United States Department of Agriculture
Forest Service

Bonneville Power Administration
Department of Energy

Longley Meadows Fish Habitat Enhancement Project

Environmental Assessment

La Grande Ranger District, Wallowa-Whitman National Forest, Union County, Oregon

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Chapter 1 – Purpose and Need

Introduction

The United States Forest Service (USFS) and the Bonneville Power Administration (BPA) are Co-lead Agencies proposing to restore habitat for spring/summer Chinook salmon, steelhead, and bull trout within a 1.5-mile reach of the Grande Ronde River (GRR). The Longley Meadows Fish Enhancement Project (project) would continue the work begun upstream in the Bird Track Springs Fish Enhancement Project to re-establish natural river-floodplain connections and processes. Natural processes within this reach of the GRR include multiple channel networks usually created through forcing mechanisms of large wood, ice, beaver, and rock. These actions are proposed to be implemented on the La Grande Ranger District of the Wallowa-Whitman National Forest (WWNF) and some adjacent private lands.

The Co-Lead Agencies providing project National Environmental Policy Act (NEPA) oversight and analyzing the environmental impacts in this NEPA document are the USFS-WWNF, having both land management jurisdiction on a portion of the project area and technical expertise, and the BPA who would be providing implementation funding. The Bureau of Reclamation (BOR) and Confederated Tribes of the Umatilla Indian Reservation (CTUIR) are cooperating agencies for this project.

We prepared this environmental assessment (EA) to determine whether implementation of the fish habitat enhancement activities (addition of large wood instream, channel re-meandering, improved stream and floodplain connectivity, planting of native vegetation, construction of riffles/pools/gravel bars, and repositioning of boulders for instream habitat enhancement) may significantly affect the quality of the human environment and thereby require the preparation of an Environmental Impact Statement (EIS). By preparing this EA, we are fulfilling agency policy and direction to comply with NEPA (42 U.S. Code [USC] 4321 *et seq*.), which requires Federal agencies to assess the effects of major federal actions that may significantly affect the human environment. This EA was prepared to determine if the proposed project would cause effects of a magnitude that would warrant preparing an EIS, or whether it is appropriate to issue a Finding of No Significant Impact (FONSI).

Proposed Project Location

The 139-acre Longley Meadows project area is approximately 10 air miles west of La Grande, Oregon along approximately 1.5 miles of the GRR along State Highway 244. The project area is in the vicinity of Spring Creek and Longley Meadows and includes 1.25 miles of river on National Forest System (NFS) lands on the WWNF and 0.25 miles on state and privately-owned lands beginning near river mile 143.45 and continuing downstream to river mile 142.15. No activities are proposed on private lands owned by Bear Creek Ranch Quarter Horses adjacent to the project area. The project area is entirely within the Coleman Ridge-Grande Ronde River sub-watershed within the Grande Ronde River-Beaver Creek watershed. Approximately 111 acres of the project area are located on NFS lands, 13 acres on Oregon Department of Transportation (ODOT) lands, and 15 acres on private lands. The general legal description is Township 3 south, Range 36 east, sections 11, 12, and 14.

Forest Plan Management Direction

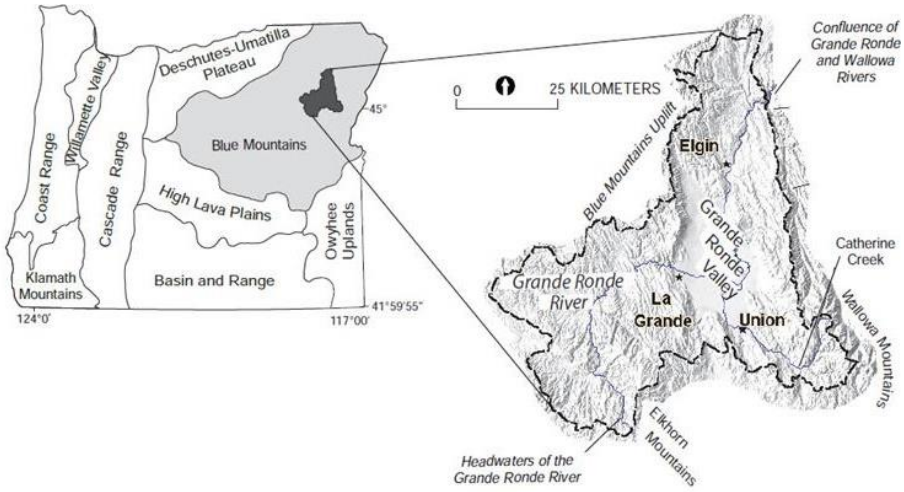
This EA is tiered to the 1990 Final Environmental Impact Statement (FEIS) for the Wallowa-Whitman National Forest Land and Resource Management Plan (Forest Plan), as amended. Major Plan amendments relevant to this project include:

EA on Continuation of the Interim Management Direction Establishing Riparian, Ecosystem, and Wildlife Standards for Timber Sales, as signed on May 20, 1994, which provides additional standards and guidelines (USDA, 1994, and commonly known as the Screens);

Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California, as signed in 1995, which provides additional standards and guidelines (USDA, 1995, and commonly known as PACFISH). Refer to guidelines described on page 42 of the EA for specific PACFISH direction.

The Forest Plan, as amended, includes management goals, objectives, standards, and guidelines (both forest-wide and specific) to all land allocations.

Figure 1. Vicinity map



The NFS lands in the project area are allocated under the Wallowa-Whitman National Forest Plan and its FEIS (as amended) to the following management areas (refer to the Management Direction Map in Appendix B). All applicable management direction specific to the following management areas (MAs) apply to this project area:

MA3 – (111 acres). This management area provides a broad array of forest uses and outputs with emphasis on timber production. However, timber management is designed to provide near-optimum cover and forage conditions on big game winter ranges.

The remainder of the project area acres are State and private lands located within the project area boundary. Activities proposed in this project are consistent with the management guidance and direction provided in the Forest Plan.

Bonneville Power Administration

BPA is a co-lead agency in the development of this EA and is proposing to provide funding for the project. The project would meet BPA's objectives mandated under several Federal laws.

BPA is a Federal power-marketing agency within the U.S. Department of Energy. BPA's operations are governed by several statutes, including the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (16 U.S.C. 839 §§ et seq.) (Northwest Power Act). Among other things, this Act directs BPA to protect, mitigate, and enhance fish and wildlife affected by the development and operation of the

Federal hydroelectric dams in the Columbia River basin from which Bonneville markets commercial power. To assist in accomplishing this, the Act requires BPA to fund fish and wildlife protection, mitigation, and enhancement actions consistent with the purposes of the Act and the Northwest Power and Conservation Council's Fish and Wildlife Program. Under this program, the Council recommends mitigation measures for Bonneville to implement. The Council determined that this project was consistent with the Fish and Wildlife Program and recommended it to Bonneville. BPA will use the analysis in this EA to decide whether to fund the project.

Additionally, under the Endangered Species Act (16 U.S.C. 1531 et seq.) BPA has made commitments to implement Reasonable and Prudent Alternative 35, which calls for identifying tributary habitat restoration projects in the 2008 FCRPS Biological Opinion, as amended by a Supplemental Biological Opinion in 2010 and 2014 (National Oceanic and Atmospheric Administration Fisheries 2008, 2010, 2014). The 2008/2014 Biological Opinion was remanded in federal court in 2016 and a new Biological Opinion called the CRS was signed in 2019.

Need for the Proposal

The purpose and need for action describes what the desired condition is for the Longley Meadows project area and how the existing condition does not meet that desired condition answering the question "why here, why now?"

Desired Conditions

The desired conditions for the habitat within this project area relate primarily to spring/summer Chinook habitat, summer steelhead habitat and resident fish species specifically through the following habitat elements.

Restoration of natural processes that create and maintain habitats required for native fish, including salmonids, is the overarching desired condition for the reach. The following desired future conditions (DFCs) for the Longley Meadows project provide a future vision for the area consistent with the overarching goals of the project and can assist in development of management options for the project. The Interdisciplinary Team (IDT) developed DFCs using Forest Plan goals, objectives, standards, and guidelines. These DFCs focus on major resource areas associated with this project. The focus of this project will be in meeting the DFC related to water quality and fish habitat as follows:

> Networks of watersheds with good habitat and functionally intact ecosystems contribute to and enhance conservation and recovery of specific threatened or endangered fish species and provide high water quality and quantity. The networks contribute to short-term conservation and long-term recovery at the major population group, core area, or other appropriate population scale. Roads within the watershed do not present substantial risk to aquatic resources.
>
> Connectivity exists within watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact habitat refugia. These network connections provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic, riparian-dependent, and many upland species of plants and animals.
>
> Habitat elements (including spawning and rearing habitat, substrate, pool habitat, winter habitat, migration corridors, cover, food, habitat complexity, water quality, refugia, productivity, and connectivity) are in a functional condition and are sufficiently distributed to support self-sustaining populations of native resident and anadromous fish. Native fish species have access to

historically occupied habitats and connectivity between habitats allows for the interaction of local populations.

Existing Condition

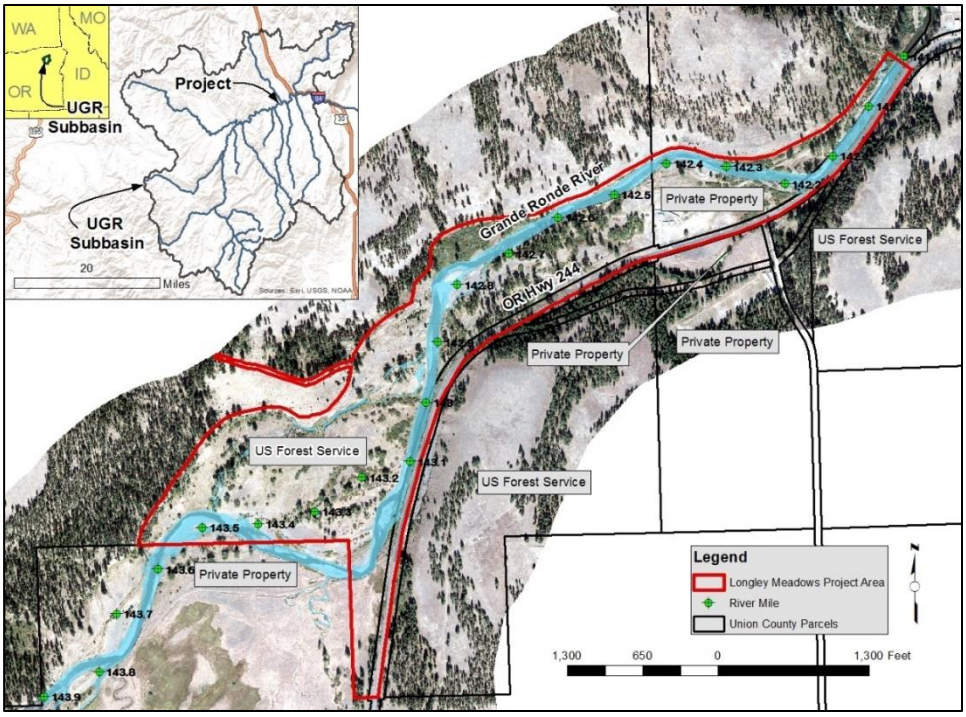


Figure 2. Project Area Location and Landownership.

Within the upper GRR watershed, multiple historical practices have contributed to riparian and instream habitat degradation that have negatively affected spring/summer Chinook salmon, steelhead, and bull trout habitat within the proposed project area. Currently, within the project reach, high water temperatures, low stream flows, simplified habitat, and limited off-channel habitat availability are of greatest concern for these native salmonid populations. These habitat limitations are the result of several historical anthropogenic disturbances that include, but are not limited to, systematic removal of beavers, historical logging practices and use of splash-dams, railroad and road embankment construction, vegetation clearing, placer mining, and gravel mining. Although many of these practices have been reduced or eliminated in recent years, their physical effects persist throughout the project reach.

The existing Longley Meadows reach of the GRR has shallowed and widened into a plane-bed channel with limited heterogeneity and a lower degree of channel-floodplain interaction. Few pools of moderate depth exist. Large wood features that would have played a significant role in channel form are nearly non-existent.

In addition to channel changes, the floodplains within the project reach have been altered, negatively affecting off-channel habitats and floodplain water storage. The most prevalent historical feature within the floodplain includes remnants of the Mount Emily Logging

Company railroad grade. The grade has been breached and removed in a few locations, but still acts as a barrier to natural floodplain inundation within the reach.

Previous attempts at restoring this reach include the placement of instream structures including rock weirs, rock barbs, and large wood buried in banks, but those smaller-scale attempts to restore habitat complexity have been largely unsuccessful. This is likely due in part to a lack of existing large streamside trees and winter ice issues within the reach. During the winter months, the upper GRR is generally shallow and has a relatively low flow along with cold temperatures that favors ice formation. Ice that forms tends to create jams, which then break and raft through the reach. For the most part, these ice processes are naturally occurring, but have likely been exacerbated by widening and shallowing of the channel. Furthermore, raft ice is currently confined within the channel, resulting in channel bed scour and removal of vegetation. Ice sorts channel bed materials, removing fine gravels and resulting in channel armoring.

Existing riparian vegetation includes scattered patches of woody shrubs, immature trees, and large areas of herbaceous vegetation where the floodplain had been cleared and drained for ranching. Beavers exist within the reach, but numbers are substantially reduced compared to the historical population, and they no longer play a major role in wood delivery to the channel or maintaining connected off-channel habitats and riparian conditions.

The Bird Track Springs reach located approximately 0.65 miles upstream, is currently undergoing extensive rehabilitation to meet the desired conditions described above.

Need for Action

The need for the proposed action is to re-establish hydraulic conditions creating a mosaic of diverse habitat types, improving channel-floodplain interactions through increased connectivity, dissipation of high-water flows, and resolution of winter ice issues; and improve riparian vegetation condition and vitality, streambank stability, and nutrient cycling within this reach of the Grande Ronde River. There is also a need to protect existing infrastructure such as roads and private property, while enhancing recreational and educational opportunities. Restoring the Longley Meadows reach would lead to meeting the desired future condition and thus support the Co-Lead Agencies' commitments to mitigate and aid in the recovery of ESA-listed salmonids within the Grande Ronde River system.

In addition, BPA needs to fulfill its contractual commitment to the CTUIR under the Columbia River Fish Accord Extension agreement and respond to the tribe's request to fund the project.

USFS Purpose

The purpose for the proposed action is reduce or eliminated the difference or "gap" between the existing condition within the project area and its desired future condition based on Forest Plan management direction, Confederated Tribes of the Umatilla Indian Reservation River Vision, and other regional salmon recovery efforts.

BPA Purpose

In meeting the need for action, BPA seeks to achieve the following purposes:

- Help fulfill Bonneville's obligation to mitigate for effects of the development and operation of the Federal hydroelectric dams in the Columbia River basin on fish and wildlife in the mainstem Columbia River and its tributaries, under the Northwest Power Act (16 U.S.C. § 839b(h)(10)(A)),

in a manner consistent with the purposes of the Act and the Northwest Power and Conservation Council's Fish and Wildlife Program.

- Help BPA meet its obligations under the Endangered Species Act by fulfilling commitments begun under the 2008 NOAA Fisheries Federal Columbia River Power System Biological Opinion (as supplemented in 2010 and 2014) (2008 BiOp) and ongoing commitments under the 2019 NOAA Fisheries Columbia River System BiOp (2019 CRS BiOp). The 2008 BiOp called for identifying tributary habitat restoration projects and the 2019 CRS BiOp largely continues the tributary habitat restoration program.
- Fulfill Bonneville's commitment to the CTUIR under the Columbia River Fish Accord Extension agreement.
- Implement BPA's Fish and Wildlife Implementation Plan Environmental Impact Statement and Record of Decision policy direction which calls for protecting weak stocks, such as ESA-listed salmon and steelhead, while sustaining overall populations of fish for their economic and cultural value (BPA 2003).
- Minimize harm to natural and human resources, including species listed under the ESA.

Public Involvement and Tribal Consultation

The USFS and BPA consulted and involved the following individuals, Federal, State, tribal, and local agencies during the development of this EA:

The Longley Meadows Fish Habitat Enhancement project was published in the Wallowa-Whitman Schedule of Proposed Actions (SOPA), a quarterly publication, in October 2018 and has appeared in each quarterly SOPA since then. This mailing is distributed to a mailing list of individuals, organizations, and agencies and is published on the Forest's web page at https://www.fs.usda.gov/project/?project=54798 .

The project was included in the government to government consultation in the Wallowa-Whitman National Forest 2019 program of work presentation to the CTUIR Board of Trustees in July, 2019. Scoping and consultation for the project is ongoing with the CTUIR.

Scoping and consultation with Oregon Department of Fish and Wildlife (ODF&W) was initiated in 2018 and has been ongoing throughout this project.

The USFS and BPA sent a letter inviting comments from interested forest users and concerned publics which directed them to a detailed description of the proposed action on Forest Service and BPA websites. This letter was mailed on December 14, 2018 to approximately 100 individuals, groups, agencies, and organizations soliciting comments and concerns related to this project. Four individuals/ organizations/ agencies expressed interest in the Longley project. One commenter suggested giving the funds needed to implement the Longley Meadows project directly to tribal members to do the project if that is their priority. Oregon Department of Transportation pointed out that if access is needed beyond what is currently permitted from Hwy 244 then additional permits would need to be acquired. One commenter requested that studies/monitoring from the Bird Track Springs project be applied to the effects analysis of the Longley Meadows project. A final commenter advocated for measures to avoid/minimize negative impacts, use of best management practices, application of lessons learned from the Bird Track Springs project, and use of native species.

The Bureau of Reclamation initiated consultation in compliance with the National Historic Preservation Act (NHPA) Section 106 consultation with the Oregon State Historic Preservation

Office (SHPO) and CTUIR in November 2017. BPA will complete consultation with SHPO and CTUIR regarding potential project impacts prior to signing the Decision Notice/FONSI.

Consultation with National Marine Fisheries Service (NMFS) and US Fish and Wildlife Service (USF&WS) for threatened and endangered species will be completed for this project through the latest version of the BPA Habitat Improvement Program (HIP) programmatic agreement.

An analysis file for this project is available for public review at the La Grande Ranger District. The analysis file includes specialists' reports, data specific to the project, public notifications and their responses, meeting notes, and miscellaneous documentation.

Key Issues

As a result of the public involvement described above, an interdisciplinary team of resource specialists identified the following key issues associated with the proposed action. *Specific issues brought up by the public can be found in italics in the key issues and other issues sections below*. The issues and concerns are the basis for subsequent steps of the analysis in formulating alternatives or developing constraints and mitigation measures.

Key issues were identified and subsequently used to develop a range of alternatives. The following section describes the key issues identified for this analysis and the key indicators used to evaluate each key issue.

Issue: Water Quality

Water quality within the project area is poor due to low flows, sediment, and high water temperatures during the summer months. The measures used below are not direct water quality indicators; however, they indicate measurable changes which lead to water quality benefits. Due to the large amount of ground disturbance and activities within and immediately adjacent to the river and its riparian habitat, there is a potential to create short-term impacts to water quality and aquatic ecosystem health during project implementation. *Public feedback recommended taking measures to avoid/minimize potential negative impacts during project implementation by using best management practices and incorporating lessons learned from the Bird Track Springs Fish Habitat Enhancement Project.*

Key Indicators:

- Changes in Habitat and Channel Morphology:
  - Main Channel Length – measured in feet
  - Side Channel Length – measured in feet
  - Sinuosity – measured in channel length divided by valley length and percent slope
- Changes in Area Flooded by 5-Year Interval Event – measured in acres flooded
- Changes in Water Quality – (turbidity and water temperature)
- Changes in Area of Wetlands – acres of wetlands affected

Issue: Fish Habitat

There is a potential to impact resident and threatened and endangered fish species within the project area during some project activities while creating high quality fish habitat.

Two commenters indicated that monitoring and lessons learned from the Bird Track Springs Fish Enhancement project should be incorporated into project design and used to support effects analyses in the Longley Meadows project.

Key Indicators:

Key Indicators used to quantitatively display the differences in effects between alternatives on fish and aquatic resources are:

- Large Woody Debris:
  - Total Wood – Pieces/mile
  - Key Pieces – Pieces/mile
- Pool Frequency – Number of pools/mile
- Width to Depth Ratio – Rosgen C4 Channel Range

Issue: Cultural Resources

There are several known historic and prehistoric sites located within the project area which have the potential to be impacted by project activities. There is also a potential to discover new sites during the ground disturbance phases of this project. Appropriate protection measures or mitigation measures would need to be taken for each known and newly discovered site.

Key indicators:

- Known cultural resources are protected by avoidance – Yes/No
- Known cultural resources are mitigated during project activities – Yes/No

Issue: Protection of Adjacent State and Private Lands/Infrastructure

Improvements on adjacent private lands need to be protected so that activities proposed in this project would not negatively affect them or the adjacent landowners' ability to carry out activities and management of their property. Project design and practices need to promote protection of adjacent private lands, structures, downstream infrastructure, and Highway 244. *One commenter pointed out that should access to the project area from Highway 244 be needed beyond that currently permitted, additional permits and approval would be required prior to implementation from Oregon Department of Transportation.*

Key Indicators:

- Current levels of potential flood inundation on adjacent State and private lands – Maintained/Decreased/Increased
- Potential impacts from large wood movement to adjacent State and private lands/infrastructure – Maintained/Decreased/Increased

Other Issues

The following issues were raised during public scoping for this project; however, they were either resolved during project design or outside of the scope of actions proposed in this project.

Resolved in project design/analysis:

> *There is a need for monitoring to validate the effectiveness of the activities proposed in this project.* An extensive monitoring plan has been developed for this project; refer to the monitoring section under the Alternatives section below.
>
> *One commenter asked if there are any connections between the impacts of the Federal hydroelectric dams on fish and wildlife and this proposal.* The proposed action would constitute an enhancement project for Bonneville. Under the Northwest Power Act, "enhancement" is "a

means of achieving offsite protection and mitigation with respect for compensation for losses arising from development and operation of the hydroelectric facilities of the Columbia River and its tributaries as a system." 16 U.S.C. § 839b(h)(8)(A). The effects of this project on fish and wildlife of this proposal are displayed in detail in the Environmental Impacts of the Alternatives section of this EA.

Outside of the scope:

Road building appears to be the problem in this area. The money BPA would spend on this project should be given directly to tribal members and if the tribal members want to spend their money on road design then they can proceed. With the exception of a short segment of FS Roads 5155037 and 5155039 which are located well outside of the GRR riparian area, the only other road within the project area is Oregon State Highway 244 which is a double-lane paved highway. While it has had some influence on hydrologic conditions in the project area it is not the primary cause for current instream conditions and is not proposed for any realignment as a part of this project. As discussed in the existing condition section, current conditions within this reach of the GRR were primarily caused by historical splash dam logging, the Mount Emily Railroad grade which was constructed within the riparian area and used to facilitate logging operations in the Upper Grande Ronde, gravel mining, eradication of historical beaver populations, and ice flow damage. This project is designed to mitigate those past impacts; therefore, this recommendation is outside the scope of this analysis.

Chapter 2 - Proposed Action and Alternatives

The following is a brief description of the proposed action alternative which meets the need for action. NEPA requires that the agency study, develop, and describe appropriate alternatives to recommend courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources. Because no unresolved conflicts exist with the proposed action based on scoping results, the EA will only analyze the no action and proposed action alternatives and proceed without consideration of additional topics (36 CFR 220.7(b)(2)(i)).

Alternative 1 – No Action

This alternative constitutes the "No Action" required by NEPA. BPA would not provide funding to the CTUIR and instream enhancement activities identified in this analysis would not occur. This alternative forms the baseline for comparison with the action alternative.

Alternative 2 - Proposed Action

To address limited habitat conditions for native fish within the project area, the proposed action would re-establish natural river-floodplain connections and processes. Natural processes within this reach of the GRR include multiple channel networks created through forcing mechanisms of large wood, ice, beaver, and rock.

To meet the purpose and need described above, the following types of activities are proposed within the Longley Meadows project area (refer to map in Appendix A):

- Improve channel geometry to reduce width-to-depth ratios through large wood placement, channel fill, and bar construction.
- Place large wood structures throughout the mainstem channel to provide habitat and channel control.

- Place floodplain wood and plant native shrubs to reduce overland velocities and trap ice.
- Increase channel/floodplain interactions by removing topographic features that inhibit overland flows.
- Increase connectivity of relic channel swales and enhance fish cover.
- Re-meander channel in appropriate locations to reconnect floodplains and existing swale networks while improving channel form and function.
- Improve alcove connectivity to mainstem and enhance fish cover.
- Enhance and protect existing functional juvenile fish rearing habitats.
- Improve connectivity of spring-fed side channels, wetlands, and alcoves to provide additional summer and winter rearing habitats.
- Plant native vegetation to improve riparian and floodplain conditions and to shade the stream.
- Reduce risk of erosion to highway embankments through strategic placement of log structure treatments and graded features.
- Enhance existing ponds and provide for additional beaver habitat.
- Enhance/create protective berms on private lands around the La Grande Rifle Club.
- Institute an area closure on NFS lands during construction activities to provide for public safety.

Channel reconstruction would include both instream work (wood placement and fill) and extensive channel construction activities (refer to Appendix A for detailed activities and locations). New channel construction would be focused on relocating portions of the river channel to allow it to re-engage with several historical channel swales and desired pond features (see maps in Appendix A). Large wood features (examples pictured below) would be added throughout the project. Additionally, selective removal of floodplain fill is proposed. Additional side channels and alcove features would be enhanced at historical channel meander scars and depressions throughout the floodplain area that may require additional excavation to meet grade.

Large wood features would be constructed with locally sourced logs from either the Jordan Creek Ranch sites covered under the Bird Track Springs analysis or purchased as a market commodity from private lands. Wood structures are a combination of root wads, cut log boles, and slash material. Large wood structures would be embedded in the bed and banks of the channel and floodplain to provide stability and to resist hydraulic and ice forces. Logs would be trucked to the project site and stored in pre-established staging areas and then transported to their project locations by off-road dump truck or helicopter depending on site conditions and environmental concerns. Excavators would be used for large wood construction.

Figure 3. Examples of what large wood structures may look like once installed along this reach of the GRR.

Channel features would be re-graded or constructed to alter the existing width and depth to achieve project goals. Constructed channel features would include pools, riffles, and bars made from gravels and cobble sources from local project excavation. Channel features would be constructed to mimic natural river channel development. Floodplain features to include side channels and alcoves would be re-shaped and wood strategically placed to improve connectivity with the mainstem of the river and to enhance fish cover.

With the exception of logs, rocks, native seeds, and potted native plants, all materials utilized for the project would be from within the project site and re-purposed in construction of new channel features and floodplain elements. Existing boulder-rock weirs would be removed and boulders re-purposed as habitat features or structural ballast. Abandoned reaches of the existing channel would be filled utilizing excavated material from constructed channel segments. Existing riparian vegetation, topsoil, shrubs, and trees that require removal would be salvaged and re-used in the floodplain. At this time, it is not expected that any native materials would be removed from the project site. Non-native materials (trash, noxious weeds, etc.) would be removed if found during construction.

All areas disturbed by equipment would be re-vegetated with appropriate native potted plants, salvaged vegetation, and seeded with a native grass/forb seed mix after project completion. Mulch would be used in those areas where woody debris is not available for rehabilitation.

Short-term goals of the proposed action include protecting existing critical rearing and holding habitats within the reach and providing additional and immediate rearing and holding habitats for salmonids. Long-term goals are to re-establish natural processes to move the existing channel from a stagnant condition to a dynamic channel that interacts with its floodplain. Floodplain connectivity provides habitat for multiple species, flood control, and ice storage benefits. Long-term project goals also include providing cooler water within the reach through attenuation of daily heating with a mature and densely vegetated riparian floodplain, increased hyporheic connectivity, and heterogeneous habitat features.

Log Sources

The following approximate numbers of logs and woody material would be required for instream structure construction:

- 43 – 22+ inch trees with root wads
- 7 – 22+ inch whole trees
- 12 – 16-20+ inch full tree
- 335 - 16-20+ inch trees with root wads
- 346 – 16-20+ inch trees without root wads
- 215 – 10-16 inch trees with root wads
- 1,452 – 10-16 inch trees without root wads
- 3,220 – 6-12 inch racking logs
- 22 – tree tops
- 4,197 cubic yards of small trees and branches for racking materials.

Each structure site would vary between one to 40 pieces of large wood material (LWM) with additional wood racking and slash material. Large wood would be approximately 12 to 18 inches or more in diameter and 20 to 40 feet long.

The woody material taken from the 1,059 acre Jordan Creek Ranch site (reviewed and approved under the Bird Track Springs Fish Enhancement Project Environmental Assessment Decision Notice, 2017 – refer to map in Appendix A) would be pushed over by an excavator or felled with

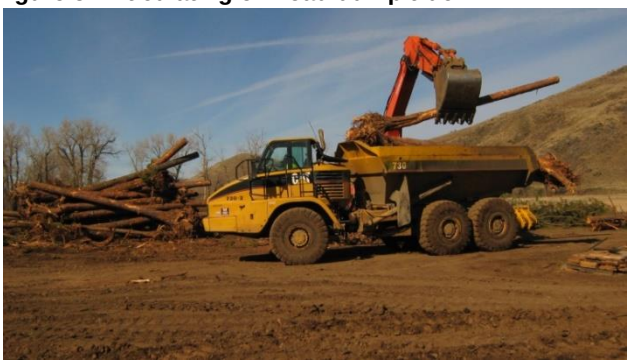
a chainsaw. All of the wood would be imported into the project with the use of an excavator and chokers, where needed. Each wood structure would have key structural members buried into the river bed and/or banks or ballasted with alluvial material/boulders to provide structural stability to withstand hydraulic forces in accordance with a risk-based design. Additional pool excavation would occur at most in-channel structure sites as depicted in detailed grading plans. These woody materials would be transported to the project area by truck or helicopter.

Large wood materials would be purchased as needed under a competitive market commodities contract from non-public lands. These trees would be trucked to the project area and unloaded in staging areas identified in Appendix A. Target trees purchased under contract and those removed from the Jordan Creek Ranch area would be harvested within 1 to 3 months of project construction in order to install the large wood structures before the wood becomes dry and brittle. This would also ensure that the tree needles and leaves become integrated into the habitat structures.

From the staging areas within the project area the trees are moved to individual large wood sites using off-road dump trucks and placed within the stream or habitat structure using a track-mounted excavator. Disturbed wood harvest sites, access roads, and staging areas are rehabilitated by planting a native grass seed mix.

Figure 4. 300 series Track-mounted excavator

Figure 5. Articulating off-road dump truck



Rock Source Areas

Project materials such as rocks and boulders would be secured through a combination of on-site materials and competitive bid processes. Materials purchased from off-site providers would be transported to on-site staging areas by truck (refer to map in Appendix A).

Implementation –

Implementation would be phased over two years. Phased implementation would be governed by available funding and permitting requirements including established in-water work periods. Depending upon receipt of all permits, initial construction could begin as early as spring of 2020 with subsequent work likely occurring for approximately two years thereafter depending upon project design outcomes, stakeholder support, and project funding. Early phases would include establishing staging and storage areas, and harvest/purchase of large wood materials and boulders. Instream work and side channel work would start at the upstream portion of the project area and work in sections downstream. Once restoration work is completed, rehabilitation and planting of disturbed areas would be completed.

Project construction scheduling and phasing would be planned and designed to occur in an orderly and structured manner consistent with environmental permit requirements, construction specifications, and

construction contract requirements. Construction scheduling and sequencing would be developed and implemented to complete major project components in logical segments within a given construction season. A construction season may encompass late spring, summer, fall, and winter pending seasonal weather patterns and onsite conditions.

Implementation of the activities in this project would require approximately 1.65 miles of temporary access roads within the project area (Table 1) in order to facilitate equipment and material access to the river segments under construction. Temporary access roads would be native surface and may have isolated areas of spot rocking if needed. Three river crossings with a temporary bridge would be installed where needed for equipment access.

Table 1. Temporary Access Roads.

Temp Access Rd Number	Miles
T1	0.01
T2	0.12
T3	0.05
T4	0.04
T5	0.09
T6	0.05
T7	0.03
T8	0.19
T9	0.04
T10	0.02
T11	0.01
T12	0.24
T13	0.19
T14	0.28
T15	0.28
T16	0.01
T19	<0.01
Total	**1.65**

Approximately 10 staging areas ranging from <1 to 4.6 acres in size would be cleared and used to store materials on site for use during construction (refer to Appendix A – All Activities Map for locations). The majority of these areas are less than one half acre in size and would primarily be used to stage large wood material before it is incorporated into instream structures (Table 2).

Table 2. Staging Areas

Storage Area Number	Type	Acres
SA1	Staging Area	1.68
SA2	Staging Area	4.59
SA3	Staging Area	0.97
SA4	Staging Area	1.44
SA5	Staging Area	0.37
SA6	Staging Area	0.39
SA7	Staging Area	0.06

Storage Area Number	Type	Acres
SA8	Staging Area	0.06
SA9	Staging Area	0.16
SA10	Staging Area	1.06
Total		**10.78**

Bypass channels may be constructed by a track mounted excavator to create areas where river water can be diverted while instream work is being completed in the main stem of the river. Fish salvage and rescue standards will be strictly followed to prevent or limit incidental take. Approximately 10 temporary coffer dams made of bulk bags filled with native materials (clean sands, gravels, and cobbles) would be installed to keep the water within the bypass channels.

All temporary roads, constructed bypass channels, and areas disturbed by equipment (except some rock sources) would be decommissioned and re-vegetated with appropriate native potted plants, salvaged vegetation, and seeded with a native grass/forb seed mix after project completion. Mulch would be used in those areas where woody debris is not available for rehabilitation. All disturbed areas would be rehabilitated in a manner that results in similar or improved conditions relative to pre-project conditions.

As a part of the design of this project approximately 48,669 cubic yards of cut (excavated) material generated during instream enhancement work would be created. Nearly all of this material would be used as fill to abandon or alter the existing river channel and for creating riffle and point bar materials. Disposal of the remaining cubic yards of excess material would be used to extend the berm at the La Grande Gun Club within the project area. This would provide additional protection behind the shooting range. Top-soil would initially be scraped in these areas and then placed on top of fill. Fill locations would be planted and seeded with appropriate native plants and grasses to re-establish. Approximately 0.58 acres of permanent fill areas (Table 3) have been identified to accommodate this excess material (refer to Appendix A – All Activities Map for locations).

Table 3. Excess Permanent Fill Areas

Fill Area Number	Acres
1	0.58
Total	0.58

Public Safety

An area closure within the project area boundary (as depicted in the project area map in Appendix A) would be promulgated to restrict public access during project activities in order to provide for public safety. This area closure would be lifted at the conclusion of all project activities.

Management Requirements, Constraints, Design Criteria, and Mitigation Measures

The following measures identified in the BPA HIP Handbook and Resource Specialists reports are included as part of the proposed action to minimize short term adverse effects and keep project impacts at acceptable levels.

General Aquatic Mitigation Measures

The following general conservation measures would apply to the action alternative:

1) **Climate change.** Best available science regarding the future effects within the project area of climate change, such as changes in stream flows and water temperatures, will be considered during project design.

2) **State and Federal Permits.** All applicable regulatory permits and official project authorizations will be obtained before project implementation. These permits and authorizations include, but are not limited to, National Historic Preservation Act, and the appropriate state agency removal and fill permit, access permits and approval from Oregon Department of Transportation, US Army Corps of Engineers Clean Water Act (CWA) Section 404 permits, and CWA Section 401 water quality certifications.

3) **Timing of in-water work.** Oregon Department of Fish and Wildlife (ODFW), guidelines for timing of in-water work windows (IWW) will be followed.

    a. Instream work would be completed during the designed instream work window, July 1 through October 15, which is the in-water work period for federally listed fish species in this reach. Instream work is defined as all work that is completed within the ordinary high water or bankfull channel.
    b. Exceptions to ODFW, National Marine Fisheries Service (NMFS), and USFWS in-water work windows will be requested through the Variance process.

4) **Site layout and flagging.** Prior to construction, the action area will be clearly flagged to identify the following:

    a. Sensitive resource areas, such as areas below ordinary high water, spawning areas, springs, existing native vegetation to be saved, and wetlands;
    b. Equipment entry and exit points;
    c. Road and stream crossing alignments;
    d. Staging, storage, and stockpile areas; and
    e. No-spray areas and buffers.

5) **Temporary access roads and paths**.

    a. Existing access roads and paths will be preferentially used whenever reasonable, and the number and length of temporary access roads and paths through riparian areas and floodplains will be minimized to lessen soil disturbance and compaction, and impacts to vegetation.
    b. Temporary access roads and paths will not be built on slopes where grade, soil, or other features suggest a likelihood of excessive erosion or failure. If slopes are steeper than 30%, then the road will be designed by a civil engineer with experience in steep road design.
    c. The removal of riparian vegetation during construction of temporary access roads will be minimized. When temporary vegetation removal is required, vegetation will be cut at ground level (not grubbed).
    d. At project completion, all temporary access roads and paths will be obliterated, and the soil will be stabilized and revegetated. Road and path obliteration refers to the most comprehensive degree of decommissioning and involves decompacting the surface and ditch, pulling the fill material onto the running surface, and reshaping to match the original contour.

e. Temporary roads and paths in wet areas or areas prone to flooding will be obliterated by the end of the in-water work window.
f. Temporary roads would be carefully located in places that would require minimal grubbing and clearing (approximately 12 feet wide) of existing trees and vegetation. These roads would be restored to the pre-activity conditions. Any rutting or berms shall be repaired with deep ripping and drainage structures installed to control surface runoff as needed. All exposed soils would be seeded/planted.
g. All reopened roads and major equipment trails accessed from system roads shall have a permanent closure berm placed at road intersection to prevent unauthorized motorized use. If closures are breached by motor vehicles the area would be promulgated with a legal closure order.

6) **Temporary stream crossings**.

a. Existing stream crossings will be preferentially used whenever reasonable, and the number of temporary stream crossings will be minimized.
b. Temporary bridges and culverts will be installed to allow for equipment and vehicle crossing over perennial streams during construction.
c. Equipment and vehicles will cross the stream in the wet only where:
    i. The streambed is bedrock; or
    ii. Mats or off-site logs are placed in the stream and used as a crossing.
d. Vehicles and machinery will cross streams at right angles to the main channel wherever possible.
e. The location of the temporary crossing will avoid areas that may increase the risk of channel re-routing or avulsion.
f. Potential spawning habitat (i.e., pool tailouts) and pools will be avoided to the maximum extent possible.
g. No stream crossings will occur at active spawning sites, when holding adult listed fish are present, or when eggs or alevins are in the gravel. The appropriate state fish and wildlife agency will be contacted for specific timing information.
h. After project completion, temporary stream crossings will be obliterated and the stream channel and banks restored.

7) **Staging, storage, and stockpile areas.**

a. Staging areas (used for construction equipment storage, vehicle storage, fueling, servicing, and hazardous material storage) will be 150 feet or more from any natural water body or wetland, or on an adjacent, established road area in a location and manner that will preclude erosion into or contamination of the stream or floodplain.
b. Natural materials used for implementation of aquatic restoration, such as large wood, gravel, and boulders, may be staged within the 100-year floodplain.
c. Any large wood, topsoil, and native channel material displaced by construction will be stockpiled for use during site restoration at a specifically identified and flagged area.
d. Any material not used in restoration, and not native to the floodplain, will be removed to a location outside of the 100-year floodplain for disposal.

8) **Equipment.** Mechanized equipment and vehicles will be selected, operated, and maintained in a manner that minimizes adverse effects on the environment (e.g., minimally-sized, low pressure tires; minimal hard-turn paths for tracked vehicles; temporary mats or plates within wet areas or on sensitive soils). All vehicles and other mechanized equipment will be:

a. Stored, fueled, and maintained in a vehicle staging area placed 150 feet or more from any natural water body or wetland or on an adjacent, established road area;
b. Refueled in a vehicle staging area placed 150 feet or more from a natural waterbody or wetland, or in an isolated hard zone, such as a paved parking lot or adjacent, established road (this measure applies only to gas-powered equipment with tanks larger than 5 gallons);
c. Biodegradable lubricants and fluids shall be used on equipment operating in and adjacent to the stream channel and live water.
d. Inspected daily for fluid leaks before leaving the vehicle staging area for operation within 150 feet of any natural water body or wetland; and
e. Thoroughly cleaned before operation below ordinary high water, and as often as necessary during operation, to remain grease free.

9) **Erosion control.** Erosion control measures will be prepared and carried out, commensurate in scope with the action, that may include the following:

a. Temporary erosion controls.

i. Temporary erosion controls will be in place before any significant alteration of the action site and appropriately installed downslope of project activity within the riparian buffer area until site rehabilitation is complete.
ii. If there is a potential for eroded sediment to enter the stream, sediment barriers will be installed and maintained for the duration of project implementation.
iii. Temporary erosion control measures may include fiber wattles, silt fences, jute matting, wood fiber mulch and soil binder, or geotextiles and geosynthetic fabric.
iv. Soil stabilization utilizing wood fiber mulch and tackifier (hydro-applied) may be used to reduce erosion of bare soil if the materials are noxious weed free and nontoxic to aquatic and terrestrial animals, soil microorganisms, and vegetation.
v. Sediment will be removed from erosion controls once it has reached 1/3 of the exposed height of the control.
vi. Once the site is stabilized after construction, temporary erosion control measures will be removed.

b. Emergency erosion controls. The following materials for emergency erosion control will be available at the work site:

i. A supply of sediment control materials; and
ii. An oil-absorbing floating boom whenever surface water is present.

10) **Dust abatement.** The project sponsor will determine the appropriate dust control measures by considering soil type, equipment usage, prevailing wind direction, and the effects caused by other erosion and sediment control measures. In addition, the following criteria will be followed:

a. Work will be sequenced and scheduled to reduce exposed bare soil subject to wind erosion.
b. Dust-abatement additives and stabilization chemicals (typically magnesium chloride, calcium chloride salts, or lignin sulfonate) will not be applied within 25 feet of water or a stream channel and will be applied so as to minimize the likelihood that they will enter streams. Applications of lignin sulfonate will be limited to a maximum rate of 0.5 gallons per square yard of road surface, assuming a 50:50 (lignin sulfonate to water) solution.
c. Application of dust abatement chemicals will be avoided during or just before wet weather, and at stream crossings or other areas that could result in unfiltered delivery of the dust abatement materials to a waterbody (typically these would be areas within 25 feet of a

waterbody or stream channel; distances may be greater where vegetation is sparse or slopes are steep).

d. Spill containment equipment will be available during application of dust abatement chemicals.
e. Petroleum-based products will not be used for dust abatement.

11) **Spill prevention, control, and counter measures.** The use of mechanized machinery increases the risk for accidental spills of fuel, lubricants, hydraulic fluid, or other contaminants into the riparian zone or directly into the water. These contaminants can degrade habitat, and injure or kill aquatic food organisms and ESA-listed species. The project sponsor will adhere to the following measures:

a. A description of hazardous materials that will be used, including inventory, storage, and handling procedures will be available on-site.

b. Written procedures for notifying environmental response agencies will be posted at the work site.

c. Spill containment kits (including instructions for cleanup and disposal) adequate for the types and quantity of hazardous materials used at the site will be available at the work site.

d. Workers will be trained in spill containment procedures and will be informed of the location of spill containment kits.

e. Any waste liquids generated at the staging areas will be temporarily stored under an impervious cover, such as a tarpaulin, until they can be properly transported to and disposed of at a facility that is approved for receipt of hazardous materials.

12) **Riparian Vegetation Planting**.

Vegetation management strategies will be utilized that are consistent with local native succession and disturbance regimes and specify seed/plant source, seed/plant mixes, and soil preparation. Planting will address the abiotic factors contributing to the sites' succession, i.e., weather and disturbance patterns, nutrient cycling, and hydrologic condition. Only certified noxious weed- free seed (99.9%), hay, straw, mulch, or other vegetation material for site stability and revegetation projects will be utilized.

a. An experienced silviculturist, botanist, ecologist, or associated technician shall be involved in designing vegetation treatments.
b. Species to be planted must be of the same species that naturally occurs in the project area.
c. Tree and shrub species as well as sedge and rush mats to be used as transplant material shall come from outside the bankfull width, typically in abandoned flood plains, and where such plants are abundant.
d. Sedge and rush mats should be sized as to prevent their movement during high flow events.
e. Generally, planting containerized plants will be concentrated above the bankfull elevation. Streambank bio-engineering, trenching live willows, and installation of sedge plugs and mats will be installed both within and above bankfull elevations.
f. Species distribution shall mimic natural distribution in the riparian and floodplain areas.

Soils

1. Detrimental Soil Conditions:

a. In areas where more than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and restoration must, at a minimum, not exceed the conditions prior to the planned activity and should move towards a net improvement in soil quality.

    i. Rehabilitate landings and used or old skid trails as needed to bring post-activity DSCs to acceptable levels in each activity area.

    ii. If subsoiling or ripping is not feasible (i.e., shallow, clayey, rocky and/or topographic constraints):

        1. Allow no increase in detrimental soil conditions,
        2. Operate ground-based equipment on existing disturbed areas or under winter harvest conditions
        3. Consider alternate harvesting methods such as hand felling or harvest/forwarder system,
        4. If none of the above actions are feasible, then the particular treatment area should be excluded from mechanical activities. If there are any questions contact your unit soils specialist.

b. In areas where less than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effect of the current activity following project implementation and restoration must not exceed 20 percent.

2. Limit equipment operations to dry, frozen, or snow-covered conditions. If possible, operate on a bed of slash >12 inches deep to mitigate soil compaction and displacement.

    a. During the winter season ground conditions shall meet at least one of the following criteria for machine operations:

        i. Six inches of frozen ground,
        ii. Four inches of frozen ground with one foot of settled snow,
        iii. Two feet (>24 inches) or more of settled snow,
        iv. One foot (>12 inches) slash mat in combination with one foot of settled snow, or
        v. Soil moisture conditions acceptable for minimizing rutting or puddling of soils

    b. Some “watch-out” situations include:

        i. Machine break-through begins to occur
        ii. Equipment tracks sink deeply (half the width of the track) below the soil surface with one or two passes
        iii. Ruts greater than six inches deep form
        iv. Mid-day temperatures are forecast to rise above freezing
        v. Surface melt occurs over still-frozen subsurface.

3. Coarse Woody Debris (CWD)

    a. Retain adequate supplies of CWD (greater than three inches in diameter) to provide organic matter reservoirs for nutrient cycling and microbiotic (fungi and bacteria) habitat following completion of all project activities. It is recommended that approximately 5 to 10 tons per acre of CWD be retained on dry ponderosa pine sites. In order to retain adequate organic matter reservoirs for nutrient cycling and maintenance of long-term site

productivity, minimize disturbance and piling of decaying large woody debris during fuel treatments.

b. Strive to maintain fine organic matter (commonly referred to as the duff layer) over at least 65 percent of an activity area following both harvest and post-harvest operations. Adjust minimum amounts to reflect vegetative capabilities if the potential natural plant community on site is not capable of producing fine organic matter over 65 percent of the area (Regional Soil Quality Guidelines / FSH 2090.11).

4. Effective Ground Cover (EGC)

a. After completion of land management activities, the minimum effective ground cover (EGC) within each activity area shall be in place to prevent erosion from exceeding background erosion rates for each of the four established erosion hazard classes: low, medium, high or very high (table below). Effective ground cover is defined as the basal area of perennial vegetation, plus litter and coarse fragments (greater than 2mm sizes), including tree crowns and shrubs that are in direct contact with the ground.

Erosion Hazard Class	Minimum Effective Ground Cover	
	1st Year	2nd Year
Low (Very Slight – Slight)	20-30%	30-40%
Medium (Moderate)	30-45%	40-60%
High (Severe)	45-60%	60-75%
Very High (Very Severe)	60-90%	75-90%

b. Effective ground cover for all subsoiling treatments should take advantage of harvest slash. If no suitable organic material is available, then weed free straw or other equivalent erosion control measures should be applied on slopes exceeding 15%, adjacent to waterways and ditches (within 100 feet), and prior to September 30th or seasons ending precipitation event, whichever comes first. See BMP AqEco-2 for additional information

5. Post Project

a. In areas of general disturbance in ash soils, the top layer (A Horizon) should be pulled back over any disturbed surface. (Pull berms back over disturbed surfaces)

b. In areas where subsoiling is prescribed, subsoil to a depth sufficient to ameliorate the presence of detrimental soil compaction (usually between 2 and 12 inches). Discontinue subsoiling where large rocks are continually brought to the soil surface. If a change in soil color is noticed by the operator, operate at a shallower depth that prevents topsoil and subsoil from mixing. Skid trails on slopes steeper than 30 percent should not be subsoiled.

Livestock Grazing

Fences: All improvements should be protected during restoration activities. If it is necessary to cut range fences, the contractor must be required to immediately repair them to Forest Service standards. These standards are available and should be made a part of the restoration contract. Fence line right of ways must be kept cleared for eight feet on each side of the fence following harvest or piling.

Roads/Access/Safety

Appropriate temporary area and road closures, flagging, signage, and public notice will be provided during project implementation to ensure public safety.

Invasive Species

Project personnel will inform invasive species personnel pre-seasonally of upcoming project activities (i.e. ground disturbing activities), so reprioritization of treatment (if deemed necessary) and inventory can begin prior to the start of project activities.

Prior to project implementation, known weed sites and any additional weed sites discovered at the time of implementation would be flagged and pulled/treated by knowledgeable personnel approved by the District's Noxious Weed program. Prior to entering the site, all vehicles and equipment will be power washed, allowed to fully dry, and inspected to make sure no plants, soil, or other organic material adheres to the surface. The project lead may choose to have equipment operators avoid the flagged noxious weed areas.

The following specific measures are recommended to be implemented along with any action undertaken in the Longley Meadows Project in order to mitigate the effects of project activities.

1. Noxious weed locations are on maps located in the Longley Meadows analysis file. A copy of these will be included in the contract preparation package, for use by the contract administrator. These sites will be reviewed with the contractor and mitigations explained. No road construction or maintenance should occur at these sites, until the previous year's dead plants/stalks have been removed.
2. Treatment of the noxious weed sites located along haul route roads should be a high priority, along with monitoring.
3. Rock pit, boulder, and large wood source areas should be surveyed, inspected, and cleared prior to use of any materials.
4. Known infestations should be designated as Areas to Protect.
5. If new noxious weed infestations are located within the project area, a noxious weed inventory and site assessment (as defined in the WWNF Integrated Noxious Weed Management Plan) will be completed. Location of other species, conditions or future treatments may require additional analysis to determine the appropriate treatment method.
6. All mapped weed sites will be designated as "Areas to Protect" and include in the contract package for use by the contract administrator. Landings and staging areas should not be built on or near sites of noxious weed infestation.
7. Highly disturbed areas will be seeded. The seed mix to be used will consist of native species, or a non-native species mix, to be approved by the District Diverse Species Program. This may include one fast germinating annual grass species to provide immediate ground cover. Seed application rates will be adjusted, as needed to compensate for the broadcast method of application, and to generate vegetation densities adequate to help in deterrence of noxious weed invasion.
8. Seed will be certified weed free, per the Wallowa-Whitman INWMP protocol.
9. All hay or straw used for mulching, erosion control, or other rehabilitation purposes will be weed free (per the Wallowa-Whitman INWMP protocol).
10. All equipment to be operated on the project area will be cleaned in a manner sufficient to prevent noxious weeds from being carried onto the project area. This requirement does not apply to passenger vehicles or other equipment used exclusively on roads. Cleaning, if needed, will occur off of National Forest System lands. Cleaning will be inspected and approved by the Forest Officer in charge of administering the project.

11. Watercraft, waders, boots, and any other gear to be used in or near water will be inspected for aquatic invasive species. Wading boots with felt soles are not to be used due to their propensity for aiding in the transfer of invasive species.

Fish

Work Area Isolation & Fish Salvage

Any work area within the wetted channel will be isolated from the active stream whenever ESA-listed fish are reasonably certain to be present, or if the work area is less than 300-feet upstream from known spawning habitats. When work area isolation is required, design plans will include all isolation elements, fish release areas, and, when a pump is used to dewater the isolation area and fish are present, a fish screen that meets current NMFS fish screen criteria. Work area isolation and fish capture activities will occur during periods of the coolest air and water temperatures possible, normally early in the morning versus late in the day, and during conditions appropriate to minimize stress and death of species present.

Salvage operations will follow the ordering, methodologies, and conservation measures specified below in Steps 1 through 6. Steps 1 and 2 will be implemented for all projects where work area isolation is necessary according to conditions above. Electrofishing (Step 3) can be implemented to ensure all fish have been removed following Steps 1 and 2, or when other means of fish capture may not be feasible or effective. Dewatering and rewatering (Steps 4 and 5) will be implemented unless wetted in-stream work is deemed to be minimally harmful to fish, and is beneficial to other aquatic species. Dewatering will not be conducted in areas known to be occupied by lamprey, unless lampreys are salvaged using guidance set forth in U.S. Fish and Wildlife Service.

1) **Isolate**

   a) Block nets will be installed at upstream and downstream locations and maintained in a secured position to exclude fish from entering the project area.
   b) Block nets will be secured to the stream channel bed and banks until fish capture and transport activities are complete. Block nets may be left in place for the duration of the project to exclude fish.
   c) If block nets remain in place more than one day, the nets will be monitored at least daily to ensure they are secured to the banks and free of organic accumulation. Less frequent intervals must be approved through a variance request.
   d) Nets will be monitored hourly anytime there is instream disturbance.

2) **Salvage.** As described below, fish trapped within the isolated work area will be captured to minimize the risk of injury, then released at a safe site:

   a) Remove as many fish as possible prior to dewatering.
   b) During dewatering, any remaining fish will be collected by hand or dip nets.
   c) Seines with a mesh size to ensure capture of the residing ESA-listed fish will be used.
   d) Minnow traps will be left in place overnight and used in conjunction with seining.
   e) If buckets are used to transport fish:

      i. The time fish are in a transport bucket will be limited, and will be released as quickly as possible;
      ii. The number of fish within a bucket will be limited based on size, and fish will be of relatively comparable size to minimize predation;
      iii. Aerators for buckets will be used or the bucket water will be frequently changed with cold clear water at 15 minute or more frequent intervals.

iv. Buckets will be kept in shaded areas or will be covered by a canopy in exposed areas.
v. Dead fish will not be stored in transport buckets, but will be left on the stream bank to avoid mortality counting errors.

f) As rapidly as possible (especially for temperature-sensitive bull trout), fish will be released in an area that provides adequate cover and flow refuge. Upstream release is generally preferred, but fish released downstream will be sufficiently outside of the influence of construction.
g) Salvage will be supervised by a qualified fisheries biologist experienced with work area isolation and competent to ensure the safe handling of all fish.

3) **Electrofishing.** Electrofishing will be used only after other salvage methods have been employed or when other means of fish capture are determined to not be feasible or effective. If electrofishing will be used to capture fish for salvage, the salvage operation will be led by an experienced fisheries biologist and the following guidelines will be followed:

a) The NMFS's electrofishing guidelines (NMFS 2000).
b) Only direct current (DC) or pulsed direct current (PDC) will be used and conductivity must be tested.

i. If conductivity is less than 100 µs, voltage ranges from 900 to 1100 will be used.
ii. For conductivity ranges between 100 to 300 µs, voltage ranges will be 500 to 800.
iii. For conductivity greater than 300 µs, voltage will be less than 400.

c) Electrofishing will begin with a minimum pulse width and recommended voltage and then gradually increase to the point where fish are immobilized.
d) The anode will not intentionally contact fish.
e) Electrofishing shall 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 one foot of water.
f) If mortality or obvious injury (defined as dark bands on the body, spinal deformations, de-scaling of 25% or more of body, and torpidity or inability to maintain upright attitude after sufficient recovery time) occurs during electrofishing, operations will be immediately discontinued, machine settings, water temperature and conductivity checked, and procedures adjusted or electrofishing postponed to reduce mortality.

4) **Dewater.** Dewatering, when necessary, will be conducted over a sufficient period of time to allow species to naturally migrate out of the work area and will be limited to the shortest linear extent practicable.

a) Diversion around the construction site may be accomplished with a coffer dam and a by- pass culvert or pipe, or a lined, non-erodible diversion ditch. Where gravity feed is not possible, a pump may be used, but must be operated in such a way as to avoid repetitive dewatering and rewatering of the site. Impoundment behind the cofferdam must occur slowly through the transition, while constant flow is delivered to the downstream reaches.
b) All pumps will have fish screens to avoid juvenile fish impingement or entrainment, and will be operated in accordance with NMFS's current fish screen criteria. If the pumping rate exceeds 3 cubic feet second (cfs), a NMFS Hydro fish passage review will be necessary.
c) Dissipation of flow energy at the bypass outflow will be provided to prevent damage to riparian vegetation or stream channel.
d) Safe reentry of fish into the stream channel will be provided, preferably into pool habitat with cover, if the diversion allows for downstream fish passage.

e) Seepage water will be pumped to a temporary storage and treatment site or into upland areas to allow water to percolate through soil or to filter through vegetation prior to reentering the stream channel.

5) **Re-watering.** Upon project completion, the construction site will be slowly re-watered to prevent loss of surface flow downstream and to prevent a sudden increase in stream turbidity. During re-watering, the site will be monitored to prevent stranding of aquatic organisms below the construction site.

6) **Salvage Notice.** Monitoring and recording of fish presence, handling, and mortality must occur during the duration of the isolation, salvage, electrofishing, dewatering, and rewatering operations. Once operations are completed, a salvage report will document procedures used, any fish injuries or deaths (including numbers of fish affected), and causes of any deaths.

Construction and Post-Construction Mitigation Measures

1) **Fish passage.** Fish passage will be provided for any adult or juvenile fish likely to be present in the action area during construction, unless passage did not exist before construction or the stream is naturally impassable at the time of construction. If the provision of temporary fish passage during construction will increase negative effects on aquatic species of interest or their habitat, a variance can be requested from the NMFS Branch Chief and the USFWS Field Office Supervisor (Appendix B of the HIP BO). Pertinent information, such as the species affected, length of stream reach affected, proposed time for the passage barrier, and alternatives considered, will be included in the variance request.

2) **Construction and discharge water**.

   a. Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate.
   b. Diversions will not exceed 10% of the available flow.
   c. All construction discharge water will be collected and treated using the best available technology applicable to site conditions.
   d. Treatments to remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present will be provided.

3) **Minimize time and extent of disturbance**. Earthwork (including drilling, excavation, dredging, filling and compacting) in which mechanized equipment is in stream channels, riparian areas, and wetlands will be completed as quickly as possible. Mechanized equipment will be used in streams only when project specialists believe that such actions are the only reasonable alternative for implementation, or would result in less sediment in the stream channel or damage (short- or long term) to the overall aquatic and riparian ecosystem relative to other alternatives. To the extent feasible, mechanized equipment will work from the top of the bank, unless work from another location would result in less habitat disturbance.

4) **Cessation of work.** Project operations will cease under the following conditions:

   a. High flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage;
   b. When allowable water quality impacts, as defined by the state CWA Section 401 water quality certification or HIP Turbidity Monitoring Protocol, have been exceeded; or
   c. When “incidental take” limitations have been reached or exceeded.

5) **Site restoration.** When construction is complete:

   a. All streambanks, soils, and vegetation will be cleaned up and restored as necessary using stockpiled large wood, topsoil, and native channel material.
   b. All project related waste will be removed.
   c. All temporary access roads, crossings, and staging areas will be obliterated. When necessary for revegetation and infiltration of water, compacted areas of soil will be loosened.
   d. All disturbed areas will be rehabilitated in a manner that results in similar or improved conditions relative to pre-project conditions. This will be achieved through redistribution of stockpiled materials, seeding, and/or planting with local native seed mixes or plants. Seeding of disturbed soil will be completed with a mix of native grasses and forbs to be provided by the La Grande Ranger District. Mulching will be completed using Oregon State Certified weed free wheat straw.

6) **Revegetation**. Long term soil stabilization of disturbed sites will be accomplished with reestablishment of native vegetation using the following criteria:

   a. Planting and seeding will occur prior to or at the beginning of the first growing season after construction.
   b. An appropriate mix of species that will achieve establishment, shade, and erosion control objectives, preferably forb, grass, shrub, or tree species native to the project area or region and appropriate to the site will be used.
   c. Vegetation, such as willow, sedge and rush mats, will be salvaged from disturbed or abandoned floodplains, stream channels, or wetlands.
   d. Invasive species will not be used.
   e. 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.
   f. Surface fertilizer will not be applied within 50 feet of any stream channel, waterbody, or wetland.
   g. Fencing will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
   h. Re-establishment of vegetation in disturbed areas will achieve at least 70% of pre-project conditions within 3 years.
   i. Invasive plants will be removed or controlled until native plant species are well- established (typically 3 years post-construction).

7) **Site access**. The project sponsor will retain the right of reasonable access to the site in order to monitor the success of the project over its life.

River, Stream, Floodplain and Wetland Restoration

In the event new stream channel segments and other project features (e.g., alcoves, wetlands, ponds, etc.) are constructed but not connected to the existing stream channel network during a given construction season, measures will be incorporated into construction plans and specifications to minimize potential risk of damage and activation during spring high flows. Measures may include delaying construction of upstream segments of channel features until the following instream construction work window and/or installing temporary earthen berms to direct flow in the channel or on the floodplain around project features to minimize damage, avoid inadvertent activation, and minimize the risk of erosion and sediment mobilization from the project. Best management practices (BMPs) will be in place as required by the USACE, ODSL, and ODEQ to stabilize and isolate work areas from waters of the United States,

including installation of silt fences, mulching, and initiation of revegetation efforts to minimize delivery of sediment to jurisdictional waterways.

All activities intended for improving secondary channel habitats will provide the greatest degree of natural stream and floodplain function achievable and shall be implemented to address basin specified limiting factors. The long term development of a restored side channel will depend on natural processes like floods and mainstem migration.

1. If new side channel habitat is proposed, designs must demonstrate sufficient hydrology and that the project will be self-sustaining over time. Self-sustaining means the restored or created habitat would not require major or periodic maintenance, but function naturally within the processes of the floodplain.
2. Designs must demonstrate that the proposed action will mimic natural conditions for gradient, width, sinuosity and other hydraulic parameters.
3. Designs must demonstrate that the proposed action will not result in the creation of fish passage issues or post construction stranding of juvenile or adult fish.
4. Off- and side-channel improvements can include minor excavation (< 10%) of naturally accumulated sediment within historical channels. There is no limit as to the amount of excavation of anthropogenic fill within historical side channels as long as such channels can be clearly identified through field and/or aerial photographs.
5. Side channel habitat will be constructed to prevent fish stranding by providing a continual positive overall grade to the intersecting river or stream, or by providing a year-round water connection.
6. Excavated material removed from off- or side-channels shall be hauled to an upland site or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity. Hydric soils may be salvaged to provide appropriate substrate and/or seed source for hydrophytic plant community development. Hydric soils will only be obtained from wetland salvage sites.
7. Excavation depth will never exceed the maximum thalweg depth in the main channel.
8. Restoration of existing side channels including one-time dredging and an up to two times project adjustment including adjusting the elevation of the created side channel habitat.
9. All side channel and pool habitat work will occur in isolation from waters occupied by ESA-listed salmonid species until project completion, at which time a final opening may be made by excavation to waters occupied by ESA-listed salmonid or water will be allowed to return into the area.
10. Adequate precautions will be taken to prevent the creation of fish passage issues or stranding of juvenile or adult fish unless the benefits of providing overwintering habitat for rearing juveniles can be demonstrated.

Rewatering stream channels. For stream channels which have been isolated and dewatered during project construction:

1. Temporary bypass channels would be used when needed to minimize construction effects to aquatic resources.
2. Constructed stream channel activation would only be completed during designated in-stream work periods (July 1 to October 15) unless otherwise allowed through appropriate environmental permitting variance authorization.
3. Typical channel activations that occur during designated instream windows require pre-washing into a reach with sediment capture devices, prior to reintroduction of flow to the stream. Flushing with water to mobilize sediment, followed by pumping of that sediment-laden water to uplands to

minimize introduction of sediment into active streams that have limited or no background turbidity during summer base flow periods.
4. Stream channels will be re-watered slowly to minimize a sudden increase in turbidity.
5. Alternative stream channel activation on larger projects and rivers such as Longley Meadows, may be to connect and activate constructed stream channels during spring high water conditions to flush sediment during periods of naturally high background turbidity.

Installation of Habitat-Forming Natural Material Instream Structures (Large Wood, Boulders, and Spawning Gravel)

1. Designs must demonstrate that the large wood placements mimic natural accumulations of large wood in the channel and address basin defined limiting factors.
2. Designs must demonstrate that boulder placements will be limited to stream reaches with an intact, well-vegetated riparian area, including trees and shrubs where those species would naturally occur, or that are part of riparian area restoration action; and a stream bed that consists predominantly of coarse gravel or larger sediments.
3. Designs must demonstrate that boulder sizing is appropriate for the size of the stream, maximum depth of flow, planform, entrenchment, and ice and debris loading.
4. For systems where boulders were not historically a component of the project stream reach, it must be demonstrated how this use of this technique will address limiting factors and provide the appropriate post restoration habitats.
5. Designs must demonstrate that LWM and boulder placements will not result in a fish passage barrier.
6. Designs must demonstrate that spawning gravel augmentation is limited to areas where the natural supply has been eliminated or significantly reduced through anthropogenic means.

Large Wood (LWM)

1. LWM will be placed in channels that have an intact, well-vegetated riparian buffer area that is not mature enough to provide large wood, or in conjunction with riparian rehabilitation or management.
2. LWM may partially or completely span the channel in first order streams if the active channel top width is less than 20 feet.
3. When available and if the project is located within the appropriate morphology and sized stream, 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.
4. Stabilizing or key pieces of large wood that will be relied on to provide streambank stability or redirect flows must be intact, hard, and undecayed to partly decaying, and should have untrimmed root wads to provide functional refugia habitat for fish. Use of decayed or fragmented wood found lying on the ground or partially sunken in the ground is not acceptable for key pieces but may be incorporated to add habitat complexity.
5. The partial burial of LWM and boulders may constitute the dominant means of placement and key boulders (footings) or LWM can be buried into the stream bank or channel.
6. LWM anchoring will not utilize cable or chain. Manila, sisal or other biodegradable ropes may be used for lashing connections. If hydraulic conditions warrant use of structural connections then rebar pinning or bolting may be used. The utilization of structural connections should be used minimally and only to ensure structural longevity in high energetic systems such as (high gradient systems with lateral confinement and limited floodplain). Need for structural anchorage shall be demonstrated in the design documentation.
7. Rock may be used for ballast but is limited to what is needed to anchor the LWM.

8. Ground-based equipment should generally be limited to slopes less than 30%.
9. Remove as much soil and rock material from tree root systems as possible before trees are removed from the site. Soils in gap openings disturbed through tree removal should be re-contoured as much as possible to resemble pre-activity surface soil conditions. This should include filling of deeper holes and leveling of berms using materials onsite.
10. PACFISH/INFISH Biological Opinion Riparian buffers would be implemented, no trees would be harvested or skid trails located within these buffers.
11. Harvest would occur during the dry season to avoid adverse effects to soils such as compaction and adverse effects to run off patterns from soil compaction.
12. Applicable federal and state timber harvest standards would be followed. This includes stream buffer widths, fire restrictions, and site rehabilitation.

Boulder Placement

1. The cross-sectional area of boulder placements may not exceed 25% of the cross-sectional area of the low flow channel, or be installed to shift the stream flow to a single flow pattern in the middle or to the side of the stream.
2. Boulders will be machine-placed (no end dumping allowed) and will rely on the size of boulder for stability.
3. Boulders will be installed low in relation to channel dimensions so that they are completely overtopped during channel-forming flow events (approximately a 1.5-year flow event).
4. Permanent anchoring, including rebar or cabling, may not be used.

Spawning Gravel

1. Spawning gravel to be placed in streams must be obtained from an upland source outside of the channel and riparian area and properly sized gradation for that stream, clean, and non-angular. When possible use gravel of the same lithology as found in the watershed. After spawning gravel placement, allow the stream to naturally sort and distribute the material.
2. A maximum of 100 cubic yards of spawning sized gravel can be imported or relocated and placed upstream of each structure when in combination with other restoration activities that address the underlying systematic problem. For example a combined project consisting of: planting streambank vegetation, placing instream LW and supplementing spawning gravel.
3. Imported gravel must be free of invasive species and non-native seeds.

Channel Reconstruction

Channel reconstruction designs will mimic natural conditions for gradient, width, sinuosity and other hydraulic parameters. Structural elements shall fit within the geomorphic context of the stream system and demonstrate sufficient hydrology and that the project will be self-sustaining over time. Self-sustaining means the restored or created habitat would not require major or periodic maintenance, but function naturally within the processes of the floodplain. Channel reconstruction will not result in the creation of fish passage issues or post construction stranding of juvenile or adult fish.

Due to their complex nature, channel reconstruction projects are required to pass through a Restoration Review Team (RRT) and to produce a Basis of Design Report (BDR) documenting the design process and the project linkages to sub-basin limiting factors.

Water Quality

Streambanks Protection

1. Without changing the location of the bank toe, damaged streambanks will be restored to a natural slope, pattern, and profile suitable for establishment of permanent woody vegetation. This may include sloping of unconsolidated bank material to a stable angle of repose, or the use of benches in consolidated, cohesive soils. The purpose of bank shaping is to provide a more stable platform for the establishment of riparian vegetation, while also reducing the depth to the water table, thus promoting better plant survival.
2. Streambank restoration projects shall include the placement of a riparian buffer strip consisting of a diverse assemblage of species native to the action area or region, including trees, shrubs, and herbaceous species. Do not use invasive species.
3. Large wood will be used as an integral component of all streambank protection treatments unless restoration can be achieved with soil bioengineering techniques alone.
4. LWM will be placed to maximize near bank hydraulic complexity and interstitial habitats through use of various LWM sizes and configurations of the placements.
5. Structural placement of LWM should focus on providing bankline roughness for energy dissipation vs. flow re-direction that may affect the stability of the opposite bankline.
6. LWM will be intact, hard, and undecayed to partly decaying with untrimmed root wads to provide functional refugia habitat for fish. Use of decayed or fragmented wood found lying on the ground may be used for additional roughness and to add complexity to LWM placements but will not constitute the primary structural components.
7. Wood that is already within the stream or suspended over the stream may be repositioned to allow for greater interaction with the stream.
8. Rock will not be used for streambank restoration, except as ballast to stabilize large wood unless it is necessary to prevent scouring or downcutting of an existing flow control structure (*e.g.*, a culvert or bridge support, headwall, utility lines, or building). In this case rock may be used as the primary structural component for construction of vegetated riprap with large woody debris. Scour holes may be filled with rock to prevent damage to structure foundations but will not extend above the adjacent bed of the river. This does not include scour protection for bridge approach fills.
9. The rock may not impair natural stream flows into or out of secondary channels or riparian wetlands.
10. Fencing will be installed as necessary to prevent access and grazing damage to revegetated sites and project buffer strips.
11. Riparian buffer strips associated with streambank protection shall extend from the project bankline towards the floodplain a minimum distance of 35 feet.

A Spill Prevention Control and Containment Plan (SPCCP). The contractor would be required to have a written SPCCP, which describes measures to prevent or reduce impacts from potential spills (fuel, hydraulic fluid, etc.) The SPCCP should contain a description of the hazardous materials that would be used, including inventory, storage, handling procedures; a description of quick response containment supplies that would be available on the site (e.g. a silt fence, straw bales, and an oil-absorbing, floating boom whenever surface water is present).

The time that heavy equipment is in stream channels would be minimized as much as possible. Mechanized equipment will work from the top of the bank to the extent feasible, unless another location would result in less habitat disturbance.

Recreation/Special Uses

Project activities would be designed to protect the structures and facilities at the La Grande Gun Club during and after implementation. The special use permit for the gun club includes a short term annual

event on 95 acres of adjacent USFS lands. An alternative site will be found to accommodate this event during project implementation activities.

Wildlife

A bald eagle nest which has been historically active is located adjacent to the project area. The project area and nest site will be monitored when project activities are ready to begin to determine if the nest is active. As per the National Bald Eagle Management Guidelines, human activities within 600 feet of an active nest will be restricted February 15th - August 15th. This restriction can be waived if the nest is determined to be unoccupied. If monitoring shows the young have fledged before August 15th then buffer restrictions can be lifted.

Cultural Resource Protection

All identified sites within the Longley Meadows project area will be avoided during project design and during project activities.

If any new cultural resources are located during project implementation, work would be halted and the BOR and BPA Archaeologists notified. The cultural resource would be evaluated and a mitigation plan developed in consultation with the Oregon SHPO, Tribes, and other consulting parties if necessary.

Proposed, Endangered, Threatened, and Sensitive Species (PETS)

Biological evaluations and/or assessments have been completed for plants, fish, and wildlife PETS species. Contract provisions will be included to provide for the protection of areas where PETS occur and for those that may be discovered in the area during the contract period.

Scenery

The following scenery mitigation measures and design elements will be developed site-specifically on the ground with the District Recreation Specialist.

1. Where practical, screen staging areas from Highway 244.
2. New temporary roads and landings may be evident but should remain subordinate to the shape and pattern of the natural appearing forest canopy. In areas of Retention and Partial Retention foreground from Hwy 244.
3. In areas of Retention foreground as seen from Highway 244, skid patterns, slash, soil exposure and stumps should be visually minor or unnoticed (4" maximum height of stumps).
4. Cut stumps at a height less than 4" that are within 100' of Highway 244.
5. Where practical, slash piles shall not be located within the immediate Foreground (100') of Highway 244.

Monitoring Plan

Monitoring specific to project activities would be accomplished to assure that activities conform to objectives of the Forest Plan and Biological Opinions/Requirements. Project level monitoring is a component of Forest Plan monitoring.

Implementation Monitoring

The following types of monitoring would be accomplished:

Implementation Monitoring - Are the project designs being implemented as planned?

This monitoring is specific to project activities to assure that activities conform to the Project Design Criteria, Mitigation Measures, and the objectives of the Forest Plan. The following types of implementation monitoring would be accomplished:

Invasive Species Monitoring

Activity Monitored	Frequency and Timing	Responsible Person
Noxious weed inspections, pretreatment, equipment cleaning, weed infestation avoidance, documentation and communication.	Prior to move into project area and during active operations near noxious weed infestations.	Contract Administrator
Noxious weed treatment.	Annually for 3 years following project completion.	FS Invasive Plant Crew
Broadcast seeding of disturbed soils.	Within the recommended seeding period following the disturbance.	Contract Administrator
Rock sources, pits and/or quarry noxious weed inspections	Prior to use for temporary roads and maintenance and/or prior to removal for instream structure construction.	Zone Invasive Plant Coordinator; Zone Engineer
Large wood source noxious weed inspections	Prior to removal for staging and instream structure construction.	Zone Invasive Plant Coordinator; Zone Engineer

Fish/Water Quality Monitoring

CWA Section 401 water quality certification. The project sponsor or designated representative will complete and record water quality observations to ensure that in-water work is not degrading water quality. During construction, CWA section 401 water quality certification provisions provided by the Oregon Department of Environmental Quality will be followed.

Turbidity Monitoring Protocol. Turbidity monitoring shall be conducted in accordance with the HIP turbidity monitoring protocol outlined below and recorded in the Project Completion Form (PCF).

HIP Turbidity Monitoring Protocol.

The Project Sponsor shall complete and record the following water quality observations to ensure that any increase in suspended sediment is not exceeding the limit for HIP compliance. Records shall be reported on the HIP Project Completion Form (PCF).

If the geomorphology of the project area (silty or claylike materials) or the nature of the action (large amounts of bare earth exposed below the waterline) shall preclude the successful compliance with these triggers, notify the Environmental Compliance Lead (EC Lead, Dan Gambetta from BPA) who shall inform the USFWS and NMFS of a likely exceedance.

a. Take a background turbidity sample using an appropriately and frequently calibrated turbidimeter in accord with manufacturer's instructions, or a visual turbidity observation, every 2 hours while work is being implemented, or more often if turbidity disturbances vary greatly, to ensure that the in-water work area is not contributing visible sediment to the water column. The background samples or observations should be taken at a relatively undisturbed area approximately 100 feet upstream from the project area. Record the observation, location, and time before monitoring at the downstream point.

b. Take a second sample or observation, immediately after each upstream sample or observation, approximately 50 feet downstream from the project area in streams that are 30

feet wide or less; 100 feet downstream from the project area for streams between 30 and 100 feet wide; 200 feet downstream from the project area for streams greater than 100 feet wide; and 300 feet from the discharge point or nonpoint source for areas subject to tidal or coastal scour. Record the downstream observation, location, and time.

c. Compare the upstream and downstream observations/samples. If observed or measured turbidity downstream is more than upstream observation or measurement (> 10%), the activity must be modified to reduce turbidity. If visual estimates are used, an obvious difference between upstream and downstream observations shall bear the assumption of a (>10%) difference. Continue to monitor every 2 hours as long as instream activity continues.

d. If exceedances occur for more than two monitoring intervals in a row (after 4 hours), the activity must stop until the turbidity level returns to background, and the EC lead must be notified within 48 hours. The EC lead shall document the reasons for the exceedance, corrective measures taken, notify the local NMFS branch chief and/or USFWS field supervisor and seek recommendations.

e. If at any time, monitoring, inspections, or observations/samples show that the turbidity controls are ineffective, immediately mobilize work crews to repair, replace, or reinforce controls as necessary.

Spawning Surveys. Intensive spawning ground surveys for Chinook salmon and steelhead would continue.

Biological Opinion. Project sponsor staff or their designated representative will provide implementation monitoring to ensure compliance with the applicable biological opinion, including:

a. General conservation measures are adequately followed; and
b. Effects to listed species are not greater than predicted and incidental take limitations are not exceeded.

Project Effectiveness Monitoring Plan

Effectiveness Monitoring - Were the desired results achieved?

- Groundwater monitoring and installation of piezometers will be used to evaluate the potential effects of the project on hyporheic hydrology and thermal energy processes. Findings will be incorporated into the design process to identify an option that would provide aquatic habitat benefits associated with groundwater-surface water interchange. This monitoring will be completed by CTUIR.

- **Structure construction:** Monitoring of structures would involve photo points of before and after operations occur. Follow up photo points would occur at year 1, year 3, and year 5 after project completion. This monitoring will be completed by the USFS.

- **Stream Survey:** Region 6 Level II Stream Habitat Inventory has been conducted in this project area (completed 2012) and will be repeated again at year 1 and year 5 after completion. This monitoring will be completed by the USFS.

- **Plant/seed survival:** Native plantings and seeded areas would be evaluated for survival on a yearly basis for three years after project completion through photo points and determining plant

survival. If plant/seed survival is poor, then subsequent replanting and/or seeding would occur. This monitoring will be completed by the USFS.

- **Noxious weeds:** Noxious weeds would be monitored on Forest Service lands, yearly, for three years after project operations. This monitoring will be completed by the USFS.

- **Instream habitat and stream channel changes** within the project area will be monitored by establishing a series of photo points and by evaluating plan-form channel changes from periodic aerial photography.

Effectiveness monitoring will be accomplished by using the Aquatic Inventory protocol, and Columbia Habitat Monitoring Program Scientific Protocol for Salmonid Habitat Surveys. There is existing pre-restoration data using these survey methods. Monitoring specifics to meet project objectives are described in the Longley Meadows Fish Enhancement Project Monitoring Plan which describes in detail the required effectiveness monitoring for this project (Longley Meadows Analysis File).

Table 4. Summary of proposed activities for each action alternative for the Longley Meadows Project.

Alternative Elements		**Alternative 1**	**Alternative 2**
Project Area Boundary (PAB) Acres • **USFS Lands** • **Private Lands** • **State/ODOT Lands**		139 111 15 13	
Subwatershed: **Coleman Ridge-Grande Ronde River –** 17,700 acres **Jordan Creek** – 16,376 acres		**Proj. Area Acres** 135 4	
Affected River Miles • **USFS Miles** • **Private Land Miles**		1.5 1.25 0.25	
Restoration Activities			
Cut/Fill/Dewatering	Dewatering and Fish Rescue Channels (miles)	0	0.74
	Cu. Yards of Cut Materials	0	48,669
	Cu. Yards of Fill Materials	0	48,722
	Excess Permanent Fill Areas (acres)*	0	0.58
*See breakdown table in Alternative Description section	Number of Staging Areas*	0	10
	Staging Areas (acres)*	0	10.78
	Coffer Dams	0	10
Channel Realignment/Changes	New Main Channel (miles)*	0	0.55
	Side Channels (miles)*	0	2.06
	Filled Channel (miles)	0	0.15
	Filled Channel (acres)	0	3.63
	Channel Realignment (acres)	0	8.26
Channel Summary	Main Channel (miles)*	1.5	1.69
	Side Channels (miles)*	1.08	2.39
Instream Enhancement	Large Wood Structures	0	335
	Number of Boulders Placed (>24”)	0	986

Alternative Elements		Alternative 1	Alternative 2
	Boulder Placement areas (acres)	0	2.35
Road Work (Miles) *See breakdown table in Alternative Description section	Temporary Access Roads (miles)*	0	1.65
	Temporary Access Road (acres)	0	3.23
	Culverts	0	0
	Temporary River Crossings	0	3
La Grande Rifle and Pistol Club	Side Channel/Alcove Excavation (miles)	0	0.13
	Permanent Fill/Berm Shooting Barrier to River Users (CY)	0	1,687
	Permanent Fill/Berm Shooting Barrier to River Users (acres)	0	0.34
	Swale Construction (acres)	0	0.65
	Swale Construction (CY)	0	268 (cut)
Large Wood Size and Amounts (Number of trees)	22+ Inch trees with Rootwads	0	43
	22+ Inch Whole Tree	0	7
	16-20+ Inch Full tree	0	12
	16-20+ Inch trees with Rootwads	0	335
	16-20+ Inch trees without Rootwads	0	346
	10”-16” with Rootwad	0	215
	10”-16” without Rootwad	0	1452
	Tree Top	0	22
	Small trees/limbs for racking materials (CY)	0	4,197
Forest Plan Management Area Acres	MA3	111	

Chapter 3 - Environmental Impacts of the Proposed Action and Alternatives

This section summarizes the potential impacts of the proposed action and no action alternatives for each impacted resource. The following resources would either be minimally affected or not measurably impacted and therefore will not be analyzed further in this EA:

> Forest vegetation – Activities on Federal lands would occur primarily within the riparian area which is characterized primarily by riparian vegetation. Large conifer trees would be retained on site where possible. Stands where trees would be removed on the Jordan Creek Ranch lands (covered under the Bird Track Springs Fish Enhancement Project, 2018) would remain fully stocked following the completion of project activities; therefore, no negative impacts are anticipated.
>
> Fire and fuels – Slash generated during project activities would primarily be incorporated into instream structures as racking materials. Any slash left on stockpile and staging areas would either be piled and burned on site or lopped and scattered as part of the site rehabilitation following project activities.
>
> Rangeland vegetation and livestock management – would not be impacted on Federal lands as none of these acres are currently within an active allotment. Livestock management opportunities on the Jordan Creek Ranch would remain the same.
>
> Minerals – There are no active mining operations or plans of operation within this project area.
>
> Wilderness and inventoried roadless areas – There are no wilderness or inventoried roadless areas within the project area; therefore, there would be no impacts to those resources.
>
> Terrestrial Wildlife Species – Under this project there would be no canopy cover affected, no changes in road management, no source habitat for any MIS species impacted, no snags affected except a couple within the riparian corridor which would be addressed in the biological evaluation (BE); therefore, big game species, MIS species, most neotropical migrant species (except Lewis' woodpecker and bald eagles – discussed in the Wildlife BE), and snag dependent species would not be impacted in this project area. Effects to beavers and their habitat are discussed later in this section.

The No Action Alternative (Alternative 1) and Proposed Action Alternative (Alternative 2) are described in detail in the Proposed Action and Alternatives section. This section discloses the anticipated environmental effects of these alternatives on various resources for which there are potential direct, indirect, and cumulative effects. The effects analysis forms the basis for comparison of the alternatives.

For the purposes of this EA, the cumulative effects are the sum of all past, present, and reasonably foreseeable future actions. The purpose of the cumulative effects analysis in the EA is to evaluate the significance of the No Action's and Action Alternatives' contributions to cumulative effects. A cumulative effect is defined under Federal regulations as follows:

> "...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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

The analysis of past actions is based on current environmental conditions for each resource area. All known baseline present and reasonably foreseeable future activities used by the Interdisciplinary Team for their cumulative effects analyses are located in Appendix D of this EA. The duration and geographic scale of direct, indirect, and cumulative effects varies, and is addressed by each resource and subject area. In addition, the type of projects considered under the cumulative analysis varies according to the resource and nature of the project being considered.

The best available science is considered in preparation of this EA; however, what constitutes best available science might vary over time and across scientific disciplines. As a general matter, we show consideration of the best available science when we consider the scientific integrity of the discussions and analyses in the project NEPA document. Specifically, this EA and the accompanying Project Record identifies methods used, references reliable scientific sources, discusses responsible opposing views, and discloses incomplete or unavailable information, scientific uncertainty, and risk (See 40 CFR, 1502.9 (b), 1502.22, 1502.24).

The project Analysis File references all scientific information considered: papers, reports, literature reviews, review citations, academic peer reviews, science consistency reviews, and results of ground-based observations to validate best available science. This EA incorporates by reference (as per 40 CFR 1502.21) the project Analysis File, including specialist reports and other technical documentation. Analysis was completed for Proposed, Endangered, Threatened, and Sensitive (PETS) Species, Botanical Resources (includes PETS species and Noxious Weeds), Wildlife (includes PETS species), Soils, Watershed and Fisheries (includes PETS species), Cultural/Heritage, Engineering, and Recreation. Information from these reports has been summarized below in this section. The Project Analysis File is located at the La Grande District Office.

Fisheries and Aquatic Resources

Introduction

Since the 1990s, restoring watershed processes has been widely accepted as the key to restoring watershed health and improving fish habitat (Roni et al. 2002). In the Upper Grande Ronde River Tributary Assessment (Bureau of Reclamation 2014) four moderately confined to unconfined reaches were identified including the area of the proposed project, the “Bird Track/Longley Reach.” The Bird Track Longley Reach was determined to be the only unconfined geomorphic reach with a high potential to improve the overall physical and ecological processes that supports species listed as Threatened under the Endangered Species Act (ESA).

The Longley Meadows Fish Habitat Enhancement Project, referred to hereafter as the Longley project, is located in the Upper Grande Ronde Subbasin (HUC 17060104). The project area boundary is within the Coleman-Ridge Grande Ronde River subwatershed within the Grande Ronde River –Beaver Creek watershed. The project area boundary includes approximately 139 acres. This includes acres adjacent to the GRR used for access, staging and storing materials and equipment, and floodplain and side channel restoration, and riparian planting. The Longley project extends along approximately 1.5 miles of the upper Grande Ronde River between river mile 143.5 and 142.2. The reach proposed for instream treatment includes Wallowa-Whitman National Forest and private lands along State Highway 244 within the Grande Ronde recovery plan assessment units UGC3A and UGS16.

Approximately 1.0 mile of river flows through the Wallowa-Whitman National Forest, and 0.4 miles are on state and privately owned land. The primary purposes of the project include restoring degraded riparian and floodplain function and habitats, improving instream habitat diversity, and improving water

quality for adult and juvenile summer steelhead (*Oncorhynchus mykiss*) and spring Chinook salmon (*O. tshawytscha*).

Three species in the Upper Grande Ronde Subbasin are listed as Threatened under the ESA:

> Snake River spring/summer Chinook (*Oncorhynchus tshawytscha*), ESA listed as Threatened, January 5, 2006 and updated on April 14, 2014. (http://www.nwr.noaa.gov/publications/frn/2005/70fr37160.pdf)
>
> Snake River Basin steelhead (*Oncorhynchus mykiss*), ESA listed as Threatened, January 5, 2006 and updated on April 14, 2014. (http://www.nwr.noaa.gov/publications/frn/2006/71fr834.pdf)
>
> Columbia River bull trout (*Salvelinus confluentus*), ESA listed as Threatened, June 10, 1998. (http://www.fws.gov/pacific/bulltrout/)

An additional 2 fish species are listed on the Region 6 Sensitive Species List:

> Redband trout (*Oncorhynchus mykiss gibbsi*) are present in the Upper Grande Ronde Subbasin and are listed as a sensitive species by the U.S. Fish and Wildlife Service, and NOAA Fisheries (NPCC 2004).
>
> Pacific lamprey (*Lampetra tridentate*) were reintroduced into the Grande Ronde River in 2014 and 2015 and have an unknown distribution. They are listed as a sensitive species by the U.S. Fish and Wildlife Service, and NOAA Fisheries (NPCC 2004).

Four additional species of aquatic mollusks are on the Region 6 Sensitive Species List and are suspected to occur on the Wallowa Whitman National Forest:

> Western Ridged Mussel (*Gonidea angulata*)
> Shortfaced Lanx (*Fisherola nuttalli*)
> Columbia Pebblesnail (*Fluminicola fuscus*)
> California floater (*Anodonta californiensis*)

Two frog species are on the Region 6 Sensitive Species List and are documented on the Wallowa-Whitman National Forest (both frog species are covered under the Biological Evaluation for Wildlife for Longley Fish Enhancement Project):

> Columbia Spotted Frog (*Rana luteiventris*)
> Inland Spotted Frog (*Ascaphus montanus*)

Fish salvage efforts in the Bird Track Springs (BTS) reach in 2018 and 2019 found presence of juvenile rainbow trout/steelhead (*Oncorhyncus mykiss*), Pacific Lamprey (*Entosphenus tridentatus*) and Wester Pearlshell freshwater mussels (*Margaritifera falcata*) (Wilson 2018).

Background

Dating back to the early 1900s activities that have caused riparian and instream habitat degradation have adversely affected spring Chinook salmon, steelhead and bull trout production potential in the Upper Grande Ronde Subbasin. Sediment, water temperature, low stream flows and, habitat quality and quantity are the most critical limiting factors for these salmonid populations. These habitat limitations are the result of several anthropogenic disturbances that include, but are not limited to, the following: surface water diversions for agriculture, turning floodplains into pastures, livestock grazing, hydraulic mining,

logging and use of splash-dams, roads, and fire suppression (McIntosh 1992). Although many of these impacts have been reduced in recent years their effects still persist throughout the subbasin.

The existing upper Grande Ronde River in the Longley reach is an unconfined, free-formed alluvial channel that has a straight planform with a plane-bed, and lower degree of channel-floodplain interactions compared to historical conditions. Artificial channel constrictions and disconnected floodplains resulting from railroad grades, road grades and levees changed the channel geometry and floodplain cross-sectional area which increases flow depths, flow velocities and shear stresses during high water events. This condition translates into increased sediment mobilization and transport resulting in a wider, shallower channel with an armor layer that inhibits pool development when flows are not sufficient to mobilize the armoring particles, or in the absence of channel-spanning structures or significant channel constrictions.

Existing riparian vegetation conditions include scattered patches of woody shrubs and immature trees, and large areas of herbaceous vegetation where the floodplain has been cleared and drained for ranching. Beavers are not common and no longer play a major role in wood delivery to the channel, maintaining diverse off-channel habitats and riparian conditions, or maintaining stable habitat for fish during the winter by creating habitat with consistent water levels, very low current velocities and stationary ice cover (Jackober et al. 1998).

Icing has been a significant process during low flows in the winter months due to the wider, shallower channel geometry in the project area. Trees with ice scars have been identified in the area and provide an indication of longitudinal ice scour extent. These trees show height of scour occurring consistently above the 100-year water surface elevation. Surface ice accumulation can be significant during winter months to the point of creating large ice dams. Salmonids overwintering in rivers such as the Grande Ronde are vulnerable to numerous threats to their survival as a result of highly variable environmental conditions due to fluctuations in water temperatures, discharge and ice conditions (Brown et al. 2011).

Anchor ice effects on salmonids include filling pools or other habitat and displacing fish, and creating high-velocity conduits for water to flow through that create velocities that are unsuitable for fish to maintain position (Brown et al. 2011). Research has shown that fish are forced to make larger numbers of movements when influenced by frazil ice or anchor ice, which demands using limited stores of energy in their bodies during the winter and increases the probability of mortality (Brown et al. 2011). Studies have found that bull trout and cutthroat trout moved more often in streams affected by anchor ice than in streams with stationary ice cover (Jakober et al. 1998). In addition, incubating embryos and alevins can be killed when frazil or anchor ice forms in streams and reduces water interchange between the stream and the redd (Bjornn and Reiser 1991). Anchor ice normally forms in shallow water typical of spawning areas and may completely blanket the substrate. Ice dams may impede flow or even dewater spawning areas. When dams melt, the water released can displace the streambed substrate and scour redds (Bjornn and Reiser 1991). The formation of ice dams and their subsequent failure can result in scouring the stream bed and damaging banks and riparian vegetation.

ESA-Listed Fish

All three species listed under the ESA as threatened occur within the project area and the project area is designated critical habitat for these species. Other fish species on the Region 6 Sensitive Species list include redband trout (*Oncorhynchus mykiss gibbsi*) and pacific lamprey (*Lampetra tridentate*) and four aquatic mollusks are on the Region sensitive species list (as updated February 2019). Improving fish and aquatic habitat within the proposed treatment reach would aid in ensuring habitat quality is available for the recovery of fish.

The preliminary ESA effects determination for the proposed action is "Likely to Adversely Affect" to all three fish species and their designated critical habitat due to short-term disturbance, sedimentation, and turbidity related to in-stream activities (Bonneville Power Administration Habitat Improvement Program Habitat Improvement Program IV). Over the mid- to long-term, the project is expected to substantially improve habitat conditions and promote recovery for all three species. Effects of habitat improvement on fish may begin to occur immediately following completion of instream work and would be expected to continue to improve as riparian vegetation establishes, floodplain function is restored, and in channel habitat features such as scour pool development occurs. Refer to the Threatened, Endangered, Proposed, and Sensitive Species section of this EA for a description of the effects to these species.

Affected Environment

Selected Indicators from the "Matrix of Pathways and Indicators" from the 1996 NMFS document Making Endangered Species Act Determinations of Effects for Individual or Grouped Actions at the Watershed Scale and 1998 USFWS *A framework to assist in making Endangered Species Act determinations of effect for individual or grouped actions at the bull trout subpopulation scale* were used to analyze effects of the no action and proposed action alternatives on fish and aquatic species and their habitat. Indicators selected from the matrix are representative of habitat indicators that can be affected by large wood installation, channel realignment and rehabilitation, and floodplain function.

Indicators selected from the matrix are:

- Temperature
- Sediment
- substrate embeddedness
- large woody debris
- pool frequency and quality
- large pools,
- width/depth ratio,
- stream bank condition, and
- function of riparian areas – sinuosity and floodplain connection

Table 5 illustrates how each of these indicators is currently functioning within the Upper Grande Ronde subbasin. The three categories in Table 5 that rate the condition of each habitat indicator are properly functioning, functioning at risk, and not properly functioning. For each habitat indicator there is a definition or description for each of the three categories, described in *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (NMFS, 1996). The ranges for criteria described in this document are not meant to be absolute and may be adjusted for unique watersheds or channel reaches.

Table 5. Selected Indicators from the Matrix of Pathway and Indicators (NMFS 1996, USFWS 1998)

Indicator	Reach Scale		
	Properly functioning	Functioning At Risk	Not Properly functioning
Temperature			X
Sediment	X		
Substrate Embeddedness			X
Large Woody Debris			X
Pool frequency and quality			X

Indicator	Reach Scale		
	Properly functioning	Functioning At Risk	Not Properly functioning
Large Pools			X
Width/Depth Ratio		X	
Streambank Condition		X	
Riparian Reserve (RHCAs)		X	

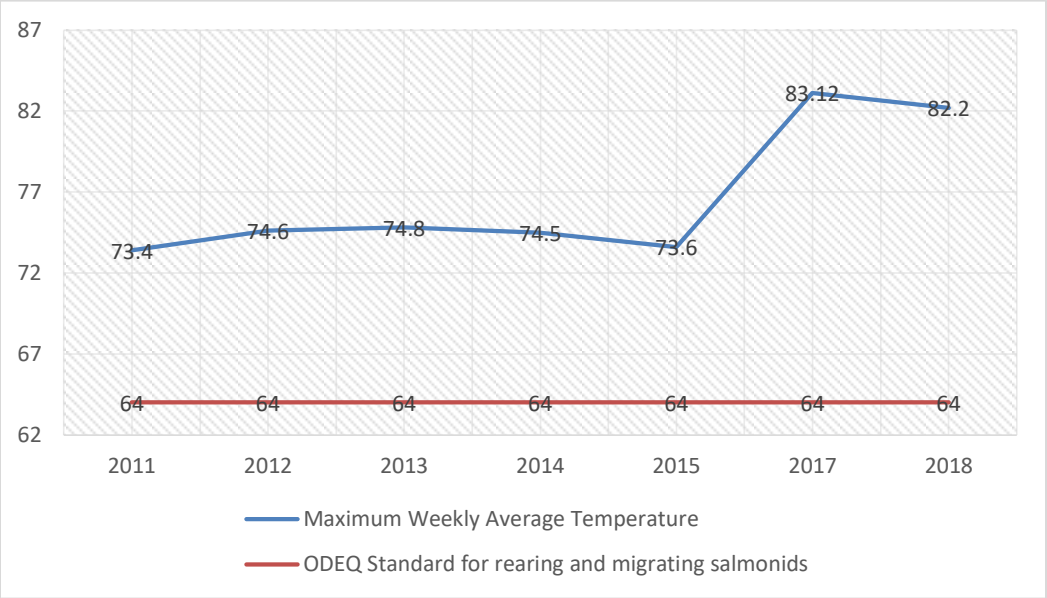
Temperature

Fish are cold blooded animals in which the environmental conditions of the stream control their body temperature. Because water temperature affects the body temperature of fish, it can regulate activity and physiological processes (Thompson and Larsen 2004). Stream temperature directly influences aquatic organisms' physiology, metabolic rates, and life history behaviors and influence aspects of important processes of habitat for fish and aquatic species such as nutrient cycling and productivity (Allen 1995). Interactions between external drivers of stream temperature such as air temperature, solar radiation, and wind speed and the internal structure of the stream system such as the channel, riparian zone, and alluvial aquifer, drive temperature (Poole and Berman 2001).

Oregon's 2012 303(d) List of Water Quality Limited Waterbodies identified seven parameters, including temperature, for the Upper GRR within the project. Seven parameters in the upper GRR do not meet standards for beneficial use including conditions suitable for fish. A total maximum daily load (TMDL) and a Water Quality Management Plan were prepared for the Upper Grande Ronde Sub-Basin in 2000 to address the water quality problems (ODEQ 2000). Due to the predominance of non-point source pollutants, the plan relies largely on habitat restoration to achieve the TMDL goals. Water quality parameters (and standards) of temperature (64°F/55°F, rearing/spawning), relate to the beneficial use for fish life (NPCC 2004). Although fish can function in a wide range of temperatures, they have an optimum range as well as lower and upper lethal temperature for various activities, life stage, and species (Beschta et al. 1987). The standard for a "properly functioning" channel for temperature habitat indicator in the project area is a Maximum Average Weekly Temperature (MWAT) that does not exceed 50-57° F (NMFS 1996). The standard for functioning at risk is 57-60° for spawning fish and 57-64° for migrating and rearing fish. MWAT temperatures over 60° for spawning fish and over 64° for migration and rearing are considered "not properly functioning." It is uncertain whether the Grande Ronde River in the project area ever met the 50-57° temperatures even before the extensive floodplain and channel modification and history of management.

Maximum Average Weekly Temperatures (MWAT) have greatly exceeded the 64° threshold (Figure 6) in the mainstem GRR every year. The majority of days in July and August reach temperatures above 64° for some duration with the highest average temperature weeks near or over 74°F (CHaMP 2015) for the GRR in the BTS and Longley project areas. It is common to see stream temperature reach 84° or higher in the late afternoon in July and August in this location in the mainstem GRR. This is over the lethal limit for juvenile rearing for salmonids, including ESA listed species in the project area, which is considered 77.4°F for Chinook and 75.4°for steelhead (Beschta et al. 1987, Thompson and Larsen 2004). There is very little juvenile Chinook use in the project area, presumably due to these temperature exceedances and the duration of temperature exceedances. Juvenile *O. mykiss* are very common in the project area and in the summer months are founds taking refuge into cold water patches within this stretch of the Grande Ronde.

Figure 6. GRR at Bird Track Springs Longley Meadows MWAT



The 2017 and 2018 temperature data is from an area in the mainstem Grande Ronde at the top of the Longley project reach immediately downstream of private property downstream of the Jordan Creek confluence. Temperature data from 2011-2015 is from a temperature probe upstream of the Bear Creek confluence. The reason for the large differences in MWATs is due to different locations in the GRR and potential groundwater influences.

Sediment and Turbidity

Fine sediment in the GRR mainstem has been identified as being excessive from Five Points Creek confluence to the headwaters, this includes the project area (UGR TDML 2000).

In the Aquatic Inventory (AQI) survey (2015) that encompassed the project area (Bear Creek to Spring Creek) found gravel, cobble and sand as the dominant stream substrates. The survey found stream substrates of 41% gravel, 23% cobble, 24% sand, and 10% fine sediment (<2 mm). The standard for a "properly functioning" channel for the sediment and turbidity habitat indicator is <12% fines (0.85 mm) "functioning at risk" is 12-20% fines and moderate turbidity, and "not properly functioning" is >20% fines at surface or depth in spawning habitat, and turbidity high. The Longley project reach of the GRR is considered properly functioning for levels of fine sediment.

Substrate embeddedness has been observed as a limiting factor for channel dynamics in this reach. The channel appears to be armored and have little ability to deposit and scour. This is likely due to past management activities, very high road densities in the headwaters preventing natural rates of erosion, and lack of channel roughness that would meter out and retain gravels and sediment moving through the system.

Large Woody Debris

The 2015 Aquatic Inventory Surveys (AQI) by Oregon Department of Fish and Wildlife Service found a total of 16 pieces of wood per mile (minimum size >15cm diameter and >3m long) in the project area. Zero pieces of wood considered "key" (minimum 30cm diameter and 6->15m in length) exist in the project area.

The NMFS (1996) "properly functioning" standard for large wood, or large woody material (LWM) for streams east of the Cascade crest in Oregon, Washington, and Idaho is a minimum of 20 pieces per mile, which have a minimum 12 inch diameter and 35 feet length and an adequate source of LWM for future recruitment in riparian areas (Table 6). The 2015 AQI survey did not observe any wood in that size class. This survey included 3.0 miles of stream including the mainstem GRR (2 miles) and side channels (3 miles) in the project area; however, wood was only measured in the primary channel-mainstem GRR (32 pieces/2 miles). The GRR and side channels in the project area are "not properly functioning" because the riparian management objective (RMO) for pieces of LWM per mile is not met and the riparian area lacks potential for large woody debris recruitment.

Table 6. Large Wood counts in Longley Project Area and Adjacent Reaches

Large Wood Indicators	Properly Functioning Levels	Reach Project Area
Total Wood (pieces/mile)	N/A	16
Key Pieces (pieces/mile)	>20	0

LWM numbers in this table are from ODFW AQI, 2015

Pool Frequency, Quality, and Large Pools

Pools provide refuge and cover to fish and aquatic organisms, for protection from predators as well as important living space. Space requirements vary with fish species, age, and time of year. Amount of living space necessary can increase with age and size of the fish (Bjornn and Reiser 1991). Living space for salmonids, such as pool area has been related to fish biomass. Carrying capacity of fish for a stream has been found to be dependent on morphology including channel shape and streamflow (Thompson and Larson 2004).

McIntosh (1992) calculated that from 1941 to 1990 the GRR large and total pool densities decreased by 71% (1.1 pools /km) to 78% (1.4 pools/km) respectively. In the vicinity of the project area, CHaMP surveys found 8 pools/1.1 kilometers (or approximately 12.8 pools/mile) in the mainstem GRR in a reach just upstream of the Bear Creek confluence, and upstream of the Longley project area boundary in 2015 and 3/1.0 kilometer (approximately 5 pools/mile) in the mainstem GRR within the Longley reach. A channel the size of the mainstem GRR through the project area would be "properly functioning" if it had a minimum of 26 pools per mile, the RMO for pools per mile, and met the large woody debris recruitment standards in the riparian area (NMFS 1996). The description of a reach in "not properly functioning" condition is "does not meet pool frequency standards;" therefore, the GRR through the project area is in "not properly functioning" condition.

Table 7. Overview of Pool Frequency in the Longley Project Area and Adjacent Reaches

Indicators	PFC Levels	Reach	
	Properly Functioning Levels	CHaMP Reach Downstream	CHaMP Reach Gun Club
Pools/mile	26	12.8	5

Streambank Condition

Current streambank conditions are considered to be "functioning at risk" based on channel morphology observations including lateral stream migration and accelerated bank erosion actively contributing to the sediment load of the GRR. Major influences to the existing conditions are likely loss of riparian vegetation and the history of logging and grazing practices and the dynamics associated with icing and ice dams where ice dam failure results in scouring the stream bed and damaging banks and riparian vegetation. Upstream of the project area at the boundary of Forest Service and Bear Creek Ranch private

property, on the mainstem GRR channel, a headcut continues to progress downstream of the split flow on river right.

It is estimated that the GRR in the project area has 80-90% stable banks, which falls into the "functioning at risk" category. For a reach to be "properly functioning," on average less than 10% of banks are actively eroding.

Width/Depth Ratio

The width to depth ratio is a good indicator of channel cross section shape and as the ratio increases generally so does the incidence of degradation. As a stream becomes wider and shallower this ratio increases.

The Longley project reach of the Grande Ronde is a relatively simplified, wide, and shallow channel. The width to depth ratio is 28.6 (AQI 2015) in this section of the GRR. This shows an over-widened channel without large wood, resistant bank material, and adequate riparian vegetation. This type of channel, Rosgen (1996) stream type C4, have a width to depth ratio range of 13.5 to 28.7. The width to depth ratio in the project area indicates a wide and shallow channel within the upper range found for this channel type. The channel has lost connectivity with the floodplain at most flows and it is believed that the loss of interaction has reduced the storage capacity and slow release of water from the floodplain throughout the summer months. For this indicator, Rosgen (1996) range was used instead of the very general NMFS (1996) categories because it is specific to stream type. This indicator is rated as "functioning at risk" due to the over-widening trend and current channel dimensions at the upper end of the C4 channel type range (Table 8).

Figure 7. Longley project reach, wide channel lacking wood or habitat structure. Photo credit AQI 2015

Table 8. Width to Depth Ratio in Longley Project Area

Indicators	Rosgen C4 Channel Range (PFC)	Project Area Reach
Width to Depth Ratio	13.5-28.7	28.6

Riparian Habitat Conservation Areas

The Expert Panel for the Upper Grande Ronde Subbasin through Reclamation's Columbia/Snake River Salmon Recovery Office in 2013 determined riparian vegetation in the Upper Grande Ronde Subbasin to

be a limiting factor. Riparian vegetation and large wood recruitment were identified as an ecological concern and limiting factor.

It is assumed that prior to Euro-American settlement and associated disturbances, the upper GRR developed under an intermittent disturbance regime where flows, sediment inputs and large wood dynamically interacted to create successional states (Lyon 2015). Riparian vegetation likely included woody species such as cottonwood, willow, river birch and alder of varying ages (seral stages). The upland areas adjacent to the active floodplain likely supported mature Ponderosa pine and Douglas fir trees readily accessible to the channel through lateral channel migration and avulsion (Lyon 2015).

Existing riparian vegetation conditions include scattered patches of woody shrubs and immature trees, and large areas of herbaceous vegetation where the floodplain has been cleared and drained for ranching (Lyon 2015). Beavers are uncommon and no longer play a major role in wood delivery to the channel or maintaining diverse off-channel habitats and riparian conditions (Lyon 2015).

Current riparian conditions in the upper GRR, including the project area, are the result of several anthropogenic disturbances that include developing and filling in the floodplain for agriculture, livestock grazing, trapping beaver and eliminating beaver forage, logging and use of splash-dams, and railroad grade and road construction. In the 2015 AQI survey, three riparian transects were surveyed in the project area. The total number of trees per 100m² (2 acres) was .1 conifers and .8 hardwoods. The trees found most frequently in the riparian zone were 30-50cm conifers and 3-90 cm dbh hardwoods. NMFS (1996) defines "functioning appropriately" riparian reserve as "the riparian reserve system provides adequate shade, large woody debris recruitment, and habitat protection and connectivity in all subwatersheds, and buffers or includes known refugia for sensitive species (>80% intact) and/or for grazing impacts: percent similarity of riparian vegetation to the potential natural community/composition >50%."

Based on the AQI survey data and professional judgement, the riparian reserve in the project area fits under the "functioning at risk" description: "moderate loss of connectivity or function (shade, LWM recruitment, etc.) of riparian reserve system, or incomplete protection of habitats and refugia for sensitive aquatic species (70-80% intact), and/or for grazing impacts: percent similarity of riparian vegetation to the potential natural community/composition 25-50% or better."

Figure 8. Riparian zone on river right; high terrace and conifer dominated hillslope. Photo Credit AQI 2015.

Effects Analysis

Methods

The direct, indirect, and cumulative effects to fish aquatic resources are based on the estimated beneficial and/or detrimental effects to fish and aquatic resources as a result of proposed activities in both alternatives. Monitoring results of past restoration work in similar types of channels and literature review of similar instream restoration activities were used by Forest Service fisheries biologist to determine short and long term effects of proposed activities.

Long term and short term effects are defined as follows:

- **Short term** effect refers to effects that occur at the time of implementation of project activities and last through the first flood stage event (for example sediment disturbance that occurs from instream work would be expected to flush out and disperse downstream at the first flood stage event.
- **Long term** effects refer to effects lasting from the time of implementation and would persist for decades, at a minimum. For example, long term beneficial effects are expected to provide a time buffer for the riparian area in the Longley project area to recover and function at its natural, pre-disturbance state with large wood recruitment potential, functional floodplain, and a channel with complex habitat for fish and aquatic resources.

Table 9 describes the level of effects which were used to illustrate the relative differences in effects between alternatives to fisheries and aquatic resources within the project area reach only. Project activities focus on 1.5 miles of the 212 miles of the GRR (<1% of the Grande Ronde River). The analysis focuses on the potential effects to fish and aquatic habitat and species populations within the project reach; therefore, the effects may be rated "negligible to major" (as defined below) within the reach but would not positively or negatively impact populations at the basin or sub basin level.

Table 9. Relative Level of Effects for Fish and Aquatic Resources

Level of Effect	Description
Negligible	No measureable effects resulting from restoration activities to fish and aquatic resources, and no measurable change in fisheries habitats are detectable. Individuals would not be affected, or the action would affect an individual but the change would be so small that it would not be of any measurable or perceptible consequence to the individuals or populations.
Minor	Effects resulting from restoration activities to fish and aquatic resources or other resource areas which indirectly affect fish and/or aquatic resources may occur. Individuals would be affected but the change would be small. Impacts would not be expected to have any long-term effects on species or their habitats, or the natural processes sustaining them. Occasional responses to disturbance by some individuals could be expected, but without interference to reproduction, or other factors affecting population levels.
Moderate	Individuals would be noticeably affected. The effect could have some long-term consequence to individuals or habitat. Fish and/or aquatic organisms are present during particularly vulnerable life-stages, such as spawning, eggs or pre-emergent fry in redds, or migration; or interference with activities necessary for survival can be expected on an occasional basis. Frequent response to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, or other factors affecting short-term population levels, but no long term population effects are expected.
Major	Populations would be affected with a long-term, vital consequence to the individuals, populations, or habitat. Impacts on species, their habitats, or the natural processes sustaining them would be detectable. Frequent responses to actions by some individuals would be expected, with negative or positive impacts to feeding, reproduction, or other factors resulting in a long-term change in population levels.

Assumptions

All activities in the proposed action would follow Bonneville Power Administration's (BPA) Habitat Improvement Program (HIP) General Aquatic Conservation Measures. All General Aquatic Conservation Measures laid out in the HIP would be implemented and are described within this analysis under the appropriate "action", this includes post-construction conservation measures. Proposed actions for the Longley project are covered under HIP for River, Stream, Floodplain, and Wetland Restoration. Activities under this category include, improve secondary channel and wetland habitats, set-back or removal of existing berms, dikes, and levees, protect streambanks using bioengineering methods, install habitat-forming natural material instream structure (large wood, boulders, and spawning gravel), riparian

vegetation planting, and channel reconstruction. All instream work would occur in compliance with the Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources (2008).

This effects analyses is based on professional judgment using information provided by forest staff, Aquatic Inventory Survey (AQI) habitat data from Oregon Department of Fish and Wildlife Service (2015), CHaMPs habitat data (2015), relevant references and technical literature review, and subject matter experts. Using technical reports from the published literature that described the most susceptible aspects of species life cycle and/or habitat needs as a guide, quantitative and qualitative information regarding the presence and status of these species and their habitat within the analysis area was assessed. This effects analysis tiers to the effects analysis for Bird Track Springs Fish Enhancement Project (2016). The scope, proposed activities, and location are similar in nature and a majority of expected short and long term effects are the same.

The analysis area for fish and fish habitat is the existing 1.5 mile mainstem GRR, all relic (currently abandoned) channels and channel realignment areas, floodplain and riparian areas and all wetland and stream courses including private land in rootwad and whole tree harvest units. Because short term effects to fish and aquatic organisms and habitat are unlikely to stop at the downstream boundary of the project area during construction activities, the fish and aquatics effects analysis area includes 300 feet downstream of all in channel or stream bank project related disturbance. This is based on the Department of Environmental Quality Technical Basis for Revising Turbidity Criteria (2005).

Direct effects to fish and aquatic resources are primarily related to sediment input from project actions, which occur at the same time and place as these resources. Direct effects to fish and aquatic organisms also include fish salvage where fish, mussels, and potentially crayfish are handled and moved to a designated location upstream of project activities. Indirect effects are primarily related to sediment and stream temperature impacts which are caused by the action and are later in time or farther removed in distance. Beneficial indirect effects to fish and aquatic habitat include increase in large wood, increase in pool quantity and quality, improved water quality and temperature conditions, and increase in riparian vegetation. Cumulative effects are effects that occur from present and reasonably foreseeable future actions that overlap in time and space that would create a measureable effect when combined with the effects of the Longley project.

Key Indicators used to quantitatively display the differences in effects between alternatives on fisheries and aquatic resources are:

- Large Woody Debris:
  - Total Wood – Pieces/mile
  - Key Pieces – Pieces/mile
- Pool Frequency – Number of pools/mile
- Width to Depth Ratio – Rosgen C4 Channel Range

The alternatives were also analyzed using the following categories from the Matrix of Pathway and Indicators (NMFS 1996, USFWS 1998) to qualitatively assess potential environmental effects based on existing conditions at the project and watershed scale. The ratings (Table 10) of these indicators show relative change to the baseline (existing condition), and whether the alternatives would have beneficial, neutral, or negative impacts on the habitat indicator.

Table 10. Alternative 1 and 2 project and watershed scale comparison of selected indicators from the Matrix of Pathway and Indicators (NMFS 1996, USFWS 1998)

Indicator	Baseline (Watershed Scale - 5HUC)			Effects of Proposed Alternatives (Project Scale)		Effects of Propoed Alternatives (Watershed Scale)	
	Properly functioning	Functioning At Risk	Not Properly functioning	No Action	Proposed Action	No Action	Proposed Action
Temperature			X	M	R	M	M
Sediment	X			M	R/d	M	M
Substrate Embeddedness			X	M	R/d	M	M
Large Woody Debris			X	M	R	M	M
Pool frequency and quality			X	M/D	R	M	M
Large Pools			X	M	R	M	M
Width/Depth Ratio		X		M/D	R	M	M
Streambank Condition		X		M	R/d	M	M
Riparian Reserve		X		M/D	R/d	M	M

(R) Restore=project is likely to have beneficial impacts on habitat indicator
(M) Maintain = project may affect indicator, but impact is neutral
(D) Degrade = project is likely to have a negative impact on the habitat indicator
d = Short-term negative impact associated with construction/implementation phase

Direct and Indirect Effects on Fisheries and Aquatic Species and Habitat

Temperature

The following describes the effects of the alternatives in this project on stream temperatures within the analysis area.

Alternative 1 - No Action

Under the No Action Alternative maximum water temperatures would continue to be negatively affected by poor channel stability, high stream width to depth ratios, and riparian and floodplain conditions that are not properly functioning. The existing condition that would persist is an overall temperature trend in the dry season (July through November) that is lethal for fish, particularly in the summer months. Stream temperature as high as 86.9°C have been measured in the BTS/Longley project area in July, 2013 (CHaMP 2015). In addition, winter water temperature fluctuations and trends that cause increased discharge or anchor ice development and ice dam creation and break up would continue to make this area inhospitable for juvenile fish by causing forced swimming events when fish need to be conserving energy during periods of low metabolism in the winter (Favrot and Jonasson 2004). The current degraded condition would be maintained.

Alternative 2 - Proposed Action

No direct effects to fish and aquatic species or habitat would result from activities in the proposed action alternative due to temperature. It is anticipated that long term indirect beneficial effects to water temperature would occur beginning after restoration is complete. Temperature would be expected to decrease incrementally in the proposed action alternative as a result of increasing stream bank stabilization, reduced channel over-widening (width-to-depth ratio), protecting and

increasing riparian vegetation and increasing stream shade in the long term. In addition, by reconnecting the channel to its floodplain by restoring morphological processes, floodplain inundation would be expected to occur at more frequent intervals and as the floodplain adjacent to the channel absorbs water and saturates, this water would recharge underlying alluvial aquifers (an area that underlies both the stream channel and riparian zone). This restored process could be an effective buffer against stream channel warming, particularly if the aquifer is recharged predominantly with cold water during the winter and spring months (Poole and Berman 2001), which is what would be expected on the upper GRR. This cold water would then be expected to be discharged to the stream during base flow periods when the highest stream temperatures occur. This would have the potential to buffer extremes in water temperature (Poole and Berman 2001).

Studies have found that a potential benefit of large wood reintroduction is an increase in hyporheic exchange (Boulton, 2007); a process that connects streams with their surrounding aquifers (Sawyer and Cardenas 2012). Restoring complex streambed topography through increasing pool/riffle sequences that drive streambed hyporheic flow (Harvey and Bencala 1993) and installing roughness factors such as large wood and rock that would encourage gravel bar development and would force subsurface and hyporheic flow could have moderate to major beneficial effects to fish and aquatic species and habitat. An enhanced cooling effect of stream temperature would be expected particularly if flood events and aquifer recharge occurs during winter and spring months when the stream temperature is coldest (Poole and Berman 2001). Additionally, McHenry et al. (2007) observed that engineered logjams can create cooler temperature microclimates by the scour pools that develop by these habitat features.

Water temperature buffering could reduce salmonid stress particularly in the summer and winter months; fluctuations in water temperature or permanent shifts in water temperature regimes have likely caused this stream reach to be unusable for native fish species (Quigley and Arbide 1997, Wissmar et al. 1994), particularly at certain life stages. The hyporheic zone is habitat for invertebrates and fish embryos in spawning areas, which are sensitive to temperature, dissolved oxygen, and other biophysical parameters controlled by fluid flow (Poole and Berman 2001). Hyporheic restoration may improve water quality and habitat in both the channel and streambed.

Airborne thermal infrared remote sensing information from Watershed Sciences (Watershed Sciences Inc. 2010) indicated that the BTS and Longley project reaches contain a concentration of cooler water influences and inputs, when compared to the rest of the upper GRR. Project design would incorporate these cooler water influences and improve hydraulic exchange so that the mainstem and side channels would capture connected flow and cool water influence. In addition, designing structures such as beaver dam analogs would increase habitat that forms behind beaver dams where the water column has vertical temperature stratification and yields stable and highly suitable overwintering habitat for juvenile salmonids (Cunjak 1996).

Addressing the existing over-widened channel by correcting the width to depth ratio, would both decrease the amount of solar radiation because the channel surface area is the area across which heat is exchanged (Poole and Berman 2001) and encourage water to more readily be exchanged laterally or beneath the stream channel with saturated sediments (Findlay 1995).

Activities in and design of the proposed action address factors which markedly influence stream temperature: stream morphology, groundwater influences, and riparian canopy condition (Pool and Berman 2001). The combined effects of restoring these processes would set the trajectory to "restore" the habitat indicator temperature at the reach scale. Moderating temperature in the summer and winter could have moderate to major beneficial effects on fish and aquatic organisms and habitat.

Sediment and Turbidity

Alternative 1 - No Action

The no action alternative would have no impact on sediment input and substrate embeddedness, current conditions would be "maintained." Lateral stream migration and accelerated bank erosion would continue to contribute to the sediment load in the GRR, and the simplified channel would quickly mobilize materials out of the reach.

Fine sediment in the GRR mainstem has been identified as being excessive from Five Points Creek confluence to the Headwaters, this includes the project area (UGR TDML 2000). However, in this reach there is not an observed excess of sands and fines. The channel substrate appears to be armored and rates of normal erosion/depositions appear to be lacking.

Alternative 2 - Proposed Action

Activities in the proposed action that have the potential to result in short term direct increases in sediment and associated turbidity to stream channels include excavation in existing stream channels and banks to "seat" trees, rootwads, and boulders, digging trenches in banks to plant cuttings, and "cutting" new channels in the floodplain and RHCA associated with channel realignment or constructing habitat features such as alcoves and beaver analogs. There may also be indirect input of sediment into stream channels from ground disturbance in the floodplain and stream banks associated with heavy equipment tracking on temporary access trails and mobilizing material to the channels, the four sites where heavy equipment would cross the GRR to access the north side of the channel, and tree and rootwad harvest. The long term effects of proposed project activities on sediment and turbidity would be indirect beneficial effects to fish and aquatic species and habitat by restoring stream processes and stabilizing areas of lateral migration and accelerated bank erosion.

Proposed construction of channel and habitat structures would cause short term increases in sediment delivery and associated turbidity to the GRR in the project area and up to 300 feet downstream that could exceed Oregon turbidity standards. Excavators would work in the channel and from the banks to dig pools, construct habitat structures, beaver analogs, and alcoves, seat trees, trees with rootwads and boulders into the stream bed and banks for large wood structure construction, and excavate new or realigned channels. Work areas would be isolated, fish would be removed, and channel would be dewatered. However, it is likely that excavation work would hit ground water even with all effort taken to "dewater" the construction area. This ground water could seep downstream and cause plumes of sediment and an increase in turbidity during construction. These activities would likely cause short term direct effects to water quality, which could cause short term, direct effects to fish and aquatic habitat and short term indirect effects to fish and aquatic species.

In addition, when water is "introduced" or "reintroduced" to the channel after construction is complete, there would be local sediment flushing and increased turbidity from the disturbance in the channel and banks. Turbidity generated from these sediment pulses would be expected occur in the immediate vicinity of the structures and up to 300 feet downstream. The duration of elevated turbidity levels could last as long as equipment is working in the channel, stream banks, or digging or trenching to plant riparian vegetation. Even in a dewatered channel, excavation may reach ground water, which could connect to downstream flows and elevate turbidity levels. See description below for turbidity monitoring and mitigation.

Heavy equipment tracking on access trails to the channel and tracking over banks to enter the channel at the four designated locations would compact the soil and could cause rutting and rilling during run off events. See the soil and hydrology effects analysis for effects to soils and hydrologic function from floodplain ground disturbing activities. These activities would be expected to have potential short term effects to water quality, but would have negligible effects to fish and aquatic species and habitat because in water work areas would be isolated with blocknets to keep fish and aquatic species away from disturbance and the construction area would be dewatered, see Project Design Criteria and Mitigation Measures related to fish, fish habitat and water quality. All access trails and equipment access areas and tracking on the floodplain would be decompacted, planted and rehabilitated, which would minimize any long term effects to fish and aquatic habitat.

Trenching is a method that may be used in some locations over 4.1 miles of streambank and RHCA in the project area for riparian planting. In order to dig far enough down to ensure roots reach the water table, ground water disturbance may occur, which could input sediment into fish and aquatic habitat. Effect would be short term, and a buffer between the area of trenching and fish and aquatic habitat may filter out sediment before it enters the channel.

Although there would be some short term adverse effect to water quality, short term effects to fish would be minimized since work would occur within the ODFW in water work window, when stream flows are generally low and conditions are dry and fish species are in their least vulnerable life stages. Construction areas would be isolated and fish and mollusks such as freshwater mussels, would be removed and placed at a location upstream of work area, to avoid direct effects from increased sediment and turbidity.

Erosion control measures discussed in the Proposed Action and Alternatives section of this EA would be followed to minimize effects of construction. The HIP Turbidity Monitoring Protocol would be implemented during in channel disturbance. The HIP Turbidity Monitoring Protocol involves measuring suspended sediment to ensure that there are not exceedances in turbidity levels. A site would be sampled 100 feet upstream of project activities and 100 feet downstream; these turbidity levels would be measured and compared every 2 hours. If the difference in turbidity is over 10% at the downstream site, the activity would stop until the turbidity levels return to back ground levels.

Constructed stream channel activation accomplished during instream work periods as described in the Management Requirements section of Chapter 2 has proven effective on small scale projects with smaller streams. Stream channel activation on larger projects and rivers, such as Longley Meadows, where constructed stream channels would be connected and activated during spring high water conditions, would flush sediment during periods of naturally high background turbidity. A variance would be requested for “early activation” of constructed channel segments outside the in-water work window (e.g., spring) to flush channel segments during naturally high turbidity conditions.

Early activation flushes sediment from newly constructed channel segments during periods of normal elevated turbidity, promoting food web recovery for rearing and migrating fish soon after activation. According to modeling done by Warren et al. (2014), juvenile Chinook salmon production in a low gradient, mid-order stream is dominated by bottom up food processes such as detritus, periphyton, and macroinvertebrate interactions thus creating an ideal forage base. A major benefit associated with this action is that during spring runoff, flows are naturally turbid, and fish are accustomed to these conditions. The connection of the newly constructed channel would mobilize and transport fine grained sediment from the constructed channel and allow early

macroinvertebrate colonization. This action would "clean" the new channel so when low flows and the in-water work period arrive, the new channel sediment inputs into the GRR are largely reduced. This reduces the amount of stress applied to aquatic organisms within the reach during a critical time when flows are low, temperatures are rising, and turbidity levels are typically minimal.

Temporary bypass channels are designed to route all river flow around construction activities during the in-water work period. Temporary bypass channels maintain adequate flows for all life stages during operations, including spawning, incubation, emergence, juvenile and adult holding, and passage. When combined with constructed channel segments, benefits of the temporary bypass include: 1) minimize adverse effects to ESA-listed salmonids and other fishery resources by flushing fine sediments from newly constructed channel segments while background turbidity levels are high (e.g., spring); 2) promote fluvial transport of upstream food material (aquatic insect drift) into newly constructed channels early to facilitate food web recovery; 3) promote volitional fish migration; 4) decrease fish handling times and incidental take during fish salvage operations and facilitate effective work area isolation and fish removal; and 5) safely and effectively divert streamflow during construction and optimize water management and turbidity control.

Allowing access to juvenile salmonids would also likely cause a relocation of juveniles from the main channel into the newly constructed channel with deep pools, cover, and velocity refuge. This is likely to reduce the encountered fish densities during de-fishing activities throughout the normal in-water work period. A similar temporary bypass and work area isolation plan was implemented on similar projects (Catherine Creek CC-44 Phases 3 and 4) and allowed for a safe and effective fish salvage effort.

Fluvial transport of upstream materials (aquatic insect drift) would be facilitated through activation of a temporary bypass channel. The bypass channel would be constructed several weeks prior to being connected to the river and would begin to fill with groundwater, thus allowing some primary production to occur before the channel is opened for fish. There may be a slight reduction in foraging behavior, but no increased likelihood of death or injury to individual fish would be anticipated. Additionally, volitional fish passage is implicit in the designs and juvenile salmonids have a short distance to travel to higher, more productive waters.

Water quality monitoring and observations would be recorded to ensure that in-water work is not degrading water quality. Clean Water Act section 401 water quality certification provisions provided by the Oregon Department of Environmental Quality would be followed. If allowable water quality impacts defined by Oregon CWA section 401 water quality certification or HIP Turbidity Monitoring Protocol are exceeded, project operations would stop. The HIP rewatering plan, which involves staged rewatering by introducing streamflow into a new excavated channel or side channel slowly, would be implemented to minimize short term increases in sediment and turbidity and associated effects to fish and aquatic organisms. The turbidity monitoring protocol would be followed during this process also. Adverse effects to fish would be short term and would occur during construction or post construction as the channel is rewatered and connected to downstream flow. Sediment and turbidity increase would not be expected to occur beyond 300 feet downstream of construction.

Large wood structures installed into the banks are expected to dramatically increase bank stability and reduce chronic sediment inputs into the stream from eroding banks after installation. Monitoring of 1996 restoration efforts in Layout Creek, on the Gifford Pinchot National Forest demonstrated that in-stream log structure increased bank stability from 60% stable to 80% stable

and reduced the annual sediment load in treated areas from 330 cubic yards to less than 30 within four years (USDA 2000).

Direct mortality of aquatic macro invertebrates within the project area is anticipated. This impact would be brief (12 hours) after disturbance and would be limited to the treatment reach and approximately 1 mile downstream. Based on research by Novotny and Faler (1982), recolonization of aquatic invertebrates from upriver reaches could occur rapidly due to species dispersal from in river drift. Gersich and Brusven (1981) estimated that full aquatic insect colonization of rock substrates within disturbed areas would take 47 days.

The short term direct and indirect effects of the project actions on sediment and turbidity and substrate embeddedness are expected to move the baseline condition toward a "degrade" rating for the short term (lasting through the length of construction activities). Large wood complexes are expected to retain, sort, and route some amount of construction related sediment within the project reach, however, short term effects of sediment retention could cause elevated substrate embeddedness, affecting the living space for macroinvertebrates and armoring potential spawning gravels. Sediment retention would likely not be observable in the GRR downstream of construction work. Studies have shown that large wood complexes not only catch sediment but the size of sediment that is retained increases spawning habitat for salmonids (McHenry et al. 2007).

Water quality at a local scale is expected to improve in the long term due to a decrease in erosion and sediment input into the channel. As the new channel alignment and complexity, including channel braids and side channels, capture water at high flows and as the wood structures force water laterally onto the floodplain, existing stream banks would receive less sheer stress and would have bank protecting materials such as large wood complexes and eventually mature riparian vegetation to increase stream bank stability.

Rehabilitation of eroding banks would provide long term benefits to fish and aquatic habitat by reducing fine sediment inputs for the long term, at the local, project area, scale. Therefore the long term and indirect effects to fish and aquatic organisms and habitat in the project area on these indicators are considered "restore" indicating the project is likely to have beneficial impacts to sediment levels.

Large Woody Debris

The physical and biological effects of LWM on stream ecosystems has been widely studied, and the effects of streamside logging practices on stream ecosystems in the North American Pacific Northwest of are well understood (Hartman et al 1996). For instance, LWM has been shown to decrease stream bank erosion, increase storage and routing of sediment and organic debris (Smith et al. 1993, Wallace et al. 1995, Gomi et al. 2002, Hassan and Woodsmith 2003), modify and maintain channel geomorphology (Murphy and Meehan 1991, Nakamura and Swanson 1993), alter flows (Bryant 1983, Everest and Meehan 1981, Harmon et al. 1986), retain organic and dissolved materials important to primary producers (Bilby and Likens 1980, Wallace et al. 1995), and lead to increased densities of fish (Roni and Quinn 2001).

Studies have also shown that logging in riparian areas can decrease instream LWM recruitment, and removal of LWM from streams can increase the export of sediment bedload and organic material from stream systems (Dolloff 1986, Smith et al. 1995, Hedin et al. 1988). The result of these practices are obvious in the BTS and Longley project reach of the GRR.

Alternative 1 - No Action

The no action alternative would have no immediate impact on the volume of in-stream large wood. The current condition is "not properly functioning" (Table 6). Current degraded conditions would be "maintained" (Table 6). Currently there is no large wood in the river that qualifies as "large" for the size of river of the GRR and there are extremely limited sources of wood recruitment since riparian areas and streamside vegetation has been degraded by historical land management in the project area and upstream in the Upper Grande Ronde subbasin. It is expected that some large wood recruitment would occur and the volume of instream woody debris would slowly recover in the long term (50-100 years) since riparian areas are now protected. Wood that currently exists in the channel would continue to decay and mobilize with ice buildup and release or flood events. The current lack of large wood within the project area would continue to preclude juvenile salmonid rearing habitat, cover and protection for fish and other aquatic organisms, habitat diversity, and hydrologic and floodplain function.

Alternative 2 - Proposed Action

The proposed action would have major short and long term direct and indirect beneficial effects to fish and aquatic habitat and moderate to major indirect beneficial effects to fish and aquatic species. Up to 2,500 trees, including about 1,000 with rootwads attached, would be incorporated into 335 habitat forming large wood structures over 4.0 miles of channel in the project area. In addition, smaller trees and limbs used to simulate "racking" material would be incorporated into large wood habitat structures. Benefits to adult and juvenile salmonids and habitat from the addition of large wood include increased channel complexity, increased cover for protection, increased pool frequency and quality, improved off channel habitat, increased frequency of inundation of water on the floodplain and retention of organic materials.

Table 11. Alternatives 1 and 2 LWM in Longley Project Area Mainstem and Side Channels

Large Wood Indicators	PFC Levels	Alternatives	
	Properly Functioning Levels	Alternative 1	Alternative 2
Total Wood (pieces/mile)	N/A	16*	625**
Key Pieces (pieces/mile)	>20	0*	186**

*AQI 2015 numbers
**this is total wood divided by 4 miles of channel, it includes side channels

Pieces of LWM would increase dramatically in Alternative 2 (Table 11). The RMO of >20 pieces per mile of "key" sized LWM would be greatly exceeded. The reach would still not be considered "properly functioning" until the riparian area recovered to the point where an adequate source of future woody debris available for recruitment was present. Quantities of LWM in Alternative 1 and 2 shown in Table 11 include wood counts in side channels. The pieces of LWM per mile in Alternative 1 includes AQI survey length downstream of the project area reach.

LWM has been shown to play a crucial role in the survival and abundance of juvenile salmon. In winter months juvenile coho and steelhead have been shown to occupy microhabitats within 1 meter of instream LWM (Bustard and Narver 1975). In contrast, experimental LWM removals from a southeastern Alaska stream lead to a decline in the abundance of age 1 coho and dolly varden (Bryant 1982, Dolloff 1986).

In summary, adverse effects to fish and aquatic organisms from large wood addition including structure construction (discussed in Sediment and Turbidity effects) are expected to be minor and short in duration. Direct and indirect effects to fish and aquatic habitat from large wood addition are expected to be moderate to major beneficial effects. The overall effect of the proposed action on this indicator is classified as "restore," (Table 6) indicating the project would have beneficial fish and aquatic habitat results from increasing large wood levels.

Pool Frequency, Quality, and Large Pools

Pools provide refuge and cover to fish and aquatic organisms, for protection from predators as well as important living space. The following describes the effects of each alternative on pool frequency, quality and size.

Alternative 1 - No Action

The no action alternative would have no impact on pool frequency, quality or large pools. Previous restoration efforts, which used rock dikes and boulder weirs and some buried root wads sticking out of the bank to serve as rip rap would remain in place. Many of these structures were limited in effectiveness in restoring habitat, however some small pools are associated with these structures. The GRR in the project area is considered "not properly functioning" (Table 10) for the habitat indicators pool frequency and quality and large pools. Average residual pool depth was 0.47 meters or 18.4 inches. The percent of the reach considered scour pool is 29%; the majority of the reach is riffle and glide habitat. Current degraded conditions would be "maintained" (Table 10).

Pool frequency, quality, and large pools may slowly improve in the long term if and when mature riparian vegetation and large wood recruitment return to pre-disturbance levels.

Alternative 2 - Proposed Action

Some large wood structures in the proposed action alternative are designed with the objective to scour pools and decrease width-to-depth ratios. Pools would be constructed at some locations and existing pools would be enhanced. Therefore; the direct and indirect effects of the proposed action on this indicator is classified as "restore." Effects from implementing the construction that includes excavation of channel materials to construct large wood structures or create pools is discussed under "Sediment and Turbidity" above.

Table 12. Alternatives 1 and 2 Pool Frequency in Longley Project Area

Indicators	PFC Levels	Reach		
	Properly Functioning Levels	Alternative 1	Alternative 2	
			Mainstem	Side Channels
Pools/mile	26	5	14	18

The increase in wood forced large scour pools would have the potential to directly and indirectly benefit all species and life stages of fish by providing low velocity resting habitat, cover from predators, and depth that could provide cooler temperatures through vertical stratification in the summer and more stable temperatures in the winter (particularly low velocity pools with warmer groundwater and/or subsurface river water) when surface ice occurs. In addition, the increase in large pool habitat would indirectly increase foraging efficiency for juvenile and resident fish at certain life stages. In Alternative 2, approximately 21 major pools would be constructed in the main stem and larger side channels (14/mile). Many additional pools would be constructed in the

smaller side channels and alcove features. There would be approximately 18 pools per mile in side channels Alternative 2.

Through a biotelemetry study in the Upper GRR, Favrot and Jonasson (2016) found that overwintering Chinook parr overwhelmingly occupied near bank pools exhibiting depths exceeding 1 meter, bottom velocities ranging from 0.0 to 0.1 m/s, cobble and boulder substrates, cover consisting of large woody debris, and undercut banks. This was determined to be the most suitable habitat for overwintering parr. Favrot and Jonasson (2016) advise habitat restoration efforts on the upper GRR to focus on stabilizing overwintering conditions, such as side-channels, alcoves, backwaters, and beaver ponds. This is especially important during meteorological conditions such as rain on snow events and ice dam break up that cause flooding. Increased discharge and velocity cause additional stress to overwintering juvenile salmonids during periods when their metabolic rates are depressed. Changes in habitat, including increased velocity, can force salmonids into forced swimming events that can have detrimental effects to fish, causing size selective morality due to exhaustion or elevated predation vulnerability (Simpkins et al. 2004, Brown et al. 2011).

Increasing pool frequency, pool quality and large pools in the 4.1 miles of existing and realigned channel would have major long term, beneficial direct and indirect effects on fish and aquatic habitat in the project area. Restoring this type of habitat would also have major beneficial indirect effects to fish and aquatic species. Short term adverse effects associated with channel construction and excavation of channel bed material are discussed in the Sediment and Turbidity discussion above.

Streambank Condition

Alternative 1 - No Action

The no action alternative would have no impact on this indicator, current conditions, which are "functioning at risk" would be "maintained." Under the no action alternative lateral stream migration and accelerated bank erosion would continue to contribute to the sediment load of the GRR. Upstream of the project near the border of Bear Creek Ranch property, a headcut that has begun just downstream of the split flow on river right could progress upstream and the majority of the Grande Ronde could occupy this new channel. Over the long term (50-200+ years), as riparian forests begin to recover, and the volume of in-stream large wood debris increases, streambank conditions and sediment inputs are expected to slowly improve.

Alternative 2 - Proposed Action

As previously discussed in Sediment, Turbidity, and Substrate Embeddedness section of this analysis, bank stability is expected to be dramatically increased and, thus, the short term and long term direct effects to fish and aquatic habitat of the proposed action on this indicator are classified as "restore." Benefits to fish and aquatic species would be indirect in nature and associated with stabilizing banks and bank erosion using large wood and riparian planting, adjusting width to depth ratio, and constructing bank protecting large wood complexes. In addition, creating more complex channel(s) with braids and complexity would be expected to reduce the sheer stress on erosional banks during run off and high flow events. In addition, addressing ice forming dam build up and break up effected areas would reduce the impact on eroding banks during such events.

Width/Depth Ratio

Alternative 1 - No Action

The existing width to depth ratio in this section of the mainstem GRR, characterized by an extremely over widened channel, would remain the same due to lack of channel roughness found in large wood, resistant bank material, or adequate riparian vegetation. The lack of connectivity with the floodplain would continue to reduce the storage capacity and slow release of water saturated in the floodplain throughout the summer months. The no action alternative would "maintain" a degraded condition for this indicator (Table 6).

Alternative 2 - Proposed Action

Implementation of the proposed action would have immediate direct effects on fish and aquatic habitat through decreasing width to depth ratio. Realigning the mainstem GRR and increasing complexity, braiding, improving off channel habitat, and narrowing cross-sectional area to force scour pools, would restore channel morphology. Large wood structures and increased bank stability would provide a more defined river channel with greater lateral resistance, which would indirectly decrease width to depth ratios beginning in the short term and persisting in the long term. These actions would create deeper, more defined pools and riffle sections with adequate gravels and improved aeration, lateral sediment storage features, and floodplain development. Analysis of previous restoration efforts suggests that width-to-depth ratios may be reduced by one-third or more in the year following structure installation (USDA 1997). This immediate enhancement of channel morphology would foster recovery of riparian vegetation and floodplain function. Reduction in width-to-depth ratios and increased stream shade in the long term is also expected to incrementally decrease water temperature (see Temperature analysis above). Consequently, the indirect effects of the proposed action alternative on this indictor are classified as "restore."

Table 13. Alternatives 1 and 2 Width to Depth Ratio in Longley Project Area

Indicators	Rosgen C4 Channel Range (PFC)	Alternative 1	Alternative 2	
			Main Stem	Side Channels
Width to Depth Ratio	13.5-28.7	28.6	20-22	12 to 13

Riparian Habitat Conservation Areas

Alternative 1 - No Action

The no action alternative would have no impact on riparian forests over the short- or mid-term (0-10 years). Current conditions, "functioning at risk" would be "maintained." Riparian vegetation would likely grow at current rates, with potential improvement in forest structure and diversity as trees become more mature. With the existing cottonwood trees, a seed source exists and there are some areas where young trees are thriving. It would be expected that in 50-100+ years root networks would help stabilize soils, canopy cover would more sufficiently shade streams, and sources of large wood recruitment would exist. And because there is no grazing on the public land portion of this project and no harvest of trees within 300 feet of the main stem or existing side channels, riparian vegetation would be expected to continue to improve if conditions such as soil moisture, chemistry, and nutrients are suitable for existing species.

Alternative 2 - Proposed Action

During the construction phase along the riverbank some trees may be removed as excavators access treatment site and realignment areas and dig the log structures into the bank. These trees would be incorporated into the constructed log complexes. There would be 1.65 miles of temporary roads built and approximately 11 acres of staging, storage and stockpile areas in the floodplain with some amount of clearing or damage existing vegetation including. Removal of existing vegetation would cause some short term effect to the riparian area, floodplain and potentially stream banks and stream channel. Direct effects to water quality from loss of vegetation from stream banks would be erosion during runoff and high water events. This would be minimized by implementation of the erosion control plan (such as silt fencing). Indirect effects to fish and aquatic habitat and species from removal of some streamside vegetation is loss in shade and cover. No large trees would be cut and removed from the riparian area. New or existing side channels would be designed to maintain riparian trees for shade and future large wood recruitment as much as possible. These disturbances would be minor and short term. Revegetation of the site would be expected to begin in the first year post project completion. Additional plantings and seeding exposed soil are activities that would take place after construction is complete. Recovery and establishment of mature riparian vegetation would occur on a long term time scale.

All decommissioned access trails and temporary staging areas would be seeded using a native erosion control mix and replanted after soil is decompacted as outlined in Project Design Criteria and Mitigation Measures. In addition to all disturbed areas being seeded and replanted, project activities include large scale riparian planting. The planting plan includes seedlings and cuttings on stream banks, on the floodplain, and on channel islands and gravel bars in the channel. Seedlings and cuttings would be planted over some or all of the 4.1 miles of stream bank and floodplain associated with channel restoration. Short term effects from ground disturbance associated planting include mechanical trenching, use of a skid steer mounted auger to drill holes to a depth where roots have access to groundwater. Potential short term effects to water quality from increased sediment and turbidity are discussed in the Sediment and Turbidity section of this analysis.

Short term indirect effects to fish and aquatic species and habitat could occur from ground disturbance resulting in increased turbidity during excavation within the channel as discussed in the Sediment and Turbidity analysis above. In the long term (30+ years), stabilization of the floodplain and accelerated recovery of riparian areas would indirectly benefit fish and aquatic habitat and species by providing stream shade, banks stability and future recruitment potential of large woody debris. Moderate to major beneficial effects to the RHCA including vegetation recovery, floodplain function, water quality, and soil rehabilitation are expected.

There would be a short term “degrade” to Riparian Habitat Conservation Areas during the construction phase of the proposed action, but the project effects would have a long term “restore” effect to the Riparian Reserve.

A. Aquatic Management Indicator Species

Introduction

U. S. Forest Service (USFS) regulations require site-specific analysis of the effects of actions on species identified as Management Indicator Species in the Wallowa-Whitman Forest Land and Resource Management Plans (LRMP, 1990) as amended. This analysis was conducted for the Longley Meadows

Fish Habitat Enhancement Project and meets USFS regulations, policies and objectives for MIS management.

The Wallowa-Whitman National Forest Land and Resource Management Plan (1990) identifies the following fish species as management indicator species: redband /rainbow trout and steelhead. These species were selected as they were considered to be good indicators of the maintenance and quality of instream habitats. These habitats were identified as high quality water and fishery habitat.

The National Forest Management Act regulations require that "fish and wildlife habitat be managed to maintain viable populations of existing …species in the planning area." To ensure that these viable populations are maintained, the Pacific Northwest Region of the Forest Service has identified management requirements for a number species within the region. These Management Indicator Species are emphasized either because of their status under ESA or because their populations can be used as an indicator of the health of a specific type of habitat (USDA 1990).

Riparian areas occur at the margins of standing and flowing water, including intermittent stream channels, ephemeral ponds, and wetlands and extend out to include the floodplain and associated groundwater and vegetation. The aquatic MIS were selected to indicate healthy stream and riparian ecosystems across the landscape. Attributes of a healthy aquatic ecosystem includes: cold and clean water, clean and appropriate sized channel substrates, stable streambanks; healthy, mature streamside vegetation, complex channel habitat created by large wood, cobles, boulders, streamside vegetation, and undercut banks, deep pools, and no artificial barriers obstructing movement. Healthy riparian areas maintain adequate temperature regulation, nutrient cycles, natural erosion rates, and provide for instream wood recruitment.

The length of the upper GRR through the project area, 1.5 miles, is documented habitat for redband and steelhead trout.

Steelhead :
The viability criteria defined by the Interior Columbia Technical Review Team (ICRT) reflects the hierarchical structure of salmonid populations and species. The criteria describe the biological characteristics for the species, Major Population Groups (MPGs) and independent populations that are consistent with a high probability of long-term persistence. The ICTRT used the viability criteria to assess the extinction risk based on four different viable salmonid population (VSP) parameters: abundance, productivity, spatial structure and diversity. The ICTRT also assessed the "gap" between the populations' current status and the desired status for delisting based on the viability criteria. The ICTRT used the information from the population –level assessments to evaluate viability at the next hierarchical level, the MPG. All Steelhead MPGs need to meet the ICTRTs viability criteria for the ESU to be rated viable.

The Lower Grande Ronde population of the Grande Ronde MPG currently does not meet the minimum abundance and productivity values that represent levels needed to achieve a viable population (95% probability of persistence over 100 years for the population). The current status of the Lower GRR Steelhead population for risk of extinction is Low to Moderate with the desired status of Low or Very Low Risk.

The Wallowa-Whitman National Forest is utilizing this viability assessment for Snake River Steelhead populations for the purposes of MIS assessment.

Redband/Rainbow Trout:
Redband trout habitat requirements are similar to that of juvenile steelhead. Redband trout are sensitive to changes in water quality and habitat. Adult redband trout are generally associated with pool habitat,

although other life stages require a wide array of habitats for rearing, hiding, feeding and resting. Pool habitat is important refugia during low water periods. An increase in sediment in the stream channel lowers spawning success and reduces the quality and quantity of pool habitat. Spawning takes place from March through May. Redband redds tend to be located where velocity, depth and bottom configuration induce water flow through the stream substrate, generally in gravels at the tailout area of pools. Eggs incubate during the spring and emergence occurs from June through July depending on water temperatures. Redband trout may reside in their natal stream or may migrate to other streams within a watershed to rear.

Other important habitat features include healthy riparian vegetation, undercut banks and large wood debris. The Wallowa-Whitman National Forest is utilizing this fish/habitat relationship to provide the basis for assessment of redband trout populations for the purposes of MIS assessment.

In the absence of redband trout population trend data, the Wallowa-Whitman National Forest has measured key habitat variables, and then assessed changes expected to occur as a result of project activities. This MIS analysis assumes that activities that maintain and improve aquatic/riparian habitat would provide for resident fish population viability on Wallowa-Whitman National Forest lands.

Affected Environment

The area of analysis for USFS MIS for the proposed action is miles of steelhead and redband/rainbow trout habitat in the project area, 1.5 miles. There is approximately 990 miles of steelhead habitat and over 1,310 miles of redband/rainbow trout habitat on the Wallowa-Whitman National Forest. The amount of habitat in the project area represents a fraction of the overall miles of habitat for the entire forest.

Overall habitat conditions for the Upper Grande Ronde Subbasin, and specifically the reach of the GRR in the project area, confirmed by recent ODFW (CHaMPs and AQI) habitat data, are rated as not properly functioning for temperature, sediment, substrate embeddedness, large woody debris, pool frequency and quality, large pools and width to depth ratio. The current conditions for streambank condition and riparian reserves are functioning at risk (Table 6). These surveys collect data on stream channel and habitat elements, riparian vegetation and fish. Data collected from these surveys are then rated using habitat indicator benchmarks developed by the NMFS (1996) and USFWS (1998).

Direct and Indirect Effects to Aquatic MIS

Alternative 1 - No Action

Under Alternative 1 the current conditions considered to be “functioning at risk” would be maintained. The degraded habitat conditions would continue to negatively impact MIS fish species and would not support their life cycle needs in the short or long term.

Alternative 2 – Proposed Action

There is potential for short term direct effects to MIS fish and fish habitat from the implementation of the proposed action. Direct effects are fish salvage, which would trap, net or electroshock fish to capture them and relocate them to an adequate area upstream of isolated areas, which would be dewatered. There would be short term direct effects to water quality from channel work including habitat structure construction, channel realignment including streambed excavation, wood and boulder placement, and digging in streambanks for riparian vegetation planting. These direct effects to water quality could have indirect effects to MIS fish downstream of the project area, if suspended sediment and turbidity is carried into an area where fish are present (for more information see direct and indirect effects to Sediment and Turbidity in the

Effects Analysis). Project design would monitor turbidity and water quality, utilize erosion control measures and follow all HIP Construction and Post Construction Conservation Measures. This would minimize direct and indirect effects to fish.

Long term benefits to all habitat indicators would have moderate to major beneficial effects to redband/rainbow trout and steelhead. Improved habitat, increased channel complexity, restored floodplain function, riparian vegetation planting and restoration would all benefit habitats in this reach of the GRR.

B. Project Effects on Riparian Management Objectives (RMOs)

Landscape-scale interim RMOs describing good habitat for anadromous fish were developed using stream inventory data for pool frequency, large woody debris, bank stability, and width to depth ratio. State water quality standards were used to define favorable water temperatures. All of the described features may not occur in a specific segment of stream within a watershed, but all generally should occur at the watershed scale for stream systems of moderate to large size (3rd to 7th order).

RMOs are as follows:

Pool Frequency: (varies by wetted width)

Wetted width in feet:	10	20	25	50	75	100	125	150
Number of pools per mile:	96	56	47	26	23	18	14	12

Water Temperature: Compliance with state water quality standards, or maximum < 68F.
Large Woody debris: > 20 pieces per mile; >12 inches diameter; 35 foot length
Bank Stability: >90 percent stable
Width/Depth Ratio: <10, mean wetted width divided by mean depth

All of the RMOs would be trending toward "restored" in the long term with the implementation of the proposed action (see Table 6).

Cumulative Effects to Fisheries and Aquatic Habitat

Potential cumulative effects are analyzed by considering the proposed activities in the context of present and reasonably foreseeable future actions. Reasonably foreseeable future action is defined as within the next five years. Appendix D of the EA summarizes the present and reasonably foreseeable management activities that would occur in the cumulative effects analysis area, and summarizes the determination of cumulative effects.

The logical area for effects to occur that could have a cumulative impact would be in two subwatersheds that partially overlap with the project area; Coleman Ridge-Grande Ronde River (HUC 170601040307), and Jordan Creek subwatershed (HUC 170601040303). Because the project area and effects analysis area is small (139 acres), activities that occur within portions of these subwatersheds that are not in the vicinity of the project area are less likely to add to a cumulative effect.

Alternative 1 - No Action

The detrimental effects from no action are similar to indirect effects of lack of recovery from past degrading actions rather than cumulative effect from no action. The proposed project area, like most of the upper GRR has been highly disturbed by the historical logging, grazing, road building, mining and beaver trapping. By not improving channel conditions in this alternative, the proposed project area would continue to maintain a degraded channel condition and degraded habitat for fish and aquatic species.

Past timber harvest, splash dams, railroad grade, road building, converting floodplain into agricultural uses, and heavy grazing have been the primary management activities that contribute to cumulative effects and degradation of fish and aquatic habitat. Ice buildup and flooding has also likely slowed the rate of recovery of the upper GRR through the Longley project area. Restoration efforts in Bird Track Springs and the upper watershed have included road decommissioning, instream large wood placement, and riparian plating.

Future timber harvest and road construction on private lands within the subwatersheds could result in incremental increases in fine sediment which could be delivered to fishbearing streams, particularly if these activities occur within RHCAs. Sediment production from future vegetation management projects on public lands is not expected to accumulate to levels above background, because riparian protection measures would be incorporated into harvest unit design and vegetation treatments on public land.

Alternative 2 - Proposed Action

Fine sediment introduced into the GRR channel affecting this reach of the GRR and up to 300 feet downstream of the site during construction activities is the most widespread indirect effect from prosed activities. This would cause short term effects to water quality and indirect effects to fish and aquatic habitat and individuals. Turbidity levels are expected to return to background levels within hours of construction completion. All work would be done during low flows and dry conditions. Long term effects of the proposed action would improve conditions to habitat.

Other activities in the project area or within subwatersheds affected by the project area that cause sediment input could have a cumulative effect on fisheries and fish habitat, particularly if they occur during the construction and operating window for the proposed action (since increased sediment and turbidity would be short in duration). Sediment entering the stream from OHV use and user built trail construction could impact riparian habitat, streambanks and could introduce sediment into the channels. Because the Longley project area receives recreation use, due to adjacent recreation facilities, these activities could cause additional sediment to the channel, which would result in a short term cumulative effect on water quality in the project area and downstream of the project area.

It is not known whether road building or timber harvest is planned on private lands in subwatersheds that overlap with the project area. If these activities occur at the same time as implementation of the proposed action, an incremental increase in fine sediment could be delivered to the GRR through tributaries on private land.

Current (Bird Track Springs Fish Enhancement Project) and future restoration activities within these subwatersheds or in the Upper Grande Ronde Subbasin that would address prime spawning habitat for Chinook or cold water refute found in tributaries to the GRR that benefit rearing juvenile fish, would have overall beneficial cumulative effects to fish and aquatic species that occupy these habitats.

Forest Plan Compliance

The Longley Meadows project would meet the goals identified in the Forest Plan to maintain or enhance the unique and valuable characteristics of riparian areas and improve water quality, stream flows, and fish habitat.

Hydrology, Floodplains and Wetlands Resources

Introduction

The Longley Meadows project area ranges from 3,050 feet of elevation at the downstream end to 3,080 feet at the upstream end and drains an approximately 475-square-mile watershed that reaches a maximum elevation of 7,923 feet. The mean annual precipitation averages 26.2 inches, most of which falls as snow during winter months. Most of the basin is forested (over 73%) and has very little development (less than 0.1% estimated impervious area) (U.S. Geological Survey [USGS] 2014). The reach was identified in the Upper Grande Ronde River Tributary Assessment (U.S. Bureau of Reclamation [Reclamation] 2014) as an unconfined geomorphic reach with high potential to improve physical and ecological processes to support salmonid recovery.

Affected Environment

In the project reach, the Upper Grande Ronde (UGR) was historically likely an unconfined, forced alluvial channel with alternating pool-riffle and run bedforms. Beechie and Imaki (2014) empirically determined that intermediate-sized unconfined channels, similar to the UGR, that transport their sediment primarily as bedload and retain wood long enough to establish erosion-resistant points were transitional, and generally favored island-braided patterns in forested mountain systems (Cardno 2016a). Beechie and Imaki's (2014) data also show that island-braided channels are continually adjusting to intermittent perturbations, which sustains a high degree of successional states, resiliency, and habitat diversity (Cardno 2016a). Analysis of aerial imagery, light detection and ranging (LiDAR) and elevation data, and field observations of existing conditions and features including existing riparian vegetation and floodplain features was utilized to estimate the historical planform of the GRR within the project area. Based on the results of the analysis, field observations, and literature findings, it is believed that the GRR within the project area was a multi-thread channel with interconnected beaver wetland complexes.

Based on geophysical investigations conducted in association with the Bird Track Springs Project (BTS), a simplified description of the general geologic conditions of the active floodplain of the GRR within the Longley Meadows Fish Habitat Enhancement Project area would be approximately 20 feet of alluvial material overlying bedrock, with the bedrock shallowing to depths of approximately 15 to 18 feet in the downstream end of the project area. The valley bottom alluvium has been identified as the Gulliford-Collegecreek-Bullroar complex (U.S. Department of Agriculture [USDA] 1995).

Within the project area, the GRR is moderately confined—defined here as having a floodplain width greater than two but less than four times the bankfull width (Oregon Watershed Enhancement Board [OWEB] 1999). The moderately confined designation is based on a bankfull width bound by the existing railroad grade alignment.

The project area was delineated into two geomorphic reaches based on physical characteristics including degree of confinement, channel sinuosity, and land use. Levels of channel and floodplain dynamics were also considered in the reach delineation. Table 14 and Figure 9 provide a summary of the geomorphic characteristics and show surficial geology for Reaches 1 and 2 for the project area. The overall average stream gradient is 0.5% in both Reaches 1 and 2 (Figure 9).

Table 14. Key Channel and Streambank Characteristics by Geomorphic Subreach

Reach ID	Length (ft)	Average Slope (ft/ft)	Sinuosity (ft/ft)	Average Riffle Spacing at Low Flow		% of Riffle, Run or Pool by Length at Low Flow			% of BFW Area that is Bar (vegetated and non-vegetated) at Low Flow	% of Channel Length with Eroding Banks ft/ft
				ft	xBFW*	Riffle	Run	Pool		
1	5,394	0.0051	1.4	301	2.2	27	61	12	51%	57%
2	2,796	0.0051	1.1	209	2.4	48	52	N/A	44%	NA

* Multiples of bankfull width

Figure 9. Preliminary surficial geology of the Longley Meadows Fish Habitat Enhancement Project area.

Within Reach 1 of the project area, the GRR is unconfined, with a straight (sinuosity <1.5) channel planform. The bedform is predominantly run, and bed material consists mostly of gravel and cobble-sized material. The runs are typically long, with average lengths of 226 feet, with common instances of residual depth of up to 2 feet. Geomorphic elements (wood or other) are not present in the reach aside from some structures placed in the stream associated with past restoration activities. However, during the winter months, ice can potentially act as a geomorphic element to raise water surface elevations and/or redirect water onto adjacent floodplain surfaces and scour bed and bank surfaces. Based on field observation and existing condition floodplain inundation at bankfull, 2-year, and 5-year recurrence interval discharges, the GRR in Reach 1 is interpreted to be incised by roughly 3 to 4 feet.

Within Reach 1 approximately 47 acres of floodplain is located along river left. The floodplain area contains a wetland complex that flows into the mainstem along the left bank. The source of the wetland is believed to be groundwater upwelling, and is a cold-water source. At the downstream end of Reach 1 approximately 8 acres of floodplain is located on river right. Highway 244 and the historic railroad grade occupy and/or disconnect approximately 3 additional acres of floodplain.

In Reach 2 of the project area, the GRR is unconfined with a straight planform (sinuosity of 1.1). The bedform is plane bed with a riffle-run morphology consisting of predominantly cobble and gravel-sized material. The riffles and runs are long, averaging 190 feet and 210 feet in length, respectively. Also similar to Reach 1, geomorphic elements (wood or other) are not present in the reach. In winter months, ice can potentially act as a geomorphic element to raise water surface elevations and/or redirect water onto adjacent floodplain surfaces and scour bed and bank surfaces. Based on field observation and existing condition floodplain inundation at bankfull, 2-year, and 5-year recurrence interval discharges, the GRR in Reach 2 is interpreted to be incised by 3 to 5 feet. Banks comprise varying percentages of cobble and gravel, with sand and silt overlain by floodplain deposits of silts and fine sand. Approximately 24 acres of active floodplain is located along river right (Figure 10). Approximately 10 additional acres of floodplain are occupied or disconnected due to the presence of Highway 244 and the historic railroad grade.

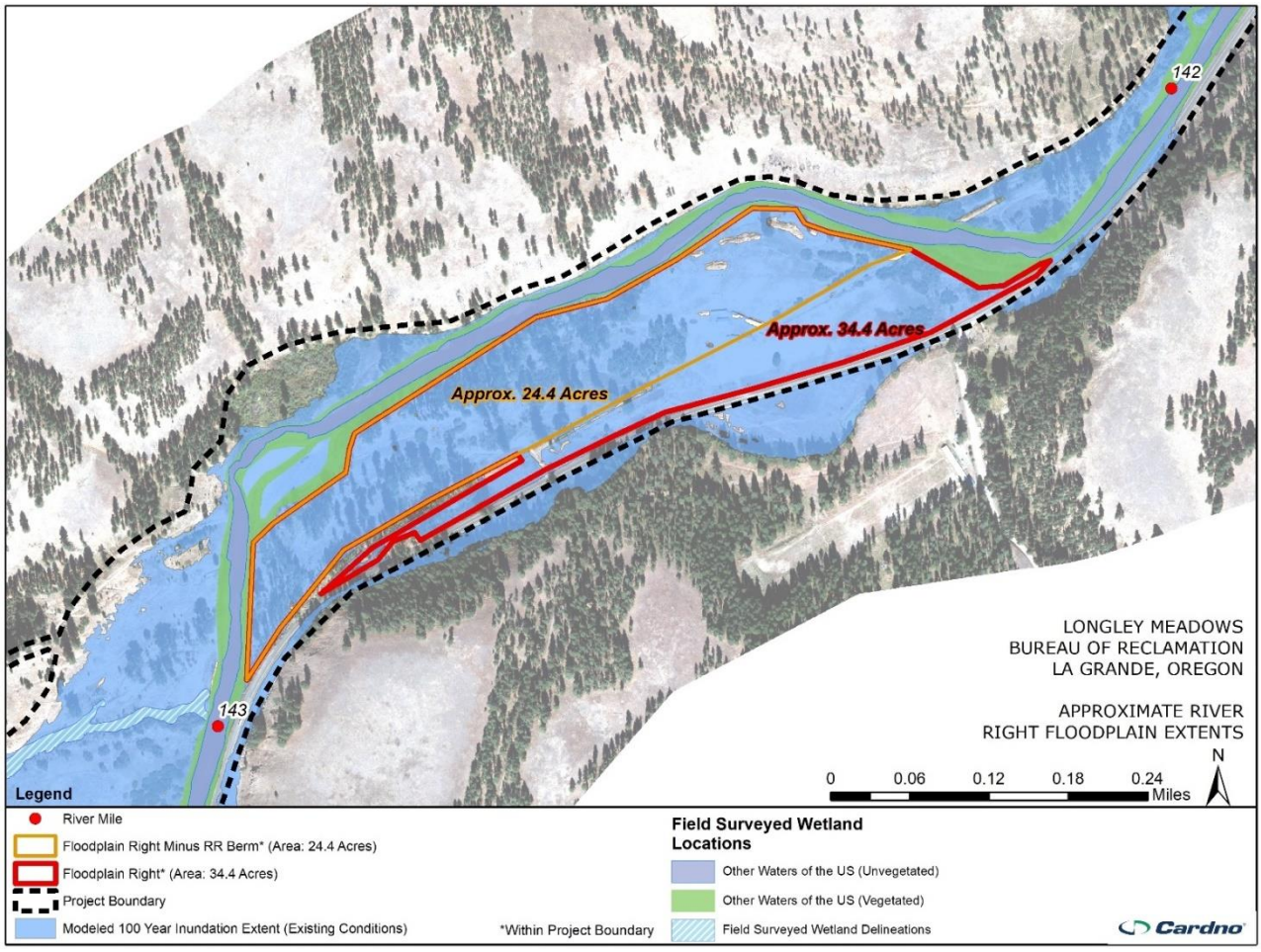


Figure 10. Approximate river right floodplain extents of the Longley Meadows Fish Habitat Enhancement Project area.

A. Hydrology

Flows in the UGR are not impacted by dam-imposed flow regulation. In general, the annual hydrograph is dominated by snowmelt-derived high flows in April and May, with peak flows also occurring occasionally due to winter rain storms. The low-flow season typically extends from August through December. A detailed hydrologic analysis was conducted in conjunction with the BTS project (Cardno 2016a: Appendix C) and updated for Longley Meadows (Reclamation 2018). Results from these documents are summarized below. Recurrence interval flows were estimated for 1.05- to 500-year peak flows, and flow duration curves were estimated using data from gages near the project site or from regional regression equations. Table 15 lists the gages used in the analysis, their location on the river, drainage area, and period of record. In addition, flows were measured during the summer of 2015 to better calibrate low-flow estimates.

Table 15. Stream Gages in the GRR Basin used in the Hydrologic Analysis

Station Number	Name	Agency	River Mile	Drainage Area (mi^2)	Start Year	End Year
13319000	Grande Ronde R at La Grande, OR	USGS	132	686	1903	1989
13318960	Grande Ronde R Near Perry, OR	OWRD	135.9	677	1997	Current
13318920	Five Points Cr at Hilgard, OR	OWRD	137.7	71.9	1992	Current
13318800	Grande Ronde R at Hilgard, OR	USGS	139.3	544	1966	1981
13318500	Grande Ronde R Near Hilgard, OR	USGS	142.9	495.7	1937	1956

Table 16 displays estimated monthly and annual flows for the 5% exceedance discharge (high flows exceeded 5% of the time in a given month based on the period of record), the 50% exceedance discharge (the median monthly flow), and the 95% exceedance discharge (low-flow conditions where flows are expected to be higher 95% of the time) estimated at the upstream project boundary at RM 146.1. Trends in the flow data over the period of record were reviewed to see if change had occurred in discharges and peak flows. The results indicate a slight increase in the median and 95% exceedance (i.e., low) flows on the UGR, although the statistical significance of the increase was not tested. Three out of four local weather stations showed a slight increase in mean annual precipitation and all four stations showed a slight increase in mean annual temperature over the period of record (since 1895).

Table 16. Exceedance Statistics for Flows Estimated at the Upstream Project Boundary at RM 146.1

Month	5% Exceedance Discharge (cfs)	50% Exceedance Discharge (cfs)	95% Exceedance Discharge (cfs)
October	68	25	15
November	168	37	19
December	383	58	19
January	515	83	30
February	671	148	47
March	1,395	412	89

Month	5% Exceedance Discharge (cfs)	50% Exceedance Discharge (cfs)	95% Exceedance Discharge (cfs)
April	1,697	725	276
May	1,645	634	183
June	1,083	221	65
July	204	54	16
August	49	20	9
September	40	19	12
Annual	1,079	77	14

To determine how the BTS design flows could be modified for use at Longley Meadows, the percent increase was determined for each peak flow calculated for Longley Meadows. This increase was consistently near 4.6%. Habitat design flows from BTS were increased by 4.6% to determine flows for Longley Meadows. Mainstem GRR design flows and their corresponding annual exceedance for key periods of salmonid use within the project reach are summarized in Table 17 below.

Table 17. Habitat Design Flows for the Upstream Project Boundary (RM 143.6)

Design Flow Description	Flow (cfs)	Exceedance Statistic
Low flow (winter and summer)	19	95% exceedance for critical winter rearing period (October–March) 50% exceedance flow for August
Winter median flow	86	50% exceedance for critical winter rearing period (October–March)
Median March flow	418	Approximately the 50% exceedance flow for March
Winter high flow	941	5% exceedance for critical winter rearing period (October–March)

The highest mean monthly flows occur in April and May, and two of the top 10 historical flood peaks occurred in May. The other eight historical peak flows occurred in January through March and were likely the result of rain-on-snow storm events. The flood of record occurred on January 30, 1965, as a result of a major warm rain event following a week of continuous rain and snow. The heavy rainfall in combination with antecedent conditions and a much higher freezing elevation caused record runoff. That peak is estimated at 9,082 cubic feet per second (cfs) at the upstream project boundary and would be between a 200-year and 500-year event based on return interval estimates at that location (Cardno 2016a: Appendix C). A slight increase in peak flows was noted over the period of record, but was not statistically tested (Cardno 2016a: Appendix C). Table 18 shows the flow estimates for various return intervals at the upstream project boundary and its tributaries within the project area.

Table 18. Annual Return Intervals for the Grand Ronde River at the Project's Upstream Boundary and Its Tributaries within the Project Area

Annual Probability	Annual Return Interval	GRR (RM 143.6) (cfs)	Jordan Creek (cfs)	Unnamed Tributary 2 (cfs)	Spring Creek (cfs)
0.95	1.05	1,002	47	12	64
0.9	1.1	1,174	55	14	75

Annual Probability	Annual Return Interval	GRR (RM 143.6) (cfs)	Jordan Creek (cfs)	Unnamed Tributary 2 (cfs)	Spring Creek (cfs)
0.8	1.25	1,432	67	17	91
0.6667	1.5	1,731	81	21	110
0.5	2	2,113	90	22	122
0.4292	2.33	2,314	108	28	146
0.2	5	3,210	148	37	200
0.1	10	4,025	190	48	257
0.04	25	5,153	245	62	332
0.02	50	6,062	288	73	389
0.01	100	7,031	332	85	448
0.005	200	8,069	377	96	509
0.002	500	9,557	440	113	594

The lowest flows of the year typically occur in the project reach in August and September (Table 16). Low flows are typically coupled with high temperatures, impacting salmonid species (Salinger and Anderson 2006). Much of the flow through the project reach during the low-flow season is subsurface, as described below in Section 1.3. There is little evidence of groundwater contribution to low flows in this reach to moderate temperatures.

The primary modification for the Longley Meadows analysis was to move the upstream boundary of the analysis from RM 146.1 downstream to RM 143.6, the beginning of the Longley Meadows project area, to estimate mainstem GRR flows. Additionally, 4 years of provisional gage data from the closest active gauge (13318960 GRR near Perry, OR) was included in this analysis for water years 2015 to 2018. The peak flows during this time did not rank in the top 10 historical peak flows and in general were moderate. The additional data were used for flood flow. Tributary flows entering the project reach were not modified.

Groundwater

Anderson-Perry & Associates, Inc. and GSI Water Solutions, Inc. conducted the Upper Grande Ronde River Watershed Storage Feasibility Study for the Grande Ronde Model Watershed (Anderson Perry & Associates and GSI Water Solutions 2013). Their study area included the Bear Creek Subbasin, which is less than 0.5 mile downstream of the project reach. Boreholes in the vicinity of the Bear Creek Subbasin showed there was between 40 feet to over 100 feet of weakly cemented interbedded sandstone, siltstone, and gravel overlying basalt flows. The alluvial aquifer is a thin veneer of fluvial deposits overlying much older sedimentary and volcanic rock within a shallow, fault-bounded structural basin. The average residence time of water flowing through the alluvial aquifer is likely less than 1 year, a rate that is likely much shorter than the residence times in the underlying regional bedrock aquifer.

The hyporheic zone is the volume of saturated sediment surrounding the open channel flow. The water filling the pore space in the sediment of the hyporheic zone comes from the channel rather than a deep groundwater source. At the project reach, particularly during summer low flow, the entire valley bottom can be considered the hyporheic zone, bounded by the much less hydraulically conductive bedrock. Throughout the year, it does not appear that deep groundwater inputs add appreciably to discharge at this

site; especially during summer low flow, the vast majority of water in the alluvial aquifer is of riverine origin.

In October of 2017, five piezometers were installed in the Longley Meadows reach to support project monitoring. Continuous monitoring of water levels and temperature is ongoing to support pre-project implementation vs. post-project assessment. Additionally, the development of the wells included logging the size and type of sediment, depth to groundwater, and depth to refusal. Current groundwater data are depicted in Figures 11 and 12 below (Reclamation 2018).

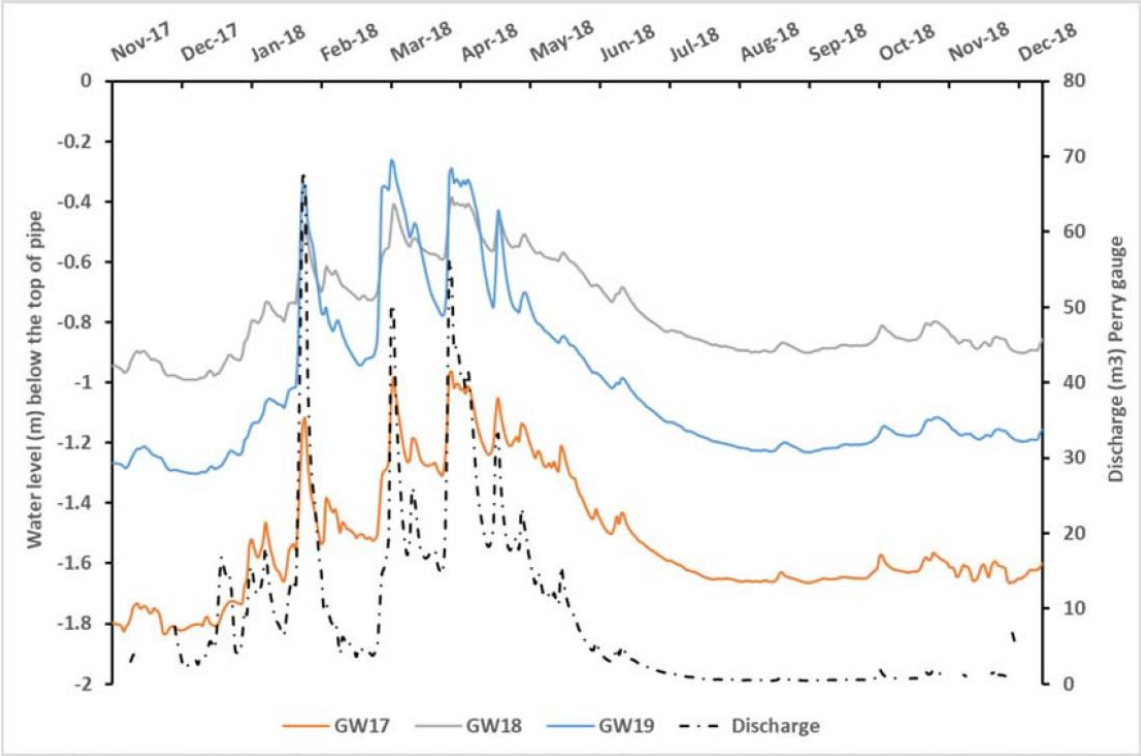


Figure 11. Longley Meadows Reach Average Daily Groundwater Levels and Discharge at Perry Gauge for Wells 17–19, November 2017 to December 2018.

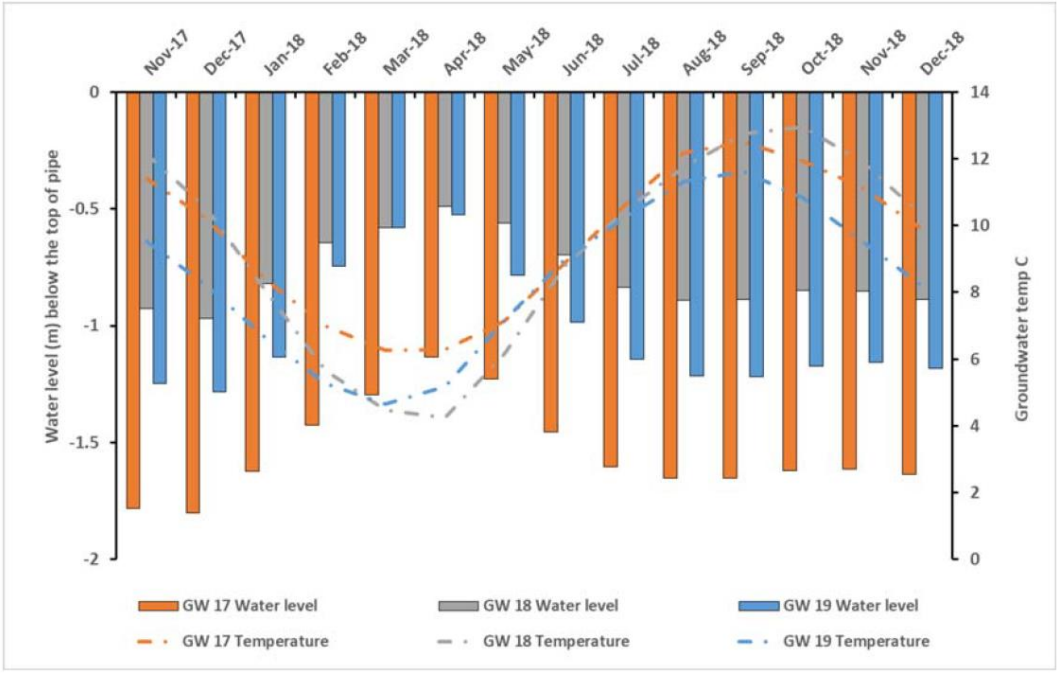


Figure 12. Longley Meadows reach monthly average groundwater levels for Wells 17–19 and corresponding groundwater temperatures, November 2017 to December 2018; colors for groundwater temperatures and levels are matching.

B. Floodplains

Flooding

Bankfull discharge was estimated for the project reach as the 1.25-year return interval flow of approximately 1,432 cfs. Technically, these flows occur almost every year, and higher flows would result in out-of-bank flows at some areas along the project reach, causing localized flooding. The modeled return intervals are provided in the flooding effects analysis below.

Floodplain Overlay Zone

Article 17 of the Union County Planning Department regulations describes the Floodplain Overlay Zone and regulations regarding development in the floodplain (Union County Planning Department 2019). The rule requires development or building permits before construction or development occur in areas of special flood hazards as defined by the Federal Emergency Management Agency (FEMA) on the Flood Insurance Rate Maps (FIRM). Most of the regulations pertain to construction of buildings in the floodplain. The most recent FIRM for the active project area was published in 1980 and includes the entire active project area (Figure 13). The base flood elevations at this location have not been determined, but the estimated Special Flood Hazard Area includes the project area and extends beyond Highway 244. It should be noted that this flood map was produced using regional information and should only be considered for regulatory purposes rather than an accurate estimate of the extent of a 100-year flood event.

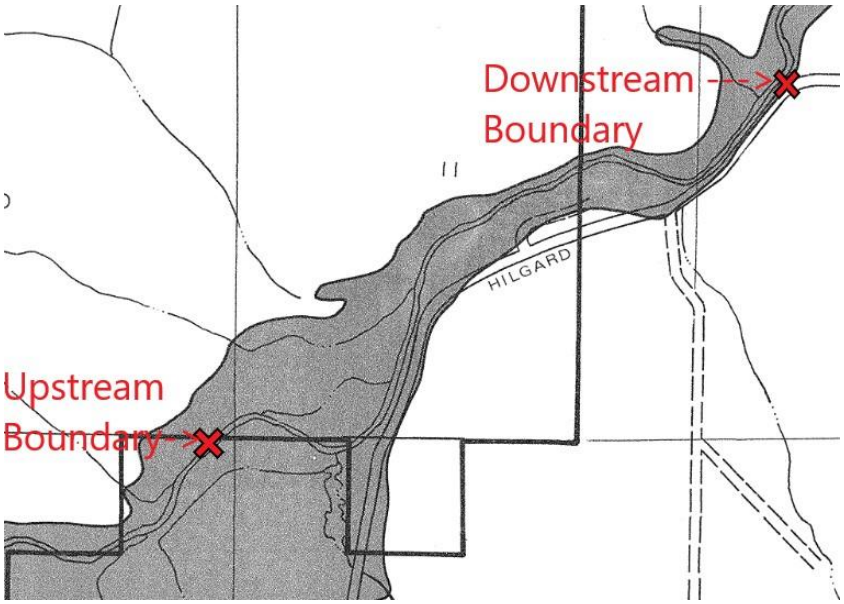


Figure 13. Close-up of the project area from Flood Insurance Rate Map 4102160275B, effective May 15, 1980. The gray area is Zone A; areas of 100-year flood, base flood elevations, and flood hazard factors are not determined.

Water Quality

The Oregon Department of Environmental Quality's (ODEQ's) most recent (2012) integrated report listing 303 limited waterbodies identified seven parameters for the UGR within the project area as water quality limited: algae, flow modification, habitat modification, pH, phosphorous, sedimentation, and temperature (ODEQ 2016). Water quality limited means instream water quality fails to meet established standards for certain parameters for a portion of the year and requires a total maximum daily load (TMDL) to be prepared to address pollutants. The TMDL and Water Quality Management Plan were prepared for the UGR in 2000 to address these parameters (ODEQ 2000). Due to the predominance of non-point sources, the plan relies largely on habitat restoration to achieve the TMDL goal standards related to beneficial uses for fish life. Temperature and sedimentation are discussed in more detail below and pool-riffle ratios are discussed in the geomorphology section above (Table 14). Flows are discussed in

the hydrology section. No data were available regarding dissolved oxygen, pH, or phosphorous levels in the project reach.

Temperature

The state standard for the GRR in the project area is 17.8°C (64°F). In 2010, thermal infrared water temperature data were collected for the UGR. This type of data indicates differences in water temperatures across a large area at one point in time so that relative temperatures can be compared. In general, temperatures decreased in the upstream direction with lower flows and higher elevation. Tributaries, particularly those flowing into the mainstem just downstream of the project reach, contributed water that was cooler by 0.5 to 3°C.

Biologists from Reclamation and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) deployed several surface water temperature monitoring probes in 2017 and 2018 within the current project reach (Figure 14; CTUIR 2019). The data presented in Figure 15 below represent the 7-day average of maximum temperatures (CTUIR 2019). The GR3 and Gun Club locations regularly exceeded the stream temperature standard during the summer months of June, July, and August. The other monitoring locations shown in the graph had cooler temperatures relative to the GR3 and Gun Club sites. The other sites monitored reflect off-channel habitat, whereas the GR3 and Gun Club sites represent the mainstem and adjacent alcove of the GRR, respectively. During the summer months the GR3 monitoring site reflects the decreased water depth and increased ambient air temperatures, both of which drive up the mainstem water temperatures. The Gun Club monitoring site is deployed within a mainstem alcove, which includes a cold-water source input. This water input assists in buffering water temperatures throughout the year; however, during the summer months the input flows decrease, making them less influential to the recorded water temperatures. Figure 8 depicts these areas within the Longley Meadows reach and select cold-water locations along the GRR that buffer stream water temperatures (personal communication, Ian Wilson, CTUIR, with Chris Donley, Cardno, April 24, 2019).

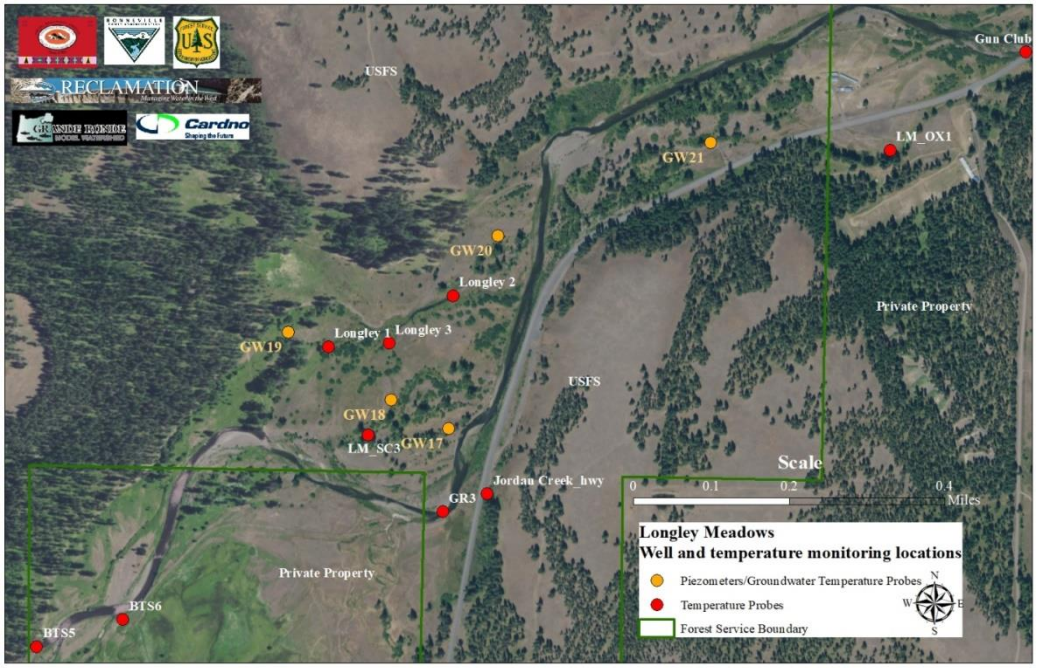


Figure 14. Surface water temperature monitoring locations within the Longley Meadows project reach (personal communication, Ian Wilson, CTUIR, with Chris Donley, Cardno, April 23, 2019).

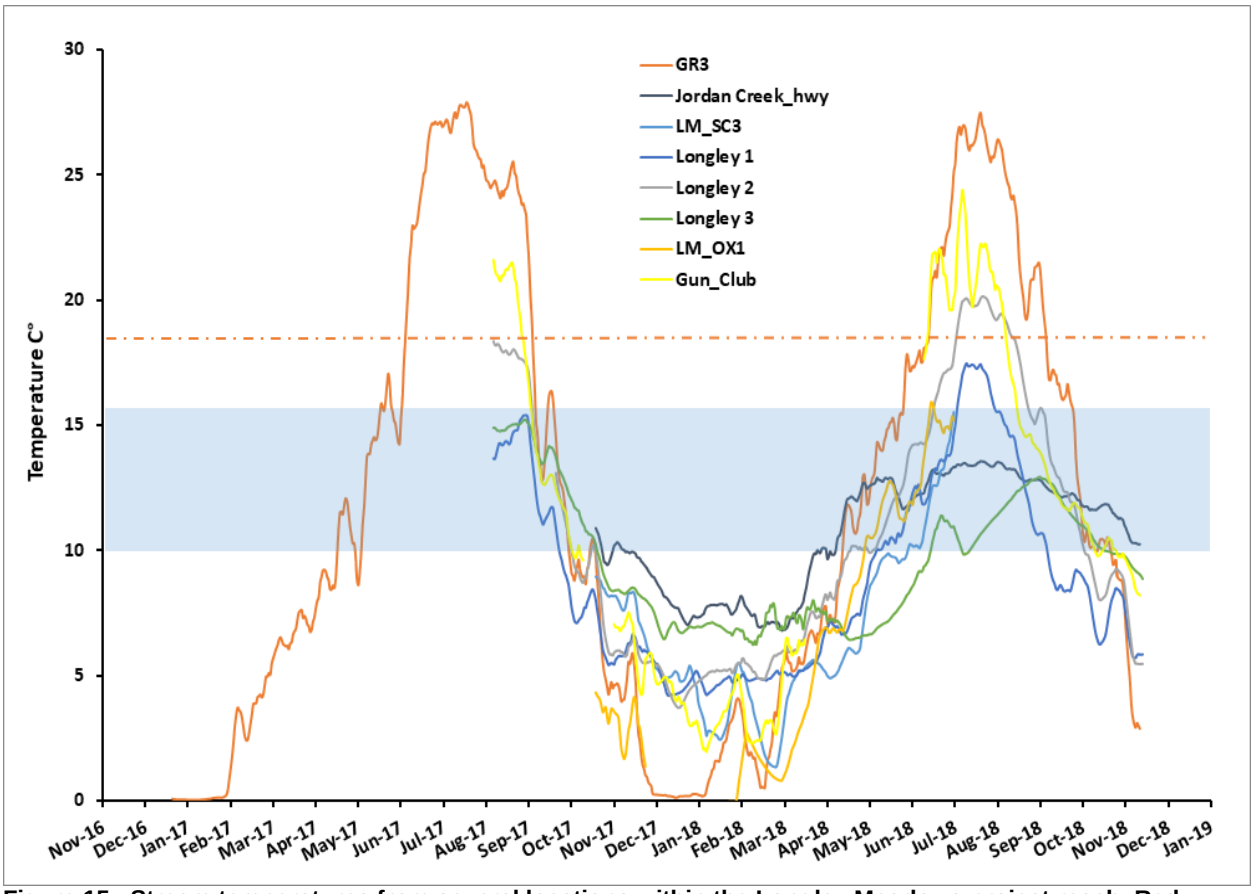
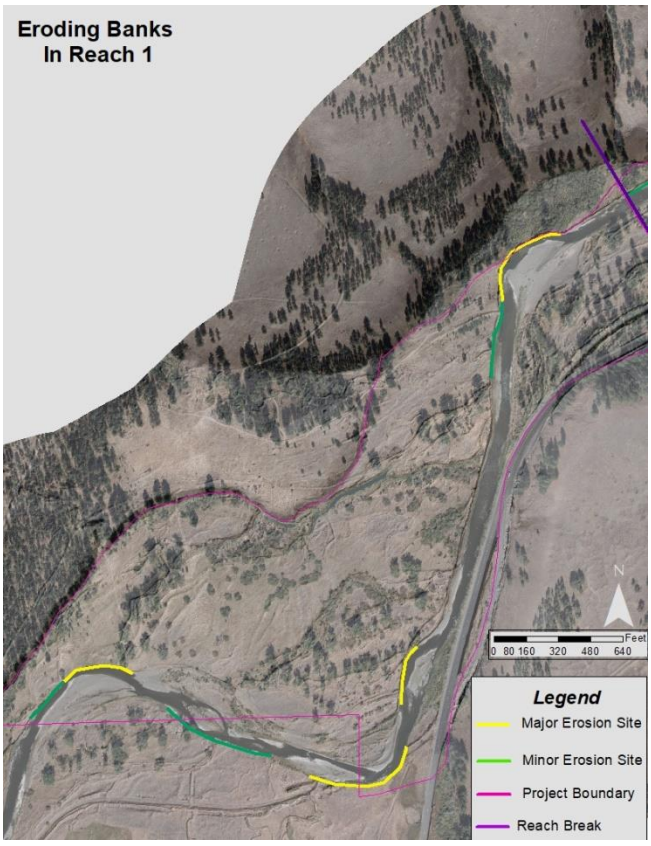


Figure 15. Stream temperatures from several locations within the Longley Meadows project reach. Red (dashed) line represents the upper limit temperature standard (18°C) for juvenile Chinook rearing and the blue box represents the optimal temperatures for juvenile Chinook rearing (10–15.6°C) (CTUIR 2019).



Sedimentation

Eroding banks within the project reach actively supply sediment to the GRR. Major and minor sources of sediment along actively eroding banks were mapped in the field and are shown in Figure 16. Minor sources were classified as any eroding banks mapped along floodplain geomorphic units, whereas major sediment sources were classified as eroding banks along alluvial fans, river terraces, and valley walls. Bank erosion takes place only in Reach 1 and through approximately 57% of the reach length. Major erosion takes place in the form of lateral migration that coincides with point bar development at RMs 143.5, 143.3, and 142.8 (Reclamation 2019).

Figure 16. Bank erosion in Reach 1 on 2013 aerial image.

B. Wetlands

National Wetlands Inventory (NWI) data were available for the project area and are depicted in Figure 17. Field investigations were conducted in June of 2016 and August 2019 to identify wetlands within the active project area and the results are also indicated in Figure 17. The NWI layer is developed at a regional level and is not considered sufficiently accurate for site-specific project-level work. As indicated on the map, there is some overlap between the NWI layer and the formally delineated wetlands, but formal wetland delineation boundaries represent the regulated features and are used in this report (Cardno 2016b, Cardno 2019).

Three primary types of wetland resources were identified from fieldwork within the active project area: Type 1) unvegetated riverine Other Waters (the GRR), Type 2) vegetated Other Waters (riparian corridor of the GRR), and Type 3) floodplain wetlands (floodplain/depressional wetlands) (Cardno 2016b, Cardno 2019). Table 19 describes the wetlands mapped within the active project area and their corresponding Cowardin classifications. Functions of these wetlands include protection and armoring of the banks of the GRR, mechanical filtration, chemical filtration, energy dissipation during high-flow events, and a high capacity to support resident wildlife including fish, fish spawning, and fish rearing habitat.

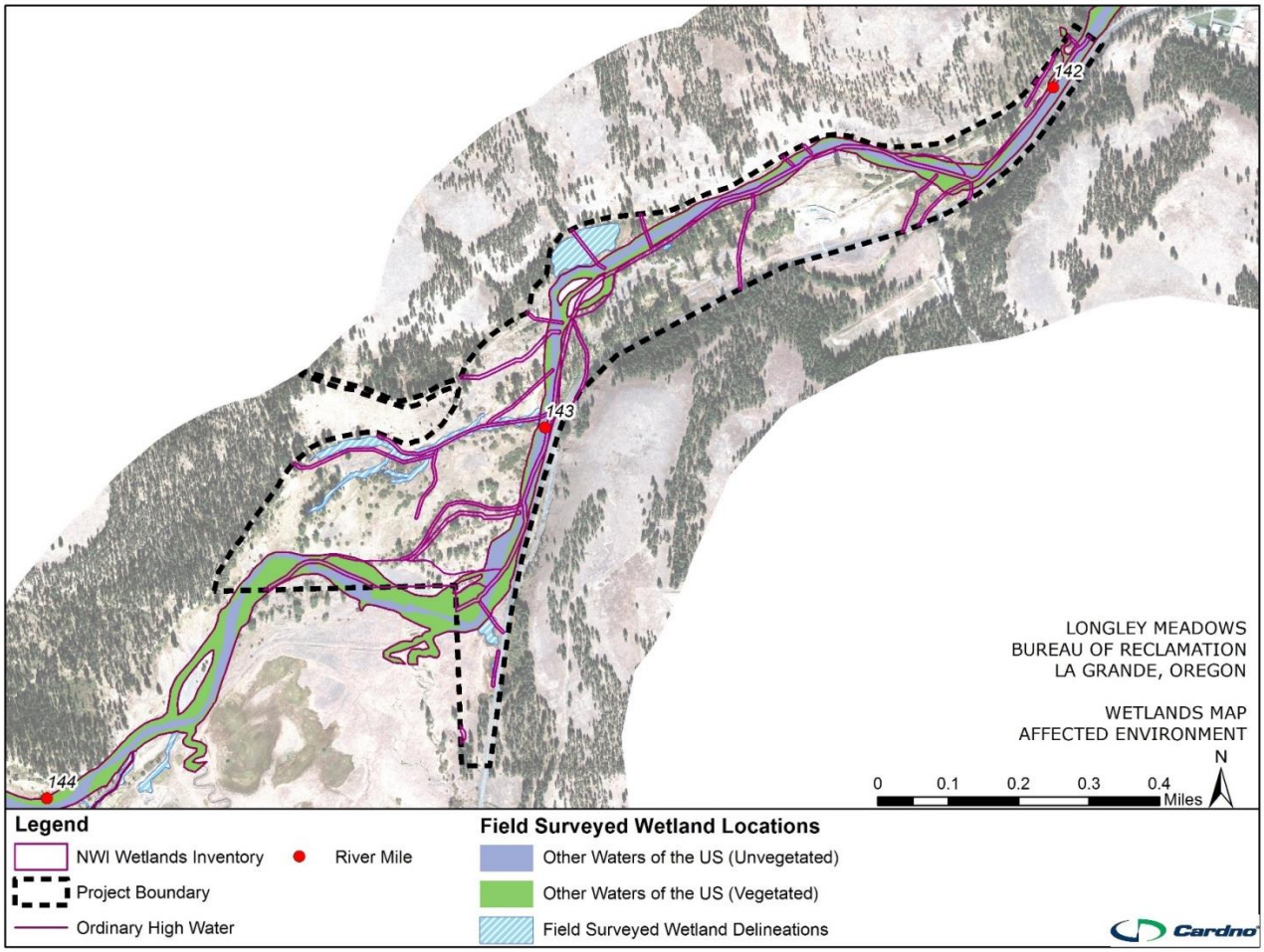


Figure 17. Map of the active project area showing NWI wetlands and field-surveyed wetlands.

Table 19. Field-mapped Wetlands within the Active Project Area

Type	Description	Acres	Description	Cowardin Classification
1	Unvegetated Riverine Other Waters	11.7	Located within the active channel of the GRR, below the field-observed ordinary high water mark (OHWM). All unvegetated areas within the OHWM were inundated by surface water. Classified as RIVERINE wetlands under the 2008 U.S. Department of Agriculture (USDA) hydrogeomorphic (HGM) wetland classification system (USDA 2008).	Unvegetated portions of the GRR would be classified as R3UB1H; Riverine (R) Upper Perennial (3) Unconsolidated Bottom (UB) Cobble-Gravel (1) Permanently Flooded (H). This area is located within the wetted portion of the river channel. Low, unvegetated mid-channel bars would also be classified as R3UB1 with a modifier of C, E, F, G H, or J (Seasonally Flooded, Seasonally Flooded/Saturated, Semi-permanently Flooded, Intermittently Exposed, Permanently Flooded, or Intermittently Flooded).
2	Vegetated Other Waters	15.6	Herbaceous and shrub-scrub wetland vegetation communities commonly colonized the low banks and water bars within the OHWM of the GRR. These areas were evaluated as potentially jurisdictional wetlands owing to the presence of established hydric vegetation and indicators of hydrology. All sites were located within the OHWM of the GRR, and showed primary indicators of hydrology such as surface water, high water table, and/or saturation. Drift deposits and inundation visible on aerial imagery was also recorded. For the purposes of this delineation, Vegetated Other Waters were considered potentially jurisdictional wetlands based on a prevalence of semi-permanent wetland vegetation, frequent inundation, and indicators of hydric soil. However, because these areas are within the OHWM, they are subject to fluvial processes such as frequent scour and deposition, and therefore could be considered transient communities. Classified as RIVERINE wetlands under the 2008 USDA HGM wetland classification system (USDA 2008).	Vegetated areas including the river margin and mid-channel or point bars were classified as Palustrine Emergent (PEM) or Palustrine Scrub-Shrub (PSS) based on predominance of shrub and/or herbaceous vegetation at each location. Modifiers for water regime would likely be Temporarily Flooded (A), Saturated (B), or Seasonally Flooded (C) based on the site-specific water regime.
3	Floodplain Wetlands	6.2	Typically located on floodplain areas directly adjacent to the river corridor, and/or separated by an upland low terrace feature. Several wetland features were characterized by a linear, channel-like depression possibly derived from a relic (or current) flood channel. Not all wetland areas had a visible connection to the river, indicating that hydrology at these locations is driven by groundwater, rather than maintained by seasonal flood flows. In some cases, surface	These adjacent or “flood-plain” wetlands are categorized as Palustrine Emergent (PEM), Palustrine Scrub-Shrub (PSS), or Palustrine Forested (PFO). If tree and shrub cover was greater than 30%, the wetland was classified as PSS, otherwise PEM was assigned to reflect dominance by herbaceous (emergent) vegetation. Based on the prevalence of hydrophytic vegetation, and presence (or lack) of surface water present at each site (during the dry season), it is likely that these wetlands are best described

Table 19. Field-mapped Wetlands within the Active Project Area

Type	Description	Acres	Description	Cowardin Classification
			flow from the main river channel was observed, indicating that seasonal high flows are likely to migrate onto some floodplain areas occupied by wetlands. A linear, channel-like wet depression (the lowest point of each wetland area) holding surface water was observed frequently in most wetland areas. In all cases, wetland areas displayed indicators of vegetation, soils, and hydrology. These wetlands would be classified as DEPRESSIONAL wetlands under the HGM system (USDA 2008).	as Temporarily Flooded (A), Saturated (B), Seasonally Flooded (C), Seasonally Flooded/Saturated (E), or F (Semi-permanently Flooded) (Cowardin et al. 1979).

Effects Analysis

Introduction

The following is a site-specific analysis of the potential direct and indirect impacts of this project on hydrology, flooding, water quality and quantity, and wetlands.

Several management directives/recommendations apply to this project, including management directives from the 1990 Wallowa-Whitman Land and Resource Management Plan (Wallowa-Whitman National Forest 1990), Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH 1995); the Land and Resource Management Plan Biological Opinions (USDA 1998); and the Biological Opinion for Endangered Species Act Section 7 Formal Consultation (NOAA 2008). In addition, the PACFISH amendments add further interim management direction in the form of Riparian Management Objectives, Riparian Habitat Conservation Areas, and standards and guidelines. Executive Order (EO) 11988 requires the U.S. Forest Service (USFS) to "avoid to the extent possible the long and short term adverse impacts associated with the occupation or modification of floodplains." EO 11990 requires the USFS to "avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands." Conservation measures and best management practices (BMPs) that would be followed during design and construction of the project have been included in this analysis and are described in the Alternatives Description section of the Environmental Assessment (EA).

The active project area is approximately 139 acres and includes the channel modifications, storage and staging areas, temporary roads, and one tree harvest and staging area on the south side of Highway 244. The area of analysis includes the activity areas plus the area of potential impacts associated with the action. This analysis area varies depending on the resource considered. For example, water resource impacts are considered within the activity area and include the area downstream that could be impacted by the action, while cumulative impacts have been considered regionally.

Methods and Assumptions

The description of watershed resources, along with the analysis of the expected and potential impacts for each alternative, were assessed using field surveys, water quality databases, current scientific literature presented herein, and professional judgment. Site-specific research, field data collection, and modeling were conducted in support of the Longley Meadows project design and included studies on hydrology, geomorphology, wetlands, and groundwater. Hydraulic modeling was conducted by Cardno and

Reclamation to estimate existing conditions and project impacts. Where available, quantitative data were used in the impacts analysis. Key indicators for the analysis include:

- Changes in flows;
- Changes in channel length and sinuosity;
- Changes in area flooded by the 5-year return interval event;
- Changes in water quality (turbidity, water temperature); and
- Changes in area of wetlands.

Project impacts and potential changes in key resource indicators have been estimated for two timeframes: short and long term.

> **Short term** impacts generally include the period during and immediately after construction, but could last up to 2 years from the start of the project.
>
> **Long term** impacts include the period of time between the end of short term impacts and approximately 5 to 25 years in the future.

The impact analysis assumes that near-future conditions would be similar to those in the recent past (for hydrologic and hydraulic modeling purposes), that rare flood events are unlikely to occur during construction, and that BMPs and mitigation would be applied, monitored, and function as designed and corrective actions would be applied if they were found not to be functioning as intended. The Management Requirements, Constraints, Design Criteria, and Conservation Measures section in the Alternatives Description section of the EA describes the conservation measures that apply to this project. The conservation measures that apply directly to water resources are included in the General Aquatic Conservation Measures subsection. Additional measures that would protect water quality are found under the Soils, Fisheries, River, Stream Floodplain, and Wetland Restoration sections.

Direct and Indirect Effects

Alternative 1 – No Action

> Under the No Action Alternative, there would be no direct effects. The restoration project would not occur in the floodplain and trees would not be harvested in the log source area. Activity on National Forest lands would continue to be governed by the current land management and transportation plans, and could include agency actions such as road maintenance and noxious weed treatments, and public activities such as fuel-wood removal, mining, and recreation. Activities on private lands would continue and could include actions such as grazing, timber removal, vegetation management, and recreation. Other Reclamation restoration projects would likely be considered along the GRR.
>
> The existing conditions at the site are considered degraded from a fish habitat perspective when compared to likely historical conditions (Fisheries and Aquatics section of the EA). As described in the Affected Environment section, historical land use and river disturbances have created conditions of high water temperatures, low stream flows, simplified habitat, and limited off-channel habitat that negatively affect native salmonid populations. The abandoned railroad grade acts as a barrier to natural floodplain inundation within the reach.
>
> Without the proposed project, the existing conditions are likely to persist, resulting in the indirect effects of continued degraded habitat and warmer water temperatures.

Alternative 2 – Proposed Action

A detailed description of the proposed action is provided in the Proposed Action and Alternatives section of the EA. Proposed activities in the project area that could impact water resources include:

- Temporary access road construction and use;
- Staging area construction and use;
- Grubbing, grading, cutting, and filling;
- New channel construction and back-filling yielding a new channel configuration;
- Changes in floodplain vegetation, elevations, and connectivity to the GRR;
- Placement of logs, boulders, rock, and fill; and
- Potential leaks and spills from construction equipment.

With the exception of logs, some large boulders, additional rock, native seeds, and potted native plants, all materials used for the project would be sourced from within the project site and repurposed in construction of new channel features and floodplain elements. Existing boulder-rock weirs would be removed and boulders repurposed as habitat features or structural ballast. Abandoned reaches of the existing channel would be filled using excavated material from constructed channel segments. Existing riparian vegetation, topsoil, shrubs, and trees that require removal would be salvaged and reused in the floodplain. At this time, it is not expected that any native materials would be removed from the project site. Non-native materials (trash, noxious weeds, etc.) would be removed if found during construction and disposed of at a permitted dump site.

Changes in channel dimensions and floodplain connectivity could alter downstream flows, subsurface flows, and groundwater connectivity. Earth-moving activities, access road construction, and construction and use of staging areas could impact subsurface flows and wetlands through compaction. The extent and magnitude of flooding would be affected by the proposed project by increasing channel sinuosity and roughness as well as increasing vegetation and contours of the existing floodplain. Water quality could be affected during construction by erosion, sedimentation, leaks, and spills from construction equipment. Longer-term water quality impacts include changes in temperatures and the possibility of continued erosion if the channel continues to adjust for a period of 5 to 10 years. Impacts can be both positive and negative, and the overall goal of the project is to create positive impacts to benefit salmonid species. Resource impacts are described in more detail in the following sections.

Hydrology

Hydrologic changes as a result of this project would be local and minor since the project area and proposed action are not large enough to influence regional hydrologic processes. Precipitation and the flow regime at the upstream boundary would not change as a result of the project. Changes in flow patterns through the reach from the proposed changes in channel length (an increase of 1,003 feet), sinuosity (an increase of 0.11), slope (a 0.02% decrease), and floodplain connections would result in slower flows through the reach, increasing ponding, hyporheic flows, and groundwater infiltration, which are objectives of the project.

In some areas where the water table is near the surface, construction traffic may cause short-term soil compaction and reduced subsurface flows. Compaction is expected to occur near the surface and would be a highly localized impact, as the depth to bedrock ranges from 23 to 28 feet in the project reach. During precipitation events, construction access roads and staging areas may cause impermeable flow paths and ponding due to compaction caused by construction traffic. These

temporary impacts would be offset by scarification of access and storage areas upon project completion.

Approximately 14 acres, or 10% of the active project area, would be used for access roads, staging, and storage areas. All access roads, staging, and storage would be obliterated at project completion, and if any of these features occur in wet areas they would be obliterated by the end of the in-water work window. Ultimately, the increased frequency of inundation would result in deposition of additional sediment and soils, increased moisture retention, and increased vegetation establishment.

Flooding

The following potential flooding impacts were provided in the *Longley Meadows Fish Habitat Enhancement 30 % Basis of Design Report* (Reclamation 2019).

Historical impacts have resulted in a degraded channel condition that includes incision ranging between 3 and 5 feet among other conditions. The incision reduces the degree of floodplain connectivity compared to estimated historical conditions. For this discussion, the floodplain is defined as sections of the valley bottom that have been mapped as active floodplain or fill material that lies beyond the edge of water at bankfull discharge. It does not include the wetted area of the main channel at bankfull discharge or sections of the historical floodplain that are disconnected by the railroad grade or Highway 244. Also, for this discussion, three flows were analyzed—1,432 cubic feet per second (cfs), 2,113 cfs, and 3,210 cfs—which correlate to 1.25-, 2-, and 5-year recurrence intervals, respectively. The 1.25-year recurrence interval is considered bankfull.

Within the project area, floodplain connectivity ranges from poorly connected at bankfull discharge to well-connected at discharges with a 5-year recurrence interval. Table 20 below summarizes floodplain inundation under existing conditions at the three discharges previously listed. Inundation characteristics of Reach 1 and Reach 2 are described subsequently.

Table 20. Summary of Acres of Inundation Compared to Acres of Available Floodplain

	1,432 cfs (1.25-year recurrence)		2,113 cfs (2-year recurrence)		3,210 cfs (5-year recurrence)	
Reach ID	Inundated Acres (approx.)	% of Available Floodplain Area	Inundated Acres	% of Available Floodplain Area	Inundated Acres	% of Available Floodplain Area
Reach 1	2	4%	17	30%	31	55%
Reach 2	0.03	<1%	0.5	2%	12	50%

Reach 1 – Upper Floodplain

During bankfull discharge, there is minor floodplain inundation that wets approximately 2 acres of floodplain surface. The activation of the floodplain is due to natural grade control in the form of a riffle just downstream of a historical channel scar on the outside of a meander bend. At the 2-year recurrence interval, the area of inundated floodplain increases to approximately 17 acres. The inundated area includes historical channel swales, the existing wetland complex area, and margin area along the edge of the channel just beyond the bankfull boundary. At flows with a 5-

year recurrence interval, the area of inundation increases to 31 acres. Figure 18 below, compares floodplain inundation at bankfull and 5-year recurrence interval.

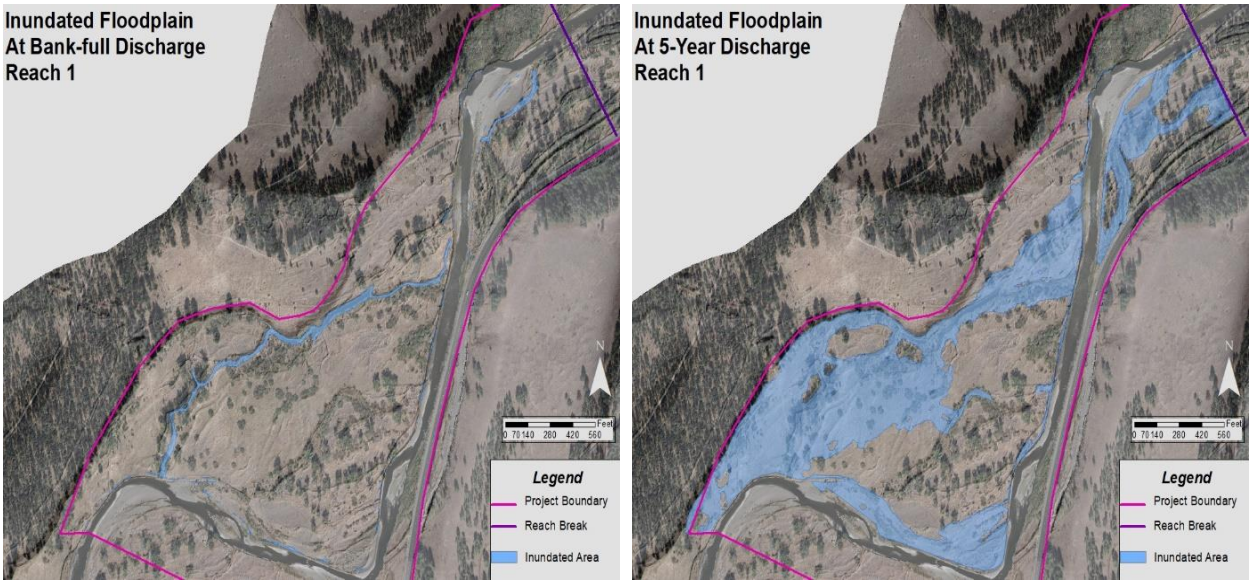


Figure 2. Floodplain inundation at bankfull discharge (left), and at 5-year recurrence interval (right).

Reach 2 – Lower Floodplain

In Reach 2, there is very little inundation of the floodplain at the bankfull and 2-year discharges. At both discharges the inundation is limited to expansion of the margin areas along the banks. At the 5-year recurrence interval, approximately 50% of the available floodplain is inundated (Figure 19).

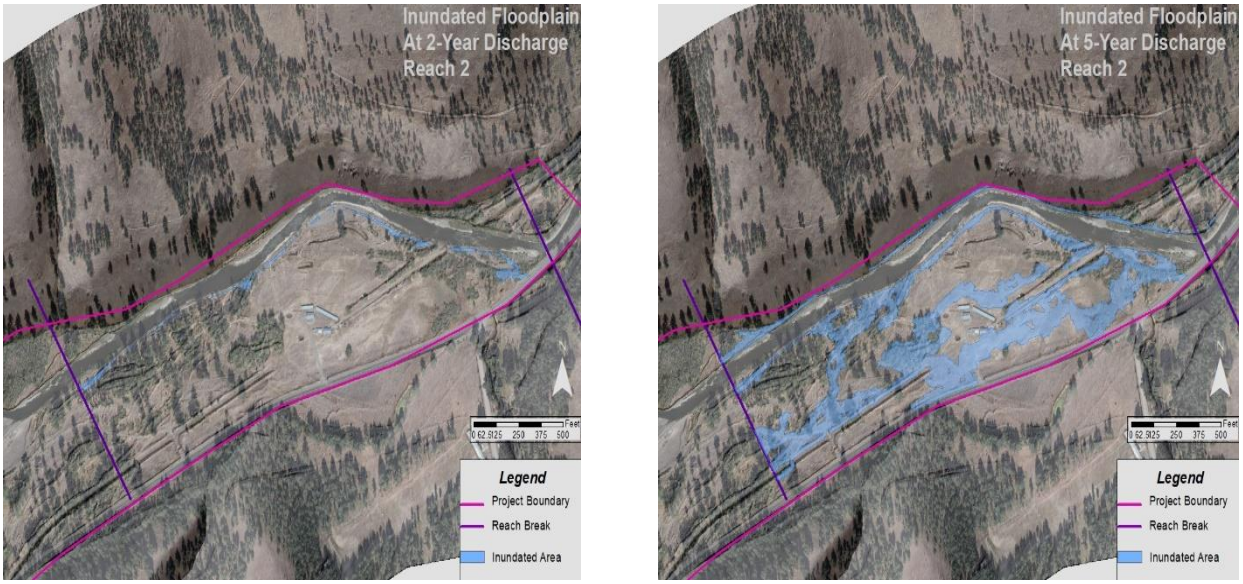


Figure 19. Floodplain inundation at 2-year recurrence interval (left) and at 5-year recurrence interval (right).

The active project area is located within a basin that is predominantly forest lands with limited development; however, there is some development within the floodplain of the active project area. South of the GRR is the Ukiah-Hilgard Highway (Highway 244), which is within the active floodplain. The highway is a two-lane paved road maintained by Oregon Department of Transportation.

Within Reach 2 exists the La Grande Rifle and Pistol Club (Gun Club).The Gun Club features a handful of structures used for club events and day-to-day operations. There is potential to increase flood risk to these structures; however, measures have been taken by the design team to minimize these risks. The structures are currently prone to flooding and the Gun Club Board have been apprised of the design alternatives and their potential impacts. The project's estimated flood risk is "low" for floodplain structures (Cardno 2016a).

There are no instream structures or infrastructure within the project reach or immediately downstream of the project reach. The nearest downstream bridge, at the interchange of Highway 244 and Interstate 84, is approximately 6 miles downstream and would not likely be affected by project activities. There is a possibility that large wood from the site could migrate downstream over the long term, but it could be deposited at any point along the 6 miles between the project site and the bridge and would be of insufficient quantity to cause a blockage at the bridge. The proposed project would also increase the likelihood that wood migrating downstream from above the project reach would become trapped in the project reach.

Water Quality

The UGR is currently operating under a TMDL and Water Quality Management Plan, approved in 2000 for temperature, dissolved oxygen, algae, nutrients, pH, sedimentation, bacteria, and habitat and flow modification. The plan relies largely on habitat restoration to achieve water quality improvements, and the proposed project would contribute to improvement in water quality for most of the elements with the possible exception of bacteria. This would be achieved by increasing complexity in the channel and floodplain, increasing shade in the long term to help reduce temperatures, and trapping sediment in the reconnected floodplain.

Direct, short-term impacts to water quality could occur during construction and channel reactivation. The primary concern would be sedimentation associated with earth-moving activities in and around the GRR. Construction would be phased over 2 years and occur near the in-water work window in July, which is one of the least rainy months of the year. Active construction and earth moving would expose soils to splash, sheet, rill, and gully erosion if a significant rain event were to occur. A stormwater pollution prevention plan (SWPPP) following the Habitat Improvement Program (HIP) protocol would be prepared and followed to reduce and mitigate soil erosion and to prevent sedimentation from entering waterways. Turbidity monitoring, in accordance with the HIP protocol, would occur during construction, and if an exceedance occurred (>10% background), activities would stop until levels returned to background. If at any time it is determined that the turbidity controls are ineffective, sediment control measures would be repaired, replaced, or reinforced. Potential impacts from soil erosion and sedimentation are described in more detail in the Soils and Fisheries sections of the EA. If the conservation measures are implemented as directed, direct negative water quality impacts to the GRR would be minimal, and indirect impacts would be positive as floodplain functions are restored.

Plans to phase construction so that channel segments would be completed and reactivated before construction stops for the winter would be part of project design. Reactivating new channels

includes using a pump and hose to wash fines from riffles, and slowly introducing water flow to the channel to minimize turbidity downstream. If construction efforts are delayed and newly formed channels are left over winter before reactivation has occurred, berms would be left in place that would withstand a 10-year flood event. If a larger flood event occurs over the winter or spring, sediment from the berms and the new channels would likely enter the GRR and exceed projected low-to-moderate sedimentation effects. A phased construction approach would reduce the risk of those adverse effects.

Wetlands

Existing wetlands within the active project area were avoided to the extent practicable during the design process; however, some wetland impacts would occur during construction. Direct impacts include temporary disturbance to wetland vegetation (vegetation cut at ground level), compaction of wetland soils, and temporary alteration of wetland hydrology. In some cases, access roads or the new channel impinged on mapped floodplain wetlands; however, these impacts would be less than an acre of floodplain wetlands in the project area (Table 21; Figure 20). A total of 4.96 acres of riverine wetlands could be affected by new channel construction and filling of the old channel, but these would be restored and reestablished with the proposed channel design.

Table 21. Field-mapped Wetlands Affected by Project Activities (acres)

Project Element	Unvegetated Other Waters	Vegetated Other Waters	Floodplain Wetlands	Grand Total
New channel design	4.963	2.273	0.616	7.852
Existing access road	0	0	0	0
New access road	0.042	0.042	0	0.084
Staging and storage area	0	0	0	0
Total	**5.005**	**2.315**	**0.616**	**7.936**

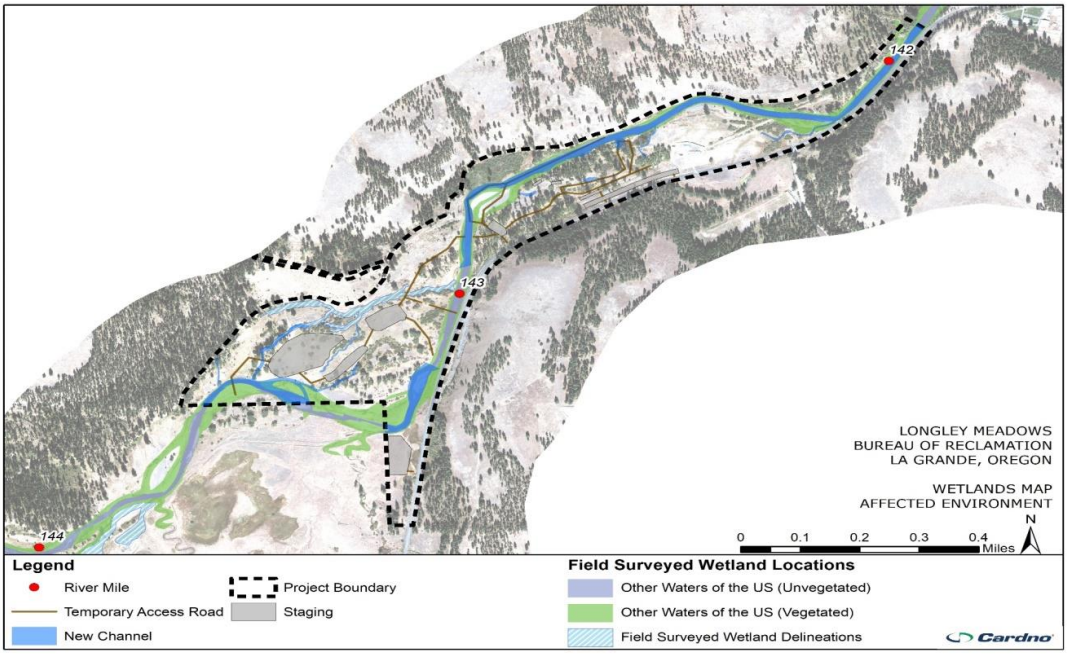


Figure 20. NWI wetlands and field-mapped wetlands with project elements.

Although construction and new channel design may result in impacts to existing vegetated wetlands along the banks of the GRR and adjacent depressional wetlands within the floodplain, the proposed design would replace these wetlands and create new riverine wetlands along the new channel, enhance floodplain connectivity, and increase the frequency and the size of the area flooded, thereby resulting in in-kind replacement or possibly a net increase in quantity of wetlands acreage. For example, increased inundation from the 2-year peak flow would enhance groundwater recharge, sustaining riparian vegetation, net deposition of fine sediment, and dissipation of ice jams. Those changes, in combination with the revegetation plan, would restore and possibly enhance impacted wetlands across the site, resulting in beneficial impacts to wetlands along this section of the GRR. There are no wetlands within the log source area boundaries.

All direct negative impacts to wetlands associated with project construction would be short term, and all disturbed areas would be restored following construction. Furthermore, construction would be followed by implementation of an approved planting plan to re-stabilize and revegetate disturbed wetlands. All project-related construction would follow the resource management guidelines and BMPs identified in the Management Requirements, Constraints, Design Criteria, and Conservation Measures section of the EA to minimize temporary negative impacts to wetlands.

Long-term indirect wetland impacts associated with completion of the project would be beneficial. Enhancing floodplain connectivity and increasing the frequency and the size of the area flooded by the 10-year event by almost double would enhance the natural wetland function and formation process within the GRR floodplain. These indirect beneficial impacts could include additional mechanical and chemical filtration, bank and floodplain stability, energy reduction and dissipation, and increase in wetland value as a result of increased connectivity to the floodplain and use by aquatic and terrestrial wildlife.

The proposed action would result in short-term direct adverse impacts to wetlands, with long-term benefits in the active project area.

Cumulative Effects for Watershed Resources

Potential cumulative effects are analyzed by considering the proposed activities in the context of present and reasonably foreseeable future actions. Reasonably foreseeable future actions are defined as activities that will occur within the next 5 years. Impacts from past actions have been incorporated into the existing condition analysis. For this project, activities are considered within the vicinity of the active project area and are described in Appendix D of the EA.

Alternative 1 – No Action Alternative

There would be no cumulative effects if the project is not implemented.

Alternative 2 – Proposed Action

Under Alternative 2, reasonably foreseeable cumulative actions that could affect water resources include off-highway vehicle (OHV) use, livestock grazing, and timber management on private lands. The Longley Meadows project, while different in its specifics, would also involve an intensive construction footprint on floodplain soils and the river channel to those ongoing construction effects from the Bird Track Springs project upstream. Overall, the Longley Meadows project, in combination with other restoration projects on the UGR is expected to have a positive

impact to water quality and fish habitat and a long term beneficial impact by increasing the amount of quality wetland and floodplain habitat along these reaches of the GRR.

Unauthorized user-built OHV trails and OHV use has spread across most of the landscape within the Spring Creek area, contributing to sediment production. Water quality could be impacted in the short term, but the long term benefits of the project and implementation of travel management within the project area would yield a net improvement in reducing sedimentation rates and improving water quality.

Adjacent State and Private Lands/Structures

Introduction

This section covers the potential direct, indirect, and cumulative effects to adjacent State and private lands and structures from the implementation of the Longley Meadows Fish Habitat Enhancement Project (Longley Meadows).

Affected Environment

The existing geomorphic and vegetation conditions have been heavily influenced by previous land use activities, resulting in degraded instream habitat complexity for Chinook salmon, steelhead, bull trout, and other sensitive aquatic species.

The existing geomorphic condition of the GRR within the project area is characterized as unconfined with a relatively straight planform and riffle run morphology consisting of predominantly cobble and gravel sized materials. Geomorphic forcing elements (large wood, boulder, or other) are not present aside from some structures placed in the stream associated with past restoration activities. However, during winter months, ice can potentially act as a geomorphic element to raise water surface elevations and/or redirect water onto adjacent floodplain surfaces and scour bed and bank surfaces. Based on field observation and existing condition floodplain inundation at bank-full, 2-year, and 5-year recurrence interval discharges, the GRR is interpreted to be incised by roughly 3 to 4 feet. In this unconfined reach there is abundant floodplain and relic channel networks that are only activated above moderate flood events (>5-year recurrence). There are areas in the upstream portion of the project of major and minor erosion and active channel migration occurring that impact both private and State lands including a meander bend advancing towards Highway 244. Otherwise the majority of the river corridor is in an arrested state where large wood, water, sediment, and aquatic species are flushed through the project area resulting in a simplified planform with little hydraulic complexity.

Existing riparian vegetation conditions include scattered patches of decadent cottonwood galleries with an understory of woody shrubs and immature trees. These patches are in larger areas of herbaceous vegetation with shallow rooting depths where the floodplain vegetation has been altered by past land use practices including extirpation of beaver, agricultural development, livestock grazing, hydraulic and gravel mining, logging and use of splash dams, and railroad/road construction. Beaver are uncommon since their extirpation in the early 1800s and no longer play a major role in wood delivery to the channel or maintaining diverse off-channel habitats, complex planform, and riparian conditions. Historically, the riparian vegetation would have likely included woody species such as cottonwood, willow, river birch, and alder of varying ages (seral stages). The upland areas adjacent to the active floodplain likely supported mature ponderosa pine. Impacts include the alteration or removal of riparian and floodplain vegetation associated with the implementation of agricultural and grazing practices in addition to commercial logging.

Previous efforts to restore geomorphic and hydraulic processes within the project area have included channel-spanning rock weirs and bank-barbs constructed of rock and wood. While the structures can promote aggradation, with or without widening, they were unsuccessful at significantly altering planform or instream complexity or increasing floodplain inundation.

As described in the purpose and need for this project, the existing river corridor at the project area is out of balance and currently provides poor quality fish habitat and poor water quality (high summer and low winter water temperatures). The Longley Meadows project area encompasses or is immediately adjacent to State Highway 244 and its right-of-way, Oregon Department of Transportation (ODOT) land, USFS system lands, and lands owned by 3 different private landowners. The area used to analyze potential direct, indirect, and cumulative impacts to adjacent State and private lands from implementation of this project is from the Bear Creek Ranch (upstream and within Longley Meadows) at River Mile 143.7 downstream to the confluence of Spring Creek at River Mile 141.9. As of 80 percent Design, all project elements occur only on USFS property upstream of the La Grande Rifle and Pistol Club, River Mile 142.4.

Environmental Consequences

Methods

The method of analysis included:

- A review of the appropriate Forest Service policy and goals, objectives and standards of the Forest Plan.
- The existing condition was compared with possible changes to adjacent State and private lands/structures use if alternatives were implemented.

Spatial and Temporal Context for Effects Analysis

The spatial context for the analysis is the river and adjacent floodplain along the GRR from river mile 143.7 to river mile 141.9. This area is downstream from the recent BTS project area where instream enhancement work may have the potential to impact downstream landowners and structures (such as corrals, buildings, campgrounds, bridges, etc.). Potential impacts to water quality and soils (turbidity, sediment, erosion, etc.) have been covered separately by resource. This analysis will focus on potential downstream impacts from channel realignment, floodplain improvement, large wood instream structure additions, gravel bar additions/changes, etc.

The environmental effects will be discussed in the following timeframes:

- Short term effects would be those that have the potential to occur within 10 to 15 years following implementation of the project.
- Long term effects would be viewed as a period of time ranging from 15 to 100 years following implementation of the project.

Direct and Indirect Effects to Adjacent Lands/Structures

Alternative 1 – No Action

Bear Creek Ranch (BCR) - No action would likely result in continued erosion and channel migration above, within, and below BCR. On the upstream portion above the BCR property boundary, the river is actively moving northward away from the property. There is very little

vegetation to slow the migration rate and larger floods (such as 2011) resulted in the bank receding approximately 60 feet. Within BCR there is active bank erosion on river right including the area at the confluence of Jordan Creek. This has been enhanced by the meander bend upstream redirecting flow and pressure onto the right bank. Deposition from the erosion of the advancing meander bend upstream is occurring within the property and creating dynamic channel behavior with the rock weirs placed as part of a previous restoration effort.

The confluence of Jordan Creek has been largely disconnected at low flows due to sediment being deposited near the confluence. Below BCR a meander bend is advancing rapidly towards Highway 244. There is a sediment layer that is cohesive that inhibits scouring of a deep pool resulting in additional pressure on the channel bank. There has been placement of riprap in the upstream part of the meander that has been marginally effective at reducing advancement in the riprapped location but has transferred energy downstream in the bend where active erosion is occurring. The bank has little vegetation to resist advancement and as a result the bend is migrating through the old railroad grade and towards the highway. In the short term (10-15 years) continued advancement of the meander bends above and below project will result in dynamic behavior and deposition within BCR. In the long term (50-100 years) the river is trending northward away from BCR and has little vegetation to limit this advancement. There is potential for avulsion **(**rapid abandonment of a river channel and the formation of a new river channel) of the entire, or a large portion of, GRR through preferential flow paths on the floodplain away from BCR.

An estimated 25-year flood event occurred during spring of 2019 resulting in continued advancement of meander bends and changes to the existing channel. Specific measurements on Bear Creek Ranch have not occurred.

ODOT Right of Way - As mentioned above, the meander bend downstream of the BCR property is advancing towards Highway 244. The meander bend has short-term and long-term potential to advance towards the highway. The river is relatively straight along Highway 244 below the active meander bend and is over-widened/incised in this reach. There are no forcing elements and most sediment, wood, and aquatic species are likely flushed through this reach during floods. At the downstream end of the project below the La Grande Rifle and Pistol Club the river is directed straight at the highway. There are rock barbs/rip rap in this area to protect the highway. However, during flood flows (2-year recurrence and above) there is very little freeboard above the water level and the highway surface elevation. The floodplain upstream of this bend is confined by the presence of the old Mt. Emily railroad grade bridge approach berms. The bridge has washed away but the berms do not allow the river to access the floodplain, focusing flow towards the highway.

The spring 2019 flood event (approximately 25-year flood) resulted in water on top of the road near the La Grande Rifle and Pistol Club). ODOT placed angular riprap on the shoulder of the road in several locations within the project area and in multiple locations up- and downstream.

La Grande Rifle and Pistol Club (LG Rifle & Pistol) - The river above and through most of the property is in an arrested state of development. This is a transport reach where there is little ability for the river to create dynamic behavior. There is likely bedrock control in the channel bed and on the left bank. In the short and long term, the river will likely remain in a static condition.

An estimated 25-year flood event occurred during the spring of 2019 which flooded much of the LG Rifle & Pistol property.

Lands Downstream of the LG Rifle & Pistol - The Hampton property is the nearest downstream private parcel. They also own a steep hill slope that is directly across from Spring Creek within the project area. The GRR is mostly confined through this reach and is in an arrested state of development and exhibits little dynamic behavior with the exception of the large bedrock pool located on the property downstream from Spring Creek.

Alternative 2

The proposed project is being designed to have short term stability (i.e. approximately 10-15 years) utilizing numerous engineered log jams (ELJs) and bank protection features to provide initial horizontal channel and bank stability along with constructed riffles of specific gradation using local river rock sources to provide vertical channel stability. These initial stabilizing elements are very important to project success and are planned to be constructed of local, natural materials, and engineered to be stable through anticipated flood events. Previous projects of this scale in the region have shown that these types of elements are stable up to, and within, extreme flood events.

It is anticipated that some of these ELJ elements would deform and shed individual pieces of wood over time. These potential mobile pieces of wood are typically caught by downstream project elements and remain within the project area; however, individual logs may travel downstream of the project and into BCR and/or the La Grande Rifle Club (and possibly below), in a similar manner as currently occurs under natural conditions. Logs used in the project would be a maximum of 45-feet long and would not be tethered with any non-natural fasteners and are therefore similar to what currently moves through this reach during flood events.

As discussed in the Hydrology and Water Quality sections, some erosion would be expected to occur and is planned for in the design to maintain a natural, balanced supply of sediment in the project reach. Monitoring of several similar scale projects in comparable environments have all shown minimal immediate erosion or instability issues using these techniques. Long-term stability would be provided by healthy riparian vegetation. Riparian vegetation improvement is expected from floodplain restoration and associated hydrology, extensive seeding, plantings and natural recruitment through improved floodplain processes. Alternative 2 has been designed to retain as much existing vegetation (trees, wetlands, and shrubs) as possible, while reestablishing disturbed vegetation through extensive soil treatment, salvage, and replanting efforts. As this is a dynamic river environment, there is always a risk of a historic flood event to occur, which may overwhelm mitigation measures. However, such extreme hydrologic risks have been evaluated and have a low probability of occurrence while vegetation reestablishes.

Hydraulic modeling was used as a tool to modify the design to create a proposed condition that does not exacerbate flooding of the BCR, La Grande Rifle and Pistol Club, and properties/structures located further downstream in comparison to existing conditions. Improved floodplain interaction may reduce flood potential downstream during smaller high water/flood events. No project elements were designed or constructed on BCR during the BTS project and none are proposed under Longley Meadows. Other project elements (e.g., side channels) that are designed to provide additional floodplain interaction are routed back to the mainstem Grande Ronde below BCR. These side channels would likely remove pressure from the actively eroding banks on BCR by routing flow through the channels and floodplain away from BCR. The historic railroad grade that currently provides floodplain protection to parts of BCR and Highway 244 would remain intact within this area and continue to provide protection. Modeling results show nearly identical flood patterns in areas downstream of the proposed project for a 100-year flood event compared to existing conditions. Any future changes to flood patterns within BCR and the

La Grande Rifle Club lands would most likely be dependent upon physical changes that may or may not occur regardless of project actions, as described previously.

Monitoring of the partially-constructed BTS project during the 25-year event during spring 2019 confirmed that ELJ design successfully retained large woody debris in place throughout the event. Some smaller materials were loosened; however, many were caught in and retained in ELJs downstream from where the materials originated. During this event, several trees/woody debris that that originated upstream of the BTS project area were retained on constructed project elements that would likely have traveled further downstream.

Additionally, the project itself would counteract historical practices that have resulted in a disconnected floodplain, poor groundwater and water temperature conditions, significant loss of pool habitat and aquatic habitat diversity and complexity, and loss of healthy conditions that provide diversity and structural stability. The project has been designed, and would be implemented, with extensive best management practices (BMPs) to provide construction-related mitigation including:

- Protecting and avoiding existing riparian tree and shrub vegetation.
- Limiting disturbance to minimum footprint as necessary to minimize disturbance to soils and vegetation.
- Confining staging areas, stockpiles, and fueling locations to areas greater than 150 feet from open water.
- Implementation of erosion control methods including work area isolation, mulching, and seeding disturbed areas to facilitate vegetation reestablishment.
- Limiting access road density and fully reclaiming to promote vegetation reestablishment.

Additional details are provided in the Basis of Design Report (BDR) in the project record. These include measures required by USFS resource specialists and BPA's Habitat Improvement Project (HIP) Programmatic to ensure short-term project impacts are minimized to the extent practicable while the project provides overall long-term benefits.

Cumulative Effects on Adjacent Lands/Structures

Alternative 1 – No Action

There would be no cumulative effects to adjacent lands and structures beyond what would normally occur if no action were implemented within the Longley Meadows project area.

Alternative 2

Project design of the Longley Meadows and BTS Fish Habitat Enhancement projects in combination with scheduled regular maintenance along the highway has the potential to increase protection of the Hwy 244 road surface and features in the right-of-way during flood and ice flow events.

The BTS Fish Habitat Enhancement project has introduced more large wood to the river system, and the Longley Meadows project would further contribute to that quantity. While extreme flow events have the potential to dislodge logs from these project structures, other logs coming from upstream sources would likely be caught and retained by the project structures, resulting in minimal change to the amount of wood observed downstream of both projects. Similarly, these projects would both improve floodplain interaction and provide more area for flood flows to spread and dissipate energy, potentially decreasing downstream flooding impacts.

Transportation Resources

Introduction

The following discloses the effects to transportation resources by the implementation of the alternatives considered in this EA.

Affected Environment

Highway 244 is a paved two-lane state highway intended for passenger vehicle and highway legal vehicle use which runs through the project area. Non-highway legal OHVs are not permitted to use this highway. It is a very high-use road providing access from Interstate 84 to the town of Ukiah and several major access roads to the forest (Forest Roads 51, 21, 2120, 2444, 5160) all of which are high-use roads. Highway 244 is currently well maintained; however, is often at risk to ice damage during winter.

There are no roads within the portion of the project area surrounding the GRR north of Highway 244. Approximately 1.5 miles of native surface single lane roads are located just outside of the project area within the Bird Track Springs Campground and another half mile of native surface road is located on the north side of the GRR outside of the riparian habitat conservation area.

A total of approximately 14.6 miles of roads are located within the Jordan Creek Ranch area, a portion of which is within the project area with the remainder adjacent to the project area. The main road into the Jordan Creek Ranch is a single lane graveled road with single lane native surface roads off of it. These roads would provide adequate access into the timbered stands where some wood, racking materials, and large boulders would be harvested from.

Effects Analysis

The following describes the effects of implementing this project on transportation resources.

No Direct, Indirect, or Cumulative Effects

The following activities in the action alternative would have a negligible potential to affect transportation opportunities in the project area:

- Instream enhancement work (large wood placement, gravel and boulder placement, new channel construction, temporary river crossings, dewatering basins and coffer dams, gravel bar construction)
- Stockpile of overage materials
- Construction and decommissioning of stockpile sites
- Planting and revegetation

These activities will not be discussed further in this analysis.

Direct and Indirect Effects on Transportation

Alternative 1 – No Action Alternative

No restoration activities would occur under this alternative; therefore, there would be no direct or indirect effects to the transportation system within the project area. Impacts from winter ice flows would continue to impact Highway 244.

Alternative 2 – Proposed Action

Short term (during the life of project implementation) increases in access within the project area would occur under the proposed action. Approximately 1.65 miles of temporary access roads would be constructed to facilitate restoration activities such as channel realignment and instream placement of large wood structures. These temporary roads would be restricted to administrative access for project implementation only and would be decommissioned and planted with native species at the conclusion of project activities.

The road system on Jordan Creek Ranch would remain the same under this alternative. Because harvest and removal of woody materials is restricted to dry conditions only existing road conditions should be adequate to meet hauling needs while protecting road surface conditions. These roads are not available for public use and would remain so following the completion of this project.

As described in the Recreation effects section, the project area would be under an area closure during project activities to ensure public and construction crew safety. Use agreements would be negotiated with the La Grande Rifle and Pistol Club to allow for their permitted use within the project area. No changes to access on private lands would occur under this alternative.

Project design providing areas for ice to flow away from Highway 244 should remediate winter ice issues within the project area and protect the highway. The installation of additional rocks (rip rap) along stream reaches near the highway would help protect the highway embankment from additional scour and potential damage along the north side of the highway. Access permits would be applied for where right of way access from the highway is not currently permitted. Project features would be vetted by Oregon Department of Transportation (ODOT) to ensure protection of the highway.

Large wood structure materials, locations, and construction specifics have been designed and modeled to minimize any movement during spring high water and flood events. These designs have also been vetted by ODOT to limit potential large woody debris entanglement/scour issues on Highway 244 or downstream bridges.

Cumulative Effects on Transportation

Analysis of the present and reasonably foreseeable future activities within the project area were analyzed in Appendix D of this EA to determine which of those activities may overlap in time and space with this project and have the potential to result in a cumulative effect when added to the activities proposed in each of the alternatives. Past activities have been incorporated into the analysis of the existing condition.

Alternative 1 – No Action Alternative

No activities would occur under this alternative which could affect the transportation system; therefore, there would be no potential for cumulative effects to the transportation system as a result of selection of the no action alternative.

Alternative 2 – Proposed Action

Most of the present/on-going and reasonably foreseeable future projects do not overlap in time and space with the project area. Of the projects that overlap in time and space only the Bird Track Springs Fish Enhancement Project and maintenance planned on Highway 244 would have a measureable beneficial cumulative effect when added to the activities proposed in this alternative. The additional protection provided to Highway 244 by the project design of the Bird Track project and this project along with additional maintenance provided during log and material

source haul would not only improve the highway condition and improve safety for vehicles using this stretch of highway but also provide for improved resource protection (soils, invasive species, etc.).

Forest Plan Compliance

Implementation of this project ensures compliance with the Wallowa-Whitman Forest Plan Transportation System goals, standards, and guidelines (Forest Plan pp. 4-34 through 4-36). This project will provide for safe, efficient, environmentally-sound access for the movement of people and materials involved in the use and management of these National Forest lands.

Soils

Introduction

The following is an analysis of the effects on soil resources of the activities proposed in the Longley Meadows Fish Habitat Enhancement Project (Longley Meadows). The analysis area for this analysis is the 139 acre project area. Restoration activities would occur along the Upper GRR (refer to Project Area Boundary map in Appendix A). Additional specific information and analysis related to soil quality and productivity is located in the specialist report in the Longley Meadows analysis file.

Affected Environment

Introduction

Soils are a complex mixture and their properties are based on source materials (geology), climate, vegetation, soil microbes, surficial processes, and time. The project area is located in the Blue Mountains physiographic province. The Blue Mountains originated in the Cenozoic era and feature extensive regional folding and faulting. The dominant geologic formation in the region is Grande Ronde Basalt, which is part of the Columbia River Basalt Group that covers large portions of the Pacific Northwest and originated in the Miocene. Locally, the Neogene sedimentary unit, which consists of tuffacious sedimentary rocks, originated in the Miocene/Pliocene era. The Powder River volcanic field has a small outcrop on the north side of the project area and also occurs to the south. It consists of Miocene-era andesite, dacite, and basalt that erupted from small volcanos located between La Grande and Baker City after the Columbia River Basalts were deposited. Most of the active project area is located in the GRR valley, which is covered with Quaternary surficial deposits consisting of alluvium (Oregon Department of Geology and Mineral Industries [DOGAMI] 2016). More detail on the regional geology, surficial geology, and geomorphic characteristics of the project area are presented in a Geomorphic Assessment appended to the Bird Track Springs Preliminary Basis of Design Report (Cardno 2016, Appendix B). Longley Meadows was originally proposed as part of the Bird Track Springs project, so both projects are discussed in this report.

Soil Description

Soil descriptions and units described here cover 29.7 acres from the U.S. Department of Agriculture (USDA) Soil Survey Report of Union County Area, Oregon (2018) and 121.0 acres from the U.S. Forest Service (USFS) Wallowa-Whitman National Forest, Oregon (OR631) (2018). While the surveys listed were updated in 2018, the area of interest may have been surveyed at much earlier date. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries. Most notably the 121 acres mapped with OR631 does not include water, making the estimate of acreage of water below erroneous.

The upland soils are generally derived from the underlying basalt bedrock or tuff deposits and recent deposits of volcanic ash. They tend to have steeper slopes and be moderately deep, and moderately to well drained. They are used for wildlife habitat and timber production. The majority of the soils in the active project area in the GRR valley bottom are deep to moderately deep, well-drained soils that form in alluvial deposits. Their location in an active floodplain has subjected them to fluvial forces over time, which tends to disrupt the soil-forming processes that create deeper soil horizons that typically form through erosion, sorting, and deposition.

The soil unit that constitutes the majority of the active project area is Gulliford-Collegecreek-Bullroar complex (Unit 0001EW, Figure 21). The complex is found on bottom lands and low stream terraces and has slopes of less than 5 percent. It consists of approximately 40 percent Gulliford and similar soils, 35 percent Collegecreek and similar soils, and 25 percent Bullroar and similar soils. Gulliford parent material is alluvium from mixed sources including gravelly loamy sand, and gravelly sand. College Creek and Bullroar components include thick mantle of volcanic ash over alluvium and colluvium derived from basalt. Permeability is moderate, runoff is slow, and the hazard of water erosion is slight. Gulliford is poorly drained although the other two components of the complex are well drained. All are subject to flooding.

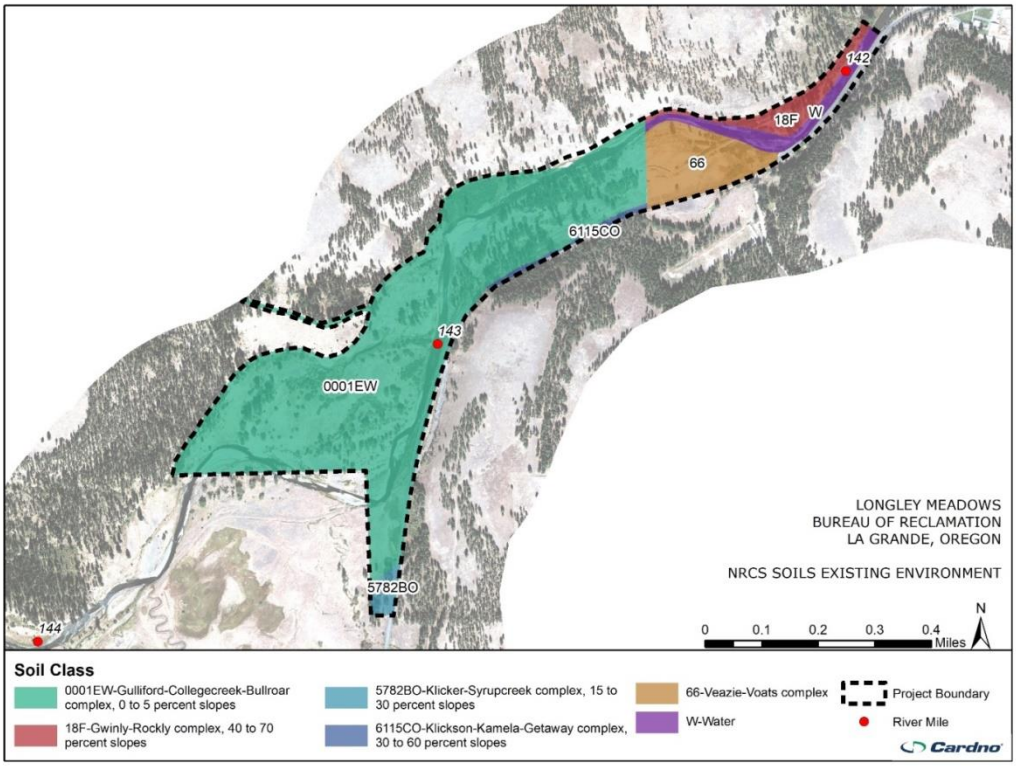


Figure 31. Active project area showing soil types.

The other primary soil unit in the project area is Veazie-Voats complex (Unit 66, Figure 21). The complex is found on bottom lands and low stream terraces and has slopes of less than 3 percent. It consists of approximately 45 percent Veazie loam, 35 percent Voats fine sandy loam, and 20 percent other soils. Both Veazie loam and Voats fine sandy loam formed from basalt, andesite, or granite and are well drained. Permeability is moderate, runoff is slow, and the hazard of water erosion is slight. Both soil types are subject to flooding.

Table 22 lists the soil types, acreages, and features of the soils within the active project area (soils covering less than 1 percent of the active project area were not included in the table). None of the soils are hydric. The hydrologic soil group rating is based on the soil's runoff potential. Group A generally has the smallest runoff potential, and Group D has the greatest.

Table 22. Soil Types and Characteristics of Soils within the Active Project Area

Code	Name / Surface Texture	Slope (percent)	Drainage Class	Hydrologic Soil Group	Erosion Potential	Acres	Percent
0001EW	Gulliford-Collegecreek-Bullroar complex	0-5	Well	B	Slight	116.2	77.1
66	Veazie-Voats complex - loam	0–3	Well	B	Slight	14.6	9.7
18F	Gwinly-Rocky complex	40-70	Well	D	Very Severe	6.7	4.4
5782BO	Kickler-Syrupcreek complex	15–30	Well	C	Moderate	2.1	1.4
6115CO	Klickson-Kamela-Getaway complex	30-60	Well	C	Severe	1.7	1.1
W	Water					6.5	4.3

In addition to the general soil mapping units and descriptions from the soil survey described above, the active project area has additional features that were identified from field studies including wetlands (described in the Hydrology, Floodplains, and Wetlands Report), test pits dug for cultural resource investigations, and a geomorphic assessment that identified areas of soil disturbance. The geomorphic assessment identified elements that have impacted floodplain functions including abandoned railroad grades, road grades, and levees where soils have been disturbed by past activities. Recreational trails from the Bird Track Springs Campground also traverse the site. Trail use appears to be primarily by hikers, although occasional off-highway vehicle (OHV) use may occur on-site. Detrimental soil conditions on the USFS portion of the active project area were not determined quantitatively, but given the limited soil-impacting activities and minimal soil impacts observed on-site, detrimental soil conditions are estimated at well below 20 percent.

Test pits dug in the active project area for cultural resource investigations found that the typical near-surface alluvial stratigraphy includes a surface layer of fine sediment (<2 millimeters [mm] and smaller) interpreted as overbank flood deposits, underlain by a layer of river-lain sandy gravel. The thickness of overbank deposits varies from 0 to over 3 feet and averages 1.25 feet across the site, as documented by the cultural test pits. These overbank deposits are characterized texturally as silty sand to sandy silt. The underlying sandy gravel layer is projected to have grain sizes similar to those measured in eroding banks.

Effects Analysis

Introduction

The following describes the potential impacts of implementing the proposed action on soils in the active project area and the upland log source areas with a focus on impacts to soil including the potential for erosion and loss of soil productivity.

Methods and Assumptions

Soil erosion is a natural process that can be accelerated by land management activities; the rate of erosion depends on soil texture, rock content, vegetative cover, and slope. For example, ash soils have higher erosion hazard ratings than other soils due to their low bulk density and high detachability. This hazard can be minimized by operating on slopes less than 30 percent with good vegetative cover. Vegetation

binds soil particles together with roots, and vegetative cover—including biological crust and duff/surface material—protects the soil surface from raindrop impact and dissipates the energy of overland flow (USFS 2015).

Soil productivity of a site is defined as the ability of a geographic area to produce vegetative biomass, as determined by abiotic conditions (e.g., soil type and depth, rainfall, and temperature) in that area. Specifically, as related to soils in this analysis, productivity is related to the capacity or suitability of a soil for establishment and growth of appropriate plant species, primarily through physical impediment to root growth, water availability, and nutrient availability.

Productivity of forested and non-forested plant communities is closely related to ash and loess content in soils. Characteristics of ash soils include: 1) high water holding capacity, 2) high water infiltration rates, 3) low bulk density, 4) low strength, 5) high compactibility, 6) high detachability, and 7) disproportionately high amounts of nutrients in upper surface layers. Ash soils can contain volcanic glass fragments, and in general are susceptible to disturbance from forest management practices. Under undisturbed conditions, these soils support good vegetation cover, which protects the ash from erosion (USDA 2007).

Key indicators for the analysis include:

- Acres of soil disturbance
- Acres of potential soil compaction and displacement
- Acres of new and temporary roads

Project impacts and potential changes in key resource indicators have been estimated for two time frames: short and long term. Short-term impacts generally occur in the period during and immediately after construction, but could last up to 2 years from the start of the project. Long-term impacts occur in the period of time between the end of short-term impacts and approximately 5 to 25 years in the future. Conservation measures and best management practices (BMPs) that would be followed during design and construction of the project have been included in this analysis and are described in Description of Alternatives section of the EA.

Management activities can result in direct, indirect, and cumulative impacts to soil productivity and stability (USFS 1998). Impacts may be beneficial or adverse and could include alteration of physical, chemical, and/or biological characteristics or properties of soils.

Impacts to soils can be short term in the case of erosion potential; the length of time for which risk of soil erosion is a concern depends on soil type and vegetative cover. The most adverse impacts of management activities on soils are described as detrimental compaction, detrimental puddling, detrimental displacement, detrimental burning, detrimental erosion, and detrimental mass wasting; other concerns include adverse changes in vegetation and organic matter on the soil surface, and adverse changes in the water table (USFS 1998). Soil compaction, puddling, displacement, severe burning, and impacts to ground cover (vegetation and organic matter) are direct impacts; soil erosion, mass wasting, and changes in the water table are indirect effects. Erosion control measures normally occur immediately following treatments, and/or revegetation occurs in the first year or two. Other impacts to soils such as compaction, rutting, and displacement tend to be longer term and can be cumulative in nature if soils have not fully recovered prior to a new activity occurring in the same location. Cumulative effects are the sum of incremental changes past, present, and reasonably foreseeable future direct/indirect impacts on the soil resource that overlap both in time and space.

Direct and Indirect Impacts to Soils

Alternative 1 – No Action

Under the No Action Alternative, the restoration project would not occur in the floodplain and trees would not be harvested in the log source area. Activity on National Forest lands would continue to be governed by current land management and transportation plans and could include agency actions such as road maintenance, noxious weed treatments, and public activities such as fuel-wood removal, mining, and recreation. Activities on private lands would continue and could include actions such as grazing, timber removal, vegetation management, and recreation. Other Reclamation restoration projects would likely be constructed along the GRR.

All current detrimental soil conditions would continue to exist, with some conditions improving, others remaining static, and still others deteriorating over time. Some new detrimental soil conditions are likely to occur from the above-listed ongoing activities.

Alternative 2 – Proposed Action

A detailed description of the proposed action is provided in the Proposed Action and Alternatives section. Proposed activities in the active project area that could impact soils include:

- Temporary access road construction and use
- Staging area construction and use
- Grubbing, grading, cutting, and filling
- New channel construction and back-filling
- Placement of logs, boulders, rock, and fill
- Potential leaks and spills from construction equipment

With the exception of logs, some large boulders, additional rock, native seeds, and seedlings, all materials used for the project would be from within the project site and repurposed in construction of new channel features and floodplain elements. Existing boulder-rock weirs would be removed and boulders repurposed as habitat features or structural ballast. Abandoned reaches of the existing channel would be filled using excavated material from constructed channel segments. The maps in Appendix A illustrate the proposed new channel configuration and the areas of the existing channel that would be filled. Existing riparian vegetation, topsoil, shrubs, and trees that require removal would be salvaged and reused in the floodplain. At this time, it is not expected that any native materials would be removed from the project site. Non-native materials (trash, noxious weeds, etc.) would be removed if found during construction.

Potential impacts to soils include removal of the organic layer and vegetation exposing mineral soils over approximately 40 (28% of the project area) acres to splash, sheet, rill, and gully erosion; compaction and displacement of surface and subsurface soil layers; mixing of soil layers during recontouring and restoration; and contamination with pollutants from leaks and spills. All of these potential impacts could reduce soil productivity and contribute to sedimentation in the river. Table 23 lists the proposed activities and the area of each soil type affected. Figure 22 shows mapped soil types with the proposed project elements.

Table 23. Acres of Soil Disturbance by Activity and Soil Type (acres)

Soil Code	New Channel	Large Woody Material Staging	New Access Road	Staging and Storage Area	Total
001EW	28.67	0.97	0.82	8.75	**39.22**
66	0.81	0	0	0	**0.81**
18F	0	0	0	0	0
5782BO	0	0	0	0	0
6115CO	0	0	0	0	0
W	0.05	0	0	0	**0.05**
Total	29.53	0.97	0.82	8.75	**40.08**

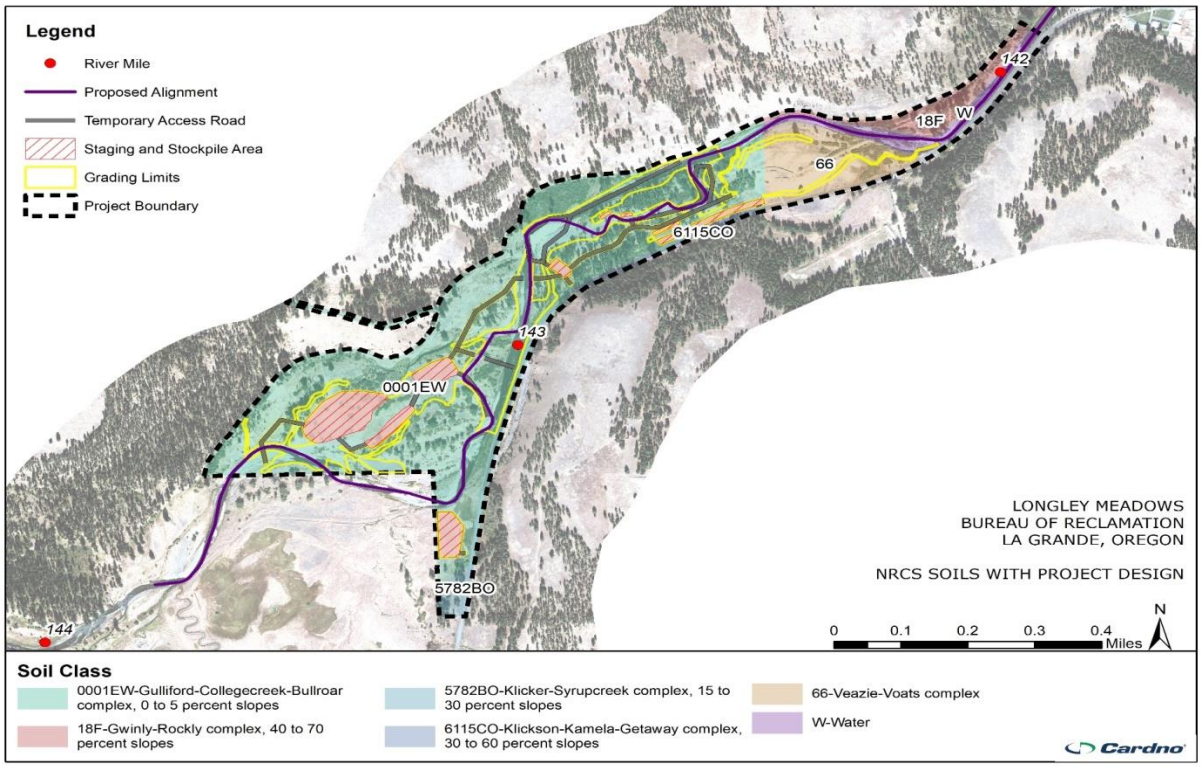


Figure 22. Active project area showing proposed project elements and mapped soil units based on the Soil Survey Report of Union County Area (2018).

A suite of Best Management Practices (BMPs) and Project Design Criteria (PDC) would be integrated into the design of alternatives and the analysis of effects to ensure that relevant natural resources, tribal treaty resources, and social values are managed and protected in a manner consistent with policy, law, and regulation. BMPs and PDCs also serve to ensure that implementation of the actions described under Alternative 2 are properly executed. The applicable

PDC's for disturbance for this project are listed under the Soils section in the Proposed Action and Alternatives section of this EA.

Soil surveys indicate areas of very severe erosion potential (18F, Table 22), however no project elements or construction related activities are located in this soil type. No PDC's are applicable as there will be no effects related to soil stability from Alternative 2 in this area.

Potential impacts include soil compaction from equipment traffic; soil displacement from vehicle and equipment traffic and skidding; soil erosion from temporary access roads, and staging area construction. Equipment operation would result in direct and indirect effects on soil physical characteristics within the boundaries of the proposed activity area. Most detrimental effects would be concentrated on the proposed temporary roads, landings, and slash piles. Minimizing the area occupied by staging areas and temporary roads to reduce the detrimental effects on soil productivity from changes in physical soil properties is recommended.

There would be potential to reduce soil effects further by limiting equipment operation, to the extent possible, when soils are drier than field capacity (McNabb et al. 2001; Startsev et al. 2001). Rutting and puddling are most often associated with equipment operation on wet soils (Williamson et al. 2000). Most summer operations would occur when soils are drier than field capacity. By operating on low soil moisture conditions we have the potential to reduce the amount of detrimental disturbance from equipment operations.

All temporary road construction, staging areas, and areas impacted by equipment operation for this project would be reclaimed to less than 20 percent detrimental soil disturbance (for the project area) by any site-appropriate combination of the following:

- Removing any installed culverts or temporary bridges,
- Recontouring the entire template to nature ground contour,
- Where recontouring is unnecessary, subsoiling will be used to ameliorate the presence of detrimental soil compaction,
- Seeding with the native plant mix as specified by the District Botanist,
- Placing woody material, and
- Planting native shrubs/trees to augment natural vegetation

Re-contouring activities would not ameliorate the long term impacts to soil productivity immediately, but would improve soil conditions compared to those on an existing or abandoned road. The establishment of vegetation and associated additions of organic matter would encourage recovery over time. Re-contouring and subsoiling would provide a suitable seed bed for native forest vegetation while increasing soil hydraulic conductivity, organic matter, total carbon, and total nitrogen (Lloyd et al. 2013). These conditions would likely accelerate the recovery of the soil productivity. Additional protection of the soil resource would be afforded by only allowing equipment operations to occur when soils are dry, snow covered, or frozen.

Cumulative Effects on Soils

Potential cumulative effects are analyzed by considering the proposed activities in the context of present and reasonably foreseeable actions in combination with the actions proposed in this project. Reasonably foreseeable future actions are defined as activities that will occur within the next 5 years. These are the areas where cumulative effects have occurred or may occur. In addition, some activities have an influence that may extend downstream in the subwatershed within the project area boundary. This broad area is referred to as the "cumulative effects analysis area," and in general all alternatives are considered in the context of relevant past, present, and reasonably foreseeable activities in this area. Activities that occurred

in the past have been incorporated into the existing condition assessment of the project area. An extensive list of present and reasonably foreseeable future actions and the analysis for cumulative impacts is located in Appendix D of the EA.

Alternative 1 – No Action

The only reasonably present and foreseeable future actions that would overlap in time and space within this project area that have the potential to result in short term increases in soil impacts would be OHV use, livestock grazing, and continued timber management on private lands.

However, the Bird Track Springs Fish Enhancement Project is located immediately upstream of the Longley Meadows Project area and has implemented similar restoration elements.

Erosion is expected to be localized to areas with OHV use, livestock grazing, and continued timber management on private lands. Soils in areas within the project boundary that are at wildfire risk could be influenced by a combination of wildfire and the erosion processes accompanied with high winds. Winds can transport soil aloft and to a new location. This would prove to be a loss to soil productivity within a proposed unit, if this occurs it is unknown if some portion of this material would end up as sediment. The potential duration of expected erosion risk would be for at least 3 years immediately following wildfire (Elliott et al. 2001; Robichaud 2000). The volumes of erosion under this risk are also influence by the intensity and duration of precipitation events that occur during elevated erosion risk. Detrimental soil conditions that are assumed to be created by equipment traffic may be long-lived (>40 years).

Alternative 2 – Proposed Action

As with the No Action Alternative, reasonably foreseeable actions include OHV use and livestock grazing. The Bird Track Springs project, while different in its specifics, has an intensive construction footprint on floodplain soils.

The Bird Track Springs project, while different in its specifics, has an intensive construction footprint on floodplain soils. The Bird Track Springs project is experiencing similar short-term direct and indirect impacts to those described above for the Longley Meadows project. Because the timing for initiating implementation of the Longley Meadows project would most likely be within a year following completion of the Bird Track project, the short term impacts to soils resources from Bird Track would most likely have been remediated and well into recovery with streambanks stabilized, vegetation establishing, and compacted soils rehabilitated and planted to native species. The changes in channel morphology and increased large wood within the Longley Meadows reach would capture most of the residual sediment which may occur; therefore, due to rehabilitation and project design, negative cumulative impacts to soils resources are expected to be immeasurable when combined with the Bird Track project. Beneficial impacts to soils resources (such as rehabilitation of streambank erosion areas, decompaction, increased stabilization from vegetation and streambank structures, etc.) within these stretches however; are anticipated to be significantly improved across all ownerships. Bird Track has recently experienced high water and erosion in the year1 phase of construction. It is recommended the Longley Meadows project be constructed in a single season to avoid potential flooding in an unfinished project with exposed soils. If phased construction is necessary, project managers must take adequate measures are taken to ensure proper protection of exposed soils across seasons.

Long-term impacts are expected to be minimal. Displacement and erosion, the loss of topsoil, is a long-term and perhaps a permanent loss of soil productivity. However, best management practices and soil mitigation strategies outlined above would reduce the occurrence of displacement and

erosion to be within the Region 6 standards. Compaction may last from 10 to 70 years (Gonsior 1983). Compaction can be adequately mitigated through subsoiling and decompacting skid trails and recontouring temporary roads to be within the Region 6 standards.

Subsoiling restores biological processes that are reduced by soil compaction (Dick et al. 1988). In general, tilling or scarifying a compacted soil improves productivity by reducing the resistance of soil to root penetration and providing improved soil drainage and aeration to enhance seedling establishment and tree growth (Bulmer 1998). Soil restoration is not the immediate result of ripping, planting, or any other activity. The goal of soil restoration is to create favorable conditions for impaired soils to begin the recovery process. Reductions in organic matter content reverse quickly as vegetation is established. Organic debris accumulates on the surface and roots grow and are decomposed in the soil. These organic materials break down and release nutrients and improve the quality of the soil by improving its structure and reducing compaction and other detrimental soil disturbances. Loss of organic-matter is a short-term change lasting about 10 years once vegetation returns to the soil.

Soil erosion would be controlled through the use of erosion control measures. In addition, bare soils would naturally recover to be re-vegetated with native seed. Any erosion that occurs would be short-lived, most likely occurring during the time between the soil disturbance and the implementation of erosion control measures.

Unauthorized user-built OHV trails and OHV use is spread across most of the landscape within the Spring Creek area, contributing to sediment production, soil disturbance, and soil compaction. Soils could be impacted in the short term, but the long-term benefits of the project in combination with the implementation of travel management (which would manage cross-country motor vehicle use) within the project area is expected to yield a net improvement in soil conditions.

With restoration of soils in the project area and the resulting enhancement of floodplain function, detrimental soil conditions are expected to improve over the long term as overbank flows deposit sediment in the floodplain and riparian vegetation and trees become established (Graham 1994; Harvey et al. 1987, 1994). A similar outcome is expected for the Bird Track Springs and Longley Meadows projects. There could, however, be a temporary cumulative increase in erosion and sedimentation rates from the sites if a storm event of sufficient magnitude were to occur during construction.

Irreversible and Irretrievable Commitments for Soil Resources

The proposed action is not expected to create any impacts that would cause irreversible damage to soil productivity. Floodplain construction activities would not occur within any landslide-prone areas, existing debris slides/debris torrents, and other potentially unstable lands on steep slopes. Planning, project design requirements, mitigation measures, and BMPs would be used to prevent irreversible losses of soil resources.

Prime Farmlands, Rangeland, Forest Land

Actions taken under either alternative would have no impacts to farmland, rangeland, or forest land inside or outside the National Forest. There are no prime farmlands affected by the proposal.

Wildlife Resources

Introduction

As discussed earlier, analysis of the effects of this project on terrestrial wildlife species is focused on those species or their habitat found in the project area. Refer to the effects on Threatened, Endangered and Sensitive (TES) species section for disclosure of the effects on wildlife TES species. Supporting wildlife documentation is located in the Project Record, and includes detailed data, methodologies, analysis, conclusions, maps, references and technical documentation used to reach conclusions in this environmental analysis.

The project area is located within the Coleman Ridge-Grande Ronde River, Jordan Creek, and Lower Beaver Creek sub-watersheds within the Grande Ronde River-Beaver Creek watershed (refer to project area map in Appendix A). The analysis area for the following wildlife species will be the Grande Ronde River-Beaver Creek watershed.

While private lands within the project area are not subject to or managed under Forest Plan direction, the resources on these lands were considered in combination with those on public lands for the following species to disclose the potential direct, indirect and cumulative effects of implementing the Longley Meadows alternatives.

Beaver Ponds

Beavers were historically found in the GRR system. Over the years, predation, trapping, and historical logging operations have eliminated beaver in the project area. Oregon Department of Fish and Game indicate that mountain lion numbers are high in this area and predation is a factor in low beaver numbers. Beavers are also hunted along the Grande Ronde. The benefits of beaver dams to river systems and associated riparian areas are well known. The ponds, wetlands, and meadows formed by dams are effective at flood control, create habitat biodiversity within the streams and within riparian areas and provide water cleansing. Beavers are a semi-common occurrence along the Grande Ronde, though their occupancy is generally short-lived. Past management activities have severely degraded riparian areas and reduced food availability for beavers. The lack of river connection with the floodplain often occurs in beaver dam breach and fail within a season.

Direct, Indirect, and Cumulative Effects on Beaver

Alternative 1

The no action alternative would have no effects on beaver ponds because no action would be taken and existing conditions would continue.

Alternative 2

In the proposed action, six Beaver Dam Analogs (BDA) would be created as part of the restoration process. BDAs are channel-spanning structures that mimic or reinforce natural beaver dams. Like natural beaver dams, they are semi-porous to water, sediment, fish and other water-borne materials. They are intended to be temporary features on the landscape and encourage colonization by beaver and the connection of floodplain surfaces and an overall increase in instream and riparian habitat heterogeneity and quality (Castro et al. 2015). Several of these BDAs were historical ponds and associated structures that would be enhanced through more connectivity to the river network. Additionally, willow and cottonwood plantings would increase food availability and associated habitat. This area is currently not inhabited by beaver, though the historical pond indicates previous occupancy. Any effects from this project to beaver would be

positive and beneficial. Hunting is allowed within the project area. As part of this project, the Forest Service would install signs asking hunters to not trap within the restoration area. If it becomes apparent that beavers are being removed from the area through trapping, ODFW would consider re-zoning the area as non-hunting (ODFW, personal communication).

The BDAs being developed in the Bird Track Springs project upstream of Longley Meadows overlap in time and space with those developed in this project and would have the potential to have a measureable cumulative beneficial effect by increasing potential beaver habitat within the GRR.

Forest Plan Compliance

The Longley Meadows Fish Enhancement project complies with Forest Plan goals to provide habitat for viable populations of all existing and desired vertebrate wildlife species and to maintain or enhance the overall quality of wildlife habitat across the Forest.

Proposed, Threatened, Endangered, and Sensitive (PETS) Species

A. Botanical

A Biological Evaluation (BE) addressing Proposed, Endangered, Threatened, or Sensitive (PETS) plant species has been prepared for this project to determine its effects on proposed or listed species, in accordance with legal requirements set forth under Section 7 of the Endangered Species Act (19 USC 1536(c)). The complete Biological Evaluation is located in the project analysis file.

The Forest Geographic Information System (GIS), rare plant data base (NRIS), and District files were examined to identify whether any threatened, endangered or sensitive (TES) plants or potential habitat are known in or near the analysis area boundary (PAB). There are no documented occurrences within the project area boundary.

Based on present available information, it was determined that the analysis area contains potential TES plant habitat. A pre-field review of district data and the Wallowa-Whitman sensitive plant list shows that the analysis area contains potentially suitable habitat for 18 TES plants (Table 24). The table includes an assessment as to the likelihood of these species occurring in the analysis area.

Table 24. Pre-field species checklist for Longley Meadows analysis area

Scientific name	Common name	Habitat summary	Likelihood of occurring within the analysis area
Botrychium ascendens	Upward-lobed moonwort	Moist meadows, edges of ponds and lakes, grassy forests. Some species have been found under various species of conifer trees. Sandy soils, or areas moist in spring. In forested areas, often associated with queens-cup bead lily or strawberries.	Habitat is present in the area, especially along the mesic seepy areas. The most likely species would be *B. montanum*.
Botrychium campestre	Prairie moonwort		
Botrychium crenulatum	Crenulate moonwort		
Botrychium lineare	Slender moonwort		
Botrychium lunaria	Common moonwort		
Botrychium montanum	Mountain grape-fern		
Botrychium paradoxum	Twin-spiked moonwart		

Scientific name	Common name	Habitat summary	Likelihood of occurring within the analysis area
Botrychium pedunculosum	Stalked moonwort		
Carex cordillerana	Cordilleran sedge	Dry forests and riparian woods. Mid-elevations.	Potential habitat may occur within the project area.. One site is located further up on the Grand Ronde River.
Carex retrorsa	Retrorse sedge	Swamps, wet thickets, often along streams, marshes, sedge meadows, shores of streams, ponds, and lakes. Our populations are on basalt and other volcanic derived soils.	**Potential habitat unlikely** to occur. One known location on Eagle Creek on the east side of the district, but has not been relocated.
Cypripedium fasciculatum	Clustered lady's-slipper	Forest, grand fir to Ponderosa pine, and warm riparian forests. Populations generally found in 60-100% shade. Ultra-basic soils, granitics, schists, limestone, and quartz-diorite. Rocky to loamy soils in damp to dry sites. Seeps / springs.	Potential habitat may occur within the project area, however no sites known for the W-WNF. One historical collection on the east side of the district. Has not been relocated.
Eleocharis bolanderi	Bolander's spikerush	Fresh, often summer-dry meadows, springs, seeps, stream margins. Wet places, low to mid-montane. In vernally wet swales. Along intermittent streams, moist meadows.	Potential habitat may occur in within the project area. Known sites occur within the Starkey area of the La Grande Ranger District (LGRD).
Lycopodium complanatum	Ground cedar	Dry open coniferous or mixed forest alpine slopes; coniferous forest, with thick duff. Often on rotting logs, moist forest, riparian areas. Also in meadows and on open ridge tops.	**Very unlikely**. This species is very rare in northeast Oregon but one site is documented for LGRD within the Grande Ronde Watershed.
Phacelia minutissima	Dwarf phacelia	Moist meadow and seep edges, or on vernally wet open meadows and barren slopes. Reported to occur with aspen in other areas. Gravely, clay-loam, well-drained soils.	Suitable habitat may occur in the project area, primarily associated with aspen. Known populations occur on the east side of the district.
Phlox multiflora	Many-flowered phlox	Basalt cliffs, rocky outcrops, rocky openings in dry forest. Wooded rocky areas, as well as in openings in the forest. Loose substrate rather than exposed hard rocks. Residual soils, gravels, cobbles.	**Unlikely to occur** in the analysis area; however populations are located in forested habitat, upstream of the project area.
Platanthera obtusata	Small northern bog-orchid	Mesic to wet coniferous forest, forested fens, sphagnum bogs, stream banks, tundra, moist roadsides; 0-3500 m (18). Some-times found growing on top of rotting logs. Often with Engelmann spruce, or sub-alpine fir. Not necessarily on limestone soils.	**Not likely to occur** in the project area. Prefers moister, boggier habitat that is not present in the analysis area.
Schistidium cinclidodonteum	Moss	Not much known about this species. Forms large loose or dense sods on wet or dry rocks or on soil in crevices of rocks and boulders often along intermittent streams at elevations of 5,000-11,000 ft. Could include ponderosa pine forest type.	**Not likely to have suitable habitat** in the analysis area.
Trifolium douglasii	Douglas' clover	Moist or mesic meadows, prairie remnants, along riparian areas along streams. In swales, along intermittent streams, and in vernally wet areas. Alluvial soils, ash/clay, fine silt to sandy.	**Not likely to occur** within the project area. Although it does occur within suitable areas upstream of the project area.

The results of the BE are described below.

Table 25. Effects Call by Species Which May Have Suitable Habitat within the Longley Project Area

Scientific Name	Common Name	Effect call for Longley Meadows Project Alternative 2
Botrychium ascendens	Upward-lobed moonwort	**MIIH**
Botrychium campestre	Prairie moonwort	
Botrychium crenulatum	Crenulate moonwort	
Botrychium lineare	Slender moonwort	
Botrychium lunaria	Moonwort	
Botrychium montanum	Mountain grape-fern	
Botrychium paradoxum	Twin-spiked moonwart	
Botrychium pedunculosum	Stalked moonwort	
Carex cordillerana	Cordilleran sedge	**MIIH**
Cypripedium fasciculatum	Clustered lady's-slipper	**NI**
Eleocharis bolanderi	Bolander's spikerush	**NI**
Lycopodium complanatum	Ground cedar	**NI**
Phacelia minutissima	Dwarf phacelia	**MIIH**

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.
NI = No Impact

B. Fisheries

Analysis Area

The analysis area for aquatic species is the same as the analysis area used for the direct and indirect effects analysis to fish and aquatic habitat in the Longley Meadows Fish Habitat Enhancement Project area.

Short term effect refers to effects that occur at the time of implementation of project activities and last through the first flood stage event (for example sediment disturbance that occurs from instream work would be expected to flush out and disperse downstream at the first flood stage event. Long term effects refer to effects lasting from the time of implementation for decades, at a minimum.

ESA Federally Listed Threatened Fish

Consultation on effects to federally listed threatened fish in the project area will be completed under Bonneville Power Administration's Habitat Improvement Program (HIP). Requirements in Biological Opinions issued from USFWS and NMFS will be followed for all project activities.

Alternative 1 - No Action

The no action alternative would leave the proposed project area stream channel conditions in their current state. By not improving stream channel conditions the proposed project area would continue to maintain degraded stream habitat and riparian area for ESA listed fish.

Alternative 2 - Proposed Action

Snake River spring/summer Chinook, Snake River steelhead, and Columbia River bull trout have been listed as threatened by National Marine Fisheries Service (NMFS) and US Fish and Wildlife Service (USFWS). All three species occur within the project area; the project area is considered designated critical habitat.

The preliminary ESA effects determination for the proposed action for all three ESA listed fish is "Likely to Adversely Affect" due to short term disturbance, sedimentation, and turbidity related to

in-stream activities. In addition fish salvage (or removal) would occur where instream work areas are isolated and dewatered. This process would involve handling of fish and may involve use of an electro shocker following NMFS (2000) electrofishing guidelines. Operation would be led by an experienced fisheries biologist and all procedures would be followed so that pulse width and voltage would only be increased to levels where fish are immobilized, however, there is still some risk that injury and/or mortality can occur using this method for fish removal. Fish would be placed in buckets and moved to a location upstream of the project area. Over the mid to long term, the project is expected to substantially improve habitat conditions and promote the recover for all three species.

Table 26. Proposed Action Federally Listed Threatened Fish Determinations

Species	No Action	Proposed Action
Snake River spring/summer Chinook	No Effect	Likely to Adversely Affect
Snake River steelhead	No Effect	Likely to Adversely Affect
Columbia River bull trout	No Effect	Likely to Adversely Affect
Designated Critical Habitat	No Effect	Likely to Adversely Affect

Region 6 Sensitive Fish and Aquatic Species

This report satisfies the requirements in Forest Service Manual 2672.4 requiring the Forest Service to review all planned, funded, executed or permitted programs and activities for possible effects on proposed, endangered, threatened or sensitive species by completing a Biological Evaluation (BE). The Region 6 Regional Forester Special Status Species List was updated in July 2015. The BE process is intended to review the Longley Meadows Fish Habitat Enhancement Project in sufficient detail to determine effects of alternatives on species in this evaluation and ensure proposed management actions would not:

- likely jeopardize the continued existence, or cause adverse modification of habitat, for a species that is proposed (P) or listed as endangered (E) or threatened (T) by the USDI Fish and Wildlife Service or NOAA National Marine Fisheries Service; or
- contribute to the loss of viability for species listed as sensitive (S) by USDA Forest Service, Region 6, or any native or desired, non-native species; nor cause any species to move toward federal listing (FSM 2672.4).

The following sources were used during the pre-field review phase to determine the presence or absence of aquatic sensitive species in the effects area for the Longley Meadows Fish Habitat Enhancement Project:

- Wallowa-Whitman NF GIS database
- Regional Forester's (R6) sensitive animal list (July, 13, 2015)
- ODFW stream survey and fish survey reports
- Oregon Native Fish Status Report (2005)

There are six sensitive fish and aquatic species on the Forest Service Region 6 Sensitive Species List that occur or are suspected to occur within the planning area and may be potentially affected by project activities (see Table 27). Effects determination for fish and aquatic species that occur in the project area or within 300 feet downstream of the project area or are suspected to occur in the project area based on habitat association is "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." The proposed project would have beneficial long-term effects on the habitat of all listed species.

Table 27. Region 6 Fish and Aquatic Sensitive Species

Species	Proposed Action					
	Status	Documented in Analysis Area	No Effect	MIIH	WIIH	Beneficial Impact
Redband Trout (*Oncorhynchus mykiss*)	R6-Sensitive, MIS	Yes		X		X
Pacific Lamprey (*Entosphenus tridentatus*)	R6-Sensitive	Yes (reintroduced in 2014 and 2015)		X		X
Western Ridged Mussel (*Gonidea angulata*)	R6-Sensitive	Suspected		X		X
Shortfaced Lanx (*Fisherola nuttalli*)	R6-Sensitive	Suspected		X		
Columbia Pebblesnail (*Fluminicola fuscus*)	R6-Sensitive	Suspected		X		
California floater (*Anodonta californiensis*)	R6-Sensitive	Suspected		X		

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.
WIIH - Will impact individuals or habitat with a consequence that the action will contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Redband Trout (*Oncorhynchus mykiss gibbsi*)

Redband trout, the resident form of *Oncorhynchus mykiss,* are a Region 6 sensitive species and a WWNF management indicator species (MIS). Redband trout in the project area likely shared a common gene pool with Snake River steelhead. Redband trout are widely distributed in the Longley project area and occupy all Category 1 streams; approximately 1.5 miles of existing habitat.

Alternative 1 - No Action

The No Action alternative would have ***no impact to individual redband trout and their habitat*** (NI) on redband trout in the short term, but as degraded habitat persists, there could be adverse effects to individuals. Most likely they would not occupy this area particularly at times of year when conditions are unfavorable due to stream temperature.

Alternative 2 - Proposed Action

The Proposed Action Alternative ***may impact individual redband trout and their habitat*** (MIIH), but will not likely contribute toward federal listing or loss of viability to the population or species. Effects from all project activities are disclosed in the Fish and Aquatic Habitat and Species Analysis, and the MIS Analysis. Project activities would have local short term adverse effects to fish inhabiting the project area when channel construction and large wood habitat construction occurs. Construction areas would be isolated and fish would be removed either with traps, nets or electrofishing. Handling of fish would be minimal and fish would be released at a designated location upstream of project activities to avoid effects to water quality from increased sediment and turbidity.

Pacific Lamprey (*Entosphenus tridentatus*)

Until 2015, Pacific lamprey only existed as a small remnant population in the upper GRR. In 2015 the Confederated Tribes of the Umatilla began a translocation program. In the spring of 2015, 450 adult

lamprey were introduced into the Grande Ronde near Starkey. In 2016, 400 adults were introduced into the upper GRR, 201 in 2017, and 421 in 2018 in an effort to jump-start the remnant population (Johnson 2017). Pacific Lamprey have varying life history, but in the upper GRR they have been documented as spawning in tributaries to the Grande Ronde in spring to early summer (Johnson 2017). The plan for 2019 is to release approximately 550 adults into the upper GRR at five release sites upstream of the project area, These fish are expected to spawn in areas near or upstream of release sites and as ammocoetes would utilize suitable habitat downstream, including the mainstem GRR in the Longley project reach.

The most vulnerable life stage for Pacific Lamprey are when they are eggs in a redd (approximately 30 days) and when they hatch into larvae called ammocoetes and drift downstream to rear in slow velocity areas. At this stage, they live in silts/sand substrates and filter feed for 3-7 years.

During fish salvage operations for the Bird Track Springs restoration project in 2018, fish were removed from areas of the GRR that were dewatered for construction. Several hundred lamprey ammocoetes were found utilizing habitat in the mainstem GRR during these activities. It is assumed that similar numbers of ammocoetes utilize the Longley project reach of the GRR. Ammocoetes would similarly be removed from construction areas and located to an area of suitable habitat to avoid effects from sediment and turbidity for this proposed project.

Desirable habitat for pacific lamprey include:

- Stream and river reaches that have relatively stable flow conditions (sustained increases or decreases that take place over days and weeks rather than hours) and that are not extreme or flashy, offer the best opportunities to support all life stages of lampreys;
- Large substrates (i.e. very large cobble and boulders) submerged in low or no flow areas of rivers and streams may provide high quality adult overwintering habitat.
- Areas of small to medium cobbles, free of fine sediment, serve as spawning habitats. Spawning habitats created or enhanced for salmonids are generally compatible with the needs of lampreys;
- Depositional areas, including alcoves, side channels, backwater areas, pools, and low velocity stream and river margins that recruit fine sands and silts, downstream of spawning areas, provide ideal ammocoete rearing areas and should not be reduced.
- A mix of deep pools, low velocity rearing areas with fine sand or silt, and silt-free cobble areas upstream of rearing areas, all combined with summer temperatures that rarely or never exceed 20° C (68° F), is believed to provide high quality habitat conditions for all life stages.
- Studies with European lamprey species have shown that the occurrence of substantial areas of juvenile lamprey habitat may not signify presence of lamprey populations as populations have a disparate distribution (King et al 2008). However, it is important to maintain the integrity of these areas as their use by lamprey may vary temporally (USFWS 2010).

Alternative 1 - No Action

The no action alternative would have ***no impact to individual pacific lamprey and their habitat*** (NI) in the short term. The lack of deep, low velocity pools, alcoves, side channels and backwater areas, very high summer MWAT that exceed 68° F, and overall degraded conditions, which are not suitable for the majority of life stages for Pacific lamprey, may impede species recovery in the upper GRR. Inhospitable conditions would be expected to be maintained into the long term.

Alternative 2 - Proposed Action

The proposed action ***may impact individual pacific lamprey and their habitat*** (MIIH) if there are pacific lampreys in the project area in the spawning, egg, or ammocoete stage. Individuals could be directly affected by this project as work areas are isolated (and dewatered) and stream channel

disturbance occurs with realignment and habitat structure construction. Effort would be made to relocate ammocoetes during fish salvage, as recommended in US Fish and Wildlife Service's Best Management Practices for Pacific Lamprey (2010). All US Fish and Wildlife Service's Best Management Practices for Pacific Lamprey (2010) should be followed during implementation of instream activities associated with the proposed action.

Overall project restoration would benefit pacific lamprey by improving water quality, increasing side channel habitat, large, deep pools with low velocity, alcoves, backwater areas, adequate sand or silt substrate and spawning gravels and improving floodplain condition and connection.

Shortface lanx (*Fisherola nuttali*)

Shortface Lanx, *Fisherola nuttalli,* is a small pulmonate (lunged) snail in the family Lymnaeidae. Habitat requirements include cold, unpolluted, medium to large streams with fast-flowing, well-oxygenated water and cobble and boulder substrate. These snails are generally found at the edges of rapids. Shortfaced Lanx were historically present throughout much of the Columbia River drainage in Washington, Montana, Oregon, Idaho, and British Columbia. Most populations were extirpated as a result of habitat loss including 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. Additional small populations are found in Oregon in the John Day and Imnaha Rivers, and the lower Columbia River near Bonneville Dam; the Methow River, Washington; and the Grande Ronde River, in Oregon and Washington. Shortfaced Lanx is threatened by habitat alteration and reduced water quality due to dams, impoundments, and siltation and pollution from agriculture, development, industry, and grazing.

There is potential for the shortface lanx (*Fisherola nuttali*) to occur in the 1.5 miles of the mainstem GRR in the project area. The shortface lanx is a large non-migrant freshwater snail. The shortface lanx moves with a slow snail-like crawl, or is subject to transport by stream current. It feeds by scraping algae and diatoms from rock surfaces in the streams but may occasionally feed on other plant surfaces (NatureServe 2009). The species is sporadically distributed at present in the Columbia River and has been verified in a few major tributaries including the GRR. The shortface lanx are found in large bodies of water (at least 30 meters and up to 100 meters wide) that are cold, unpolluted, well-oxygenated, perennial, and dominated by cobble-boulder substrate (Neitzel and Frest 1990).

The presence of shortfaced lanx has been documented on the WWNF but has not been confirmed in the analysis area.

Alternative 1 - No Action

The no action alternative would have ***no impact to individual shortface lanx and their habitat*** (NI). Local conditions would remain in their current condition.

Alternative 2 - Proposed Action

The proposed action ***may impact individual shortfaced lanx and their habitat*** (MIIH). Isolating and dewatering the channel during instream large wood habitat construction and realignment could affect shortface lanx if they are present in the project area. Effort would be taken to salvage mollusks from work areas when fish are being relocated. Additionally, if shortface lanx are present downstream of the extent of in channel work, individuals could be effected from short term impacts to water quality from increased sediment and turbidity. Water quality and turbidity monitoring would mitigate effects by stopping work if turbidity downstream increased to 10% above the control site upstream of project work.

Overall long term effects to aquatic habitat would benefit shortfaced lanx because habitat requirements such as clean, cold, well-oxygenated water with gravel, cobble, and bolter substrate would be improved from current conditions.

Columbia pebblesnail (*Fluminicola fuscus*)

The Columbia pebblesnail is found in larger tributaries and rivers, on upper surfaces of stable rocks, boulders and bedrock outcrops in fast current, in relatively shallow water. This species requires cold water with high oxygen content, so is not found behind impoundments, or where water is warm, slow, nutrient-enriched or turbid. These snails feed by scraping bacteria, diatoms and other perilithic organisms from rock surfaces. These snails occasionally feed on aquatic plant surfaces. Columbia pebblesnail habitat is generally areas with few aquatic marcophytes of epiphytic algae. This species have been documented on the Wallowa-Whitman National Forest, but it is not certain whether they occur in the project area.

Alternative 1 - No Action

The no action alternative would have ***no impact to individual Columbia pebblesnail and their habitat*** (NI). Local conditions would remain in their current degraded condition. It is not likely that this species would occur in this stretch of the upper GRR since temperatures reach extreme highs in the summer months.

Alternative 2 - Proposed Action

The proposed action may impact individual Columbia pebblesnail and their habitat (MIIH). Because water temperature in the GRR at the project area location is extremely elevated during summer months (including the July 1-31 in-channel work window ODFW 2008), it is not expected that these species would be present during project implementation. This species is so small (7.0 – 11.2 mm height), that it would be difficult to identify and/or relocate individuals if they are encountered during project implementation. Long term effects would have a beneficial effect to habitat for these species by improving hydrologic function and water quality.

California floater (*Anodonta californiensis*)

The California floater is a freshwater bivalve mussel that lives in shallow areas of clean, clear lakes, ponds and large rivers (Taylor 1981) and some reservoirs (Nedeau et al. 2009). Preferred habitat for this species is soft, mud or sand substrate (Clarke 1981) where the mussel can burrow. This species is primarily sedentary and it filter feeds on plankton and other particulate matter suspended in the water column (reviewed by Vaughn et al. 2008). There have been major declines in this species from their historical range, reasons are thought to include a decline in numbers of native host fish, which the larval life stage of the California floater depends, pollution, sedimentation from land use activities like logging and grazing, predation by non-native fish and dam building. There is potential for this species to occur in the project area.

Alternative 1 - No Action

The no action alternative would have ***no impact to individual California floaters and their habitat*** (NI). Local conditions would remain in their current degraded condition.

Alternative 2 - Proposed Action

The proposed action ***may impact individual California floaters and their habitat*** (MIIH). There could be short term adverse effects to individuals in this species if they occur in the project area. Anodontid mussels have relatively low tolerance to fine sediment embeddedness. Effort would be made to salvage and relocate any mussels found in work areas when they are isolated and before

they are dewatered. These mussels are less than 5 inches, but large enough to identify and salvage from areas of in channel disturbance as these areas are isolated and before they are dewatered.

There would be long term beneficial effects to habitat for the California floater since they rely on native host fish and there would be benefits to fish species and habitat by implementing the proposed action. In addition, through improving channel complexity and stabilizing banks, there would be decreases in erosion and sedimentation through lateral migration of the channel and eroding banks.

Western Ridged Mussel (*Gonidea angulata*)

The Western ridged mussel occurs in large tributaries of the Snake River and Columbia River in Washington, Oregon and Idaho. These mussels occur in streams of all sizes. They are mainly found in low to mid-elevation watersheds, and do not typically inhabit high elevation headwater streams where western pearlshell can be found. They are somewhat tolerant of fine sediments and can occupy depositional habitats and banks. Western ridged mussel can withstand moderate amounts of sedimentation, but are usually absent from habitats with unstable or very soft substrate.

Alternative 1 - No Action

The no action alternative would have ***no impact to individual California floaters and their habitat*** (NI). Local conditions would remain in their current degraded condition.

Alternative 2 - Proposed Action

The proposed action ***may impact individual western ridged mussels and their habitat*** (MIIH) if they occur in the project area. Short term effects could impact the western ridged mussel within the 1.5 miles of mainstem GRR if they occur in the project area or immediately downstream of the project area. Short term increase in sediment and turbidity associated with in channel work is expected to have minor, short term effects to water quality, which could affect individuals. Effort would be made to salvage and relocate these mussels when work areas are isolated and before or during the time that the channel is dewatered so that individuals do not get stranded. These mussels would be redistributed upstream to an area of adequate habitat. Long term effects on fish and aquatic habitat would be expected to benefit the western ridged mussel as hydrologic function and habitat recover.

No western ridged mussels were found in the BTS reach upstream of the Longley project area. Only western pearlshell mussels were found. It is not likely that western ridged mussels would occur in this reach.

Essential Fish Habitat

Essential Fish Habitat (EFH) has been designated by NMFS within the Upper Grande Ronde Basin under the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (NMFS 2007). EFH includes all Chinook habitat. There would be short term sediment impacts during the construction phase of the project; however long-term effect on EFH would be beneficial. The project area within the Upper Grande Ronde is within Essential Fish Habitat and would have short term adverse effects on quality of Chinook salmon habitat in the existing 1.5 miles of the GRR in the project area. These short term effects would be caused from a short term increase in sediment and turbidity. However, implementing mitigation measures is expected to minimize adverse effects to EFH.

C. Wildlife

The list of federally-listed species applicable to the planning area was obtained from the U.S. Fish and

Wildlife Service (USDI Fish and Wildlife Service 2011). The USFS Region 6 Regional Forester's Sensitive Species List, dated March, 2019 (USDA Forest Service 2019) was reviewed for sensitive species potentially applicable to the Longley Meadows Project.

Effects Analysis

Methodology

In general, the analysis area is the same as the project area unless stated below for each species. For cumulative effects, past activities within the project area have been incorporated into the existing condition descriptions below. Present and reasonably foreseeable future actions are described in Appendix D of the EA. Those actions which overlap in time and space with the Longley Meadows project which would have a measurable cumulative effect on each of these species are described in the cumulative effects discussions below.

The project area was evaluated for PETS species to determine which species might occur in or near it, based on scientific literature, habitat availability, and La Grande Ranger District (RD) records of each species. No population surveys were conducted for any of the species addressed below. Only those PETS species known or suspected to occur, on the La Grande Ranger District, are addressed in the Biological Evaluation (BE) and an effects determination given (Table 29). Sensitive species lacking potential distribution or suitable habitats within the analysis area are not addressed further in the analysis, and all alternatives would have **No Impact** on these species and/or habitats.

Table 28. PETS Species Review, WWNF and Longley Meadows Project Area

Status	Species	Wallowa-Whitman NF Occurrence	La Grande District Occurrence	Longley Meadows Project Area Occurrence	Addressed in BE
AMPHIBIANS					
Sen	Rocky Mt tailed frog *Ascaphus montanus*	D	K	N	
Tailed frogs are strongly adapted to cold water conditions. They occur in very cold, fast-flowing streams that contain large cobble or boulder substrates, little silt, often darkly shaded, and less than 20ºC (Bull and Carter 1996). Tailed frogs are not known to occur in the project area and streams located in the area do not provide suitable habitat.					
Sen	Columbia spotted frog *Rana luteiventris*	D	K	K	X
This species is found at aquatic sites in a variety of vegetation types, from grasslands to forests (Csuti et al. 1997). Spotted frogs have been documented in the project area and suitable habitat exists within the project area.					
BIRDS					
Sen	Northern bald eagle *Haliaeetus leucocephalus*	D	K	N	X
Nesting habitat consists of large conifers within 1 km of water containing adequate supply of medium to large fish (Johnsgard 1990). The project area contains potential nesting, foraging and roosting habitat and the potential for species occurrence; however no roosting or nesting trees would be affected during project activities.					
Sen	American peregrine falcon *Falco peregrinus anatum*	D	K	N	
Suitable nesting habitat consists of cliffs, usually within 900 meters of water (Pagel 1995). No nest sites or suitable nesting habitats are known within the project area.					
Sen	Harlequin duck *Histrionicus histrionicus*	S	N	N	
Harlequin ducks winter in rough coastal waters and breed in mountain streams and rivers. Most breeding sites are on relatively rapid streams of moderate size, typically surrounded by undisturbed forest. Breeding requirements appear to be wide riparian vegetative zone, braided or multi-channel streams with islands for nesting and roosting and minimal human activity. Harlequin ducks have been documented along the Imnaha, Wallowa and Lostine Rivers. Lone individuals have					

Status	Species	Wallowa-Whitman NF Occurrence	La Grande District Occurrence	Longley Meadows Project Area Occurrence	Addressed in BE
been documented along the GRR. Lack of breeding requirements within the subwatershed of the project area indicates occurrence is unlikely.					
Sen	Columbian sharp-tailed grouse *Tympanuchus phasianellus columbianus*	D	N	N	
Potential habitats consist of bunchgrass prairies interspersed with stream bottoms containing deciduous shrubs and trees. The species was extirpated from Oregon, but has been reintroduced into northern Wallowa County (ODFW 2010). No sightings or potential suitable habitat occur within or adjacent to the project area. Occurrence within the project area is unlikely.					
Sen	Upland sandpiper *Bartramia longicauda*	D	K	N	
Suitable habitats in Oregon consist of large montane meadows ranging from 1,000 to 30,000 acres, generally surrounded by lodgepole pine (Marshall et al. 2003). The project area lacks suitable habitat, and no known sightings are reported for the area.					
Sen	Greater sage grouse *Centrocercus urophasianus phaios*	D	K	N	
Suitable habitats are associated with sagebrush. The project area lacks suitable habitat and known sightings for sage-grouse.					
Sen	Lewis' woodpecker *Melanerpes lewis*	D	K	H	X
Primary breeding habitats include open ponderosa pine, riparian cottonwood, and logged or burned pine (Tobalske 1997). Project area has the potential to provide habitat through restoration efforts.					
Sen	White-headed woodpecker *Picoides albolarvatus*	D	K	N	
Nesting habitat consists of open-canopy stands with mature and over-mature ponderosa pine (Buchanon et al. 2003). Impacted areas do not contain suitable habitat for white-headed woodpeckers.					
MAMMALS					
T	Canada lynx *Felix lynx canadensis*	D	K	N	X
The species is classified as "not present" on the WWNF					
Sen	North American wolverine *Gulo gulo luteus*	D	K	N	
Preferred habitat consists of alpine and subalpine areas with little or no human presence. Project area does not contain suitable denning habitat but the potential for a wolverine to move through the project area exists.					
Sen	Gray wolf *Canis lupus*	D	K	N	
Gray wolves are habitat generalists inhabiting a variety of plant communities, typically containing a mix of forested and open areas with a variety of topographic features. No denning sites are known in the vicinity of the project area but the potential for wolves to move through the project area exist.					
Sen	Fringed myotis *Myotis thysanodes*	D	K	H	
This bat is found throughout much of western North America and has been documented on the Wallowa-Whitman. Roosting in decadent trees and snags is common throughout its range. Lack of trees within the project area					
Sen	Townsend's big-eared bat *Corynorhinus townsendii*	D	K	N	
This bat roosts in buildings, caves, mines, and bridges and the presence of suitable roost sites is more important than the vegetation type in determining the distribution of this bat. There are no known roost sites for Townsends within the Longley Meadows project area, however riparian restoration has the potential to increase prey species					
Sen	Spotted bat *Euderma maculatum*	S	H	N	

Status	Species	Wallowa-Whitman NF Occurrence	La Grande District Occurrence	Longley Meadows Project Area Occurrence	Addressed in BE
Spotted bats primarily rely on crevices and caves in tall cliffs for roosting which likely determine their distribution. The Longley Meadows project area lacks tall cliffs, making occupancy unlikely.					
INVERTEBRATES					
Sen	Intermountain sulphur *Colia Christina pseudochristina*	D	H	N	
Suitable habitat consists of sagebrush with scattered Ponderosa Pine. Lack of sagebrush within the project area makes occurrence unlikely					
Sen	Silver-bordered fritillary *Boloria selene*	S	N	N	
Suitable habitat consists of bog and marshes, often willowy sites, sometimes tall wet grass (Pyle 2002). Only three sites are reported for Oregon, the closest of which is located north of the town of Halfway on private land. No larval host species are reported for the project area, and suitable habitat for this species is unlikely.					
Sen	Western bumblebee *Bombus occidentalis*	D	K	H	X
The western bumblebee is a habitat generalist and inhabits a wide variety of habitat types, associated with flowering plants. Recent surveys across the Wallowa-Whitman has found them to be distributed across multiple elevations and habitat types. No sightings have been documented within the project area but habitat and distribution indicates occurrence is likely.					
Sen	Suckley Cuckoo bumblebee Bombus suckleyi	D	K	H	X
The suckle cuckoo bumblebee is in the subgenus Psithyrus and is unique in that they are dependent on another Bombus sp. to serve as a host for their eggs. No sightings have been documented within the project area but habitat and distribution indicate indicates a potential for occurrence.					
Sen	Morrisoni Bumblebee *Bombus morrisoni*	S	H	N	
The Morrisoni bumblebee is a generalist forager and has been reported visiting a wide variety of flowering plants. Recent analysis (Hatfield et al. 2014) indicates this species has undergone significant declines throughout much of its range over the Western United States This species is known throughout the US Mountain West from CA east of the Sierra-Cascade Ranges to southern BC, in the Deset West and east to NM, TX and north to western SD (Williams et al. 2014). Surveys across the Wallowa-Whitman from 2014-2018 have not detected this species. The lack of open, dry scrub in the project area makes this species unlikely to occur.					
Sen	Yuma skipper *Ochlodes yuma*	D	N	N	
This species has been documented along the Imnaha River in Wallow Co. It is closely associated with its host plant Phragmites australis. Lack of the presence of the host species within the project area makes occurrence highly unlikely.					
Sen	Hells Canyon land snail *Cryptomastix populi*	D	N	N	
Land snail found in rather open and dry large-scale basalt taluses, generally at lower elevations. Most colonies occur at slope bases along the major river corridors, not in major tributaries. Associated vegetation includes *Celtus, Artemisia, Prunus, Balsamorrhiza,* and *Seligeria*. Surrounding vegetation is generally sage scrub. Generally in steep north or east-facing taluses, often only at the base. Occasionally found in meta sedimantary taluses as well (Frest and Johannes 1995). Lack of large scale basalt talus makes the occurrence of this species unlikely.					
Sen	Columbia Gorge Oregonian *Cryptomastix hendersoni*	D	N	N	
Land snail found in rather open and dry large-scale basalt taluses, generally at lower elevations. Most colonies occur at slope bases along the major river corridors, not in major tributaries. Associated vegetation includes *Celtus, Artemisia, Prunus, Balsamorrhiza,* and *Seligeria*. Surrounding vegetation is generally sage scrub. Generally in steep north or east-facing taluses, often only at the base. Occasionally found in meta sedimantary taluses as well (Frest and Johannes 1995). Lack of large scale basalt talus makes the occurrence of this species unlikely.					
Sen	Umatilla megomphix *Megomphix lutarius*	D	K	N	
Land snail found within talus, closely associated with intact conifer forests, riparian areas or both. Thought to potentially be extinct due to lack of relocations, surveys conducted on the Umatilla in 2012 and within the La Grande district on the Wallowa-Whitman in 2016 found this species in 3 separate sites. Lack of conifer forests within the project area makes the					

Status	Species	Wallowa-Whitman NF Occurrence	La Grande District Occurrence	Longley Meadows Project Area Occurrence	Addressed in BE
occurrence of this species unlikely.					
Sen	Blue Mountainsnail *Oreohelix strigose delicata*	S	H	N	
Oreohelix strigosa is a snail of riparian habitat and open forest, typically found in rock talus, shrubby areas, or under forest litter (Burke 2013) fairly open ponderosa pine and Douglas-fir forest with some deciduous understory and common grasses. Refugia sites for aestivation are assumed to be located under more stable rock schist and woody debris. Surveys conducted on the Wallowa-Whitman did not locate this species, though another thought to be undescribed species of Oreohelix was found on the La Grande district within a talus slope above a riparian area. It is unlikely this species occurs within the project area, due to its rarity.					
Sen	Fir pinwheel *Radiodiscus albietum*	D	H	N	
Most often found in moist and rocky Douglas-fir forest at mid-elevations in valleys and ravines (Frest and Johannes 1995). Known distribution in Oregon is limited to extreme NE (above Weston, Umatilla Co.; Duncan 2008). Surveys conducted on the Umatilla and Wallowa-Whitman NF in 2016 and 2018 found this species in multiple sites within dry and moist forest associated high canopy cover (<65%). Lack of forested stands within the project area makes the occurrence of this species unlikely.					
Sen	Shiny tightcoil *Pristiloma wascoense*	D	D	N	
Most sites for this species are in ponderosa pine and Douglas-fir forests at moderate to high elevations. Quaking aspen also provides habitat. Other Pristiloma species in the ecoregion are known to prefer moist microsites such as basalt talus accumulations, usually with riparian influence (Frest and Johannes 1995). Recent surveys across the Wallowa-Whitman in 2016 and 2018 found this species in a number of sites within dry and moist forest associated with high canopy cover (<65%). Lack of forested stands within the project area makes the occurrence of this species unlikely.					

Status: Sen = Sensitive, T = Threatened
Occurrence: D = Documented occurrence, S = Suspected occurrence (USDA Forest Service 2009), K = Known to occur, S = Suspected to occur, H = Not known to occur, but habitat present, N = No habitat present and/or not present.

The following table summarizes the effect determinations for the PETS wildlife species in the Longley Meadows project area.

Table 29. Effects Determination for PETS Wildlife species known or suspected to occur on the Longley Meadows Project Area.

STATUS	Species	Effects Determination
AMPHIBIANS		
Sensitive	Columbia spotted frog *Rana luteiventris*	BI
BIRDS		
Sensitive	Northern bald eagle *Haliaeetus leucocephalus*	MIIH
Sensitive	Lewis' woodpecker *Melanerpes lewis*	BI
MAMMALS		
Threatened	Canada lynx *Felix lynx canadensis*	NE
INVERTEBRATES		
Sensitive	Suckley Cuckoo bumblebee *Bombus suckleyi*	MIIH
Sensitive	Western bumblebee *Bombus occidentalis*	MIIH

Effects Determinations: NE = No Effect, NI = No Impact, BI = Beneficial 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.

A. Columbia spotted frog (*Rana luteiventris*)

The Columbia spotted frog is one of several amphibians in the Western United States experiencing population declines. Amphibians are good indicators of overall health in forest and rangeland ecosystems because of their dependence on water for reproduction, their unshelled eggs, and their permeable skin, all of which make them particularly sensitive to water-soluble environmental toxins (Bull 2005).

Habitat Information - This species is found at aquatic sites in a variety of vegetation types, from grasslands to forests (Csuti et al. 1997). It is highly aquatic and is usually near cool, permanent, quiet water. It is found in marshes, wet meadows, permanent ponds, lake edges, and slow streams with non-woody wetland vegetation, but may move considerable distances across uplands after breeding (Stebbins 1985, Corkran and Thoms 2006). Bull and Hayes (2001) recorded migration distances ranging from 15 to 560 m in northeastern Oregon. Migrations often followed shortest distance travel routes through dry, open forest, rather than along riparian corridors. Breeding occurs in shallow water at pond edges, stream margins, and inundated floodplains. Egg masses are free-floating and tadpoles live in the warmest parts of the water. Springs, ponds, and backwaters may be used as over-wintering sites for local populations of spotted frogs (Hayes et al. 1997). Larvae have a diet of algae, plant material, and other organic debris (Csuti et al. 1997). Adults eat insects, spiders, mollusks, crayfish, and slugs.

Occurrence Information- The Columbia spotted frog occurs locally in eastern Oregon (Csuti et al. 1997). A study conducted from 1997-2004 in northeastern Oregon found that the frog is widely distributed throughout northeastern Oregon where permanent ponds and rivers or creeks occur, and that although populations are generally not large, numerous small ones occur, particularly when connected by flowing water (Bull 2005). Instream habitat and riparian areas have been changed from historical conditions due to many activities that have occurred over the years. The project area lacks shallow pools necessary for breeding. Spotted frog egg mass surveys along the Grande Ronde are conducted annually by the La Grande district biologist. Spotted frogs have not been documented in the project area but they occur in multiple areas upstream along the GRR and directly across the highway.

Threats- Threats to the Columbia spotted frog include habitat degradation and destruction through agricultural development, intensive livestock grazing, spring development, urbanization, mining activities and climate change. Fragmentation of habitat may be one of the most significant barriers to Columbia spotted frog recovery and population persistence.

Direct and Indirect Effects on Columbia Spotted Frogs

Alternative 1 - No Action

Under alternative 1, the project area would continue to lack the shallow water and structure necessary for spotted frogs to occupy the habitat.

Alternative 2 - Proposed Action

Under this alternative, large wood structures would be placed within the riverbed to create better channel control and habitat through pool creation. New channel construction would be focused on relocating all or a portion of the river channel to the south floodplain to allow it to re-engage with several historical channel swales and desired pond features. In the short term (3-5 years) construction activities would remove any potential habitat for spotted frogs, affect adult movement and potentially cause direct mortality to adults through construction activities. In the medium to long term (5 years on), increased pooling habitat and healthy river flow would create more breeding habitat for the spotted frog, reduce fragmentation and help maintain steady populations.

Cumulative Effects on Columbia Spotted Frogs

Alternative 1 - No Action

There are no cumulative effects from selecting this alternative. Any changes that would occur over time as a result of selecting this alternative simply reflect the evolving baseline conditions for the area.

Alternative 2 - Proposed Action

Past activities that have affected spotted frog habitat include grazing, fire suppression and logging and have been incorporated into the existing conditions. Ongoing and future livestock grazing is expected to be maintained at the current level and have minimal effect on suitable habitat. The Bird Track Springs Fish Enhancement project occurs within the same subwatershed as Longley Meadows and is currently in the implementation stage. This project implements the same restoration activities as Longley Meadow on an additional 1.2 miles of river. Longley Meadows would contribute to cumulative effects within the subwatershed resulting in a total of 2.45 miles of impact.

Determination - The Longley Meadows project area may be inhabited by spotted frogs and would contribute to cumulative effects within the subwatershed. In the short term, the action alternatives may impact individual frogs (MIIH) but would not likely lead to a downward trend in the population or trend toward federal listing. In the medium to long term, the action alternative would have a Beneficial Impact (BI) to the spotted frog by providing more breeding habitat.

B. Bald Eagle (*Haliaetus leucocephalus*)

The bald eagle ranges throughout much of North America, nesting on both coasts and north into Alaska, and wintering as far south as Baja California. The largest breeding populations in the contiguous United States occur in the Pacific Northwest states, the Great Lakes states, Chesapeake Bay, and Florida. In Oregon, species numbers vary by season and include breeding, migration and wintering populations. The breeding season begins in late February or March, with juveniles fledging between mid-July and early September (Marshall et al.2003).

Habitat Information- Nesting territories are normally associated with lakes, reservoirs, rivers, or large streams. In the Pacific Northwest recovery area the preferred nesting habitat for bald eagles is predominately uneven-aged, mature coniferous (ponderosa pine, Douglas-fir) stands or large black cottonwood trees along a riparian corridor. Eagles usually nest in mature conifers with gnarled limbs that provide ideal platforms for nests (Marshall et al. 2003).

Occurrence Information- Bald eagle surveys are conducted annually by district biologists along the GRR. There is a known bald eagle nest site that occurs on private land adjacent to the project area. A bald eagle pair has nested consistently in this site for multiple years and are expected to continue barring disturbance.

Threats- Threats to the Bald Eagle include habitat degradation and destruction and environmental contaminants. The Bald Eagle was declared threatened under the ESA because of a declining number of nesting pairs and reproductive problems caused by environmental contaminants. Listing resulted in a ban of DDT, protection of eagle habitat and restrictions on human activities near nest and roost sites. Site-specific planning was recommended near nest and roost sites. Improved nesting success and a population increase led to a 1999 proposal to delist federally (Marshall et al. 2003.)

Direct and Indirect Effects on Bald Eagles

Alternative 1 - No Action

There would be no direct adverse effects to bald eagles from the No Action Alternative because no timber harvest, stream restoration, or transportation activities would occur.

Alternative 2 - Proposed Action

There would be no direct effects of the proposed action because the nearest known nest is outside the buffer required to avoid direct disturbance. Any additional nests that are found would receive protection from disturbance through 1) A no activity buffer of 600ft and, 2) Timing restrictions from Feb 15th- August 15th. Project activities would affect several large cottonwood trees within the riparian area along the GRR through direct removal. This would remove roosting habitat in the short to medium term. The project is designed to avoid the majority of existing cottonwood habitat. Cottonwood cuttings along with other riparian hardwoods would be planted after construction activities are completed and ideally would contribute to a functional riparian community. Successful riparian restoration would encourage large hardwood structure along the river and increase fish populations which could have a beneficial impact on Bald Eagles in the long term through an increase in roosting and foraging habitat.

Cumulative Effects on Bald Eagles

The area considered for cumulative effects is the project area, as well as the area within one mile of the project area boundary. One mile is the distance described as a threshold for disturbance of nesting bald eagles (USDA Forest Service 2009) and would encompass shorter disturbance distance for foraging eagles. All of the activities in Appendix D have been considered for their cumulative effects on bald eagles and their habitat. Ongoing and foreseeable activities considered in this cumulative effects analysis include firewood cutting, travel of open roads, summer and winter recreation, livestock grazing, and prescribed fire activities outside the project area. The Bird Track Springs Fish Enhancement project occurs within the same subwatershed as Longley Meadows and is currently in the implementation stage. This project implements the same restoration activities as Longley Meadow on an additional 1.5 miles of river. A bald eagle nest site is known with the Bird Track Springs Fish Enhancement project and is protected with a no activity buffer and timing restrictions. The Longley Meadows project would contribute to long term positive cumulative effects of riparian restoration.

Determination - Short-term disturbance effects would be mitigated through buffers and timing restrictions. Long term the project activities would have a positive effect on the availability of bald eagle nesting or winter foraging/roosting habitat. Project activities would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species (**MIIH**).

C. Lewis' Woodpecker (*Melanerpes lewis*)

Lewis' woodpecker breeds from southern British Columbia, southwestern Alberta, Montana, and parts of South Dakota and Nebraska, south to central California, and portions of Colorado, Arizona, and New Mexico. The species winters in milder portions of this range from northern Oregon to northern Mexico and west-Texas. In Oregon, the species was formerly widespread. It is known to breed in the eastern Cascades, and in low numbers along river and stream valleys in central and eastern Oregon (Marshall et al. 2003).

Habitat Information- The species' five major habitat types include ponderosa pine, oak-pine woodlands, cottonwood riparian forests, and areas burned by fire. Special needs consist of aerial insect populations

for foraging, large soft or well-decayed snags for nesting, and relatively open canopy for flycatching (ODFW 2006). Thomas (1979) identified the minimum snag diameter suitable for Lewis' woodpecker as 12 inches, while Saab and Vierling (2001) reported average snag size used by the species in conifer stands as about 18 inches DBH (diameter base height). According to Sousa (1983), habitat suitability is moderate or greater when canopy closure is less than 50% and optimal when canopy is less than 30%. Other components of suitable habitat include at least one snag per acre greater than 12 inches DBH and an available shrub layer (Sousa 1983).

The potential importance of post-fire habitats has also been identified. Saab and Vierling (2001) state that large-scale burned areas may play a critical role in providing ephemeral source habitats for this species. Block and Brennan (1987) reported the species more frequently occurring in burned versus non-burned habitats and burned areas supported the only observed nest sites on the Modoc Plateau as did Raphael and White (1984) for their study located in the Sierra Nevada.

Occurrence Information- Suitable habitat currently exists within forested habitat within 1 mile directly north of the project area. A previous stand replacing fire adjacent to pockets of Old Forest Single Story ponderosa pine provides nesting habitat. Known nests occur within this area. Potential habitat is present within ponderosa pine associations to the north and south of the project area on Forest Service land.

Threats-Lewis woodpecker is declining throughout its range, possibly due to loss of suitable habitat, destruction of lowland oak habitat, prospects for nest and food storage trees, competition for nest holes, and effects of pesticides (Marshall et al. 2003).

Direct and Indirect Effects on Lewis' Woodpecker

Alternative 1 - No Action

There would be no direct adverse effects to Lewis' woodpecker from the No Action Alternative because no timber harvest, **stream restoration**, or transportation activities would occur.

Alternative 2 - Proposed Action

Project activities would affect several large cottonwood trees within the riparian area along the GRR through direct removal. The project is designed to avoid the majority of existing cottonwood habitat. Cottonwood cuttings along with other riparian hardwoods would be planted after construction activities are completed and ideally would contribute to a functional riparian community. There are no known Lewis' woodpecker nests where project activities are proposed but there is the potential for disturbance to nesting birds and a reduction in habitat in the short term (5-10 years).

Cumulative Effects on Lewis' Woodpecker

Lewis' woodpeckers have relatively small home ranges (15 acres, Thomas 1979). All of the activities in Appendix D of the EA have been considered for their cumulative effects on Lewis' woodpeckers and their habitat. Past activities such as removal of larger ponderosa pine and fire suppression have combined to create conditions that are largely marginal or unsuitable for this species, where historically habitat was more readily available. Firewood cutting could cause additional loss of snags along roads. Livestock grazing would continue at existing levels. The Bird Track Springs Fish Enhancement project occurs within the same subwatershed as Longley Meadows and is currently in the implementation stage. This project implements the same restoration activities as Longley Meadow on an additional 1.5 miles of river. Project activities would contribute to cumulative effects resulting in 2.45 miles of riparian habitat affected. The

Bird Track Springs Campground Project and Fish Log project occur across the highway from the river restoration and within the same subwatershed. Project activities would remove trees within potential habitat for Lewis' woodpecker, however no trees over 21dbh and so snags would be affected by either project so cumulative effects are expected to be minimal.

Determination - The proposed action has the potential to disturb nesting woodpeckers and marginally reduce habitat in the short term (5-10 years) and contribute to cumulative effects within the subwatershed. Project design features would preserve the majority of available riparian habitat and post-treatment planting would increase the quality and quantity of habitat. Based on these factors, in the short term, the action alternative may impact individual woodpeckers **(MIIH)** but would not likely lead to a downward trend in the population or trend toward federal listing. In the medium to long term, the action alternative would have a Beneficial Impact (**BI**) to the Lewis' woodpecker by providing more riparian habitat.

D. Canada Lynx (Lynx canadensis)

Habitat Information- Lynx occur in mesic coniferous forests that have cold, snowy winters and provide a prey base of snowshoe hare, their primary prey (Ruediger et al. 2000). Snow conditions and vegetation types are important factors in defining lynx habitat. The primary vegetation that contributes to lynx habitat is subalpine fir where lodgepole pine is a major seral species, generally between 4,000-6,500 feet elevation. Cool, moist Douglas-fir, grand fir, western larch, and aspen forests may also contribute to lynx habitat when interspersed with subalpine forests. Dry forest types (e.g., ponderosa pine, climax lodgepole pine) are not considered habitat.

Occurrence Information- The Blue Mountains represent the southern extent of lynx distribution, which would explain the rarity of this species on the periphery of its range both historically and presently. The presence of lynx in Oregon in the late 1800s and early 1900s is documented by 9 museum specimens collected from 1897 to 1927 (McKelvey et al. 2000). Records after that are rare. Only 4 recent specimens are known, one from Wallowa County in 1964, one from Benton County in 1974, and one from Harney County in 1993 (McKelvey et al. 2000). Based on limited verified records, lack of evidence of reproduction, and occurrences in atypical habitat that correspond with cyclic highs, lynx are thought to occur in Oregon as dispersers that have never maintained resident populations. They are considered an infrequent and casual visitor by the state of Oregon (Ruediger et al. 2000).

The Forest conducted extensive winter track surveys for wolverine and lynx from 1991 to 1994, and no lynx tracks were found (Wolverine and Lynx Winter Snow Track Reports, 1991-92, 1992-93, 1993-94). Hair snares were used to survey for lynx, according to the National Lynx Survey, on the Forest during the summers of 1999-2001 and no lynx were detected.

Lynx habitat in northeastern Oregon is categorized as a "peripheral area", meaning there is no evidence of long-term presence or reproduction that might indicate colonization or sustained use by lynx, but that it may enable the successful dispersal of lynx between populations or subpopulations. The Forest is considered "unoccupied" habitat because there has not been a verified lynx observation since 1999. "Occupied" habitat is defined as requiring at least 2 verified observations or records since 1999 on the Forest or evidence of lynx reproduction on the Forest.

Direct, Indirect, and Cumulative Effects on Lynx

Alternatives 1 and 2

Neither alternative would have any direct, indirect, or cumulative effects on lynx or lynx habitat as there are no lynx or lynx habitat within the project area.

Determination - There would be **No Effect (NE)** to the Canada lynx from any of the alternatives for this proposed project because this species is not considered present on the Forest (Wallowa-Whitman National Forest Lynx Strategy Letter April 19, 2007).

E. Fringed Myotis (Myotis thysanodes)

The fringed myotis ranges through much of western North America. It primarily occurs from sea-level to 9348 feet elevation, but is primarily found at middle elevations (3,936-6,888 ft.). Distribution is patchy.

Habitat Information-It appears to be most common in drier woodlands (oak, ponderosa pine) but is found in a wide variety of habitats including desert scrub, mesic coniferous forest, grassland, and sage-grass steppe (OOFarrel et al. 1980). They are known to roost in crevices in buildings, underground mines, rocks, cliff faces, and bridges but roosting in decadent trees and snags, particularly large ones, is common throughout its range. The fringed myotis has been documented in a large 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 (Weller and Zabel 2001). This myotis feeds on a variety of invertebrate taxa. The two most commonly reported orders in its diet are beetles and moths, however several potentially flightless taxa such as harvestmen, spiders, and crickets have been found in its diet. The presence of non-flying taxa in its diet indicates that they may glean prey from vegetation in addition to capturing prey on the wing. The potential to glean prey in concert with its wing-loading, flight style, morphological adaptations of wing and tail membranes, and design of its echolocation call indicate that the fringed myotis is adapted for foraging within forest interiors and along forest edges.

Occurrence Information- Records of fringed myotis occur within forest to the west of the project area within ponderosa pine forest.

Threats- The main threats for long term persistence of the fringed myotis is the loss or modification of roosting habitat. Removal of large blocks of forest or woodland habitat may also threaten the species due to its apparent propensity for foraging in and around trees (Ports and Bradley 1996).

Direct and Indirect Effects on Fringed Myotis

Alternative 1 - No Action

There would be no direct impacts to fringed myotis from the No Action Alternative because no timber harvest, stream restoration, or transportation activities would occur.

Alternative 2 - Proposed Action

Project activities would remove several large cottonwood trees within the riparian area along the GRR that have the potential to function as roosting habitat. The project is designed to avoid the majority of existing cottonwood habitat. Cottonwood cuttings along with other riparian hardwoods would be planted after construction activities are completed and ideally would contribute to a functional riparian community.

Cumulative Effects on Fringed Myotis

Ongoing and reasonably foreseeable activities within or near the project area that have the potential the affect the fringed myotis include firewood cutting, prescribed fire and the Bird Track Springs Fish Enhancement project. Firewood cutting occurs primarily along roads and does not target snags or trees over 21 inches dbh so it should not have a measurable effect on roost site availability. Prescribed fire outside the project area could eliminate suitable roost sites in addition to the roost sites that would be eliminated from burning and harvest within the project area.

However, prescribed fire is staggered across multiple years and the area would continue to provide a mosaic of burned and unburned habitat and thus provide an abundance of roost sites for this species. The Bird Track Springs Fish Enhancement project occurs within the same subwatershed as Longley Meadows and is currently in the implementation stage. This project implements the same restoration activities as Longley Meadow on an additional 1.2 miles of river. Project activities would contribute to cumulative effects resulting in 2.45 miles of riparian habitat affected. The Bird Track Springs Campground Project and Fish Log project occur across the highway from the river restoration and within the same subwatershed. Project activities would remove trees within potential habitat for fringed myotis, however no trees over 21dbh and so snags would be affected by either project so cumulative effects are expected to be minimal.

Determination- The action alternative **May Impact Individuals or Habitat (MIIH)** but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

F. Western Bumblebee (*Bombus occidentalis*), Suckley Cuckoo Bumblebee (*Bombus suckleyi*)

Many North American bumblebee species have undergone severe declines in recent decades (Cameron et al. 2011; Hatfield et al. 2014). Range losses have been documented for several species, including the western bumble bee (*Bombus occidentalis*), the suckley cuckoo bumblebee (*Bombus suckleyi*) and 27% of bumble bee species in the US and Canada are listed in an extinction risk category by the International Union for Conservation of Nature (IUCN) (Hatfield et al. 2014).

Habitat Information- Bumble bees inhabit a wide variety of natural, agricultural, urban, and rural habitats, although species richness tends to peak in flower-rich meadows of forests and subalpine zones. Relatively recent changes in land usage have compromised this habitat, putting pressure on bumblebee populations. In addition to habitat loss and fragmentation, overgrazing, climate change, pesticide use, competition with honey bees, and the introduction of nonnative pathogens are all thought to contribute to the population decline of all North American bumblebees.

Occurrence Information- Historically *B. occidentalis* and *B. suckleyi* were found from the Pacific coast to the Colorado Rocky Mountains, but have seen severe population decline west of the Sierra-Cascade Crest. In Oregon, this species has been documented on Deschutes, Fremont-Winema, Malheur, Mt. Hood, Ochoco, Rogue River-Siskiyou, Siuslaw, Umatilla, Umpqua, Willamette, and Wallow-Whitman National Forests, and BLM land in the Burns, Lakeview and Medford Districts. Given the relatively recent range contraction for these species, it is unknown what the current "Documented" status is for many of these field units, as many of the documented sites are considered historical. Surveys conducted on the La Grande district 2014-2015 found *B. occidentalis* to be low in abundance, but present at about 50% of the surveyed sites. These same surveys only located *B. suckleyi* in two locations.

Threats- There are a number of threats facing bumble bees which include; the spread of pests and diseases by the commercial bumble bee industry, other pests and diseases, habitat destruction or alteration (agriculture, urban development, grazing), pesticides and invasive species. Specific to managed Forest Service lands, the invasiveness and dominance of native grasslands by exotic plants may threaten bumble bees by directly competing with the native nectar and pollen plants that they rely on. In the absence of fire, native conifers encroach upon many meadows, which removes habitat available to bumblebees. Apiaries put on National Forest land may compete with native pollinator species, putting additional stress on individuals (Hatfield et al. 2018).

Direct and Indirect Effects on Bumblebees

Alternative 1 - No Action

There would be no direct impacts to the Western Bumblebee from the No Action Alternative because no timber harvest, stream restoration, or transportation activities would occur.

Alternative 2 - Proposed Action

Stream restoration activities would impact pollinator habitat by disturbing 40 acres of soil through tilling and contouring with the excess material taken to create new stream channels. Soil disturbance in the winter and spring would directly affect any hibernating queens within the area of disturbance. Seeding of native plants, including pollinator plants would occur on 10 - 25 acres (remaining would be inundated as new river channels). Spraying of invasive species would occur for 3 years after project activities are finalized. Spraying activities would be consistent with BMP outline in the 2010 Invasive Species ROD. These activities would potentially decrease invasive plants and increase a diversity of native plants.

Cumulative Effects on Bumblebees

Past events that affected potential Western bumblebee habitat include grazing and fire suppression and have been incorporated into the existing conditions. Present and proposed activities within the project area with a potential to affect the Western bumblebee are a continuation of the current level of livestock grazing and the Bird Track Springs Fish Enhancement project. The Bird Track Springs Fish Enhancement project occurs within the same subwatershed as Longley Meadows and is currently in the implementation stage. This project implements the same restoration activities as Longley Meadow on an additional 1.5 miles of river. Project activities would contribute to cumulative effects resulting in an additional 40 acres of soil disturbance.

Determination- Direct effects from soil disturbance and the removal of floral resources in the short term **May Impact Individuals or Habitat (MIIH)** in the short term but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

Invasive Species

Introduction

The analysis for the Longley Meadows Fish Habitat Enhancement project (Longley Meadows) covers the specific areas where ground disturbance would occur within the project boundary. Mitigation measures contained in this document would be used to deal with specific issues after completion of final planning, and before ground-disturbing activities are begun.

This report addresses the existing conditions and the potential effects of the Longley Meadows as it pertains to non-native (invasive) species. Invasive species are defined as a non-native species whose introduction causes or is likely to cause economic, environmental, or human health harm. An invasive species is distinguished from other non-natives by their ability to spread in native ecosystems. “Noxious weeds” on the other hand, is a legal term used by state, county, and federal agencies to denote plants that pose particular threats, generally to agriculture. Many undesirable non-natives can be invasive and pose threats to healthy native ecosystems but do not meet the criteria for listing as a “noxious weed.” For that reason, this analysis would focus on all invasive non-native species and not just those listed as “noxious weeds.”

Wallowa-Whitman National Forest Invasive Species Plan

In 2010 the Wallowa-Whitman National Forest Invasive Species Plan ROD was signed. This decision authorized the treatment of invasive non-native species on specific sites on the forest. This decision created the ability to conduct Early Detection Rapid Response (EDRR) on newly discovered sites. The ability to respond to new spread or establishment of invasive non-native species has given the Forest Service a tool that should help reduce the spread and establishment of invasive species by about one-half of the previous rate.

Affected Environment

Invasive Plant Species Presence within the Project Area

The project area consists of both USFS and privately owned lands. There are 9 inventoried invasive non-native plant sites (5 different species) within Longley on USFS land. The inventoried acres within the project area are shown in the table below (Table 30). Acreages reflect current information in the Forest INSP GIS layer (GIS query, September 20, 2016). In addition to these listed species, the project area also includes the annual grasses *Ventenata dubia* and *Bromus tectorum* which are potentially harmful invasive species but do not meet the requirement for listing on the state or county "noxious weed" lists.

Table 30. Invasive Plant Inventory on USFS Land and Oregon Designations

Scientific Name	Common Name	Gross Acres	Union County Designation	Oregon State Designation
Centaurea diffusa	Diffuse knapweed	28	A	B
Cirsium arvense	Canada thistle	20	B	B
Euphorbea esula	Leafy spurge	1	A	B
Hypericum perforatum	Common St. Johnswort	21	N/A	B
Potentilla recta	Sulphur cinquefoil	29	N/A	B
Total		**99**		
Total Weed Footprint		**29**		

Union County and the Oregon Department of Agriculture (ODA) designate listed invasive species status using a similar system.

> "A" designated species – an invasive of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring states makes future occurrence in Oregon seem imminent.
>
> Recommended Action: Infestations are subject to intensive control when and where found by Union County with possible assistance from the Oregon Department of Agriculture.
>
> "B" designated species – an invasive of economic importance which is regionally abundant, but which may have limited distribution in some counties.
>
> Recommended Action: Moderate to intensive control at the county level.

ODA also has "T" designated species, which are a priority noxious weed designated by the Oregon State Weed Board for which the ODA will develop and implement a statewide management plan. "T" designated noxious weeds are species selected from either the state "A" or "B" lists.

Table 31 provides site information in relation to activities in the proposed action for Longley. Many of the sites of varying species are located on the same piece of ground. A good example is the area encompassing the south side of the river upstream of the gun club. There, the same 28 acre site, containing diffuse knapweed, Canada thistle, leafy spurge, St. Johnswort, and sulfur cinquefoil, makes up five invasive plant inventory sites. In this case, there are 97 acres of weed inventory on a 28 acre footprint.

There have been intensive and focused efforts made during the 2017 and 2018 field seasons to treat the invasive plants in the project area in anticipation of this project.

Table 31. Noxious weed proximity to activities in proposed action

Site Number	Common Name	Proximity to proposed activities
06160600032	Sulfur cinquefoil	1 acre site on the north side of river.
06160600038	St. Johnswort	1 acre site on the north side of the river. Overlapping site 032.
06160600389	Diffuse knapweed	28 acre rectangular site encompassing the largest common footprint of infested area on gravel bars on the south bank of the river where much of the channel reconstruction work is proposed.
06160600690	Sulfur cinquefoil	Completely overlapping the 28 acre common footprint of site 389.
06160600691	Canada thistle	0.1 acre site on the north side of river.
06160600672	Diffuse knapweed	0.2 acre site on north side of river
06160600705	Leafy spurge	1 acre site inside the 28 acre common footprint of site 389.
06160600706	Canada thistle	20 acre site lying within the 28 acre common footprint of site 389.
06160600707	St. Johnswort	20 acre site lying within the 28 acre common footprint of site 389.

Treatment and monitoring records document all site visits by invasive plant specialists, spanning the years since initial discovery and inventory of the site. These records are on file at the La Grande Ranger District Offices in La Grande, Oregon. These sites are visited on a regular basis for treatment and monitoring and can be relocated and identified on the ground when necessary.

The privately owned land is not managed in the same way as USFS land. The Forest Service has no records of invasive plant treatment or inventory mapped as a GIS spacial layer on this section of the project area. It is anticipated that private lands have a similar presence of invasive plants as those found on the adjacent USFS land. St. Johnswort is present in patches throughout this region. Both diffuse, and to a lesser extent, spotted knapweed are found on most gravel bars and along the gravely riverbanks. Canada thistle and Fuller's teasel are dispersed in thick patches throughout and sulfur cinquefoil is scattered throughout.

Effects Analysis

Effects Analysis Methodology

The effects (expected and potential) were assessed using field surveys, literature documentation, documented site information, and professional judgment. The boundary of the direct, indirect and cumulative effects analysis is the project area boundary. This area encompasses all areas of potential project activities.

Assumptions

The following are assumptions were utilized for analyzing the effects of implementing the alternatives in the Longley Meadows project.

- Invasive non-native species populations are increasing at a rate of 8-12% per year on public lands (USDA 2005).
- The record of decision for the Wallowa-Whitman National Forest Invasive Specie Management EIS and the adoption of the standards from the Region 6 ROD should slow the annual rate of spread and establishment of invasive non-native species by up to 50% annually (down to 4-6%) (USDA 2005, USDA 2010).
- Mitigations described earlier are implemented in full.
- Timeframes – the following timeframes were used to discuss the direct, indirect and cumulative effects of project implementation on invasive species related to the potential for establishment and spread of invasives:

A. Potential for Establishment

- **Short term timeframe:** 1-3 years. This period of time would be long enough to notice the germination and growth of any new invasive non-native species after project activities.
- **Long term timeframe:** 25-30 years. This long term timeframe was chosen because climate change, unforeseeable future projects, demographic changes, etc., make assumptions beyond this timeframe speculative. Further, changes in the plant community dynamics would have been identified by this point and establishment of invasive non-native plants due to project activities would have occurred

B. Potential for Spread

- **Short term timeframe:** 1-3 years. This period of time would be long enough to notice the increase in size of a known infestation, and allow for the rapid response to potentially contain that site after project activities.
- **Long term timeframe:** 25-30 years. This long term timeframe was chosen because climate change, unforeseeable future projects, demographic changes, etc., make assumptions beyond this timeframe speculative. Further, changes in the plant community dynamics would have been identified by this point and spread of invasive non-native plants would have been established.

Invasive non-native species are currently damaging the biological diversity and healthy native plant communities located both on and off national forest system (NFS) lands. The introduction and subsequent spread of invasive species can have a variety of environmental effects such as displacement of native species, reduction in suitable habitat, reduction in forage for livestock and wildlife, destruction of habitat and loss of threatened and endangered species (TES) species, increased soil erosion, water quality reduction, and significant reductions in soil productivity. The establishment and spread of non-native plants is a dynamic event that incorporates many diverse variables. Invasion theory, as it pertains to non-native species, contains three main principles: disturbance, propagule pressure, and competition (Hobbs & Huenneke 1992, Lockwood et al. 2005, Sutherland 2008).

The first factor in the invasion theory is disturbance. Invasive species are quick to colonize an area of disturbance and can use their "weedy" life-history traits to establish within novel habitats. Disturbance such as stream channel excavation, root wad excavation, landing creation, and temporary road

construction can alter native plant communities and increase the chance of invasion by non-native species. Several factors such as type of disturbance, proximity to propagule source, and size or magnitude of disturbance can increase the propensity for invasion of an otherwise healthy plant community by non-natives.

The second factor in the invasion theory is propagule pressure. Propagule pressure is defined as the number of possible individuals (seeds, seedlings, etc.) released into a region in which they are not native and the number of such release events (Lockwood et al. 2005). In essence, the higher the propagule pressure (more seeds or more opportunities for a release) the greater the likelihood of a successful colonization. Many factors can lead to increased propagule pressure but the most likely cause is an increase in the number of release events. Many activities conducted on NFS lands can lead to an increase in the propagule pressure including use of heavy equipment, transportation of materials containing invasive plant seeds, recreation, and grazing.

The third principle of invasion theory is competition. Even though the ability of an invasive to spread or colonize new sites is generally species dependent, all invasive non-natives are considered potential threats to native plant communities due to traits that make them good competitors for resources. However, the presence of mature native plants, site conditions, and active management practices such as seeding disturbed ground can influence the competitive dynamic.

Methodology

Throughout this section, the potential for each of the proposed activities to increase the establishment and spread of invasive species is described using the following qualitative scale:

- NO – Project activities have no potential to introduce or spread invasive species.
- LOW – Activities identified as low would create little to no bare soils and have extremely limited potential for the introduction of invasive plant material to the project area. If left untreated, invasive species within these areas would not spread from current locations or expand from current levels at rates higher than those found in the absence of project activities.
- MODERATE – Moderate level activities are those that, with recommended mitigation could be treated and reduced to pre-project levels, but without the implementation of these measures could begin to spread beyond current levels.
- HIGH - A high level activity is one that is very likely to create opportunities for the spread and introduction of invasive species which could not be mitigated with prevention measures. To control a population of invasive species established under high intensity activities would likely require an increase in invasive treatment activities (including herbicide use) and funding in order to control the infestation.

In order to analyze the effects of project activities on the potential establishment or spread of invasive non-native species, a qualitative estimate for the potential of the impact has been established for each action. They are based on the amount of ground disturbance proposed, the likelihood of spread of an existing site or new sites being established and the proximity of current invasive non-native species sites. An activity with little new ground disturbance and no known invasive non-native plants in the vicinity would be rated as having a low potential for invasive species establishment while an area that proposes large scale ground disturbance with invasive non-native plants nearby might be rated as a high. Likewise, if an activity would create little to no ground disturbance and there are no known invasive non-native species infestations nearby it would be rated as a “No” potential for spread while activities that propose

large scale new ground disturbance with invasive non-native plants on site might be rated as having a high potential for spread.

Measurement Indicators

The following two indicators will be used to analyze the effects of implementing the alternatives on invasive species. Differences between alternatives will be displayed by comparing the potential change in the indicators from the existing conditions.

A. Potential for Establishment of Invasive Species

While direct/indirect effects on the potential establishment of non-native plants are difficult to predict and quantify, they would occur through ground disturbance and introduction of invaders into new areas. Disturbance is defined as a punctuated event or series of events that kill or damage existing organisms, directly or in-directly increase resource availability, and create an opportunity for new individuals to become established (Sousa 1984). Disturbance associated with vegetation management activities are expected through movement of heavy equipment, soil displacement, and vegetation compression; but the amount of disturbance can vary depending on activity density and type. Project activities can introduce new species into areas by transporting non-native plant material on machinery or personnel. Increased disturbance and access would increase the potential for new establishment of invasive non-native species in sites previously unoccupied.

B. Potential for the Spread of Invasive Species

The potential spread of non-native plants is also difficult to predict and quantify; however, it would occur through ground disturbance and the possible increase in "invasibility" or reduction in competition from native species after disturbance. Increased disturbance and pre-existing invasive non-native sites in the vicinity of project activities would increase the potential for spread of invasive non-native species.

Direct and Indirect Effects on Invasive Species

Two alternatives are being analyzed for this project: Alternative 1 (no action), and Alternative 2 (proposed action alternative); to determine the magnitude of direct, indirect and cumulative effects on invasive non-native species. The action alternative activities in the Longley Meadows project are described in Table 32 below. The table summarizes the effects of implementing the actions proposed in the action alternative and the potential intensity of those effects.

A more comprehensive summary of all activities is found in Proposed Action and Alternatives description section of this EA. In the short term the activities of the action alternative would cause soil disturbance, transport of material containing invasive plant seed, and alter the canopy cover which would create opportunities for invasive plants to establish and spread.

Table 32. Element Specific Effects of Action Alternative

Alternative Elements/Effects Comparison	Potential Effects	Alternative 1	Alternative 2
Placement of wood and boulders instream include equipment used to install			
*Treatment Acres	Ground disturbance and introduction of invasive plant materials from trees, root wad debris, gravel material, people, and machinery.	0 miles	4 miles
*Potential for Effect		No	Moderate
New channel construction - Main channel and side channel			
*Treatment Acres	Increase in disturbance and short-term reduction in canopy cover and competition.	0 miles	8.26 acres
*Potential for Effect		No	Moderate
Construction and decommissioning of stockpile sites - Including staging area establishment and permanent excess fill areas			
*Treatment Acres	Ground disturbance and introduction of plant material	0 acres	12.35 acres
*Potential for Effect		No	Moderate
Construction and decommissioning of temporary access roads			
*Treatment	Ground disturbance and introduction of plant materials on people, machinery, and vehicles	0 miles	3.23 acres
*Potential for Effect		No	Moderate
Temporary river crossings			
*Treatment	Ground disturbance and introduction of plant materials on people, machinery, and vehicles	0 crossings	3 crossings
*Potential for Effect		No	Low
Construction of dewatering basins and placement of temporary coffer dams			
*Treatment	Ground disturbance and introduction of plant materials on people, machinery, and vehicles	0 dams	10 dams
*Potential for Effect		No	Moderate
Dewatering river segments and fish salvage			
*Treatment Acres	Foot traffic could transport seed into or out of the activity site.	0 miles	0.74 miles
*Potential for Effect		No	Low
Planting and revegetation			
*Treatment Acres	Propogate native plants. Increase competition for invasive plants.	0 acres	25 acres
*Potential for Effect		No	Moderate
Mitigation Measures			
*Treatment Acres	Inhibit invasive plants from moving into or out of project area. Inhibit invasive plants from being established on ground disturbance areas.	0 mitigation measures	6 mitigation measures
*Potential for Effect		No	Moderate (positive effect)

Alternative 1 – No-Action

No project activities would be authorized under this alternative. All inventoried invasive sites would continue to be managed in accordance with the Wallowa-Whitman Invasive Plant Program EIS (USDA 2010) and the Wallowa-Whitman Forest Plan as amended by Regional Forester

Amendment #5 that incorporates the Pacific Northwest Region Preventing and Managing Invasive Plants Record of Decision (USDA 2005).

Potential for Establishment

There would be no direct effects to the establishment potential of invasive non-native species because no activities would be authorized. Many vectors for the establishment of new populations would still exist from on-going foot travel, water inundation, wind transport, and big game migration within the project area. Over time, with no additional disturbances to known sites, further treatment success, and no reduction to existing desirable vegetation cover and vigor the known sites could be eradicated or substantially reduced.

Potential for Spread

There would be no direct effects to the spread potential of invasive non-native species because no activity would be authorized; however, as described above, vectors which can spread seeds from known populations would still occur (recreation, water, wind, big game, etc.) within the project area. In the long term, with no additional disturbances to known sites, no further treatment success, and no reduction to existing desirable vegetation cover and vigor, the known sites could be eradicated or substantially reduced.

Alternative 2 – Proposed Action

Potential for Establishment

Direct effects to the establishment potential of invasive non-native species as a result of project activities would occur by ground disturbance generated by project activities and movement of invasive species materials on project personnel and equipment, as well as on trees, gravel, and soil that would be relocated according to project activities. As a result of project activities, the amount of personnel, equipment, and ground disturbance increases. Thus, the short-term risk of non-native species establishment also increases.

Potential for Spread

Direct effects to the spread potential of invasive non-native species due to project activities may occur due to ground disturbance as a result of project activities. As the number of acres of total activities increases there is more potential disturbance and increased traffic of project equipment. The displacement of established native grasses and forbs, and over-story trees and shrubs creates a condition of ‘invasibility’ which correlates with an increase of propagule pressure and the risk of non-native species spread.

Many of the activities of the action alternative have a potential to increase the risk of spreading invasive species in the short-term beyond the current extent of known sites; however, implementation of the prevention mitigation measures such as pre-treatment of known infestations, avoiding active infestation sites, and machinery cleaning requirements, as well as restoration prescriptions should limit the potential for spread. Road activities (including use and construction of temporary roads and construction of temporary bridges) can create situations that favor the spread of invasive plants by disturbing ground and conveying seeds to un-infested areas. The risk associated with road activities and non-native species would increase as miles of temporary road use and channel construction increases. Exact estimates of this risk however, are unknown and difficult to predict. Because the area where the trees would be collected from has

not been surveyed, it is especially recommended that the area is inspected before activities so that discovered invasive plant materials can be removed, treated, or avoided.

The overall effect of the actions in the alternative on the potential to establish and spread invasive non-native species is estimated to be **Moderate**, due to the controlled area of proposed activity and ground disturbance moderated by the mitigation measures and project design features and post disturbance restoration prescriptions.

Cumulative Effects on Invasive Species

Cumulative effects are the sum of all past and present actions, and reasonably foreseeable future actions in combination with the activities proposed in the Longley Meadows project. Past activities are considered in the existing condition baseline for this project. Present and reasonably foreseeable future activities on Forest Service and private lands are described in Appendix D of the EA. The purpose of this analysis is to determine which of the present and reasonably foreseeable future activities overlap in time and space with the Longley Meadows project and if they do, if there is a measureable cumulative effect for non-native plants in the project area. Generally, overlapping activities with the risk of ground disturbance combined with movement of equipment, organisms, and materials have the greatest potential to create cumulative effects on invasive plants within the Longley Meadows project area.

Alternative 1 – No Action

There would be no direct/indirect effects to invasive non-native plants as a result of the no action alternative because project activities will not be authorized. All current conditions and trends will continue unchanged. Since there are no direct/indirect effects there would be no cumulative effects.

Alternative 2 – Proposed Action

Based on the analysis in Appendix D, the following ongoing and reasonably foreseeable future activities were determined to overlap in time and space and result in a measurable cumulative effect when considered in combination with the activities proposed in the Longley Meadows project. The potential cumulative effects related to noxious weed management, road maintenance, grazing, fishing enhancement work, and private land activities are discussed below.

Monitoring and treatment of invasive plants as part of the WWNF Invasive Plant EIS would take place if Longley were not implemented. However, there would be an increase of these activities within the project area due to the anticipated risk of infestation caused by project activities and because of the monitoring requirements. The overall effect would be of increased focus, vigilance, and funding to control and eradicate invasive plants within the project area. Tri-County CWMA plans to continue treatment of invasives along the riverbank up and downstream of the project area, which would contribute to invasive plant management.

There is a slight potential for invasive spread and introduction from machinery involved in ongoing road maintenance work along Hwy 244 and from transportation of materials in the form of gravel fill into the ODOT right-of-way within the project area. Road maintenance in the form of roadside herbicide application within this region of the project area would have the beneficial effect of inhibiting invasive plant spread within the project area.

The sheep allotment activities that overlap the project area would have a cumulative effect because sheep could carry invasive seeds from outside to inside the project area when there would be ground disturbance associated with the project. Also, sheep grazing causes a seasonally punctuated ground disturbance event. However, sheep would contribute what is referred to as

cultural invasive plant control by grazing invasive plants in the area. Timing would influence the benefit of this activity.

The Bird Track Springs Fish Enhancement Project affects 6,301 acres and is less than 5 miles upstream of Longley. There is a potential for disturbed ground within that project area to become infested with invasive plants. Increased invasive weed management is expected to keep the invasion and spread in check, but the cumulative number of acres disturbed in the general area does increase the overall threat. Active treatment and management for three years throughout the project area including the privately owned portion would be effective in the early stages of invasive plant establishment.

There is a potential for weed seeds to be carried from private land which may not have an active invasive plant management program to locations within the project area. Invasive weed management would mandated on private land under the action alternative which would reduce the extent and amount of invasive plant sites through active treatment and management for three years throughout the project area including the privately owned portion.

Utilization and maintenance of private farm facilities can create situations that favor the establishment and spread of invasive plants by disturbing ground and carrying seeds to un-infested areas. Longley activities overlap some of these sites and would increase the potential for spread of invasive species populations. Mitigations and project design features, which apply to private land associated with the project, would help to lessen the effects of these activities.

Summary of Effects

The estimated effects for the two alternatives are compared in Table 33 below. Although risks are present with or without project activities, the danger of invasive species establishment and spread due to project activities under the action alternative is greater than the 'no action' alternative. The historical presence of invasive plants within the project area combined with sheep grazing and activities on private land under unknown invasive plant management accounts for a heightened potential for spread under the no action alternative. With implementation of project design features to reduce and control the introduction and spread of non-native species we can minimize the impacts that do exist. Specific mitigations and required standards would additionally reduce the chances of new introductions, establishment, and spread of invasive non-native plants. We could, therefore, predict an establishment and spread rate at the upper end of the natural level, or about 6-8% for the action alternative.

Table 33. Summary of estimated effects for alternatives in Longley

Estimated Effect*	Alternative 1	Alternative 2
Establishment Potential	1	3
Spread Potential	2	3

* Estimated effect is based on increases (from pre-project levels) in establishment and spread of invasive non-native species due to project level activities. Greater number equates to greater risk but is only used for comparison between alternatives and is not an estimate of the intensity of the effect.

Compliance with the Forest Plan and Other Direction

The Forest Plan (as amended by the 2005 Region 6 ROD, amendment RF #5) provides direction for the control of noxious weeds and other competing vegetation where such activities are not precluded by management area direction. The goals focus on maintaining or enhancing ecosystem function to provide for long-term integrity and productivity of biological communities, treatment of priority infestations, and

monitoring the effects of all activities to reduce the impacts of non-native plants. The site specific treatment requirements are further amended by the Wallowa-Whitman National Forest Invasive Plant Treatment Program EIS (USDA, 2010). Longley Meadows is consistent with these goals by implementing the standards requiring emphasis of prevention of invasive plant introduction, requiring the use of weed-free materials (straw, mulch, gravel, fill sand, etc.), requiring the cleaning of all equipment prior to entering National Forest System lands, managing road maintenance activities in areas with large concentrations of noxious weeds and coordinating activities with pre-treatment, and requiring the use of native plant materials for rehabilitation and restoration work. Longley Meadows is consistent with these goals through adherence to the EIS and the Forest Plan.

Heritage Resources

Introduction

This section discusses the existing conditions and effects of implementation of the Longley Meadows project on cultural resources, also known as heritage resources, which are integral facets of the human environment. The term "cultural resources" encompasses a variety of resource types, including archaeological, historic, ethnographic and traditional sites or places. These sites or places are non-renewable vestiges of our Nation's heritage, highly valued by Tribes and the public as irreplaceable, many of which are worthy of protection and preservation. Related cultural resource reports and analyses can be found in the Longley Meadows Analysis File.

Affected Environment

Pre-Contact History

The Longley Meadows area of potential effect (APE) for cultural resources lies within the Plateau culture area, which extends from the Cascades to the Rockies, and from the Columbia River into southern Canada (Ames et al. 1998). Most of the archaeological work in the Columbia Plateau has been conducted along the Columbia and Snake Rivers. This section discusses the broad culture history in the Southern Plateau.

Much variability exists in the Plateau culture area due to the mountainous terrain and various climatic zones within it. Plateau peoples adapted to these differing ecoregions largely by practicing transhumance, whereby groups followed resource seasonal availability. There are eight key features of the Plateau cultural area defined by Walker (1998): riverine settlement patterns; reliance on diverse subsistence sources (e.g., anadromous fish, game, and roots); a complex fishing technology; mutual cross-utilization of subsistence resources across groups; extension of kinship ties through intergroup marriage; extension of trade links through partnerships and regional gatherings; limited political integration at the village and band levels; and relatively uniform mythology, art styles, and religious beliefs.

The antiquity of human occupation in the Plateau culture area extends as far back as 11,500 years before present (B.P.), when Clovis-type fluted spear points were in use. The early inhabitants of the region were called Paleo-Indians and were highly mobile large game hunters.

The Early Archaic period (11,000–7,000 years B.P.) is characterized by small groups of mobile hunter-gatherers who practiced a broad-spectrum subsistence economy (Aikens 1993; Ames et al. 1998). Artifacts from this period include stone and bone projectile points, cobble tools, bifacial knives, hammerstones, needles, awls, antler wedges, beads, and ochre, among others. Chipped stone projectile points vary across the region but typically include shouldered stemmed, indented bases, and lanceolate points prior to 9,000 years B.P. After 9,000 years B.P., stone projectile points tended to all be laurel-leaf shaped until 7,800 years B.P., when side-notched points were introduced to the toolkit (Ames et al. 1998).

People kept a diverse diet that included elk, bison (Bison bison), deer (Odocoileus spp.), pronghorn (Antilocapra americana), a variety of lagomorphs, seals, birds, and fish (Ames et al. 1998).

The Middle Archaic period (7,000–5,000 years B.P.) is defined by large side-notched, corner-notched, and laurel leaf–shaped stone projectile points; bifacial knives; milling stones and pestles; bone and antler tools; and semi-subterranean pit houses (Ames et al. 1998). People lived in small, mobile groups of hunter-gatherers with low dependence on root and seed processing. The population in the region appears to have declined during the Middle Archaic, which may be the result of environmental changes or other unknown causes (Ames et al. 1998). The Middle Archaic period coincides with the Altithermal period, during which the region became warmer and drier.

During the Late Archaic period (5,000–150 years B.P.), people began to settle down in pit houses, tule mat-covered long houses, and lodges, and they developed a heavy reliance on fishing, the storage of salmon, and the harvesting of camas (Ames et al. 1998). They began practicing transhumance, where they would spend winters in villages and summers in temporary camps. Artifacts dating to this period typically include small base-notched, corner-notched, triangular, and expanding stem projectile points; milling stones; decorated pestles; net weights; bone and antler tools; cordage and matting; basketry; bows and arrows; and composite harpoons, among other fishing implements (Ames et al. 1998). Sculpted stone pieces appear ca. 3,000 years B.P., as do large cemeteries. Euro-American trade goods began appearing during the protohistoric end of the Late Archaic period. The horse was introduced around 1730 A.D., which increased mobility and transport capabilities, and subsequently strengthened existing trade networks and broadened the range of trade throughout the Plateau (Haines 1938; Schalk 1980). By the time of early Euro-American contact, bison began to replace elk as the prime food source (Harvey and Biechler 2008:10).

The Late Archaic period coincides with the Medithermal period, during which the region experienced cooler conditions, similar to the environment today. The ethnographic record is likely a continuation of the lifeways and subsistence strategies that were in place by at least 3,000 years B.P. (Fagan 1974). These strategies began as a response to the Medithermal climatic change and included economic diversification and increase in root and seed processing (Fagan 1974).

Specific to the project area, archaeological evidence exists that supports the presence of pre-contact peoples, most likely for subsistence and resource procurement. The GRR and tributary streams could support significant runs of salmon and steelhead. According to the Watershed Professional Network, LLC (2004), the GRR constitutes “key habitat” for spring Chinook and steelhead. Beginning in the early spring, fish runs last into August. As for big game species, faunal assemblages from archaeological sites in northeastern Oregon tend to be dominated by deer and bighorn sheep. These animals would have been available during the pre-contact period in the foothills surrounding the Grande Ronde valley in which this project area is located.

Root crops would have also been plentiful in the area. Camas (*Cammassia* spp.) and cous (*Lomatium* spp.) can still be found in the valley and foothills beyond. Evidence of camas processing was recovered from the Marsh Meadows Site (McPherson et al. 1981). High quality basalt and andesite sources are also located throughout the valley. Evidence of quarrying has been found relatively nearby at both the Marsh Meadow Site and the Stockhoff Basalt Quarry (McPherson et al. 1981; Womack 1977) along the valley margins.

The APE lies within the traditional territory of Sahaptin speakers, including the Cayuse, Umatilla, and Walla Walla Tribes (Walker 1998) and is located on lands that were ceded by the three tribes to the U.S. government in the Treaty of 1855 (Dickson 2010a). Ethnographic maps shown by Walker (1998) depict

the Cayuse as primarily using the APE, though the region was also important to the Umatilla and Walla Walla Tribes, as well as the Nez Perce Tribe (Harvey and Biechler 2008:11).

Cayuse Indians lived in several local bands, which may have numbered between seven and nine (Dickson 2010a). They would spend their winters along the northern foothills of the Blue Mountains and would move through the Blue Mountains into the Grande Ronde and Wallowa Valleys in summer and fall (Suphan 1974). Winter villages were permanent and were the center of social, economic, and political activities (Chalfant 1974). Spring, summer, and fall camps were temporary and used while engaged in resource procurement. Division of labor was based on gender, where women would typically dig roots (e.g., camas and bitterroot) and pick berries (e.g., serviceberry and huckleberry) and men would typically hunt game and fish. Surpluses of food were dried and stored in the winter villages for consumption during winter months, though some fresh game and fish was also taken during winter (Dickson 2010a). The introduction of the horse brought with it an increased importance of buffalo. Tribes also traveled farther distances and interacted with distant groups, such as the Flathead (Dickson 2010a).

Several ethnographically named places are near the APE, including seasonal camps used primarily for fishing and hunting located along the Upper GRR and its major tributaries. It is not known if any known ethnographically named places are located in the APE; however, there are several in the general vicinity (Hunn et al. 2015; Shawley 1977). Additionally, a previously recorded ethnographic trail, ʔIcqÍtinma, may have extended near portions of the APE. Hunn et al. (2015) state that the trail existed south of the Upper GRR Valley, but the exact location is not definitive. The trail led to a place known for camas gathering and horse grazing and was used by the Cayuse and Nez Perce (Hunn et al. 2015:166–167).

History

While not venturing as far south as the Upper GRR, Lewis and Clark traveled through the Plateau along the Snake and Columbia Rivers in 1805, and shortly thereafter, they were followed by fur trappers in 1807 (Harvey and Biechler 2008). These early trappers worked for the North West Company of Canada and John Jacob Astor's Pacific Fur Company. The Pacific Fur Company reached the Upper GRR Valley at the end of 1811 and camped near La Grande in January 1812 (Parsons and Sciach 1902). The Hudson's Bay Company entered the region in 1821, and by 1830 the company had nearly decimated the beaver population (Reclamation 2014).

Oregon Trail

The expansion westward began with the first group of emigrants who made the journey from Missouri over the Rocky Mountains via a wagon and arrived in Oregon Country along what would later be known as the Oregon Trail in 1836. This group included Narcissa and Marcus Whitman, who founded a mission near present-day Walla Walla (Washington) that same year. Mass migration of settlers began around 1843, which marked the advent of the Oregon Trail. Prior to that time, the Oregon Trail had been a network of Indian trails that were also used by fur traders and other emigrants (National Historic Oregon Trail Interpretive Center n.d.).

Creation of Reservations

The Whitman Mission was a stopping point for supplies as emigrants passed through the region on the Oregon Trail. As missionaries, the Whitmans were unsuccessful in converting the Cayuse to Christianity, and after bouts of scarlet fever and measles that had been introduced by emigrants, and for which the Cayuse held the Whitman's responsible, some Cayuse members killed the Whitman's and 11 others at the mission on November 29, 1847 (Meinig 1968).

What followed was a series of conflicts between the local Native Americans and white settlers in eastern Oregon and Washington, including the Cayuse War of 1848. The Provisional Legislature of Oregon and Governor George Abernethy authorized raising companies of volunteers to go to war against the Cayuse Tribe. A 50-person unit of volunteers, called the Oregon Rifles, was raised immediately and dispatched to The Dalles under the command of Henry A.G. Lee to protect the Wascopam Mission at The Dalles and prevent any hostile forces from reaching the Willamette Valley (Beckham 2006). In addition, the governor appointed a peace commission, consisting of Joel Palmer, Henry Lee, and Robert Newell.

The U.S. Congress ended slavery in the Oregon Territory and passed a bill on August 13, 1848, that established a territorial government in Oregon (Lyman 1918). In 1853, Joel Palmer and Isaac Stevens were selected to represent Indian policies for the Northwest. They met with representatives of the Cayuse, Umatilla, Walla Walla, and Nez Perce Tribes, and signed three treaties during the Walla Walla Council, which created several reservations. The CTUIR was one such reservation created in 1855. Initially, only two reservations were proposed, the Nez Perce and Yakama Reservations (Dickson 2010a). After the Cayuse, Umatilla, and Walla Walla voiced their disappointment with having to move away from their traditional lands, however, Palmer outlined the Umatilla Indian Reservation, which would encompass 510,000 acres. The tribes ceded 6.4 million acres to the U.S. government and reserved rights for fishing, hunting, gathering foods and medicines, and pasturing livestock (Dickson 2010a). The treaty was signed on June 9, 1855 and was ratified by Congress on March 8, 1859.

Regional Roads

The history of roads along the Upper GRR Valley is scant, although court records indicate that there was interest in the establishment of roads connecting various parts of Union County (Reavis 2018). The 1874 cadastral map of Township 3 South, Range 36 East shows a road paralleling the Upper GRR as it passes through the APE (Simpson 1874). By 1935, Highway No. 34, a graveled road, was shown, and current Highway 244 follows this alignment (Metsker 1935).

Creation of Union County

Union County was originally part of Wasco County, and the northern end of the Upper GRR Valley was the first part to be settled by Euro-Americans. In 1862, due to population growth in eastern Oregon, the state legislature created Umatilla and Baker Counties from the original Wasco County. Further settlement in Baker County led to the creation of Union County in 1864 (Western Historical Publishing Company 1902). The county seat oscillated between La Grande and Union based on geography and economic and population growth. La Grande was the original county seat; however, Union usurped La Grande and became the county seat in 1874. La Grande won back the seat in 1905 (Oregon State Archives n.d.; Western Historical Publishing Company 1902).

The 1860s saw many changes to the region. Benjamin Brown was the first Euro-American to settle in the Upper GRR Valley in 1861. He built a house on the west side of the valley in 1862 and was plowing soil by April of that year (Dickson 2010a). Miners began traveling through the area ca. 1862–1864, which spurred the development of little towns and thousands of mining claims in the region. Gold was discovered in Tanner Gulch, located 35 mi (58.3 km) south of the APE, in 1862 (Reclamation 2014). By 1872, placer mining operations were active in the headwaters of the Upper GRR, upstream of Camp Carson near Union (Reclamation 2014).

Settlements in the Upper GRR Valley sprung up to provide services for the miners, including farmed goods (Dickson 2010a). A sawmill, dam, and water-powered grist mill were built at Oro Dell in 1862, which resulted in the first dam to obstruct upstream passage of salmon to the Upper GRR (Reclamation 2014). By 1900, there were approximately 50 sawmills in the valley (Reclamation 2014). Cattle and sheep became an integral part of the economy in the region in 1862 when Fred Nodine brought back 100 head

of cattle from Walla Walla. The winter of 1880–1881 decimated the livestock populations, which had overgrazed on the native bunchgrasses and left little to feed on in the winter (Western Historical Publishing Company 1902). Valleys were soon cleared and cultivated to provide livestock feed and to serve other agrarian pursuits.

Town of Hilgard (1883)

By 1843, emigrants traveling on the Oregon Trail stopped at the modern-day community of Hilgard near Hilgard Junction, located 3 mi (5 km) and 2.5 mi (4.2 km) northeast of the APE, respectively. Hilgard was situated on the main route of the trail and offered a convenient place to camp and graze animals before the emigrants continued their arduous travels into the Blue Mountains toward Emigrant Springs and Meacham (Beckham 1991).

Hilgard was named after both Eugene W. Hilgard, Dean of the College of Agriculture at the University of California, and his cousin, Henry Villard (birth name Ferdinand Heinrich Gustav Hilgard), financier and early president of the Oregon Railroad and Navigation Company (McAuthur 2003). When Villard built the Oregon Railroad and Navigation Company railroad, he employed his cousin Eugene to conduct an agricultural survey of the area. In 1883, a post office named "Dan" was established; however, its name was changed to "Hilgard" later that year (Forte 2018). The early 1880s saw a thriving Hilgard, serving stockmen, loggers, and miners (Reclamation 2014). In the early twentieth century, the Hilgard vicinity boasted several sawmills, including one operated by the Mount Emily Lumber Company, until the 1920s. The post office closed in 1943. Today, Hilgard supports a handful of residences.

Wallowa-Whitman Forest

The majority of the APE, approximately 111 acres, lies within Wallowa-Whitman National Forest property. The Wallowa-Whitman National Forest is a combination of the Wallowa National Forest, created in 1908 and containing seven forest reserves, and the Whitman National Forest, created in 1908 and containing three forest reserves. These reserves, located in Oregon, Washington, and Idaho, have been managed together since 1954. In total, the Wallowa-Whitman Forest covers 2.3 million acres (National Forest Foundation 2017).

Timber Industry and Mount Emily Railroad

The transcontinental railroad was built in 1869 and passed La Grande following Meacham Creek (Dickson 2010a). The Oregon Railroad and Navigation Company built a spur line from La Grande to Elgin in 1890 (Harvey and Biechler 2008; Reclamation 2014). Sawmills located around the valley and the forest produced railroad ties, fence rails, and lumber. The Grande Ronde Lumber Company acquired land in 1890 and began constructing splash dams on Beaver, Meadow, and Fly Creeks, as well as at Dark Canyon and Vey Meadow (Reclamation 2014). Splash dams were used to store water for use in annual log runs down the Upper GRR to Perry, located approximately 4.5 mi (7.5 km) east of Hilgard.

The timber industry continued to grow in the Grande Ronde Valley through the early 1900s. The Mount Emily Timber Company, later known as the Mount Emily Lumber Company, was founded by the Kinzel family and August J. Strange in 1912, although it would be another 12 years before the Wisconsin-based parent company would begin operations in Oregon.

In 1924, the Mount Emily Lumber Company began operation of their La Grande sawmill. The sawmill was equipped with a three-band system and drying facility, along with a complete remanufacturing and finishing plant, and quickly became the technological leader in timber harvesting, transportation, and milling operations (Turner 2005 in Sparks et al. 2018). The company owned 110,000 acres of timber and held long-term rights to timber on an additional 20,000 acres. Logs were transported down from the

Wallowa-Whitman National Forest via a railroad from the uplands, following Five Point Creek, past Hilgard, and to La Grande (Deumling 1972:68).

The Mount Emily Lumber Company purchased the Grande Ronde Lumber Company railroad in 1925. The mainline railroad route extended approximately 30 mi (50 km) to the southwest of La Grande, and they continued to expand the logging railroad farther west (Trainweb 2016). This included a spur line up Whiskey Creek, whose confluence with the Upper GRR is less than 1 mi (1.6 km) northeast of the APE, and railroad from Hilgard along the Upper GRR, which reached the headwaters (Powell 2008).

Construction of spur lines was completed by immigrant laborers originating from Greece, China, and Japan (Gray-Jeffries 2016). To house workers, the Mount Emily Lumber Company established camps, and the primary camp, known as the Meadow Creek Camp (later known as the Mount Emily Camp), was located along the Hilgard route. A company town formed in the area. The Mount Emily Camp provided housing for men with families, dormitories for single men, a commissary, dining hall, elementary school, and some recreational facilities (Turner 2005 in Dickson 2010a). The Mount Emily Camp housed 50 families with more than 150 people and remained at the Meadow Creek location until 1955 (Camp Elkanah 2018). The Meadow Creek Camp was located at present-day Camp Elkanah, approximately 12 mi (20 km) southwest of the APE.

Temporary camps were also located along the spur lines. A small lumber camp was located along the Upper GRR approximately 6 mi (10 km) southwest of Hilgard and approximately 1 mi (1.6 km) west/southwest of the APE. The camp was founded in the late 1920s and housed a crew of Japanese-American laborers who conducted rail track maintenance and removal. The camp was situated alongside the lumber company's spur rail, and provided two small buildings for the laborers and a house for the foreman (Gray-Jeffries 2016:10–11).

The Mount Emily Lumber Company began transitioning from rail logging to truck logging in the 1930s for economic and practical purposes. While the railroad mainline remained in use, Mount Emily Lumber Company began building truck roads out to the harvest sites rather than rail spurs (Trainweb 2016). The last railroad built for the Mount Emily Lumber Company was constructed in 1936. During 1937, it was reported that the Mount Emily Lumber Company employed more than 30 mi (50 km) of railroad track and 75 mi (125 km) of truck roads. An additional 42 mi (70 km) of rail line in northern Union County was added when the company bought the Oregon White Pine Lumber Company in 1938 (Deumlin 1972). Another 6 mi (10 km) was added in 1944, extending the railroad out of the Upper GRR watershed, after which point the railroad remained unchanged (Trainweb 2016). The Mount Emily Lumber Company was the last logging company in the Upper GRR Valley to rely on rail transport (Deumling 1972). The Valsetz Lumber Company bought the Mount Emily Lumber Company in 1955, and ceased to use the railroad, choosing instead to employ truck transport only. Boise Cascade Company bought the Valsetz Lumber Company in 1960.

The Mount Emily Railroad grade extends through significant portions of the APE on both private land and USFS property. Aerial photographs of the APE reveal that some portions of the railroad grade have been destroyed due to road infrastructure and private development. Along the southeastern section of the APE, Highway 244 subsumed 0.3 mi (0.5 km) of the Mount Emily Railroad grade (Google Earth 2018). A 458-ft (140-m) segment of the grade was destroyed in the construction of the La Grande Rifle and Gun Club's firing range north of Highway 244.

La Grande Rifle Range (1925–present)

The La Grande Rifle Range is a historic-age military rifle range located in Section 16 of Township 3 South, Range 36 East and approximately 1.5 mi (2.5 km) west of the APE, although the range boundary is much closer.

La Grande Rifle and Gun Club

The APE also contains portions of the La Grande Rifle and Gun Club, which is a pistol and rifle range located in Section 11 of Township 3 South, Range 36 East. The gun club consists of two firing ranges that are located north and south of Highway 244. The rifle range located north of Highway 244 is within the APE. There are 11 structures on the La Grande Rifle and Gun Club property; three structures, listed as multi-purpose sheds, were constructed in 1950 and the remaining eight structures, listed as hay cover (n=4), multi-purpose shed (n=3), general purpose shed (n=1), were constructed between 1996 and 2010 (Union County Tax Assessor 2018: Property 4879). The rifle range consists of a fenced open area, with a northerly and northeasterly firing range. The firing targets are placed in front of two earthen berms, measuring approximately 51 ft (15.5 m) and 160 ft (49 m) wide, that are located south of the Upper GRR. A review of aerial photographs of this section of the gun club reveals that a portion of the Mount Emily Railroad grade was destroyed during the construction of the pistol firing range (Google Earth 2018). The rifle firing range is located south of Highway 244 and was constructed in the late 1980s (Roberts 2018), which is located outside of the APE.

Effects Analysis

The Longley Meadows Project heritage resources analysis area encompasses all of the approximately 139-acre project area APE. The APE, following Region 6 guidance and 36 CFR 800.16(d), for the Longley Meadows project area consists of a segment of the GRR and adjacent federal, State, and private lands.

Identification of Heritage Resources

The methodology for identifying heritage resources in the APE was established in an Inventory Plan prior to commencement of the work. The Inventory Plan was agreed to by SHPO and CTUIR. A review of existing data related to previously identified cultural resources and the investigations that focused on cultural resource discovery and evaluation was undertaken. Surveys were conducted during 2017 and 2018.

The measure of significance of the heritage resources follows the National Historic Preservation Act (NHPA) regulations at 36 CFR § 800.4 through the National Park Service's National Register Bulletin 15, "How to Apply the National Register Criteria for Evaluation." These criteria are standards applied in evaluating the wide range of properties that may be historically significant in local, state, and national history, and clarifies whether a particular property is eligible for the National Register of Historic Places. Properties that are qualified are termed "historic properties" within NHPA (and utilized here). Agencies are then obligated to take into account the effects of their project activities on those significant heritage resources, and must mitigate effects that are adverse. Evaluation of the sites within the APE are undertaken by qualified cultural resource staff of project proponent Bonneville Power Administration (BPA) as part of the Section 106 consultation effort, as outlined in the Statement of Principles agreed to by all project proponents at the beginning of this project.

Pedestrian surveys followed Oregon SHPO fieldwork standards and Wallowa-Whitman National Forest survey guidelines within the APE. Discovered artifacts on the surface were documented, photographed and located with a global positioning system (GPS). In addition, shovel test survey was conducted along the riverine setting of the APE where ground disturbance would be widespread. Shovel test survey

excavation methods followed the recommended state standards described in the Guidelines for Conducting Field Archaeology in Oregon (2016), developed by the Oregon SHPO.

A total of 21 archaeological resources were identified within the APE. Of these, nine resources were previously recorded including eight sites (Table 34), one potential site, and one isolate. However, four sites were recently updated by a previous survey for a different project (Bird Track Springs Fish Habitat Improvement Project) and as such, were not revisited as part of this investigation per the request of the USFS. Five previously recorded sites and one potential site were revisited. In addition, four new sites (LM-1, LM-2, LM-3, and LM-5) and seven isolated finds (IF-1, IF-2, IF-3, IF-4, IF-5, IF-6, and IF-7) were discovered during this survey effort.

Surface visibility varied across the APE, depending on vegetation type and density, and erosion, ranging between 5 and 100 percent. Ground cover primarily consisted of various grasses, hawthorn (*Rosaceae* spp.), autumnal leaves, downed trees, and boulders. In specific locations along the right bank (nearest to the Highway 244), the surface was obscured due to marsh vegetation and standing water. An approximate 32.9 acres of the APE were inaccessible due to the Grand Ronde River, steep slopes, and dense vegetation. A total of 922 shovel probes were excavated within the APE and privately-owned portion of the 50-m buffer.

During the survey on the privately owned property, one historic site was revisited and updated. Two pre-contact sites and one pre-contact isolated find were newly recorded (Table 34). The survey on the private property included a 50-m (164-ft) buffer on the south side of Highway 244 that was subsequently removed from the project by Reclamation. However, one newly recorded site, LM-6, was identified in this buffer portion during survey. LM-6 appears to be an extension of a previously recorded site, whose site boundaries were outside both the APE and 50-m buffer. During site mapping, it was verified that the previously recorded site is within 100 ft (30 m) of and on the same landform as LM-6 and contains similar cultural materials, and subsequently, it is recommended the sites be considered a single resource.

During the survey on USFS-owned property, six previously recorded sites, one potential site (e.g., tickler), and one previously recorded isolated find were revisited and updated. One previously recorded site could not be relocated, likely due to use of the area for livestock. Newly recorded archaeological resources within USFS-owned property include two historic sites (LM-1 and LM-3), one multi-component site (LM-2), and one pre-contact site (LM-4). Upon further inspection of the pre-contact site LM-4, it was determined that this resource is an extension of 35UN67 and the temporary field name, LM-4, was subsequently dropped from use. Additionally, six newly recorded isolated finds (IFs) were also documented within USFS-owned property, including three historic IFs (IF-3, IF -5, and IF-6), two pre-contact IFs (IF-2 and IF-4), and one multi-component IF (IF-1).

Impacts to Significant Heritage Resources

The sites that have been identified within the APE that are preliminarily recommended as eligible historic properties include pre-contact lithic scatters, a possible logging camp or historic habitation area, the Mount Emily Railroad Grade, and a firing range. The project activities would be able to avoid impacting all of these potentially eligible sites (project activities would occur outside of site boundaries). Information about these sites is located in the survey report, which is to be used by cultural resource specialists to evaluate these resources for eligibility.

Table 34. List of heritage resource finds within the Area of Potential Effects

Site/IF Number	Resource Description	Previously Recorded	Time Period	Land Owner	NRHP Eligibility
35UN67 (LM-4)	Artifact assemblage of points, choppers, lithic scatters and debitage. Glass fragments, wire nails and milled lumber.	Yes	Pre-contact Historic	USFS	Eligible
35UN70 (LM-6)	Lithic Scatter	No	Pre-contact	Private	Eligible
35UN286	Lithic Scatter	Yes	Pre-contact	USFS	Unevaluated
35UN287	Debris Scatter	Yes	Historic	USFS	Unevaluated
35UN299	Railroad Property – Railroad grade	Yes	Historic	Private & USFS	Eligible
35UN589	Homestead with Debris Scatter	Yes	Historic	USFS	Not eligible
35UN657	Lithic Scatter	Yes	Pre-contact	USFS	Eligible
35UN658	Artifact assemblage of lithic scatter, lumber, depression features	Yes	Pre-contact Historic	USFS	Eligible
3S-36E-14/03	Debris Scatter	Yes	Historic	USFS	Unevaluated
BT1-ISO-1	Isolated scraper, basalt debitage	Yes	Pre-contact	USFS	Not Eligible
LM-1	Debris Scatter	No	Historic	USFS	Unevaluated
LM-2	Artifact assemblage of basalt flakes, tool fragment, glass, cast-iron pan handle	No	Pre-contact Historic	USFS	Unevaluated
LM-3	Rock Wall	No	Historic	USFS	Unevaluated
LM-5	Lithic Scatter	No	Pre-contact	Private	Unevaluated
IF-1	Artifact assemblage of lithic debitage and tobacco tin lid	No	Pre-contact Historic	USFS	Not eligible
IF-2	Flake Shatter	No	Pre-contact	USFS	Not eligible
IF-3	Horseshoe	No	Historic	USFS	Not eligible
IF-4	Lithic debitage and bone fragment	No	Pre-contact	USFS	Not eligible
IF-5	Railroad spike	No	Historic	USFS	Not eligible
IF-6	Glass bottle	No	Historic	USFS	Not eligible
IF-7	Obsidian and basalt debitage	No	Pre-contact	Private	Not eligible

Direct and Indirect Effects on Heritage Resources

Alternative 1 – No Action Alternative

Under this alternative, no effects would occur and no treatment activities would be undertaken.

Alternative 2 – Proposed Action

Avoided Pre-contact and Historic Properties

Criteria built into the design of the action alternative (refer to Management Requirements, Constraints, Design Criteria, and Conservation or Mitigation Measures section of this EA) provides protection of all known pre-contact and historic properties eligible for listing on the National Register (per 36CFR800) within the project area through avoidance. Due to these avoidance measures requiring actions to occur outside of known site boundaries and sites would not experience direct impacts from project activities.

Indirect effects on the heritage resources located near the river may take place due to the natural migration of river channels that have changed as a result of the project design. However, these indirect effects would not diminish or remove the qualities of these resources that make them important.

Project design features also would require the protection of any cultural resources found during project implementation.

Cumulative Effects on Heritage Resources

Analysis of the present and reasonably foreseeable future activities within the project area were analyzed in Appendix D of this EA to determine which of those activities may overlap in time and space with this project and have the potential to result in a cumulative effect when added to the activities proposed in each of the alternatives.

Alternative 1 – No Action Alternative

Because there would be no activities occurring which could affect heritage resources under this alternative, there would be no potential for cumulative effects to them as a result of selection of the no action alternative.

Alternative 2 – Proposed Action

Cumulative impacts to the avoided heritage resources near the river would be limited to potential changes in human or animal access to the area once the project is completed. Analysis of the cumulative effects of this project's activities in combination with the present and reasonably foreseeable future activities on the railroad grade indicate that there would not likely be any measurable effects from the activities that overlap in time and space with the remnants of this site.

Forest Plan Compliance

Consideration of the direct, indirect, and cumulative effects on heritage resources results in the finding that Alternatives 1 and 2 would be consistent with the Wallowa-Whitman Land and Resource Management Plan as all cultural resource standards and guidelines for inventory, evaluation, nomination, protection, enhancement (interpretation), resolution of conflicts with other activities (MOA Mitigation Plan), coordination with SHPO and the tribes, and monitoring would be met (USDA Forest Plan 1990).

Recreation

Introduction

This section covers the recreation activities related to: dispersed recreation, developed sites, trails, and recreational permitted uses for the Longley Meadows Fish Enhancement Project (Longley Meadows).

The majority of the recreation use in the Longley Meadows project area occurs at the La Grande Rifle and Pistol Club shooting range, which operates on USFS lands under a Special Use Permit.

The Wallowa-Whitman National Forest developed a recreation program niche which reflects its defining or unique characteristics and abilities (WWNF, 2006). To define these characteristics, the niche focuses on recreation setting descriptions and emphasis, site function, key activities, site types and capacity. The Longley Meadows project area is within the 'Blue Mountains' setting. The three settings for the forest were delineated based on large geographic areas with elements of landscape characteristics, common management themes, similar recreation activities and site developments. The 'Wallowa Mountains' is characterized as - *a mixture of backcountry roads and trails transitioning into wilderness.* This designation is a mid-range recreation setting set between the 'Hells Canyon' setting (a combination of river corridors, scenic byways, viewpoints, and access into upland areas/wilderness, and cultural sites), and 'Blue Mountains' setting (more traditional uses along forest routes transitioning into the

backcountry). Major activities identified in the 'Blue Mountains' setting include; family camping, hunting, hiking, fishing, winter sports/snowmobiling, gathering forest products (firewood, mushrooms), Interpretation & Education, driving for pleasure and OHV use on designated routes.

Affected Environment

Recreation Activities

Although no specific recreation use studies were completed for Longley Meadows, inferences can be made to the typical types of activities that occur in the project area based on a national recreation survey. In 2014 the Wallowa-Whitman National Forest (WWNF) conducted the National Visitor Use Monitoring (NVUM) (WWNF, 2016) survey to gather information about recreation visitor satisfaction, activities and use levels. One product of the survey revealed the primary and overall participation levels for various activities.

Table 35. Participation in WWNF Recreational Activities (top 10 only)

Top Activities on the WWNF	Percent of Visitors Who Participated in this Activity	Percent of Visitors who Participated in this as Primary Activity
Relaxing	48.3	10.5
Viewing Natural Features	46.8	8.7
Viewing Wildlife	46.3	4.5
Hiking/Walking	43.7	10.5
Driving for Pleasure	26.5	3.2
Picnicking	18.4	2.4
Fishing	17.3	7.6
Visiting Historic Sites	15.4	0.2
Gathering Forest Products	14.7	10.5
Developed Camping	13.1	2.6

Some of the least participated activities which occur on the WWNF are; motorized trail activity (2.8%), resort use (2.3%), Off-Highway Vehicle (OHV) use (2.1%), and snowmobiling (1.2%),

The highest percent of survey respondents were from; within 0-25 miles of the forest (26.9%), within 26-50 miles of the forest (19.6%), within 101-200 miles of the forest (17.2%), and within 201-500 miles of the forest (14.4%). A total of 6.4% of visitors travelled to the forest from greater than 500 miles away. During their time on the forest, visitors spent an average 3.1 hours at developed recreation sites, 46.0 hours at overnight sites, 34.8 hours in designated Wilderness, and 11.3 hours in undesignated areas.

Although inferences can be made from NVUM survey or from local manager's observations about the types of uses that occur in Longley Meadows, no specific information is available to better understand why visitors come to this area. It is generally believed that the vast majority of recreation visits within Longley Meadows comes from local members of the Rifle & Pistol Club. One reason for visitation to an area may be linked to a visitors 'sense of place'. Sense of place is the human connection to a place, and may involve meanings and values that facilitate intimate connections with particular geographical area (Farnum, et al., 2005). This is an individual's attachment to a place based on both internal (i.e. emotional, personal, social, cultural, activity) and external factors (i.e. scenic, aesthetic, landscape). It also varies between local residents who often feel that they have a unique, special, privileged sense of place, and tourists or regular visitors who also have strong attachments to places. Since this is an individual's 'human connection' to a place, it is anticipated that a variety of comments and reactions to management proposals could be received. However managers face a challenge in that there will be multiple senses of place and a variety of possibly conflicting meanings and attachments amongst users.

Dispersed Recreation

Visitors participating in dispersed recreation activities do not primarily use or rely upon developed sites such as campgrounds, or picnic areas to conduct their activity. However they may use a developed site to *support* their activity, such as parking at a trailhead or getting drinking water from a campground, but their main time is spent away from the developed sites. All of the activities listed in Table 35 (except developed camping) could be viewed as dispersed recreation activities. Other dispersed activities like OHV use, snowmobiling, horseback riding, and cross country skiing, are rarely pursued in the limited geographic area of Longley Meadows.

As shown in Table 35 above, other types of dispersed recreation occur year-round. Visitors enjoying these recreational pursuits may use forest roads as transportation networks (i.e. OHV riders, snowmobile riders, cross-country skiers, driving for pleasure, viewing wildlife), or just travel cross country away from roads and trails (i.e. hunters, viewing nature, fishing, hiking or walking). Recreationists who pursue dispersed activities often do so for a combination of desires to; be away from crowds, seek solitude, enjoy nature (scenery, geology, wildlife) and cultural sites, seek challenges or adventure, or wanting to be more self-reliant. As noted above, there is negligible dispersed recreation use in Longley Meadows.

Developed Recreation Sites

There are no developed FS recreation sites within the Longley Meadows project area. The Bird Track Springs Campground, though not within the project area, is nearby on Highway 244. It receives moderate to heavy use from May-September each year.

Developed Trails

There are no developed FS trails within the Longley Meadows project area. There was one developed trail system located upstream of the Longley Meadows project area. It has been disturbed by the implementation of the Bird Track Springs Fish Enhancement project. As a part of that project, it will be reconstructed consisting of a network of flat walking paths between Highway 244 and the GRR at the western (upstream) limit of the project. These trails historically are primarily used by birdwatchers and walkers who wish to explore an easily accessible riparian area. Site-specific interpretation will complement the purpose of the Bird Track Fish Enhancement project.

Permitted Uses

Some recreational activities are managed under permits which allow recreationists or operators to do certain activities under the terms of the permits. These permits include; gathering firewood, gathering forest products like mushrooms, hunting and recreation special use activities. Use of these permits can be considered ‘recreational’ since visitors often participate in them for primary or secondary forms of enjoyment.

Annually the WWNF sells over 2,500 of personal use firewood permits and over 1,900 forest product permits like mushroom and Christmas tree tags. Each permit has terms and conditions which guide uses and locations for the activities. Although no data is available for how many permits are used in Longley Meadows, these activities can generally occur in most areas outside of riparian areas, old growth area, tree plantations, and other special designated location described on the permits.

The La Grande Rifle and Pistol Club uses and maintains a target range within the Longley Meadows project area under a Special Use Permit. The permitted area is comprised of 99.8 acres in T3S, R36E, Sections 11 and 14.

Environmental Consequences

Methods

The method of analysis included:

- A review of the appropriate Forest Service policy and goals, objectives and standards of the Forest Plan
- Project site visits
- A review of Forest-level recreation use surveys
- A review of the USDA Forest Service literature related to recreation management (i.e. sense of place)
- Data base queries for the Wallowa-Whitman National Forest GIS data base queries (i.e. dispersed recreation points, developed recreation points, management areas)
- Data base queries for the USDA Forest Service I-web data base

The existing condition was compared with possible changes to recreation use if alternatives were implemented.

Spatial and Temporal Context for Effects Analysis

The spatial context for the analysis includes USFS lands within two miles of the project area, encompassing the La Grande Rifle and Pistol Club shooting range which is administered under a Special Use Permit.

The environmental effects will be discussed in different timeframes. For direct and indirect effects, a short term effect for recreational visitors is viewed as occurring within two years (or 2 visitation seasons from the beginning of the implementation activity (i.e. harvest and storage of large wood materials, instream work, and post-project rehabilitation efforts). Long term is viewed as a period of time ranging from two to ten years after initiating the implementation activity (i.e. post-project restoration activities such as planting and subsoiling are done).

Direct and Indirection Effects to Recreation

Alternative 1 – No Action

There would be no direct or indirect effects under Alternative 1 to recreation opportunities. Stream restoration activities and vegetation densities or characteristics on private lands would not be modified, and the project area would continue to be influenced by natural processes and limited management actions, such as fire suppression. Since no implementation activities would result under this alternative, no change is anticipated in the number of visitors, frequency or season of use in dispersed recreation activities, developed recreation sites, trails, or permitted uses. Recreational visits within the project area would remain near the same levels as previous years and under this alternative traditional use patterns and recreational opportunities would not be impacted. Hunting, hiking and other dispersed recreation and permitted uses access and opportunities are expected to remain unchanged.

Alternative 2

Dispersed Recreation – Dispersed recreation activities would be affected by the project activities. In the short term, users would be discouraged from entering the project area due to the area closure and presence of equipment and workers. This may occur at any time of year, as Longley Meadows is a relatively low-elevation site and does receive light winter visitation. Downed trees

and slash piles would discourage visitor use in an area. Noise and other disturbances may affect the quality of the recreation experience for an individual regardless of the proximity to the activity.

A change in natural features or landscape characteristics may elicit different responses in visitors. As discussed above one attraction to an area may be linked to visitors 'sense of place' (Farnum, et al., 2005). A visitor's sense of place includes attachments to external factors like natural features or landscape characteristics. Important landscape features may consist of large old growth trees and groves, variety of trees species, an open or closed tree canopy, rock formations, water bodies, and natural appearing openings (USDA-FS, 1995). The proposed treatments of altering the course of the GRR would change or remove some of these natural features. In some cases the changing landscape would displace or discourage certain types of dispersed recreational activities in the short term (i.e. studying nature, viewing wildlife).

In the long-term, successful implementation of this project would enhance fishing opportunities on the GRR and also provide opportunities for the public to view steelhead, chinook, and beaver.

Developed Recreation – Because of Longley Meadows' small geographic size, effects to developed and dispersed recreation are similar. Access to developed sites may be delayed or restricted during equipment staging or construction periods. The presence of large trucks and other equipment on Highway 244 may discourage users from driving the main access route to developed sites or other associated activities outside of the developed recreation area. The noise, dust, and equipment activity during project activities may affect the quality of the recreation experience for a visitor regardless of the proximity to the activity. The frequency and intensity of these activities may vary from a few hours to several weeks or months.

Due to the limited geographic size of the Longley Meadows project, long-term effects to developed recreation would be negligible.

Developed Trails – Since there are no developed trails in Longley Meadows, direct impacts would primarily affect the experience of visitors who are traveling through the project area in order to reach trails elsewhere in the forest. Long-term effects to trails would be negligible under this alternative.

Permitted Uses – The La Grande Rifle & Pistol Club would experience short-term impacts (one to three years) during project implementation and construction. Club activities may be displaced from the permit area while work is ongoing. In some instances—like during large, annual events—the Club may have to find an alternative location to host participants. Post-project, the Club may have to reconfigure some of their shooting areas in order to accommodate changes to the landscape.

Cumulative Effects on Recreation

Alternative 1 – No Action

There would be no cumulative effects under Alternative 1 to recreational opportunities.

Alternative 2

Recreationists using and traveling through the project area would experience short term (1-2 seasons) impacts from adjacent forest and fisheries management activities. Prescribed burning in the area, road maintenance along Highway 244, removal of logs for instream enhancement work

elsewhere on the District, and ongoing implementation of the adjacent Bird Track Springs Fish Enhancement project would result in the potential for additional smoke, noise, the need for traffic control, and dust in and adjacent to the Bird Track Springs campground and the La Grande Rifle and Pistol Club. These impacts would occur primarily during daylight hours during the summer months while the projects are being implemented. Long term benefits from all of these projects would result from increased stand resiliency, reduced noise and dust, interpretation opportunities related to the benefits of the project, and improved fishing and viewing along the river for fishermen and hikers.

Irreversible and Irretrievable Commitments of Resources

There are no irreversible and irretrievable commitments to the recreation resource associated with any of the alternatives analyzed. The number, available types and use capacity for developed, dispersed and trail recreation activities will not be changed by the project proposal.

Forest Plan Compliance

This project complies with Forest Plan goals and direction because it would provide a wide variety of recreational opportunities in an attractive setting and makes those opportunities available to all segments of society.

Scenic Resources

Introduction

Scenery provides the setting for all activities experienced by forest visitors. Each setting is comprised of scenic attributes that are derived by the environmental context of topography, geology, and climate. These underlying factors are expressed and highlighted by the scenic attributes that they support. Scenery, just as any other resource, must be cared for and managed for future generations. The activities proposed by the Longley Meadows Fish Habitat Enhancement Project (Longley Meadows) potentially affect the current and future condition of these valued scenic resources. Managing scenery resources involves the process of analyzing effects, implementing scenic character goals and applying scenic conservation design features to achieve the WWNF Land and Resource Management Plan (Forest Plan) desired conditions and direction for scenery resources.

The Grande Ronde River Road (Highway 244) runs through the project area. This road was identified as a Level 1 Visual Sensitivity travel route in the Forest Plan, indicating its importance as a major recreational travel route with an essentially natural appearance. Activities that are within this project are expected to meet the retention Visual Quality Objective (VQO).

The primary purpose of this section is to disclose the effects of the alternatives to scenery resources.

Affected Environment

Existing Scenic Integrity

Scenic Integrity is measured on the Wallowa-Whitman National Forest through VQO levels defined by the Forest Service (FS) Visual Management System's Chapter 1 USDA Handbook # 462. These levels and descriptors of how people perceive them are shown below.

Table 36. Visual Quality Objectives and Perceived Alteration

Visual Quality Objectives	Scenic Integrity as people perceive it
Preservation	Unaltered , visually complete or intact
Retention	Unnoticeably altered
Partial Retention	Slightly altered
Modification	Moderately altered
Maximum Modification	Heavily altered
Unacceptable Modification	Unacceptably altered

The existing scenic integrity meets the visual quality objective of the Forest Plan. Within the USFS portion of the project area there are some evidences of past activities. Rock quarries, ditches, dikes, and abandoned roadbeds are visible from the primary travel route. However, there are large areas of natural appearing landscapes. Overall, from middleground and background views there is little evidence of man's activities in this portion of the project area.

Sensitive Viewsheds

Highway 244 – This road runs east to west through the project area. With a few exceptions, the road stays at river grade, and in a portion of the project, the road is adjacent to the south bank of the GRR. From the road, travelers can frequently observe the course of the river. In areas where the river itself is not visible, the riparian area is obvious, dominated by large cottonwoods, willows, and open meadows. On the south side of the road, the terrain trends uphill, sometimes steeply, onto heavily forested benches. To the north of the road, slopes and small rocky escarpments descend to the river grade, and are dominated by open, south-facing, parklike stands of ponderosa pine.

The portion of the project area with USFS boundaries is primarily natural appearing, though there are some evidences of disturbance, as mentioned above. The evidences are subordinate in the landscape, and may not be readily apparent to the casual visitor who is traveling through in a vehicle. Elsewhere in the project area, there are substantial human developments and modifications visible from the road. These developments and modifications include but are not strictly limited to: corrals, fences, homes, barns and outbuildings, agricultural equipment, and a shooting range.

Effects

The seen area from the project area boundary is the analysis area for scenery and visual resources. Effects of the action alternatives are based on the full implementation of the mitigation measures described under the Alternative Description section of this EA. Mitigation measures for scenery and visuals apply to USFS lands only.

Direct and Indirect Effects on Scenery and Visual Resources

Alternative 1 – No Action

The no action alternative would have no direct or indirect effects on scenery and visual resources within the project area because no fisheries enhancement activities would occur.

Alternative 2 – Proposed Action

River Realignment – In the short term, there will be substantial visual impacts from active river realignment and associated activities, both on private and USFS lands. Heavy machinery, dust, slash and log piles, temporary river crossings, and disturbed ground will be obvious to travelers along Hwy 244 and to recreationists within the project area. Large canopy trees may be felled for in-stream placements, giving a slightly more open overall appearance to certain stretches of the

riparian zone. Large wood placements, beaver dam analogs, and access routes through the project area will take approximately 2-5 years to be obscured by new vegetation and gain a more natural appearance. Temporary parking areas and staging sites will affect the scenic integrity of the roadway in the short term, but will either be rehabilitated or absorbed into new recreational features at the conclusion of the project. Alterations to facilities at the La Grande Rifle & Pistol Club, which operates within the project area under a special use permit, will negligibly impact the visual experience of the casual forest visitor traveling on Highway 244.

Cumulative Effects to Scenery and Visual Resources

Alternative 1 – No Action

Because there would be no enhancement activities occurring under this alternative, there would be no cumulative effects to scenery and visual resources.

Alternative 2 - Proposed Action

There is a potential for some of the vegetation management projects occurring within the area, such as, the Bird Track Springs precommercial thinning and prescribed burning project, the fish logs being removed from the Bird Track Springs campground, and the on-going implementation of the Bird Track Springs Fish Enhancement project to create short term effects on visual scenery if project activities are going on concurrently creating smoke and dust impacts; although, it is not likely that prescribed burning would be occurring during the instream work window as fire danger levels are usually elevated at that time of the year.

On-site disturbance from tree removal, for another fish enhancement project, from the campground should be minimized as trees would be cut at the base rather than pushed over. Impacts are expected to be short term as slash cleanup and other rehabilitation will be a priority for rapid resolution.

Summary of Effects The action alternative meets Forest Plan VQOs. The alternative retains the existing VQOs and therefore meets the Forest Plan Standards and Guides for Scenery.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Alternative 1 is compliant with the Visual Quality Objectives that are Forest Plan Standards. It is expected that Alternative 2 would not reduce the scenic integrity and thus retain the existing visual quality objective standards established in the Forest Plan.

Required and Additional Disclosures

This section discloses the effects of the alternatives on the human environment as specified by law, regulation, policy, or Executive Order.

Tribal Treaty Rights

Treaties provide that Native Americans will continue to have the right to erect suitable buildings for fish curing, privileges of hunting, gathering roots and berries, and pasturing stock on unclaimed lands. Indian treaty rights and privileges were considered throughout this analysis and maintained through appropriate design and layout features, especially related to first food resources such as fish, wildlife, and riparian areas. While both alternatives are equal in their protection of treaty rights Alternative two would maintain and enhance opportunities into the future.

Biological Diversity

All existing native and desirable introduced species and communities are maintained with both alternatives. Erosion control measures (seeding, straw bales, etc.) would use native species and certified weed-free materials. Biological diversity is not expected to be affected.

Public Safety

No long term public safety problems are anticipated with this project. Short term safety hazards would exist such as truck traffic and equipment needed for restoration activities including log placement, and boulder placement. These activities would be mitigated through an area closure and contract safety provisions and are not anticipated to impact public safety.

There is no expectation that there would be a change in public health and safety. Mitigation and precautions apply to the proposed action alternative. Other safety measures are discussed in, or are a standard part of, project contracts.

Research Natural Areas, Experimental Forests, and Wilderness

There are no research natural areas, experimental forests, or wilderness areas associated with the Bird Track Springs project. There are no known significant cumulative effects from the project and other projects implemented or planned on areas separated from the affected area of the project beyond those evaluated in Chapter IV of the FEIS of the Forest Plan. The physical and biological effects are limited to this analysis area. No actions are proposed which are considered precedent setting.

There are no known effects on the human environment that are highly uncertain or involve unique or unknown risks. None of the actions threaten a violation of Federal, State, or local law. Action alternatives would comply with air and water quality regulations (laws). The effects on the quality of the human environment are not likely to be highly controversial based on public participation.

There is no expectation that there would be a change to public health and safety. Mitigation and precautions apply to the proposed action alternative. Other safety measures are discussed or are a standard part of sale contracts.

Probable Adverse Environmental Effects that Cannot Be Avoided

Some impacts caused by implementation of management activities proposed in this analysis that cannot be avoided may be considered adverse according to individual interpretations. Truck traffic would

compete with public traffic along Highway 244. Traffic and construction activities would also create dust and noise. Recreational users may experience some delays during construction activities.

Irreversible and Irretrievable Commitment of Resources

Irreversible resource commitments are actions that either deplete a non-renewable resource or disturb another resource to the point that it cannot be renewed within 100 years. Impacts to soil and water are controlled by management practices and mitigation measures and would not represent an irreversible resource commitment. For all practical purposes, rock is a non-renewable resource. Existing roads constitute a more-or-less permanent commitment of a portion of land to a purpose other than resource production.

Energy Requirements of Alternatives

Management activities such as heavy equipment usage are less energy-efficient. The need for less energy-efficient and more expensive techniques is often due to the need to achieve project outcomes, mitigate soil damage or adverse effects on a watershed and other resources that would occur if more energy-efficient means, such as hand placement were employed.

Prime Farmlands, Range Land, Forest Land

Actions taken under any of the alternatives would have no impact on farmland, rangeland, or forestland inside or outside the National Forest. There are no prime farmlands affected by the proposal.

Civil Rights, Women, Minorities, Environmental Justice

There are no known direct or adverse effects on women, minority groups, or civil rights of individuals or groups. Action alternatives are governed by sale or service contracts, which contain nondiscrimination requirements to prevent adverse impacts to these groups. The No Action alternative may have some short term adverse impacts on the local community by not providing income from service contracts. To the greatest extent possible, all populations have been provided the opportunity to comment before decisions are rendered on proposals and activities affecting human health or the environment. The proposals within this EA would not have a direct or indirect negative effect on minority or low-income populations (Presidential Exec. Order No. 12898 on Environmental Justice).

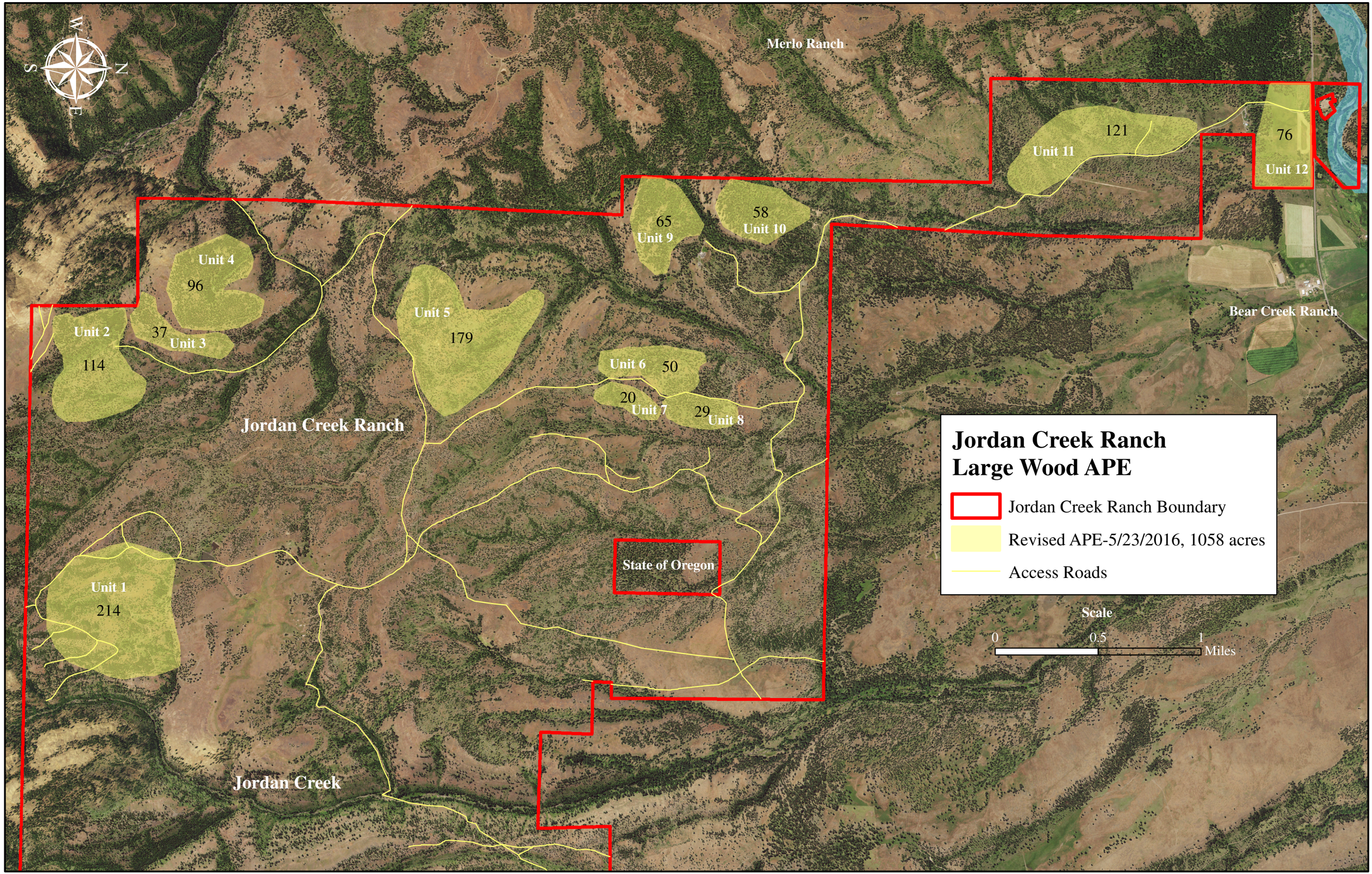
Wetlands and Floodplains

Wetlands and floodplains associated with streams and springs would be protected and enhanced using design criteria and mitigation guidelines previously identified. No designated Wild and Scenic rivers would be affected by this project proposal.

EO 11988 requires federal agencies to “avoid to the extent possible the long and short term adverse impacts associated with the occupation or modification of floodplains.” The Longley Meadows project would benefit the floodplain by connecting it back to the stream and watershed and is consistent with this EO.

EO 11990 requires federal agencies to “avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands.” This project is consistent with this EO because it would enhance natural wetland function and formation process within the GRR floodplain. These beneficial impacts could include additional mechanical and chemical filtration, bank and floodplain stability, energy reduction and dissipation, and increase in wetland value for use by aquatic and terrestrial wildlife. The Longley Meadows Fish Habitat Enhancement Project is consistent with this EO because it

does not propose to destroy any wetlands, and any modifications to the wetlands would enhance moving the project toward riparian management objectives.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Unit 3
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Bear Creek Ranch
Unit 6
50
20
Unit 7
29
Unit 8
Jordan Creek Ranch
State of Oregon
Unit 1
214
Jordan Creek
Jordan Creek Ranch
Large Wood APE
Jordan Creek Ranch Boundary
Revised APE-5/23/2016, 1058 acres
Access Roads
Scale
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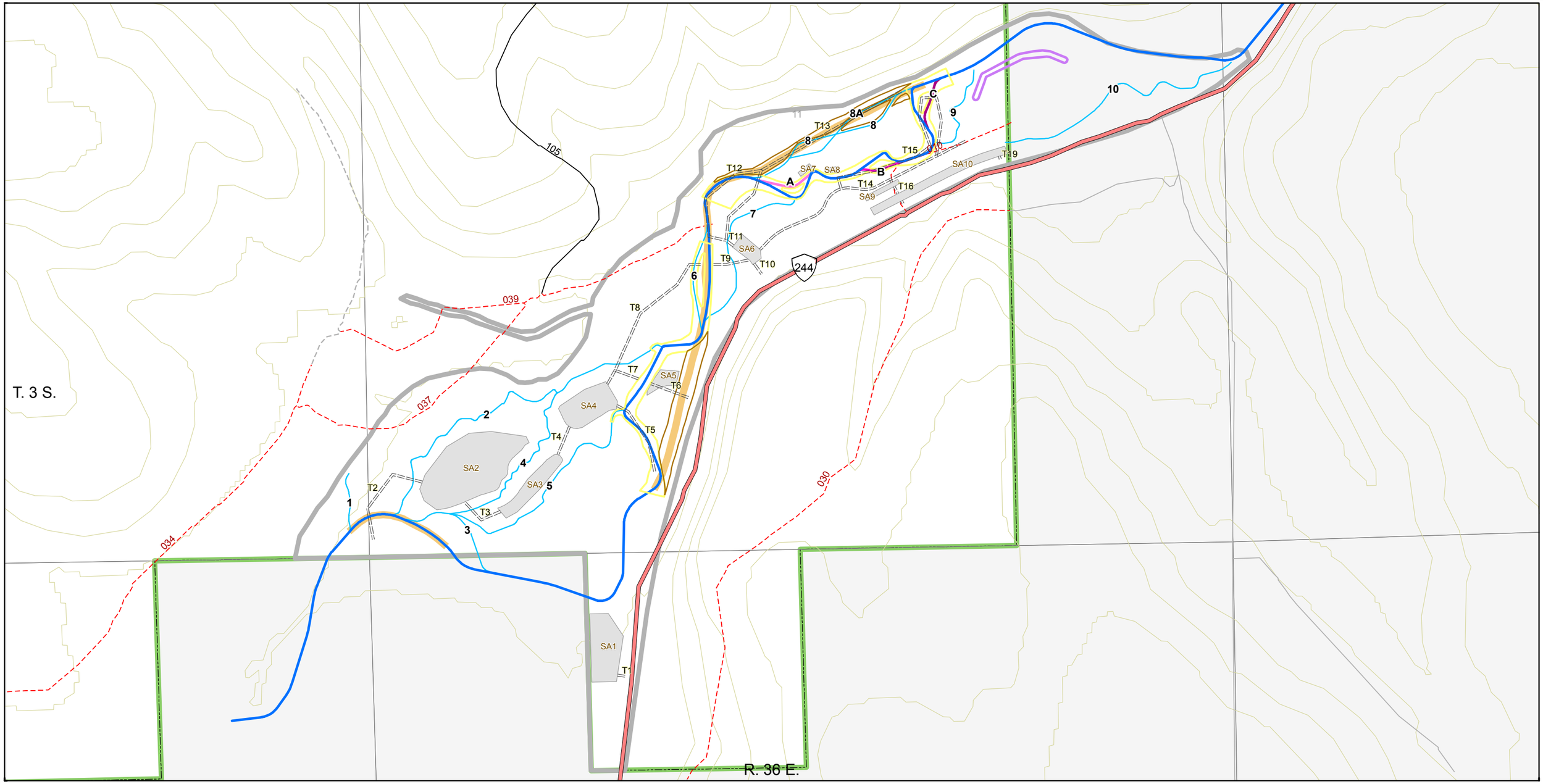


Date: 3/25/2019

Longley Meadows Fish Habitat Enhancement Project

1:7,000

0 0.25 0.5 Miles

40 Foot Contour Interval

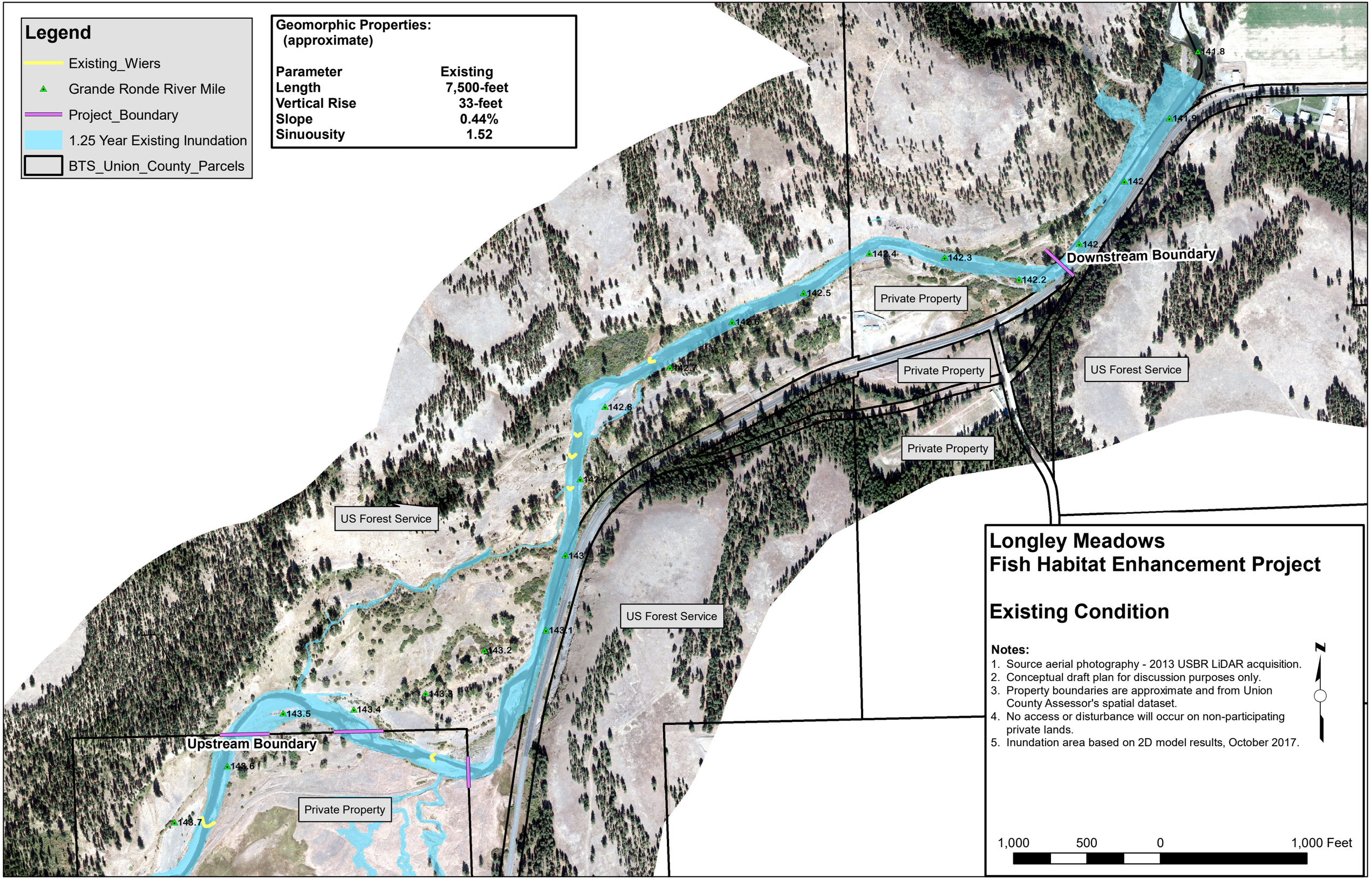
- Longley Meadows Project Area
- Main Channel - Proposed
- Main Channel - A
- Main Channel - B
- Main Channel - C
- Side Channels
- Temporary Access Road
- Channel Fill
- Channel Realignment Area
- Excess Fill
- Fish Rescue Dewatering
- Staging Areas
- US or State Highway
- Local Road
- Off Forest Road
- Closed Road - OPML = 1 closed roads
- Decommissioned Road
- Ranger District
- Private Land
- U.S. Forest Service

Legend

- Existing_Wiers
- Grande Ronde River Mile
- Project_Boundary
- 1.25 Year Existing Inundation
- BTS_Union_County_Parcels

Geomorphic Properties:
(approximate)

Parameter	Existing
Length	7,500-feet
Vertical Rise	33-feet
Slope	0.44%
Sinuousity	1.52



Longley Meadows
Fish Habitat Enhancement Project

Existing Condition

Notes:

1. Source aerial photography - 2013 USBR LiDAR acquisition.
2. Conceptual draft plan for discussion purposes only.
3. Property boundaries are approximate and from Union County Assessor's spatial dataset.
4. No access or disturbance will occur on non-participating private lands.
5. Inundation area based on 2D model results, October 2017.

N

1,000 500 0 1,000 Feet

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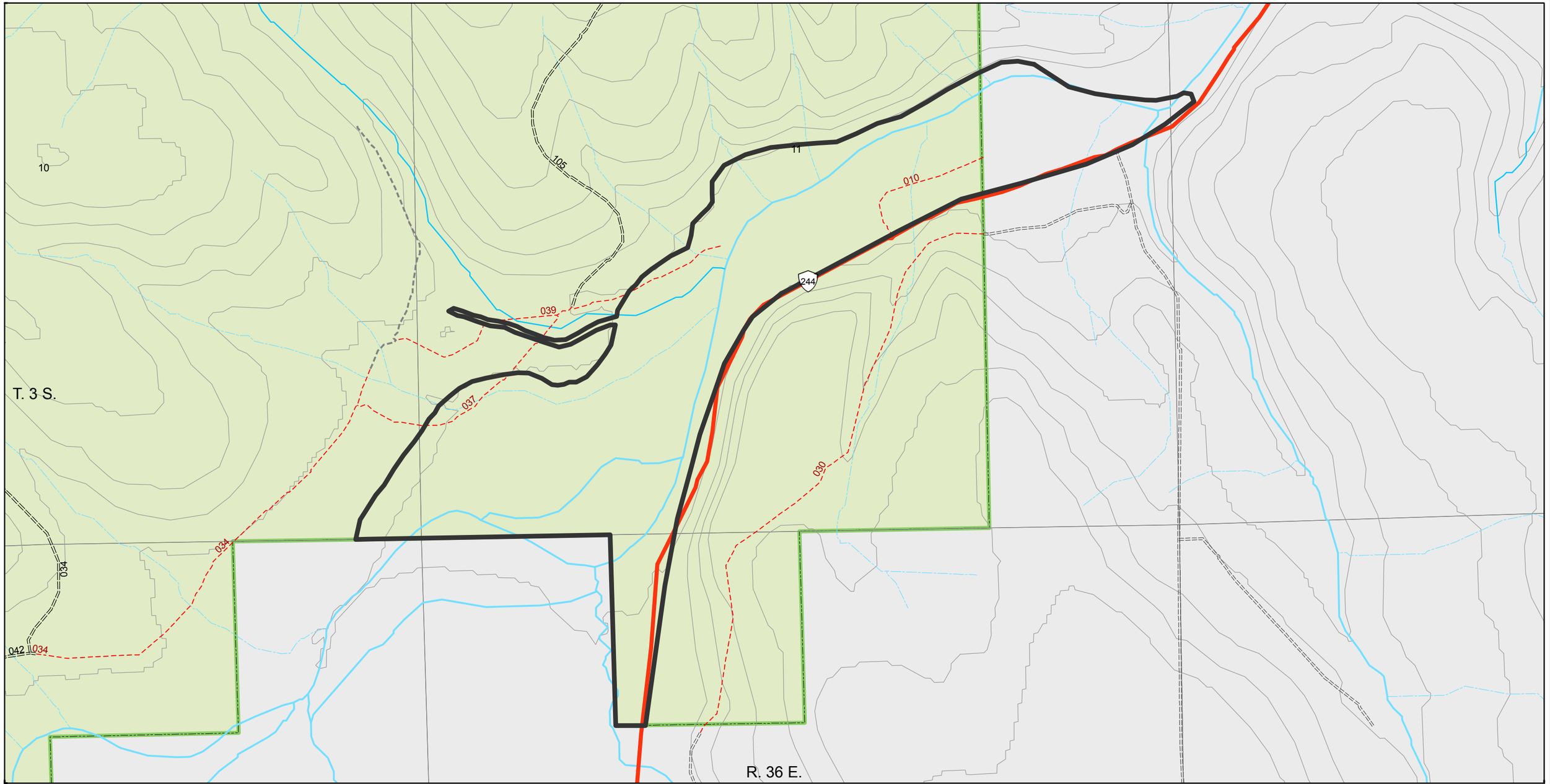

Date: 2/5/2019

Bird Track Springs
Fish Habitat Enhancement Project

Management Area Map

1:8,000

Miles

0 0.15 0.3 0.45

Longley Meadows Project Area

WAW Management Areas

Wildlife/Timber Winter Range

NHD Stream Category

Category 1 Stream

Category 2 Stream

Category 4 Stream

US or State Highway

Local Road

Off Forest Road

Closed Road - OPML = 1 closed roads

Decommissioned Road

Ranger District

Private Land

U.S. Forest Service

Undetermined

Longley Meadows Fish Enhancement Appendix D
Cumulative Effects Analysis
Process and Project Area Activities

The following process and assumptions were used by the Longley Meadows ID Team in their analysis of the effects of actions proposed in this document on their resources.

A. Analysis Area - In general, the analysis area will be the project area. If the resource being analyzed necessitates extending the analysis area outside the project area for an appropriate analysis then the extent of the analysis area is documented under each resource area.

B. Effects - The specific effects of each action alternative on the environment, including the No Action alternative are to be analyzed by each resource area.

Actions to be analyzed by ALL resources are:

1. Large wood acquisition include mechanical removal systems (tractor, helicopter) on Jordan Creek Ranch
2. Placement of wood instream include equipment used to install
3. Gravel and boulder placement
4. New channel construction
5. Construction and decommissioning of stockpile sites
6. Construction and decommissioning of temporary access roads
7. Temporary river crossings
8. Construction of dewatering basins and placement of temporary coffer dams
9. Dewatering river segments and fish salvage
10. Cut removal, fill of river segments, and stockpile of overage materials
11. Planting and revegetation
12. Mitigation Measures
13. Area Closure in Project Area Boundary

Show the cause and effect for Direct, Indirect, and Cumulative effects, defined as follows:

Direct Effects: Explain the direct effects the implementation of the alternatives would have on the environment. These include effects which are caused by the action and occur at the same time and place as the action.

Indirect Effects: Describe indirect effects of alternatives on the environment. Indirect effects include those which are caused by the action but are later in time or farther removed in distance what are still reasonable foreseeable.

Cumulative Effects: The cumulative effects analysis will include:

Past Actions + Present Actions + Proposed Actions + Reasonably Foreseeable

To understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment to the present.

Present actions will incorporate all know activities. Reasonably foreseeable future is approximately 5 years within which we are reasonably certain our proposed actions would occur.

Note: should you change any of these parameters, the change is documented in the effects writeup for that resource.

C. Analyze the effects in terms of:

1. **Differences from the present condition**: How do each of the alternatives (include all actions under each) change the environment based on what is there now? What are the specific differences between alternatives? What is the direction of the effect (increase or decrease)?

2. **Duration:** How long will the impacts last?

3. **Significance**: Analyze in terms of context and intensity.

    - **Context**: Analyze whether effects are local, regional, national, or affect society as a whole.
    - **Intensity**: Analyze in terms of severity of impacts.

Effects write-ups need to disclose what these actions WILL DO to the environment.

Avoid relative measurements such as "minimal, substantial, etc". Talk about the specific differences between alternatives in units of measure that are relevant, quantifiable, and descriptive. Use the Key Indicators to describe the effects on the key issues.

Use tables graphs, drawings, etc. when appropriate and available.

Use references to relevant scientific studies to back up statements when appropriate and available. In addition, identify where there are information gaps, incomplete or unavailable information.

IMPORTANT: Include a section on Forest Plan Compliance in your reports which describes how the project complies with the goals, standards, and guidelines for your resources.

Include your Literature Cited at the end of your report using the 2012 EMC Publishing Arts Style Guide format.

Sign and date your report – can be electronic signature but needs to be done.

D. Present and Reasonably Foreseeable Future Actions

The following is a list of present and reasonably foreseeable future activities within the project area, and on immediately adjacent public and private lands. This list will serve as a guide for resource specialists as they define their Analysis areas for their resource and identify the direct, indirect, and cumulative effects of implementing the Longley Meadows Fish Enhancement project alternatives. Reasonably foreseeable future is defined as within the next 5 years for this analysis.

Present and Reasonably Foreseeable Future Actions in the BTS Project Area

Project Name	SWS	Year	Activity
Vegetation Management			
Noxious Weed Management Plan	All	Ongoing	Continue prevention and treatment strategies for known noxious weed sites from the 1994 W-W Noxious Weed Management Plan.
W-W Invasive Species Treatment ROD	All	Ongoing	Implement the W-W Invasive Species ROD, which includes an Early Detection Rapid Response (EDRR) strategy for addressing new sites, along with strategies for preventing the spread of and treating known sites.
Vegetation Management Commercial			
BTS Campground Small Sale	Coleman Ridge-GRRiver	2019-2021	This small sale unit is less than 70 acres and is adjacent to the fish log unit, discussed below.
Spring Creek Small Sale	Spring Creek	2019-2021	This small ground based timber sale unit on 70 acres focused on overstory and understory stocking level management, fuel reduction, and reintroduction of fire through prescribed burning.
Fuels Reduction and Prescribed Burning			
Bird Track Springs Precommercial thinning and prescribed burning	Coleman Ridge-GRRiver	Ongoing 2017-2021	Precommercial thinning project by mechanical and hand focused on stocking density management and fuel reduction work which will be followed up by some prescribed underburning.
Special Uses			
OTEC Powerline	Coleman Ridge-GRRiver	Ongoing	Powerline is buried up to where it crosses the river where it comes above ground, crosses the river on the poles and then is buried again.
Outfitter Guide Fly Fishing Permits	Coleman Ridge-GRRiver	Periodic	Permits are periodically issued for guided fly fishing within this segment of the UGR River
La Grande Rifle and Pistol Club	Coleman Ridge-GRRiver	Ongoing, 20 year permit	This includes a 95 acre area that the SUP covers for 5 days per year for an event. Area adjacent to federal lands is a shooting range with structures to support these activities.
Recreation			
Bird Track Springs Interpretive Trail	Coleman Ridge-GRRiver	2021-Ongoing	1.0 mile interpretive hiking trail and small parking area for trail access. To be designed and constructed in 2021.
Bird Track Springs Campground	Coleman Ridge-GRRiver	Ongoing	Developed campground with about 25 camping sites, picnic tables, fire rings, and bathroom.
Dispersed Camping	All	Ongoing	Dispersed camping occurs primarily during hunting season and can occur throughout the project area since there is currently no restriction on cross-country motorized travel.
Firewood Cutting	Coleman Ridge-GRRiver	Ongoing	District-wide personal use firewood – mostly for camp use, firewood program restricts firewood removal within RHCAs.
Snowmobiles Routes	All	Ongoing	No designated snowmobile routes are within the project area.

Project Name	SWS	Year	Activity
OHV Use – Current	Coleman Ridge-GRRiver	Ongoing	No designated OHV trails within the project area. Only highway legal OHV use is permitted on Hwy 244. Cross-country OHV use is permitted but not a regular occurrence.
Roads & Trails			
Travel Management Plan (TMP)	All	2017-2021	To comply with the 2005 Travel Management Rule (TMR) the WWNF began a planning effort to designate roads, trails, and areas for public motor vehicle use in 2007. The 2012 WWNF TMP FEIS displays a range of alternatives meeting the intent of the TMR and the effects of implementing them. Because this planning effort is on-going and expected to occur within the reasonably foreseeable future (next 5 years), the range of alternatives from the TMP FEIS was considered the best representation of a reasonable range of potential effects that could occur upon implementation for use in this analysis. While a specific number of miles of designated routes (roads and trails) will not be known until a decision is made, the analysis from the WWNF TMP FEIS indicates that designated routes could range from a potential high of approximately 6,700 miles (Alternative 4) to a potential low of approximately 2,600 miles (Alternative 6) and x-country motor vehicle use would be managed. Once a final decision is made, the roads, trails, and areas designated for motor vehicle use by the public will be displayed on an MVUM and x-country motor vehicle travel will be regulated. The no action alternative will not be considered in this analysis as it does not meet of the purpose and need for compliance with the TMR.
Danger Tree removal within campground and along Highway 244	Coleman Ridge-GRRiver	On going	Fall and remove Danger Trees as prescribed in:Toupin, R., Filip, G., Erkert, T., & Barger, M. (2008). *Field Guide for Danger Tree Identification and Response.* Portland, OR: USDA For. Ser. Pac. NW Reg. and USDI Bur. Land Mgt.
Road Maintenance	Coleman Ridge-GRRiver	Ongoing	Yearly maintenance along Highway 244
Range Allotments			
Spring Creek Sheep Allotment	Coleman Ridge-GRRiver	Ongoing	Livestock grazing on the Spring Creek allotment. Authorized grazing sheep 1569 ewe/lamb units of domestic sheep from 6/1-10/25 each year.
Special #2 Allotment	Coleman Ridge-GRRiver	Ongoing	Livestock grazing on the Special #2 Allotment. Authorized grazing of up to 100 head months cattle (cow/calf) from 6/1-10/31 each year. Variable season of use and variable numbers in two pastures.
Water Quality and Fisheries			
Middle Upper Grande Ronde (MUGR) Instream Enhancement	Warm Springs Creek-GRR	2019-2020	Instream enhancement project including work on USFS lands with LWD placement, gravel and boulder placement, instream enhancement work, and riparian planting

Project Name	SWS	Year	Activity
Bird Track Springs Fish Enhancement Project	Coleman Ridge-GRRiver, Jordan Creek	2018-2020	Instream enhancement project including work on USFS and private lands with LWD placement, gravel and boulder placement, instream enhancement work, and riparian planting
Wildlife Enhancement			
Great Gray Owl Platforms	Coleman Ridge-GRRiver	Ongoing	Two great gray owl platforms are located in the old growth stand on the north side of the river.
Aspen Enhancement	Coleman Ridge-GRRiver	Ongoing	An aspen stand on the north side of the GR River has had conifers removed and has been fenced to protect it from ungulate browse.
Mining			
Mining		Ongoing	There are no approved plans of operation. The area is open to mineral entry.
Fisheries Enhancement			
Fish Logs from BTSprings Campground	Coleman Ridge-GRRiver	2018-2021	Removal of approximately 70 trees from 50 acres within the Bird Track Springs Campground area for instream placement in the Upper Grande Ronde River farther upstream from this project. Trees selected will basically be a thinning, cut by hand, and loaded onto trucks from existing roads by a forwarder.
Private Land Activities			
Commercial Harvest	All	2019-2024	None known at this time.
Fuels Reduction	None		
Private structures- Barn Corral Agricultural fields	Coleman Ridge-GRRiver	Ongoing	Various locations throughout the project area.
Grazing	Coleman Ridge-GRRiver	Ongoing	Various locations throughout the project area.
Roads	Coleman Ridge-GRRiver	Ongoing	Various locations throughout the project area.

Cumulative Effects Determination Tables

Fisheries

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management W-W Invasive Species Treatment ROD	Reduction of invasive species competition	Yes	Yes	No	Approved herbicides have been analyzed in WW Invasive Species Treatment ROD. Herbicide buffer widths have been identified and would be followed.
Vegetation Management: BTS Fuel Reduction Proj BTS Campgrnd Project Spring Crk Small Sale		Yes	Yes	No	While located within analysis area (6th field HUC), activities are non-commercial thinning and prescribed burning on relatively flat ground with no activity within RHCA buffers. No negative impacts to streams anticipated; therefore, no measureable cumulate effects.
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit • LG Rifle & Pistol Club		Yes	Yes	No	Powerline is suspended over river, no impacts expected from this powerline or fly fishing along this stretch of river
Recreation – BTS Interpretive Trail		Yes	Yes	No	Trail will be a stable native surface trail that will be removed and relocated as a part of this project. The effects of moving trail are described as a part of the direct and indirect effects for fisheries.
Recreation- Dispersed Camping		Yes	Yes	No	
Recreation- Snowmobile Trails		No	No	No	
Recreation -Firewood Cutting		Yes	Yes	No	Firewood cutting within the project area is very limited due to the limited amount of materials available – this area is fairly picked over due to proximity to La Grande. No cut buffers on perennial fishbearing streams reduce any potential impacts to fisheries.
Recreation – OHV Use	Sediment from OHV use and user built trail construction destroying riparian habitat	Yes	Yes	Yes	Unauthorized user built OHV trails and OHV use is spread across most of the landscape within the Spring Creek area contributing to sediment production and degrading riparian habitat. This, in combination with the impacts from project implementation has a potential to impact fisheries in the short term; however, the long term benefits of the BTS project and implementation of travel management which will restrict motor vehicle use to designated roads, trails and areas will have net beneficial effect to fisheries and critical fish habitat.

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Recreation – BTS Campground		Yes	Yes	No	Campground is separated from the GR River by Highway 244. Recreation activities within the campground have no effect on the project area.
Roads & Trails – Travel Management Plan	Sediment from OHV use and user built trail construction destroying riparian habitat	Yes	Yes	Yes	See OHV use above.
Road Maintenance On Hwy 244		Yes	Yes	No	
Roads – Danger Tree Removal		Yes	Yes	No	
Grazing Allotment – Spring Creek Sheep Allotment Special #2 Allotment		Yes	Yes	No	Sheep herds have a full time shepherd with them at all times ensuring they are kept out of riparian areas. The allotment has well maintained fences and allotment monitoring over the years have shown no measurable impacts.
Fisheries Enhancement – Fish logs from BTS Campground Bird Track Springs Fish Habitat Enhancement		Yes	Yes	Fish Logs – No BTS Fish Enhancement - Yes	Fish Logs - Ground disturbance will be kept to a minimum for this project due to the limited scope and the methods to be used for tree removal. And no harvest would occur within RHCAs. BTS Fish Enhancement-This project in combination with Longley Meadows will increase the beneficial effects for the riparian and fisheries resources in an area that has historically been of very low quality.
Wildlife Enhancement – GG Owl Platforms Aspen Enhancement		Yes	Yes	No	
Mining		No	No	No	No approved plans of operation
Private Land Activities • Private Structures • Roads • Grazing		Yes	Yes	No	Effects of moving the corral and feedlot out of the riparian area are described as a part of the direct and indirect effects for fisheries.

Hydrology, Floodplains, and Wetlands

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management: Wallowa-Whitman Invasive Species Treatment Record of Decision	Reduction of invasive species competition	Yes	Yes	No	No impacts to water resources expected since spraying guidelines will be followed.
Vegetation Management: Bird Track Springs precommercial thinning and prescribed burning		No	No	No	
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit • LG Rifle & Pistol Club		Yes	Yes	No	Powerline is suspended over river; no impacts are expected from this powerline. Fly fishing on the GRR would have minimal impacts to water resources through localized bank trampling and associated erosion.
Recreation: Bird Track Springs Interpretive Trail		Yes	Yes	No	Minimal impacts to water resources expected.
Recreation: Dispersed camping		Yes	Yes	No	Minimal impacts to water resources expected.
Recreation: Snowmobile trails		No	No	No	
Recreation: Firewood Cutting		Yes	Yes	No	No impacts to water resources expected.
Recreation: OHV Use		Yes	Yes	No	Unauthorized user-built OHV trails and OHV use is spread across most of the landscape within the Spring Creek area, contributing to sediment production. Water quality could be impacted in the short term, but the long-term benefits of the project and implementation of travel management within the project area would yield a net improvement in sedimentation rates and water quality.
Recreation: Bird Track Springs Campground		Yes	Yes	No	Campground is separated from the GRR by Highway 244. Recreation activities within the campground have no impact on the project area.
Roads & Trails: Travel Management Plan		Yes	Yes	No	See OHV use above.
Road Maintenance on Highway 244		Yes	Yes	No	No impacts to water resources expected.
Roads: Danger Tree		Yes	Yes	No	No impacts to water resources expected.

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Removal					
Grazing Allotment: Spring Creek Sheep Allotment		No	No	No	
Fisheries Enhancement: Fish logs from Bird Track Springs Campground Bird Track Springs Fish Habitat Enhancement	Short-term water quality impacts from restoration construction activities possible	Yes	Yes	Bird Track Springs Campground – No Bird Track Springs – Yes	Some large tree removal is planned within the campground area for another fish enhancement project. Trees would be cut down, loaded with a log forwarder, and hauled off-site. Most of the removal is expected to occur from existing roads and no water resource impacts are anticipated. The Bird Track Springs project would have similar short-term impacts to those described above for this project. Long-term impacts are expected to be minimal.
Wildlife Enhancement: GG Owl Platforms Aspen Enhancement		No	No	No	
Mining		No	No	No	
Private Land Activities: Private Structures Roads Grazing		Yes	Yes	Structures – No Roads – No Grazing – Yes	Grazing – An existing corral on the private property portion of the active project area would be moved out of the project area, reducing potential livestock impacts on water quality.

Soils

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management: Wallowa-Whitman Invasive Species Treatment Record of Decision	Reduction of invasive species competition	Yes	Yes	No	No impacts to soil resources expected.
Vegetation Management: BTS Fuel Reduction Project BTS Campground Project Spring Crk Small Sale		No	No	No	
Special Uses: • OTEC Powerline		Yes	Yes	No	Powerline is suspended over the river; no impacts expected

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
• Fly Fishing O/G Permit • LG Rifle & Pistol Club					from this powerline or fly fishing to soils.
Recreation: Bird Track Springs Interpretive Trail		Yes	Yes	No	This trail would be moved as part of this project; therefore, this would be a direct/indirect effect, not cumulative.
Recreation: Dispersed camping		Yes	Yes	No	No impacts to soil resources expected.
Recreation: Snowmobile trails		No	No	No	
Recreation: Firewood cutting		Yes	Yes	No	No impacts to soil resources expected within the cumulative effects analysis area.
Recreation: OHV use		Yes	Yes	No	Unauthorized user-built OHV trails and OHV use is spread across most of the landscape within the Spring Creek area, contributing to sediment production and soil compaction. Soils could be impacted in the short term, but the long-term benefits of the project and implementation of travel management within the project area would yield a net improvement in soil conditions.
Recreation: Bird Track Springs Campground		Yes	Yes	No	The campground is separated from the GRR by Highway 244. Recreation activities within the campground have no effect on the active project area.
Roads & Trails: Travel Management Plan		Yes	Yes	No	See OHV use above.
Road maintenance on Highway 244		Yes	Yes	No	No impacts to soil resources expected within the cumulative effects analysis area.
Roads: Danger Tree Removal		Yes	Yes	No	No impacts to soil resources expected within the cumulative effects analysis area.
Grazing Allotment: Spring Creek Sheep Allotment Special #2 Allotment		No	No	No	
Fisheries Enhancement: Fish logs from Bird Track Springs Campground	Short-term soils impacts from restoration activities Short-term	Yes	Yes	Bird Track Springs Campground – No	Some large tree removal is planned within the campground area for another fish enhancement project. Trees would be cut down, loaded with

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Bird Track Springs Fish Habitat Enhancement	water quality impacts from restoration construction activities possible			Bird Track Springs – Yes	a log forwarder, and hauled off-site. Most of the removal is expected to occur from existing roads and no additional detrimental soil impacts are anticipated. The Bird Track Springs project would have similar short-term impacts to those described above for this project. Long-term impacts are expected to be minimal. Suggest a single construction season or adequate protection across seasons.
Wildlife Enhancement: GG Owl Platforms Aspen Enhancement		No	No	No	
Mining		No	No	No	
Private Land Activities: • Private Structures • Roads • Grazing		Yes	Yes	Structures – No Roads – No Grazing – Yes	Grazing – An existing corral on the private property portion of the active project area would be moved out of the project area, reducing livestock impacts to the soil.

PETS – Wildlife

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management W-W Invasive Species Treatment ROD		Yes	Yes	No	
Vegetation Management: BTS Fuel Reduction Proj BTS Campgrnd Project Spring Crk Small Sale		Yes	Yes	Yes	Affected PETS species were analyzed at the subwatershed scale. The Spring Creek Small Sale is occurring in an adjacent subwatershed. Vegetation projects have the potential to reduce habitat for Lewis Woodpecker and Fringed Myotis The Bird Track Springs Fuel Reduction Project will not affect trees of the size necessary for breeding or foraging for Lewis woodpecker of fringed myotis. Longley Meadows will contribute to the cumulative effects of the BTS campground project on Lewis woodpecker and Fringed myotis. These projects could remove roosting and nesting habitat. However, both species require decadent trees and snags for roosting and nesting and no trees over 21 dbh and no snags will be removed under the BTS campground project. Cumulative effects are expected to be minimal.
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit • LG Rifle & Pistol Club		Yes	Yes	No	
Recreation – BTS Interpretive Trail		Yes	Yes	No	
Recreation- Dispersed Camping		Yes	Yes	No	
Recreation- Snowmobile Trails		No	No	No	
Recreation -Firewood Cutting		Yes	Yes	No	
Recreation – OHV Use		Yes	Yes	No	
Recreation – BTS Campground		Yes	Yes	No	
Roads & Trails – Travel Management Plan		Yes	Yes	No	
Road Maintenance On Hwy 244		Yes	Yes	No	
Roads – Danger Tree Removal		Yes	Yes	No	

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Grazing Allotment – Spring Creek Sheep Allotment Special #2 Allotment		Yes	Yes	No	
Fisheries Enhancement – Fish logs from BTS Campground Bird Track Springs Fish Habitat Enhancement		Yes	Yes	Yes	Longley Meadows would directly remove some large cottonwood trees along the riparian corridor which will contribute to the cumulative effects of the BTS campground fish log project on Lewis' woodpecker and Fringed myotis. The BTS campground fish project could remove roosting and nesting habitat. However, both species require decadent trees and snags for roosting and nesting and no trees over 21 dbh and no snags will be removed under the BTS campground project. Cumulative effects are expected to be minimal. Longley Meadows will preclude spotted frogs from breeding in the area during project activities and will add to the cumulative effects of BTSFHE which will have similar effects. Soil disturbance from the Longley Meadows project would disturb hibernating *B. occidentalis* and *B. suckleyi* queens adding another 1.2 mile of disturbance along the Grande Ronde River.
Wildlife Enhancement – GG Owl Platforms Aspen Enhancement		Yes	Yes	No	
Mining		No	No	No	No approved plans of operation
Private Land Activities • Private Structures • Roads • Grazing		Yes	Yes	No	Same as above.

PETS – Plants

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management W-W Invasive Species Treatment ROD		Yes	Yes	No	
Vegetation Management: BTS Fuel Reduction Proj BTS Campgrnd Project Spring Crk Small Sale		Yes	No		
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit • LG Rifle & Pistol Club		Yes	Yes	No	
Recreation – BTS Interpretive Trail		Yes	Yes	No	
Recreation- Dispersed Camping		Yes	Yes	No	
Recreation- Snowmobile Trails		No	No		
Recreation -Firewood Cutting		Yes	Yes	No	
Recreation – OHV Use		Yes	Yes	No	
Recreation – BTS Campground		Yes	Yes	No	
Roads & Trails – Travel Management Plan		Yes	Yes	No	
Road Maintenance On Hwy 244		Yes	No		
Roads – Danger Tree Removal		Yes	No		
Grazing Allotment – Spring Creek Sheep Allotment Special #2 Allotment		Yes	Yes	No	
Fisheries Enhancement – Fish logs from BTS Campground Bird Track Springs Fish Habitat Enhancement		Yes	No		
Wildlife Enhancement – GG Owl Platforms Aspen Enhancement		Yes	No		
Mining		No	No	No	No approved plans of operation
PVT Land Activities • Private Structures • Roads • Grazing		Yes	Yes	No	

Transportation Management

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management W-W Invasive Species Treatment ROD	Reduction of invasive species competition	Yes	Yes	No	
Vegetation Management: BTS Fuel Reduction Proj BTS Campgrnd Project Spring Crk Small Sale		No	No	No	
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit • LG Rifle & Pistol Club		Yes	Yes	No	
Recreation – BTS Interpretive Trail		No	No	No	
Recreation- Dispersed Camping		Yes	Yes	No	
Recreation- Snowmobile Trails		No	No	No	
Recreation -Firewood Cutting		No	No	No	
Recreation – OHV Use		Yes	Yes	No	
Recreation – BTS Campground		No	No	No	
Roads & Trails – Travel Management Plan		Yes	Yes	No	Will not add any roads or motorized trails in this project area; however would provide for additional protection from cross-country motor vehicle use as this area would likely not be designed as an area open to motor vehicle use.
Road Maintenance On Hwy 244	Additional protection and maintenance	Yes	Yes	Yes	Additional protection provided Hwy 244 and additional maintenance provided if log and material source haul impacts highway.
Roads – Danger Tree Removal		Yes	Yes	No	
Grazing Allotment – Spring Creek Sheep Allotment Special #2 Allotment		No	No	No	
Fisheries Enhancement – Fish logs from BTS Campground Bird Track Springs Fish Habitat Enhancement		No Yes	No Yes	No Yes	Increased projection provided for Hwy 244 from ice flow impacts and flooding along entire stretch of GRRiver from Bird Track project and the Longley Project combined.

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Wildlife Enhancement – GG Owl Platforms Aspen Enhancement		No	No	No	
Mining		No	No	No	No approved plans of operation
Private Land Activities • Private Structures • Roads • Grazing		Yes	Yes	No	Direct effect would be improved public safety along Grande Ronde River section behind the Rifle Club for river users due to increased height and length of berm behind shooting range.

Noxious Weeds – Invasive Species

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management W-W Invasive Species Treatment ROD TriCounty CWMA	Reduction of invasive species establishment and spread.	Yes	Yes	Yes (Beneficial)	Project would increase invasive plant management activities due to anticipated need along with project mitigation and monitoring requirements. Involvement of Tri-County would contribute more resources to manage invasives.
Vegetation Management: Vegetation Management: BTS Fuel Reduction Project BTS Campground Project Spring Crk Small Sale	Potential to increase invasive plant establishment and spread.	Yes	Yes	No	Thinning, which would remove over-story density, and prescribed burning potentially increase invasive plant establishment and spread. The negative effects of vegetation management are offset by the benefits of mitigating the effects of high intensity catastrophic wild fire. (Zouhar, et. al.)
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit • LG Rifle & Pistol Club	Powerline maintenance could require traffic and ground disturbance.	Yes	Yes	No	No impacts expected from this powerline or fly fishing along this stretch of river. Minimal impacts from five day annual special use permit associated with gun club activities.
Recreation – BTS Interpretive Trail	Foot/pet travel and trail maintenance could spread invasive seed and create ground disturbance.	Yes	Yes	No	Trail will be constructed as a part of the BTS project. Foot travel has a low impact. This sort of recreation site would have a higher invasive plant management priority.
Recreation- Dispersed Camping	Vehicle and foot traffic carrying invasive seed.	Yes	Yes	No	Dispersed camping within project area is very limited.

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Recreation- Snowmobile Trails	People and machines could transport invasive seeds.	No	No	No	Timing of this activity is not conducive to ground disturbance or plant seed dispersal.
Recreation -Firewood Cutting	People and machines could transport invasive seeds	Yes	Yes	No	Firewood cutting within the project area is restricted because it is within the riparian area.
Recreation – OHV Use	Introduction of invasive seeds, ground disturbance from OHV use, and user built trail construction	Yes	Yes	No	Unauthorized user built OHV trails and OHV use is spread across most of the landscape within the Spring Creek area contributing ground disturbance and invasive seed transportation. This, in combination with the impacts from project implementation has a potential to impact invasives in the short term; however, the long term benefits of the Longley project and implementation of travel management which would restrict motor vehicle use to designated roads, trails and areas would have a minor net beneficial effect to invasive plant management related to the project area.
Recreation – BTS Campground	Introduction of invasive plant seed by vehicles, pets, and people.	Yes	Yes	No	This activity has a minimal effect. Camping areas will not sustain disturbed ground.
Roads & Trails – Travel Management Plan	Introduction of invasive plant seeds by OHVs	Yes	Yes	No	See OHV use above.
Road Maintenance On Hwy 244	Invasive plant management activities contributed by ODOT. Introduction of invasive seeds from fill materials and maintenance equipment.	Yes	Yes	Yes	ODOT herbicide application along Hwy right-of-way adds to invasive plant management within project area. Equipment activities and material brought in could transport invasive seed to project area.
Roads – Danger Tree Removal	Foot travel introducing invasive seeds.	Yes	Yes	No	Saw falling trees is a low impact activity.
Grazing Allotment – Spring Creek Sheep Allotment Special #2 Allotment	Sheep transporting invasive seeds into project area. Sheep eating invasive plants.	Yes	Yes	Yes	Sheep potentially carry invasive plant material from adjacent rangeland into disturbed ground within the project area. This effect is offset by the benefits of sheep eating invasive plants in the

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
					project area.
Fisheries Enhancement – Fish logs from BTS Campground Bird Track Springs Fish Habitat Enhancement	Ground disturbance	Yes	Yes	Yes	BTS project activities have created large areas of ground disturbance, increasing potential for invasives establishment.
Wildlife Enhancement – GG Owl Platforms Aspen Enhancement	Foot travel. Increasing upper story cover and native plant density.	Yes	Yes	No	Low impact activity from foot travel. Aspen enhancement would increase competition with invasive plants.
Mining	Ground disturbance and machinery/ foot traffic.	No	No	No	No approved plans of operation
Private Land Activities • Private Structures • Roads • Grazing	Ground disturbance and machinery/ foot traffic.	Yes	Yes	Yes	Cattle grazing, vehicle and machinery traffic, hay farming, all have potential to increase potential for invasive plant introduction and spread.

Recreation

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management W-W Invasive Species Treatment ROD		Yes	Yes	No	
Vegetation Management: BTS Fuel Reduction Proj BTS Campgrnd Project Spring Crk Small Sale	Smoke impacts to campground and recreationists	Yes	No	Yes	If project activities and prescribed burning are going on at the same time could create smoke impacts in addition to noise and dust created during project implementation.
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit • LG Rifle & Pistol Club		Yes	Yes	No	
Recreation – BTS Interpretive Trail		Yes	Yes	No	
Recreation- Dispersed Camping		Yes	Yes	No	
Recreation- Snowmobile Trails		No	No		
Recreation -Firewood Cutting		Yes	Yes	No	
Recreation – OHV Use		Yes	Yes	No	

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Recreation – BTS Campground		Yes	Yes	No	
Roads & Trails – Travel Management Plan		Yes	Yes	No	
Road Maintenance On Hwy 244	Slow traffic and noise impacts to local campground	Yes	Yes	Yes	Road maintenance activities occurring concurrent with project activities would require traffic control needs and could produce short term impacts to those recreating within the area or attempting to pass through.
Roads – Danger Tree Removal		Yes	Yes	No	
Grazing Allotment – Spring Creek Sheep Allotment Special #2 Allotment		Yes	Yes	No	
Fisheries Enhancement – Fish logs from BTS Campground Bird Track Springs Fish Habitat Enhancement	Impacts to campground users – machinery noise and dust	Yes	Yes	Yes	Removing logs from the campground for a another fish enhancement project in Sheep Creek could negatively impact campers within the project area if completed at the same time Bird Track activities are going on.
Wildlife Enhancement – GG Owl Platforms Aspen Enhancement		Yes	Yes	No	
Mining		No	No	No	No approved plans of operation
Private Land Activities • Private Structures • Roads • Grazing		Yes	Yes	No	

Scenery/Visuals

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management W-W Invasive Species Treatment ROD	Reduction of invasive species competition	Yes	Yes	No	
Vegetation Management: BTS Fuel Reduction Proj BTS Campgrnd Project Spring Crk Small Sale		Yes	Yes	Yes	Machinery, smoke, and dust will cumulatively effect work being done as part of fish habitat project.

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit • LG Rifle & Pistol Club		Yes	Yes	No	
Recreation – BTS Interpretive Trail		Yes	Yes	No	
Recreation- Dispersed Camping		Yes	Yes	No	
Recreation- Snowmobile Trails		No	No		
Recreation -Firewood Cutting		Yes	Yes	No	
Recreation – OHV Use		Yes	Yes	No	
Recreation – BTS Campground		Yes	Yes	No	
Roads & Trails – Travel Management Plan		Yes	Yes	No	
Road Maintenance On Hwy 244		Yes	Yes	Yes	Machinery and road building materials will cumulatively affect scenery from 244 viewshed.
Roads – Danger Tree Removal		Yes	Yes	No	
Grazing Allotment – Spring Creek Sheep Allotment Special #2 Allotment		Yes	Yes	No	
Fisheries Enhancement – Fish logs from BTS Campground Bird Track Springs Fish Habitat Enhancement		Yes	Yes	Yes	Temp road construction, smoke, and machinery will have a cumulative effect.
Wildlife Enhancement – GG Owl Platforms Aspen Enhancement		Yes	Yes	No	
Mining		No	No	No	No approved plans of operation
Private Land Activities • Private Structures • Roads • Grazing		Yes	Yes	No	

Heritage Resources

Project	Potential Effects	Overlap APE in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management W-W Invasive Species Treatment ROD	Reduction of invasive species competition	Yes	Yes	No	No ground disturbance with these treatments
Vegetation Management: BTS Fuel Reduction Proj BTS Campgrnd Project Spring Crk Small Sale		Yes	No	No	Outside of APE and not near any known Mt. Emily RR grade segments.
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit • LG Rifle & Pistol Club		Yes	Yes	No	No ground disturbance.
Recreation – BTS Interpretive Trail		Yes	No	No	Existing trail and new trail not within APE.
Recreation- Dispersed Camping		Yes	Yes	No	No ground disturbance.
Recreation- Snowmobile Trails		No	No		
Recreation -Firewood Cutting		Yes	Yes	No	No firewood cutting permitted within River riparian habitat conservation area.
Recreation – OHV Use		Yes	Yes	No	Most OHV use not occurring on FS lands within the APE, some does occur on Private land. Limited amount no measurable effect.
Recreation – BTS Campground		Yes	No	No	
Roads & Trails – Travel Management Plan		Yes	Yes	No	
Road Maintenance On Hwy 244		Yes	Yes	No	No new ground disturbance. Only previously disturbed road location and adjacent ROW.
Roads – Danger Tree Removal		Yes	Yes	No	
Grazing Allotment – Spring Creek Sheep Allotment		Yes	No		Outside of APE.
Fisheries Enhancement – Fish logs from BTS Campground Bird Track Springs Fish Habitat Enhancement		Yes	No	No	All project activities avoid any known cultural/heritage resources and have project design criteria to avoid/protect any cultural resources found during project implementation.
Wildlife Enhancement – GG Owl Platforms Aspen Enhancement		Yes	No		Outside of APE.
Mining		No	No		No approved plans of operation
Private Land		Yes	Yes	No	

Project	Potential Effects	Overlap APE in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Activities • Private Structures • Roads • Grazing					

Adjacent State and Private Lands/Infrastructure

Project	Potential Effects	Overlap APE in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management W-W Invasive Species Treatment ROD	Reduction of invasive species competition	Yes	Yes	No	
Vegetation Management: BTS Fuel Reduction Proj BTS Campgrnd Project Spring Crk Small Sale		Yes	No	No	Floodplain areas not entered under FPlan RHCA no activity buffers.
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit • LG Rifle & Pistol Club		Yes	Yes	No	There will be direct effects on the Rifle and Pistol Club; however, the Longley project in combination with the Rifle and Pistol Club activities would not create a cumulative effect on adjacent lands and structures.
Recreation – BTS Interpretive Trail		Yes	Yes	No	
Recreation- Dispersed Camping		Yes	Yes	No	
Recreation- Snowmobile Trails		No	No	No	
Recreation -Firewood Cutting		No	No	No	Firewood cutting not permitted in floodplains
Recreation – OHV Use		Yes	Yes	No	
Recreation – BTS Campground		Yes	Yes	No	
Roads & Trails – Travel Management Plan		Yes	Yes	No	
Road Maintenance On Hwy 244	Improved protection during ice/flood events	Yes	Yes	Yes	Project design for the Longley and BTS Fish Habitat Enhancement projects in combination with scheduled regular maintenance has the potential to increase protection of Hwy 244 during flood and ice events.
Roads – Danger Tree Removal		Yes	Yes	No	
Grazing Allotment – Spring Creek Sheep Allotment		No	No	No	

Project	Potential Effects	Overlap APE in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Fisheries Enhancement – Fish logs from BTS Campground Bird Track Springs Fish Habitat Enhancement	Potential for more logs downstream	Yes	Yes	Yes (BTS Fish Habitat Enhancement Project only)	Instream enhancement work on both of these projects would increase large wood in the system; however, strategic wood structure design would minimize the downstream transport of materials (likely still less than historic levels of wood transport through the system).
Wildlife Enhancement – GG Owl Platforms Aspen Enhancement		No	No	No	
Mining		No	No	No	
Private Land Activities • Private Structures • Roads • Grazing		No	No	No	

Appendix E – Longley Meadows Fish Enhancement Project – Response to Comments

Greater Hells Canyon Council (GHCC) Comments – Brian Kelly

GHCC1 – GHCC supports projects to benefit fish habitat, clean waters, hydrology, and resilient riparian systems.

We appreciate your adherence to the National Environmental Policy Act by preparing and Environmental Assessment.

We'd like to express our gratitude to all of the partners who are working to accomplish the restoration of the Grande Ronde River.

> **Response:** *Thank you for your support of this project.*

GHCC2 – A project of this has the potential to create negative impacts during its implementation. We encourage you to take every possible measure to avoid for minimize these impacts. We are confident you will utilize all available best management practices and follow all legal requirements for this type of work. Also, we encourage you to apply any "lessons learned" from the first phase of the restoration work on this stretch of the Grande Ronde River.

> **Response:** *Refer to pages 16-36 of the EA for all Management Requirements, Constraints, Design Criteria, Mitigation Measures, and best management practices to be applied to the implementation of this project.*
>
> *Lessons learned and monitoring results from the implementation of Bird Track Springs Fish Habitat Enhancement Project were used during project design for Longley Meadows and in the analysis of the effects of implementation (EA pages 37-150). See also the Longley Meadows 80% Basis of Design Report in the project analysis file.*

GHCC3 – We strongly encourage and support the use of native plant species for all of the vegetation planting and seeding for this project.

> **Response:** *As described on pages 11-13, 20, and 22-23 of the EA native species will be used for all vegetation planting and seeding for this project. Wherever possible, plants salvaged from the site will be retained and re-planted within the project area.*

Charles Pace (CP) Comments

CP1 – Restoring habitat in the Grand Rhonde is a noble thing to do. However, this is not the responsibility of the hydro system. Rather, the harmful effects on spawning and rearing of anadromous fish come from logging, railroad construction and mining. For BPA to use ratepayers' funds for this project violates the "in lieu" provisions in the Northwest Power Act. BPA needs to focus on the mainstem and tributaries that are impacted by the day-to-day (and hour-to-hour) operation for wind integration, power peaking, load following, etc. These are the factors with harm directly tied to power system operations, not over logged and mined out tributaries in the upper reaches of the basin. Instead, BPA has become a "sugar daddy" for funding projects that bear no resemblance to the projects envisioned in the Northwest Power Act.

Response: *Thank you for your comment. One of the purposes of the Northwest Power Act is to "protect, mitigate, and enhance fish and wildlife, including related spawning grounds and habitat, of the Columbia River and its tributaries," 16 U.S.C. § 839(6), and the Act explicitly recognizes enhancement measures "as a means of achieving offsite protection and enhancement" for fish and wildlife affected by development and operation of the Federal Columbia River Power System. 16 U.S.C. § 839b(h)(8)(A). As in this instance, Bonneville often implements offsite enhancement measures to address its responsibilities under the Endangered Species Act.*

The "in lieu" provision of the Northwest Power Act; however, is a separate issue. The provision states that Bonneville's fish and wildlife expenditures "shall be in addition to, not in lieu of, other expenditures authorized or required from other entities under other agreements or provisions of law." Bonneville is not aware of any other entity being legally authorized or required to provide funding for the portion of the Longley Meadows Restoration Project that Bonneville proposes to fund, and this comment provides no evidence contradicting that conclusion. In fact, the Longley Meadows Restoration Project exhibits reasonable cost sharing with other agencies which demonstrates that Bonneville's funding is not supplanting that of another entity already authorized or required to undertake the activity.