biological Opinions.

The Aquatic Restoration EA was discussed August 14, 2018 at a Umatilla interagency Level 1 Section 7 consultation meeting (notes on file, Pendleton OR). As described in Appendix D, local Section 7 consultation is in compliance with two BOs (listed above) and will meet requirements for Section 7 consultation.

National Historic Preservation Act

In 2004 the Forest Service signed a programmatic agreement with the Oregon State Historic Preservation Office (SHPO) which allows for streamlined compliance with the National Historic Preservation Act for numerous undertaking with limited potential to negatively affect cultural resources (Oregon SHPO 2004). The the majority of the aquatics restoration project work covered by this analysis falls under the criteria of undertakings which can receive National Historic Preservation Act clearance using the streamlined procedures.

Section 3.10.1 displays the approach to National Historic Preservation Act compliance which would be used for each of the project categories listed in chapter 2 and fully described in the appendix A.

By following the terms of the 2004 Programmatic Agreement with the Oregon State Historic Preservation Office, cultural resources would be identified and evaluated before any ground disturbing activities which could potentially negatively impact these resources are authorized.

Cultural resource sites would either be avoided or any potential impacts would be mitigated following processes developed in consultation with the Oregon State Historic Preservation Office.

Executive Order 12898: Environmental Justice

As required by law and Executive Order 12898 from 1994, all Federal actions should consider potentially disproportionate effects on minority or low-income communities. Potential impact or change to low-income or minority communities within the proposed action area should be considered. Where possible, measures should be taken to avoid negative impacts to these communities or mitigate the adverse effects.

Overall, the proposed action would result in no change on low income or minority populations. There would be no change to the traditional use of the land and no change in economics. There would be no displacement of minorities, changes of land use, or increases in taxes that would constitute an economic hardship. There would be no cumulative impacts since there are no direct or indirect effects to environmental justice. No minority or low-income populations are expected to be affected by implementation of any of the alternatives.

USDA Civil Rights Policy

The Civil Rights Policy for the USDA, Departmental Regulation 4300-4 dated May 30, 2003, states that the following are among the civil rights strategic goals; (1) managers, supervisors, and other employees are held accountable for ensuring that USDA customers are treated fairly and equitably, with dignity and respect; and (2) equal access is assured and equal treatment is provided in the delivery of USDA programs and services for all customers. This is the standard for service to all customers regardless of race, sex, national origin, age, or disabilities.

Disparate impact, a theory of discrimination, has been applied to the planning process in order to reveal any such negative effects that may unfairly and inequitably impact beneficiaries regarding program development, administration, and delivery. The objectives of this review and analysis are to prevent disparate treatment and minimize discrimination against minorities, women and persons with disabilities and to ensure compliance with all civil rights statutes, Federal regulations, and USDA policies and procedures.

The projects, given the size of potential social and economic effects, are not likely to result in civil rights impacts to Forest Service employees or customers of its program.

Civil Rights, Women, and Minorities

No adverse effects on civil rights, women, and minorities not already identified in the FEIS for the Forest Plan would be expected to result from implementation of any alternative. All action Alternatives would be governed by Forest Service contracts, which are awarded to qualified contractors and/or purchasers regardless of race, color, sex, religion, etc. Such contracts also contain nondiscrimination requirements.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights of-way or road.

The projects within the aquatics restoration are not considered irreversible or irretrievable commitments of any resource.

Floodplains, Executive Order 11988

Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. The short-term impacts and long-term benefits are disclosed in the analysis as well as BMPs to protect water quality. This action complies with the direction of E.O. 11988 which directs management agencies to use the most "practicable means and measures to minimize harm". Long-term benefits would outweigh short-term impacts. This project is consistent with the E.O. 11988.

Wetlands, Executive Order 11990

Executive Order 11990 requires that the Forest Service to "avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative". The short-term impacts and long-term benefits are disclosed in the analysis as well as BMPs to protect water quality. This project is consistent with the E.O. 11990.

Clean Water Act

This decision meets or exceeds state requirements in accordance with the Clean Water Act for protection of waters of the State of Oregon (OAR Chapter 340-341) through planning, application, and monitoring of Best Management Practices in conformance with the Clean Water Act, regulations, and Federal guidelines. All of the activities proposed as part of this decision are designed to be consistent with the Clean Water Act. In addition to our water quality analysis, we conducted a thorough review of the water use permits in the analysis area. We found that the decision does not conflict with any beneficial uses of water.

Municipal Watersheds

This project will follow Forest Plan direction for municipal watersheds.

Energy Requirements

No adverse effects on energy requirements would be expected to result from implementation of any alternative.

Prime Farmland, Rangeland, and Forest Land

The Secretary of Agriculture issued memorandum 1827 which is intended to protect prime farm lands and rangelands. No adverse effects on any prime farmland, rangeland, and forestland would be expected to result from implementation of the Aquatics Restoration Project.

Climate Change

This proposed action would affect small project areas within riparian corridors. This scope and degree of change would be very minor relative to the other management actions additionally, very few of the project design categories involve removing vegetation.. Climate change is a global phenomenon because major greenhouse gasses (GHG) mix well throughout the planet's lower atmosphere (IPCC 2013). Considering emissions of GHG in 2010 was estimated at 49 ± 4.5 gigatonnes globally (IPCC 2014) and 6.9 gigatonnes nationally (US EPA, 2015), a project of this magnitude makes an infinitesimal contribution to overall emissions. Therefore, at the global and national scales, this proposed action's direct and indirect contribution to greenhouse gasses and climate change would be negligible.

In addition, because the direct and indirect effects would be negligible, the proposed action's contribution to cumulative effects on global greenhouse gasses and climate change would also be negligible.

The Intergovernmental Panel on Climate Change has summarized the contributions to climate change of global human activity sectors in its Fifth Assessment Report (IPCC 2014). In 2010, anthropogenic (human-caused) contributors to greenhouse gas emissions came from several sectors:

- Industry, transportation, and building – 41%
- Energy production – 35%
- Agriculture – 12%.
- Forestry and other land uses – 12%

There is agreement that the forestry sector contribution has declined over the last decade (IPCC, 2014; Smith et al., 2014; FAOSTAT, 2013). The main activity in this sector associated with GHG emissions is deforestation, which is defined as removal of all trees, most notably the conversion of forest and grassland into agricultural land or developed landscapes (IPCC 2000).
This restoration EA does not fall within any of these main contributors of greenhouse gas emissions. Forested land will not be converted into a developed or agricultural condition. In fact, riparian areas are being restored to maintain a vigorous condition that supports trees, and sequesters carbon long-term. US forests sequestered 757.1 megatonnes of carbon dioxide after accounting for emissions from fires and soils in 2010 (US EPA, 2015). However there is growing concern over the impacts of climate change on US forests and their current status as a carbon sink. There is strong evidence of a relationship between increasing temperatures and large tree mortality events in forests of the western US. There is widespread recognition that climate change is increasing the size and frequency of droughts, fires, and insect/disease outbreaks, which will have major effect on these forests' role in the carbon cycle (Joyce et al. 2014). Healthy aquatic systems will help the improve the forest's function in this capacity.

The project is in line with the suggested practice of reducing forest disturbance effects found in the National Climate Assessment for public and private forests (Joyce et al. 2014). Here specifically, the project proposes to restore riparian conditions. The release of carbon associated with this project is justified given the overall change in condition increases forest resistance to release of much greater quantities of carbon from wildfire, drought, insects/disease, or a combination of these disturbance types (Millar et al. 2007). This project falls within the types of options presented by the IPCC for minimizing the impacts of climate change on forest carbon, and represents a potential synergy between adaptation measures and mitigation. Actions aimed at enhancing forest resilience to climate change by reducing the potential for large-scale, catastrophic disturbances such as wildfire also prevents release of GHG and enhances carbon stocks (Smith et al. 2014). The proposed action reflects the rationale behind these recommendations because it willmaintain or enhance watershed health and promote species recovery and diversity, improving the functioning of the forest.

Timber management projects can influence carbon dioxide sequestration in four main ways: (1) by increasing new forests (afforestation), (2) by avoiding their damage or destruction (avoided deforestation), (3) by manipulating existing forest cover (managed forests), and (4) through transferring carbon from the live biomass to the harvested wood product carbon pool. Land-use changes, specifically deforestation and regrowth, are by far the biggest factors on a global scale in forests' role as sources or sinks of carbon dioxide, respectively (IPCC, Intergovernmental Panel on Climate Change, 2000). Projects like the proposed action that create forests or improve forest conditions and capacity to grow trees are positive factors in carbon sequestration.

CHAPTER 4 CONSULTATION AND COORDINATION

4.1 List of Contributers

Joy Archuleta, Forest Hydrologist

Kathy Ramsey, Forest Fish Biologist

Tracii Hickman, ESA Consultation Biologist

Katherine Richardson, Forest Environmental Coordinator

Leslie Taylor, South Zone Environmental Coordinator

Larry Randall, Forest Recreation Staff

Alyssa Tanner, Forest Silviculturist

Lizzy Berkley, Forest Wildlife Biologist

Paula Brooks, Forest Botanist

Jim Archuleta, Forest Soils Scientist

Allen Madril, Forest Archaeologist

Joby Sciarrino, Assistant Fire Management Officer – Fuels Planner (Walla Walla Ranger District)

Maura Laverty, Forest Range Program Manager

4.2 Consultation

Endangered Species Act

The Aquatic Restoration EA tiers to two Biological Opinions: the April 25, 2013 National Marine Fisheries Service (NMFS) document "Endangered Species Act – Section 7 Programmatic Consultation Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for Reinitiation of Aquatic Restoration Activities in States of Oregon and Washington (USDC NMFS 2013); and the July 1, 2013 US Fish and Wildlife Service (FWS) document "Endangered Species Act – Section 7 Consultation Programmatic Biological Opinion for Aquatic Restoration Activities in the States of Oregon, Washington and portions of California, Idaho and Nevada (USDI FWS 2013)".

The Aquatic Restoration EA was discussed August 14, 2018 at a Umatilla interagency Level 1 Section 7 consultation meeting (notes on file, Pendleton OR). As described in Appendix D, local Section 7 consultation is in compliance with the NMFS and USFWS BOs and will meet requirements for Section 7 consultation.

The Services will be notified of individual projects as outlined in Appendixes A, B and D.

National Historic Preservation Act

In 2004 the Forest Service signed a programmatic agreement with the Oregon State Historic Preservation Office (SHPO) which allows for streamlined compliance with the National Historic Preservation Act for numerous undertaking with limited potential to negatively affect cultural resources (Oregon SHPO 2004). The the majority of the aquatics restoration project work covered by this analysis falls under the criteria of undertakings which can receive National Historic Preservation Act clearance using the streamlined procedures.

Section 3.10.1 displays the approach to National Historic Preservation Act compliance which would be used for each of the project categories listed in chapter 2 and fully described in the appendix A.

By following the terms of the 2004 Programmatic Agreement with the Oregon State Historic Preservation Office, cultural resources would be identified and evaluated before any ground disturbing activities which could potentially negatively impact these resources are authorized. Cultural resource sites would either be avoided or any potential impacts would be mitigated following processes developed in consultation with the Oregon State Historic Preservation Office.

Tribal Consultation

Letters were sent on July 12, 2016 to the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), the Confederated Tribes of the Warm Springs Indian Reservation (CTWS) and the Nez Perce Tribe providing an overview of the proposed action, with direction to the detailed description of the project online, which included maps of proposed project areas in addition to narrative details. The project was also presented as part of the Umatilla NF 2017 and 2018 Program of Work (POW) package to the three tribes and in subsequent meetings.

A follow-up meeting with the Nez Perce Tribe consisted of one meeting in which it was presented as part of the Umatilla NF 2017 POW. The Forest Supervisor and Staff met with staff from the Nez Perce Tribe on March 29, 2017. The Nez Perce staff did not have any concerns at that time. The project received a letter of support for the “forest-wide approach for aquatic restoration projects on the Umatilla National Forest” on behalf of the Nez Perce Tribe’s Department of Fisheries Resources Management dated August 3, 2016.

APPENDICES

Appendix A: Project Description and Project Design Criteria

Aquatic Restoration Project Categories, Program Administration, General Aquatic Conservation Measures, and Project Design Criteria for Aquatic Restoration Activity Categories on the Umatilla National Forest

Derived from National Marine Fisheries Service's and U.S. Fish and Wildlife Service's Aquatic Restoration Biological Opinions (ARBO II 2013)

Project Categories

1. Fish Passage Restoration (Stream Simulation Culvert and Bridge Projects; Headcut and Grade Stabilization; Fish Ladders; Irrigation Diversion Replacement/Relocation and Screen Installation/Replacement).
2. Large Wood (LW), Boulder, and Gravel Placement (LW and Boulder Projects; Engineered Logjams; Porous Boulder Weirs and Vanes, Gravel Augmentation; Tree Removal for LW Projects).
3. Dam, Tide gate, and Legacy Structure Removal.
4. Channel Reconstruction/Relocation.
5. Off- and Side-Channel Habitat Restoration.
6. Streambank Restoration.
7. Set-back or Removal of Existing Berms, Dikes, and Levees.
8. Reduction/Relocation of Recreation Impacts.
9. Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering.
10. Piling and other Structure Removal.
11. In-channel Nutrient Enhancement
12. Road and Trail Erosion Control
13. Juniper Removal.
14. Riparian Vegetation Treatment (controlled burning).
15. Riparian Vegetative Planting.
16. Bull Trout Protection.
17. Beaver Habitat Restoration.
18. Fisheries, Hydrology, Geomorphology Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration.

Program Administration

1. Integration of Project Design Criteria (PDC) and Conservation Measures and Terms and Conditions into Project Design and Contract Language

The Umatilla National Forest (UNF) shall incorporate appropriate aquatic and terrestrial conservation measures along with Project Design Criteria listed in the aquatic restoration BA along with any terms and conditions included in the subsequent Aquatic Restoration Biological Opinions (ARBO II, 2013) into contract language or force-account implementation plans.

2. Project Notification

The UNF Streamlining Level 1 team would review and discuss aquatic restoration projects planned for implementation during an upcoming work season through its' team-specific processes. The UNF would provide a project Notification

Form7 to ARBO.nwr@noaa.gov, arbo@fws.gov, and the UNF Level 1 Aquatics Team members 30 days prior to implementation and would include the following information:

a. Action identifier – The same unique identification number is necessary for each project's Action Notification and Project Completion reports.
b. Project name – Use the same project name from notification to completion (*e.g.*, Jones Creek, Tillamook Co., Oregon, culvert replacement).
c. Location – 6th field HUC (hydraulic unit code), stream name, and latitude and longitude (decimal degrees)
d. Agency contact – Agency and project lead name
e. Timing – Project start and end dates
f. Activity category – As listed above in section 1.3.
g. Project description – Brief narrative of the project and objectives
h. Extent – Number of stream miles or acres to be treated
i. Species affected – Listed Fish and or Wildlife species, Critical Habitat, and or EFH affected by project
j. Date of submittal
k. For any action requiring a site assessment for contaminants, include a copy of the report explaining the likelihood that contaminants are present at the site.
l. For any action requiring NMFS fish passage and RRT reviews, attach a copy of the approval correspondence.
m. Verification – Check box that verifies that all appropriate General Aquatic Conservation Measures, Wildlife Conservation Measures, Project Design Criteria for Aquatic Restoration Activity Categories, and Project Design Criteria for Terrestrial Species and Habitats have been thoroughly reviewed and would be incorporated into project design, implementation, and monitoring.
n. Additional information would be included, if requested by the UNF Level 1 Team (photographs, more detailed specialist reports).

3. Minor Variance Process

Because of the wide range of proposed activities and the natural variability within and between stream systems, some projects may be appropriate for minor variations from criteria specified herein. NMFS branch chiefs would be authorize variances when there is a clear conservation benefit or there are no additional adverse effects (especially incidental take) beyond that covered by the ARBO II. Minor variances may be requested as part of the above notification process and must:

a. Cite ARBO II identifying number.
b. Cite the relevant criterion by page number.
c. Define the requested variance.
d. Explain why the variance is necessary.
e. Provide a rationale why the variance would be either provide a conservation benefit or, at a minimum, not cause additional adverse effects.
f. Include as attachments any necessary approvals by state agencies.

4. NMFS and/or USFWS Fish Passage Review and Approve

The NMFS/USFWS Level 1 team member(s) would coordinate NMF/USFWS fish passage review and approval for the following types of project:
a. Dewatering construction sites by pumping at a rate that exceeds 3 cubic feet per second (cfs) would be require fish screen review.
b. Fish passage culverts and bridges that do not meet width standards.
c. Headcut stabilization and channel spanning non-porous rock structures that create discrete longitudinal drops > 6 inches.
d. Fish ladders.
e. Engineered log jams (ELJs) that occupy >25% of the bankfull area.
f. Irrigation diversion replacement/relocation & screen installation/replacement.
g. Dam removal.
h. Channel reconstruction/relocation projects.
i. Off- and side-channel reconstruction when the proposed side channel would be contain >20% of the bankfull flow.
j. Passage that reconnects isolated populations of bull trout to new areas where they may face new exposure to populations of non-native species (example-brook trout) would be approved by the USFWS Division or Field Office Supervisor prior to a decision to implement the project.

5. Restoration Review Team (RRT)

The following types of project require RRT review:
a. Dam removal.
b. Channel reconstruction/relocation projects.

c. Precedent or policy setting actions, such as the application of new technology.

The RRT would be comprised of highly skilled interagency (BLM, Forest Service, BIA, NMFS, USFWS) fisheries biologists, hydrologists, geomorphologists, soil scientists, or engineers to review and help select project designs. The RRT would be have a four member core group—one individual from each of the following agencies: Forest Service, BLM, NMFS, and USFWS. The designated Forest Service and BLM ARBO II contacts would serve as core group members. Additional technical experts from these agencies would be recruited depending on the project to be reviewed.

The RRT reviews would be help ensure that projects: (1) Meet the obligations set forth in the Aquatic Restoration Biological Assessment (BA) and subsequent Biological Opinion (ARBO II); (2) maximize ecological benefits of restoration and recovery projects; (3) maximize efficient and effective use of limited financial resources; and (4) ensure consistent use and implementation throughout the geographic area covered by this opinion. Any RRT concerns must be described in detail, referencing underlying scientific (based on peer-reviewed science) or policy rationale, and include recommended changes to the proposed project to address the specific concerns. When requested, RRT would be provide an estimate of the time necessary to complete the review based on the complexity of the proposed action and work load considerations at the time of the request. Approval may be delayed if a substandard design is submitted for review during the post-design or action implementation stage and significant revision is necessary.

The RRT would be keep a record of each review, including any recommended clarifications, changes, or interpretations. The RRT does not replace any existing review process, nor would it slow down project implementation unless significant technical, policy, or program concerns with a particular restoration approach are identified.

6. Project Completion Report

The UNF Level 1 team would be discuss and review aquatic restoration projects completed during a previous season. The UNF would be submit a Project Completion Report for completed projects to ARBO.nwr@noaa.gov, arbo@fws.gov, and their USFWS and NMFS Level 1 Team counterparts. Reports are due 60 days after project completion. Reports would be include the following information:

a. Action identifier (same number as in notification).
b. Action name (same name as in notification).
c. Location – 6th field HUC, stream name, latitude and longitude.
d. Agency contact – Agency and project lead name.
e. Date of submittal.
f. Timing – Actual project start and end dates.
g. Activity category – As listed above in section 1.3.
h. Project description – Brief narrative of the completed project and objectives.
i. Extent – Number of stream miles or acres treated.
j. Species affected – Fish and or wildlife species, critical habitat, or EFH affected by the project.
k. Fish pursuit and capture – If fish are pursued or captured during salvage operations, the project biologist would be describe removal methods, stream conditions, and the number of fish handled, injured, or killed, and reasons for the fish mortality. This report would be likely be limited to fish passage, dam removal, and channel restoration/relocation projects.
l. State-specific Clean Water Act section 401 certification monitoring results. If protocol conditions were not met, describe effects and any remedial actions.
m. Post Project Assessment – Remedial actions taken, including any dates work ceased due to high flows.

7. Annual Program Report

Any projects implemented on the UNF in a given year under this EA would be reported to the USFS Region 6 Office, which would provide an annual program report to NMFS and USFWS by February 15 of that year, describing agency projects that would be implemented under ARBO II, as described in this proposed action. The report would include the following information:

a. An assessment of overall program activity.
b. A map showing the location and category of each project carried out under ARBO II.
c. A list of any projects that were funded or carried out using the ARBO II, including the name of the Action Agency designated as the lead agency for each project for ESA purposes.
d. Data or analyses that the UNF deems necessary or helpful to assess habitat trends as a result of actions carried out under the ARBO II.
e. Totals for amount of incidental take and for each extent of take indicator by recovery domain for NFMS, and by Interim Recovery Unit (IRU) or affected river basin for USFWS purposes.
f. Requests for variance and their disposition and a description of RRT activity.

8. Technical Skill and Planning Requirements

a. Ensure that an experienced fisheries biologist or hydrologist is involved in the design of all projects covered by the two biological opinions. 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 would be 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.

9. Climate Change

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

10. In-water Work Period

Follow the appropriate state (ODFW 2008; WDFW 2010) or most recent guidelines for timing of in-water work. The UNF would be request exceptions to in water work windows through Level 1 NMFS or USFWS representatives as well as essential state agencies. 10 For National Forests in the state of Washington, the UNF would be work with Washington Department of Fish and Wildlife (WDFW) to determine in-water work periods, using the process contained in the 2012 Memorandum of Understanding between the WDFW and USDA-Forest Service, Pacific Northwest Region regarding hydraulic projects conducted by the Forest Service (WDFW and USDA-Forest Service 2012).

11. Fish Passage

Fish passage would 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) would be provided for the life of the structure. Note: Passage that reconnects isolated populations of bull trout to new areas where they may face new exposure to populations of non-native species (example-bull trout) must be approved by the USFWS Division or Field Supervisor prior to implementation. Passage for lamprey species should always be considered where practical. To the extent possible, incorporate lamprey Best Management Practices (BMPs) to Minimize Adverse Effects to Pacific Lamprey (Entosphenus tridentatus) (USFWS 2010).

12. 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 would be conducted on projects that involve excavation of >20 cubic yards of material. The UNF would 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 would 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.

13. Pollution and Erosion Control Measures

Implement the following pollution anderosion control measures:
a. Project Contact: Identify a project contact (name, phone number, an address) that would 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 would 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.

14. 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 would be in place before any significant alteration of the action site and would 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 would 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.

15. Heavy Equipment Use

a. Choice of equipment – Heavy equipment would 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 would 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 would 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 would not be built on slopes where grade, soil, or other features suggest a likelihood of excessive erosion or failure. When necessary, temporary access roads would be obliterated or revegetated. Temporary roads in wet or flooded areas would 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 would be at right angles and avoid potential spawning areas to the greatest extent possible. Stream crossings would not increase the risk of channel re-routing at low and high water conditions. After project completion, temporary stream crossings would be abandoned and the stream channel and banks restored.
e. Work from top of bank – To the extent feasible, heavy equipment would 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.

16. 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 would be maintained until permanent erosion control measures are effective. Stabilization measures would 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 would 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 would be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
d. Planting manuals – All riparian plantings would 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.

17. Monitoring

Monitoring would be conducted by Action Agency staff, as appropriate for that project, during and after a project to track effects and compliance with this opinion.
a. Implementation
i. Visually monitor during project implementation to ensure effects are not greater (amount, extent) than anticipated and to contact Level 1 representatives if problems arise.
ii. Fix any problems that arise during project implementation.
iii. Regular biologist/hydrologist coordination if biologist/hydrologist is not always on site to ensure contractor is following all stipulations.
b. 401 Certification – To minimize short-term degradation to water quality during project implementation, follow current 401 Certification provisions of the Federal Clean Water Act for maintenance or water quality standards described by the following: Oregon Department of Environmental Quality (Oregon BLM, Forest Service, and BIA); Washington Department of Ecology (Washington BLM); and the Memorandum of Understanding between the Washington Department of Fish and Wildlife and Forest Service regarding Hydraulic Projects Conducted by Forest Service, Pacific Northwest Region (WDFW and USDA-Forest Service 2012); California, Idaho, or Nevada 401 Certification protocols (BLM and Forest Service).
c. Post project – A post-project review would be conducted after winter and spring high flows.
i. For each project, conduct a walk through/visual observation to determine if there are post-project affects that were not considered during consultation. For fish passage and revegetation projects, monitor in the following manner:
ii. Fish Passage Projects – Note any problems with channel scour or bedload deposition, substrate, discontinuous flow, vegetation establishment, or invasive plant infestation.
iii. Revegetation – For all plant treatment projects, including site restoration, monitor for and remove invasive plants until native plants become established.
iv. In cases where remedial action is required, such actions are permitted without additional consultation if they use relevant PDC and aquatic conservation measures and the effects of the action categories are not exceeded.

18. Work Area Isolation, Surface Water Withdrawals, and Fish Capture and Release

Isolate the construction area and remove fish from a project site for projects that include concentrated and major excavation at a single location within the stream channel. This condition would typically apply to the following aquatic restoration categories: Fish Passage Restoration; Dam, Tidegate, and Legacy Structure Removal; Channel Reconstruction/Relocation.

a. Isolate capture area – Install block nets at up and downstream locations outside of the construction zone to exclude fish from entering the project area. Leave nets secured to the stream channel bed and banks until construction activities within the stream channel are complete. If block nets or traps remain in place more than one day, monitor the nets and or traps at least on a daily basis to ensure they are secured to the banks and free of organic accumulation and to minimize fish predation in the trap.
b. Capture and release – Fish trapped within the isolated work area would be captured and released as prudent to minimize the risk of injury, then released at a safe release site, preferably upstream of the isolated reach in a pool or other area that provides cover and flow refuge. Collect fish in the best manner to minimize potential stranding and stress by seine or dip nets as the area is slowly dewatered, baited minnow traps placed overnight, or electrofishing (if other options are ineffective). Fish must be handled with extreme care and kept in water the maximum extent possible during transfer procedures. A healthy environment for the stressed fish would be provided—large buckets (five-gallon minimum to prevent overcrowding) and minimal handling of fish. Place large fish in buckets separate from smaller prey-sized fish. Monitor water temperature in buckets and well-being of captured fish. If buckets are not being immediately transported, use aerators to maintain water quality. As rapidly as possible, but after fish have recovered, release fish. In cases where the stream is intermittent upstream, release fish in downstream areas and away from the influence of the construction. Capture and release would be supervised by a fishery biologist experienced with work area isolation and safe handling of all fish.

c. Electrofishing – Use electrofishing only where other means of fish capture may not be feasible or effective. If electrofishing would be used to capture fish for salvage, NMFS's electrofishing guidelines would be followed (NMFS 2000).
1. General Specifications

i. Reasonable effort should be made to avoid handling fish in warm water temperatures, such as conducting fish evacuation first thing in the morning, when the water temperature would likely be coolest. No electrofishing should occur when water temperatures are above 18ºC or are expected to rise above this temperature prior to concluding the fish capture.
ii. If fish are observed spawning during the in-water work period, electrofishing would not be conducted in the vicinity of spawning fish or active redds.
iii. Only Direct Current (DC) or Pulsed Direct Current would be used.
iv. Conductivity <100, use voltage ranges from 900 to 1100. Conductivity from 100 to 300, use voltage ranges from 500 to 800. Conductivity greater than 300, use voltage to 400.
v. Begin electrofishing with minimum pulse width and recommended voltage and then gradually increase to the point where fish are immobilized and captured. Turn off current once fish are immobilized.
vi. Do not allow fish to come into contact with anode. Do not electrofish an area for an extended period of time. Remove fish immediately from water and handle as described above (PDC 18). Dark bands on the fish indicate injury, suggesting a reduction in voltage and pulse width and longer recovery time.
vii. If mortality is occurring during salvage, immediately discontinue salvage operations (unless this would result in additional fish mortality), reevaluate the current procedures, and adjust or postpone procedures to reduce mortality.

2. Bull trout-specific additional specifications
i. To reduce adverse effects to bull trout, electrofishing shall only occur from May 1 (or after emergence occurs) to July 31 in known bull trout spawning areas. No electrofishing would occur in any bull trout habitat after August 15.
ii. Electrofishing would not be conducted when the water conditions are turbid and visibility is poor. This conditions may be experienced when the sampler cannot see the stream bottom in 1 foot of water.
iii. Electrofishing would not be conducted within local populations that contain 100 or fewer adult bull trout.
iv. Electrofishing within spawning and rearing habitat would need to be approved by the USFWS Field or Division Supervisor prior to implementation.
v. Bull trout must not be handled when water temperatures exceed 15ºC.
vi. Nets, hands, etc. must be free of insect repellant, sunscreen or any other substance that might harm fish.
vii. Ice packs would be used to keep capture water <15ºC.
viii. If using MS 222, the formulation should be buffered.

d. Dewater construction site –When dewatering is necessary to protect species or critical habitat, divert flow around the construction site with a coffer dam (built with non-erosive materials), taking care to not dewater downstream channels during dewatering. Pass flow and fish downstream with a by-pass culvert or a water-proof lined diversion ditch. Diversion sandbags can be filled with material mined from the floodplain as long as such material is replaced at end of project. Small amounts of instream material can be moved to help seal and secure diversion structures. If ESA listed-fish may be present and pumps are required to dewater, the intake must have a fish screen(s) and be operated in accordance with NMFS fish screen criteria described below (in part e.iv) of this section. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. If diversion allows for downstream fish passage, place diversion outlet in a location to promote safe reentry of fish into the stream channel, preferably into pool habitat with cover. Pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.
e. Surface water withdrawals
i. Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate. Where ESA-listed fish may be present, diversions may not exceed 10% of the available flow and fish screen(s) would be installed, operated, and maintained according to NMFS's fish screen criteria (NMFS 2011e).
ii. For the dewatering of a work site to remove or install culverts, bridge abutments *etc.*, if ESA-listed fish may be present, a fish screen that meets criteria specified by NMFS (2011e) must be used on the intake to avoid juvenile fish entrainment. If ESA-listed salmon, steelhead, eulachon, or green sturgeon may be present, the UNF would ensure that the fish screen design is reviewed and approved by NMFS for consistency with NMFS (2011e) criteria if the diversion (gravity or pump) is at a rate greater than 3 cfs. NMFS approved fish screens have the following specifications: a) An automated cleaning device with a minimum effective surface area of 2.5 square feet per cfs, and a nominal maximum approach velocity of 0.4 feet per second (fps), or no automated cleaning device, a minimum effective surface area of 1 square foot per cfs, and a nominal maximum approach rate of 0.2 fps; and b) a round or square screen mesh that is no larger than 2.38 mm (0.094 inches) in the narrow dimension, or any other shape that is no larger than 1.75 mm (0.069 inches) in the narrow dimension.
f. Stream re-watering – Upon project completion, slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden release of suspended sediment. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the construction site.

Project Design Criteria for Aquatic Restoration Activity Categories

The aquatic restoration activity categories described below would be designed and implemented to help restore watershed processes. These projects would improve channel dimensions and stability, sediment transport and deposition, and riparian, wetland, floodplain and hydrologic functions, as well as water quality. As such, these improvements would help address limiting

factors—related to spawning, rearing, migration, and more—for ESA-listed and other native fish species. Aquatic habitat restoration and enhancement projects are conducted within stream channels, adjacent riparian/floodplain areas, wetlands, and uplands. Work may be accomplished using manual labor, hand tools (chainsaws, tree planting tools, augers, shovels, and more), all-terrain vehicles, flat-bed trucks, and heavy equipment (backhoes, excavators, bulldozers, front-end loaders, dump trucks, winch machinery, cable yarding, *etc.*). Helicopters would be used for many LW and salmon carcass placement projects.

1. Fish Passage Restoration **would** include the following: total removal of culverts or bridges, or replacing culverts or bridges with properly sized culverts and bridges, replacing a damaged culvert or bridge, and resetting an existing culvert that was improperly installed or damaged; stabilizing and providing passage over headcuts; removing, constructing (including relocations), repairing, or maintaining fish ladders; and constructing or replacing fish screens for irrigation diversions. Such projects would take place where fish passage has been partially or completely eliminated through road construction, stream degradation, creation of small dams and weirs, and irrigation diversions. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. Stream Simulation Culvert and Bridge Projects – All road-stream crossing structures would simulate stream channel conditions per *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road- Stream Crossings* (USDA-Forest Service 2008), located at: http://stream.fs.fed.us/fishxing/aop_pdfs.html

i. Culvert criteria – Within the considerations of stream simulation, the structure would , 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 would be at least 1.3 times the bankfull channel width. This is consistent with *Anadromous Salmonid Passage Facility Design* (section 7.4.2 “Stream Simulation Design”) (NMFS 2011e). 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 width 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, would have channel widths that are designed using the culvert criteria (PDC 1a-i above). This opinion does not cover bridges that require pile driving within a wetted stream channels.
2. Primary structural elements must be concrete, metal, fiberglass, or untreated timber. Concrete must be sufficiently cured or dried13 before coming into contact with stream flow.
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 would be designed using an interdisciplinary design team consisting of an experienced Engineer, Fisheries Biologist, and Hydrologist/Geomorphologist.
2. Crossing structures wider than 20 feet or with costs that exceed $100,000 that are authorized, funded or carried out by the UNF would be reviewed by the USDA- Forest Service, Region 6, Aquatic Organism Passage Design Assistance Team.
3. At least one member of the design team would be trained in a weeklong Aquatic Organism Passage course based *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings* (USDA-Forest Service 2008).
4. Bankfull width would 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.
iv. NMFS fish passage review and approve – If the structure width is determined to be less than the established width criteria as defined above, a variance must be requested from NMFS for consistency with criteria in NMFS (2011e).
v. Opportunity for individual consultation – The UNF has a legal duty under the ESA to consult with NMFS and USFWS on a project-specific basis if they prefer to operate outside the conditions in this opinion. The standards provided in this document are conservative for the purpose of this programmatic and may or may not be applicable to projects that undergo individual Level 1 Consultation. The standards in ARBO II are not new defaults to be used universally outside the programmatic arena.
vi. Headcut and grade stabilization – Headcuts often occur in meadow areas, typically on Rosgen “C” and “E” channel types. Headcuts develop and migrate during bankfull and larger floods, when the sinuous path of Rosgen E type streams may become unstable in erosive, alluvial sediments, causing avulsions, meander cut-offs, bank failure, and development of an entrenched Rosgen G gully channel (Rosgen 1994).
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 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 would 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 I recommended to construct a series of downstream log or rock structures as described in part ii below to expedite channel aggradation.
vii. Grade stabilization to promote fish passage associated with headcut stabilization
1. NMFS fish passage review and approve – If a grade stabilization structure spans the channel and creates one or more discrete longitudinal drops > 6 inches, the UNF would ensure that the action is individually reviewed and approved by the NMFS for consistency with criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011e).
2. Provide fish passage over stabilized headcut through constructed riffles for pool/riffle streams or a series of log or rock structures for step/pool channels. If LW and boulder placement would be used for headcut stabilization, refer to Large Wood, Boulder, and Gravel Placement (PDC 2) below.
3. Construct structures in a 'V' or 'U' shape, oriented with the apex upstream, and lower in the center to direct flows to the middle of channel.
4. Key structures into the stream bed to minimize structure undermining due to scour, preferably at least 2.5x their exposure height. The structures should also be keyed into both banks—if feasible greater than 8 feet.
5. If several structures would be used in series, space them at the appropriate distances to promote fish passage of all life stages of native fish. Incorporate NMFS fish passage criteria (jump height, pool depth, *etc.*) in the design of step structures. Recommended spacing should be no closer than the net drop divided by the channel slope (for example, a one-foot high step structure in a stream with a two-percent gradient would have a minimum spacing of 50-feet [1/0.02]).
6. Include gradated (cobble to fine) material in the rock structure material mix to help seal the structure/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.

b. Fish Ladders
i. NMFS fish passage review and approve – The UNF would ensure that the action is individually reviewed and approved by NMFS for consistency with criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011e).
ii. Design preference is based on project type, level of maintenance, and required monitoring essential for reliable fish passage. Typical fishway designs include:

1. roughened channels/boulder step structures
2. channel spanning concrete sills
3. pool and chute, and
4. pool and weir fishways.

Roughened channel and boulder step structure fishways consist of agraded mix of rock and sediment in an open channel that creates enough roughness and diversity to facilitate fish passage. NMFS's review would include any appurtenant facilities (*i.e.*, fish counting equipment, pit tag detectors, lighting, trash racks, attraction water) that may be included with the fish ladder design. See: the most recent version of *Anadromous Salmonid Passage Facility Design* (NMFS 2011e) for guidelines and design criteria. Through the NMFS Level 1 team member, collaborate with NMFS engineering staff prior to the conceptual design process of fishway projects to solicit NMFS's preferred design type.
iii. 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.
iv. Design consideration should be given for Pacific Lamprey passage (USFWS 2010). Measures for ladder design would include any of the following: rounded corners, resting areas, natural stream channel using stream simulation designs, or a wetted ramp to facilitate lamprey passage through a fish ladder.

c. Irrigation Diversion Replacement/Relocation & Screen Installation/Replacement
i. NMFS fish passage review and approve – The UNF would ensure that the action is individually reviewed and approved by NMFS for consistency with criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011e).
ii. Diversion structures—associated with points of diversion and future fish screens—must pass all life stages of threatened and endangered aquatic species that historically used the affected aquatic habitat.
iii. Water diversion intake and return points must be designed (to the greatest degree possible) to prevent all native fish life stages from swimming or being entrained into the diversion.

iv. NMFS fish screen criteria (NMFS 2011e) applies to federally listed salmonid species under their jurisdiction. This includes screens in temporary and permanent pump intakes.
v. All fish screens would be sized to match the irrigator's state water right or estimated historic water use, whichever is less.
vi. Size of bypass structure should be big enough to pass steelhead kelt into the stream.
vii. Abandoned ditches and other similar structures would be plugged or backfilled, as appropriate, to prevent fish from swimming or being entrained into them.
viii. When making improvements to pressurized diversions, install a totalizing flow meter capable of measuring rate and duty of water use. For nonpressurized systems, install a staff gage or other measuring device capable of measuring instantaneous rate of water flow.
ix. Conversion of instream diversions to groundwater wells would only be used in circumstances where there is an agreement to ensure that any surface water made available for instream flows is protected from surface withdrawal by another water-user.
x. For the removal of diversion structures constructed of local rock and dirt, the project sponsor would dispose of the removed material in the following manner:
1. Material more than 60% silt or clay would be disposed in uplands, outside of the active floodplain.
2. Material with more than 40% gravel would be deposited within the active floodplain, but not in wetlands.
3. Material with more than 50% gravel and less than 30% fines (silt or clay) may be deposited below the ordinary high water mark (HWM).

2. Large Wood, Boulder, and Gravel Placement would include Large Wood (LW) and boulder placement, Engineered Log Jams (ELJs), porous boulder structures and vanes, gravel placement, and tree removal for LW projects. Such activities would occur in areas where channel structure is lacking due to past stream cleaning (LW removal), riparian timber harvest, and in areas where natural gravel supplies are low due to anthropogenic disruptions. These projects would occur 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. Equipment such as helicopters, excavators, dump trucks, front-end loaders, full-suspension yarders, and similar equipment may be used to implement projects.

a. Large Wood and Boulder 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 would simulate disturbance events to the greatest degree possible and include, but are not limited to, log jams, debris flows, windthrow, 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 would 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 2.0x 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 LW increases stability
ix. Anchoring LW – 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 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 (driven into a dewatered area or the streambank, but not in water). 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 fish passage review and approve – For ELJs that occupy >25% of the bankfull area, the UNF would ensure that the action is individually reviewed and approved by NMFS for consistency with criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011e).
ii. ELJs would be patterned, to the greatest degree possible, after stable natural log jams.

iii. Grade control ELJs are designed to arrest channel down-cutting 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 would 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 force of water upon the LW 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 Structures and Vanes
i. Full channel spanning boulder structures 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 would not allow log placements due to concerns about damage to their streambanks or property.
ii. Install boulder structures 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 step structures 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 step structures are to be constructed to allow upstream and downstream passage of all native fish species and life stages that occur in the stream. Plunges would be kept less than 6 inches in height.
v. The use of gabions, cable, or other means to prevent the movement of individual boulders in a boulder step structure is not allowed.
vi. Rock for boulder step structures would 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 step structure 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 would 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 would 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 (USDA-Forest Service 2008) to determine gravel sizes appropriate for the stream.
iv. Gravel can be mined from the floodplain at elevations above bankfull, but not in a manner that would cause stranding during future flood events. 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 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 would 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 would coordinate with an action-agency wildlife biologist in tree-removal planning efforts.

3. Dam, Tidegate and Legacy Structure Removal would include removal of dams, tidegates, channel-spanning weirs, legacy habitat structures, earthen embankments, subsurface drainage features, spillway systems, outfalls, pipes, instream flow redirection structures (*e.g.*, drop structure, gabion, groin), or similar devices used to control, discharge, or maintain water levels. Projects would be implemented to reconnect stream corridors, floodplains, and estuaries, reestablish wetlands, improve aquatic organism passage, and restore more natural channel and flow conditions. Any instream water control structures that impound substantial amounts of contaminated sediment are not proposed. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. Dam Removal
i. Design review
1. NMFS fish passage review and approve – The UNF would ensure that the action is individually reviewed and approved by NMFS for consistency with criteria in NMFS (2011e).
2. Restoration Review Team (RRT) – The UNF would ensure that the action is individually reviewed by the RRT.
ii. Dams greater than 10-feet in height require a long-term monitoring and adaptive management plan that would be developed between the Services and the action agency.
iii. At a minimum, the following information would be necessary for review:
1. A longitudinal profile of the stream channel thalweg for 20 channel widths downstream of the structure and 20 channel widths upstream of the reservoir area (outside of the influence of the structure) would be used to determine the potential for channel degradation.
2. A minimum of three cross-sections – one downstream of the structure, one through the reservoir area upstream of the structure, and one upstream of the reservoir area (outside of the influence of the structure) to characterize the channel morphology and quantify the stored sediment.
3. Sediment characterization to determine the proportion of coarse sediment (>2mm) in the reservoir area.
4. A survey of any downstream spawning areas that may be affected by sediment released by removal of the water control structure or dam. Reservoirs with a d35 greater than 2 mm (*i.e.*, 65% of the sediment by weight exceeds 2 mm in diameter) may be removed without excavation of stored material, if the sediment contains no contaminants; reservoirs with a d35 less than 2 mm (*i.e.*, 65% of the sediment by weight is less than 2 mm in diameter) would require partial removal of the fine sediment to create a pilot channel, in conjunction with stabilization of the newly exposed streambanks with native vegetation.
5. 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.
b. Tide Gate Removal – This action includes the removal of tide gates.
i. NMFS fish passage review and approve – For projects that constrain tidal exchange, the UNF would ensure that the action is individually reviewed and approved by the NMFS for consistency with criteria in NMFS (2011e).
ii. Follow Work Area Isolation, Surface Water Withdrawals, and Fish Capture and Release (PDC 20). If a culvert or bridge would be constructed at the location of a removed tide gate, then the structure should be large enough to allow for a full tidal exchange.
c. Removal of legacy structures – This action includes the removal of past projects, such as LW, boulder, rock gabions, and other in-channel and floodplain structures.
d. If the structure being removed contains material (LW, boulders, concrete, *etc.*) not typically found within the stream or floodplain at that site, remove material from the 100-year floodplain.
e. If the structure being removed contains material (*e.g.*, LW, boulders) that is typically found within the stream or floodplain at that site, the material can be reused to implement habitat improvements described under the Large Wood, Boulder, and Gravel Placement activity category in this opinion.
f. If the structure being removed is keyed into the bank, fill in "key" holes with native materials to restore contours of stream bank and floodplain. Compact the fill material adequately to prevent washing out of the soil during over-bank flooding. Do not mine material from the stream channel to fill in "key" holes.
g. When removal of buried log structures may result in significant disruption to riparian vegetation or the floodplain, consider using a chainsaw to extract the portion of log within the channel and leaving the buried sections within the streambank.
h. 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.
i. If the legacy structures (log, rock, or gabion weirs) were placed to provide grade control, evaluate the site for potential headcutting and incision due to structure removal. If headcutting and channel incision are likely to occur due to structure removal, additional measures must be taken to reduce these impacts.
j. If the structure is being removed because it has caused an over-widening of the channel, consider implementing other ARBO II restoration categories to decrease the width to depth ratio of the stream to a level commensurate with the geomorphic setting.

4. Channel Reconstruction/Relocation projects include reconstruction of existing stream channels through excavation and structure placement (LW and boulders) or relocation (rerouting of flow) into historic or newly constructed channels that are typically more sinuous and complex. This proposed action applies to stream systems that have been straightened, channelized,

dredged, or otherwise modified for the purpose of flood control, increasing arable land, realignment, or other land use management goals or for streams that are incised or otherwise disconnected from their floodplains resulting from watershed disturbances. This activity type would be implemented to improve aquatic and riparian habitat diversity and complexity, reconnect stream channels to floodplains, reduce bed and bank erosion, increase hyporheic exchange, provide long-term nutrient storage, provide substrate for macroinvertebrates, moderate flow disturbance, increase retention of organic material, and provide refuge for fish and other aquatic species. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. General Project Design Criteria

i. Design Review

1. NMFS fish passage review and approve – The UNF would ensure that the action is individually reviewed and approved by NMFS for consistency with NMFS (2011e).

2. Restoration Review Team (RRT) – The UNF would ensure that the action is individually reviewed by the RRT.

ii. Design Guidance

1. Construct geomorphically-appropriate stream channels and floodplains within a watershed and reach context.

2. Design actions to restore floodplain characteristics—elevation, width, gradient, length, and roughness—in a manner that closely mimics, to the extent possible, those that would naturally occur at that stream and valley type.

3. To the greatest degree possible, remove nonnative fill material from the channel and floodplain to an upland site.

4. When necessary, loosen compacted soils once overburden material is removed. Overburden or fill comprised of native materials, which originated from the project area, may be used within the floodplain where appropriate to support the project goals and objectives.

5. Structural elements would fit within the geomorphic context of the stream system. For bed stabilization and hydraulic control structures, constructed riffles would be preferentially used in pool-riffle stream types, while roughened channels and boulder step structures would be preferentially used in step-pool and cascade stream types.

6. Material selection (LW, rock, gravel) would also mimic natural stream system materials.

7. Construction of the streambed should be based on Stream Simulation Design principles as described in section 6.2 of *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings* or other appropriate design guidance documents (USDA-Forest Service 2008).

iii. Project documentation – Prior to the Design Review, the project contact would provide NMFS and the RRT with the following documentation:

1. Background and Problem Statement
a. Site history.
b. Environmental baseline.
c. Problem Description.
d. Cause of problem.

2. Project Description
a. Goals/objectives.
b. Project elements.
c. Sequencing, implementation.
d. Recovery trajectory –how does it develop and evolve?

3. Design Analysis
a. Technical analyses.
b. Computations relating design to analysis.
c. References.

4. River Restoration Analysis Tool – The River Restoration Analysis Tool (restorationreview.com) was created to assist with design and monitoring of aquatic restoration projects. The following questions taken from the tool must be addressed in the project documentation:

a. Problem Identification
i. Is the problem identified?
ii. Are causes identified at appropriate scales?

b. Project Context
i. Is the project identified as part of a plan, such as a watershed action plan or recovery plan?
ii. Does the project consider ecological, geomorphic, and socioeconomic context?

c. Goals & Objectives
i. Do goals and objectives address problem, causes, and context?
ii. Are objectives measurable?

d. Alternatives/Options Evaluation
i. Were alternatives/options considered?
ii. Are uncertainties and risk associated with selected alternative acceptable?

e. Project Design
i. Do project elements collectively support project objectives?
ii. Are design criteria defined for all project elements?
iii. Do project elements work with stream processes to create and maintain habitat?
iv. Is the technical basis of design sound for each project element?

f. Implementation
i. Are plans and specifications sufficient in scope and detail to execute the project?
ii. Does plan address potential implementation impacts and risks?

g. Monitoring & Management
i. Does monitoring plan address project compliance?
ii. Does monitoring plan directly measure project effectiveness?

h. Monitoring – Develop a monitoring and adaptive plan that has been reviewed and approved by the RRT and the Services. The plan would include the following:
i. Introduction
ii. Existing Monitoring Protocols
iii. Project Effectiveness Monitoring Plan
iv. Project Review Team Triggers
v. Monitoring Frequency, Timing, and Duration
vi. Monitoring Technique Protocols
vii. Data Storage and Analysis
viii. Monitoring Quality Assurance Plan
ix. Literature cited

5. Off- and Side-Channel Habitat Restoration projects would be implemented to reconnect historic side-channels with floodplains by removing off-channel fill and plugs. Furthermore, new side-channels and alcoves can be constructed in geomorphic settings that would accommodate such features. This activity category typically applies to areas where side channels, alcoves, and other backwater habitats have been filled or blocked from the main channel, disconnecting them from most if not all flow events. These project types would increase habitat diversity and complexity, improve flow heterogeneity, provide long-term nutrient storage and substrate for aquatic macroinvertebrates, moderate flow disturbances, increase retention of leaf litter, and provide refuge for fish during high flows. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.
a. Review and approve – When a proposed side channel would contain >20% of the bankfull flow,16 the UNF would ensure that the action is reviewed by the RRT and reviewed and approved by NMFS for consistency with criteria in NMFS (2011e).
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 or aerial photographs. Excavation depth would not exceed the maximum thalweg depth in the main channel. Excavated material removed from off- or side-channels would be hauled to an upland site or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity.

6. Streambank Restoration would be implemented through bank shaping and installation of coir logs or other soil reinforcements as necessary to support riparian vegetation; planting or installing LW, trees, shrubs, and herbaceous cover as necessary to restore ecological function in riparian and floodplain habitats; or a combination of the above methods. Such actions are intended to restore banks that have been altered through road construction, improper grazing, invasive plants, and more. Benefits include increased amounts of riparian vegetation and associated shading, bank stability, and reduced sedimentation into stream channels and spawning gravels. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.
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 LW to the extent it would naturally occur. If possible, LW 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 would not be used for streambank restoration, except as ballast to stabilize LW.
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.

7. Set-back or Removal of Existing Berms, Dikes, and Levees would be conducted to reconnect historic fresh-water deltas to inundation, stream channels with floodplains, and historic estuaries to tidal influence as a means to increase habitat diversity and complexity, moderate flow disturbances, and provide refuge for fish during high flows. Other restored ecological functions include overland flow during flood events, dissipation of flood energy, increased water storage to augment low flows, sediment and debris deposition, growth of riparian vegetation, nutrient cycling, and development of side channels and alcoves. Such projects would take place where estuaries and floodplains have been disconnected from adjacent rivers through drain pipes and anthropogenic fill. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.
a. Floodplains and Freshwater Deltas
i. Design actions to restore floodplain characteristics—elevation, width, gradient, length, and roughness—in a manner that closely mimics, to the extent possible, those that would naturally occur at that stream and valley type.
ii. Remove drain pipes, fences, and other capital projects to the extent possible.
iii. To the extent possible, remove nonnative fill material from the floodplain to an upland site.
iv. Where it is not possible to remove or set-back all portions of dikes and berms, or in areas where existing berms, dikes, and levees support abundant riparian vegetation, openings would be created with breaches. Breaches would be equal to or greater than the active channel width to reduce the potential for channel avulsion during flood events. In addition to other breaches, the berm, dike, or levee would always be breached at the downstream end of the project or at the lowest elevation of the floodplain to ensure the flows would naturally recede back into the main channel thus minimizing fish entrapment.
v. Elevations of dike/levee setbacks would not exceed the elevation of removed structures
vi. When necessary, loosen compacted soils once overburden material is removed. Overburden or fill comprised of native materials, which originated from the project area, may be used within the floodplain to create set-back dikes and fill anthropogenic holes provided that floodplain function is not impeded.

8. Reduction/Relocation of Recreation Impacts would close, better control, or relocate recreation infrastructure and use along streams and within riparian areas. This would include removal, improvement, or relocation of infrastructure associated with designated campgrounds, dispersed camp sites, day-use sites, foot trails, and off-road vehicle roads/trails in riparian areas. The primary purpose is to eliminate or reduce recreational impacts to restore riparian areas and vegetation, improve bank stability, and reduce sedimentation into

adjacent streams. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. Design remedial actions to restore floodplain characteristics—elevation, width, gradient, length, and roughness—in a manner that closely mimics, to the extent possible, those that would naturally occur at that stream and valley type.
b. To the extent possible, non-native fill material would be removed from the floodplain to an upland site.
c. Overburden or fill comprised of native materials, which originated from the project area, can be used to reshape the floodplain, placed in small mounds on the floodplain, used to fill anthropogenic holes, buried on site, or disposed into upland areas.
d. For recreation relocation projects—such as campgrounds, horse corrals, off-road vehicle trails—move current facilities out of the riparian area or as far away from the stream as possible.
e. Consider de-compaction of soils and vegetation planting once overburden material is removed.
f. Place barriers—boulders, fences, gates, *etc.*—outside of the bankfull width and across traffic routes to prevent off-road vehicle access into and across streams.
g. For work conducted on off-road vehicle roads and trails, follow relevant PDC in Road and Trail Erosion Control and Decommissioning (PDC 12) below.

9. Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering Facilities projects would be implemented by constructing fences to exclude riparian grazing, providing controlled access for walkways that livestock use to transit across streams and through riparian areas, and reducing livestock use in riparian areas and stream channels by providing upslope water facilities. Such projects promote a balanced approach to livestock use in riparian areas, reducing livestock impacts to riparian soils and vegetation, streambanks, channel substrates, and water quality. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.
a. Livestock Fencing
i. Fence placement must allow for lateral movement of a stream and to allow establishment of riparian plant species. To the extent possible, fences would be placed outside the channel migration zone.
ii. Minimize vegetation removal, especially potential LW recruitment sources, when constructing fence lines.
iii. Where appropriate, construct fences at water gaps in a manner that allows passage of LW and other debris.
b. Livestock Stream Crossings
i. The number of crossings would be minimized.
ii. Locate crossings or water gaps where streambanks are naturally low. Livestock crossings or water gaps must not be located in areas where compaction or other damage can occur to sensitive soils and vegetation (*e.g.*, wetlands) due to congregating livestock.
iii. To the extent possible, crossings would not be placed in areas where ESAlisted species spawn or are suspected of spawning (*e.g.*, pool tailouts where spawning may occur), or within 300-feet upstream of such areas.
iv. Existing access roads and stream crossings would be used whenever possible, unless new construction would result in less habitat disturbance and the old trail or crossing is retired.
v. Access roads or trails would be provided with a vegetative buffer that is adequate to avoid or minimize runoff of sediment and other pollutants to surface waters.
vi. Essential crossings would be designed and constructed or improved to handle reasonably foreseeable flood risks, including associated bedload and debris, and to prevent the diversion of streamflow out of the channel and down the trail if the crossing fails.
vii. If necessary, the streambank and approach lanes can be stabilized with native vegetation or angular rock to reduce chronic sedimentation. The stream crossing or water gap should be armored with sufficient sized rock (*e.g.*, cobble-size rock) and use angular rock if natural substrate is not of adequate size.
viii. Livestock crossings would not create barriers to the passage of adult and juvenile fish. Whenever a culvert or bridge—including bridges constructed from flatbed railroad cars, boxcars, or truck flatbeds—is used to create the crossing, the structure width would tier to project design criteria listed for Stream Simulation Culvert and Bridge Projects under Fish Passage Restoration (PDC 1).
ix. Stream crossings and water gaps would be designed and constructed to a width of 10 to 15 feet in the upstream-downstream direction to minimize the time livestock would spend in the crossing or riparian area.
x. When using pressure treated lumber for fence posts, complete all cutting/drilling offsite (to the extent possible) so that treated wood chips and debris do not enter water or flood prone areas.
xi. Riparian fencing is not to be used to create livestock handling facilities or riparian pastures.
c. Off-channel Livestock Watering Facilities
i. The development of a spring is not allowed if the spring is occupied by ESA-listed species.
ii. Water withdrawals must not dewater habitats or cause low stream flow conditions that could affect ESA-listed fish. Withdrawals may not exceed 10% of the available flow.
iii. Troughs or tanks fed from a stream or river must have an existing valid water right. Surface water intakes must be screened to meet the most recent version of NMFS fish screen criteria (NMFS 2011e)(NMFS 2011e)(NMFS 2011e)(NMFS 2011e)(NMFS 2011e)(NMFS 2011e)(NMFS 2011e), be self-cleaning, or regularly maintained by removing debris buildup. A responsible party would be designated to conduct regular inspection and as-needed maintenance to ensure pumps and screens are properly functioning.
iv. Place troughs far enough from a stream or surround with a protective surface to prevent mud and sediment delivery to the stream. Avoid steep slopes and areas where compaction or damage could occur to sensitive soils, slopes, or vegetation due to congregating livestock.
v. Ensure that each livestock water development has a float valve or similar device, a return flow system, a fenced overflow area, or similar means to minimize water withdrawal and potential runoff and erosion.
vi. Minimize removal of vegetation around springs, wet areas.
vii. When necessary, construct a fence around the spring development to protect the water source.

10. Piling and other Structure Removal would include the removal of untreated and chemically treated wood pilings, piers, boat docks as well as similar structures comprised of plastic, concrete, and other material. Piling and other structure removal from waterways would improve water quality by eliminating chronic sources of toxic contamination and associated impacts to riparian dependent species. Pilings and other structures occur in estuaries, lakes, and rivers and are typically used in association with boat docks and other facilities. Equipment such as boats, barges, excavators, dump trucks, front-end loaders, and similar equipment may be used to implement projects.
a. When removing an intact pile:
i. Install a floating surface boom to capture floating surface debris.
ii. To the extent possible, keep all equipment (*e.g.*, bucket, steel cable, vibratory hammer) out of the water, grip piles above the waterline, and complete all work during low water and low current conditions.
iii. Dislodge the piling with a vibratory hammer, whenever feasible. Never intentionally break a pile by twisting or bending.
iv. Slowly lift piles from the sediment and through the water column.
v. Place chemically-treated piles in a containment basin on a barge deck, pier, or shoreline without attempting to clean or remove any adhering sediment. A containment basin for the removed piles and any adhering sediment may be constructed of durable plastic sheeting with sidewalls supported by hay bales or another support structure to contain all sediment.
vi. Fill the holes left by each piling with clean, native sediments located from the project area.
vii. Dispose of all removed piles, floating surface debris, any sediment spilled on work surfaces, and all containment supplies at a permitted upland disposal site.
b. When removing a broken pile:
i. If a pile breaks above the surface of uncontaminated sediment, or less than 2 feet below the surface, every attempt short of excavation would be made to remove it entirely. If the pile cannot be removed without excavation, excavate sediments and saw the stump off at least 3 feet below the surface of the sediment.
ii. If a pile breaks above contaminated sediment, saw the stump off at the sediment line; if a pile breaks within contaminated sediment, make no further effort to remove it and cover the hole with a cap of clean substrate appropriate for the site.
iii. If dredging is likely in the area of piling removal, use a global positioning device (GPS) to note the location of all broken piles for future use in site debris characterization.

11. In-channel Nutrient Enhancement would include the placement of salmon carcasses, carcass analogs (processed fish cakes), or inorganic fertilizers in stream channels to help return stream nutrient levels back to historic levels. This action helps restore marine-derived nutrients to aquatic systems, thereby adding an element to the food chain that is important for growth of macroinvertebrates, juvenile salmonids and riparian vegetation. Application and distribution of nutrients throughout a stream corridor can occur from bridges, streambanks, boats or helicopter.

a. In Oregon, projects are permitted through ODEQ. Carcasses would be used from the treated watershed or those that are certified disease free by an Oregon Department of Fish and Wildlife (ODFW) pathologist.
b. In Washington, follow Washington Department of Fish and Wildlife's (WDFW) Protocols and Guidelines for Distributing Salmonid Carcasses, Salmon Carcass Analogs, and Delayed Release Fertilizers to Enhance Stream Productivity in Washington State (Cramer 2012) or its most recent edition.
c. Ensure that the relevant streams have the capacity to capture and store placed carcasses.
d. Carcasses should be of species native to the watershed and placed during the normal migration and spawning times that would naturally occur in the watershed.
e. Nutrient supplementation would not be conducted in eutrophic or naturally oligotrophic systems.

12. Road and Trail Erosion Control would include hydrologically closing or decommissioning roads and trails, including culvert removal in perennial and intermittent streams; removing, installing or upgrading cross-drainage culverts; upgrading culverts on non-fish-bearing steams; constructing water bars and dips; reshaping road prisms; vegetating fill and cut slopes; removing and stabilizing of sidecast materials; grading or resurfacing roads that have been improved for aquatic restoration with gravel, bark chips, or other permeable materials; contour shaping of the road or trail base; removing road fill to native soils; soil stabilization and tilling compacted surfaces to reestablish native vegetation. The Umatilla National Forest Travel and Access Management Plan has been completed. Roads previously closed to the public in a separate NEPA decision would be subject to these PDC and may be addressed under this EA (see footnote below). Erosion control actions would target priority roads that contribute sediment to streams, block fish passage, or disrupt floodplain and riparian functions. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.
a. Road Decommissioning[9] 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 road segments adjacent to a stream, use sediment control barriers between the road and stream if space is available.
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.

[9] ***This Proposed Action would NOT close nor decommission any existing open roads***. Roads which have previously been closed through other site-specific NEPA decisions, would be considered on a year-to-year basis, for implementation of any of a suite of erosion control measures. A variety of methods for erosion control is available for use on both open and closed roads. Decommissioning of previously closed roads would only occur, after additional public notice and comment and after resolution of public concerns has been completed when any existing closed road is scheduled for decommissioning.

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 would determine if culvert removal should include stream isolation and rerouting in project design. Culvert removal on fish bearing streams would adhere to the measures described in Fish Passage Restoration (PDC 21).
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 would not increase the drainage network and would be constructed to hydrologically disconnect it from the stream network to the extent practical. New cross drains would discharge to stable areas where the outflow would 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.

13. Juniper Tree Removal would be conducted in riparian areas and adjoining uplands to help restore plant species composition and structure that would occur under natural fire regimes. Juniper removal would occur in those areas where juniper have encroached into riparian areas as a result of fire exclusion, thereby replacing more desired riparian plant species such as willow, cottonwood, aspen, alder, sedge, and rush. This action would help restore composition and structure of desired riparian species, thereby improving ground cover and water infiltration into soils. Equipment may include chainsaws, pruning shears, winch machinery, feller-bunchers, and slash-busters. The following measures would apply:
a. Remove juniper to natural stocking levels where the UNF determines that juniper trees are expanding into neighboring plant communities to the detriment of other native riparian vegetation, soils, or streamflow.
b. Do not cut old-growth juniper, which typically has several of the following features: sparse limbs, dead limbed or spiked-tops, deeply furrowed and fibrous bark, branches covered with bright-green arboreal lichens, noticeable decay of cambium layer at base of tree, and limited terminal leader growth in upper branches (Miller *et al.* 2005).
c. Felled trees may be left in place, lower limbs may be cut and scattered, or all or part of the trees may be used for streambank or wetland restoration (e.g., manipulated as necessary to protect riparian or wetland shrubs from grazing by livestock or wildlife or otherwise restore ecological function in floodplain, riparian, and wetland habitats).
d. Where appropriate, cut juniper may be placed into stream channels and floodplains to provide aquatic benefits. Juniper can be felled or placed into the stream to promote channel aggradation as long as such actions do not obstruct fish movement and use of spawning gravels or increase width to depth ratios.
e. On steep or south-facing slopes, where ground vegetation is sparse, leave felled juniper in sufficient quantities to promote reestablishment of vegetation and prevent erosion.
f. If seeding is a part of the action, consider whether seeding would be most appropriate before or after juniper treatment.
g. When using feller-buncher and slash-buster equipment, operate equipment in a manner that minimizes soil compaction and disturbance to soils and native vegetation to the extent possible. Equipment exclusion areas (buffer area along stream channels) should be as wide as the feller-buncher or slash-buster arm.

14. Riparian Vegetation Treatment (controlled burning) would include reintroduction of low and moderate-severity fire into riparian areas to help restore plant species composition and structure that would occur under natural fire regimes in dry forest types east of the Cascades and in southwestern Oregon. Additionally, controlled burns may be implemented in localized lowland areas in western Oregon, *i.e.,* oak woodlands. Conifer thinning may be required to adjust fuel loads for moderate-severity burns to regenerate deciduous trees and shrubs. Equipment would include drip torches and chainsaws, along with fire suppression vehicles and equipment.
a. Low and Moderate Severity Burns
i. Experienced fuels specialists, silviculturists, fisheries biologist, and hydrologists would be involved in designing prescribed burn treatments.
ii. Prescriptions would focus on restoring the plant species composition and structure that would occur under natural fire regimes.
iii. Burn plans are required for each action and would include, but not be limited to the following: a description of existing and desired future fire classifications, existing and target stand structure and species composition (including basis for target conditions); other ecological objectives, type, severity, area, and timing of proposed burn; and measures to prevent destruction of vegetation providing shade and other ecological functions important to fish habitat.
iv. Low-severity burns would be used except where the objective is to restore deciduous trees, as describe below under part "v.", with a goal of creating a mosaic pattern of burned and unburned landscape. Low severity burns are characterized by the following: Low soil heating or light ground char occurs where litter is scorched, charred, or consumed, but the duff is left largely intact. LW accumulation is partially consumed or charred. Mineral soil is not changed. Minimal numbers of trees, typically pole/saplings, would be killed.
v. Moderate-severity burns are permitted only where needed to invigorate decadent aspen stands, willows and other native deciduous species, and may be targeted in no more than 20% of the area within RHCAs/6th field HUC/year. Such burns would be contained within the observable historical boundaries of the aspen stand, wouldow site, other deciduous species, and associated meadows; additional area outside of the "historical boundaries" may be added to create controllable burn boundaries. Moderate severity are characterized by the following: Moderate soil heating or moderate ground char occurs where the litter onforest sites is consumed and the duff is deeply charred

or consumed, butthe underlying mineral soil surface is not visibly altered. Light colored ash is present. LW is mostly consumed, except for logs, which are deeply charred.
vi. Fire lines would be limited to five feet in width, constructed with erosion control structures, such as water bars, and restored to pre-project conditions before the winter following the controlled fire. To the extent possible, do not remove vegetation providing stream shade or other ecological functions that are important to streams.
vii. Ignition can occur anywhere within the Riparian Reserve and RHCAs area as long as project design criteria are met.
viii. Avoid water withdrawals from fish bearing streams whenever possible. Water drafting must take no more than 10% of the stream flow and must not dewater the channel to the point of isolating fish. Pump intakes would have fish screens consistent with NMFS fish screening criteria (NMFS 2011e).
b. Non-commercial Thinning associated with Moderate-severity Burns
i. Non-commercial tree thinning and slash removal is allowed only as required to adjust fuel loads to implement a moderate-severity burn to promote growth of deciduous trees and shrubs, such as aspen, cottonwood, willow, other deciduous species, and associated meadows.
ii. Thinning is allowed only in dry forest types, *i.e.*, east of the Cascades.
iii. To protect legacy trees, thinning from below is allowed. If conifers are even-aged pole, sapling, or mid-seral with no legacy trees, thin existing trees to the degree necessary to promote a moderate-severity burn.
iv. No slash burning is allowed within 30-feet of any stream. To the extent possible, avoid creating hydrophobic soils when burning slash. Slash piles should be far enough away from the stream channel so any sediment resulting from this action would be unlikely to reach any stream.
v. Apply PDC in National Fire Plan salmonid criteria (USDI-Bureau of Land Management 2005) for limits on mortality to residual overstory vegetation.
vi. Only hand equipment—chain saws, axes, Pulaski's, *etc.*—may be used for felling.
vii. Where livestock or wildlife grazing could be a threat to restoration of aspen, cottonwood, willow, alder, and other deciduous vegetation and an immediate moderate-severity burn would consume large amounts of felled trees, consider delaying the burn and leaving felled trees in place to create grazing barriers to help assure plant growth.
viii. If in an existing grazing allotment, projects in this category would be accompanied by livestock grazing practices that promote the attainment of moderate-severity burn objectives.

15. Riparian Vegetation Planting would include the planting of native riparian species that would occur under natural disturbance regimes. Activities may include the following: planting conifers, deciduous trees and shrubs; placement of sedge and or rush mats; gathering and planting willow cuttings. The resulting benefits to the aquatic system can include desired levels of stream shade, bank stability, stream nutrients, LW inputs, increased grasses, forbs, and shrubs, and reduced soil erosion. Equipment may include excavators, backhoes, dump trucks, power augers, chainsaws, and manual tools.

a. Experienced silviculturists, botanists, ecologists, or associated technicians would be involved in designing vegetation treatments.
b. Species to be planted would be of the same species that naturally occur in the project area. Acquire native seed or plant sources as close to the watershed as possible.
c. Tree and shrub species, wouldow cuttings, as well as sedge and rush mats to be used
s transplant material would 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 would compete with plantings is permitted.
g. Exclosure fencing to prevent utilization of plantings by deer, elk, and livestock is permitted.

16. Bull Trout Protection would include the removal of brook trout or other non-native fish species via electrofishing or other manual means to protect bull trout from competition or hybridization.18
a. For brook trout or other non-native fish species removal, staff experienced in the specific removal method would be involved in project design and implementation.
b. When using electrofishing for removal of brook trout or other non-native fish species, use the following guidelines:
i. Electrofishing would be conducted using the methods outlined in the NMFS's guidelines (NMFS 2000).
ii. Electrofishing equipment would be operated at the lowest possible effective settings to minimize injury or mortality to bull trout.
iii. To reduce adverse effects to bull trout, electrofishing would only occur from May 1 (or after emergence occurs) to July 31 in known bull trout spawning areas. No electrofishing would occur in any bull trout habitat after August 15.
iv. Electrofishing would not be conducted when the water conditions are turbid and visibility is poor. This condition may be experienced when the sampler cannot see the stream bottom in 1 foot of water.
v. Electrofishing would not be conducted within core areas that contain 100 or fewer adult bull trout.
vi. Other removal methods, such as dip netting, spearing, and other means can be used.

17. Beaver Habitat Restoration includes installation of in-channel structures to encourage beavers to build dams in incised channels and across potential floodplain surfaces. The dams are expected to entrain substrate, aggrade the bottom, and reconnect the stream to the floodplain.
a. **In-channel Structures**
i. Consist of porous channel-spanning structures comprised of biodegradable vertical posts (beaver dam support structures) approximately 0.5 to 1 meter apart and at a height intended to act as the crest elevation of an active beaver dam. Variation of this restoration treatment

may include post lines only, post lines with wicker weaves, construction of starter dams, reinforcement of existing active beaver dams, and reinforcement of abandoned beaver dams (Pollock *et al.* 2012).
ii. Place beaver dam support structures in areas conducive to dam construction as determined by stream gradient or historical beaver use.
iii. Place in areas with sufficient deciduous shrub and trees to promote sustained beaver occupancy.
b. **Habitat Restoration**
i. Beaver Restoration activities may include planting riparian hardwoods (species such as willow, red osier dogwood, and alder) and building exclosures (such as temporary fences) to protect and enhance existing or planted riparian hardwoods until they are established.
ii. Maintain or develop grazing plans that would ensure the success of beaver habitat restoration objectives.
iii. As a means to restore desired vegetation (*e.g.*, aspen, willow, alder, and cottonwood) associated with quality beaver habitat, follow project design criteria in the *Riparian Vegetation Treatment (controlled burning) b. Noncommercial thinning associated with Moderate-severity burns* category.

18. Fisheries, Hydrology, Geomorphology, Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration include assessments and monitoring projects that could or are associated with planning, implementation, and monitoring of aquatic restoration projects covered by this opinion. Such support projects may include surveys to document the following aquatic and riparian attributes: fish habitat, hydrology, channel geomorphology, water quality, fish spawning, fish presence19, macro invertebrates, riparian vegetation, wildlife, and cultural resources (including excavating test pits <1 m2 in size). This also includes effectiveness monitoring associated with projects implemented under ARBO II, provided the effectiveness monitoring is limited to the same survey techniques described in this section.
a. Train personnel in survey methods to prevent or minimize disturbance of fish. Contract specifications should include these methods where appropriate.
b. Avoid impacts to fish redds. When possible, avoid sampling during spawning periods.
c. Locate excavated material from cultural resource test pits away from stream channels. Replace all material in test pits when survey is completed and stabilize the surface.
d. Does not include research projects that have or should obtain a permit pursuant to section 10(a) of the ESA.

Literature Cited

USFWS. 2010. Best Management Practices to Minimize Adverse Effects to Pacific Lamprey.http://www.fws.gov/pacific/Fisheries/sphabcon/lamprey/pdf/Best%20Management%20Practices%20for%20Pacific%20Lamprey%20April%202010%20Version

Appendix B: Additional Project Design Criteria

Additional Project Design Criteria

The following design criteria provide additional direction for project implementation to ensure compliance with Forest Plan standards, guidelines and desired future conditions.

All mitigation measures and project design criteria for aquatic restoration activities as shown in *'Appendix A: Aquatic Restoration Project Categories, Program Administration, General Aquatic Conservation Measures, and Project Design Criteria for Aquatic Restoration Activity Categories on the Umatilla National Forest.'*

Fisheries and Hydrology

Tree Tipping and Tree Felling for Large Wood Projects

Source trees being extracted (either by tipping and or falling) as part of this project for instream restoration will not be harvested from within the primary shade zone.

Table B-25. Primary shade zone width, based on adjacent hill slope.

	Hill Slope less than 30%	Hill Slope 30% to 60%	Hill Slope greater than 60%
Primary Shade Zone Width (slope distance)	50 ft.	55 ft.	60 ft.

The Temperature Implementation Strategies allow the distances in the above table to be less (but not less than 25 ft.) if any of the following conditions applies:

The trees are located on a south facing slope (175-185 degree azimuth) and therefore do not provide stream shade;
An appropriate level of analysis is completed and documented, such as shade modeling, using site-specific characteristics to determine the primary shade tree width; and or
Field monitoring or measurements are completed to determine the width where optimum Angular Canopy Density (65% or greater) is achieved (see TMDL Implementation Strategies).
Source trees should come from but are not limited to: over or fully stocked upland and riparian stands, hazard trees, trees generated from administrative sites (maintenance, expansion, or new construction), and hardwood restoration.
There is no DBH (diameter at breast height) restriction for large wood, but consider the following before removing and placing trees:

Diameter

The key to establishing a logjam is utilizing larger diameter wood that resists decay. These pieces of wood are often called "key pieces," and serve as the anchors for the logjam structure. Wood can improve fish habitat only if the wood is large enough to stay, influence flow patterns, and sediment sorting. Larger diameter wood retains its size longer as abrasion and decay occurs over the years. Larger diameter wood is more effective in creating pools and complex channels that improve fish populations. The minimum diameter required for a key piece of wood depends on the bankfull width of the stream is found in the following table.

Table B-26. Bankfull widths and minimum diameter of logs to be considered key pieces.

Bankfull Width* - Feet	Minimum Diameter* - Inches
0 to 10	10
10 to 20	16
20 to 30	18
Over 30	22

*This table was taken from '1995 A Guide to Placement of Large Wood in Streams.

Length

The length of the wood is also important to stability. To be considered a key piece a log with a rootwad still attached should be at least one and one-half times (1.5X) the bankfull or a log without a rootwad should be twice (2X) the length of the stream's bankfull width. As the best fish habitat is formed around jams composed of 3 to7 logs, at least 2 key pieces should be used at each structure.
Mimic natural accumulations of large woody debris based on stream type, valley setting, and community type and ensure future large woody debris recruitment.
Tailholds as part of tree tipping operations are permitted across perennial, intermittent and ephemeral streams but the use of protective straps will be required to prevent tree damage.

Juniper Treatments

The majority of the juniper treatment areas would be within the riparian habitat conservation areas and adjoining uplands. For each area evaluated for juniper treatments, interdisciplinary teams would discuss the following questions in order to identify the attributes of an area and select the appropriate treatments:

What kind of site (potential natural vegetation, soils)?
Successional state of site?
Components that need to be restored?
How units may fit into the overall landscape mosaic?
Long-term goals and objectives?
Utilize the "Western Juniper Field Guide: Asking the Right Questions to Select the Appropriate Management Actions. (Bates et al. 2007, Circular 1321) http://pubs.usgs.gov/circ/1321/pdf/circ1321.pdf

Tree and Boulder Hauling

Apply mitigation and best management practices for dust abatement (water, lignosulfonate, Calcium and Magnesium Chlorides) dry conditions, and erosion control as directed by physical scientist or road engineer (See Road Maintenance project design criteria #6 for application).
Haul or maintenance is permitted on roads under the following conditions:
During haul, weather conditions are monitored daily for the chance of precipitation by the Hydrologist or Fish Biologist.
No rutting of the road surface is occurring, indicating the subsurface is wet.
Frozen ground conditions.
Haul will cease at any time when the travelway of the road is wet and turbid water or fines are observed moving off the road surface to ditchlines that deliver to stream channels regardless of time of year.
Roads Exempt from Haul Restrictions include (Do to no mechanism for sediment delivery):
Paved roads
Surfaced Ridge top roads
Surfaced outsloped roads with no ditch or stream crossings

Prescribed Burning and Related Activities

Piling and burning of large machine piles will be restricted to existing roads and landings.
Machine piles will not be located on road fills or locations downslope of road ditch relief culverts, to limit created hydrophobic conditions and accelerated erosion.
Include all relevant PDC in Silviculture prescriptions and burn plan objectives for all fuel treatment activities within RHCA's.

For perenial and fish-bearing stream channels:

Avoid removing trees along stream banks (e.g. don't cause bank instability or increase erosion)
Within 100' of the stream channel backing fire is preferred.
Within primary shade zone retain 100% of the over-story canopy closure with the exception of hardwood treatment.

For intermittent, non-fish-bearing stream channels:

Within 50' of the stream channel backing fire is preferred.

For the maintenance and use of water sources and draft sites:

Minimize disturbance of existing riparian vegetation to the greatest extent practical; in particular, maintain shade, bank stability, and large woody material recruitment potential.
Use sediment control measures such as straw bales, filter cloth, or sediment fences when conditions warrant.
Maximize maintenance activities during late summer and early fall to best avoid wet conditions.
Do not pump from streams that do not have continuous surface flow. When pumping water in all situations from streams, ensure that at least one-half of the original streamflow remains below the pump site.
Refuel power equipment, or use absorbent pads for immobile equipment, and prepare concrete at least 150 feet (or as far as possible from the water body where local site conditions do not allow a 150 foot setback) from water bodies to prevent direct delivery of contaminants into associated water bodies.
Fisheries, hydrology or other qualified personnel must work with engineering/fire personnel to review proposed activities to minimize potential effects to fish, stream channel conditions, and water quality.
Use and develop off-channel ponds outside of stream channels were feasible and appropriate. Work with fire folks to prioritize and decommission unnecessary in-stream drafting sites.
Water withdrawal equipment must have a fish screen installed, operated and maintained in accordance to NOAA Fisheries guidelines.

Wildlife

Threatened, Endangered or Sensitive Species

If wolves become established (denning) while project implementation is occurring, appropriate conservation measures will be implemented. Wildlife Biologists will refer to "Status and trend of gray wolves and forest management on the Umatilla National Forest" (Berkley and Hickman 2015) white paper to determine appropriate conservation measures.
If any evidence of wolverines is discovered during project implementation, appropriate conservation measures will be implemented.

Raptors

Activity restrictions will occur within currently known or discovered goshawk or other raptor nest stands as appropriate to conserve nesting habitat and to minimize disturbance to nesting individuals. Consult with wildlife biologist for appropriate conservation measures for current and discovered nests (restrictions may vary by species).
A buffer zone will be established by the wildlife biologist to restrict activities near the nest area during occupancy.
Where possible, retain trees with inactive nests that may be important to secondary nesters (e.g. great gray owl).

Snags

A wildlife biologist will approve any removal of snags unless deemed a safety hazard.

Big Game

Within big game winter range a wildlife biologist will be consulted between December 1 and April 1 to determine if activities should be restricted for big game needs.

Wildlife - general

Wildlife friendly fences will be used. Range specialist and wildlife biologist will work together on fence design. Recommended guidelines for wildlife friendly fences: Paige, C. 2012. A Landowner's Guide to Wildlife Friendly Fences. Second Edition. Private Land Technical Assistance Program, Montana Fish, Wildlife & Parks, Helena, MT. 56 pp."

Escape ramps will be installed on all water developments.

Botany

Sensitive Plant Populations and Habitats

Pre-Implementation:
Proposed restoration projects shall be completely surveyed early in the implementation planning process by a qualified botanist or rare plant technician, to identify and assess any sensitive or rare plant populations or habitats.
Proposed restoration projects shall develop restoration plans for degraded sensitive species habitats and/or mitigation plans in areas where sensitive plant populations are documented. This shall be accomplished by a journey-level Forest Service botanist in collaboration with the interdisciplinary team and other stakeholders.
Implementation:
Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, recreation sites, prescribed fires, fire lines, and other operational activities shall not be allowed in any documented sensitive plant sites unless it is for the demonstrated benefit or protection of the site. All sensitive plant populations should be buffered 100 ft. from all operational activities

where topography does not restrict such a distance. Sensitive plant sites and associated buffers shall be identified as Areas to Protect (ATPs).

Sensitive and Unique Habitats

Implementation:

The integrity of unique habitats shall be maintained. Unique habitats include meadows, rimrock, talus slopes, cliffs, animal dens, wallows, bogs [fens], seeps and springs. This shall be accomplished by incorporating cover buffers approximately 100 feet in width.

Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, recreation sites, prescribed fires, fire lines, and other operational activities shall not occur within, or at the interface of lithosols (scablands).

Cutting of juniper displaying old-growth characteristics such as sparse limbs, dead limbed or spiked-tops, deeply furrowed and fibrous bark, branches covered with bright-green arboreal lichens, noticeable decay of cambium layer at base of tree, and limited terminal leader growth in upper branches shall be prohibited.

Groundwater-Dependent Ecosystems

Implementation:

The integrity of groundwater-dependent ecosystems (GDE) shall be maintained. Spring developments shall not dewater GDEs. Spring developments shall not be allowed if the spring is occupied by rare or sensitive plant species, or in peatlands, fens, or where histic soils are present. These sites should be buffered 100 ft. from all operational activities where topography does not restrict such a distance, and be identified as Areas to Protect (ATPs).

Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, fire lines, and other operational activities shall not be allowed in springs, seeps, or any other GDE, unless it is for the benefit or protection of the GDE or development of the spring.

Spring developments should not disturb the spring orifice (point where water emerges). Spring head boxes should be placed in a location that will cause the least amount of disturbance to the soils and vegetation of the GDE. Preferable locations for spring head boxes should be in an established channel downstream from the orifice or a location where flowing water becomes subsurface.

Construct fenced exclosures around spring developments to prevent damage from wild ungulates and livestock.

Spring developments shall have a return flow system to minimize the diversion of surface and subsurface water from the catchment area. Consider using a float valve or similar device to reduce the amount of water withdrawn from the GDE.

When developing springs, place troughs far enough away from GDEs, wetlands, and other sensitive or unique habitats to prevent erosion, compaction, or degradation to sensitive soils and vegetation due to livestock congregation.

Invasive Plant Species

Pre-Implementation:

Proposed restoration projects shall be surveyed for invasive plants early in the implementation planning process by a qualified invasive plant specialist /technician, to identify and assess any undocumented invasive plant infestation.

For project areas that overlap or are adjacent to invasive plant infestations, assure that there is sufficient time prior to develop a long-term site strategy for control, eradication, and revegetation of the site. This shall be accomplished by a qualified invasive plant specialist in collaboration with the interdisciplinary team and other stakeholders.

Implementation:

All activities shall be conducted in a manner as to minimize or prevent the potential spread or establishment of invasive species.

Actions conducted on National Forest System Lands that will operate outside the limits of the road prism, require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering the National Forest. Cleaning will be inspected and approved by the forest officer in charge of administering the project.

Assure that all materials are weed-free. Use weed-free straw and mulch for all projects conducted or authorized by the Forest Service on National Forest System Lands. If State certified straw and/or mulch is not available, individual Forests should require sources certified to be weed-free using the North American Weed Free Forage Program standards or a similar certification process.

Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, and/or rock that are judged to be weed free by a qualified invasive plant specialist.

Prohibit heavy equipment operation, vehicle travel, staging areas, fire-control lines, and any other operational activities in invasive plant infestations, unless the activities are for the express purpose of eradicating the infestation or INV1 and INV2 have been completed.

Conduct post-implementation monitoring for invasive plants. Continue monitoring, treating, and removing invasive plants until all infestations are eradicated and native plant species are well established.

Native Plant Materials and Revegetation

Pre-Implementation:

Where the need for native plant materials is anticipated, assure that there is sufficient time for the plant materials specialist to develop a native plant materials plan and/or prescription prior to implementation of planned revegetation, rehabilitation, and restoration projects. This may include allowing for enough time to harvest and store hardwood cuttings, produce suitable quantities of native seed, and/or grow-out container stock.

Locally adapted, genetically appropriate native plant materials are the first choice for use in revegetation, restoration and rehabilitation, where timely natural regeneration of the native plant community is not likely to occur. Use a diverse assemblage of species that have the potential to naturally occur in the project area. Acquire native seed or plant sources as close to the watershed as possible. Examples of areas that may need treatment include: habitat restoration efforts, log decks, staging areas, landing zones, temporary roads, slash piles, culvert replacements, severely burned areas, skid trails, decommissioned roads, invasive species treatments, and other disturbances.

It is anticipated that use of non-native species will rarely occur, but may be needed under certain conditions. Non-native, non-invasive plant species may be used in the following situations: (1) when needed in emergency conditions to protect basic resource values (e.g., soil stability, water quality, and to help prevent the establishment of invasive species), (2) as an interim, non-persistent measure designed to aid in the re-establishment of native plants, (3) if native plant materials are not available and/or are not economically feasible, and (4) in permanently altered plant communities. Under no circumstances shall non-native invasive plant species and/or noxious weeds be used for revegetation.

Development, review and/or approval of revegetation, rehabilitation, and restoration prescriptions, including species selection, genetic heritage, growth stage, seed mixes, sowing guidelines, and any needed site preparation, shall be accomplished by a plant materials specialist who is knowledgeable about local ecological conditions and plant materials.

Implementation:

Concentrate plantings above the bank-full elevation. Sedge and rush mats should be placed and sized to prevent their movement during high flow events.

Newly planted and/or seeded areas should be protected from animals and activities that may prevent, retard, or slow the establishment and recovery of native vegetation. Site-specific measures may include building fences, piling slash, jack-strawing, closing areas to vehicles, and/or temporarily changing grazing regimes until the desired condition is sufficiently achieved.

Soils

For projects involving heavy machinery off road, the site shall be inspected for DSC (Detrimental Soil Conditions) for existing impacts to the soil. Activities will not create or result in greater than 20% DSC for the project area. If DSCs will result in >20% DSCs, then the project will either lower the DSCs for the project area or use an alternative methods in the design criteria necessary to meet Forest Plan and Forest Service Manual standards and guidelines.

Erosion would be minimized by following General Aquatic Conservation Measures and by implementing the appropriate project design criteria based on the type of activity (see appendix A).

Erosion from heavy machinery use would be minimized; by limiting compaction and puddling, rutting would be minimized.

Heavy equipment will not operate on Lithosols (scab openings) or shallow soils in general unless dry conditions exist and bearing strength of soil will prevent rutting. A map of lithic and shallow soils are available in the Blue Mountain Soil Atlas for access needs.

Fire and Fuels

Prescribed burning activities that create smoke emissions will follow the States of Oregon or Washington Smoke Management Regulations, depending on location.

Prescribed fire is not permitted within RHCAs within the Mill Creek Municipal Watershed. Use of prescribed fire is permitted outside the riparian influence zone where needed to improve watershed conditions or reduce significant risk of watershed damaging wildfire.

Prescribed burns are designed, located and scheduled to minimize risk of short term degradation of water quality.

Heritage Resources

Compliance with Section 106 of the National Historic Preservation Act for activities authorized under this analysis will be completed and concurred with by the Oregon State Historic Preservation Office before any ground disturbing action takes place. For each potential activity the District or Zone archaeologist will determine which of the criteria in the 2004 Programmatic Agreement with the Oregon State Historic

Preservation Office best fit the particular project. This will vary somewhat project to project based on the scale of the particular activity, the location on the landscape, and the nature of associated cultural resources, if any.

The District or Zone archaeologist will document their findings on a Programmatic Agreement form with a project description, rationale and location map which will be attached to the Forest Service Heritage Event database. The Forest archaeologist will review and sign off on the Programmatic Review form if concurred with. For appendices A, B and C projects as defined in the 2004 Programmatic Agreement, the Forest will retain the documentation and provide the Oregon State Historic Preservation Office with the annual summary of projects as described in the Preservation Act.

For full inventories the District or Zone archaeologist will complete an inventory report meeting current Oregon State Historic Preservation Office standards which will be reviewed by the Forest archaeologist. The Forest archaeologist will forward the completed inventory report to the Oregon State Historic Preservation Office for review and concurrence signature or further discussion as appropriate.

Consultation with Native American tribes is conducted under the terms of the Memorandums of Understanding the Forest has with each individual tribe. The Forest regularly consults with the Burns Paiute Tribe, the Confederated Tribes of the Umatilla Indian Reservation and the Confederated Tribes of Warm Springs Reservation.

For work requiring a full inventory under the terms of the 2004 Programmatic Agreement any identified cultural resources sites will generally be avoided. For cases where site avoidance is impractical mitigation procedures will be developed in consultation with the Oregon SHPO before project work begins.

If any previously unidentified cultural resources are located during project implementation, ground disturbing work will be halted until the resources are evaluated by the District or Zone archaeologist. If the cultural resources are determined to be potentially eligible for listing on the National Register of Historic Places work will either be permanently halted or a mitigation plan will be developed in consultation with the Oregon SHPO before work continues.

Recreation

Wilderness, Wild and Scenic Rivers-Wild segments: Motorized or mechanized equipment and restoration methods will not be used. Proposed exemptions to use prohibited motorized/mechanized equipment in Wilderness will be analyzed and documented in a site specific Minimum Requirements Analysis (MRA). Utilize the Minimum Resource Decision Guide (MRDG) document to facilitate the analysis and a decision by an authorized officer.

Inventoried Roadless Areas (IRAs): Projects will be designed to protect the undeveloped character of IRAs. Project activities involving road construction or reconstruction and the cutting, sale or removal of timber in inventoried roadless areas are not allowed unless authorized by the Chief of the Forest Service. A site specific analysis would be required to consider an exemption from these prohibited activities.

Potential Wilderness Areas (PWAs): Projects will be designed to protect the undeveloped character of the PWA to the extent practicable. Proposed project activities that may result in lasting evidence of development (such as more than the incidental presence of stumps from tree cutting activities or disturbance from road construction) that may reduce the number of acres meeting PWA criteria would need to be analyzed in a site specific document. The analysis would need to disclose the effects of actions that could affect future wilderness decisions associate with forest plan revision.

***Developed Recreation Sites/Recreational Activities*:** Consult with local recreation staff to help reduce effects of project activities that may directly or indirectly impact visitors at developed campgrounds, trailheads and day use areas or to popular recreation activities such as big game hunting. Examples include posting notices on bulletin boards of pending prescribed burns, scheduling of burn activities around big game hunting seasons to the extent practicable, and avoiding conducting project activities around campgrounds during busy holiday weekends if practicable.

Visuals

Identify Visual Quality Objectives (VQOs) that are specific to the project area. VQO maps are available and VQOs are described in the forest plan. Identify project specific activities that would be implemented to ensure the VQO is met following completion of the project.

Depending upon the VQO, measures could include such activities as fully recontouring road templates, replanting with native vegetation, etc.

Grazing

General

Range and Fire Specialists and permittees would coordinate activities including scheduling of burning activities in grazing allotments and/or pastures.

Utilize the Forest Post-Fire Interim Grazing Guidelines[10] to aid in determining when to resume grazing activities. When making that decision to resume grazing after fire, some factors that should be considered such as:

- Amount of acres burned (suitable for grazing and non-suitable).
- Amount and spatial arrangement of moderate and high intensity burned areas in relation to the whole burn and surrounding non-burned area.
- History of past grazing use.
- Vegetation community type and its condition prior to the burn. The vegetation community and its condition will influence the amount of time necessary for it to recover from the effects of fire.
- How much effective ground cover is available and is needed to resume grazing.
- Aquatic resource values.
- Condition of range improvements, if damaged, have they been reconstructed?

Whenever possible, units to be rested would be burned in the spring of the year to be rested or in the fall prior to the rest year.

If a rest period is required following a burn the permittee has the option to exclude cattle grazing from those portions of a pasture that were burned through the use of fencing and could continue to graze the unburned areas of a unit.

Protection of Government and Permittee Investments

All existing structural range improvements (fences, gates, spring developments, etc) and permanent ecological plots would be contractually protected.

Maintain structural integrity of range improvements.

If structural improvements are damaged during project operations they would be repaired to Forest Service standards prior to livestock scheduled use by the party responsible for causing the damage. Repairs would be required of the purchaser if damage were done during thinning or fuel treatment contractors or by force account where appropriate.

Three or more splices to a single wire within a distance of 20 feet will be replaced with a single splice.

Fence right of ways (6ft either side of fence), trails, other developments and access to them would be cleared of slash produced by project activities.

Notification of Permittees

During planning stage of each individual project, all potentially impacted grazing permittees will be notified of the proposed action and given the opportunity to provide input that may lessen impacts to their livestock operation. Implementation dates will be confirmed with permittee(s) prior to the activity.

Aspen Restoration

New aspen exclosure fences would have gates installed in proper locations to allow for removal of stray livestock. Aspen fences would be maintained each year and repaired whenever necessary. Plans for aspen exclosures will define when restoration of the protected stand has been achieved and who has responsibility for maintenance of the structure. When fences are no longer needed, aspen fences should be removed.

Alternate livestock water sources to those being used in aspen stands would be developed off-site before fencing aspen or re-evaluate fencing of the aspen site. Coordinate with range specialist and permittee.

[10] https://ems-team.usda.gov/sites/fs-r06-unfnepa/Aquatic%20Restoration%20Project/NEPA/Williams,%202003-%20MALHEUR%20POST-FIRE%20GRAZING%20INTERIM%20GUIDELINES.pdf

Appendix C: NEPA Compliance and Implementation Checklist

Umatilla National Forest Service
Aquatic Restoration Project Notification Form

Project Title:

Notification Date:

Project Leader Contact:
Phone:
Email:

Activity Type(s) (ARBO Category): Choose an item.

Location of Project (attach map);
The project is located in the watershed name and number(s); include lat and long in degrees

Proposed Dates for Project Implementation:

Species including TES species Affected:

Land Management Consistency: Does project lie within one of these land management designations?

☐ A7 - Wild and Scenic River
☐ Potential Wilderness Area (PWA)
☐ Inventoried Roadless Area(IRA)
☐ Municipal Watershed
☐ B1 - Wilderness
☐ Developed Recreational Site
☐ Research Natural Area

Proposed project is consistent with Forest Plan Land Management allocation? If no, then this project is not consistent with Umatilla Aquatic Restoration EA.

☐ **Yes** ☐ **No**

Does this project involve decommissioning a ML1 closed road? *(Only ML1 roads with a previous signed decision closing them to public use can be decommissioned under this decision unless they are in association with road relocation projects. (The decision needs to be included in the project record.)*

☐ **Yes** ☐ **No**

If yes, what signed decision closed this road to public access? _____

Project design is consistent with the General Aquatic Conservation Measures and Project Design Criteria for this ARBO II category (Appendix B). *(If no, this project is not consistent with the UMF Aquatic Restoration EA. Project cannot be implemented under this decision.)*

☐ **Yes** ☐ **No**

Project design is consistent with the Umatilla specific "Additional Project Design Criteria" (Appendix C). *(If no, this project is not consistent with the UMF Aquatic Restoration EA. Project cannot be implemented under this decision.)*

☐ **Yes** ☐ **No**

Are there additional project design criteria or mitigations required to meet visual quality objectives identified for the project area?

☐ **Yes** ☐ **No**

Are there additional project design criteria or mitigations required? If yes, what are the additional PDCs and/or mitigations?

☐ **Yes** ☐ **No**

Is there a potential conflict with a mining claim? If yes, has coordination occurred with the claims owner? Please attach narrative summarizing coordination.

☐ **Yes** ☐ **No**

Will this action impact recreation? If yes, does the opportunity exist to replace or relocate affected activity?

☐ **Yes** ☐ **No**

Required Surveys Completed:

Heritage:

- ☐ *Required heritage surveys completed*
- ☐ *Appropriate heritage mitigations and PDCs identified*
- ☐ *Tribal notification completed*

Botany:

- ☐ *Required botany surveys completed*
- ☐ *Appropriate botany mitigations and PDCs identified*

Noxious Weeds:

- ☐ *Required noxious weed surveys completed*
- ☐ *Invasive species plan completed with appropriate mitigations and PDCs identified for noxious weeds*

File Code: 1950 **Date:**

Subject: [NAME of PROJECT] Aquatic Restoration Project

To: The Record

I have determined that [Project Name] will implement an activity covered under the Umatilla National Forest Aquatic Restoration Environmental Assessment. Details on project location and description are available in the project record checklist. It is covered by project categories [list number from EA appendix A] and has been found to be consistent with the Forest Plan, General Aquatic Conservation Measures and Project Design Criteria for ARBO II, and Additional Project Design Criteria as outlined in the EA.

The following additional project design criteria are to be applied [list any additional, if needed].

U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) as appropriate, will be notified at least 30 in advance of activity implementation. Required botanical surveys and cultural clearances have been completed. SHPO concurrence was received on [date]. Tribal notification was completed [date]. [No or /number] concerns were identified [or identify concerns and how they were resolved].

[NAME]

[Title]

Appendix D: ARBO II Pre-Project Notification to Regulatory Agencies

Aquatic Restoration BO II Project Notification
Project Title:

Project Leader and Fish Biologist Contact:
Phone:
Email:

Location of Project
The project is located in the watershed name and number(s); include lat and long in degrees

Proposed Dates for Project Implementation:

Activity Type: Category #

Project Description

Process to Ensure Compliance with ARBO II Design Criteria:

The project is designed to comply with all Terms and Conditions and Design Criteria in the Reinitiation of the Endangered Species Act Section 7 Formal Programmatic Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Aquatic Restoration Activities in the States of Oregon and Washington (ARBO II), National Marine Fisheries Service (NMFS) April 25, 2013 (NMFS reference NWP-2013-9664); and the Endangered Species Act - Section 7 Programmatic Biological Opinion for Aquatic Restoration Activities in the State of Oregon, Washington and portions of California, Idaho and Nevada (ARBO II) [FWS *reference*: 01EOFW00-2013-F-00090].

All required design criteria and terms and conditions have been included in the project design (and as appropriate will be included in the construction contract). Associated with this pre-project notification is a separate notification to the U.S. Army Corps of Engineers (Corps) and Oregon Department of State Lands (DSL) as required under the Regional General Permit 4 (RGP-4) and General Permit 42104-61 (GP). The RGP-4 and GP require the following notifications:

Notification of the Corps and DSL
Notification of the local ODFW District Fish Biologist
Obtain other approvals as necessary (such as Umatilla County)
Cultural Resource Coordination with appropriate Tribes
Coordination with State Historic Preservation Office

Documentation of these notifications is on file at the XX Ranger District, Umatilla National Forest.

Species Affected:

Compliance with ARBO II (NMFS reference NWP-2013-9664)(FWS reference 01EOFW00-2013-F-00090)

Page 175 and page 346 of the ARBO II lists non-discretionary terms and conditions. The following description documents compliance of the XX with PDC 4 and 8, NMFS and/or USFWS Fish Passage Review and Approve(al).

PDC 4 requires NMFS Fish Passage Review and Approve – "The NMFS Level 1 team member will coordinate NMFS fish passage review and approval for the following types of project:
a. Dewatering construction sites by pumping at a rate that exceeds 3 cubic feet per second (cfs) will require fish screen review.
b. Fish passage culverts and bridges that do not meet width standards.
c. Headcut stabilization and channel spanning non-porous rock structures that creates discrete longitudinal drops > 6 inches.

d. Fish ladders.
e. Engineered log jams (ELJs) that occupy >25% of the bankfull area.
f. Irrigation diversion replacement/relocation & screen installation/replacement.
g. Dam removal.
h. Channel reconstruction/relocation projects.
i. Off- and side-channel reconstruction when the proposed side channel will contain >20% of the bankfull flow."

XX Project follows the PDC for XX category, and do not meet the criteria needed for NMFS passage review and approval, and do not meet the criteria for Restoration Review Team review.

/s/ Biologist Name and Signature

Date of Submittal

Appendix E: 303d Listed Streams Feb 2018

SUBBASIN	STREAM NAME	POLLUTANT	SEASON	*LISTING STATUS*[11]	MILES
LOWER GRANDE RONDE	Beaver Creek	Biological Criteria	Year Round	5	0 to 3.9
LOWER GRANDE RONDE	Grande Ronde River	Habitat Modification	Undefined	4C	36.3 to 80.7
LOWER GRANDE RONDE	Grande Ronde River	Sedimentation	Undefined	5	36.3 to 80.7
LOWER GRANDE RONDE	Wenaha River	Temperature	Year Round (Non-spawning)	4A	0 to 10.3
LOWER GRANDE RONDE	Wenaha River	Temperature	August 15 - June 15	4A	6.7 to 10.3
LOWER JOHN DAY	Brown Creek	Biological Criteria	Year Round	5	0 to 9.4
LOWER JOHN DAY	Brown Creek	Sedimentation	Year Round	5	0 to 9.5
LOWER JOHN DAY	Brown Creek	Temperature	Year Round (Non-spawning)	4A	0 to 9.5
LOWER JOHN DAY	East Bologna Canyon	Biological Criteria	Year Round	5	0 to 6.7
LOWER JOHN DAY	East Bologna Canyon	Sedimentation	Year Round	5	0 to 6.7
LOWER JOHN DAY	Henry Creek	Temperature	Summer	4A	0 to 7.1
LOWER JOHN DAY	Kahler Creek	Dissolved Oxygen	Year Round (Non-spawning)	5	0 to 12.2
LOWER JOHN DAY	Kahler Creek	Dissolved Oxygen	January 1 - May 15	5	10.6 to 13.8
LOWER JOHN DAY	Stahl Canyon	Temperature	Summer	4A	0 to 5.7
LOWER JOHN DAY	Tamarack Creek	Dissolved Oxygen	Year Round	5	0 to 1.3
MIDDLE FORK JOHN DAY	Big Creek	Temperature	Year Round (Non-spawning)	4A	0 to 11.6
MIDDLE FORK JOHN DAY	Granite Boulder Creek	Temperature	Year Round (Non-spawning)	4A	0 to 8.1
NORTH FORK JOHN DAY	Alder Creek	Biological Criteria	Year Round	5	0 to 5.5
NORTH FORK JOHN DAY	Alder Creek	Habitat Modification	Undefined	4C	0 to 5.5
NORTH FORK JOHN DAY	Alder Creek	Sedimentation	Undefined	5	0 to 5.5

[11] *Cat 4A-Water quality limited, TMDL approved; Cat 4C-Water quality limited, not a pollutant; Cat 5-Water quality limited, 303(d) list, TMDL needed*

SUBBASIN	STREAM NAME	POLLUTANT	SEASON	*LISTING STATUS*[11]	MILES
NORTH FORK JOHN DAY	Bacon Creek	Habitat Modification	Undefined	4C	0 to 6.2
NORTH FORK JOHN DAY	Bear Creek	Habitat Modification	Undefined	4C	0 to 6.5
NORTH FORK JOHN DAY	Bear Wallow Creek	Habitat Modification	Undefined	4C	0 to 7.4
NORTH FORK JOHN DAY	Bear Wallow Creek	Temperature	Summer	4A	0 to 7.4
NORTH FORK JOHN DAY	Big Creek	Temperature	Summer	4A	0 to 10.7
NORTH FORK JOHN DAY	Big Wall Creek	Dissolved Oxygen	Year Round (Non-spawning)	5	0 to 21.3
NORTH FORK JOHN DAY	Big Wall Creek	Dissolved Oxygen	January 1 - May 15	5	17 to 21.3
NORTH FORK JOHN DAY	Big Wall Creek	Dissolved Oxygen	January 1 - May 15	5	0 to 17
NORTH FORK JOHN DAY	Big Wall Creek	Habitat Modification	Undefined	4C	0 to 21.3
NORTH FORK JOHN DAY	Big Wall Creek	pH	Fall/Winter/Spring	5	0 to 21.3
NORTH FORK JOHN DAY	Big Wall Creek	Sedimentation	Undefined	5	0 to 21.3
NORTH FORK JOHN DAY	Big Wall Creek	Temperature	Year Round (Non-spawning)	4A	0 to 21.3
NORTH FORK JOHN DAY	Bowman Creek	Biological Criteria	Year Round	5	0 to 6.9
NORTH FORK JOHN DAY	Bowman Creek	Habitat Modification	Undefined	4C	0 to 6.9
NORTH FORK JOHN DAY	Bowman Creek	Temperature	Summer	4A	0 to 6.9
NORTH FORK JOHN DAY	Bridge Creek	Temperature	Summer	4A	0 to 9
NORTH FORK JOHN DAY	Buck Creek	Temperature	Year Round (Non-spawning)	4A	0 to 1.6
NORTH FORK JOHN DAY	Camas Creek	Biological Criteria	Year Round	5	0 to 36.7
NORTH FORK JOHN DAY	Camas Creek	Habitat Modification	Undefined	4C	0 to 36.7
NORTH FORK JOHN DAY	Camas Creek	Temperature	Year Round (Non-spawning)	4A	15.5 to 36.7
NORTH FORK JOHN DAY	Camas Creek	Temperature	September 1 - June 15	4A	15.5 to 25
NORTH FORK JOHN DAY	Clear Creek	Temperature	Summer	4A	0 to 7.1
NORTH FORK JOHN DAY	Crane Creek	Biological Criteria	Year Round	5	0 to 8.1
NORTH FORK JOHN DAY	Crane Creek	Habitat Modification	Undefined	4C	0 to 5.9
NORTH FORK JOHN DAY	Crane Creek	Temperature	Summer	4A	0 to 5.9
NORTH FORK JOHN DAY	Davis Creek	Habitat Modification	Undefined	4C	0 to 3.2

SUBBASIN	STREAM NAME	POLLUTANT	SEASON	*LISTING STATUS*[11]	MILES
NORTH FORK JOHN DAY	Desolation Creek	Temperature	Year Round (Non-spawning)	4A	0 to 3.8
NORTH FORK JOHN DAY	Desolation Creek	Temperature	January 1 - June 15	4A	0 to 3.5
NORTH FORK JOHN DAY	Ditch Creek	Biological Criteria	Year Round	5	0 to 19.5
NORTH FORK JOHN DAY	Ditch Creek	Dissolved Oxygen	Year Round (Non-spawning)	5	10.1 to 19.5
NORTH FORK JOHN DAY	Ditch Creek	Dissolved Oxygen	January 1 - May 15	5	0 to 19.5
NORTH FORK JOHN DAY	Ditch Creek	Temperature	Summer	4A	0 to 19.5
NORTH FORK JOHN DAY	Fivemile Creek	Biological Criteria	Year Round	5	0 to 21.3
NORTH FORK JOHN DAY	Fivemile Creek	Habitat Modification	Undefined	4C	0 to 21.3
NORTH FORK JOHN DAY	Fivemile Creek	Temperature	Summer	4A	0 to 21.3
NORTH FORK JOHN DAY	Frazier Creek	Habitat Modification	Undefined	4C	0 to 6.2
NORTH FORK JOHN DAY	Frazier Creek	Temperature	Summer	4A	0 to 6.2
NORTH FORK JOHN DAY	Granite Creek	Biological Criteria	Year Round	5	0 to 16.3
NORTH FORK JOHN DAY	Granite Creek	Habitat Modification	Undefined	4C	0 to 16.2
NORTH FORK JOHN DAY	Granite Creek	Sedimentation	Undefined	5	11.2 to 16.2
NORTH FORK JOHN DAY	Granite Creek	Temperature	Year Round (Non-spawning)	4A	0 to 16.3
NORTH FORK JOHN DAY	Hidaway Creek	Habitat Modification	Undefined	4C	0 to 16.2
NORTH FORK JOHN DAY	Hidaway Creek	Temperature	Summer	4A	0 to 16.2
NORTH FORK JOHN DAY	Hog Creek	Sedimentation	Undefined	5	0 to 4.1
NORTH FORK JOHN DAY	Indian Creek	Habitat Modification	Undefined	4C	0 to 5.4
NORTH FORK JOHN DAY	Indian Creek	Temperature	Year Round (Non-spawning)	4A	0 to 5.4
NORTH FORK JOHN DAY	Junkens Creek	Temperature	Year Round (Non-spawning)	4A	0 to 7
NORTH FORK JOHN DAY	Lane Creek	Temperature	Summer	4A	0 to 7.1
NORTH FORK JOHN DAY	Mallory Creek	Biological Criteria	Year Round	5	0 to 14.3
NORTH FORK JOHN DAY	Mallory Creek	Dissolved Oxygen	Year Round (Non-spawning)	5	0 to 14.4
NORTH FORK JOHN DAY	Mallory Creek	Temperature	Summer	4A	0 to 14.3
NORTH FORK JOHN DAY	Meadow Creek	Temperature	Year Round (Non-spawning)	4A	0 to 10.4

SUBBASIN	STREAM NAME	POLLUTANT	SEASON	*LISTING STATUS*[11]	MILES
NORTH FORK JOHN DAY	North Fork Cable Creek	Temperature	Year Round (Non-spawning)	4A	0 to 7.5
NORTH FORK JOHN DAY	North Fork Desolation Creek	Temperature	Year Round (Non-spawning)	4A	0 to 6.6
NORTH FORK JOHN DAY	North Fork John Day River	Habitat Modification	Undefined	4C	86.2 to 97.1
NORTH FORK JOHN DAY	North Fork John Day River	Temperature	Year Round (Non-spawning)	4A	86.3 to 111.2
NORTH FORK JOHN DAY	North Fork John Day River	Temperature	Year Round (Non-spawning)	4A	56 to 86.3
NORTH FORK JOHN DAY	North Fork John Day River	Temperature	September 1 - June 15	4A	59.6 to 86.3
NORTH FORK JOHN DAY	North Fork John Day River	Temperature	January 1 - June 15	4A	56 to 59.6
NORTH FORK JOHN DAY	Olive Creek	Habitat Modification	Undefined	4C	0 to 6.7
NORTH FORK JOHN DAY	Onion Creek	Biological Criteria	Year Round	5	0 to 4.5
NORTH FORK JOHN DAY	Onion Creek	Sedimentation	Year Round	5	0 to 4.5
NORTH FORK JOHN DAY	Onion Creek	Temperature	Year Round (Non-spawning)	4A	0 to 4.5
NORTH FORK JOHN DAY	Oriental Creek	Biological Criteria	Year Round	5	0 to 3.8
NORTH FORK JOHN DAY	Owens Creek	Habitat Modification	Undefined	4C	0 to 14.8
NORTH FORK JOHN DAY	Owens Creek	Temperature	Summer	4A	0 to 14.8
NORTH FORK JOHN DAY	Porter Creek	Habitat Modification	Undefined	4C	0 to 7.4
NORTH FORK JOHN DAY	Porter Creek	Sedimentation	Undefined	5	0 to 7.4
NORTH FORK JOHN DAY	Potamus Creek	Biological Criteria	Year Round	5	0 to 18.4
NORTH FORK JOHN DAY	Potamus Creek	Dissolved Oxygen	Year Round (Non-spawning)	5	0 to 18.4
NORTH FORK JOHN DAY	Potamus Creek	Dissolved Oxygen	January 1 - May 15	5	0 to 14.5
NORTH FORK JOHN DAY	Potamus Creek	Dissolved Oxygen	January 1 - May 15	5	14.5 to 18.4
NORTH FORK JOHN DAY	Potamus Creek	pH	FallWinterSpring	5	0 to 18.4
NORTH FORK JOHN DAY	Potamus Creek	Temperature	Summer	4A	0 to 18.4
NORTH FORK JOHN DAY	Rancheria Creek	Temperature	Summer	4A	0 to 5.1
NORTH FORK JOHN DAY	Skookum Creek	Dissolved Oxygen	Year Round (Non-spawning)	5	4.3 to 12.4
NORTH FORK JOHN DAY	Skookum Creek	Dissolved Oxygen	January 1 - May 15	5	0 to 11.2
NORTH FORK JOHN DAY	Skookum Creek	Habitat Modification	Undefined	4C	0 to 12.4

SUBBASIN	STREAM NAME	POLLUTANT	SEASON	*LISTING STATUS*[11]	MILES
NORTH FORK JOHN DAY	Skookum Creek	pH	FallWinterSpring	5	0 to 12.4
NORTH FORK JOHN DAY	Skookum Creek	Temperature	Summer	4A	0 to 12.4
NORTH FORK JOHN DAY	South Fork Cable Creek	Temperature	Year Round (Non-spawning)	4A	0 to 8.4
NORTH FORK JOHN DAY	South Fork Cable Creek	Temperature	January 1 - June 15	4A	0 to 1.5
NORTH FORK JOHN DAY	Sponge Creek	Temperature	Year Round (Non-spawning)	4A	0 to 2.7
NORTH FORK JOHN DAY	Stalder Creek	Temperature	Summer	4A	0 to 4.1
NORTH FORK JOHN DAY	Swale Creek	Dissolved Oxygen	Year Round (Non-spawning)	5	2.8 to 11.2
NORTH FORK JOHN DAY	Swale Creek	Dissolved Oxygen	January 1 - May 15	5	4.8 to 11.2
NORTH FORK JOHN DAY	Swale Creek	Habitat Modification	Undefined	4C	0 to 11.1
NORTH FORK JOHN DAY	Swale Creek	Sedimentation	Undefined	5	0 to 11.1
NORTH FORK JOHN DAY	Swale Creek	Temperature	Summer	4A	0 to 11.1
NORTH FORK JOHN DAY	Taylor Creek	Habitat Modification	Undefined	4C	0 to 6.6
NORTH FORK JOHN DAY	Trail Creek	Habitat Modification	Undefined	4C	0 to 1.9
NORTH FORK JOHN DAY	Trail Creek	Temperature	Year Round (Non-spawning)	4A	0 to 1.9
NORTH FORK JOHN DAY	Trib to Wilson Creek	Dissolved Oxygen	Year Round (Non-spawning)	5	0 to 3.2
NORTH FORK JOHN DAY	Trib to Wilson Creek	Dissolved Oxygen	January 1 - May 15	5	0 to 0.9
NORTH FORK JOHN DAY	Trib to Wilson Creek	Dissolved Oxygen	January 1 - May 15	5	0.9 to 3.2
NORTH FORK JOHN DAY	Wilson Creek	Habitat Modification	Undefined	4C	0 to 10.7
NORTH FORK JOHN DAY	Wilson Creek	Sedimentation	Undefined	5	0 to 10.7
NORTH FORK JOHN DAY	Wilson Creek	Temperature	Summer	4A	0 to 10.7
UMATILLA	Boston Canyon	Habitat Modification	Year Round	4C	1.5 to 4.7
UMATILLA	Boston Canyon	Sedimentation	Year Round	4A	1.5 to 4.7
UMATILLA	Butter Creek	pH	Summer	4A	0 to 65.7
UMATILLA	East Meacham Creek	Temperature	Summer	4A	0 to 5.4
UMATILLA	Johnson Creek	Temperature	Year Round (Non-spawning)	4A	0 to 11.7
UMATILLA	Line Creek	Habitat Modification	Undefined	4C	0 to 3.9
UMATILLA	Line Creek	Sedimentation	Undefined	4A	0 to 3.9
UMATILLA	Meacham Creek	Habitat Modification	Undefined	4C	18 to 35.5
UMATILLA	Meacham Creek	Habitat Modification	Year Round	4C	5 to 18

SUBBASIN	STREAM NAME	POLLUTANT	SEASON	*LISTING STATUS*[11]	MILES
UMATILLA	Meacham Creek	Sedimentation	Year Round	4A	5 to 18
UMATILLA	Meacham Creek	Sedimentation	Undefined	4A	18 to 35.5
UMATILLA	Meacham Creek	Temperature	Summer	4A	5 to 18
UMATILLA	Meacham Creek	Temperature	Summer	4A	18 to 35.5
UMATILLA	North Fork Meacham Creek	Habitat Modification	Undefined	4C	0 to 11.8
UMATILLA	North Fork Meacham Creek	Sedimentation	Undefined	4A	0 to 11.8
UMATILLA	North Fork Meacham Creek	Temperature	Summer	4A	0 to 11.8
UMATILLA	North Fork Umatilla River	Temperature	Summer	4A	0 to 10.3
UMATILLA	Sheep Creek	Sedimentation	Undefined	4A	0 to 4.7
UMATILLA	Shimmiehorn Creek	Temperature	Summer	4A	0 to 6.5
UMATILLA	South Fork Umatilla River	Temperature	Summer	4A	0 to 10.8
UMATILLA	Umatilla River	Aquatic Weeds Or Algae	Summer	4A	82 to 88.1
UMATILLA	Umatilla River	Habitat Modification	Year Round	4C	82 to 88.1
UMATILLA	Umatilla River	Iron	Year Round	5	82 to 88.1
UMATILLA	Umatilla River	Sedimentation	Year Round	4A	82 to 88.1
UMATILLA	Umatilla River	Temperature	Summer	4A	82 to 88.1
UMATILLA	West Birch Creek	Habitat Modification	Undefined	4C	0 to 19.7
UMATILLA	West Birch Creek	Sedimentation	Undefined	4A	0 to 19.7
UMATILLA	West Birch Creek	Temperature	Summer	4A	0 to 19.7
UPPER GRANDE RONDE	Jarboe Creek	Temperature	Summer	4A	0 to 8.3
UPPER GRANDE RONDE	Little Lookingglass Creek	Habitat Modification	Undefined	4C	0 to 10.8
UPPER GRANDE RONDE	Little Lookingglass Creek	Temperature	Summer	4A	0 to 10.8
UPPER GRANDE RONDE	Lookingglass Creek	Habitat Modification	Undefined	4C	0 to 11.1
UPPER GRANDE RONDE	Lookingglass Creek	Sedimentation	Undefined	4A	0 to 11.1
UPPER GRANDE RONDE	Lookingglass Creek	Temperature	Summer	4A	0 to 7
UPPER GRANDE RONDE	Mottet Creek	Sedimentation	Undefined	4A	0 to 10.3
UPPER GRANDE RONDE	Mottet Creek	Temperature	Summer	4A	0 to 10.3
UPPER GRANDE RONDE	Pelican Creek	Biological Criteria	Year Round	5	0 to 9.1
UPPER GRANDE RONDE	Pelican Creek	Temperature	Summer	4A	0 to 9.1
UPPER GRANDE RONDE; LOWER GRANDE RONDE	Grande Ronde River	Dissolved Oxygen	January 1 - May 15	5	65.9 to 104.9

SUBBASIN	STREAM NAME	POLLUTANT	SEASON	*LISTING STATUS*[11]	MILES
UPPER GRANDE RONDE; LOWER GRANDE RONDE	Grande Ronde River	Temperature	Year Round (Non-spawning)	4A	35.6 to 172.4
WALLA WALLA	North Fork Walla Walla River	Flow Modification	Undefined	4C	0 to 18.7
WALLA WALLA	North Fork Walla Walla River	Temperature	Year Round (Non-spawning)	4A	0 to 18.7
WALLA WALLA	North Fork Walla Walla River	Temperature	Summer	4A	0 to 18.7
WALLA WALLA	South Fork Walla Walla River	Dissolved Oxygen	September 1 - June 15	5	0 to 27.2
WALLA WALLA	South Fork Walla Walla River	Temperature	Year Round (Non-spawning)	4A	0 to 27.2
WALLA WALLA	South Fork Walla Walla River	Temperature	Summer	4A	0 to 27.1
WILLOW	Willow Creek	Dissolved Oxygen	Year Round (Non-spawning)	5	66.6 to 72.7
WILLOW	Willow Creek	Dissolved Oxygen	January 1 - May 15	5	0 to 72.7
WILLOW	Willow Creek	E. Coli	Summer	5	0 to 72.7
WILLOW	Willow Creek	pH	FallWinterSpring	5	62.2 to 72.7
WILLOW	Willow Creek	Temperature	Year Round (Non-spawning)	4A	0 to 72.7

Appendix F: References

Agee, J. (1993). Fire Ecology of the Pacific Northwest Forests. Washington, D.C.: Island Press.

Agee, J. K. (1999). Fire effects on landscape fragmentation in interior west forests. In L. L. Eds JA Rochelle, Forest fragmentation: wildlife and management implications (pp. 43-60). Leiden, The Netherlands: Koninklijke Brill NV.

Altman, R. 2000. Conservation strategy for landbirds in the northern Rocky Mountains of eastern Oregon and Washington. Oregon-Washington Partners in Flight. 86pp.

Anderson, J.W., Beschta, R.L., Boehne, P.L., Bryson, D., Gill, R., McIntosh, B.A., Purser, M.D., Rhodes, J.J., Sedell, J.W., and Zakel, J. 1993. A comprehensive approach to restoring habitat conditions needed to protect threatened salmon species in a severely degraded river -- The Upper Grande Ronde River Anadromous Fish Habitat Protection, Restoration and Monitoring Plan. Riparian Management: Common Threads and Shared Interests, pp. 175-179, USFS Gen. Tech. Rept. RM-226, Fort Collins, Co.

Applegarth, J. S. and N. Duncan. 2005. Conservation assessment for Cryptomastix hendersoni, Columbia Oregonian. Originally issued as Management Recommendations in February 1999. Revised in 2005. USDA Forest Service Region 6 and USDI Bureau of Land Management, Oregon and Washington.

Armour, C.L. 1990. Guidance for evaluating and recommending temperature regimes to protect fish. U.S. Fish and Wildlife Service. Fort Collins. Biological Report 90(22). 13 p.

Batchelar, J. W. (2015). Restoration of Riparian Areas Following the Removal of Cattle in the Northwestern Great Basin. Environmental Management, 55: 930-942.

Bates, J., R.F. Miller, and T.S. Svejcar. 2000. Understory dynamics in cut and uncut western juniper woodlands. Journal for Range Management 53:119–126.

Beauvais, G. P., and L. Johnson. 2004. Species Assessment for Wolverine (Gulo gulo) in Wyoming.

Belongie, C. C. 2008. "Using GIS to create a gray wolf habitat suitability model and to assess wolf pack ranges in the western upper Peninsula of Michigan". Resource Analysis. Saint Mary's University of Minnesota Central Services Press 10:15pp.

Benda, L. and W. Zhang. 1990. The hydrological and geomorphological characteristics of landslide/dam break floods in the Cascade Range of Washington. EOS, Transactions of the American Geophysical Union.

Benda, L., Beechie, T.J., Wissmar, R.C., and A. Johnson. 1992. Morphology and evolution of salmonid habitats in a recently deglaciated river basin, Washington State, USA. Can, J. Fish. Aqua. Sc. 49:1246-1256.

Berg, L. and T.G. Northcote. 1985. Changes in territorial, gill-flaring, and feeding behavior in juvenile coho salmon (Onchorhynchus kisutch) following a short-term pulses of suspended sediment. Can. J. Fish. Aqua. Sc. 42:1410-1417.

Berkley E. and T. Hickman. October 2015. Status and trend of gray wolves and forest management on the Umatilla National Forest. Supervior's Office, Pendleton, OR White paper.

Beschta, R. L., W. S. Platts, and J. B. Kauffman. 1991. Field review of fish habitat improvement projects in the Grande Ronde and John Day River basins of eastern Oregon. DOE/BP-21493-1. U.S. Department of Energy, Bonneville Power Administration, Portland, OR.

Bestcha, R.L. and W.S. Platts. 1986. Morphological features of small streams: significance and function. Water Resources Bulletin 22(3):369-379

Bisson, P.A., R.E. Bilby, M.D. Bryant, C.A. Dolloff, G.B, Grette, R.A. House, M.L. Murphy, K.V. Koski, and J.R. Sedell. 1987. Large woody debris in forested streams in the Pacific Northwest: past, present, and future. In. Salo, E.O.; Cundy, T.W., eds. Streamside management: forestry and fishery interactions. Seattle, Washington: University of Washington, Institute of Forest Resources: 143-190.

Bisson, P.A., T.P. Quinn, G.H. Reeves, and S.V. Gregory. 1992. Best management practices, cumulative effects, and long-term trends in fish abundance in Pacific Northwest river systems. In: Naiman, R.J. ed. Watershed management: balancing sustainability and environmental change. New York, NY: Springer-Verlag. 189-232.

Bjornn, T.C. and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. American Fisheries Society Publication 19. 83-138.

Branson, B. A. 1977. Freshwater and Terrestrial Mollusca of the Olympic Peninsula, Washington. The Veliger 19: 310-330.

Branson, B. A. 1980. Collections of gastropods from the Cascade Mountains of Washington. The Veliger 23: 171-176.

Brunson, R. B. and R. H. Russell, 1967. Radiodiscus, new to molluscan fauna of Montana. The Nautilus 81:18-22

Buchanan, J. B., R. E. Rogers, D. J. Pierce, and J. E. Jacobson. 2003. Nest site habitat use by white-headed woodpeckers in the eastern Cascade Mountains of Washington. Northwestern Naturalist 84; 119-128.

Buckman, R.C., W.E. Hosford and P.A. Dupee. 1992. Malheur river bull trout investigations. Pages 45-57 in Howell, P.J. and D.V. Buchanan, eds., Proceedings of the Gearhart Mountain bull trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, OR.

Bull, E. L. 2005 Ecology of the Columbia spotted frog in northeastern Oregon. Gen. Tech. Rep. PNW-GTR-640. Portland, OR: U.S. Department of Agriculture Forest Service, Pacific Northwest Research Station. 46 p.

Bull, E. L., A. D. Twombly, and T. M. Quigley. 1980. Workshop Proceedings. Management of Western Forests and Grasslands for Nongame Birds. Perpetuating Snags in Managed Mixed-Conifer Forests of the Blue Mountains. Oregon. USDA Forest Service, General Technical Report INT-86: 325-336.

Bull, E. L., and R. S. Holthausen. 1993. Habitat use and management of Pileated Woodpeckers in northeastern Oregon. J. Wildl. Manage. 57: 335-345.

Bull, E. L., N. Nielsen-Pincus, B. C. Wales, and J. L. Hayes. 2007. The influence of disturbance events on pileated woodpeckers in Northeastern Oregon, Forest Ecology and Management 243:320-329.

Burchard, Greg C., 1998. Environment, Prehistory and Archaeology of John Day Fossil Beds National Monument, Blue Mountains Region, North-Central Oregon. Document prepared for USDI National Park Service, Columbia Cascades System Support Office, Seattle. International Archaeological Research Institute, Inc. Honolulu.

Burke, T. 2013. Land Snails and Slugs of the Pacific Northwest. Corvallis, OR: Oregon State University Press. 344 pp.

Burke, T. and W. Leonard. 2009. Land Mollusks of the Pacific Northwest United States. In preparation.

Burleigh, T. D. 1972. Birds of Idaho. Caxton Printers, Caldwell, Idaho. 468 pp.

Cairns, M.A., J.L. Ebersole, J.P. Parker, P.J. Wigington Jr., H.R. Lavigne, and S.M. Davis. 2005. Influence of Summer Stream Temperatures on Black Spot Infestation of Juvenile Coho Salmon in the Oregon Coast Range. Transactions of the American Fisheries Society 134 (6):1471-1479.

Cannings, R. J. 1995. Status of the White-headed woodpecker in British Columbia. Wildlife Bulletin, BC. Environment: No B-80.

Carmichael, R.W. 2007. Conservation and Recovery Plan for Oregon Steelhead Populations in the Middle Columbia River Steelhead Distinct Population Segment. November, 2007 Review Draft.

Cederholm, C.J. and N.P. Peterson. 1985. The retention of Coho salmon (Onchorhynchus kisutch) carcasses in spawning streams. Canadian Journal of Fisheries and Aquatic Sciences 42:1222-1225.

Compton, J.E, C.P. Andersen, D.L. Phillips, J. R. Brooks, M.G. Johnson, M.R. Church, W.E. Hogsett, M.A. Cairns, P.T. Rygiewicz, B.C. McComb, and C.D. Shaff. 2006. Ecological and water quality consequences of nutrient addition for salmon restoration in the Pacific Northwest. Frontier in Ecology, 4(1): 18–26

Consortium of Pacific Northwest Herbaria. 2007-2015. University of Washington Herbarium, Burke Museum of Natural History and Culture, University of Washington, Seattle. Viewed online on various dates <http://www.pnwherbaria.org/data/search.php>.

Cordone, A.J. and D.W. Kelley. 1961. The influences of inorganic sediment on the aquatic life of streams. California Fish and Game 47:189-228.

Countryman, B. 2011. Rangeland Forage Supply and Use.

Crispin, V., R. House, and D. Roberts. 1993. Changes in instream habitat large woody debris and salmon habitat after restructuring of a coastal Oregon stream. North American Journal of Fisheries Management 13:96-102.

Crowe, Elizabeth A. and R.L. Clausnitzer. 1997. Mid-Montane Wetland Plant Associations of the Malheur, Umatilla and Wallowa-Whitman National Forests. USDA FS. Pacific Northwest Region. R6-NR-Ecol-TP-22-97.

Csuti, B., A. J. Kimerling, T. A. O'Neil, M. M. Shaughnessy, E. P. Gaines, and M. M. P. Huso. 1997. Atlas of Oregon Wildlife, Distribution, Habitat and Natural History. Oregon State University Press, Corvallis, Oregon.

Csuti, B., A. J. Kimerling, T. A. O'Neil, M. M. Shaughnessy, E. P. Gaines, and M. M. P. Huso. 2001. Atlas of Oregon Wildlife, Distribution, Habitat and Natural History. Oregon State University Press, Corvallis, Oregon.

D. Ganskopp, Manipulating cattle distribution with salt and water in large arid-land pastures: a GPS/GIS assessment, Applied Animal Behaviour Science, Volume 73, Issue 4, 27 August 2001, P. 251

Dunne, T. and L.B. Leopold. 1978. Water in Environmental Planning. W.H. Freeman and Co., San Francisco, CA: 818 pp.

Dwire, K and Kauffman, J.B., Fire and riparian ecosystems in landscapes of the western USA, Forest Ecology and Management, Volume 178, Issues 1–2, 3 June 2003, P. 61

Dwire, K. A. (2003). Fire and riparian ecosystems in landscapes of the western USA. Forest Ecology and Management, 61-74.

Elmore, W. and R.L. Bestcha. 1987. Riparian areas: perceptions in management. Rangelands 9(6):260-265.

Endangered Species Act of 1973 (P.L. 93-2015).

Everest, F.H.; Bestcha, R.L.; Scrivener, J.C.; Kiski, K.V.; Sedell, J.R.; Cederholm, C.J. 1987. Fine sediment and salmonid production: a paradox. In. Salo, E.O.; Cundy, T.W., eds. Streamside management: forestry and fishery interactions. Contribution 57. Seattle, Washington: University of Washington, Institute of Forest Resources. 98-142.

Everett, R. e. (2003). Continuity in fire disturbance between riparian and adjacent sideslope Douglas-fir forests. Forest Ecology and Management 175, 31-47.

FAOSTAT (2013). FAOSTAT database. Food and Agriculture Organization of the United Nations. http://faostat.fao.org/

Fausch, K.D. and T.G. Northcote. 1992. Large woody debris and salmonid habitat in a small coastal British Columbia stream. Canadian Journal of Fisheries and Aquatic Sciences 49:682-693.

Frest, T. J. and E. J. Johannes. 1999. Mollusk Survey of southwestern Oregon, with emphasis on the Rogue and Umpqua river drainages. Final report prepared for Oregon Natural Heritage Program, Portland, Oregon. Deixis Consultants, Seattle, Washington. 278 pp. plus appendices.

Frest, T. J., and E. J. Johannes. 1995a. Land Snail Survey of the Lower Salmon River Drainage, Idaho. Prepared for USDI Bureau of Land Management, Boise Idaho. Contract # D910C30061.

Frest, T. J., and E. J. Johannes. 1995b. Interior Columbia Basin mollusk species of special concern. Final report: Interior Columbia Basin Ecosystem Management Project, Walla Walla, WA. Deixis Consultants, Seattle, WA. Contract #43-0E00-4-9112. 274 pp. plus appendices.

Fuller, T. K. 1989.Population dynamics of wolves in north-central Minnesota. Wildlife monographs, 3-41.

Fuller, T. K., Mech, L. D., & Cochrane, J. F. 2003. Wolf population dynamics

Furniss, M.J., T.D. Roelofs, and C.S. Yee. 1991. Road construction and maintenance. Pages 297-324 in W. R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. Amer. Fish. Soc. , Spec, Pub. 19, Bethesda, Maryland.

Galen, C. 1989. A preliminary assessment of the status of the Lewis's woodpecker in Wasco County, Oregon. Oregon Department of Fish and Game, Nongame Wildlife Program, Technical Report 88- 3-1, Portland, OR.

Garling, D. L. and M. Masterson. 1985. Survival of Lake Michigan Chinook salmon eggs and fry incubated at three temperatures. Prog. Fish-Culturist 47:63-66.

Gedney, D. R., Azuma, D. L., Bolsinger, C. L., & McKay, N. (1999). Western juniper in eastern Oregon. Portland,OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: Gen. Tech. Rep. PNW-GTR-464. .

Gende SM, Edwards RT, Willson MF, and Wipfli MS. 2002. Pacific salmon in aquatic and terrestrial ecosystems. BioScience.

Geppert, R.R., Lorenz, C.W., and Larson, A.G. 1984. Cumulative Effects of Forest Practices on the Environment: A State of the Knowledge. Wash. For. Practices Board Proj. No. 0130, Dept. of Natural Resources, Olympia, Wash.

Goetz, F. 1994. Distribution and juvenile ecology of bull trout (Salvelinus confluentus) in the Cascade Mountains. Master's Thesis. Oregon State University, Corvallis, OR.

Goggans, R. R., R. Dixon, and L. C. Seminara. 1987. Habitat use by three-toed and black-backed woodpeckers. Oreg. Dept. Fish and Wildl. Nongame Rep 87-3-02. Oreg. Dept. Fish and Wildl., Bend. 46 pp.

Gowan, D. and T. E. Burke. 1999. Conservation Assessment for Pristiloma arcticum crateris, Crater Lake Tightcoil. Originally issued as management recommendations; reconfigured September 2004 by N. Duncan. USDA Forest Service Region 6 and USDI Bureau of Land Management, Oregon and Washington. Available online at http://webcache.googleusercontent.com/search?q=cache:RL5zD-

oJXFwJ:www.fs.fed.us/r6/sfpnw/issssp/documents/planning-docs/20050713-moll-crater-lake-tightcoil.doc+pristiloma+idahoense&cd=2&hl=en&ct=clnk&gl=us(Last accessed 29 June 2010).

Gregory, S.V., F.J. Swanson, W.A. McKee, and K.W. Cummins. 1991. An ecosystem perspective of riparian zones. Bioscience 41:540-551.

Haight, R. G., Mladenoff, D. J., & Wydeven, A. P. 1998. Modeling Disjunct Gray Wolf Populations in Semi-Wild Landscapes. Conservation Biology, 12(4), 879-888.

Halofsky, J. E. (2008). Determinants of riparian fire severity in to Oregon fires, USA. Canadian Journal of Forest Resources, 38: 1959 - 1973.

Hann, W. J. (2001). Fire and Land Management Planning and Implemetation across Multiple Scales. International Journal of Wildland Fire 10, 389-403.

Harr, R.D., W.C. Harper, J.T. Krygier, and F.S. Hsieh. 1975. Changes in storm hydrographs after road building and clear cutting in the Oregon Coast Range. Water Resources Research 11(3):436-444.

Heede, B.H. 1985. Channel adjustments to the removal of log steps: an experiment in a mountain stream. Environ. Manage. 9:427-432.

Hendricks, P. and B. A. Maxell. 2005. USFS Northern Region 2005 land mollusk inventory: a progress report. Report submitted to the U.S. Forest Service Region 1. Montana Natural Heritage Program, Agreement #05-CS-11015600-033, Helena, Montana. 52 pp.

Hicks, B.J., Bestcha, R.L., Bisson, P.A.; Sedell, J.R. 1991. Response of salmonids to habitat change. Amer. Fish. Soc. Spec. Pub. 19: 483-518.

Holocheck, J. L., Pieper, R.D. and Herbel, C. H. 1995. Range Management Principles and Practices. Prentice-Hall, Inc., New Jersey, USA

Huff, M. H., Ottmar, R. D., Alvarado, E., Vihnanek, R. E., Lehmkuhl, J. F., Hessburg, P. F., & Everett, R. L. (1995). General Technical Report PNW-GTR-355, Historical and CUrrent FOrest Landscapes in Eastern Oregon and Washington. Part II: Linking Vegetation Characteristics to Potential FIre Behavior and Related Smoke Production. Wenatchee, WA: Pacific Northwest Research Station.

Hunsaker, C. T. (2014). Forested Riparian Areas. In Science Synthesis to Support Socioecological Resilience in the Sierra Nevada and Southern Cascade Range, GTR - 247 (pp. 323 - 340). Redding, CA: USDA Forest Service, Pacific Southwest Research Station.

IPCC 2000. Intergovernmental Panel on Climate Change (IPCC), Special Report on Land Use, Land Use Change and Forestry, Summary for Policy Makers, 2000. IPCC, Geneva, Switzerland. 20 pp. http://www.ipcc.ch/ipccreports/sres/land_use/index.php?idp=0

IPCC 2013. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp. http://www.ipcc.ch/report/ar5/wg1/

IPCC, 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.). IPCC, Geneva, Switzerland, 151 pp. http://www.ipcc.ch/report/ar5/syr/

Jepsen, S., A. Carleton, S. Foltz Jordan, and T. Burke. 2012. Final report to the Interagency Special status Sensitive Species Program regarding 2012 blue Mountains terrestrial mollusk surveys. Report submitted by the Xerces Society for Invertebrate Conservation. Available from http://www.fs.fed.us/r6/sfpnw/issssp/documents2/inv-rpt-ig-bluemtns-xerces-surveys-2012.pdf.

Johnson, Charles G. 2004. Alpine and Subalpine Vegetation of the Wallowa, Seven Devils and Blue Mountains. USDA FS. Pacific NW Region. R6-NR-ECOL-TP-03-04. 2004.

Johnson, Charles G. and D.K. Swanson. 2005. Bunchgrass plant communities of the Blue and Ochoco Mountains: a guide for managers. USDA Forest Service. PNW Research Station. PNW-GTR-641. August 2005.

Johnson, Charles G. and R.L. Clausnitzer. 1992. Plant Associations of the Blue and Ochoco Mountains. USDA. Forest Service. PNW Region. R6-ERW-TP-036-92.

Johnson, D. J. and T. O'Neil, managing Dirs. 2001. Managing dirs. 2001. Wildlife habitat relationships in Oregon and Washington. , Oregon State University Press, Corvallis

Johnson, R. E., and K. M. Cassidy. 1997. Terrestrial mammals of Washington State: Location data andpredicted distributions. In K.M. Cassidy, C.E. Grue, M.R. Smith, and K.M. Dvornich, editors. Washington GAP Analysis Final Report, Volume 3. Washington Cooperative Wildlife Research Unity, University of Washington, Seattle, Washington. 304 pp.

Johnston, N.T., S.A. Bird, D.L. Hogan, and E.A. Wallace. 2011. Mechanisms and source distances for the input of large woody debris to forested streams in British Columbia, Canada. Canadian J. For. Res. 41:2231-2246.

Jones, J.A. and G.E. Grant. 1996. Cumulative effects of forest harvest on peak stormflow in the western cascades of Oregon. Water Resources Research 32(4):959-974.

Joyce, Linda A.; Running, Steven W.; Breshears, David D.; Dale, Virginia H.; Malmsheimer, Robert W.; Sampson, R. Neil; Sohngen, Brent; Woodall, Christopher W. 2014. Chapter 7: Forests. In: Melillo, Jerry; Richmond, Terese (T.C.); Yohe, Gary, eds. Climate change impacts in the United States: The third national climate assessment. U.S. Global Change Research Program: 176–194. http://nca2014.globalchange.gov/report/sectors/forests

Kauffman, J. (1990). Ecological relationships of vegetation and fire In: Walstad, J.D., Radosevich, S.R., Sandberg, D.V. (Eds.). Prescribed Fire in Pacific Northwest Forests. Corvallis, OR: Oregon State University Press.

Kauffman, J. B. (1997). An ecological perspective of riparian and stream restoration in the western United States. Fisheries 22.5, 12-24.

Keith, L. B. (1983). Population dynamics of wolves. Wolves in Canada and Alaska: their status, biology, and management. Canadian Wildlife Service Report Series, 45(135), 66-77.

Keller, E.A., A. MacDonald, T. Tally, and N.J. Merrit. 1985. Effects of large organic debris on channel morphology and sediment storage in selected tributaries of Redwood Creek, northwestern California. Geomorphic Processes and Aquatic Habitat in the Redwood Creek Basin, Northwestern California. K.M. Nolan, H.M. Kelsey and D.C. Maron. Vicksburg, MS, US Geological Survey:29.

Kelsey, H.M., Madej, M.A., Pitlick, J., Coughlan, M., Best, D., Bending, R. and P. Stroud. 1981. Sediment sources and sediment transport in the Redwood Creek Basin: a progress report. Redwood National Park Research and Development Technical Report 3. National Park Service. 114 p.

King, J.G. and Tennyson, L.C. 1984. Alteration of streamflow following road construction in north central Idaho. Water Resour. Res., 20: 1159-1163.

Kohler, A.E., T.D. Pearsons, J.S. Zendt, M.G. Mesa, C.L. Johnson, and P.J. Connolly. 2012. Nutrient Enrichment with Salmon Carcass Analogs in the Columbia River Basin, USA: A Stream Food Web Analysis. Transactions of the American Fisheries Society 141 (3):802-824.

Latterell, J.J. and R.J. Naiman. 2007. Sources and dynamics of large logs in a temperature floodplain river. Ecological Applications, 17(4):1127-1141.

Lee, D. C., Sedell, J. R., & Rieman, B. E. (1997). Broadscale assessment of aquatic species and habitats. In: Quigley, Thomas M.; Arbelbide, Sylvia J., tech. eds. An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-405. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 1057-1496. Vol. 3.

Leopold, L. 1994. A View of a River. Cambridge, MA: Harvard University Press.

Ligon, J. D. 1973. Foraging behavior of the white-headed woodpecker in Idaho. Auk 90: 862-869.

Liquori, M. a. (2001). Channel Response from Shrub Dominated Riparian Communities and Associated Effects on Salmonid Habitat. Journal of the American Water Resources Association 37.6 1639-1651.

Loyd, D.S., Koenings, J.P. and J.D. LaPerriere. 1987. Effects of turbidity in fresh waters of Alaska. N. Amer. J. Fish. Manage. 7:18-33.

MacDonald, L.H., Smart, A.W., and Wissmar, R.C. 1991. Monitoring Guidelines to Evaluate Effects of Forestry on Streams in the Pacific Northwest and Alaska. EPA 910/9-91-001, USEPA, Water Division, Region 10, Seattle, Wash.

Mantua, N., I. Tohver and A. Hamlet. 2010. Climate change impacts on streamflow extremes and summertime stream temperature and their possible consequences for freshwater salmon habitat in Washington State Climatic Change 102(1-2): 187-223.

Marcot, B. G., B. C. Wales, and R. Demmer. 2003. Range maps of terrestrial species in the Interior Columbia River Basin and northern portions of the Klamath and Great Basins. PNW-GTR-583, USDA Forest Service, Pacific Northwest Research Station, and USDI Bureau of Land Management, Portland, OR. 304 p. [Online] http://www.fs.fed.us/pnw/publications/gtr583/.

Marshall, D. B., M. G. Hunter, and A. L. Contreras, Eds. 2003. Birds of Oregon: A General Reference. Oregon State University Press, Corvallis, OR.

McCullough, D.A. 1999. A Review and Synthesis of Effects of Alterations to the Water Temperature Regime on Freshwater Life Stages of Salmonids, with Special Reference to Chinook Salmon. Prepared for the U.S. Environmental Protection Agency, Region 10, Seattle, Washington. EPA 910-R-99-010.

McGrath, M. T., S. Destefano, R. A. Riggs, L. L. Irwin, and G. J. Roloff. 2003. Spatially explicit influences on Northern Goshawk nesting habitat in the interior Pacific Northwest. Wildlife Monographs 154:1-63

McIntosh, B.A. 1992. Historical Changes in Anadromous Fish Habitat in the Upper Grande Ronde River, Oregon, 1941-1990. Unpub. M.S. thesis, Ore. State Univ., Corvallis, OR.

McIntosh, B.A., Sedell, J.R., Smith, J.E., Wissmar, R.C., Clarke, S.E., Reeves, G.H., and Brown, L.A. 1994. Management History of Eastside Ecosystems: Changes in Fish Habitat Over 50 years, 1935 to 1992. Eastside Forest Ecosystem Health Assessment, Vol III, USFS Gen. Tech. Rept. PNWGTR- 321, Portland, Or.

McPhail, J.D. and C. Murray. 1979. The early life history of Dolly Varden (Salvelinus malma) in the upper Arrow Lakes. Report to the British Columbia Hydro and Power Authority and Kootenay Department of Fish and Wildlife. University of British Columbia, Department of Zoology and Institute of Animal Resources, Vancouver, B.C. (As referenced in USDI, 1997 and EPA Temp).

McPhail, J.D. and J.S. Baxter. 1996. A review of bull trout (Salvelinus confluentus) life-history and habitat use in relation to compensation and improvement opportunities. Fisheries management report no. 104. University of British Columbia. Vancouver, B.C.

Megahan, W.F. 1982. Channel sediment storage behind obstructions in forested drainage basins draining the granitic bedrock of the Idaho batholith. In: Swanson, [and others]. Sediment budgets and routing in forested drainage basins. General Technical Report PNW-141. Portland, Oregon: USDA Forest Service, Pac. NW. Res. St. 114-121.

Millar, Constance I; Stephenson, Nathan L.; Stephens, Scott L. 2007. Climate change and forests of the future: Managing in the face of uncertainty. Ecological Applications. 17(8): 2145-2151. http://www.nrs.fs.fed.us/pubs/31774

Miller, J. C. and P. C. Hammond. 2007. Butterflies and moths of Pacific Northwest forests and woodlands: rare, endangered, and management sensitive species. Forest Health Technology Enterprise Team, Technology Transfer Species Identification FHTET-2006-7.

Miller, M. (2000). Fire autecology In: Brown, J.K., Smith, J.K.(Eds.), Wildland Fire and Ecosystems: Effects of Fire on Flora. Ogden, UT: Gen. Tech. Rep. RMRS-GTR-412-vol 2, USDA Forest Service.

Miller, R. F. (2005). Biology, Ecology, and Management of Wester Juniper (Juniperus occidentalis), Technical Bullentin 152. Corvallis, OR: Oregon State University, Agricultural Experiment Station.

Montgomery, D.R., J.M. Buffington, R.D. Smith, K.M. Schmidt, and G. Pess. 1995. Pool spacing in forest channels. Water Resources Research 31:9.

Moyle, P.B and G.M. Sato. 1991. On the design of preserves to protect native fishes. In: Minckley, W.L.; Deacon, J.E., eds. Battle against extinction: native fish management in the American west. Tucson, Arizona: University of Arizona Press. 155-169.

Moyle, P.B. 2002. Inland fishes of California. University of California Press, Berkeley, California. Pages 195-204.

Murphy, M.L and W.R. Meehan. 1991. Stream ecosystems. American Fisheries Society Special Publication 19. 179-246 p.

Murray, C.B. and J.D. McPhail. 1988. Effect of incubation temperature on the development of five species of Pacific salmon (Onchorhynchus) embryos and alevins. Can. J. Zool. 66(1):266-273.

Naiman, R. D. (1993). The role of riparian corridors in maintaining regional biodiversity. Ecol. Appl. 3, 209-212.

Naiman, R.J., Beechie, TJ., Benda, L.E., Berg, D.R., Bisson, P.A., MacDonald, P.A., O'Connor, M.D., Olson, P.L., and E.A. Steel. 1992. Fundamental elements of ecologically healthy watersheds in the Pacific Northwest coastal ecoregion. In: Naiman, R.J., ed. Watershed management: balancing sustainability and environmental change. New York, NY: Springer-Verlag. 127-188 p.

National Environmental Policy Act of 1969 (P.L. 91-190).

National Forest Landscape management Volumes 1 and 2 (Forest Service Handbook #434 and #462,

National Forest Management Act of 1976 (P.L. 94-588).

NatureServe. 2011. "Lycaena cupreus". Version 7.1 2009. Data last updated: July 2011. Available at: www.natureserve.org/explorer (Accessed: 10/10/2011).

NatureServe. 2016. "Haliaeetus leucocephalus". Version 7.1 2009. Data last updated: November 2016. Available at: www.natureserve.org/explorer (Accessed: 2/5/2016)

Nickelson, T. E., J. D. Rodgers, S. L. Johnson, and M. F. Solazzi. 1992a. Seasonal changes in habitat use by juvenile coho (Oncorhynchus kisutch) in Oregon coastal streams. Canadian Journal of Fisheries and Aquatic Sciences 49:783-789.

Noggle, C.C. 1978. Behavioral, physiological and lethal effects of suspended sediments to juvenile salmonids. Master's thesis. University of Washington, Seattle.

Noss, R.F., M.A. O'Connel, and D.D. Murphy. 1997. The Science of Conservation Planning: Habitat Conservation under the Endangered Species Act. Island Press, Washington D.C., and Covelo, California. 246 pp.

Oregon SHPO 2004, Programmatic Agreement among the United States Department of Agriculture Forest Service Pacific Northwest Region (Region 6), the Advisory Council on Historic Preservation, and the Oregon State Historical Preservation Officer Regarding Cultural Resources Management in the State of Oregon by the USDA Forest Service. Document on file at the Malheur National Forest, John Day, Oregon.

Oakleaf, J. K., D. L. Murray, J. R. Oakleaf, E. E. Bangs, C. M. Mack, D. W. Smith, J. A. Fontaine, M. D. Jimenez, T. J. Meier, and C. C. Neimeyer. 2006. Habitat selection by recolonizing wolves in the northern Rocky Mountains of the United States. Journal of Wildlife Management 70(2):554-563

Olson, D. (2000). Fire in Riparian Zones: A Comparison of Historical Fire Occurrence in Riparian and Upslope Forests in the Blue Mountains and Southern Cascades of Oregon. Seattle, WA: M.S. Thesis, University of Washington.

Opler, P. A., K. Lotts, and T. Naberhaus, coordinators. 2011. Butterflies and Moths of North America. Bozeman, MT: Big Sky Institute (Version 06032011). Available at: http://www.butterfliesandmoths.org/ , (Accessed 10 October 2011).

Pilsbry, H. A. 1948. Land Mollusca of North America (North of Mexico), Vol. II, Part 2., p. 658.

Powell, D.C., C.G. Johnson Jr., E.A. Crowe, A. Wells and D.K. Swanson. 2007. Potential vegetation hierarchy for the Blue Mountains section of northeastern Oregon, southeastern Washington, and west-central Idaho. USDA Forest Service General Technical Report PNW-GTR-709.

Pyle, R. M. 2002. The Butterflies of Cascadia. Seattle Audubon Society. Seattle, WA. 420 pp.

Quigley, T. M., & Arbelbide, S. J. (1997). An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins: volume 1. . Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: Gen. Tech. Rep. PNW-GTR-405.

Ratliff, D.E. 1992. Bull trout investigation in the Metolius River-Lake Billy Chinook system. Pages 37-44. In Howell, P.J. and D.V. Buchanan, eds., Proceedings of the Gearhart Mountain bull trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, OR.

Reeves, G.H., J.D. Hall, T.D. Roelofs, T.L. Hickman, and C.O. Baker. 1991. Rehabilitating and modifying stream habitats. American Fisheries Society Special Publications 19. 519-557.

Reeves, G.H., L.E. Benda, K.M. Burnett, P.A. Bisson, and J.R. Sedell. 1995. A disturbance-based ecosystem approach to maintaining and restoring freshwater habitats of evolutionary significant units of anadromous salmonids in the Pacific Northwest. American Fisheries Society Symposium 17:334-349.

Robichaud, P.R., J.W. Wagenbrenner, and R.E. Brown. 2010. Rill erosion in natural and undisturbed forests: 1. Measurements. Water Resources Research 46 (W10506).

Roni, P., T.J. Beechie, R.E. Bilby, F.E. Leonetti, M.M. Pollock, and G.R. Pess. 2002. A review of stream restoration techniques and a hierarchical strategy for prioritizing restoration in pacific northwest streams. North American Journal of Fisheries Management 22:1-20.

Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, CO.

Ruggiero, L. F.; Aubry, K. B.; Buskirk, S. W.; Lyon, L. J.; Zielinski, W. J. 1994. The scientific basis for conserving forest carnivores: American marten, fisher, lynx and wolverine in the Western United States. Gen. Tech. Rep. RM-254. Fort Collins, CO: Rocky Mountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 183 p.

Sedell, J.R., and F.H. Everest. 1990. Historic changes in habitat for Columbia River Basin salmon under study for TES listing. Draft Report, U.S. Forest Service, Pacific Northwest Research Station, Corvallis, Oregon.

Sheer, M.B. and E.A. Steel. 2006. Lost watersheds: barriers, aquatic habitat connectivity, and salmon persistence in the Willamette and lower Columbia River basins. Transactions of the American Fisheries Society 135 (6):1654-1669.

Sheldon, A.I. 1998. Conservation of stream fishes: patterns of diversity, rarity, and risk. Conservation Biology. 2:149-156.

Smith P., M. Bustamante, H. Ahammad, H. Clark, H. Dong, E. A. Elsiddig, H. Haberl, R. Harper, J. House, M. Jafari, O. Masera, C. Mbow, N. H. Ravindranath, C. W. Rice, C. Robledo Abad, A. Romanovskaya, F. Sperling, and F. Tubiello, 2014. Agriculture, Forestry and Other Land Use (AFOLU). In: Climate Change 2014: Mitigation of Climate Change. Contribution of

Stickney, P. (1986). First Decade Plant Succession Following the Sundance Forest Fire, Northern Idaho. Ogden, UT: Gen. Tech. Rep. GTR-INT-197, USDA Forest Service.

Stout, H.A., P.W. Lawson, D. Bottom, T. Cooney, M. Ford, C. Jordan, R. Kope, L. Kruzic, G. Pess, G. Reeves, M. Scheuerell, T. Wainwright, R. Waples, L. Weitkamp, J. Williams, and T. Williams. 2011. Scientific conclusions of the status review for Oregon Coast coho salmon (Oncorhynchus kisutch). Draft revised report of the Oregon Coast Coho Salmon Biological Review Team. National Marine Fisheries Service, Northwest Fisheries Science Center. Seattle.

Strobel, B., D.R. Shively, and B.B. Roper. 2009. Salmon carcass movements in forest streams. Transactions of the American Fisheries Society 29 (3):702-714.

Swanson, F.J. and G.W. Lienkaemper. 1978. Physical consequences of large organic debris in pacific northwest streams. USDA Forest Service, Gen. Tech. Rep., PNW-69.

Swanson, F.J., Gregory, S.V., Sedell, J.R., and A.G. Campbell. 1982. Land-water interactions: the riparian zone. In: Edmonds, R.L., ed. Analysis of coniferous forest ecosystems in the western United States. Stroudsburg, PA: Hutchinson Ross. 267-291.

Swanston, D.N. 1991. Natural processes. Am. Fish. Soc. Sp. Pub. 19:139-179.

Tait, C. 2007. Conservation assessment of the Great Basin population of the Columbia spotted frog. USDA Forest Service, Intermountain Region, Ogden, Utah. 79 pp.

The Recreation Opportunity Spectrum: A Framework for Planning, Management, and Research, General Technical Report PNW-98, 1979, p. 7.

Tirmenstein, D. (1999, April 12). Juniperus occidentalis. Retrieved from Fire Effects Information System: http://www. fs. fed. us/database/feis/

Tonina, D. and J.M. Buffington. 2009. Hyporheic exchange in mountain rivers: mechanics and environmental effects. Geography Compass 3/3:1063-1086.

U.S. Department of Agriculture and U.S. Department of Interior (USDA and USDI). 1995a. Decision of Notice and Finding of No Significant Impact for the Inland Native Fish Strategy: Interim Strategies for Managing Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana and Portions of Nevada (INFISH).

U.S. Department of Agriculture and U.S. Department of Interior (USDA and USDI). 1995b. Decision Notice/Decision Record for Interim Strategies for Managing Anadromous Fish-Producing Watersheds on Federal Lands in Eastern Oregon and Washington, Idaho and Portions of California (PACFISH).

Umatilla National Forest Recreation Niche, 2007

US Department of Agriculture, Forest Service, Regions 1, 4, and 6. 17 Aug 1995. Memo (File Code 2670/1950): Streamlining Biological Evaluation and Conclusions for Determining Effects to Listed, Proposed, and Sensitive Species. Salwasser, H., D. Bosworth, and J. Lowe.

US EPA 2015. US Inventory of Greenhouse Gas Emissions and Sinks: 1990 – 2013. Executive Summary. EPA 430-R15-004 United States Environmental Protection Agency. Washington, D.C. 27 pp. http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html

USDA Forest Service, USDI Bureau of Land Management, and the Coquille Indian Tribe. 2006. Fish Habitat Restoration Activities Affecting ESA and MSA-Listed Animal and Plant Species found in Oregon and Washington (ARBA I).

USDA Forest Service, USDI Bureau of Land Management, Bureau of Indian Affairs. 2013. Fish Habitat Restoration Activities Affecting ESA-Listed Animal and Plant Species and their Designated or Proposed Critical Habitat and Designated Essential Fish Habitat under MSA found in Oregon, Washington and parts of California, Idaho, and Nevada (ARBA II).

USDA Forest Service. 2011. Watershed Condition Framework, a framework for assessing and tracking changes to watershed condition, FS-977. 24 pg. http://www.fs.fed.us/biology/watershed/condition_framework.html

USDA Forest Service. 1990. Land and Resource Management Plan, Umatilla National Forest. Pacific Northwest Region.

USDA Forest Service. 2005. Forest Service Manual FSM 2670-2671. Threatened, Endangered and Sensitive Plants and Animals, Amendment No. 2600-2005-1, September 23, 2005.

USDA Forest Service. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands.

USDA Forest Service. 2015. Pacific Northwest Regional Forester's Sensitive Species List. July 13, 2015. Available online at: http://www.fs.fed.us/r6/sfpnw/issssp/agency-policy

USDA Forest Service. 2018. Blue Mountain Aquatic and Riparian Conservation Strategy. Pacific Northwest Region. 181 p. In press

USDA Forest Service. Natural Resources Manager database. Contains records of documented Forest Service Sensitive plants, with geographic locations and details of each population. Online database, not available to the public.

USDC NMFS. 2011. 5-year review: summary and evaluation of Snake River sockeye, Snake River spring-summer Chinook, Snake River fall-run Chinook, Snake River Basin steelhead. National Marine Fisheries Service, Portland, Oregon.

USDC NMFS. 2017. ESA Recovery Plan for Snake River Spring/Summer Chinook Salmon Fall Chinook Salmon and Snake River Basin Steelhead. 284 p.

USDC NMFS. 1996. Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale. National Marine Fisheries Service, Environmental and Technical Services Division, Habitat Conservation Branch.

USDC NMFS. 2009. Middle Columbia River Steelhead district Population Segment ESA Recovery Plan. 260 p.

USDC NMFS. 2013. Endangered Species Act – Section 7 Programmatic Consultation Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for Reinitiation of Aquatic Restoration Activities in States of Oregon and Washington

USDC NMFS. 2015. Northwest Fisheries Science Center. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. 356 p.

USDC NMFS. 2016 Williams, T.H., B.C. Spence, D.A. Boughton, R.C. Johnson, L.G. Crozier, N.J. Mantua, M.R. O'Farrell, and S.T. Lindley. 2016. Viability assessment for Pacific salmon and steelhead listed under the Endangered Species Act: Southwest. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-564. 170 p

USDI FWS and USDC NMFS. 1998. Endangered Species Consultation Handbook: Procedures for conducting consultation and conference activities under section 7 of the Endangered Species Act.

USDI FWS. 2015. Recovery Plan for the Coterminous United States Population of Bull Trout (Salvelinus confluentus). U.S. Fish and Wildlife Service, Portland, Oregon. 179 p.

USDI FWS. 1999. A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale. U.S. Fish and Wildlife Service.

USDI FWS. 2013. Endangered Species Act – Section 7 Consultation Programmatic Biological Opinion for Aquatic Restoration Activities in the States of Oregon, Washington and portions of California, Idaho and Nevada

Valley, S. 2010. Founder: Oregon Dragonfly Survey, Insect Imaging Specialist, Oregon Dept of Agriculture- Plant Division.

Van de Water, K. M. (2010). Fire history of coniferous riparian forests in the Sierra Nevada. Forest Ecology and Management, 260: 384-395.

Verts, B. J., and L. N. Carraway. 1998. Land Mammals of Oregon. University of California Press, Berkeley / Los Angeles / London. 668 pp.

Wahl, T. R, B. Tweit, and S. G. Mlodinow. 2005. Birds of Washington; Status and Distribution. Oregon State University Press, Corvallis, OR

Warren, A. D. 2005. Butterflies of Oregon: their taxonomy, distribution, and biology. Lepidoptera of North America 6. C.P. Gillette Museum. Colorado State University. Fort Collins, CO. 408 pp.

Wells, Aaron F. 2006. Deep Canyon and Subalpine Riparian and wetland plant associations of the Malheur, Umatilla, and Wallowa-Whitman National Forests. USDA FS. Pacific NW Research Station. PNW-GTR-682. November 2006.

Wemple, B.C., J.A. Jones, and G.E. Grant. 1996. Channel network extension by logging roads in two basins, western cascades, Oregon. Water Resources Bulletin 32(6):1195-1207.

Williams, P. H., Thorp, R. W., Richardson, L. L., & Colla, S. R. (2014). Bumble bees of North America: an identification guide. Princeton University Press.

Williams, Roger, Forest Supervisor Malheur National Forest, Appendix D Post-Fire Interim Grazing Guidelines December 2, 2003

Wipfli, M.S., J.P. Hudson, D.T. Chaloner, and J.P. Couette. 1999. Influence of salmon spawner densities on stream productivity in southeast Alaska. Canadian Journal of Fisheries and Aquatic Sciences 56:1600–1611.

Wisdom, M. J. (2000). Source habitats for terrestrial vertebrates of focus in the interior Columbia Basin: broad-scale trends and management implications. Portland OR: USDA GTR PNW 1.

Wisdom, M. J., et al. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia basin: broad-scale trends and management implications. General Technical Report PNW-GTR-485, 3 volumes. Portland, OR, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Wisdom, M. J., R. S. Holthausen, B. C. Wales, C. D. Hargis, V. A. Saab, D. C. Lee, W. Hann, T. D. Rich, M. M. Rolland, W. J. Murphy, and M. R. Eames. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Gen. Tech Rep. PNW-GTR-485 (CD-ROM, Draft Version, March 2000). USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Wissmar, R.C., J.E. Smith, B.A. McIntosh, H.W. Li, G.H. Reeves, and J.R. Sedell. 1994. Ecological health of river basins in forested regions of eastern Washington and Oregon. General Technical Report PNW-GTR-326, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Portland, Oregon.

Wolverine Foundation Inc., The (TWF): Wolverine life history, ecology, and management [Online]. 2012. Kuna, Idaho, USA. Available: http://www.wolverinefoundation.org

Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. 121 pp. http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter11.pdf

Zielinski, W. J., K. M. Slauson, C. Carroll, C. Kent, and D. Kudrna. 2001. Status of American martens in coastal forests of the Pacific states. Journal of Mammalogy 82:478–490.

Ziller, J.S. 1992. Distribution and relative abundance of bull trout in the Sprague River subbasin, Oregon. Pages 18-29 in Howell, P.J. and D.V. Buchanan, eds., Proceedings of the Gearhart Mountain bull trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, OR.

Appendix G: Response to Comments on Aquatic Restoration EA

This appendix is a summary of public comments received on the Aquatic Restoration EA. The Umatilla National Forest published legal notice of the EA for review and public comment on June 15th, 2018. Comments were requested within 30 of publication of the legal notice. All comments received during the 30 day period have been reviewed and responses to specific concerns are included herein.

A total of 7 comment letters and emails were received from 7 interested and affected individuals and groups, tribes, and other agencies. The letter numbers, names of respondents, and information on attachments to comments letters are displayed in Table G-1.

Comment documents were tracked upon receipt to assure all comments were captured. Individual comments from within each document were categorized based on the comment topic. A number of general comments were received, with roughly equal number voicing support or lack of support for the proposed action. Several comments also noted the potential this action created for partnership between public agencies and private landowners. Full text of public comments received is available in the project record.

Supporting documents referenced responses below are found within the project record. To review resource reports visit: https://www.fs.usda.gov/project/?project=47428

Table G-27 Letter number, name, and address of respondent, and information on attachments

Letter Number	Date	Name of Respondent and Organization Affiliation if Given	Attachment Information
1	6/15/2018	Lisa Hayes, Oregon Department of Transportation	None
2	7/2/2018	Donna Beverage, Union County Commissioner	Comments entered were also attached
3	7/9/2018	Brian Kelley, Greater Hells Canyon Council	None
4	7/12/2018	Doug Heiken, Oregon Wild	Comments from scoping were attached
5	7/10/2018	Chuck Chase	None
6	7/16/2018	Bill Harvey, Baker County	None
7	7/16/2018	Ken Alexander, Eastern Oregon Mining Association	None

Responses to specific concerns are found in table Table G-2 below. The response table is organized by subject area using the categories listed below.

The following five responses were used to respond to comments as per guidance provided by the Council of Environmental Quality (CEQ) regulations:

1. Modify alternatives, including the Proposed Action
2. Develop and evaluate alternatives not previously given consideration
3. Supplement, improve, or modify the analysis
4. Make factual corrections
5. Explain why the comments do not warrant further agency response

In the following response table, issues from comments have been assigned to one of the five categories above and is listed prior to each response.

Table G-28 Summarized concerns and responses

Concern	Letter Number	Response Type and Response
General Concerns		
A number of letters indicated an interest in receiving notification and an opportunity to comment on projects on a site specific basis.	3,4,6	**Section 2.2.4 describes the public collaboration process and period including discussion of proposed activities. Completed NEPA Compliance and Implementation checklists will be available on the project website. Additional information is available on request.**
Concerns were raised about designating additional special management areas such as wilderness or wild and scenic rivers.	6, 7	**This project does not change any existing land allocations or land designations as determined in the existing Forest Plan.**
We received a request to determine if our action was consistent with the Baker County Natural Resources Plan	6	**We have reviewed the Baker County Natural Resources Plan and agree the watershed policy shares the same objective as our proposed action: to improve water quality and the function of stream channels, floodplains and wetlands.**
We received a request for government to government coordination with Baker County.	6	**We appreciate the interest in additional cooperation. NFMA requires coordination with the counties during the forest planning process, such as the Blue Mountain Forest Plans (36 CFR 219.7(c)(1982). For project level analysis, providing the opportunity to comment and object meets our requirements for coordination.**
Impacts to Mining		
Mining claims may be flooded, interfering with extraction of minerals	5,7	**It is unlikely restoration activities under this action will impact mining claims. However, we have added a requirement for review of potential mining conflicts to our project NEPA checklist to ensure review of this issue before each project is implemented.**
Access to mining claims may be flooded or otherwise lost	5,7	**No stream crossings under approved operating plans will be removed as required by the 1955 Multiple Use Mining Act. If there is no approved operating plan than the Forest Service will continue to provide reasonable access to the mining claim as necessary.**
Miners must be notified of restoration work that occurs in areas overlapped by their claims	7	**We have added a requirement to review for potential mining conflicts to our NEPA checklist. If mines overlap these activities, we will coordinate with claims owners.**
Input of sediment from mining sites are reduced due to mounds of tailings along streams. Removing tailings could impact the waterway and mining operations	7	**Approved operating plans that include tailing mounds will not be removed, per the 1955 Multiple Use Mining Act.**

Concern	Letter Number	Response Type and Response
Increases to Wilderness, Roadless and Wild and Scenic rivers was not supported, particularly in areas where minerals exist	6,7	**This action does not consider increases to these management areas.**
Impacts to Vegetation Communities		
Decrease in pesticide use by the USFS has resulted in increases of noxious weeds and insects, resulting in detrimental impacts that must be addressed.	6	**The use of pesticides is beyond the scope of this action. Non-native invasive plants encountered during project activities will be treated in accordance with the Umatilla National Forest's Invasive Plant Treatment EIS. Treatment of deleterious insects will be evaluated under separate decisions.**
Concern was expressed about the purpose of tree cutting in riparian areas.	3, 6	**Documents have been edited to clarify tree cutting in riparian areas is only for restoration of aquatic resources in areas of juniper encroachment. Removal of juniper would be occur only under the conditions described in Appendix A, category 13.**
Concern expressed regarding description of historical conditions of plant communities	6	**The Forest Service historically seeded Umatilla National Forest lands with non-native pasture grasses in an effort to improve forage for cattle. It is true that there is very little historical data on sensitive plant species distribution and abundance on the Umatilla National Forest. The project design criteria will ensure that surveys will be completed before project implementation to document plants that may be present.**
Impacts to Aquatic Resources		
Concern was expressed that this action would not be beneficial and that some of the project categories would have contradictory impacts.	2	**The proposed action is consistent with recovery plans developed for ESA listed aquatic species (mid-Columbia River steelhead, Snake River steelhead and chinook salmon and bull trout) and their habitats on the Umatilla National Forest and is designed around ARBA II and ARBO II. Site-specific project design criteria would be developed for each type of restoration action, tailored to the need of a particular site.**
Concern was expressed that the purpose and need included a need to maintain adequate flows. This may not be possible because flows are under authority of Oregon Water Resources	6	**We agree and have removed this from our purpose and need. Aquatic restoration projects under this action may indirectly contribute to maintaining adequate flows, but maintain flows is no longer listed as a need.**

Impacts to Aquatic Resources		
Concerns were expressed over design of instream structures and use of an engineer for some types of instream structures.	6	**All activities would follow requirements for the category of large wood, boulder and gravel placement. As described in this category some types of activities, such as engineered log jams, require additional review by National Marine Fisheries Service.**
Concerns if restoration activities described in the proposed action were needed	2	**Section 1.1 gives an overview of existing conditions and overall degradation of aquatic habitat on the Umatilla National Forest. This section also describes the species of fish listed on the Endangered Species Act because of their decline in populations, and habitat restoration actions needed to help recovery of these imperiled fish.**
Reducing or removal of grazing was raised a concern.	6	**Removal of grazing is not part of the proposed action. Grazing will continue in accordance with current permit agreements. An additional EA would be required for any AUM reductions that are not an administrative action, such as non-compliance with a permit.** **Many streams with ESA listed fish are already fenced on the Umatilla NF, and future fencing proposals would most likely be limited to smaller areas without a need to reduce livestock numbers to be consistent with the Final EA section 3.9.3 Affected Environment - Range, Desired Conditions (page 115), which describes "Riparian corridor fencing should be considered on a very limited basis for special applications." There may be proposals for periods of rest after riparian planting. Fencing projects under this EA will be limited in number and grazing will continue according to current permit agreements.**
The impacts of fencing in riparian areas and associated impacts to riparian plant species and wildlife, and costs of fencing (including riparian areas) were raised as a concern.	3	**Appendix B page 160 describes the wildlife friendly fences that will be used. The Range Specialist and Wildlife Biologist will work together on fence design according to recommended guidelines for wildlife friendly fences. Grazing fee collections returned to the forest pay for the range improvement projects, unless partnership funds are acquired.** **Appendix A page 139 Final EA identifies there will be periods after planting in the riparian area, for protection of seedlings or for administration purposes, there may be a need to install fencing as necessary to prevent access to revegetated sites by livestock or unauthorized persons. Use of exclosure fencing to prevent utilization of plantings by deer, elk, and livestock is permitted. Appendix B page 165 also identifies the potential need for fencing if a rest period is required following a burn, and the permittee has the option to exclude cattle grazing from those portions of a pasture that were burned through the use of fencing and could continue to graze the unburned areas of a unit.**

Impacts to Transportation Systems		
The Umatilla National Forest is adjacent to Oregon Highways under the jurisdiction of the Oregon Department of Transportation. Access and/or permits must be obtained if use or impacts are expected to these highways.	1	**This project is not expected to impact highways under the jurisdiction of the state of Oregon. Project activities specific to roads will mostly involve forest roads. Permits will be acquired if needed.**
One concern noted that road and trail decommissioning might not have benefits as high as expected, as contribution of these features to discharge varies greatly from place to place.	6	**We agree that potential discharge from roads and trails depends on location. Project design criteria will take into account impacts during project selection.**
Support was expressed for road relocation, but not for road closure. Some letters expressed concern we would close roads and reduce recreation.	2,6	**Projects under this action may eliminate a route within environmentally sensitive area, and the route would be replaced with a new route. This decision would not change the use status of any National Forest System Road. Road relocation may indirectly alter access to a few dispersed recreation sites, but this action is not expected to reduce recreational opportunities.**
A number of letters indicated an interest in receiving notification and an opportunity to comment on projects on a site specific basis.	3,4,6	**Section 2.2.4 describes the public collaboration process and comment periods, including discussion of proposed activities. Completed NEPA Compliance and Implementation checklists will be available on the project website.**