United States Department of Agriculture
Forest Service

Bonneville Power Administration
Department of Energy

Bird Track Springs Fish Habitat Enhancement Project

Environmental Assessment

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

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Note: Highlighted items in this EA are still proceeding through their regulatory processes and will be adjusted/finalized at the completion of ESA/Section 106 consultations and before a final decision is signed.

Contents

List of Tables

Introduction

The United States Forest Service (USFS) and the Bonneville Power Administration (BPA) are proposing to restore habitat for spring/summer Chinook salmon, Steelhead, and bull trout within a 2-mile reach of the Grande Ronde River (GRR). The Bird Track Springs Fish Enhancement Project (project) would 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 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 their actions may have on 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 Bird Track Springs analysis area is approximately 10 air miles west of La Grande, Oregon along approximately 1.9 miles of the Grande Ronde River along State Highway 244. The area consists of 1.2 miles of river on National Forest system lands, 0.1 miles along state lands, and 0.6 miles on privately-owned lands along the reach beginning from just upstream of Bird Track Springs Campground (at river mile 146.1) downstream to river mile 144.2 including a portion of Bear Creek Ranch (refer to the Project Area Map in Appendix A). The project area is within the Coleman Ridge-Grande Ronde River, Jordan Creek, and Lower Beaver Creek subwatersheds within the Grande Ronde River-Beaver Creek watershed. The general legal description is Township 3 south, Range 36 east, sections 15 and 16. Refer to Figure 1 Bird Track Springs Vicinity Map.

Forest Plan Management Direction

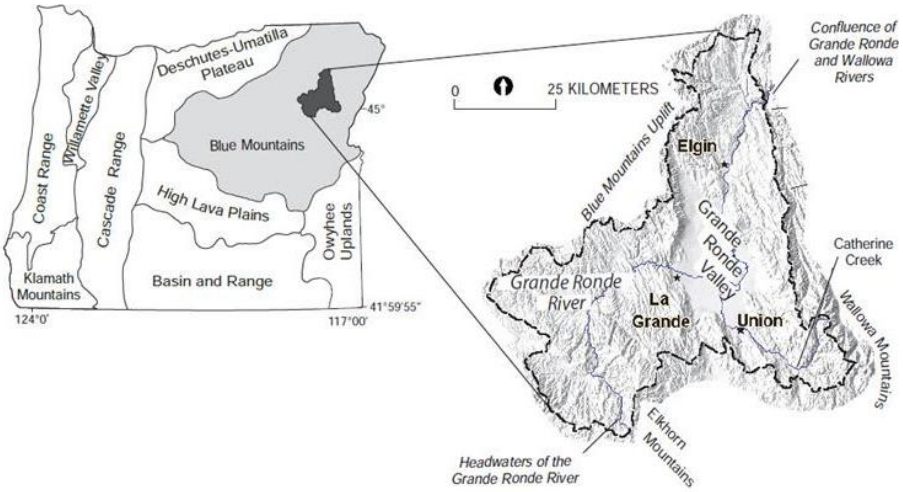
This EA is tiered to the Final Environmental Impact Statement (FEIS) for the Wallowa-Whitman National Forest Land and Resource Management Plan (Forest Plan), as amended. Major Plan amendments relevant to this project include:

> *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 USFS 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 – (133 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.

MA15 – (5 acres). This area is intended to maintain habitat diversity, preserve aesthetic values, and to provide old growth habitat for wildlife. Evidence of human activities may be present but does not significantly alter the other characteristics and would be a subordinate factor in a description of such a stand.

Although management area 15 is within the project area, there will be no project activities conducted within it. Project activities are completely limited to lands allocated to MA3. The remainder of the project area acres are state and private lands located within the project area boundary. are consistent with the management guidance and direction provided in the Forest Plan.

Bonneville Power Administration

BPA is a cooperating 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 that is part of 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 (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 Columbia River Power System (FCRPS). To assist in accomplishing this, the Act requires BPA to fund fish and wildlife protection, mitigation, and enhancement actions consistent with the Northwest Power and Conservation Council's Fish and Wildlife Program. Under this program, the Council makes recommendations to BPA concerning which fish and wildlife projects to fund. The Council determined that this project was consistent with the Fish and Wildlife Program, and BPA will use the analysis in this EA to decide whether to fund the project.

Additionally, this project would help BPA meet its obligations under the Endangered Species Act (16 U.S.C. 1531 et seq.) by fulfilling 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).

Need for the Proposal

The purpose and need for action describes what the desired condition is for the Bird Track Springs 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 Bird Track Springs reach of the GRR. The desired future conditions (DFCs) listed below for the Bird Track Springs 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 within the project area. The focus of this project would be in meeting the DFCs related to water quality and fisheries 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

Within the Upper Grande Ronde River watershed, multiple historical practices have contributed to riparian and instream habitat degradation that has 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, and placer mining. Although many of these practices have been reduced or eliminated in recent years, their physical effects persist throughout the project reach.

The existing Bird Track Springs reach of the Grande Ronde River 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 consisted of the placement of instream structures including rock weirs, rock barbs, and large wood buried in banks, but those attempts to restore habitat complexity have been largely unsuccessful. This is likely due in part to the scale of previous attempts in light of winter ice issues and a lack of existing large streamside trees within the reach. Freeze-up ice jams have been problematic in this reach. During the winter months, the Upper Grande Ronde River is generally shallow and has a relatively low flow along with cold temperatures that favor 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. 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.

Need for Action

The need for the proposed action is to re-establish hydraulic conditions to create a mosaic of diverse habitat types, improve channel-floodplain interactions to increase connectivity to dissipate high-water flows and resolve 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 campgrounds, roads, and private property, while enhancing recreational and educational opportunities. Restoration of physical processes would lead to meeting the desired condition for long-term recovery of salmonids and resident fish within the Grande Ronde River system.

USFS Purpose

The purpose for the proposed action is represented by the difference or "gap" between the existing condition within the project area and its desired condition based on Forest Plan management direction and other regional salmon recovery efforts.

BPA Purpose

In meeting the need for action, BPA seeks to mitigate for effects of the development and operation of the FCRPS on fish and wildlife, pursuant to the Northwest Power Act. Additionally, this project would help BPA meet its obligations under the Endangered Species Act by fulfilling 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).

Public Involvement and Tribal Consultation

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

The Bird Track Springs Fish Habitat Enhancement project was published in the Wallowa-Whitman Schedule of Proposed Actions (SOPA), a quarterly publication, in July 2015 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=47283 .

The Bureau of Reclamation initiated consultation with CTUIR in July 2015. The project was also included in the Wallowa-Whitman National Forest 2016 program of work presentation to the CTUIR Board of Trustees on October 19, 2016. 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 2014 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 February 16, 2016 to approximately 100 individuals, groups, agencies, and organizations soliciting comments and concerns related to this project. Five letters and two phone calls were received during this scoping period. Three of the letters expressed interest/support of the project or interest/support in opportunities to participate in the implementation of the project. The other two letters expressed support for the project and requested design features or monitoring be incorporated into project

design. One phone call related to opportunities on a parcel of ground outside of this project area and another was from an adjacent landowner ensuring that his property was not included in this project.

An informational meeting with approximately 50 representatives from agencies and organizations involved and/or interested in this project was held on February 23, 2016 to bring stakeholders up to speed on project status and plans.

The Bureau of Reclamation initiated consultation in compliance with section 106 of the National Historic Preservation Act with the Oregon State Historic Preservation Office (SHPO) in July 2015. The Bonneville Power Administration updated the area of potential effects for the project in August 2016. Oregon SHPO agreed with the delineation of the area of potential effects in September 2016. This project will be reviewed and approved by the State Historical Preservation Officer (SHPO).

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 BPA Habitat Improvement Program (HIP III) 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, Interdisciplinary Team of Forest Service resource specialists developed the following key issues were identified 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.

Key Indicators:

- Changes in Flows:
  - Channel Length – measured in feet
  - Sinuosity – measured in channel length divided by valley length and percent slope
- Changes in Area Flooded by 10-Year Interval Event – measured in acres flooded
- Changes in Area of Wetlands – acres of wetlands affected

Issue: Fisheries 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 fisheries habitat.

An interest in making this project respond to the needs of a wide variety of fish and wildlife species beyond just listed fish species was also expressed.

Key Indicators:

- Large Woody Debris:
  - Total Wood – Pieces/mile
  - Key Pieces – Pieces/mile
- Pool Frequency – Number of pools/mile
- Width-to-depth Ratio

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

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:

> *Current recreational pursuits such as opportunities to float the river in inner tubes, hiking, and picnics should not be seriously affected by the project.* Existing recreational opportunities would be maintained by construction of a new interpretive trail under the proposed action and instream design elements would allow for floating of the river. Picnicking in the project area would remain at current levels.
>
> *Improvements on adjacent private lands need to be protected to ensure that activities proposed in this project will not negatively affect them or the adjacent landowners' ability to carry out activities and management of their property.* During scoping for the Proposed Action and through further coordination with adjacent landowners, the project area was modified to include a portion of this landowners' parcel of land at their request. Restoration design features would occur to enhance and protect the riparian habitat on this parcel of land (refer to the Bear Creek Channel Work map in Appendix A). Work to move the existing corral and feedlot area in the riparian area on the Jordan Creek Ranch was also proposed in coordination with the landowner to ensure protection of the corrals and enhance management opportunities on their land (refer to the Corral Relocation Map in Appendix A).

Cost of project activities occurring on private lands should not be borne by private landowners. Funding for implementation of this project would come from BPA if the decision is made to proceed with the project.

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.

There is a potential for impacts to State Highway 244 such as possible flooding from clogged undersized culverts which pass under the highway in two locations. The design has been modified to eliminate the side channel that passed under Highway 244 in two locations. Additional bank stabilization measures have also been incorporated into the project design to protect the highway.

Ice encroachment on State Highway 244 has been an on-going issue over the years and needs to be alleviated. Project has been designed to accommodate winter ice issues as much as possible along this stretch providing areas for ice to flow away from the highway.

There is a concern that large woody debris used for instream structures may be washed downstream during spring flooding and cause entanglement/scour issues on Highway 244 or downstream bridges. Large wood structure materials, locations, and construction specifics have been design using a risk-based approach to promote sustainability during spring high water and flood events. These designs will be vetted through Oregon Department of Transportation (ODOT) for their acceptance prior to implementation.

There is a concern that scour may damage the north side of Highway 244. Project design will avoid subjecting the highway embankment to additional scour and will incorporate features to mitigate that risk. Additionally, all project features will be vetted through ODOT for acceptance prior to implementation.

One commenter requested that the restoration design be self-maintaining and work with natural dynamic ecological processes which occur within this river system. This is being done to the maximum extent possible during project design.

While the project area is severely deficient in large woody debris and instream structure needed for fisheries habitat; concern was raised over the potential impacts that a loss of large trees across the landscape may incur to other species dependent on this type of habitat feature. Wood removal is being focused completely on approximately 1,000 acres of private land. The stands are not currently in old growth structure and the majority of the materials to be removed are in the 6” to 12” size category. Large snags and down wood would be left on site.

Outside of the scope:

Landowners downstream of the current project area expressed interest in incorporating design features into restoration work in the section of the river which borders their property to shield river recreationists from activities on that property and provide for flood protection. This land parcel is outside of the project area; however, these opportunities would be taken into consideration in a future phase of this project (Longley Meadows) which is being currently discussed and could be scheduled to begin scoping within the next five years.

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. Instream enhancement activities identified in this analysis would not occur. This alternative forms the baseline for comparison of the action alternatives.

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 Grande Ronde River (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 Bird Track Springs project area:

- 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 topographical features that inhibit overland flows (historical railroad grade).
- Increase connectivity of existing channel scars (swales) and enhance fish cover.
- Re-meander channel in appropriate locations to reconnect to 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 and ice damage through strategic placement of log structure treatments, rock, and graded features.

Channel reconstruction would include both instream work (wood placement and fill) to the existing channel and extensive channel construction activities (refer to the maps in Appendix A for detailed activities and locations). 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. Large wood features (examples pictured below) would be added throughout the project reach. Additionally, selective removal of floodplain fill to include portions of the historic Mt. Emily Railroad grade 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 some additional excavation to meet grade.

Figure 2. Examples of what large wood structures may look like once installed along this reach of the GRR.

Large wood features would be constructed from locally-sourced logs 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 ice forces. Logs would be trucked or helicoptered 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 constraints. Excavators would be used for large wood construction.

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 gravel 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, some large boulders, additional rock, 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.

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 riparian shading with a mature and densely vegetated riparian floodplain and attenuation of daily heating via hyporheic exchange.

Log Source Areas

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

- 930 – 18+ inch trees with root wads
- 240 – 12-18 inch trees with root wads
- 210 – 12-18 inch trees without root wads
- 3,220 – 6-12 inch racking logs
- 780 – 12 inch pinning logs
- 5,910 tons of small trees and branches for racking materials.

Each structure site would vary between one to 40 pieces of large woody debris (LWD) 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 large woody material 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. Logs will be dug into native materials of significant size to a designed depth to withstand predicted forces. Additional pool excavation would occur at most in-channel structure sites as depicted in detailed grading plans. These materials would be taken from the following location and transported to the project area by truck or helicopter (refer to map in Appendix A):

Jordan Creek Ranch – 1,059 acre area on the Jordan Creek Ranch where logs would be removed for instream enhancement work from 12 units. Tree removal would be restricted to outside of riparian habitat conservation areas (RHCAs) on slopes less than 35%. (Refer to map in Appendix A)

Jordan Creek Ranch Unit	Acres
1	214
2	114
3	37
4	96
5	179
6	50
7	20
8	29
9	65
10	58
11	121
12	76
Total	1,059

Target trees 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 also ensures that the tree needles and leaves become integrated into the habitat structures.

Trees would be harvested using a track-mounted (200 series or larger) excavator (Figure 3). A shallow, 2-3 feet trench is dug around approximately half of the outer diameter of the root wad. The excavator bucket is then used to push the tree over, avoiding damage to the root wad and bole, and the hole is filled with soil and graded to match the adjacent ground surface. Depending on the size of the tree, the top is cut and the tree and intact root wad are loaded on an off-road dump truck (Figure 4) or log truck, and then transported to a staging area where the trees are sorted into various size categories. 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 3 – 300 series Track-mounted excavator

Figure 4. Articulating off-road dump truck

Rock Source Areas

Rock and boulder materials would be taken from Jordan Creek Ranch (within the same area identified as a source for LWD) and transported to the site by truck (refer to map in Appendix A):

Implementation –

Implementation would be phased over two years. Phased implementation will 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 during the spring of 2018 with subsequent work likely occurring for approximately two years thereafter depending upon project design outcomes, stakeholder support, and project funding. Early phases would include restoration activities on the Bear Creek Ranch and moving the corrals on the Jordan Creek Ranch followed by establishing staging and storage areas, and harvest of large wood materials and boulders. Instream work and side channel work would start in the northwest end (near the campground) of the project area and work in sections downstream. Once restoration work is completed, rehabilitation and planting of disturbed areas would be completed.

Implementation of the activities in this project will require approximately 3.8 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. Four temporary river crossings would be constructed where needed for equipment access.

Table 1. Temporary Access Roads.

Temp Rd Number	Miles
1	0.53
2	0.13
3	0.02
4	0.07
5	0.31
6	0.03
7	0.29
8	0.21
9	0.06
10	0.1
11	0.02
12	0.18
13	0.11
14	0.39
15	0.2
16	0.34
17	0.22
18	0.43
19	0.2
20	0.01
22	<0.01
Total	3.85

Approximately 50 staging and storage areas ranging from 0.04 to 12.1 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 and Storage Areas

Storage Area Number	Type	Acres
1	LWD Staging Area	0.13
2	LWD Staging Area	0.14
3	LWD Staging Area	0.08
4	LWD Staging Area	0.11
5	LWD Staging Area	0.1
6	LWD Staging Area	0.04
7	LWD Staging Area	0.14
8	LWD Staging Area	0.16
9	LWD Staging Area	0.13
10	LWD Staging Area	0.15
11	LWD Staging Area	0.34
12	LWD Staging Area	0.22
13	LWD Staging Area	0.19
14	LWD Staging Area	0.21
15	LWD Staging Area	0.11
16	LWD Staging Area	0.07
17	LWD Staging Area	0.28
18	LWD Staging Area	0.14

Storage Area Number	Type	Acres
19	LWD Staging Area	0.1
20	LWD Staging Area	0.32
21	LWD Staging Area	0.56
22	LWD Staging Area	0.26
23	LWD Staging Area	0.19
24	LWD Staging Area	0.05
25	LWD Staging Area	0.06
26	LWD Staging Area	0.5
27	LWD Staging Area	0.24
28	LWD Staging Area	0.12
29	LWD Staging Area	0.24
30	LWD Staging Area	0.08
31	LWD Staging Area	0.21
32	LWD Staging Area	0.32
33	LWD Staging Area	0.42
34	Stockpile/Staging Area	1.98
35	Stockpile/Staging Area	0.24
36	Stockpile/Staging Area	0.29
37	Stockpile/Staging Area	0.43
38	Stockpile/Staging Area	0.26
39	Stockpile/Staging Area	0.71
40	Stockpile/Staging Area	0.55
41	Stockpile/Staging Area	0.87
42	Stockpile/Staging Area	0.12
43	Stockpile/Staging Area	0.15
44	Stockpile/Staging Area	8.31
45	Stockpile/Staging Area	1.91
46	Stockpile/Staging Area	0.26
47	Stockpile/Staging Area	0.75
48	Stockpile/Staging Area	2.08
49	Stockpile/Staging Area	3.24
50	LWD Staging Area	12.10
Total		**40.66**

1.9 miles of bypass channels would be constructed by a track mounted excavator to create areas where river water can be diverted to while instream work is being completed in the main stem of the river. Approximately 25 temporary coffer dams made of native materials (dirt and rock) 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 70,632 cubic yards of cut (excavated) material generated during instream enhancement work would be created. Approximately 69,027 cubic yards of this material would be used as fill to abandon or alter the existing river channel. Disposal of the remaining 1,600 cubic yards of excess material would be within the project site at locations identified within USFS and adjacent private lands. Excess fill locations will be contoured to simulate natural

features. 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 7.39 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	0.57
2	0.54
3	0.4
4	1.13
5	4.75
Total	7.39

The corral in the floodplain on the Jordan Creek Ranch would have all materials removed, compacted grounds rehabilitated and seeded with native plant seeds. The corral and feeding grounds would be reconstructed on the southern side of Highway 244, well outside of the riparian area (refer to map in Appendix A).

In the Bear Ranch portion of the project area (see BTS Bear Creek Channel Work map in Appendix A), instream work would excavate gravels and push them creating a gravel bar in the end of the river, narrowing the width of the river. Large logs would be partially buried within the new coarse gravel bar integrated with willow cuttings buried in trenches between the logs which will sprout and grow along with live 6-12 inch cottonwood poles which will create a live cottonwood flood fence. Deflector log jams would be constructed at the northern and southern edges of the newly constructed gravel bar.

Management Requirements, Constraints, Design Criteria, and Conservation or Mitigation Measures

The following measures identified in the BPA HIP III 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 Conservation 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, NEPA, National Historic Preservation Act, and the appropriate state agency removal and fill permit, US Army Corps of Engineers Clean Water Act (CWA) 404 permits, and CWA section 401 water quality certifications.

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

a. All instream work would be completed from July 1 through July 31, which is the instream work window for federally listed fish species. Instream work is defined as all work that is completed within the bankfull channel.
b. Exceptions to ODFW, 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 ligninsulfonate) 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 ligninsulfonate will be limited to a maximum rate of 0.5 gallons per square yard of road surface, assuming a 50:50 (ligninsulfonate 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. Concentrate plantings above the bankfull elevation.
f. Species distribution shall mimic natural distribution in the riparian and floodplain areas.

Soils

Minimize detrimental soil conditions with total acreage detrimentally impacted not to exceed 20 percent of the total acreage within the activity area including system roads. Where detrimental conditions affect 20 percent of more of the activity area, restoration treatments will be considered. Detrimental soil conditions include compaction, puddling, displacement and severe burning.

The following guidelines from The Watershed Management Practices Guide for Achieving Soil and Water Objectives for the Wallowa-Whitman National Forest (Hauter and Harkenrider 1988) are applicable to this project:

- Soil Moisture: "Under saturated soil conditions no off-trail/access road skidding or machine movement is allowed. Skidding on designated trails may be allowed as long as such use does not cause deep rutting causing erosion damage, or erosion damage potential. Allowing skidding under these conditions makes mitigation by subsoiling/scarifying less effective and should be avoided both on and off trails." Existing skid trails, if available, will be used as much as possible.

- Subsoiling/Scarifying: Skid trails and landings will be evaluated for the need for subsoiling/scarifying following treatment by the sale administrator and district watershed personnel. Sub-soil treatment will be determined by the district resource specialists and based on soil depth and characteristics. Sufficient woody material will be left to maintain long term site productivity. This recommendation specifies a minimum of 10 tons per acre of woody material greater than 3 inches in diameter.
    - Subsoil to a depth of 20-24 inches on skid trails and landings.

- Discontinue subsoiling where large rocks are continually brought to the soil surface, or operate with the shoes at a shallower depth (15 inches).

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 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 BTS Project in order to mitigate the effects of project activities.

1. Noxious weed locations are on maps located in the Bird Track Springs 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.

Fisheries

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 US 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 Conservation 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 FWS Field Office Supervisor (Appendix B of the HIP III 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 HIPIII 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

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 historic 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. Reconstructed stream channels will be “pre-washed” into a reach equipped with sediment capture devices, prior to reintroduction of flow to the stream.
2. Stream channels will be re-watered slowly to minimize a sudden increase in turbidity.

Set-back or Removal of Existing Berms (Historic Railroad Grade)

1. To the greatest degree possible, nonnative fill material, originating from outside the floodplain of the action area will be removed from the floodplain to an upland site.

2. Where it is not possible to remove or set-back all portions of dikes and berms, or in areas where existing berms, dikes, and levees support abundant riparian vegetation, openings will be created with breaches.
3. Breaches shall be equal to or greater than the active channel width (as defined above) to reduce the potential for channel avulsion during flood events.
4. In addition to other breaches, the berm, dike, or levee shall always be breached at the downstream end of the project and/or at the lowest elevation of the floodplain to ensure the flows will naturally recede back into the main channel thus minimizing fish entrapment.
5. When necessary, loosen compacted soils once overburden material is removed.
6. Overburden or fill comprised of native materials, which originated from the project area, may be used within the floodplain to create set-back dikes and fill anthropogenic holes provided that does not impede floodplain function.
7. When full removal is not possible and a setback is required, the new structure locations should be prioritized to the outside of the meander belt width or to the outside or the channel meander zone margins.

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 LWD 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 (LWD)

1. LWD 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. LWD 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 LWD and boulders may constitute the dominant means of placement and key boulders (footings) or LWD can be buried into the stream bank or channel.
6. LW 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 LWD.
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. LW will be placed to maximize near bank hydraulic complexity and interstitial habitats through use of various LW sizes and configurations of the placements.
5. Structural placement of LW should focus on providing bankline roughness for energy dissipation vs. flow re-direction that may affect the stability of the opposite bankline.
6. LW 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 LW 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

Project activities would eradicate the existing Bird Track Springs interpretive hiking path. To mitigate this effect, a new trail and interpretive sites will be developed as a part of this project once the fisheries enhancement impacts have been completed (Refer to map in Appendix A and description in the Alternative Description section).

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 Bird Track Springs project area with the exception of the Mt. Emily Railroad Grade will be avoided during project design and during project activities.

Activities in and around the historic Mt. Emily Railroad Grade will adhere to the Section 106 Mitigation Memorandum of Agreement (MOA, EA – Appendix E).

If any new cultural resources are located during project implementation, work would be halted and the South Zone Archaeologist notified. The cultural resource would be evaluated and a mitigation plan developed in consultation with the Oregon SHPO 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

Fisheries/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 HIPIII turbidity monitoring protocol outlined below and recorded in the Project Completion Form (PCF).

HIPIII 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 HIPIII compliance. Records shall be reported on the HIPIII 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 Bird Track Springs Fish Enhancement Project Monitoring Plan which describes in detail the required effectiveness monitoring for this project (Bird Track Springs Analysis File).

Table 4. Summary of proposed activities for each action alternative for the Bird Track Springs Project.

Alternative Elements		Alternative 1	Alternative 2
Affected River Miles • **USFS Miles** • **State Land Miles** • **Private Land Miles**		1.9 1.3 0 0.6	
Restoration Activities			
Implementation Activities	Dewatering and Fish Rescue Channels (miles)	0	1.9
	Cu. Yards of Cut Materials	0	70,632
	Cu. Yards of Fill Materials	0	69,027
	Excess Permanent Fill Areas (acres)*	0	7.39
	Number of Staging and Storage Areas*	0	50
	Staging and Storage Areas (acres)*	0	40.66
	Coffer Dams	0	25
Channel Realignment	Main Channel (miles)*	1.9	2.12
	South Channel (miles)*	0	0.59
	Side Channels (miles)*	0	2.09
	Filled Channel (miles)	0	0.3
	Channel Realignment (acres)	0	6.9
Instream Enhancement	Large Wood Structures	0	640
	Number of Boulders Placed (>24”)	0	540
	Boulder Placement areas (acres)	0	0.1 acres
Road Work (Miles)	Temporary Access Roads (miles)*	0	3.85
	Temporary Access Road (acres)	0	13.2
	Culverts Replaced	0	0
	Temporary River Crossings	0	4
Bear Creek Ranch Activities	Channel Excavation (miles)	0	0.14
	Gravel Bar Construction (acres)	0	.83

Alternative Elements		Alternative 1	Alternative 2
(as shown on App.A_BTS_BearCreekChannelWork map)	Willow Trench Construction (feet)	0	392 ft
	Live Cottonwood Flood Fence Construction (feet)	0	392 ft
	Cover Logs/Floodplain Roughness/Key Members	0	31
	Cobble/Boulder Placement (CY)	0	1,119 yd^3
Jordan Creek Ranch Activities			
Corral Relocation Acres		No	5
Large Wood Removal Unit Acres	Unit 1	0	214
	Unit 2	0	114
	Unit 3	0	37
	Unit 4	0	96
	Unit 5	0	179
	Unit 6	0	50
	Unit 7	0	20
	Unit 8	0	29
	Unit 9	0	65
	Unit 10	0	58
	Unit 11	0	121
	Unit 12	0	76
	Total Acres	0	1,059
Large Wood Size and Amounts (Number of trees)	18+ Inch trees with Rootwads	0	930
	12-18+ Inch trees with Rootwads	0	240
	12-18+ Inch trees without Rootwads	0	210
	6 -12 Inch Racking Log	0	3,220
	12 Inch Pinning Logs	0	780
	Tons of Small trees/limbs for racking materials (CY)	0	5,910
Interpretive Trail Relocation	Miles of Interpretive Trail	1.1	1.0

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 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. Moving the existing corral on Jordan Creek Ranch would swap one location for another approximately 200 feet apart. Livestock management opportunities on the ranch would remain the same and grazing impacts would be removed from the current floodplain location which is discussed under other resources.

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.

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 (no bedrock confinement) 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 project is located in the Upper Grande Ronde Subbasin (HUC 17060104). The project area boundary includes portions of three subwatersheds; Coleman Ridge-Grande Ronde River (HUC 170601040307), Jordan Creek subwatershed (HUC 170601040303), and Lower Beaver Creek (HUC 170601040302). The project area boundary includes approximately 6,301 acres. This includes acres adjacent to the Grande Ronde River (GRR) used for access, staging and storing materials and equipment, riparian planting, and acres on the Jordan Creek Ranch where trees would be harvested to be used for instream restoration. The project extends approximately two miles along the mainstem Upper Grande Ronde River between river mile 146.1 and 144.2.

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 1.3 miles of river are on the Wallowa-Whitman National Forest and 0.6 miles are on private land. The upstream extent of the reach is just upstream of the Bird Track Springs Campground and the downstream extent is near the boundary of the Bear Creek Ranch.

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 Regional Forester's 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 Bird track Springs Fish Enhancement Project):

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

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 Bird Track Springs 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 historic conditions. Artificial channel constrictions and disconnected floodplains due to railroad grades, road grades and levees have 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 upper .5 miles of the channel in the Bird Track Springs project 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 red (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 Teiser 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 July 2015). 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 threatened 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 III). Over the mid- to long term, the project would be 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

Table 5 illustrates how each of these indicators is currently functioning within the Upper Grande Ronde subbasin. Function ratings are considered to be either properly functioning, functioning but at low levels and at risk of becoming not 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	Baseline (Watershed Scale - 5HUC)		
	Properly functioning	Functioning At Risk	Not Properly functioning
Temperature			X
Sediment			X
Substrate Embeddedness			X
Large Woody Debris			X
Pool frequency and quality			X
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 area that 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° MWAT range even before the extensive floodplain and channel modification and history of management.

Between 2011 and 2015 MWATs have greatly exceeded the 64° threshold (Figure 5). 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 Bird Track Springs area. This is close to 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 (Thompson and Larsen 2004). This is one reason this reach receives very little utilization by rearing salmonids. The GRR in the project area is "not properly functioning."

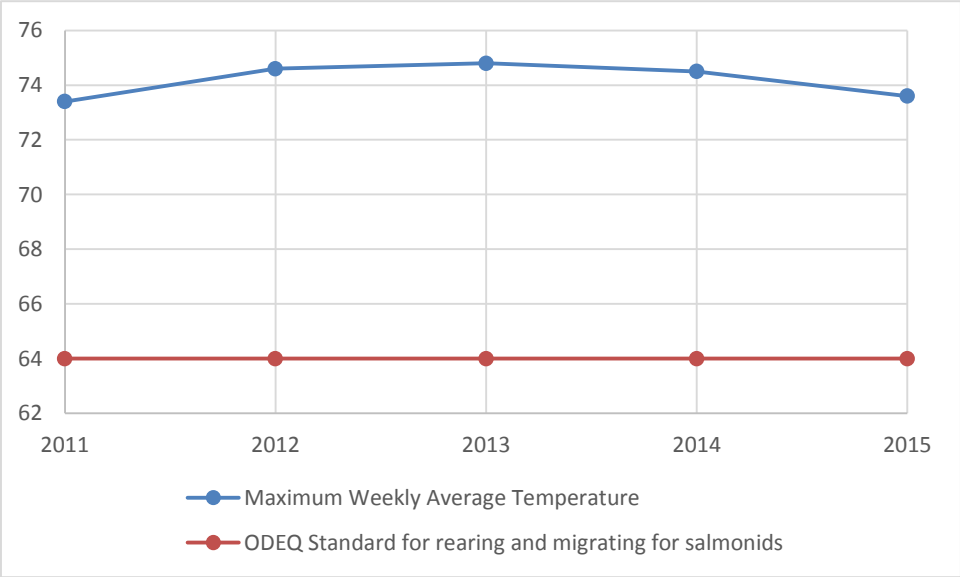


Figure 5. Grande Ronde River at Bird Track Springs MWAT

Sediment and Turbidity

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

The Aquatic Inventory (AQI) survey (2015) that encompassed the project area found gravel, cobble and sand as the dominant stream substrates. The survey found stream substrates of 54% gravel, 20% cobble, and 20% sand (<2 mm). In the survey just downstream of Bear Creek, downstream of the project area sand and fine sediment made up 34% of channel substrate (<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.

Because the project area and the area immediately downstream of the project area have elevated sediment loads, at a reach level, the GRR in the project area is "not properly functioning."

Large Woody Debris

The 2015 AQI by the Oregon Department of Fish and Wildlife Service found a total of 22 pieces of wood per mile (minimum size >15cm diameter and >3m long) in the project area, and 9 pieces of wood considered "key" wood per mile (minimum 30cm diameter and 6->15m in length.

The NMFS (1996) "properly functioning" standard for LWD for streams east of the Cascade crest in Oregon, Washington, and Idaho is a minimum of 20 pieces of LWD per mile, which have a minimum 12 inch diameter and 35 feet length and an adequate source of LWD for future recruitment in riparian areas (Table 6). The 2015 AQI survey found a total of 9 pieces of wood per mile in this size class. This survey included 2.46 miles of stream including the mainstem GRR and side channels in the project area. The GRR and side channels in the project area are "not properly functioning" because the riparian management objective (RMO) for pieces of LWD per mile is not met and the riparian area lacks potential for large woody debris recruitment

Table 6. Overview of Large Woody Debris in BTS Project Area and Adjacent Reaches

Large Wood Indicators	PFC Levels	Reach
	Properly Functioning Levels	Project Area
Total Wood (pieces/mile)	N/A	22
Key Pieces (pieces/mile)	>20	9

LWD numbers in this table are from AQI, 2015

PFC – Proper Functioning Condition

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 pool and total pool densities decreased by 71% (1.1 pools /km) and 78% (1.4 pools/km) respectively due to the impacts from past land management activities. In the vicinity of the project area, CHaMPs surveys found 8 pools/1.1 kilometers

(or approximately 12.8 pools/mile) in the mainstem GRR just downstream of the project boundary in 2015 and 1 pool/.5km (or approximately 3 pools/mile) in a reach near the upstream extent of the project area in 2016. 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). If a reach does not meet the pool frequency standards it is considered "not properly functioning;" therefore, the GRR through the project area is in "not properly functioning" condition.

Table 7. Overview of Pool Frequency in Bird Track Springs Project Area and Adjacent Reaches

Indicators	PFC Levels	Reach	
	Properly Functioning Levels	CHaMPs Reach Downstream	CHaMPs Reach Upstream
Pools/mile	26	12.8	3

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 can result in scouring the stream bed and damaging banks and riparian vegetation. At the downstream most extent of the project area on the boarder of Bear Creek Ranch on the mainstem channel, a headcut has begun just 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 Bird Track Springs reach of the Grande Ronde is a relatively simplified, wide, and shallow channel. The width-to-depth ratio is 39.2 (AQI 2015) in this section of the GRR. This shows an extremely over-widened channel in areas without significant large wood, resistant bank material, and adequate riparian vegetation. This type of channel, Rosgen (1996) stream type C4, should have a width-to-depth ratio range of 13.5 to 28.7 The width-to-depth ratio in the project area indicates an extremely wide and shallow channel. The channel has also 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 the 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 "not properly functioning."

Figure 6. Downstream extent of project area, wide channel lacking wood and habitat structure. Photo credit AQI 2015

Table 8. Overview of Width-to-depth Ratio in Bird Track Springs Project Area

Indicators	Rosgen C4 Channel Range for PFC	Project Area Reach
Width-to-depth Ratio	13.5 - 28.7	39.2

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 0.3 conifers and 1.8 hardwoods. The trees found most frequently in the riparian zone were 3 to 15 cm dbh hardwoods. NMFS (1996) defines "functioning appropriately" riparian reserve as providing 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, LWD 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 7. Wide, slow water area showing very little riparian vegetation, predominantly sedges and grasses 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 Bird Track Springs 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 identifies the relative level of effect for fish and aquatic resources.

The following table 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. Project activities focus on 1.9 miles of the 212 miles of the Grande Ronde River (<1% of the GRR). 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 would be 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 consequences 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. Response to actions by some individuals could be expected, with some positive or negative impacts to feeding, reproduction, or other factors affecting short term within reach population levels, but no long term within reach population effects are expected.
Major	Populations would be affected with a long term, vital consequence to the individuals, populations, or habitat within the reach. Impacts on species, their habitats, or the natural processes sustaining them would be detectable. 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 within the reach.

Assumptions

All activities in the proposed action would follow Bonneville Power Administration's (BPA) Habitat Improvement Program III version 3.0 (HIP III) General Aquatic Conservation Measures. All General Aquatic Conservation Measures laid out in the HIP III would be implemented and are described within this analysis under the appropriate "action", this includes post-construction conservation measures. Proposed actions for Bird Track Springs are covered under HIP III 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, AQI survey 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.

The analysis area for fish and fish habitat is the existing 1.9 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 past (as reflected in the existing condition), 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 Bird Track 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 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. 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 Proposed 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	R	M	M
Large Pools			X	M	R	M	M
Width/Depth Ratio			X	M	R	M	M
Streambank Condition		X		M	R/d	M	M
Riparian Reserve		X		M	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 temperatures as high as 86.9°C have been measured in the Bird Track Springs reach 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 under Alternative 2 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) which 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 Grande Ronde River. 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); which is 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 to encourage gravel bar development and 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 log jams 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 Bird Track Springs project reach contains 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 result in an increase in habitat that would form behind beaver dams where the water column has vertical temperature stratification and would yield 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 1) decrease the amount of solar radiation through reducing the channel surface area across which

heat is exchanged (Poole and Berman 2001) and 2) 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.

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 groundwater even with all efforts taken to "dewater" the construction area. This groundwater 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 groundwater, which could connect to downstream flows and elevate turbidity levels; however, these impacts would be mitigated. Refer to the 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, 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 could be used in some locations over 4.8 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, groundwater disturbance may occur, which could input sediment into fish and aquatic habitat. The 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.

Disturbed wood harvest sites, access roads, and staging areas are rehabilitated by planting a native grass seed mix. All stream channels and wetland areas in wood harvest units would be protected using PACFISH/INFISH no activity buffers. There are no Category 1 Fish Bearing streams in any wood harvest units. Perennial non-fish bearing streams would have a minimum no activity buffer of 150 feet on each side of the stream channel and intermittent channels and wetlands (< 1 acre) would have a minimum 100 foot no activity buffer. Implementing these buffers would prevent any potential indirect sediment or turbidity effects to fish and aquatic species and habitat.

Although there would be some short term adverse effect to instream water quality, short term effects to fish would be minimized since work would occur within the ODFW in-water work window, a time when stream flows are low, conditions are dry, and fish species are in their least vulnerable life stages. Construction areas would be isolated and fish and mollusks, such as 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 as a part of the Proposed Action and Alternatives section of this EA would be followed to minimize effects of construction. The HIP III Turbidity Monitoring Protocol would be implemented during in-channel disturbance. The HIP III 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 background levels.

Water quality monitoring and observations would be recorded to ensure that in-water work is not degrading water quality. Clean Water Act (CWA) 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 III Turbidity Monitoring Protocol are exceeded, project operations would stop. The HIP III 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 will 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 macroinvertebrates 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 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 would be 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-protection materials such as large wood complexes and eventually mature riparian vegetation to increase streambank stability.

Rehabilitation of eroding banks would provide long term benefits to fish and aquatic habitat by reducing fine sediment inputs at the 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 LWD on stream ecosystems has been widely studied, and the effects of streamside logging practices on stream ecosystems in the Pacific Northwest of are well understood (Hartman et al 1996). For instance, LWD 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 LWD recruitment, and removal of LWD 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).

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" (Tables 10 and 6). Current degraded conditions would be "maintained" (Table 10). Although currently there are 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). 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 inhibit 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 1,380 trees, the majority with rootwads attached, would be incorporated into 640 habitat-forming large wood structures over 4.8 miles of channel in the project area. In addition, smaller trees and limbs used to simulate "racking" material will 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. Overview of Large Woody Debris in Bird Track Project Area and Adjacent Reaches

Large Wood Indicators	Rosgen C4 Channel Range (PFC)	Alternatives	
	Properly Functioning Levels	Alternative 1	Alternative 2
Total Wood (pieces/mile)	N/A	22*	499
Key Pieces (pieces/mile)	>20	9*	287.5

*AQI 2015 numbers

Pieces of LWD would increase dramatically in Alternative 2 (Table 11). The RMO of >20 pieces per mile of "key" sized LWD would be met. 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. Riparian restoration in Alternative 2 would be designed to provide stability and habitat benefits while surround riparian vegetation res-establishes and eventually replaces the LWD placed instream in this alternative. Quantities of

LWD in Alternatives 1 and 2 shown in Table 11 include wood counts in side channels. The pieces of LWD per mile in Alternative 1 includes AQI survey length immediately downstream of the project area reach in the Longley Meadows area.

LWD 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 LWD (Bustard and Narver 1975). In contrast, experimental LWD 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 10) indicating the project would have beneficial impacts 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, 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 ineffective 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, quality and large pools. 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. Overview of Pool Frequency in Bird Track Springs Project Area and Adjacent Reaches

Indicators	PFC Levels	Reach	
	Properly Functioning Levels	Alternative 1	Alternative 2
Pools/mile	26	12.8	25 to 30

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.

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 meters/second (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 mortality 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 4.8 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. At the downstream most extent of the project area on the border of Bear Creek Ranch on the mainstem channel, the headcut that has begun just downstream of the split flow on river right could progress upstream and the majority of the Grande Ronde would 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 the Sediment, Turbidity, and Substrate Embeddedness section, 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 protection large wood complexes. In addition, creating a more natural 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 affected 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 10).

Alternative 2 - Proposed Action

Implementation of the proposed action would have immediate beneficial direct effects on fish and aquatic habitat through decreasing width-to-depth ratio. Realigning the mainstem GRR and increasing complexity, braiding, off channel habitat, 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 rations in the short 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 improvement of stable riffle and pool development. Reduction in width-to-depth ratios and increased stream shade in the long term would also be 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. Overview of Mainstem Width-to-depth Ratio in Bird Track Springs Project Area

Indicators	Rosgen C4 Channel Range (PFC)	Alternative 1	Alternative 2 Main stem	Alternative 2 Side channels
Width-to-depth Ratio	13.5-28.7	39.2	24 to 25	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 mainstem 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 taken down as excavators access treatment sites and realignment areas and dig the log structures into the bank. These trees would be incorporated into the constructed log complexes. There would be 3.8 miles of temporary roads built and 40.7 acres of staging, storage and stockpile areas in the floodplain with some amount of clearing of existing vegetation. Removal of existing vegetation would cause some short term effect to the riparian area, floodplain and potentially stream banks and stream channel. Direct effects of loss of vegetation from stream banks would be erosion during runoff events. This would be minimized by implementation of the erosion control plan. Indirect effects to fish and aquatic habitat and species from removal of some streamside vegetation would be 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 wood for shade and future large wood recruitment as much as possible. These disturbances would be minor and short term and would be expected to revegetate in one year with all of the additional plantings, although mature riparian vegetation would be a long term process for recovery.

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. This would entail using various methods to plant 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 4.8 miles of stream bank and floodplain associated with channel restoration. Short term effects associated with riparian vegetation planting include mechanical trenching to reach groundwater for trees, shrub seedlings, and cuttings to thrive. 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 would 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. In addition approximately 4.7 acres adjacent to the GRR on the Jordan Creek Range, which is currently a corral structure and feedlot with an impoundment for water right next to the river, would be moved and rehabilitated. This would have moderate to major beneficial effects to the RHCA, including vegetation recovery, floodplain function, water quality, and soil rehabilitation. This structure and feedlot would be moved to an area outside of the RHCA.

There would be a short term “degrade” to RHCAs 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

Forest Service regulations require site-specific analysis of the effects of actions on species identified as Management Indicator Species (MIS) in the Wallowa-Whitman Forest Land and Resource Management Plans (LRMP, 1990) as amended. This analysis was conducted for the Bird Track Springs 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 include: 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, 1.9 miles, is documented habitat for redband trout and steelhead.

Steelhead:

The viability criteria defined by the Interior Columbia Technical Review Team (ICTRT) 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 Grande Ronde River 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 an 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 will 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 the miles of steelhead and redband/rainbow trout habitat in the project area, which is 1.9 miles of the GRR. 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 10). 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 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 would be 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 III Construction and Post Construction Conservation Measures. This will 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 habitat 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 10).

RMOs are the interim objectives for each habitat feature (indicator).

Cumulative Effects to Fisheries and Aquatic Habitat

Potential cumulative effects are analyzed by considering the proposed activities in the context of past, 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 actions that will 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 the three subwatersheds that partially overlap with the project area; Coleman Ridge-Grande Ronde River (HUC 170601040307), Jordan Creek subwatershed (HUC 170601040303), and Lower Beaver Creek (HUC 170601040302). Because the project area and effects analysis area are small (6,301 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 Bird Track Springs area. Restoration efforts in the Upper watershed have included road decommissioning, instream large wood placement, and riparian planting. Wood and boulder weirs were added in past restoration efforts to the GRR and side channels.

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 measureable levels above background, because riparian protection measures would be incorporated into all harvest unit designs on public land.

Alternative 2 - Proposed Action

Past timber harvest, splash dams, railroad grade, road building, converting floodplain into agricultural uses, and heavy grazing have been the primary management activities that have contributed to the existing degraded fish and aquatic habitat. Ice buildup and flooding has likely slowed the rate of recovery of the Upper GRR through the Bird Track Springs area. Restoration efforts in the upper watershed have included road decommissioning, instream large wood placement, and riparian planting. Wood and boulder weirs were added in past restoration efforts to the GRR and side channels.

Other activities in the project area or in within subwatersheds that cause sediment could have a cumulative effect, particularly if they occur during the construction and operation 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 and streambanks and could introduce sediment into the channels. 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; however, the long term benefits of the Bird Track Springs project and implementation of travel management which will restrict motor vehicle use to designated roads, trails and areas would have net beneficial effect to fisheries and critical fish habitat.

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.

Future restoration activities, such as the Longley Meadows Fish Enhancement project, within these subwatersheds or in the Upper Grande Ronde Subbasin that would address prime spawning habitat for Chinook or cold water refuge 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 Bird Track 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 Bird Track Springs project area ranges from 3,050 feet of elevation at the downstream end to 3,139 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 percent) and has very little development (less than 0.1 percent 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

The project reach is an unconfined alluvial channel with low sinuosity and little interaction with the floodplain when compared to historical conditions. Prior to Euro-American settlement, riparian vegetation would have included woody species such as cottonwood, willow, birch, and alder with adjacent upland areas supporting mature Ponderosa pine and Douglas-fir. Beaver were common and would have contributed to channel and floodplain complexity. The historical channel would likely have had an island-braided pattern with greater numbers of pools, riffles, logjams, woody material, and floodplain connectivity. (See Fisheries/Aquatics Resource report for more detail on habitat conditions, Kavanagh 2015, Cardno 2016a, Beechie et al. 2006.) Current geomorphic conditions in the project reach were surveyed and the results are illustrated in Figure 8 and described in Tables 14 and 15. Geomorphic reaches are labeled in Figure 8 and start at the upstream end of the project reach.

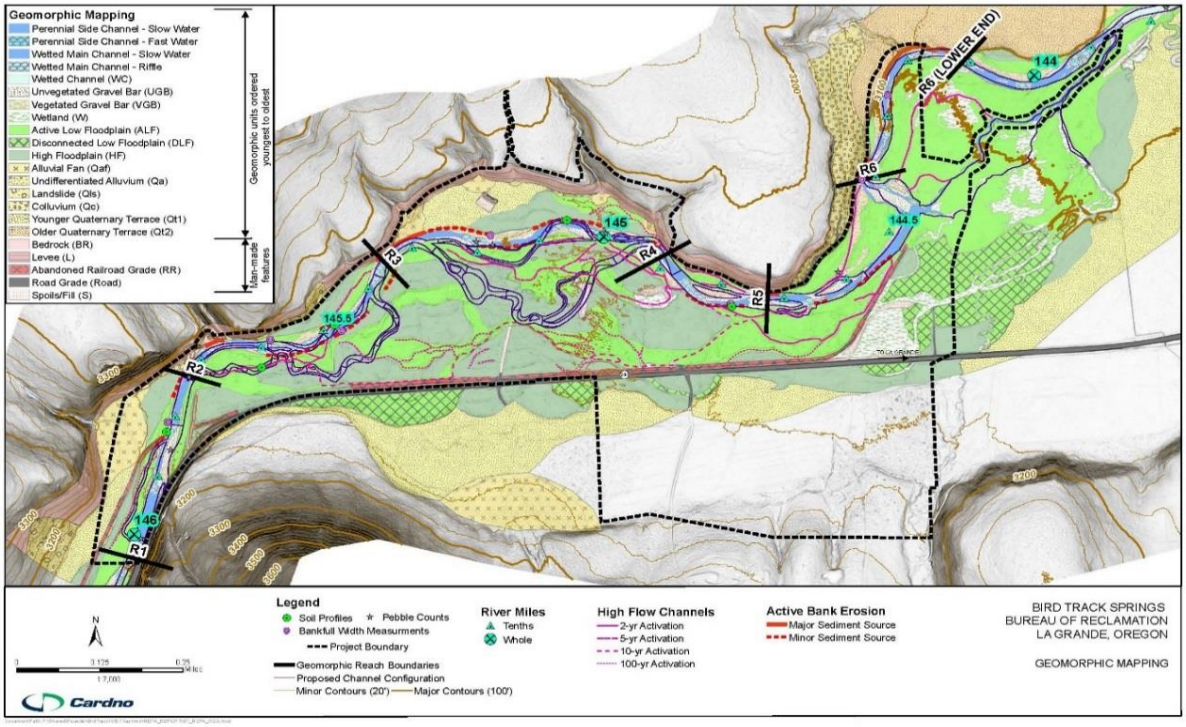


Figure 8. Overview geomorphic map of the project reach. Detailed maps in the App. B of the BDR.

Table 14. Geomorphic Reach Descriptions

Reach	Description
1 (upper end of project reach)	The GRR is moderately confined with a straight channel planform. Ice scour is a major process, while lateral channel migration and bank erosion are negligible. Key lateral constraints include a Highway 244 levee on the right bank and the historical railroad grade on the left bank. Historical log abutments from the historical railroad bridge are exposed in the channel bed along the left bank. Channel complexity is low as indicated by the lack of pools and general lack of woody debris.
2	The GRR is decreasingly confined relative to Reach 1, but intersects the bedrock valley wall on the left bank where a historical quarry is present. Downstream of the quarry and bedrock is an apparent abundance of angular cobbles and boulders, which wanes by the downstream end of the reach. Historical channel migration rates have been low to moderate, while ice scour is active. An existing high-flow channel (activated by 5-year flood) is present on the right bank, while additional high-flow channels currently activated only during 10- and 100-year floods extend downstream along the right valley. Channel complexity is low as indicated by the lack of pools and general lack of woody debris.
3	The GRR is unconfined with a sinuous planform. Historical channel migration rates have been relatively high, which has helped to create surfaces for cottonwood recruitment. Recent cottonwood recruitment occurred within the upper reach within the last 10 years. Ice scour processes, if active, are not apparent from vegetation indicators. An alluvial fan and river terrace remnant on the left bank are major sediment sources. Existing high-flow channels on the right activate at 2- and 5-year intervals. An alcove on the right bank has a strong groundwater/hyporheic temperature signature in the summer, and was observed to be ice-free in winter 2016 during a period when the river channel was largely frozen otherwise. Channel complexity, as indicated by area and prevalence of wetted off-channel features, is improved relative to reaches 1 and 2.
4	The GRR is unconfined with a sinuous planform. Historical channel migration has occurred at moderate rates. Low, active floodplain extends for the reach entirety on the left bank, whereas high floodplain is present on much of the right bank. On the left bank, existing off-channel features include a high-flow channel (2-year activation) and wetland. This wetland exhibits a subtle temperature signature of hyporheic upwelling. On the right bank, an excavated pond/wetland is located in the upper reach, and a high-flow channel (2-year activation) departs from the main channel in the lower reach.
5	The GRR is unconfined and dynamic in this reach, with shifting bars and a meandering to braided planform. Historical channel migration rates have been high, and have generally involved bend growth and channel switching between the existing main channel and high-flow channel on the left. The main channel longitudinal profile exhibits a significant decrease in slope in the upper two-thirds of the reach, at which point the channel steepens and turns abruptly to the northwest. A perennial side channel diverges from the main channel at this sharp bend, and is a priority for preservation. While this side channel is connected to the main channel at the surface, temperature mapping indicates that groundwater is the primary source. The main channel is braided with multiple channels and shifting bars below the bend. The historical (abandoned) railroad grade is present in the right floodplain. The high-flow channel on the left is activated in the 2-year flood and has adjacent ponds wetted during low-flow conditions. Temperature signatures in these ponds indicate either groundwater or hyporheic connection). In addition, indications of hyporheic upwelling are present along the downstream end of the high-flow channel at its convergence with the main channel.
6 (Downstream end of project reach)	The GRR is unconfined, but runs along the northern valley wall for much of its length. The valley wall is composed of the bedrock-cored hillslope in the upper portion of the reach, and an older river terrace in the lower reach. This river terrace (Qt2) appears to be older than the Mount Mazama eruption, and is largely composed of fluvial sand and gravels, overlain by hillslope-derived silts and sands. At the base of this terrace (underlying fluvial deposits) are hardened silts and sands resembling weakly cemented bedrock. This exposed sedimentary unit is likely the base of the hillslope bedrock (over which the terrace has been deposited), or a bedrock-cored river terrace. Deep pools are present in the main channel where it impinges upon the terrace at sharp bends. This terrace, while erosion resistant, appears to have retreated historically with fluvial erosion, suggesting this reach provides sediment to the Longley Meadows project reach downstream. Away from valley walls, the channel runs entirely through active, low floodplain area.

Source: Cardno 2016a

Table 15. Key Channel and Streambank Characteristics by Geomorphic Subreach

Subreach ID	Length ft	Slope ft/ft	Average Riffle Spacing		Ratio of Riffle Length to Slow Water Unit (run, glide, or pool) Length	# Slow Water Units with >1-foot Residual Depth	% Bar Area (% of Active Channel)	% Eroding Banks (% of Total Bank Length)
			ft	xBFW*				
1	1,631	0.0036	631	6.51	0.71	0	28%	12%
2	2,086	0.0046	460	4.75	1.14	0	17%	35%
3	2,477	0.0046	495	5.11	0.72	2	33%	44%
4	1,034	0.0045	517	5.33	0.83	0	36%	28%
5	2,104	0.0037	444	4.58	0.36	1	38%	14%
6	1,663	0.0045	554	5.71	0.36	1	27%	38%
Total	10,995	0.004	509	5.25	0.64	4	0.31	0.29

Source: Cardno 2016a
* Multiples of bankfull width (BFW)

Icing is a significant process during winter low flows, and has likely been exacerbated by the current wider and shallower channel geometry. Scarred trees are present in the upper 3,000 feet of the channel and provide a conservative estimate on longitudinal ice scour extent due to limited mature downstream vegetation. 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. The formation of ice dams and their subsequent failure can scour the stream bed and damage banks and riparian vegetation.

A. Hydrology

Flows in the Upper GRR are not impacted by dam-imposed flow regulation. Some irrigation diversions exist, primarily affecting flows during irrigation season. 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 November. A detailed hydrologic analysis was conducted for the project and is summarized below (Cardno 2016a, Appendix C). Recurrence interval flows were estimated for 1.05 to 500-year peak flows and flow duration curves were estimated from gauges near the project site or from regional regression equations. Table 3 lists the gauges 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 16. Stream Gauges 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 River at La Grande, OR	USGS	132	686	1903	1989
13318960	Grande Ronde River Near Perry, OR	OWRD	135.9	677	1997	Current
13318920	Five Points Creek at Hilgard, OR	OWRD	137.7	71.9	1992	Current
13318800	Grande Ronde River at Hilgard, OR	USGS	139.3	544	1966	1981

Station Number	Name	Agency	River Mile	Drainage Area (mi^2)	Start Year	End Year
13318500	Grande Ronde River Near Hilgard, OR	USGS	142.9	495.7	1937	1956

Figure 9 is a reconstructed flow record based on records from the historical USGS gauge located at river mile (RM) 142.9 downstream of the project reach (Station 13318500). The short period of record (1937–1956) has been augmented with flow records from other gauges adjusted to match that gauge location. The figure shows mean monthly flows for the augmented period of record along with estimates of annual peak flows. A few data gaps still exist in the record in the early 1900s and the 1990s.

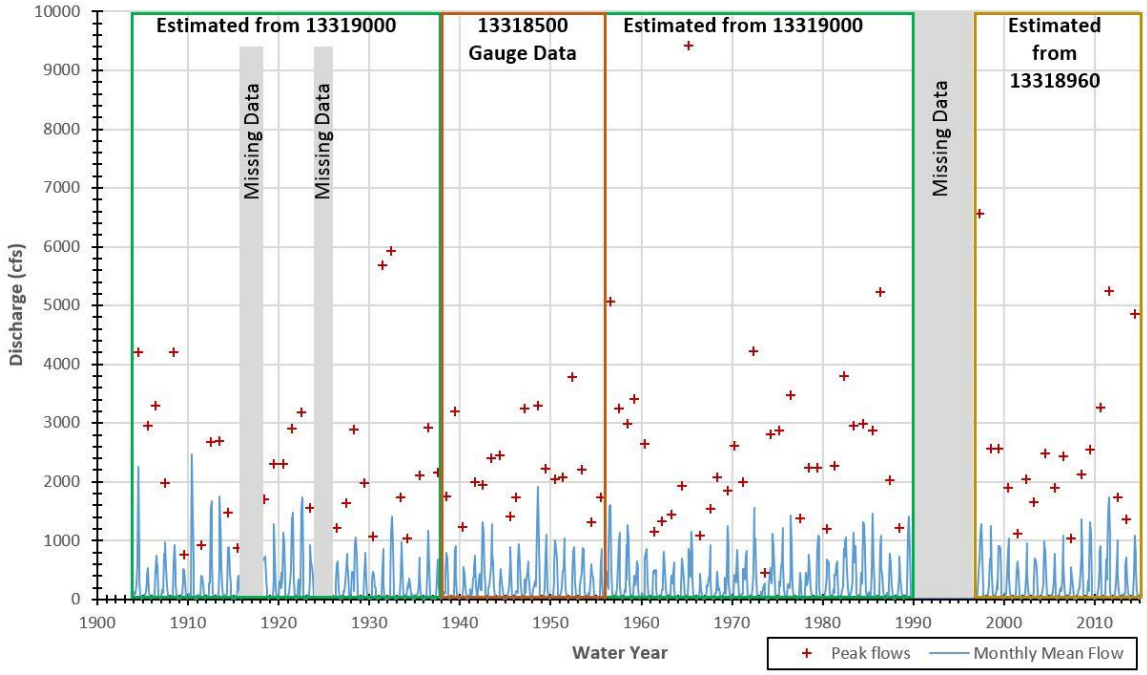


Figure 9. Reconstructed flow record for water years 1904–2015 for the historical gauge at RM 142.9 below the project reach. The reconstructed record includes measured flows from 1938–1956, and drainage area adjusted flows from the USGS gauges at La Grande (13319000) and Perry (13318960). Years with missing data include 1910, 1916–1917, 1924–1925, and 1989–1996.

Table 17 displays estimated monthly and annual flows for the 5 percent exceedance discharge (high flows exceeded 5 percent of the time in a given month based on the period of record), the 50 percent exceedance discharge (the median monthly flow), and the 95 percent exceedance discharge (low-flow conditions where flows are expected to be higher 95 percent 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 percent exceedance (i.e. low) flows on the Upper GRR, 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 17. Exceedance Statistics for Flows Estimated at the Upstream Project Boundary at RM 146.1

Month	5 Percent Exceedance Discharge (cfs)	50 Percent Exceedance Discharge (cfs)	95 Percent 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
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

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 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 8,741 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.

Table 18. Return Interval Flows Estimated for the Upstream Project Boundary at RM 146.1

Annual Probability	Return Interval (years)	Flow (cfs)	95% Confidence Intervals	
			Low (cfs)	High (cfs)
0.95	1.05	957	838	1,069
0.9	1.1	1,122	998	1,240
0.8	1.25	1,368	1,238	1,495
0.6667	1.5	1,654	1,515	1,795
0.5	2	2,029	1,872	2,199
0.4292	2.33	2,212	2,042	2,401
0.2	5	3,072	2,813	3,393
0.1	10	3,847	3,477	4,333
0.04	25	4,922	4,367	5,685
0.02	50	5,791	5,069	6,812
0.01	100	6,719	5,805	8,042
0.005	200	7,713	6,580	9,386

Annual Probability	Return Interval (years)	Flow (cfs)	95% Confidence Intervals	
			Low (cfs)	High (cfs)
0.002	500	9,141	7,675	11,360

The lowest flows of the year typically occur in the project reach in August and September (Table 17). 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 the Section 1.3. There is little evidence of groundwater contribution to low flows in this reach to moderate temperatures.

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.

B. Floodplains

Flooding

Bankfull discharge was estimated for the project reach as the 1.05-year return interval flow of approximately 957 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 10-year return interval flood would inundate approximately 69 acres or 24 percent of the active project area (Cardno 2016a). Overbank flows contribute to diverse riparian conditions and complexity, which tends to benefit salmonids.

Floodplain Overlay Zone

Article 17 of the Union County Planning Department regulations describes the Floodplain Overlay Zone and regulations regarding development in the floodplain (http://union-county.org/planning/). 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 4). 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.

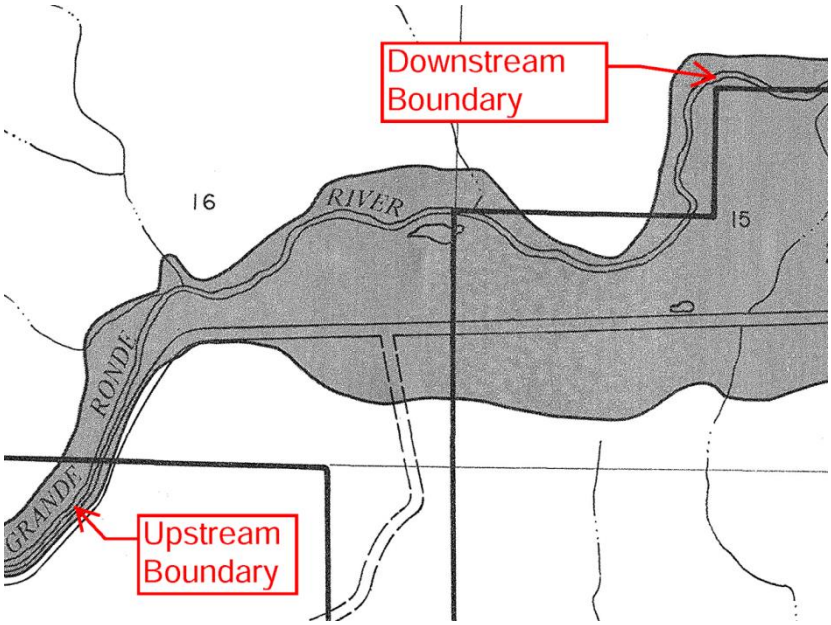


Figure 10. Close-up of the project area from Flood Insurance Rate Map 4102160275B, effective May 15, 1980. The grayed area is Zone A; areas of 100-year flood, base flood elevations, and flood hazard factors not determined.

Water Quality

The Oregon Department of Environmental Quality (ODEQ) has identified many stream segments within the Upper Grande Ronde Subbasin as water quality limited (ODEQ 2016, 2000). 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. Oregon's 2012 303(d) List of Water Quality Limited Waterbodies identifies seven parameters for the Upper GRR within the project reach that do not meet standards: algae (TMDL approved), flow modification, habitat modification, pH (TMDL approved), phosphorous (TMDL approved), sedimentation (TMDL approved), and temperature (TMDL approved).

A TMDL and Water Quality Management Plan were prepared for the Upper Grande Ronde Subbasin in 2000 because it does not meet state standards for temperature, dissolved oxygen, algae, nutrients, pH, sedimentation, bacteria, ammonia, and habitat and flow modification (Grande Ronde Water Quality Committee 2000; ODEQ 2000). Due to the predominance of non-point sources, the plan relies largely on habitat restoration to achieve the TMDL goals. Water quality parameters (and standards) of temperature (64 degrees Fahrenheit [°F]/55°F, rearing/spawning), dissolved oxygen (98 percent saturation), habitat modification (pool frequency), and flow modification (flows) relate to beneficial use for fish life (Northwest Power and Conservation Council 2004). Temperature and sedimentation are discussed in more detail below and pool-riffle ratios are discussed in the geomorphology section above (Table 15). Flows are discussed in the hydrology section. No data were available regarding dissolved oxygen levels in the project reach.

Temperature

In 2010, thermal infrared water temperature data was collected for the Upper GRR. 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 a 0.5 to 3 degrees Celsius (°C). Mainstem temperatures at the time of sampling were about 23°C. Surface water data were also collected at multiple locations in the project reach in August and September 2016 using temperature loggers (Figure 5). The temperature data show regular exceedances of the 64°F (17.8°C) criteria for rearing in the mainstem,

although the temperatures show a declining trend through the monitoring period. Side channel temperatures are lower likely due to groundwater influence.

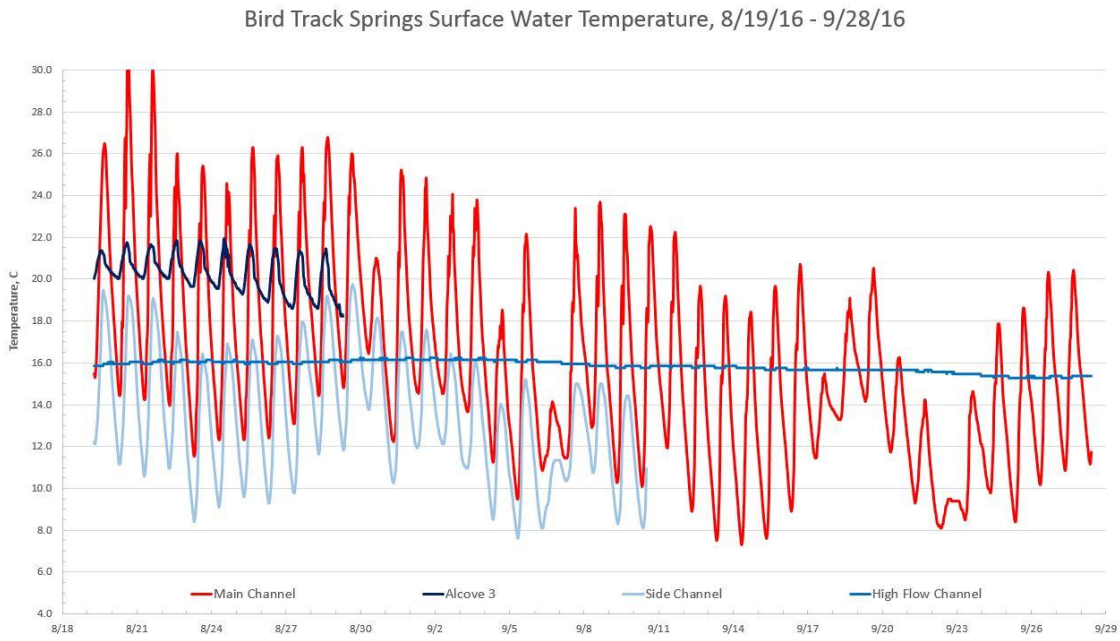


Figure 11. Surface water temperature measurements at four locations near the middle of the project reach in August and September 2016 (Cardno 2016a).

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 2. Minor sources are 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. Approximately 21 percent of the channel in the project area is subject to minor bank erosion and 8 percent is subject to major bank erosion (Cardno 2016a; Table 2). Active bank erosion is most predominant in the middle project reach and at the lower end of the project reach. In general, the channel character does not appear to change in direct response to local sediment inputs except where the channel intersects a bedrock valley wall and the historical quarry, which is a major sediment source. Extending downstream from the quarry for approximately 1,000 feet is a zone of increased abundance of angular cobble and boulder-sized grains (Cardno 2016a; Kavanagh 2015).

C. Wetlands

National Wetlands Inventory (NWI) data were available for the project area and are depicted in Figure 12. Field investigations were conducted in June of 2016 to identify wetlands within the active project area and the results are also indicated in Figure 12. 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 field-surveyed wetlands, but the site-specific wetland survey will be used in this analysis.

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). 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.

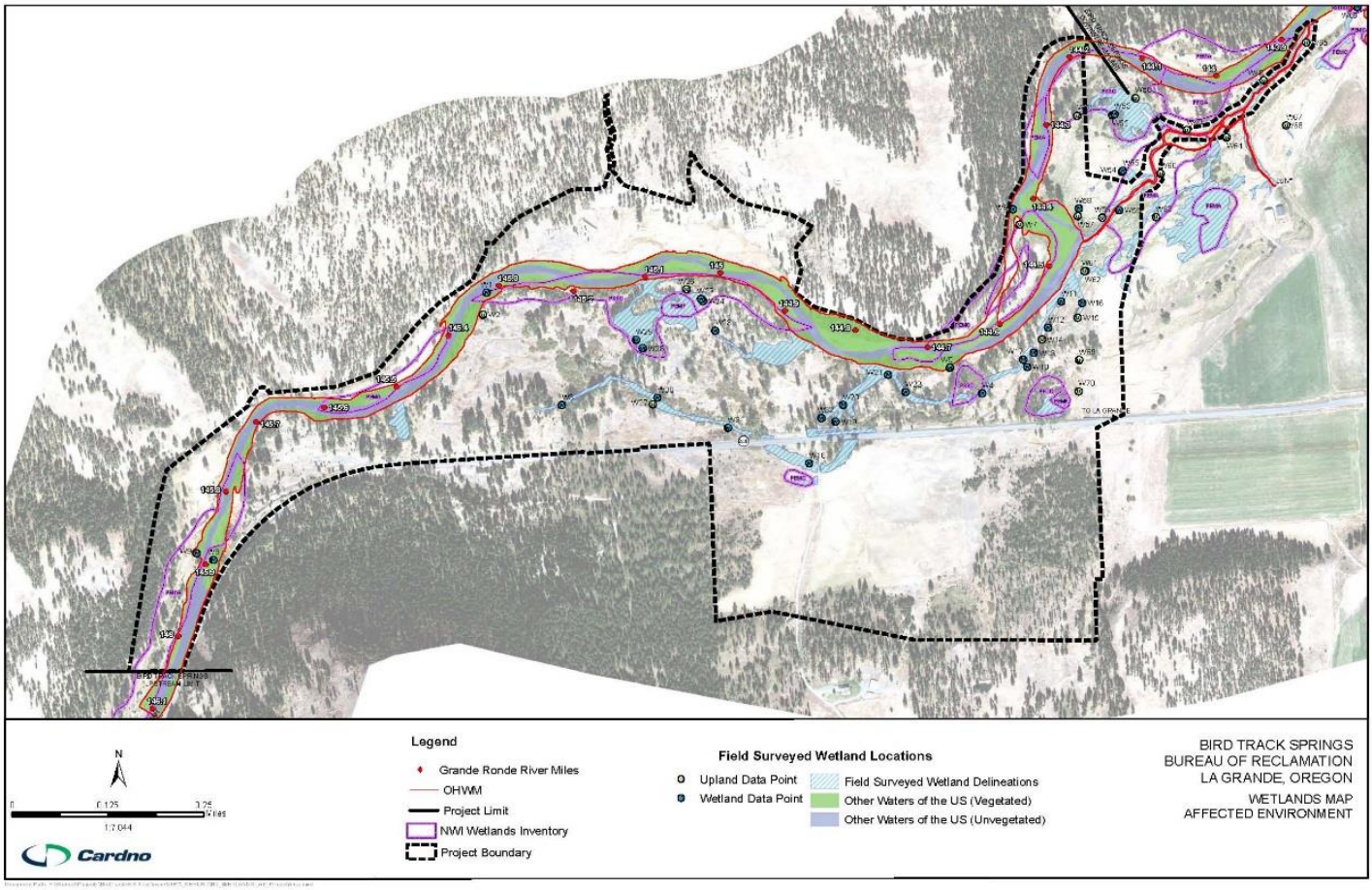


Figure 12. Map of the active project area showing NWI wetlands and field-surveyed wetlands.

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

Type	Description	Acres	Description	Cowardin Classification
1	Unvegetated Riverine Other Waters	13.0	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 at 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	21.4	Herbaceous and shrub-scrub wetland	Vegetated areas including the river margin

Type	Description	Acres	Description	Cowardin Classification
	Other Waters		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).	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	12.9	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 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).	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 percent, 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 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 (WWNF 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 (1998); and the Biological Opinion for Endangered Species Act Section 7 Formal Consultation. The PACFISH amendment added interim management direction in the form of Riparian Management Objectives, Riparian Habitat Conservation Areas and standards and guidelines. Executive Order (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." 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." 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 EA.

The analysis area 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 Bird Track Springs project design and included studies on hydrology, geomorphology, wetlands, and groundwater. Hydraulic modeling was conducted 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 10-year return interval event
- Changes in water quality (turbidity, water temperature)
- 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.

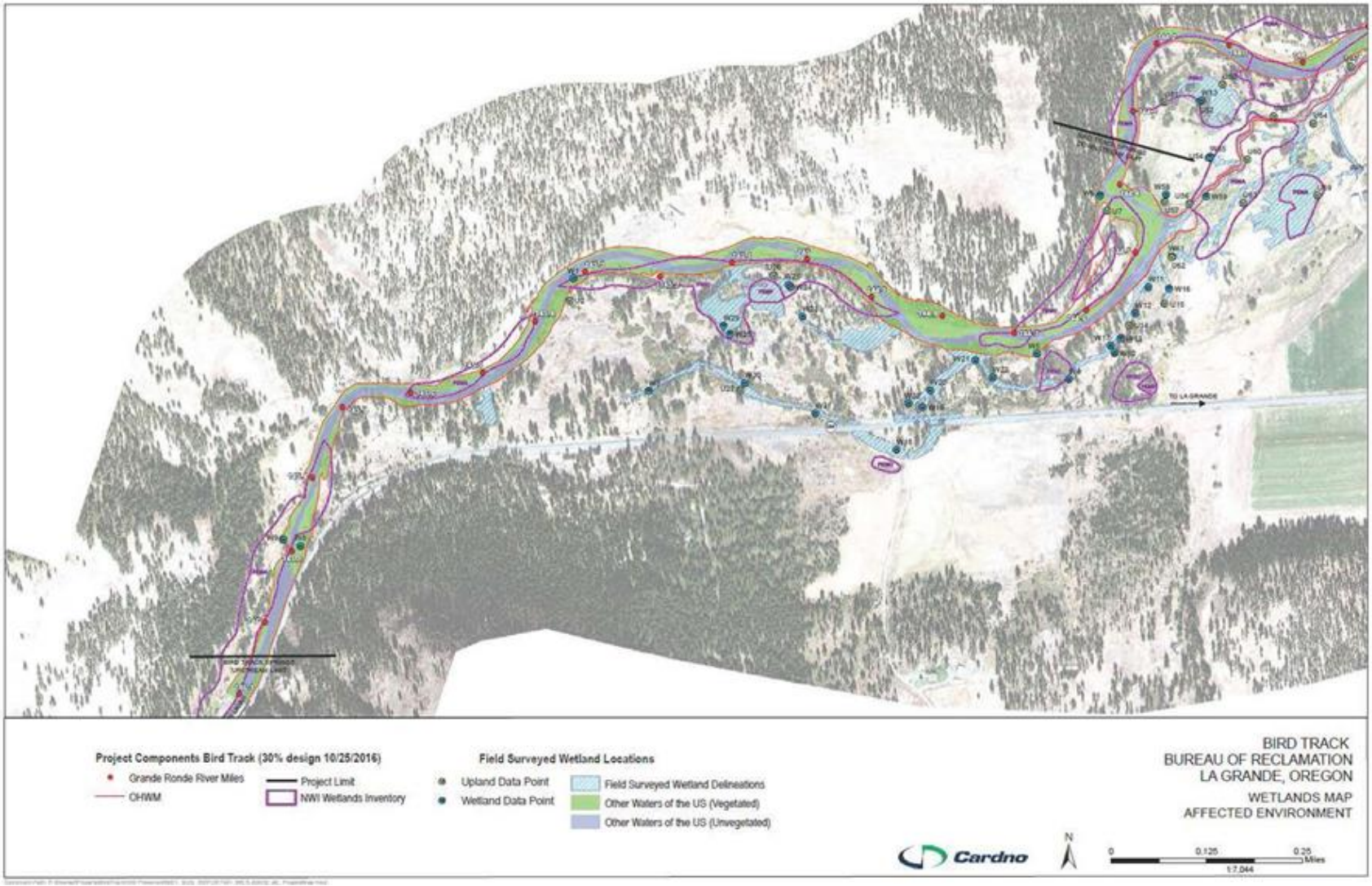


Figure 13. Project area wetland features.

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 mitigations 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, 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, 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 Bureau of Reclamation restoration projects would likely be considered along the GRR.

Hydrology, floodplain, and wetland conditions would remain the same as those described under existing conditions above. 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 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 this 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
- 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 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 1,100 feet), sinuosity (an increase of 0.13), slope (a 0.05 percent 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.

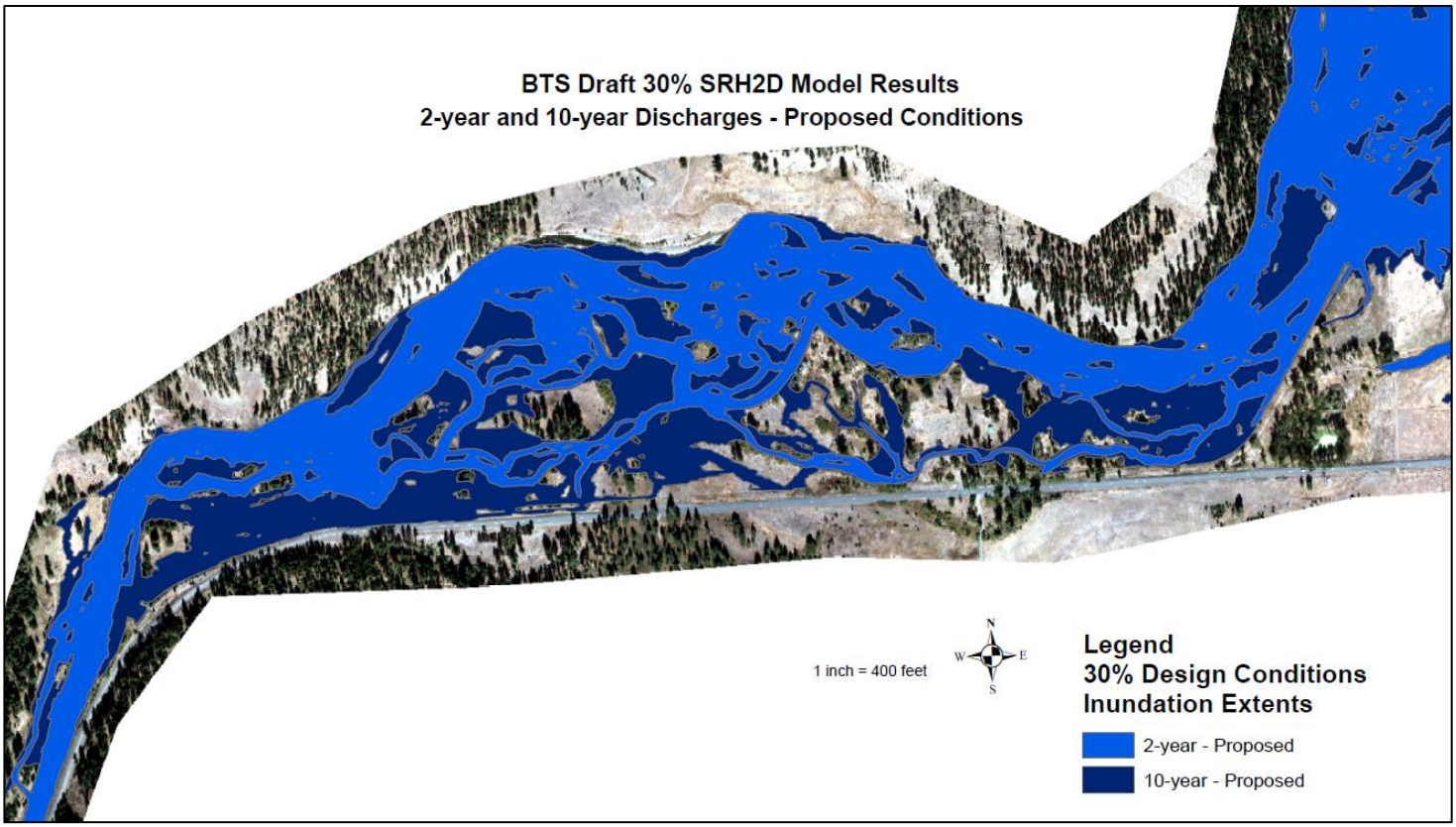
In some areas where the water table is near the surface, construction traffic may cause short term soil compaction and reduced subsurface flows. Compaction is expected to occur near the surface and would be a highly localized impact, as the depth to bedrock ranges from 23 to 28 feet in the project reach. Increased ponding upstream of access roads or staging areas may occur, but would be offset by scarification after the project is completed.

Approximately 42 acres, or 14 percent 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. No impacts to hydrology are expected in the log source areas due to the low density of harvest and distance from riparian areas and streams.

Flooding

One of the project objectives is to increase floodplain connectivity to the GRR; changes in area flooded within the active project area are expected and would be local in effect. No changes to flooding are expected in the log source areas. The area affected by the two-year flood in the active project area is expected to increase 67 percent to approximately110 acres, and the area affected by the modeled 10-year flood is expected to increase 60 percent to 115-176 acres (Figure 14). The project would generate approximately 70,630 cubic yards of cut material from the stream channel work. Of this, 69,030 cubic yards would be used on-site to fill the old channel,

and 1,600 cubic yards would be disposed of off-site, resulting in a net reduction of material in the project area floodplain. Floodplain function would also improve in the long term with a reduction in ice scour that would be accomplished by increasing channel complexity and floodplain vegetation. Overall, floodplain function and quality would increase, especially once the



revegetated areas become established.

Figure 14. Modeled inundation of the floodplain for draft 30 percent design for the 2- and 10-year flood event.

As part of the project design, hydraulic modeling was performed to analyze inundation limits and water surface elevations upstream, through the project reach, and downstream. Comparing the existing conditions water surface elevations to the proposed conditions water surface elevations downstream of the project limits shows the project would not increase water surface elevations downstream (Cardno 2016a). Modeling results for the 100-year flood indicate a slight reduction in flooded area north of the channel and in the Bear Creek Ranch area due to improved channel flows (Cardno 2016a).

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. Between the highway and the river, directly north of the Bird Track Springs Campground, is a series of trails that run through the floodplain, which would be relocated as part of the proposed project. The trailhead is located at the highway turnout directly across from the campground entrance.

Within the Lowe Family and Bear Creek Ranches, there are a handful of barn-type structures, as well as a corral on the Lowe Family Ranch. This corral is intended to be relocated as part of this project. 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.

No changes in flood frequency or inundation would occur along streams in the log source areas or for the GRR because there would be no changes to streams or flows in the log source watersheds from low-density harvest.

Water Quality

The Upper GRR 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 as discussed above. 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 impacts could occur during construction and channel rewatering. 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) III 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 III protocol, would occur during construction and if an exceedance occurred (>10 percent 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 section. 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.

Log source areas, roads, landings, and skid trails would be seeded with a native seed mix at the conclusion of activities to provide erosion control. In addition, waterbars and slash would be placed on skid trails where needed. No harvest would occur in or near riparian areas or streams, and impacts to water quality are expected to be minimal.

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 would impinge on mapped floodplain wetlands; however these impacts would be less than an acre of floodplain wetlands in the project area (7.5 percent of floodplain wetlands) (Figure 15, Table 20). A total of 20.95 acres of riverine wetlands could be temporarily affected by new channel construction and filling of the old channel (61 percent), but these would be restored and reestablished with the proposed channel design.

Table 20. Field-mapped Wetlands Affected by Project Activities (acres)

Project Element	Unvegetated Other Waters	Vegetated Other Waters	Floodplain Wetlands	Grand Total
Bar (Constructed)	0.963	2.187	0.004	3.15
New channel design	8.919	6.423	0.268	15.61
Existing Access Road			0.031	0.031
New Access Road	0.128	1.313	0.480	1.92
Staging and Storage Area	0.037	0.979	0.147	1.16
Total	**10.047**	**10.903**	**0.930**	**21.88**

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; therefore, no wetlands would be impacted there.

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 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 identified 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.

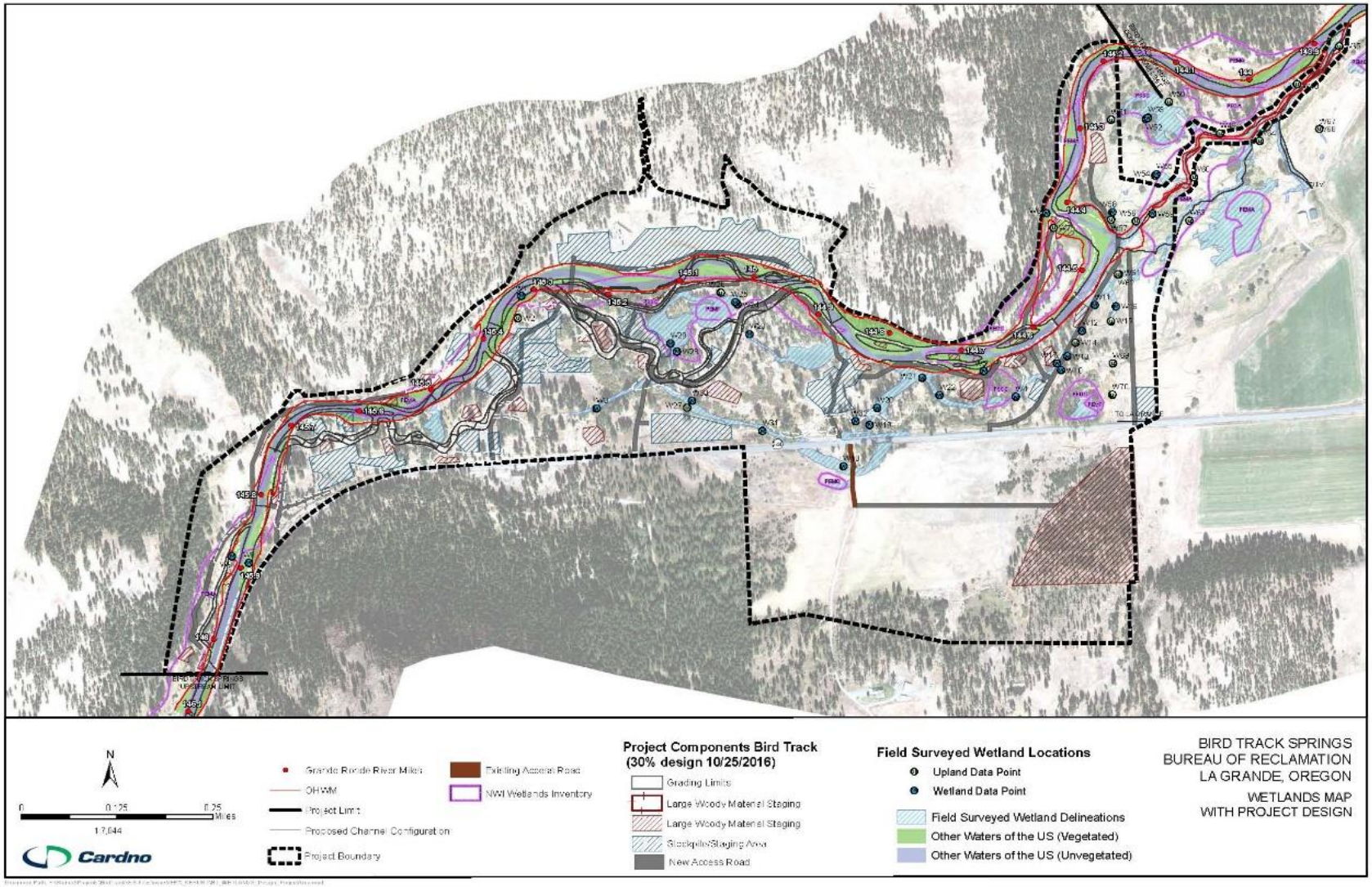


Figure 14. NWI wetlands and field-mapped wetlands with project elements.

The proposed action would result in short term direct impacts to wetlands, with long term benefits in the active project area. No wetlands occur or would be impacted in the log source areas.

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

The only present and reasonably foreseeable future actions that would overlap in time and space within this project area that may have a potential to have a short term increase to water resource impacts would be off-highway vehicle (OHV) use, livestock grazing, and continued timber management on private lands.

In addition, the Longley Meadows Restoration Project is located immediately downstream of the Bird Track Springs project and is proposed to have similar restoration elements as this project.

Alternative 2 – Proposed Action

As with No Action Alternative, present and reasonably foreseeable future actions that could affect water resources are described in Table 7 and include OHV use, livestock grazing, and timber management on private lands. The Longley Meadows Restoration Project, while different in its specifics, would also involve an intensive construction footprint on floodplain soils and the river channel. Overall, the Bird Track Springs project, in combination with other restoration projects on the Upper GRR is expected to have long term beneficial effects to water quality and fish habitat.

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 sedimentation rates and water quality.

The Longley Meadows Fish Enhancement project would occur within the next 5 years downstream from this project area. It would have similar short term negative impacts to those described above for this project and long term negative impacts are expected to be minimal. Long term beneficial impacts from these two projects would increase the amount of quality wetland and floodplain habitat along these reaches of the GRR.

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 Grande Ronde River north of Highway 244. A turnout just off of Highway 244 is available for the public accessing the Bird Track Springs Interpretive Trails within the project area (near the Bird Track Springs Campground).

Approximately 1.5 miles of native surface single lane roads are located just outside of the project area within the Bird Track Springs Campground.

A total of approximately 14.6 miles of roads are located within the Jordan Creek Ranch portion of the project area. The main road into the area 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 large 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, Bear Creek Ranch 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 3.85 miles of temporary 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, a small graveled spur road and a graveled parking area for those accessing the relocated Bird Track Springs Interpretive Trail would be constructed and available for public parking when visiting the trail system. This would provide for safe off highway parking for public recreationists.

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. 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

Because there would be no activities occurring which could affect the transportation system under this alternative, 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 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 and 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 Bird Track Springs Project. The analysis area for this analysis is the 6,301 acre project area. The Bird Track Springs Fish Enhancement Project has two activity areas; an active project area where restoration activities would occur along the Upper Grande Ronde River (GRR) and a log source area on private property south of the main active project area (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 Bird Track Springs 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. 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).

Soil Description

Soil descriptions and units described here are from the U.S. Department of Agriculture (USDA) *Soil Survey Report of Union County Area, Oregon* (1985). Additional soil data are available for the Forest Service (USFS) system lands portion of the project, but were not used since those data were not available for the private land portion of the project and the USDA soil survey covers the entire project area.

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 tend 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 Veazie-Voats complex (Unit 66, Figure 16). 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 over very rapid, runoff is slow, and the hazard of water erosion is slight. Both soil types are subject to flooding in winter and spring.

Figure 15. Active project area showing soil types.

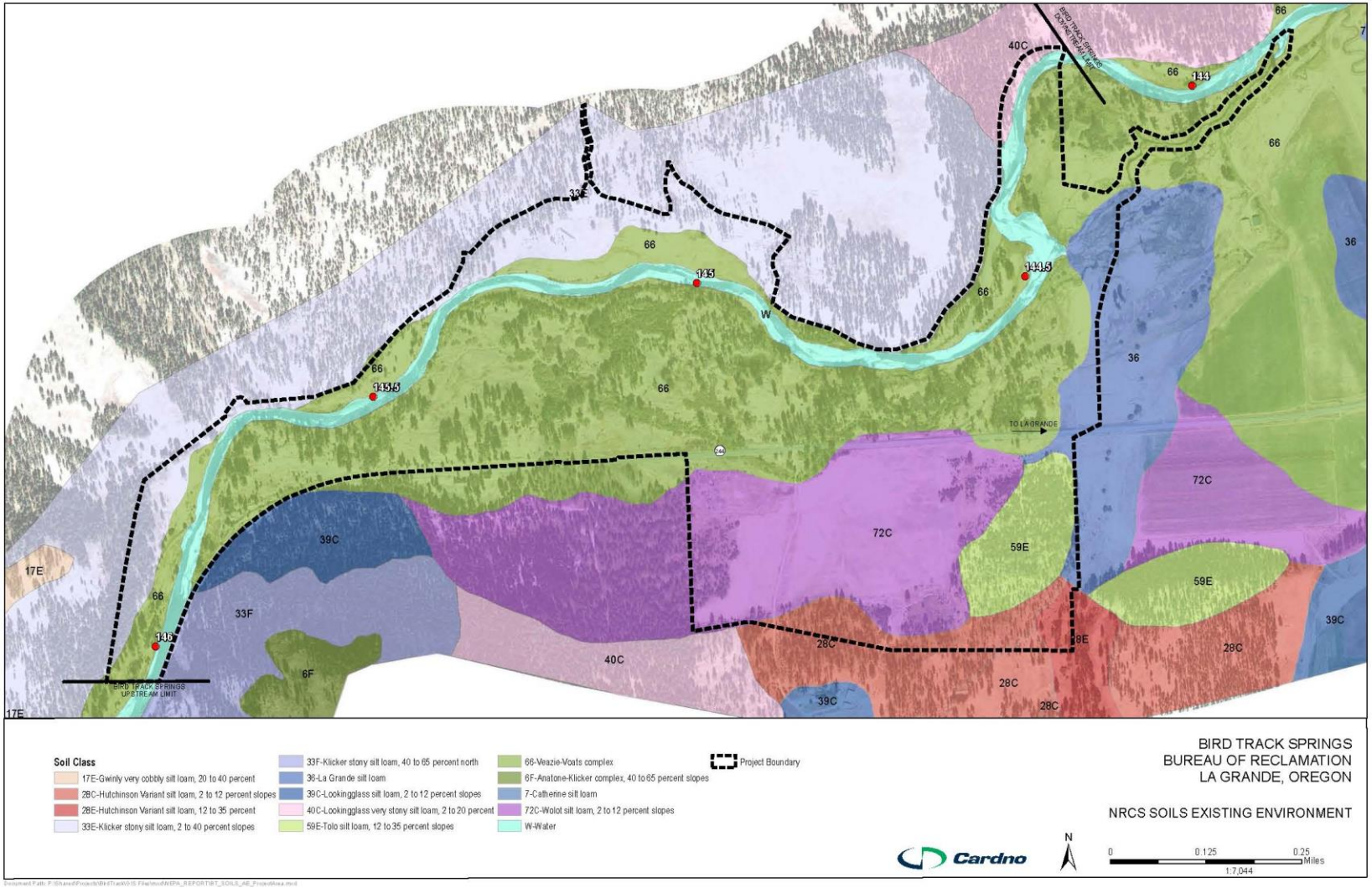


Table 21 lists the soil types, acreages, and features of the soils within the active project area (soils covering less than 1 percent of the active project area were not included in the table). None of the soils are hydric. The hydrologic soil group rating is based on the soil's runoff potential. Group A generally has the smallest runoff potential, and Group D has the greatest.

Table 21. 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 of Project Area
28C	Hutchinson Variant silt loam	2–12	Well	D	Slight to moderate	9.1	3
33E	Klicker stoney silt loam	2–40	Well	C	Slight to high	25.9	9
36	La Grande silt loam	0–2	Moderately well	C	Slight	8.8	3
59E	Tolo silt loam	12–35	Well	C	Moderate to high	13	4
66	Veazie-Voats complex - loam	0–3	Well	B	Low	154	53
72C	Wolot silt loam	2–12	Well	C	Slight to moderate	53.6	18
W	Water					24.5	8

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.

Soils types found in the log source area areas are listed in Table 22 and displayed in Figure 17. Most of the log source areas occur within the Klicker-Anatone complex (49 percent) and the Klicker stony silt loam (25 percent); both are well drained and have slight to high soil erosion potential, which is likely strongly influenced by the slope, with higher erosion potentials corresponding with higher slopes. The Klicker series is moderately deep and formed from basalt source rock with some loess and volcanic ash in the surface layer. The Anatone series is similar to the Klicker series in composition, but tends to be shallower. These soil types occur on uplands with timber cover.

Table 22. Soil Types and Characteristics of Soils within the Log Source Areas

Code	Name / Surface Texture	Slope (percent)	Drainage Class	Hydrologic Soil Group	Erosion Potential	Acres	Percent
5E	Anatone-Bocker Complex – extremely stony loam/very cobbly silt loam	2–35	Well	D	Slight to moderate	27.8	3
6F	Anatone-Klicker complex – extremely stony loam/stony silt loam	40–65	Well	D	High	6.5	1
19E	Hall Ranch stony loam	2–35	Well	C	Moderate	55.1	6
33E	Klicker stony silt loam	2–40	Well	C	Slight to high	243.5	25
33F	Klicker stony silt loam	40–65	Well	C	High	11.4	1
35E	Klicker-Anatone complex – stony silt loam/extremely stony loam	5–40	Well	C	Slight to high	485.9	49
38E	Loneridge stony silt loam	12–40	Well	C	Moderate to high	9.3	1
39C	Lookingglass silt loam	2–12	Moderately well	C	Slight to moderate	86.7	9
40C	Lookingglass very stony silt loam	2-20	Moderately well drained	C	Slight to moderate	34.8	4
59E	Tolo silt loam	12-35	Well	C	Moderate to high	16.5	2

Effects Analysis

Introduction

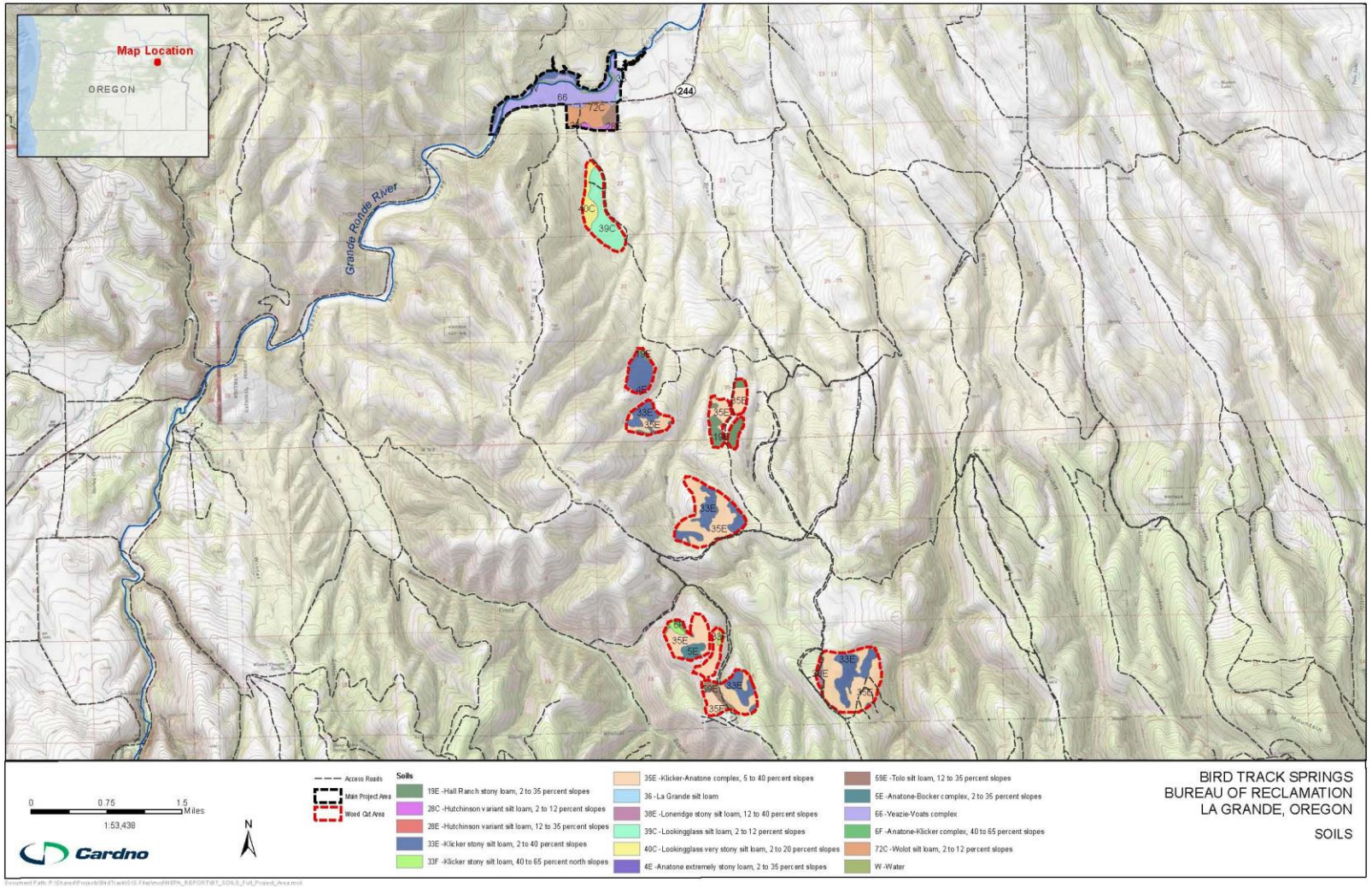
The following describes the potential impacts of implementing the proposed action on soils in the active project area and the upland log source areas with a focus on impacts to soil including the potential for erosion and loss of soil productivity.

Methods and Assumptions

There are two areas of analysis for this project: the active project area (Figure 18) and the log source area, which includes areas where trees would be harvested on private land in the hills south of the project area (Figure 17). The active project area is approximately 293 acres and includes the channel modifications, storage and staging areas, temporary roads, and one area where trees would be harvested and staged on the south side of Highway 244. The log source area includes 982 acres of upland forests located a few miles south of the project area in the Bear, Dog, Jordan, and Beaver Creek drainages (Figure 3).

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 a 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).

Figure 17. Active Project Area and Log Source Areas with Soil Types



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).

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. Mitigation measures and 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 measureable changes in 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 of this EA. 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 35 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 18 shows mapped soil types with the proposed project elements.

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

Soil Code	Bar-Constructed	New Channel	Existing Access Road	Large Woody Material Staging	New Access Road	Staging and Storage Area	Total
28C				0.19			**0.19**
28E				0.09			**0.09**
33E		0.03			0.46	2.52	**3.01**
33F		0.04					**0.04**
36		0.00		1.16	0.35	0.75	**2.25**
39C		0.00			0.00		**0.01**
59E				10.55	0.00		**10.56**
66	2.52	8.12	0.16		11.16	24.72	**46.67**
72C			0.15	0.11	1.05		**1.31**
Water	2.58	13.39			0.55	0.57	**17.09**
Total	5.10	21.58	0.30	12.10	13.58	28.55	**81.21**

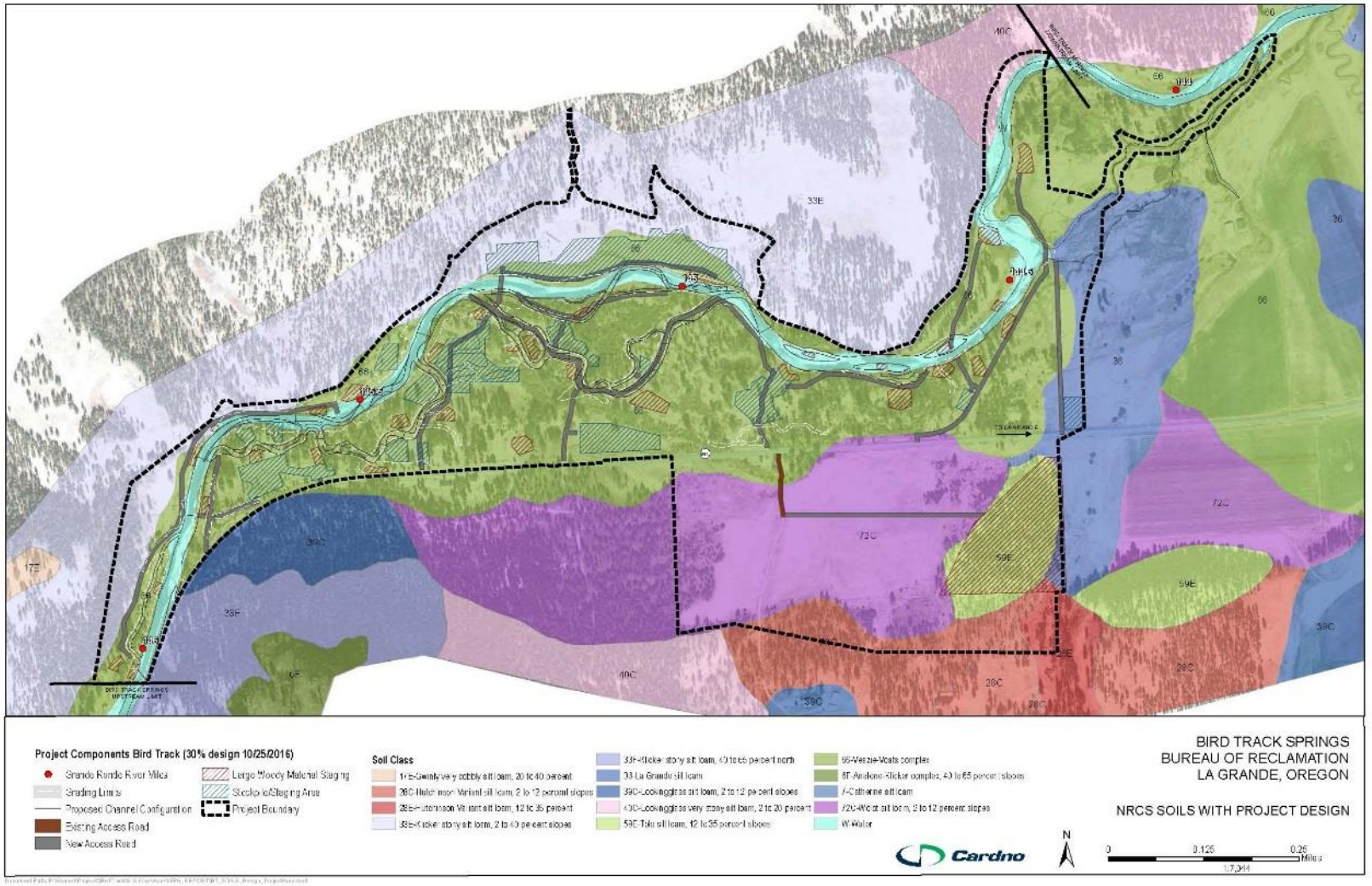
Logs would be obtained from various sources as described in the Log Source Area section of the project description. One source is a 12-acre plot in the active project area, where trees would be harvested and staged. Potential impacts from that area are included in the active project area analysis. Additional logs would be harvested from the log source areas south of the active project area on the Jordon Creek Ranch. Logs would be harvested using low-density selective harvest methods and hauled on existing roads to the active project site. Proposed activities in the log source areas that could impact soils include:

- Using ground-based logging equipment (tractors or forwarders) to harvest trees
- Soil disturbance from pushing trees over to include rootwads
- Creating temporary landings and slash piles
- Skidding logs
- Driving logging trucks on access roads and at loading sites

Potential impacts include soil compaction from equipment traffic; soil displacement from vehicle and equipment traffic and skidding; soil erosion from skid trails, landings, roads, and rootwad holes; and reduced nutrient availability due to removal of trees. Table 22 above indicates the acres of each soil type within the log source areas. It is assumed that tree removal would be dispersed throughout these areas.

Ground-based logging operations would result in direct and indirect effects on soil physical characteristics within the boundaries of proposed activity areas. Most detrimental effects would be concentrated on the proposed skid trails, temporary roads, landings, slash piles, and rootwad holes within or associated with timber harvest units. Minimizing the area occupied by landings and skid trails to reduce the detrimental effects on soil productivity from changes in physical soil properties is recommended in several papers (Garland 1983; Page-Dumroese 1993; Williamson et al. 2000).

Figure 18. Active project area showing proposed project elements and mapped soil units based on the Soil Survey Report of Union County Area (1985).



System roads, skid trails and landings would be laid out to occupy less than 20 percent of the activity area. Spacing skid trails to 75 and 100 feet apart limits detrimental disturbance to less than 20 percent of the activity area. Designated skid trails with 100-foot spacing impact 11 percent of a harvest area (Garland 1983). Literature indicates that Regional Soil Quality Standards can be met by using designated skid trails.

In addition to using designated skid trails and landings, there would be potential to reduce soil effects further by limiting equipment operation, to the extent possible, on skid trails when soils are drier than field capacity (McNabb et al. 2001; Startsev et al. 2001). Rutting and puddling are most often associated with logging on wet soils (Williamson et al. 2000). Most summer logging 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 skidding operations.

All temporary road construction, landings, and log skidding corridors constructed for this project would be reclaimed to less than 20 percent detrimental soil disturbance (per unit) 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 Forest 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 ground-based logging operations to occur when soils are dry, snow covered, or frozen.

Erosion is expected from temporary roads and extended log skidding corridor construction where native surfaces are exposed to rainfall impact and overland flow. Some areas would likely have short term increases of soil erosion above 2 tons per acre per year. Erosion rates would decrease as roads are obliterated immediately following use. Where there is a risk of soil erosion, it would be minimized by implementing the following management practices:

- Reducing the area where equipment operates,
- Locating landings on relatively flat ground that can be properly drained, locating skid trails on slopes less than 35 percent that have soils with a low or moderate erosion hazard,
- Using erosion control features, such as water bars, replanting, and placing slash on disturbed soils.

Sediment from the permanent transportation system has direct effects on water quality, but is not a component of the soil quality assessment process. These effects are evaluated in the Fisheries and Aquatics Section.

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 Alternative

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 Longley Meadows Restoration Project is located immediately downstream of the Bird Track Springs Fish Enhancement Project area and is proposed to have 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 Alternative 1, reasonably foreseeable actions which overlap in time and space with the Bird Track cumulative effects area which may have measureable cumulative effects on soils resources include the Longley Meadows Fish Enhancement project, OHV use, and livestock grazing.

The Longley Meadows project, while different in its specifics, would also involve an intensive construction footprint on floodplain soils. The Longley Meadows project would have similar short term direct and indirect impacts to those described above for the Bird Track project. Because the timing for initiating implementation of the Longley Meadows project would most likely be within 2-3 years following completion of the Bird Track project, the short term impacts to soil resources from this Bird Track project 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 Bird Track Springs 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 Longley Meadows

project. Beneficial impacts to soil 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 improved across all ownerships.

Long term cumulative impacts are expected to be minimal as discussed below.

Displacement and erosion, the loss of topsoil, is a long term and perhaps a permanent loss of soil productivity. However, BMPs and soil mitigation strategies outlined above would reduce the occurrence of displacement and erosion to be within the USFS Region 6 standards in the Longley Meadows project also. 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; therefore, there would not be measurable cumulative effects to soil erosion, displacement, or loss of top soil from the Longley Meadows project when considered in combination with the Bird Track Springs project.

Because this project would move an existing corral located on the private property portion within the active project area to outside of that area and outside of the riparian habitat, soils impacts from livestock management within the project area would be reduced. Livestock impacts to the soils within the area selected for the new corral location would be similar to those being experienced within the current location (compaction, disturbance, removal of vegetation). The corral would move from within Veazie-Voats complex (Unit 66; Figure 16) to within Wolot silt loam (Unit 72C, Figure 16). Wolot silt loam soils are deep, well drained upland soils, on 2 to 12 percent slope. They formed in volcanic ash deposited over a soil that formed in residuum and colluvium derived dominantly from basalt and loess. Permeability of Wolot soil is moderate to a depth of 20 inches and moderately slow below this depth. Wolot soils are in the Hydrologic Soil Group B. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. This soil type is mainly used for timber production, but also used for some cultivated crops and for wildlife habitat. These soils have moderately slow permeability, shrinking and swelling of the soil, and dustiness during dry periods. Wolot silt loam is in capability subclass IIe, non-irrigated. Soils in this class have moderate limitations that reduce the choice of plants or require moderate conservation practices. Subclass e are soils for which the susceptibility to erosion is the dominant hazard affecting their use. Soil erosion rates are poor indicators of loss in productivity because most soil is redistributed within a watershed and not necessarily lost to production (Elliot et al

1999). Wolot is of the Andisol soil order, which have relatively high water-holding capacity and natural fertility. Erosion may be severe on these sites, but productivity may decline little.

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 Longley Meadows project. 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. Tree removal and floodplain construction would avoid landslide-prone areas, existing debris slides/debris torrents, and other potentially unstable lands on steep slopes. Careful 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

This analysis describes the terrestrial wildlife species found in the project area and the effects of the alternatives on these species. Effects analysis discussions focus on Forest Plan management indicator species (MIS); threatened, endangered and sensitive (TES) species; Landbirds (Neotropical Migratory Birds); and Project Area Species of Interest. TES species are covered in the biological evaluation (located in the project record) with a summary of the results of this analysis in Proposed, Endangered, Threatened, and Sensitive Species section of this EA. The existing condition is described for each species, group of species, or habitat. Direct, indirect and cumulative effects of alternatives are identified and discussed. 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 each of the

following species to disclose the potential direct, indirect and cumulative effects of implementing the Bird Track Springs alternatives.

A. Management Indicator Species (MIS)

The Wallowa-Whitman National Forest Land and Resource Management Plan (LRMP) identifies five wildlife species, or groups of species, as MIS (U.S. Forest Service, 1990). These species are identified because of their special habitat needs that may be influenced significantly by planned management activities, and as a result their populations can be used to indicate the health of a specific type of habitat. MIS species welfare can be used as an indicator of other species dependent upon similar habitat conditions.

Table 24. Wallowa-Whitman National Forest Management Indicator Species

Management Indicator Species	Habitat	Presence Within Analysis Area
Rocky mountain elk	Cover and forage	Yes
American marten	Old growth and mature forest	No
Northern goshawk	Old growth and mature forest	Yes
Pileated woodpecker	Old growth and mature forest	Yes
Primary cavity excavators*	Snags and logs	Yes

* Northern flicker; black-backed, downy, hairy, Lewis', three-toed, and white-headed woodpeckers; red-naped and Williamson's sapsuckers; black-capped, and mountain chickadees; and pygmy, red-breasted, and white-breasted nuthatches

I. Rocky Mountain Elk

Rocky Mountain elk have been selected as an indicator of habitat diversity, interspersion of cover and forage area, and security habitat provided by areas of low human disturbance. Elk management on the Wallowa-Whitman National Forest is a cooperative effort between the Forest Service and the Oregon Department of Fish and Wildlife (ODFW). The Forest Service manages habitat while ODFW manages populations by setting seasons, harvest limits, and goals for individual Wildlife Management Units (WMU). The Bird Track Springs project lies within the Starkey WMU.

Potential elk habitat effectiveness may be evaluated using the Habitat Effectiveness Index (HEI; Thomas et al. 1988). This model considers the density of open roads, the availability of cover habitat, the distribution and juxtaposition of cover and forage across the landscape, and forage quantity and quality. More recently, Rowland et al. (2005) has proposed the use of distance band analysis (DBA) to better understand the effects of roads on elk security habitat.

Background Information

Rocky Mountain elk (*Cervus canadensis nelson*- hereafter elk) are an important big game species in northeastern Oregon (Csuti et al. 2001) and are an indicator of the quality and diversity of forested habitat (defined as $\geq$ 40% canopy closure, USDA LRMP 1990) which includes an interspersion of cover and forage areas, and security habitat provided by cover and low levels of human activity (Thomas 1979). It is commonly accepted that the other big game species (i.e. mule deer, white-tailed deer, black bear, and cougar) are at least partially accommodated when high quality elk habitat is present. Elk are habitat generalists; they exploit a variety of habitat types in all successional stages and their patterns of use change daily and seasonally (Toweill and Thomas 2002). Elk are quite responsive to land management activities, thus the density or health of elk populations (as opposed to examining population trends) most likely indicate the effectiveness of elk management. (Toweill and Thomas 2002).

Logging generally results in increased elk forage, with declines in the short term (1-3 years), followed by large increases in forage that may last 10 years or longer (Wisdom et al. 2005). Large-scale habitat manipulations are being conducted with increased frequency in western forests, and although fuels

reduction via thinning or prescribed burning often is assumed to benefit wildlife (Toweill and Thomas 2002, Wisdom et al. 2005), based on the interacting effects of fuels reduction and season on forage characteristics, Long et al. (2008) suggests that maintaining a "mosaic of burned and unburned forest habitat may provide better long term foraging opportunities for elk than burning a large proportion of the stand on a landscape."

Displacement of elk from areas during human activities (e.g. logging, fuels reduction) is well documented (Edge 1982, Toweill and Thomas 2002, Wisdom et al. 2005a). Under most cases, this displacement is temporary, and there is no evidence that elk will not eventually return to harvested areas (Toweill and Thomas 2002). Of much more concern to resource managers are the establishment of roads associated with harvest activities that increase accessibility to recreationists (e.g. hunter, hikers, cross country skiers, OHV). Increased road use by recreationists has been shown to significantly reduce elk security (Towill and Thomas 2002), increase stress levels (Creel et al. 2002), and increase elk vulnerability to mortality from both legal and illegal hunter harvest (Rowland et al. 2005).

Blue Mountain/WWNF Population Viability

The National Forest Management Act (1976) requires that habitat exist to provide for viable populations of all native and desired non-native vertebrates. Elk is a game species that is managed on a management objective (MO) basis. Management objectives were developed to consider not only the carrying capacity of the lands, but also the elk population size that would provide for all huntable surplus, and tolerance levels of ranchers, farmers, and other interests that may sometimes compete with elk for forage and space. Biologically, a population that is managed around a MO is much larger than a minimum viable population. A minimal viable population represents the smallest population size that can persist over the long term. Historically there were game species, including elk, which warranted serious conservation concerns due to depressed populations and range contractions resulting from unregulated market and sport hunting and loss of habitat. Many of the factors that contributed to the decline of large wild ungulates in the past do not exist today. Currently, elk populations on the WWNF are regulated by hunting and predation. Elk numbers are substantially higher than what would constitute a concern over species viability.

Affected Environment

The Bird Track Springs project area falls within the Starkey WMU (ODFW). Population estimates in the Starkey unit from 1990-2000 average 4,750 animals with cow/calf ratios estimated at 21/100 and bull/cow ratios estimated at 9/100 (Schommer and Johnson 2003). The Starkey Unit is within the Umatilla-Whitman Province. Population estimates in the province are 116% of the management objective of 17,100.

The Jordan Creek Ranch is a private land parcel which lies in the northern portion of the project area. 1,059 acres are proposed for commercial and non-commercial harvest treatments which would provide large wood structure for in-stream placement. The majority of forested stands within the Jordan Creek Ranch are dry upland forest vegetation groups and contain ponderosa pine, grand fir, Douglas-fir and western larch. Many of the stands are in a structure stage of understory reinitiation and have an overstocked understory. According to the land manager approximately 2,000 elk occupy the land. There is minimal human and road disturbance as this area is closed to the public.

The forested area directly adjacent to the western area of the Bird Track Springs project area provides designated winter range habitat for big game. This area is closed to motorized vehicles from December 15th – April 30th every year.

The Grand Ronde River- Beaver Creek watershed was analyzed using a habitat effectiveness model (Thomas et al. 1988) to assess the quality of elk habitat. The habitat effectiveness index (HEI) model evaluates size and spacing of cover and forage areas, density of open roads, quantity and quality of forage available to elk and cover quality. Forage data is unavailable and is not included in the total HEI value.

Table 25. Habitat effectiveness index calculations for elk habitat within the Grande Ronde- Beaver Creek watershed.

Habitat Effectiveness Variable	Habitat Effectiveness Value (Optimal = 1.0)	Comments
HE cover	0.69	Amount of satisfactory cover relative to marginal cover- No numerical standard in the LRMP, but it states "to provide near-optimum cover and forage conditions for big game"
HE size and spacing	0.75	Mosaic of cover and forage – at least 80% of the treated area that converts cover to forage is to be within 600 ft of a satisfactory cover patch at least 40 acres in size
HE road density	0.54	Open road density $\leq$1.51 mi/ mi^2
Total HEI	0.66	LRMP MA3 $\geq$ 0.74 HEI

HEI calculations do not include a forage variable because current, reliable forage data are not available.

Cover quality - Forests stands with relatively closed canopies function as thermal and security cover, providing a visual barrier from predators, and may reduce the effects of ambient temperature, wind, and long and short wave radiation functions on energy expenditure (i.e. increased metabolic rates) in elk. The Wallowa-Whitman LRMP establishes a minimum standard for big game thermal cover (marginal and satisfactory combines). At least 30% of the forested lands should be maintained in a thermal cover condition. All Management Areas were pooled for analysis, because they have the same cover standard, thus providing for a more landscape-scale based approach. An HEI value of 0.69 (Table 25) indicates a higher than average level of satisfactory cover.

Size and Spacing – Thomas et al. (1979) suggest that size and spacing of cover and forage habitat is a key to elk use of forested habitat, and this assumption was verified by Leckenby (1984) in the Blue Mountains of northeastern Oregon. Size and spacing of habitat is considered optimal when cover to forage edge widths are between 100-200 yards (Thomas et al. 1988). Considering an HE value of 1 is optimal, an HE size and spacing value of 0.75 (Table 25) indicates that forage to cover ratios within the analysis area is higher than average but less than optimal. However, this variable is not meant to stand alone and therefore management decisions for providing optimum elk habitat solely based on HE size and spacing value should be used with caution.

Open Roads – Excessive open road densities have deleterious effects on habitat effectiveness by taking land out of production (1 road mile equals 4 acres of land), reducing the effectiveness of cover and increasing disturbance to elk. The existing average open road density within the Grande Ronde- Beaver creek analysis area is 1.51 mi/mi^2 (Table 25). The average open road density is lower than the forest plan guideline of 2.5mi/mi^2 for MA-1. However, the road density estimate does not take into account off-road vehicle use on OHV trails, cross-country travel and on closed roads. When these variables are taken into account, road density estimates are likely to be higher.

Direct/Indirect Effects on Rocky Mountain Elk

Alternative 1

Under the no action alternative there would be no direct/indirect effects toward elk because there would be no habitat alteration or associated disturbances.

Alternative 2

Under the proposed action, 1,059 acres of private land have the potential to be impacted with a commercial harvest to obtain racking material and large wood structure. Approximately 197 acres of small diameter trees would be cleared to enlarge an area for cattle grazing, 562 acres would be treated with an improvement harvest and approximately 300 acres would be treated with an overstory removal harvest.

Direct - Direct effects to elk from harvest activities would be the disturbance associated with increased human activity. Noise, visual disturbance, and increased human traffic would likely to displace elk from the area for the duration of the disturbance. The private land occurs in an area likely used by elk as winter range. Displacement during this time could affect over-winter survival by causing animals to mobilize stored bodily energy reserves that are needed to survive the winter when food is scarce. If harvest activities are conducted outside the winter season, it is likely to have a lesser disturbance effect on the elk.

Indirect - Project activities would remove 197 acres of currently small diameter trees and 300 acres of large overstory trees. This will reduce canopy cover and likely increase forage in the short term (10 years). Existing conditions within the watershed show a surplus of cover. Cover to forage ratios would remain the same across the majority of the watershed and the minimal increase in forage would not affect elk distribution. Project activities would not change the cover to forage or size and spacing HEI values.

Cumulative Effects on Rocky Mountain Elk

Effects of past activities including road construction, fire suppression, prescribed fire, and timber management on WWNF lands have been incorporated into the existing condition. The current condition of elk habitat is largely a function of past management activities and historic large wildfires. Historically, the area was unroaded, and forest stands were less dense and provided larger amounts of forage.

Cattle grazing will continue within the watershed. The majority of range acres in the project area are grazed from June 1 – October 30. Resource partitioning between elk and cattle in northeastern Oregon was studied by Stewart et al. (2002). Elk utilized steeper slopes and higher elevations than cattle when cattle were present, possibly indicating competitive displacement of elk by cattle. Diet overlap between cattle and elk has been described, and is most prominent when forage resources are limited. However, most of the rangeland on NFS lands contained within the analysis area is in satisfactory condition.

A small stand (<70 acres) within the watershed is planned for a thinning treatment in the foreseeable future. This stand lies within designated winter range for elk and would be treated outside of the restricted time period (Dec 15th- April 30th). This stand is already considered in forage condition and would not change the cover-to-forage ratio within the watershed.

Proposed project activities on private land and future thinning within the watershed would not affect cover-to-forage or size and spacing values within the Grande Ronde River- Beaver Creek watershed, due to the small scale of proposed activity. No long term sources of disturbance (i.e. new roads) would be

proposed for the landscape. Because of this, harvest activities within the private land would not contribute to cumulative effects for elk.

II. Old Growth Habitat: American Marten, Northern Goshawk, and Pileated Woodpecker

Introduction

The American marten, northern goshawk, and pileated woodpecker are MIS of old growth habitat (U.S. Forest Service 1990). Old growth is a structural classification used to implement direction in the Forest Plan Amendment #2 (Screens; U.S. Forest Service 1995) and refers to multi-strata stands with large trees (Old Forest Multi-Stratum- OFMS) and single-stratum stands with large trees (Old Forest Single Strata- OFSS). Although the two terms have different administrative implications, both are intended to provide habitat for old growth associated wildlife species.

The American marten (*Martes americana,* - hereafter marten*)* is associated with mature, mesic coniferous forests and is one of the most habitat-specialized mammals in North America (Bull and Heater 2001). Martens require complex physical structure in the forest understory created by lower branches of trees, shrubs and coarse woody debris (Buskirk and Ruggiero 1994, Witmer et al. 1998, Bull and Heater 2000). Marten in northeastern Oregon have been documented using large-diameter hollow trees and logs, accumulations of coarse woody debris, and trees with brooms for denning and resting sites (Bull and Heater 2000). 70% of martens in eastside mixed conifer forests used snags > 23.9 in dbh for denning and resting and downed wood > 20.7 in dbh for denning, resting and foraging (Mellen-Mclean et al. 2009).

The Northern goshawk (*Accipiter gentilis*, hereafter goshawk) was chosen as a supporting indicator of abundance and distribution of mature and old-growth forests (LRMP 1990). The goshawk is associated with dense canopied mixed conifer, white fir, and lodgepole pine associations (Wisdom et al. 2000). Important habitat attributes of goshawk prey species include snags, down logs, woody debris, large trees, openings, herbaceous and shrubby understories, and an intermixture of various forest structural stages (Wisdom et al. 2000). Goshawks are prey generalists and use open understories below the forest canopy and along small forest opening to forage for mammals and small birds (Bull and Hohman 1994, Marshall 1992, Squires 2000).

The pileated woodpecker (*Dryocopus pileatus*) occurs primarily in dense mixed-conifer forest in late seral stages or in deciduous tree stands in valley bottoms. It is occasionally seen in younger stands lacking large diameter trees, particularly in winter. It is rarely found in stands of pure ponderosa pine. The association with late seral stages stems from the need for large diameter snags or living trees with decay for nest and roost sites, large diameter trees and logs for foraging on ants and other arthropods, and a dense canopy to provide cover from predators (Marshall et al. 2003).

Correct determination of the scale of analysis is the cornerstone of habitat analysis (Morrison et al. 2006). The choice of spatial scale must be based on the species' relationship with the landscape and should consider the scale at which to apply our results for management purposes (Morrison et al., 2006). Wildlife habitat is commonly analyzed at the watershed scale because it provides a systematic way to understand and organize ecosystem information and thus enhances the ability to estimate direct, indirect, and cumulative effects of management activities (Regional Interagency Executive Committee 1995). However, the watershed scale may be too fine to analyze viability for wide-ranging species' unless it can be placed within the broader context of how the watershed contributes to overall species viability (Regional Interagency Executive Committee 1995).

Impacts to old growth and old growth dependent MIS species within the Bird Track Springs project area were determined by analyzing effects to their habitat at several spatial scales starting with the watershed then framing that within the context of the Wallowa-Whitman National Forest and the Blue Mountains Ecological Province. These scales take into account the species' relationship with the landscape as well as being practical for management purposes. MIS population viability assessments have been conducted for American marten, pileated woodpecker, and northern goshawk at the Blue Mountains and WWNF. These assessments are incorporated by reference within the existing condition and effects analysis for each species. For more in-depth information on the methodology behind these assessments, please refer to the full-length assessments in the project record and the associated peer-reviewed literature scales (Penninger and Keown 2011a, Penninger and Keown 2011b, Penninger and Keown 2011c).

a. Old Growth Structure

Background information

Regional Forester Amendment #2 of June 12, 1995 established interim riparian, ecosystem, and wildlife standards for timber sales (these standards are referred to as the "Eastside Screens"). The Eastside Screens require that a range of variation approach be used when comparing historical reference and current conditions, incorporating the best available science. The range of variation approach assumes that native species have evolved with the historical disturbance regimes of an area and so a forest will continue to sustain populations of those species if current conditions fall within the historic range of variation (Powell 2010). The following range of variation analysis uses methods described in Range of Variation Recommendations for Dry, Moist and Cold Forests (Powell 2010), which is now considered the best available science. Five forest structural stages are identified within these three potential vegetation groups; Stand Initiation (SI), Stem Exclusion (SE), Understory Retention (UR) and Old Forest Single Stratum (OFSS) and Old Forest Multi Strata (OFMS).

LRMP standards and guidelines

The Regional Forester's Eastside Forest Plan Amendment #2 (SCREENS) contains standards and guidelines for old growth (U.S. Forest Service 1995). Standards and guidelines include maintaining all existing remnant late and old seral and/or structural live trees >21" dbh. According to the LRMP, areas allocated to MA15 have no scheduled timber harvest although salvage may occur following catastrophic destruction if more suitable replacement stands exist.

The SCREENS also provides direction for connectivity. Old growth stands are directed to be connected in a least two different directions by the shortest length, minimum 400 ft. wide corridor which maintains canopy cover in the upper one-third of the site potential. If this standard cannot be met, proposed treatments are dropped.

Affected Environment

Late Old-Growth Structure

Analysis was conducted at the watershed level. Moist old forest multi-story (OFMS) is below HRV and all potential vegetation groups (PVG) are below the historic range of variability (HRV) and deficient in old forest single-story (OFSS) (Table 26).

Table 26. Comparison of HRV to existing by potential vegetation group (PVG) in the Grande Ronde River-Beaver Creek watershed

PVG	Existing Acres	% of PVG	Historical Range %
Old Forest Multi Stratum (OFMS)			
moist upland	2,361	12.4%	15-20%
dry upland	1,611	7.7%	5-15%
cold upland	2,657	18.6	10-25%
Old Forest Single Stratum (OFSS)			
moist upland	44	0.2%	10-20%
dry upland	91	0.4%	40-60%
cold upland	0	0%	5-20%

Direct/Indirect Effects to Old Growth Habitat

Alternative 1

Under the no action alternative, there would be no direct or indirect impacts to old growth because there would no harvest.

Alternative 2

There would be no harvest associated with the project taking place on Forest Service land. Harvest is planned on 1,059 acres of private land to obtain racking material and large wood structure. This area is primarily within the dry PVG and the majority of tree species consist of ponderosa pine, western larch, grand fir and Douglas-fir. This area has a history of heavy harvest including targeting snags and down woody material. Emphasis in the past has been placed on economic value over ecological. As a result the area is deficient in large trees over 21”dbh, snags, down woody structure and old growth structure stages. None of the proposed activities would take place within old growth and no old growth was observed on the property. The majority of the proposed units are within an understory reinitiation stage or a stem exclusion structural stages and are not nearing old growth conditions.

Under the proposed action, approximately 197 acres of small diameter trees would be cleared to enlarge an area for cattle grazing and movement of the corral, 562 acres would be treated with an improvement harvest and approximately 300 acres would be treated with an overstory removal harvest. Commercial and non-commercial treatments in the proposed action would not directly impact old growth conditions because there is no existing old growth within the treatment areas to be affected. Indirectly these treatments would preclude affected stands from becoming old growth in the medium to long term (25-50 years). However, the current owner and land manager have expressed a desire to enhance the area for wildlife. Existing snags and down woody debris would be maintained and can help provide future habitat for old growth dependent species as the stands mature over time.

Cumulative Effects to Old Growth Habitat

Project activities do not overlap in time and space with existing old growth habitat within the analysis area. This project would not impact current old growth conditions; therefore, there would be no measureable cumulative effects from the project to old growth habitat.

b. American Marten (Martes americana)

Viability Determination

Wisdom et al. (2000) assessed broad-scale trends of 91 species in the interior Columbia Basin, including the marten. The historical estimate of source habitat for marten in the Blue Mountains was 8.83%, which increased to 23.5% by the 1990s. By managing habitat similar to historical conditions, it is assumed that remaining habitat will be adequate to ensure population viability because species survived those levels of habitat in the past to be present today (Landres et al. 1999).

Source habitat for marten was evaluated on the Wallowa-Whitman National Forest (Penninger and Keown 2011a) and represents the highest quality habitat which contributes to species viability. Source habitat for American marten is considered to be cold-moist and cold-dry forests with multi-stories, large tree structure and closed canopies. The threshold of $\geq$40% of the historical amount of source habitat in a watershed was used to identify watersheds with a relatively high amount of source habitat. Watersheds that contain $\geq$40% of the estimated historical median amount of source habitat are believed to provide for habitat distribution and connectivity, and better contribute to species viability across the forest. Not all watersheds on the Wallowa-Whitman NF have the potential to provide source habitat for marten; historically 76% of the watersheds provided source habitat and currently 68% of the watersheds provide source habitat. Although the viability outcomes for the current condition are lower than the historical, habitat is estimated to currently exist in the quality, quantity, and distribution capable of supporting a viable marten population at the Wallowa-Whitman National Forest scale.

Grande Ronde River- Beaver Creek

According to a GIS query, the Beaver Creek- Grande Ronde watershed provides 2,399 acres of marten source habitat that can contribute to a stable or increasing population out of 33,101 (7%) potential acres of marten habitat. The current watershed index is 0.63 with the historic watershed index at 2.64, indicating a high historic level of habitat quality and a low current level of habitat quality and quantity. This watershed currently does not provide $\geq$ 40% of the median amount of source habitat that occurred historically, and is not above the threshold necessary to support marten population viability (Penninger and Keowen 2011a). The majority of the available habitat is found in the southern section of the watershed and is not connected to the habitat found within the project area.

The size and distribution of the patches of marten habitat within the project area indicate that this area is unlikely to support a source population of marten, now or in the future. The patches of source and potential habitat are small relative to the home range size of marten and separated by large patches of non-habitat that do not have the capability to provide marten habitat, due to the abundance of warm dry forest types and naturally occurring forest openings. The combination of warm, dry forest types, early seral stages, and high levels of disturbance make this area unlikely to support a stable or increasing population of marten. No marten have been detected within the project area boundary. Marten are not suspected to occur through the project area and as such, effects on marten populations from the Bird Track Springs project alternatives will not be analyzed.

c. Northern Goshawk

Viability Determination

Throughout the Interior Columbia Bain, the amount of source habitat (i.e., habitat requirements to provide long term population persistence) available to the goshawk has declined from historical conditions. The greatest declines have occurred in the interior ponderosa pine and western larch forest types. It is estimated that there has been a 96% decline in old forest single-story ponderosa pine (Wisdom et al.

2000). However the interior Douglas-fir, grand fir, white fir, lodgepole pine, and juniper sagebrush have all increased in abundance from historical conditions. The overall decline in source habitat and strong decline in the ponderosa pine cover type is offset somewhat by increases in these other cover types and structural stages that provide source habitat.

Additional source habitat analysis was conducted at a finer scale on National Forest lands as part of a species viability assessment conducted in support of the Blue Mountains Forest Plan revision (Penninger and Keown 2011b). The threshold of ≥ 40% of the historical amount of source habitat in a watershed was used to identify watersheds with a relatively high amount of source habitat. Watersheds that contain ≥40% of the estimated historical median amount of source habitat are believed to provide for habitat distribution and connectivity, and better contribute to species viability across the forest. Thirty-two of the thirty-five watersheds on the Wallowa-Whitman National Forest (WWNF) which historically provided source habitat are above the historical median of source habitat providing 440,696 acres (94% of historical condition) of goshawk habitat. While the presence of roads and trails has decreased the habitat effectiveness of source habitat in most watersheds (67% in the low habitat effectiveness class) the majority of watersheds (86%) on the WWNF have high watershed index scores. High watershed index scores indicate good habitat abundance with low departure from historical conditions, and high habitat quality, with greater 50% of the source habitat being late-successional habitat.

The current viability outcome index for the WWNF show that current source habitat for the goshawk is slightly lower than for the entire Blue Mountains but is very near historical conditions, indicating that suitable habitats are broadly distributed and of high abundance, and the goshawk is likely well-distributed throughout the WWNF (Penninger and Keown 2011b).

LRMP Standards and guidelines

The Regional Forester's Eastside Forest Plan Amendment #2 (SCREENS) requires that all known and historically used goshawk nest-sites be protected from disturbance. An active nest is defined as a nest that has been used by goshawks within the past five years. SCREENS requires that a 30-acre buffer of the most suitable nesting habitat be established around every known active and historical nest tree(s), that it be deferred from harvest, and that a 400-acre post fledging area be established around every known active nest site. While harvest activities can occur within the PFA, up to 60% of the area should be retained in LOS conditions and harvest is to promote the development of LOS. Management of the PFA is intended to provide a diversity of forest conditions. Thinning from below with irregular spacing of leave trees would maintain the appropriate stand composition and structure. A seasonal restriction on logging in the PFA would be implemented during the nesting season from March 1 – September 30.

Grande Ronde River- Beaver Creek

The Bird Track Springs Langley project lies within the Beaver Creek- Grande Ronde River watershed (5th HUC). This watershed contains 7,956 acres of source habitat (habitat that can support a stable or increasing population of goshawks). The current watershed index is 2.55 and the historic watershed index is 2.94 indicating a high level of habitat quality and quantity both now and historically. This watershed currently provides ≥ 40% of the median amount of source habitat that occurred historically, which is above the threshold necessary to support goshawk population viability (Penninger and Keown 2011). Multiple historic goshawk nests have been identified within the watershed, however none have been active within the past 5 years. Die-off of trees in those areas due to insects is suspected to have made the historic nest sites unsuitable.

Project Area

There are no known historic goshawk nests within Forest Service land affected by project activities. The project area contains no source habitat for goshawks on Forest Service land. Potential habitat exists on the Jordan Creek Ranch but a history of heavy harvest has resulted in most of the land being unsuitable for goshawk nesting.

Direct/Indirect Effects on Goshawks

Alternative 1

The no action alternative would have no effect on northern goshawks because there would be no harvest or associated disturbance.

Alternative 2

Under the proposed action, harvest is planned on 1,059 acres of private land to obtain racking material and large wood structure. Approximately 197 acres of small diameter trees will be cleared to enlarge a meadow for cattle grazing, 562 acres would be treated with an improvement harvest and approximately 300 acres would be treated with an overstory removal harvest. The 300 acres of overstory removal is considered a priority and would be treated before the improvement harvest units. The overstory removal would take place in stands containing mostly larch infected with mistletoe in the overstory and thick, small diameter grand fir and Douglas-fir in the understory. There would be no direct effect to nesting goshawks as the majority of habitat proposed for treatment is not suitable nesting habitat. Goshawks that may nest in the vicinity of the private land could potentially use the area for hunting. The proposed improvement harvest would retain overstory canopy, snags, and down wood and units with this treatment would remain suitable for hunting. The overstory removal harvest would create habitat unsuitable for goshawk hunting in the short to medium term (0-25 years).

Because this project does not affect source habitat, post-treatment availability of source habitats would continue to exceed the threshold of 40% of the historical amount in the Grande Ronde River/Beaver Creek and Five Points-Grande Ronde watersheds, thereby continuing to contribute to habitat distribution and species viability on the WWNF.

Cumulative Effects on Goshawks

Many of the present and reasonably foreseeable future activities actions overlap in time and space with the project area and goshawk habitat. However, there are no known goshawk nests within the units proposed for treatment on private land and proposed treatments would not affect goshawk source habitat; therefore, there would be no measureable cumulative effects on goshawks or their habitat from this project.

d. Pileated Woodpecker

Viability determination

Habitat trends of the pileated woodpecker were assessed at the Interior Columbia Basin, Blue Mountains ecological reporting unit (ERU), and WWNF scales using information provided by Wisdom et al. (2000) and the species viability assessment conducted by Wales (2011) in support of the Blue Mountains Forest Plan revision.

A fine-scale analysis of source habitat on National Forest lands in the Blue Mountains, including the WWNF was conducted in 2011 (Penninger and Keown 2011c).This analysis indicated that there has been

a decline in the amount of source habitat on the WWNF from historical conditions. However, source habitat of the pileated woodpecker is still available in adequate amounts and distribution to maintain pileated species viability on the WWNF. Currently, there are approximately 206,374 acres (57% of historical condition) of source habitat on the WWNF, with twenty-nine of the thirty-five watersheds (83%) on the WWNF that historically provided source habitat, continuing to provide that habitat. Reductions of snags and the presence of roads has decreased the quality of source habitat in many watersheds but 33% of the watersheds on the WWNF have high watershed index scores, indicating good habitat abundance, moderate to high snag densities and low to moderate road densities. Additionally, 29% of the watersheds are in the moderate category. Watersheds having $\geq$ 40% of the median amount of source habitat are distributed across the WWNF and found in all clusters.

The viability assessment indicates the WWNF still provides for the viability of the pileated woodpecker. The pileated woodpecker is distributed across the WWNF and there are adequate amounts, quality, and distribution of habitat to provide for pileated woodpecker population viability.

Grande Ronde River- Beaver Creek

This watershed contains 3,266 existing acres of pileated woodpecker source habitat (habitat that can support a stable or increasing population of pileated) out of 48,697 (7%) potential acres of pileated woodpecker habitat. The current watershed index is 2.48 with the historic watershed index at 2.94, indicating a high historic level of habitat quality and a current high level of habitat quality and quantity. This watershed currently provides $\geq$ 40% of the median amount of source habitat that occurred historically, and is above the threshold necessary to support pileated population viability (Penninger and Keowen 2011c). Habitat is scattered across the watershed, including in the area of the proposed action.

Project Area

The project area contains no source habitat for pileated woodpeckers on Forest Service land. Potential habitat exists on the Jordan Creek Ranch, however a history of heavy harvest that targeted snags and down wood left little suitable habitat for pileated woodpeckers.

Direct/Indirect Effects on Pileated Woodpeckers

Alternative 1

The no action alternative would have no effect on pileated woodpeckers because there would be no harvest or associated disturbance.

Alternative 2

Harvest activities would reduce canopy cover which can increase predation rates for pileated woodpeckers and degrade potential habitat. Targeting mistletoe and other disease-affected trees would reduce snag recruitment through mortality. Thinning to allow the remaining trees more space to grow would reduce competition mortality, further reducing future snags. Private land is not required to maintain certain levels of snag habitat; however, the land manager has stated that all existing snags will be maintained. Pileated woodpeckers might use the land for foraging but due to the lack of large snag structure, they would not be expected to use the land for nesting. Because this project does not affect source habitat, post-treatment availability of source habitats would continue to exceed the threshold of 40% of the historical amount in the Grande Ronde-Beaver Creek and Grande Ronde-Five Points watersheds thereby continuing to contribute to habitat distribution and species viability on the WWNF.

Cumulative Effects on Pileated Woodpeckers

Past, present, and reasonably foreseeable future actions were analyzed for cumulative impacts to the species. Effects of past activities including road construction, fire suppression, prescribed fire, woodcutting, and timber management on WWNF lands and past harvest on the Jordan Creek Ranch have been incorporated into the existing conditions for amounts and locations of pileated woodpecker habitat in the analysis area. As discussed above, these past activities have resulted in a snag deficient landscape. While many of the present and on-going activities overlap in time and space with the Bird Track Springs analysis area, because this project would not impact existing levels of snags it would not contribute measurable cumulative effects to pileated woodpeckers or their habitat. (Refer to analysis in Appendix D of this EA).

III. Snag and Log Habitat: Primary Cavity Excavators (PCEs)

Background information

More than 80 species of wildlife use snags and living trees with defects (deformed limbs or bole, decay, hollow, or trees with brooms) in the interior Columbia River basin (Bull et al. 1997). The Blue Mountains of Oregon have 39 bird and 23 mammal species that use snags for nesting or shelter (Thomas 1979). These wildlife are categorized as PCEs.

PCEs rely heavily on decadent trees, snags, and down woody material and can be used as an indicator species of snag habitat. These birds depend on snags for nesting and roosting, and snags and down wood for foraging. A key assumption is if habitat is provided for PCEs, then habitat requirements for secondary cavity users will be met. Suitable nest sites are often considered the limiting factor for cavity nesting bird populations.

Many PCEs, and secondary cavity nesters, feed on forest insects and play a vital role in maintaining healthy, productive forests. Large snags and trees provide more functions, for more species, for a greater period of time than smaller ones. Large woody structures are not easily or quickly replaced. Down woody material is an important component of the forest ecosystem because of its role in nutrient cycling and immobilization, soil productivity, and water retention (Johnson and O'Neil 2001). It also provides habitat for mycorrhizal fungi, invertebrates, reptiles, amphibians, and small mammals. For these reasons emphasis should be placed on conserving or creating these structures when carrying out forest management practices. There is increasing pressure on snag and log habitat as logging safety restrictions and firewood gathering intensify.

LRMP standards

LRMP direction is to maintain snags and green tree replacement trees of ≥21 inches dbh, or whatever is the representative diameter of the overstory layer if it is <21 inches dbh, at 100% potential population levels of primary cavity excavators (U.S. Forest Service 1995). The LRMP used information from Wildlife Habitats in Managed Forests (Thomas et al. 1979; at least 2.25 snags >20 in dbh per acre) to establish minimum snag guidelines. More recently, several studies have shown these snag densities are too low to meet the needs of many primary and secondary cavity users (Bull et al. 1997, Harrod et al. 1998, Korol et al. 2002). Consequently, the original standards for snags and down wood from Thomas et al. (1979) were replaced with the Regional Forester's Forest Plan Amendment #2 (U.S. Forest Service 1995). Bull et al. (1997) found the 2.25 snags/acre insufficient and that 4 snags/acre (2.8 are between 10-20 inches dbh and 1.2 are >20 inches dbh) is more appropriate as a minimum density required by primary and secondary cavity users for roosting, nesting, and foraging needs. Harrod et al. (1998) determined a range of historic snag densities for dry eastside forests between 5.9-14.1 snags/acre (5-12 are between 10-20 inches dbh and 0.9 to 2.1 are >20 inches dbh). Korol et al. (2002) determined that HRV for large snags

(20 inches dbh) for dry eastside mixed conifer forest with a low intensity fire regime was 2.9 to 5.4 snags/acre.

Direction from the Eastside Screens requires that pre-activity levels of logs be left unless those levels exceed those shown in Table 27. Live green trees of adequate size must also be retained to provide replacements for snags and logs through time. Generally green tree replacements (GTRs) need to be retained at a rate of 25 to 45 trees per acre, depending on biophysical group. Pre-activity levels of logs should also be left unless levels exceed amounts specified in Eastside Screens (U.S. Forest Service 1995; Table 26). Larger blowdowns with intact tops and root wads are preferred to shorter sections of tree boles.

Table 27. LRMP standards for down wood[1] (U.S. Forest Service 1995).

Stand type	Pieces/acre[1]	Piece length	Diameter small end	Linear ft/acre
Ponderosa Pine	3-6	> 6`	12``	40`
Mixed conifer	15-20	> 6`	12``	140`
Lodgepole Pine	15-20	> 8`	8``	260`

[1] The table converts to about 0.4, 1.7, and 3.3 tons/acre for ponderosa pine, mixed conifer, and lodgepole pine,

The Decayed Wood Advisor (DecAID)

Integration of the latest science is incorporated into this analysis using DecAID Advisor (version 2.2) (Mellen-McLean et al. 2012) which is an internet-based summary, synthesis, and integration (a "meta-analysis") of the best available science: published scientific literature, research data, wildlife databases, forest inventory databases, and expert judgment and experience. In addition to data showing wildlife use of dead wood, DecAID also contains data showing amounts and sizes of dead wood across the landscape based on vegetation inventory data.

Data from unharvested plots are assessed separately and these data can be used as a reference condition to approximate HRV of dead wood. There is debate among professionals on the impact fire exclusion has on stands relative to HRV of dead wood. One caveat to using these data is, "On the eastside in particular, current levels of dead wood may be elevated above historical conditions due to fire suppression and increased mortality, and may be depleted below historical levels in local areas burned by intense fire or subjected to repeated salvage and firewood cutting" (Mellen-McLean et al. 2012). Even with this caveat, the data are used in this analysis because: they are still some of the best data available to assess HRV of dead wood, even in eastside dry forests; they are the only available data showing distribution and variation in snag and down wood amounts across the landscape; the data from unharvested stands are in the range of other published data on HRV of dead wood even in the drier vegetation types. For a full discussion see HRV Dead Wood Comparison (Mellen-McLean 2011).

Affected Environment

The existing condition analysis was done at the scale of the affected watershed (Grande Ronde River-Beaver Creek) as this is the most appropriate scale for a DecAID analysis.

The habitat categories from DecAID that most closely reflect conditions within the project area are the “Small/medium tree” structural conditions in “Ponderosa Pine/Douglas-fir Forest” wildlife habitat descriptions. DecAID synthesized data for wildlife use of snag densities, by a representative sample of PCEs possibly found within the analysis area, are given below (Table 28). Effects are discussed in terms of snag densities with and without the proposed treatments, and how those densities relate to tolerance levels for wildlife species that utilize snags. The information is presented at three statistical tolerance levels which may be interpreted as three levels of “assurance”: low (30% TL), moderate (50% TL) and

high (80% TL). Each tolerance level is the amount of assurance a land manager would have that they are meeting the habitat needs of the specific species (e.g., 0.3 snags per acre <10 inches dbh would provide a 30% assurance of meeting habitat needs for white headed woodpeckers).

Table 28. DecAID synthesized data for wildlife use of snag densities for ponderosa pine/Douglas-fir habitat type and small/medium trees and larger trees structural condition classes (PPDF_S/L).

Species	Snags > 10 in dbh			Snags > 20 in dbh		
	30% TL	50% TL	80% TL	30% TL	50% TL	80% TL
	Snag density (#/acre)	Snag density (#/acre)	Snag density (#/acre)	Snag density (#/acre)	Snag density (#/acre)	Snag density (#/acre)
White-headed woodpecker	0.3	1.7	3.7	0.5	1.8	3.8
Pygmy nuthatch	1.1	5.6	12.1	0.0	1.6	4.0
Black-backed woodpecker	2.5	13.6	29.2	0.0	1.4	5.7
Williamson's sapsucker	14.0	28.4	49.7	3.3	8.6	16.6
Pileated woodpecker	14.9	30.1	49.3	3.5	7.8	18.4

TL = Tolerance level.

Existing snag densities were compared to wildlife tolerance levels (Table 28). For white-headed woodpeckers, snag density estimates are between the 50% and 80% TL for snags >10 in dbh and snags > 20 in dbh in dry and upland forest and at 80% TL for all snags >10 dbh in the cold upland forest. For pygmy nuthatches, snag densities are between the 30% and 50% TL for snags >10 in dbh and snags > 20 in dbh in all in dry and upland forest and at 80% TL for snags >10 dbh in the cold upland forest. For black-backed woodpeckers, snag densities are below 30% and 50% TLs for snags >10 in dbh and between 30%-50% TLs for snags > 20 in dbh in dry and upland forest and at 30% TL for snags >10 dbh in the cold upland forest. For Williamson's sapsucker and the pileated woodpecker, snag densities are well below the 30% TL for snags >10 in dbh and around 30% TL for snags > 20 in dbh for all potential vegetation groups. The studies used in DecAID to derive this data are largely from NE Oregon and are applicable to the project area.

At the existing snag densities and sizes, Williamson's sapsuckers and pileated woodpeckers would not use the majority of the project area for nesting, roosting, or foraging. These birds need areas with snag densities much higher than those in the project area. Historically, white-headed woodpeckers probably used most of the lower elevation areas within the analysis area. Source habitats for low-elevation old-forest species have declined more than any other habitat type from historical to current conditions and populations of white-headed woodpeckers have declined strongly along with this loss of habitat (Wisdom et al. 2000).

Down wood in all size classes (0 - 0.25 in, 0.25 - 1 in, and > 3 in) is common throughout the Grande Ronde River-Beaver Creek Watershed, therefore the total volume of down wood exceeds LRMP standards. Within the watersheds the cold upland forest types contain (< 30 tons/acre fuel loads), the dry upland forest types contain (< 20 tons/acre fuel loads), and the moist upland forest types contain (>30 tons/acre fuel loads).

Direct/Indirect Effects to Snag and Log Habitat

Alternative 1

The no action alternative would have no effect on primary cavity excavators because there would be no harvest or associated disturbance.

Alternative 2

Under the proposed action approximately 197 acres of small diameter trees would be cleared to enlarge a meadow for cattle grazing, 562 acres would be treated with an improvement harvest and approximately 300 acres would be treated with an overstory removal harvest. The 300 acres of overstory removal is considered a priority and would be treated before the improvement harvest units. The overstory removal would take place in stands containing mostly larch infected with mistletoe in the overstory and thick, small diameter grand fir and Douglas-fir trees in the understory. Both the improvement harvest and overstory removal would reduce recruitment of snags on the landscape. The improvement harvest would retain the healthiest trees reducing mortality from disease and limiting competition mortality. Overstory removal harvest would remove mistletoe infected larch and reduce canopy cover over grand fir and Douglas-fir to allow them to grow faster and healthier. However the land manager has stated that existing snag habitat and down wood would be retained on the landscape to the best of their ability. Snags on Forest Service land would not be affected and snag levels within the watershed would continue to meet the minimum thresholds for primary cavity excavators and forest plan standards for ecologically appropriate numbers.

Cumulative Effects on Snag and Log Habitat

Effects of past activities including road construction, fire suppression, prescribed fire, and timber management on WWNF have been incorporated into the existing condition. Firewood cutting on Forest Service land would continue to reduce available snags and logs, but the effect is generally limited to areas adjacent to open roads. Roads that are temporarily open for harvest activities on private land would not temporarily increase firewood cutting activities as the lands are not accessible to the public.

B. Neotropical Migratory Bird Species

Background Information

A migratory bird is defined by the Migratory Bird Treaty Act of 1918 as any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle. They are a large group of species with diverse habitat needs spanning nearly all successional stages of most plant community types. Nationwide declines in population trends for migratory species, especially neotropical species, have developed into an international concern. Recent analyses of local and regional bird population counts, radar migration data, and capture data from banding stations show that forest-dwelling bird species, have experienced population declines in many areas of North America (Finch 1991). Habitat loss is considered the primary reason for declines. Other contributing factors include fragmentation of breeding grounds, deforestation of wintering habitat, and pesticide poisoning.

The U.S. Fish and Wildlife Service (FWS) is the lead federal agency for managing and conserving migratory birds in the United States; however under Executive Order (EO) 13186 all other federal agencies are charged with the conservation and protection of migratory birds. In response to this, the Forest Service has implemented management guidelines that require the Forest Service to address the conservation of migratory bird habitat and populations when developing, amending, or revising management plans (Executive Order 13186, 2001). To aid in this effort, the USFWS published *Birds of*

Conservation Concern 2008 (*BCC 2008*). The overall goal of the report is to accurately identify the migratory (and non-migratory) bird species that represent the high conservation priorities. BCC 2008 uses current conservation assessment scores from three bird conservation plans: Partners in Flight North American Landbird Conservation Plan (PIF; Rich et al. 2004), the United States Shorebird Conservation Plan (USSCP; Brown et al. 2001, USSCP 2004), and the North American Waterbird Conservation Plan (NAWCP, Kushlan et al. 2002).

Bird Conservation Regions (BCRs) are used to separate ecologically distinct regions in North American with similar bird communities, habitats, and resource management issues. Species contained within the BCC are identified for each BCR. The La Grande District and majority of the Wallowa-Whitman National Forest (WWNF) is found within BCR-10, Northern Rockies.

Affected Environment

BCR-10 includes the Northern Rocky Mountains and outlying ranges in both the United States and Canada, and also the inter-montane Wyoming Basin and Fraser Basin. The Rockies are dominated by a variety of coniferous forest habitats. Drier areas are dominated by ponderosa pine, with Douglas-fir and lodgepole pine at higher elevations and Engelmann spruce and subalpine fir even higher. More mesic forests to the north and west are dominated by eastern larch, grand fir, western red cedar and western hemlock. Five migratory species of conservation concern have been identified as potentially occurring within the project area (Table 29). No formal surveys have been conducted specifically for any of these species within the project area, although terrestrial birds were monitored in the Blue Mountains from 1994-2011 as part of the U.S. Forest Service Avian Monitoring Program (Huff and Brown 2006), as well as multiple annual breeding bird survey route through the La Grande and Baker districts (Sauer et al. 2011).

Table 29. Migratory species of conservation concern identified within the Bird Track Springs Analysis area

Focal Species	Key Habitat Relationships		
	Vegetative	Vegetation Structure	Special Considerations
	Dry Forest		
White-headed woodpecker	Ponderosa pine	Large patches of old forest with large trees and snags	
Flammulated owl	Ponderosa pine, Douglas-fir	Old forest with grassy opening and dense thickets	Thicket patches for roosting; grassy openings for foraging
Williamson's Sapsucker	Ponderosa pine, Douglas-fir, grand fir	Mature open and mixed coniferous-decidous forests	Snags are a critical component
Lewis' woodpecker	Ponderosa pine	Patches of burned old forest	Soft snags for excavation; pesticide spraying may reduce prey base
Bald Eagle	Riparian Habitat		
	Forested areas near water	Large bodies of waters, along rivers, lakes and reservoirs	Timing restrictions and buffers assocated with nesting activity

Dry Forests

Dry forests in relation to migratory bird species are described as coniferous forests composed exclusively of ponderosa pine or dry stands codominated by ponderosa and Douglas-fir or grand fir (Altman 2000). Large-scale declines in open stands, especially those with large trees, have raised concern for such species as the white-headed woodpecker, flammulated owl, Williamson's sapsucker, and Lewis' woodpecker. The majority of the project area is made up of dry forest.

Riparian Habitat

There is a known bald eagle nest site that occurs on private land within the project area. A bald eagle pair has nested consistently in this site for multiple years and are expected to continue barring disturbance.

Direct/Indirect Effects Neotropical Migratory Birds

Alternative 1

The no action alternative would have no effect on primary cavity excavators because there would be no harvest or associated disturbance.

Alternative 2

Due to the occurrence of regular harvest rotations and the lack of prescribed fire on private lands, it is unlikely that these stands would achieve an old forest structure stage. The units with an improvement harvest would likely result in larger trees due to decreased competition and these areas could provide better habitat for neotropical migrants like the chipping sparrow.

The riparian area along the Grande Ronde River currently provides habitat for neotropical migrants. Stream channel reconstruction would remove some habitat that currently exists and would result in disturbance in the short term (2 years). Creating new side channels and connecting the channelized streams with their associated floodplains along with the addition of cottonwood and willow cuttings along the new stream banks would result in additional and higher quality habitat for species such as the yellow-billed cuckoo and the Lewis' woodpecker.

Direct effects to bald eagles could include nest abandonment or nest failure due to disturbance from construction activities. Disruptive activities in or near eagle foraging areas can interfere with feeding young, reducing chances of survival and productivity. Bald eagle restrictions would be implemented for the project to avoid disturbance of the eagles. These restrictions include: 1) A no activity buffer of 600ft and, 2) Timing restrictions from Feb 15th- August 15th.

Cumulative Effects on Neotropical Migratory Birds

Effects of past activities including road construction, fire suppression, prescribed fire, and timber management on WWNF lands have been incorporated into the existing condition. Most current and reasonably foreseeable future actions which overlap in time and space with the project area would not create a measurable cumulative effect on neotropical migratory birds; however, livestock grazing is expected to continue on the private land portion of the project area. Habitat improvements afforded by the proposed action for chipping sparrow may also increase access of areas to livestock and brown-headed cowbirds. The potential for increase in nest parasitism is expected to be most pronounced in areas adjacent to existing cattle operations and agriculture on private lands.

C. Beaver Ponds

Beavers were historically found in the Grande Ronde River system. Over the years, predation, trapping, and historic 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.

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, two 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). A third beaver site consists of a historical pond and associated structure 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).

Forest Plan Compliance

The Bird Track Springs fish enhancement project complies with Forest Plan goals to provide habitat for viable populations of all existing and native and desired nonnative vertebrate wildlife species and to maintain or enhance the overall quality of wildlife habitat across the Forest.

Threatened, Endangered, Proposed 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 30). The table includes an assessment as to the likelihood of these species occurring in the analysis area.

Table 30. Pre-field species checklist for BTS 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		
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 historic 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.

Scientific name	Common name	Habitat summary	Likelihood of occurring within the analysis 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 31. Effects Call by Species for those 13 species which may have suitable habitat within the Bird Track Springs Fish Restoration Project Area

Scientific Name	Common Name	Effect call for Bird Track Springs 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 Bird Track Springs 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 III). Requirements in Biological Opinions issued from USFWS and NMFS would 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 the 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 recovery for all three species.

Table 32. 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 aquatic specialist report satisfies requirements of 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 Bird Track Springs 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 prefield review phase to determine the presence or absence of aquatic sensitive species in the effects area for the Bird Track Springs Fish Habitat Enhancement Project:

- Wallowa-Whitman N.F. 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 33). 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.

The Columbia spotted frog *(Rana luteiventris)* and Inland spotted frog *(Ascaphus montanus)* will be covered in the wildlife biological evaluation.

Table 33. 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*)	R6S, MIS	Yes		X		X
Pacific Lamprey (*Entosphenus tridentatus*)	R6S	Yes (reintroduced in 2014 and 2015)		X		
Western Ridged Mussel (*Gonidea angulata*)	R6S	Suspected		X		X
Shortfaced Lanx (*Fisherola nuttalli*)	R6S	Suspected		X		
Columbia Pebblesnail (*Fluminicola fuscus*)	R6S	Suspected		X		
California floater (*Anodonta californiensis*)	R6S	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 Bird Track Springs project area and occupy all Category 1 streams; approximately 1.9 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. However, overall, the project would have a long term beneficial effect.

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 and in 2016, 400 adults were introduced into the Upper GRR 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 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 slow velocity areas. At this stage, they live in silts/sand substrates and filter feed for 3-7 years.

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 lamprey 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) would 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 nuttali,* 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. Shortface 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 1.9 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 Grande Ronde River. 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 shortface 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 shortface 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 in-channel work, individuals could be affected 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 shortface 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 historic range, reasons are thought to include a decline in numbers of native host fish (on which the larval life stage of the California floater depends), pollution, and 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 occur 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 1.9 miles of mainstem GRR if they occur in the project area or immediately downstream of the project area. Short term increases in sediment and turbidity associated with in-channel work are 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 would be 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.

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 EFH and would have short term adverse effects on quality of Chinook salmon habitat in the existing 1.9 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 August, 2015 (USDA Forest Service 2016) was reviewed for sensitive species potentially applicable to the Bird Track Springs Project.

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 records of each species. No population surveys were conducted for any of the species addressed in this BE. Only those PETS known or suspected to occur, on the La Grande Ranger District, are addressed in this BE (Table 34). 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 34. PETS Species Review, WWNF and Bird Track Springs Project Area

Common Name	Scientific Name	USFWS Status	USFS Status	WWNF Occurrence[1]/ Bird Track Occurrence[2]	Addressed Further in this BE
Amphibians					
Rocky mountain tailed frog	*Ascaphus montanus*		SEN	D/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.					
Columbia spotted frog	*Rana leutriventris*		SEN	D/D	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 not been documented in the project area but they occur in close proximity to the project area and suitable habitat exists within the project area.					
BIRDS					
Upland Sandpiper	*Bartramia longicauda*		SEN	D/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.					
Bufflehead	*Bucephala Albeola*		SEN	S/N	
Known breeding range in Oregon is restricted to the Cascades. Breeding habitat consists of high-elevation lake or pond habitat surrounded by forest (ODFW 2006). The project area lacks suitable habitat, and no known sightings are reported for the area.					
Greater Sage-Grouse	*Centrocercus Urophasianus*	CANDIDATE	SEN	S/N	
Suitable habitats are associated with sagebrush. The project area lacks suitable habitat and known sightings for sage-grouse.					

Common Name	Scientific Name	USFWS Status	USFS Status	WWNF Occurrence[1]/ Bird Track Occurrence[2]	Addressed Further in this BE
American Peregrine Falcon	*Falco Peregrinus Anatum*		SEN	D/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.					
Bald Eagle	*Haliaeetus Leucocephalus*	DELISTED	SEN	D/D	X
Nesting habitat consists of large conifers within 1 km of water containing adequate supply of medium to large fish (Johnsgard 1990). 1 known nest site exist within the project area. Nearest nest sites are located more than 10 miles from the project area. The project area contains potential foraging habitat and the potential for species occurrence.					
Lewis' Woodpecker	*Melanerpes Lewis*		SEN	D/H	X
Primary breeding habitats include open ponderosa pine, riparian cottonwood, and logged or burned pine (Tobalske 1997). No sightings are reported within the project area; however, sightings are reported for forested lands directly adjacent to the west. The project area contains potential suitable habitat and the potential for species occurrence.					
White-Headed Woodpecker	*Picoides Albolarvatus*		SEN	D/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. .					
Columbian Sharp-Tailed Grouse	*Tympanuchus Phasianellus Columbianus*		SEN	D/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.					
MAMMALS					
Canada Lynx	*Lynx Canadensis*	THREATENED		D/N	X
The species is classified as “not present” on the WWNF					
Gray Wolf	*Canis Lupus*	DELISTED	SEN	D/H	X
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.					
Fisher	*Martes Pennanti*		SEN	S/H	
Preferred habitat consists of late-successional conifer forests. No sightings have been reported for northeastern Oregon since 1976, leaving no evidence for an extant population in the Wallowa Mountains (Aubrey and Lewis 2003).					
California Wolverine	*Gulo Gulo Luteus*	CANDIDATE	SEN	D/H	X
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.					
Townsend’s big-eared bat	Corynorhinus townsendii		SEN	S/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 Bird Track project area.					
Spotted Bat	Euderma maculatum		SEN	S/N	
Spotted bats primarily rely on crevices and caves in tall cliffs for roosting which likely determine their distribution. The Bird Track project area lacks tall cliffs, making occupancy unlikely.					
Fringed myotis	Myotis thysanodes		SEN	D/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. Harvest activities to obtain large wood for instream work takes place on private land that lacks decadent trees and snags.					

MOLLUSKS					
Fir Pinwheel	*Radiodiscus Albietum*		SEN	D/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). No sightings are reported within or adjacent to the project area. Lack of moist forest makes occurrence unlikely.					
Columbia Gorge Oregonian	*Cryptomastix hendersoni*		SEN	S/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 sedimentary taluses as well (Frest and Johannes 1995). Lack of basalt talus and sage scrub makes the occurrence of this species unlikely.					
Shiny Tightcoil	Pristiloma wascoense		SEN	S/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. There has been no documentation on the Wallowa-Whitman but potential habitat is present. There is a lack of microsites within the project area and occurrence is unlikely.					
INSECTS					
Meadow Fritillary	*Boloria Bellona*		SEN	S/N	
The only known site in Oregon is located in Umatilla County (Fleckenstein 2006). The project area is located outside the known distribution of this species.					
Silver-Bordered Fritillary	*Boloria Selene*		SEN	S/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.					
Johnson's Hairstreak	*Callophrys Johnsoni*		SEN	D/S	X
Suitable habitat includes mistletoe on ponderosa pine, which is present on the private land are of the project area.					
Intermountain Sulphur	*Colias occidentalis pseudochristina*		SEN	D/N	
Suitable habitat consists of sagebrush with scattered Ponderosa Pine. Lack of sagebrush within the project area makes occurrence unlikely					
Yuma Skipper	*Ochlodes yuma*		SEN	D/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.					
Western Bumblebee	*Bombus occidentalis*		SEN	D/S	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 = Sensitive.
[1]D = Documented occurrence, S = Suspected occurrence (USDA Forest Service 2009).
[2] 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 effects on PETS wildlife species in the Bird Track Springs project area. Specifics for the analysis of these species can be found in the Wildlife Biological Evaluation in the Bird Track Springs Analysis File.

Table 35. Effects Determination for PETS Wildlife species known or suspected to occur on the BTS Project Area.

STATUS	Species	Effects Determination
	AMPHIBIANS	
Sensitive	Columbia spotted frog *Rana luteiventris*	MIIH
	BIRDS	
Sensitive	Northern bald eagle *Haliaeetus leucocephalus*	MIIH
Sensitive	Lewis' woodpecker *Melanerpes lewis*	MIIH
	MAMMALS	
Threatened	Canada lynx *Felix lynx canadensis*	NE
Sensitive	California wolverine *Gulo gulo luteus*	MIIH
Sensitive	Gray wolf *Canis lupus*	NI
	INSECTS	
Sensitive	Johnson's hairstreak *Callophrys johnsoni*	MIIH
Sensitive	Western bumblebee *Bombus occidentalis*	MIIH

Effects Determinations: NI = No Impact, MIIH = May Impact Individuals or Habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Invasive Species

Introduction

The analysis for the Bird Track Springs project covers the specific areas where ground disturbance will occur within the project boundary. Mitigation measures contained in this document will 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 Bird Track Springs Fish Enhancement Project (BTS) 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 will 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 18 inventoried invasive non-native plant sites (9 different species) within the BTS project area on USFS land. The inventoried acres within the project area are shown in the table below (Table 36). Acreages reflect current information in the Forest INSP GIS layer (GID 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 36. 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	74	A	B
Centaurea maculosa	Spotted knapweed	61	A	B
Cirsium arvense	Canada thistle	72	B	B
Cynoglossum officinale	Hounds tongue	72	N/A	B
Euphorbea esula	Leafy spurge	22	A	B
Hypericum perforatum	Common St. Johnswort	60	N/A	B
Leucanthemum vulgare	Oxeye daisy	8	N/A	N/A
Linaria vulgaris	Yellow toadflax	1	N/A	B
Potentilla recta	Sulphur cinquefoil	60	N/A	B
Total		**430**		
Total Weed Footprint		**83**		

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 37 provides site information in relation to activities in the proposed action for the BTS Project Area. Many of the sites of varying species are located on the same piece of ground. A good example is the area

encompassing the Bird Track Springs Nature Trail System. There, the same 60 acre site, containing diffuse knapweed, Canada thistle, houndstongue, St. Johnswort, and sulfur cinquefoil, makes up five invasive plant inventory sites. In this case, there are 300 acres of weed inventory on a 60 acre footprint.

There have been intensive and focused efforts made during the 2015 and 2016 field seasons to hand pull, hoe, and apply herbicide to the invasive plants in the project area in anticipation of this project.

Table 37. Noxious weed proximity to activities in proposed action

Site Number	Common Name	Proximity to proposed activities
06160600048	Diffuse knapweed	60 acre site encompassing the Bird Track Springs Nature Trail System. The area in which channel construction, material stockpiling, and project staging are to occur.
06160600049	Diffuse knapweed	2 acre site between campground and Hwy. Adjacent to where trees from campground would be taken.
06160600050	Spotted knapweed	Overlapping site 048.
06160600111	Diffuse knapweed	12 acre rectangular site on the edge of FS near the private hay barn. Overlaps where river bank enhancement would occur.
06160600255	Diffuse knapweed	0.4 acre linear site downstream of site 111. Adjacent to where river bank enhancement would occur.
06160600512	Spotted knapweed	Overlapping site 255.
06160600513	Houndstongue	Overlapping sites 255 and 512.
06160600514	Canada thistle	Overlapping sites 255, 512, and 513.
06160600519	Leafy spurge	Overlapping site 111.
06160600520	Houndstongue	Overlapping sites 111 and 519.
06160600521	Canada thistle	Overlapping sites 111,519, and 521
06160600524	Houndstongue	Overlapping sites 048 and 050
06160600525	Sulfur cinquefoil	Overlapping sites 048, 050, and 524
06160600526	Canada thistle	Overlapping sites 048, 050, 524, and 525
06160600735	Yellow toadflax	0.5 acre site at the west end of river trail. Where newly constructed river channel would pass through.
06160600757	Leafy spurge	10 acre site along river trail with a peninsula shaped lobe extending away from the river bank toward the highway. Overlaps where river channel would be filled and a small portion overlaps where the new channel would be constructed.
06160600758	St. Johnswort	Overlapping sites 048, 050, 524, 525, and 526
06160600759	Oxeye daisy	8 acre site along the river trail. Overlaps where old channel would be filled, and new channel and new side channel would be constructed.
Private Land Associated with stream restoration activities	Diffuse and spotted knapweed Canada thistle St. Johnswort Sulfur cinquefoil Leafy spurge Hounds tongue Common Mullein	Approximately 47 acres where temporary access roads would be located, stockpiles will be established, and the corrals would be removed and rehabilitated.
Private Land Associated with large wood acquisition	Unknown at this time. Not surveyed.	1,059 acres where 1,170 trees with rootwads would be collected and 4,210 logs would be collected. Machinery and log truck traffic would be present.

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. There has been treatment of leafy spurge and knapweed performed along the river bank over the last several years by Tri-County Cooperative Weed Management Area (Tri-County). During a tour of the private land region of the project in September 2016 it was observed that this land has a similar presence of invasive plants as the 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 this portion of the project area and sulfur cinquefoil is scattered throughout. There is a smaller population of leafy spurge along the river bank on the private ground suggesting that the recent Tri-County treatments, in which USFS land was omitted because of the EIS lawsuit, have had a beneficial effect. Ventenata and cheatgrass are present on two half acre riverbank shelves.

The privately owned land to the south of the restoration project from which the large wood to be placed in the river would be collected has not been surveyed at this point in time. This consists of roughly 6,000 acres of the project area from which 1,059 selected acres, 12 separate units, would have tree removal activities.

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 BTS 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 document, 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 BTS Project are delineated in Table 38 below. A more comprehensive summary of all activities is found in Proposed Action and Alternatives alternative 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.

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 significantly 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 significantly reduced.

Alternative 2 – Proposed Action

The following table summarizes the effects of implementing the actions proposed in the action alternative and the potential intensity of those effects.

Table 38. Element specific effects of action alternative

Alternative Elements	Potential Effects	Alternative 1	Alternative 2
Large wood acquisition include mechanical removal systems (tractor, helicopter) on Jordan Creek Ranch			
*Treatment Acres	Ground disturbance. Introduction of plant materials on people and vehicles to tree source area. Transportation of plant materials on people and vehicles from tree source to landing and placement area.	0 acres	1,058 acres
*Potential for Effect		No	Moderate
Placement of wood instream include equipment used to install			
*Treatment Acres	Ground disturbance and introduction of invasive plant materials from trees, root wad debris, people, and machinery.	0 miles	1.9 miles
*Potential for Effect		No	Moderate
Gravel and boulder placement			
*Treatment Acres	Ground disturbance and introduction of plant materials on people and machinery. Transportation of potentially weed infested material to new location.	0 miles	0.1 acres
*Potential for Effect		No	Moderate
New channel construction			
*Treatment Acres	Increase in disturbance and short term reduction in canopy cover and competition.	0 miles	6.9 acres
*Potential for Effect		No	Moderate
Construction and decommissioning of stockpile sites			
*Treatment Acres	Ground disturbance and introduction of plant material.	0 acres	22.15 acres
*Potential for Effect		No	Moderate
Construction and decommissioning of temporary access roads			
*Treatment Acres	Ground disturbance and introduction of plant materials on people, machinery, and vehicles.	0 miles	13.2 acres
*Potential for Effect		No	Moderate
Temporary river crossings			
*Treatment	Ground disturbance and introduction of plant materials on people, machinery, and vehicles.	0 crossings	4 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	25 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	1.9 miles
*Potential for Effect		No	Low
Cut removal, fill of river segments, and stockpile of overage materials			
*Treatment Acres	Ground disturbance, distribution, and introduction of plant materials on people, machinery, and vehicles.	0 acres	7.39 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)
Moving of Bear Ranch corrals to new location, construction of new corrals			
*Treatment Acres	Ground disturbance and introduction of plant materials on people, machinery, and vehicles. Conveyance of corral base material to another location could relocate weed seeds to previously non-infested areas.	0 acres	5 acres
*Potential for Effect		No	Moderate
Bear Creek Ranch gravel bar construction (including willow trenches and live cottonwood flood fencing)			
*Treatment Acres	Ground disturbance and introduction of plant materials on people, machinery, and vehicles.	0 acres	0.25 acres/ 220 ft. trench/fence
*Potential for Effect		No	Low

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.

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 would also increase.

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 increase 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.

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 BTS 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 BTS 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 BTS 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 BTS Project. The potential cumulative effects related to noxious weed management, road maintenance, grazing allotment, 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 the BTS project 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 seasonal ground disturbance event. However, sheep would contribute to what is referred to as cultural invasive plant control by grazing invasive plants in the area. Timing would influence the benefit of this activity.

There is a potential for weed seeds to be carried from private lands which may not have an active invasive plant management program to locations within the project area. Invasive weed management would be mandated on private lands within the project area 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. BTS 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 39 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 higher 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 mitigation measures 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 39. Summary of estimated effects for alternatives in the BTS Project

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

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

Climate Change

The potential effects of climate change on invasive species are unclear. Studies have suggested that climate change could favor invasion by non-native plants, while others have found that some species may actually be reduced as a result of potential climate change effects (Bradley, et. al, 2009; Hellman, et. al, 2008). It is safe to assume however, that invasions by non-native species would still be a concern.

With the unknown extent of climate change and the potential effect on non-native species, it is difficult to analyze the effects of climate change on invasive species in the BTS Project. However, it seems unlikely that the activities of this project when coupled with climate change would increase the risk of invasion of the BTS Project area beyond that outlined in this report.

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). The BTS Project 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 high concentrations of noxious weeds and coordinating activities with pre-treatment, and requiring the use of native plant materials for rehabilitation and restoration work. The BTS Project is consistent with these goals through adherence to the FEIS and the Forest Plan.

Heritage Resources

Introduction

This section discusses the existing conditions and effects of implementation of the Bird Track Springs 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 Bird Track Springs Analysis File.

Affected Environment

Pre-Contact History

The Upper Grande Ronde River Basin lies within the Southern Plateau culture area. The term "culture area" refers to an area or region in which the Tribal peoples who lived there were more similar to one another than to Tribes that inhabited other regions. The Tribes within a culture area might share similar clothing styles, foods, customs, stories, myths, beliefs, and languages. Inter-marriage and similar family organizational systems are also common within a culture area. While the Southern Plateau was inhabited by Sahaptin speakers with different historical origins, there were strong cultural similarities between the groups. These similarities may have been due to several factors, including similar subsistence adaptations and technologies, art and rituals, and shared behaviors, styles and materials that were maintained by regular interactions and exchanges between community groups (Hayden and Schulting 1997:51-52).

Archaeological investigations have revealed that people living in the Southern Plateau area have practiced a seasonal round of subsistence for thousands of years that kept them moving throughout the land over the course of the year. The seasonal round movements responded to the rhythms of nature and took them from fishing camps and plant procurement sites at low elevations to berry-picking sites and hunting camps high in the mountains. Through evidence collected in their work, archaeologists have noted that the pre-contact history of the Southern Plateau can be divided into three general periods:

- Period I (11,5000 years ago to about 5,000-4,400 years before present [BP])
- Period II (4,400 BP-1,900 BP)
- Period III (1,900 BP – A.D. 1720)

As described by Ames et al. (1998:103-119), and summarized in the Bird Track Springs Heritage Resources Report (ICF, 2017), these periods are distinguished by similarities in material remains over time, and period transitions are denoted by substantial changes in materials (in either quantity or type). Period I is characterized by stemmed, leaf-shaped and side-notched projectile points (spear and atlatl dart points), and people utilizing this area during Period I were characterized by high seasonal mobility, low population densities, and a technology geared to maximum flexibility. Period II is marked by changes in settlement and subsistence strategies that may have been spurred by changes in climate and environmental conditions. More permanent habitation types are seen at the beginning of Period II in semi-subterranean pit houses, and there is an increased reliance on root crops and anadromous fish. Period III is characterized by the florescence of the winter village pattern, and intensive reliance on root crops and anadromous fish. Seasonal mobility continues to dictate subsistence and cultural activities during this period. The horse appears near the end of this period and takes the Southern Plateau into the historic era.

More specific to the project area, archaeological evidence exists that supports the presence of pre-contact peoples, most likely for subsistence and resource procurement. The Grande Ronde River and tributary streams could support significant runs of salmon and steelhead. According to the Watershed Professional Network, LLC (2004), the Grande Ronde River 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. Both of these animals would have been available 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.

Post-Contact History

Euro-American explorers such as David Thompson, Benjamin De Bonneville, Nathaniel Wyeth, David Douglas, and John C. Fremont first entered the Grande Ronde valley as early as 1811. Two additional expeditions soon followed (Edvalson Almquist et al. 1996). Shortly thereafter, The Hudson's Bay Company, a prominent English operation, brought fur trading to the area and quickly began over-trapping beaver in the Wallowa's in order to discourage American fur companies from crossing the Rockies. However, this strategy was unsuccessful and American trappers swarmed into the region, resulting in a nearly depleted beaver population along the river by 1830 (Bureau of Reclamation 2014).

Very few others settled in the area until the 1850s and 1860s when pioneers on the Oregon Trail, a 2,000 mile long wagon road running from Missouri to the Columbia River, crossed over from the Powder River basin in the south and headed west into the Blue Mountains (Duncan 1998). As settlers began to enter the valley, several important roads leading from larger commercial centers to local mining communities were built through the town of Union to the southeast. Many of the early surrounding settlers engaged in the freighting business, yoking their oxen into teams of six and carrying merchandise from The Dalles or Umatilla to the mines around Auburn in Baker County (Barklow 1987).

The increase in Euro-American settlers in the area brought tensions between them and the Indian population already established there. Although the Umatilla Indian Reservation at Grand Ronde had already been established by 1855, many settlers viewed the tribes as trespassers and worked to displace them from the Wallowa Valley and surrounding areas. Due to the discovery of gold and silver as well as placer mining operations active upstream of Camp Carson in the Upper Grande Ronde at the headwaters, the population in the area increased significantly (Bureau of Reclamation 2014).

As settlement pressures increased, treaty amendments were executed, eventually pushing the Umatilla and other Tribes out of the area, and many onto the reservations (Duncan 1998; Oregon Historical Society 1960). By 1869, with the completion of the transcontinental railroad, the Oregon Trail became mostly obsolete and emigrants were able to settle in the area with more ease and in larger numbers. The railroad also opened up the market for farmers to export their goods to the growing city of Portland.

Irrigation development began to take place during the 1870s in the Grande Ronde valley first at rich alluvial lands along the river and feeder streams, then up into drylands when alluvial grasslands were depleted. Many canals and crude ditches were dug extending away from emerging mountain streams in order to support settlers' crops and livestock (Duncan 1998). Farming crops and livestock proved to be a suitable way of life in the valley; however, old growth firs and pine seemed to offer an endless supply of wood. Therefore, many sawmills sprouted all over Union County and logging quickly became the lucrative industry (Turner 2005).

The establishment of the national forests in eastern Oregon played an important role in the local economy of the area. During the early twentieth century, roads, campgrounds, and trails were constructed for recreation and resource extraction. The Wallowa National Forest, which encompasses portions of the area of potential effect (APE) for this project, was created in 1908 from the combination of seven forest reserves and the Whitman National Forest was created the same year from the combination of three forest reserves. These forests, located in Idaho, Washington, and Oregon have been managed together since 1954 and are known as the Wallowa-Whitman National Forest consisting of 2.3 million acres ranging

from the Blue Mountains and Wallowa Mountains down to the Snake River on the Idaho border, which includes the Hells Canyon National Recreation Area (National Forest Foundation 2017).

Ethnography

Oregon's Plateau Indians included the Wasco, Wishram, Warm Springs (or Tenino), John Day, Cayuse, Umatilla, and Nez Perce, and the associated Walla Walla along the Columbia River. They lived from the Cascade Mountains to the Wallowas, from the margins of the rivers to summer camps at high elevations. "In historic times, the Umatilla and Walla Walla occupied riverine tracts along the Columbia and the lower courses of tributary streams, including Willow Creek and Umatilla River for the former, and the Walla Walla and Snake rivers for the latter… The Cayuse homeland extended along the upper courses of the Umatilla and Walla Walla rivers, as well as that of the Grande Ronde, a tributary of the Snake River that takes its name from the large oval prairie in which it lies" (Stern 1998). The upland slopes that drain into the Powder River located to the south of the Grande Ronde Valley and the headwaters of the Grande Ronde River, located west of the valley are considered to lie within the territory exploited by the Cayuse Indians (Ray et al. 1938). According to early 20th century accounts, the Grande Ronde Valley was reported to have been jointly occupied by the Umatilla and Nez Perce Indians (Spinden 1908).

The Plateau Tribes occupied a challenging environment. Summers were hot and windy; winters were cold and windy. The lodges to shelter human activities thus varied over the year from pole-frame, mat-covered summer encampments to semi-subterranean pit houses, framed with a cone of rafters covered with brush and earth to provide a refuge from the winter conditions. In spite of its harshness the region abounded in life. The Columbia and its tributaries--Deschutes, John Day, Umatilla, Snake, Grande Ronde, and Owyhee--were filled with fish that not only fed the people, but also brought groups together for trade and socializing. Following annual ceremonies, the women harvested the roots of wild celeries, camas and cous (*Lomatium* spp.), gathered nutritious moss, and picked huckleberries in the nearby mountains. The men hunted deer to secure meat and hides to tan for clothing and moccasins.

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR), a proponent of this project, are the primary Tribes with interest in *Ka Katla*, the Grande Ronde Valley (Steinmetz 2003). The CTUIR is a union of three Tribes: Cayuse, Umatilla, and Walla Walla, the latter two of which were riverine tribes (Stern 1998). In 1855, the three Tribes signed a treaty with the U.S. government, in which it ceded over 6.4 million acres to the United States. In the treaty, the Tribes reserved rights to fish, hunt, and gather foods and medicines within the ceded lands, which today is northeastern Oregon and southeastern Washington. The Grande Ronde Valley lies within the ceded CTUIR treaty lands. Tribal members still exercise and protect those rights today.

Water plays a central role in Tribal life and "represents an integral link in a world view where water is sacred and extremely important to preserving precious balance – water is the origin of and essential for the survival of all life" (CTUIR 2017). The river system of the Southern Plateau was the lifeblood of the Walla Walla, Umatilla, and Cayuse and it linked many different people by trade, marriage, conflict, and politics. The people fished, traded, and traveled along the river in canoes. The river people were tied with other Tribes along the river with closely related family, trade, and economic interests in the Columbia River Gorge and the Northern Plateau. The current project, which would restore habitat for fish, would play a small part in continuing the lifeways and traditions of the CTUIR Tribes.

The Mount Emily Railroad Grade

Located within the APE is a portion of the Mount Emily Railroad Grade which has been determined to be a historic property eligible for listing in the National Register of Historic Places. The Mount Emily Timber Company, later known as the Mt. Emily Lumber Company was founded in 1912 by the Kinzel family and August J. Stange, son of August H., a master millwright, sash and door manufacturer from

Wisconsin. The company was formed to acquire and hold timberlands in Oregon, although it had not yet moved west. This was a trend during the teens and twenties as the timber supply throughout the rest of the country was dwindling. August H. was already using lumber from mills in eastern Oregon for his sash and door business and when the timber supply became scarce in Wisconsin, he sent his son, August J. to La Grande to purchase land and timber and in 1924 the business moved west and became the basis for the La Grande sawmill.

The new modern sawmill was equipped with a 3-band system and drying facility, along with a complete remanufacturing and finishing plant. The capacity of the La Grande sawmill was 50 million board feet per year (Powell 2008). With its modern sawmill, the company quickly became the technological leader in timber harvesting, transportation, milling operations, and nationwide marketing (Turner 2005). The main hauling route for Mt. Emily's railroad at the time was at Hilgard up Five Points Creek where the company was logging National Forest timber (Deumling 1972). The town of Hilgard near Hilgard Junction, 2.5 miles east of the APE, was a thriving community since the 1880s, serving miners, loggers, and stockmen and had one of the earliest sawmills in the Grande Ronde area owned by Daniel Chaplin (Bureau of Reclamation 2014).

The Mt. Emily Lumber Company began construction on a logging railroad from the Union Pacific mainline eight miles west of La Grande and in 1925 purchased the Grande Ronde Lumber Company logging railroad. The mainline railroad route extended approximately 30 miles to the southwest of La Grande. The company replaced the outdated engines with geared locomotives and continued to expand the logging railroad farther west (Turner 2005). This included a spur line up Whiskey Creek and railroad from Hilgard along the Grande Ronde River and over the Blue Mountains to the mouth of Camas Creek about 18 miles from Ukiah (Deumling 1972).

A number of logging camps developed along the length of the railroad, changing position over the years as timber was thinned out in one area and it became necessary to move closer to the more plentiful resource procurement locations. Camp houses were box cars that were movable so that they could be placed on flat cars and relocated by rail to a new campsite, although by 1935 it was decided that the Mt. Emily Camp, the primary camp, would remain at the Meadow Brook Creek site (south of the APE). In light of that news, many people added on to their houses. Most yards had small chicken coops, a privy, and a cellar for refrigeration built into the hillside (Turner 2005). The Mt. Emily Camp became the focal point for logging in Union County (Skovlin 1991).

Sometime in the 1930s, the company shifted from rail logging to truck logging. The shift to truck logging was mainly due to financial and practical advantages of trucks being able to climb steeper grades and access previously inaccessible mountainsides. Trucks also helped eliminate the fire hazard that flying cinders presented from the locomotives. Horse teams were used to skid and bunch logs to truck roads except for uphill skids, which were completed using tractors. Tractor technology became widely available around 1930; however, it was expensive therefore horses were still used on flat areas as a more cost effective alternative (Powell 2008). Although the railroad mainline remained in use at the time, Mt. Emily Lumber began building truck roads out to the harvest sites rather than rail spurs (Trainweb 2016).

The last railroad for the Mt. Emily operation was constructed in 1936 by Morrison and Knudson of Idaho. It was used in conjunction with the truck logging operation that sent trucks to the forest to haul logs down to the railroad and then be transported to the mill in La Grande (Deumling 1972). During 1937, it was reported that the Mt. Emily Lumber Company had over 30 miles of railroad track in use, 75 miles of truck roads, and operating 20 diesel trucks and three locomotives. The company bought out the Oregon White Pine Lumber Company of La Grande the following year, which already had 42 miles of railroad from Enterprise to Flora in northern Union county (Deumling 1972). In 1944, a six mile extension was added to the railroad, lifting it out of the Grande Ronde River watershed and into the John Day River watershed.

After this extension, there were no additional changes or updates to the railroad and it remained the same for the remainder of its existence.

The Wallowa-Whitman National Forest has been working to document the segments of this grade that exist on Forest Service lands, and at least one segment on private land has also been recorded. In the general Bird Track project area, the segments on Forest land in T3S R36E Sections 11, 14, and 16 have been identified as contributing elements to the overall eligibility of the resource.

Effects Analysis

The Bird Track Springs Project heritage resources analysis area encompasses all of the approximately 6,000-acre project APE. The APE, following Region 6 guidance and 36 CFR 800.16(d), for the Bird Track Springs Project area consists of a segment of the Grande Ronde River and an upland area defined for wood procurement. A qualified archaeologist (as defined by the Oregon SHPO) supervised all fieldwork as per the contract requirements.

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 the State Historic Preservation Officer (SHPO) and CTUIR. Qualified personnel conducted a review of existing data related to previously identified cultural resources and the investigations that focused on cultural resource discovery and evaluation. Five previous archaeological surveys were found to have been conducted at least partially within the project APE, and six surveys had been conducted within a one-mile radius of the APE boundary. Three previously recorded archaeological sites within the APE and thirteen sites located within one mile of the APE were noted. Six of these sites are historic period sites (e.g. can dumps, sheep pens, historic homestead), while eight are pre-contact sites (primarily lithic scatters) and one is potentially a multi-component (involving both pre-contact and post-contact/historic artifacts). The majority of these sites are unevaluated for significance. No traditional cultural properties have been identified in this area by the Tribes as part of the Section 106 consultation process for this project.

Pedestrian surveys were performed over the entire APE (including the wooded uplands) following Oregon SHPO fieldwork standards and Wallowa-Whitman National Forest survey guidelines. Pedestrian survey was accomplished over 6,083 acres. Discovered artifacts on the surface were documented, photographed and mapped. In addition, shovel test survey was conducted along the riverine setting of the APE where ground disturbance would be widespread, for a total of 191 acres. 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. More than 2,000 shovel probes (Table 40) were excavated, assessed, and backfilled after completion.

Table 40. Summary of shovel probes performed within the Area of Potential Effect.

Shovel Probe Type	Number of Shovel Probes	Percentage of Total
Positive for Heritage Resources	33	1.6%
Negative for Heritage Resources	1,688	83.5%
Shovel Probe Planned but Not Dug	301	14.9%
Totals:	2,022	100%

Through the methods identified above, the field crews identified 30 isolated heritage resource finds and 28 heritage resource sites. Sites were defined according to Oregon state standards (a locale containing 10 or more artifacts within a 50-meter boundary), with finds containing fewer than 10 artifacts identified in a location that appear to reflect a single event, loci, or activity being categorized as isolates. Isolated finds are generally restricted to surface artifacts and lack subsurface components. Because of this, isolated finds

are rarely considered significant or meet the criteria necessary to qualify as eligible for listing in the National Register of Historic Places. The newly discovered isolates and sites within the project area are outlined briefly in Tables 41 and 42. Site types include pre-contact chipped stone and artifact scatters, an historic cabin, historic artifact scatters, and a section of an historic military firing range. Isolated find types were largely pre-contact chipped stone artifacts and historic debris.

Impacts to Eligible/Potentially Eligible 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) except for the Mount Emily Railroad Grade. A description of that resource is included above under the Affected Environment. Information about this railroad grade is also located in the survey report, which is to be used by cultural resource specialists to evaluate these resources for eligibility.

Table 41. List of heritage resource isolated finds within the Area of Potential Effects.

Field Resource ID	Description	Time Period	NRHP Eligibility
B2-MH-09	Lithic flake	Pre-contact	Not Eligible
B2-MS-08	Lithic flake	Pre-contact	Not Eligible
B2-MS-10	Bottle	Historic	Not Eligible
BT-ARM-001	Springboard cutout in tree stump	Historic	Not Eligible
BT-ARM-002	Projectile point	Pre-contact	Not Eligible
BT3-ARM-014	Small refuse scatter	Historic	Not Eligible
BT3-ARM-018	Lithic flake	Pre-contact	Not Eligible
BT3-ARM-019	Small refuse scatter	Historic	Not Eligible
BT3-ARM-020	One-knife-opened can with wire	Historic	Not Eligible
BT3-ARM-021	One-knife-opened can	Historic	Not Eligible
BT3-KY-002	Railroad rails on graded surface	Historic	Not Eligible
BT3-KY-003	Projectile Point Fragment	Pre-contact	Not Eligible
BT3-KY-005	Historic refuse scatter	Historic	Not Eligible
BT3-MS-001	Bottle	Historic	Not Eligible
BT3-MS-002	Bottle	Historic	Not Eligible
BT3-TF-003	Small refuse scatter	Historic	Not Eligible
BT4-ARM-006	Lithic scatter	Pre-contact	Not Eligible
BT4-KY-004	Bottle	Historic	Not Eligible
BT4-MES-002	Stove pipe	Historic	Not Eligible
BT4-TU-003	Bottle	Historic	Not Eligible
BT5-KY-001	Refuse scatter	Historic	Not Eligible
KY-006	Lithic flake	Pre-contact	Not Eligible
KY-011	Lithic flake	Pre-contact	Not Eligible
PWR-04	Glass fragment	Historic	Not Eligible
PWR-06	Lithic scatter	Pre-contact	Not Eligible
PWR-07	Lithic scatter	Pre-contact	Not Eligible
PWR-103	Lithic scatter	Pre-contact	Not Eligible
PWR-105	Lithic scatter	Pre-contact	Not Eligible
TF001	Bottle	Pre-contact	Not Eligible
BT1-ISO-4	Lithics	Pre-contact	Not Eligible

Table 42. List of newly discovered heritage resource sites within the Area of Potential Effects.

Field Resource ID	Description	Time Period	Preliminary NRHP Eligibility Recommendation
BT2-Site-1-MC	Historic and lithic scatter	Multicomponent	Eligible
BT2-Site-3	Lithic scatter	Pre-contact	Eligible
BT3-ARM-007	Historic scatter with livestock enclosure	Historic	Eligible
BT3-ARM-017	Lithic scatter	Pre-contact	Eligible
BT3-KY-004	Large historic refuse scatter	Historic	Eligible
BT3-MES-001	Lithic scatter	Pre-contact	Eligible
BT3-SO-001	Lithic scatter	Pre-contact	Eligible
BT3-TF-001	Large historic refuge scatter	Historic	Eligible
BT3-TF-002	Large historic refuse scatter	Historic	Eligible
BT3-TF-004	Large historic refuse scatter	Historic	Eligible
BT4-ARM-001	Lithic and historic refuse scatter	Multicomponent	Eligible
BT4-ARM-002	Lithic scatter	Pre-contact	Eligible
BT4-ARM-003	Lithic scatter	Pre-contact	Eligible
BT4-LA-001	Lithic scatter	Pre-contact	Eligible
BT4-LS-001	Large lithic scatter	Pre-contact	Eligible
BT4-LS-002	Lithic scatter	Pre-contact	Eligible
BT4-LS-003	Lithic scatter	Pre-contact	Eligible
BT4-KY-001	Lithic scatter	Pre-contact	Eligible
BT4-MRS-001	Large lithic scatter	Pre-contact	Eligible
BT4-TU-002	Lithic scatter	Pre-contact	Eligible
BT5-Site-001	Components of historic military firing range	Historic	Eligible
KY-008	Lithic scatter	Pre-contact	Eligible
KY-012	Log cabin	Historic	Eligible
KY-013	Lithic scatter	Pre-contact	Eligible
BOR1	Historic scatter, non-diagnostic	Historic	Not Eligible
BT4-MES-003	Historic refuse scatter	Historic	Not Eligible
BT-H1	Historic refuse scatter, non-diagnostic	Historic	Not Eligible

Treatment of Heritage Resources

The Preservation Plan for the Mt. Emily Lumber Company, an historic context created by La Grande Ranger District of the Wallowa-Whitman National Forest, specifies that segments of the Mt. Emily Railroad grades "which are still intact" should receive "protection only" (Mead and Ruth n.d.) where protection is defined as the act or process of applying measures designed to affect the physical condition of the property by defending or guarding it from deterioration, loss or attack, or to cover or shield the property from danger or injury. The phrase "protection only" precludes such actions as rehabilitation or reconstruction.

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 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 historic properties eligible for listing on the National Register (per 36CFR800) within the project area through avoidance, with the exception of the eligible Mount Emily Railroad Grade (discussed below). Due to these avoidance measures requiring actions would occur outside of known site boundaries all other known heritage resources within the project area would not experience direct impacts from project activities or outcomes.

Indirect effects on the heritage resources located near the river may take place as the setting of the resources would change slightly by the relocation or construction of new river channels. However, these indirect effects would not diminish or remove the qualities of these resources that make them important. The heritage resources located in the forested uplands would likely not experience indirect effects once the project activities are complete due to the fact that they are located on private land and would not be subject to frequent visitation, either explicit or inadvertent.

Mount Emily Railroad Grade

The Mount Emily Railroad Grade, which runs the length of the APE, would be directly affected by project activities. These intact segments meet eligibility criteria and are considered contributing elements to a larger Mt. Emily Lumber Railroad Grade historic property. The effects of this project on the resource would be direct. At the southwest end of the project area just beyond where a railroad bridge once connected the grades on either side of the river, the downstream grade would be leveled under this alternative to shape the river bank and place large woody materials instream. Along the portion of the grade that runs parallel to the highway, at least one breach of the grade would occur to allow for equipment access into the flats. The upstream section of the grade that turns and continues to the northeast may be used as an access road to allow equipment to gain entry to that part of the APE.

As per the Section 106 regulations, a Memorandum of Agreement (MOA) has been developed in consultation with the Oregon SHPO, the CTUIR, BPA, the Wallowa-Whitman National Forest, and the Bureau of Reclamation. This mitigation MOA outlines measures that would be taken to avoid, minimize, or mitigate the adverse effect, thereby resolving (through agreement) the direct impacts according to 36 CFR 800.6. Mitigation cannot, and is not intended to, fully compensate for damage to or the loss of irreplaceable historic resources. Instead, mitigation is an opportunity for Federal agencies to preserve and document the past for the public's education and appreciation. Mitigation is project-specific, takes into account the current and future impact(s) of the project, and the needs of the local community (Oregon Parks and Recreation Department 2017). Mitigation efforts are described at length in the Section 106 Mitigation MOA (Appendix E of the EA). Activities would include some or all of the following: documenting historic resources before they are demolished; creating websites, displays, and brochures; holding public education events; etc. The Section 106 process requires mitigation efforts be commensurate with the scale of the adverse effects.

Indirect effects to this segment of the railroad grade would be considered as a diminishment of its overall physical and historic integrity, and could encourage more complete documentation and preservation of other intact segments outside this APE.

The impacts to the Mt. Emily Railroad Grade are considered adverse effects under the National Historic Preservation Act (NHPA), but under NEPA, the significance of the likely environmental impacts is considered low. This is due to the lack of intensity of the removal of small portions of the grade when measured against the NEPA variables. The removal of small portions of the grade would not affect public health or safety or cause controversy on environmental grounds; would not cause uncertainty about effects or pose unique risks; would not establish a precedent that would further define the parameters of a further action; would not result in cumulative impacts; would not cause potentially adverse effects on endangered or threatened species or habitat (and would actually benefit fish habitat); and would not cause potential for violation of a Federal, state, or local law or requirement imposed for the protection of the environment. Because the only variable involved in the removal of small portions of the Mt. Emily Railroad Grade would be the adverse effect to the eligible historic property (which would be mitigated), the significance of the impact has been measured and determined to be low.

While the Mt. Emily Lumber Railroad Grade historic property would be directly affected by project activities, these affects would be mitigated as part of the NHPA Sec 106 consultation process to resolve adverse effects. Other known cultural sites in the project area would be avoided and protected from the proposed restoration work. Cultural sites inadvertently discovered during construction would be addressed by an Archaeological/Cultural Resources Inadvertent Discovery Plan. USFS would monitor project impacts on sites that are or may be eligible for listing on the National Register. In the short term, the project would have a low impact on known cultural resources because the majority of sites would be avoided and because the impact to the Mt. Emily Lumber Railroad Grade would be mitigated. In the long term, indirect effects to this segment of the railroad grade could be considered as a diminishment of its overall physical and historic integrity, and could encourage more complete documentation and preservation of other intact segments outside this APE.

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. Upland, forested sites would likely not experience cumulative impacts while the land ownership remains in private status.

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 measureable 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 Bird Track Springs Fish Enhancement Project (Bird Track).

The majority of the recreation use in the Bird Track project area occurs at the Bird Track Springs Interpretive Trail. There is limited developed or dispersed recreation within the project area outside of this site. The La Grande Rifle and Pistol club operates a shooting range within the project area 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 Bird Track 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 Bird Track, 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 43. 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

Top Activities on the WWNF	Percent of Visitors Who Participated in this Activity	Percent of Visitors who Participated in this as Primary Activity
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 the Bird Track area, no specific information is available to better understand why visitors come to this area. 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 will 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 1 (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 Bird Track Springs.

As shown in Table 43 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.

Developed Recreation Sites

The Bird Track Springs Campground, though not technically within the project area, is immediately adjacent to the Interpretive Trail system on Highway 244. It receives moderate to heavy use from May-September each year.

Developed Trails

There is only one developed trail system located within the Bird Track project area. The Bird Track Springs Interpretive Trail is a network of flat walking paths between Highway 244 and the Grande Ronde River at the western (upstream) limit of the project. These trails are primarily used by birdwatchers and walkers who wish to explore an easily accessible riparian area. Though initially designed to incorporate some interpretive elements, the full educational and interpretive potential of these trails is not fully realized. Post-project redesigns of the trail system and site-specific interpretation would complement the purpose of the Bird Track Fish Enhancement project.

Table 44. Developed Trails within the Bird Track Project Area

Trail Name and Number	Miles in Project
Bird Track Springs (1940)	0.74
Bird Track Springs Spur A (1940A)	0.14
Bird Track Springs Spur B (1940B)	0.21
Bird Track Springs Connector C (1940C)	0.02
Bird Track Springs Connector D (1940D)	0.01
Bird Track Springs Spur E (1940E)	0.004
Project Area Totals =	1.124 miles

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 Bird Track, 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 Bird Track 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 developed recreation site at Bird Track Springs and 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 recreational 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 recreational and permitted uses access and opportunities are expected to remain unchanged.

Alternative 2

Dispersed Recreation – Dispersed recreational activities would be affected by the project activities. In the short term, users may be discouraged from entering the project area due to the presence of equipment and workers. This may occur at any time of year, as Bird Track Springs is a relatively low-elevation site and does receive light winter visitation. Downed trees and slash piles may discourage visitor use in an area. Noise and other disturbances may affect the quality of the recreational 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 Grande Ronde River 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 Grande Ronde River, and would also provide opportunities for the public to view steelhead, Chinook salmon, and beaver. As described in the Wildlife section of this EA, trapping of beaver is currently permitted within the project area; however, in order to re-establish beaver in this section trapping may be restricted. Restricting trapping within the project area could have a negative impact on any who currently trap in the Grande Ronde system; however, is it likely to only be limited to this reach of the river.

Developed Recreation – Because of Bird Track's 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 recreational area. The noise, dust, and equipment activity during project activities may affect the quality of the recreational 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. Some loss or change of vistas, scenery, natural features, or wildlife viewing opportunities may result with the vegetation treatments visible from the developed sites.

Developed Trails – Due to the proposed realignment of the Grande Ronde River, there would be a direct effect to the Bird Track Springs Interpretive Trail system during this project. The proposed new river channel would lie significantly closer to Highway 244 than the existing river; thus, the vast majority of the existing trail system would either be obliterated during project work or would be inaccessible on the far bank of the post-project riverbed. The USFS proposes for a new trail system (See Appendix A of the EA) to be constructed along the south bank of the river after Phase 1 realignment is complete. This new trail system, as proposed, would include updated site-specific interpretation and would repurpose the equipment staging site as a new off-highway parking area. The proposed trail rebuild would be approximately one (1) mile in length, a loss of approximately 0.1 mile from the current system total. There may be a post-project period of one year or longer when there is not a functional trail system at Bird Track Springs.

Permitted Uses – All permitted uses are authorized under the term and conditions of a permit which allow activities not available to a non-permitted user. Most of these uses are intrinsically tied to road access, and the removal of forest products is dependent upon specific areas or vegetation. Permitted uses could be affected by the project activities mentioned above. Depending on the intensity of activity near the river, permit users may be displaced to other areas inside or outside the Bird Track Springs area. Residual dust, noise, and equipment activity is also not conducive to a quality recreational experience; however, this would be a short term impact lasting approximately two seasons.

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, and removal of logs for instream enhancement work elsewhere on the District 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. 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 within the campground, 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 Bird Track Springs Fish Habitat Enhancement Project (Bird Track) 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 45. 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 Grande Ronde River. 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 FS 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 FS 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 would be substantial visual impacts from active river realignment, instream enhancement, and associated activities, both on private and USFS lands. Heavy machinery, dust, slash and log piles, temporary river crossings, and disturbed ground would be obvious to travelers along Highway 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 would take approximately 2-5 years to be obscured by new vegetation and gain a more natural appearance. Temporary parking areas and staging sites would affect the scenic integrity from the roadway in the short term, but would either be rehabilitated or absorbed into new recreational features at the conclusion of the project.

Corral Relocation – The Jordan Creek Ranch corrals adjacent to Highway 244 would be relocated to the south side of the road. Short term visual impacts from this activity would include dust and machinery, both as the new corrals are being built and as the old corrals are being disassembled. Long term visual impacts from this activity would include a larger corral footprint in the new location and tree removal adjacent to the new pasture on the Jordan Creek Ranch property.

Timber Harvest – Proposed timber harvest activities on the Jordan Creek Ranch property are either in the distant background or out of view from Highway 244, and are not expected to affect the scenic integrity of the Level 1 viewshed.

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 and the fish logs being removed from the Bird Track Springs campground) 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 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. One portion of an eligible heritage site would be adversely affected; however, mitigation is prescribed to minimize impacts and meet Section 106 requirements.

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 Bird Track Springs 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 Bird Track Springs 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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Appendix A

Proposed Action Maps

T. 3 S.

R. 36 E.

Date: 11/23/2016

Bird Track Springs
Fish Habitat Enhancement Project

1:7,000

Miles

0 0.15 0.3 0.45

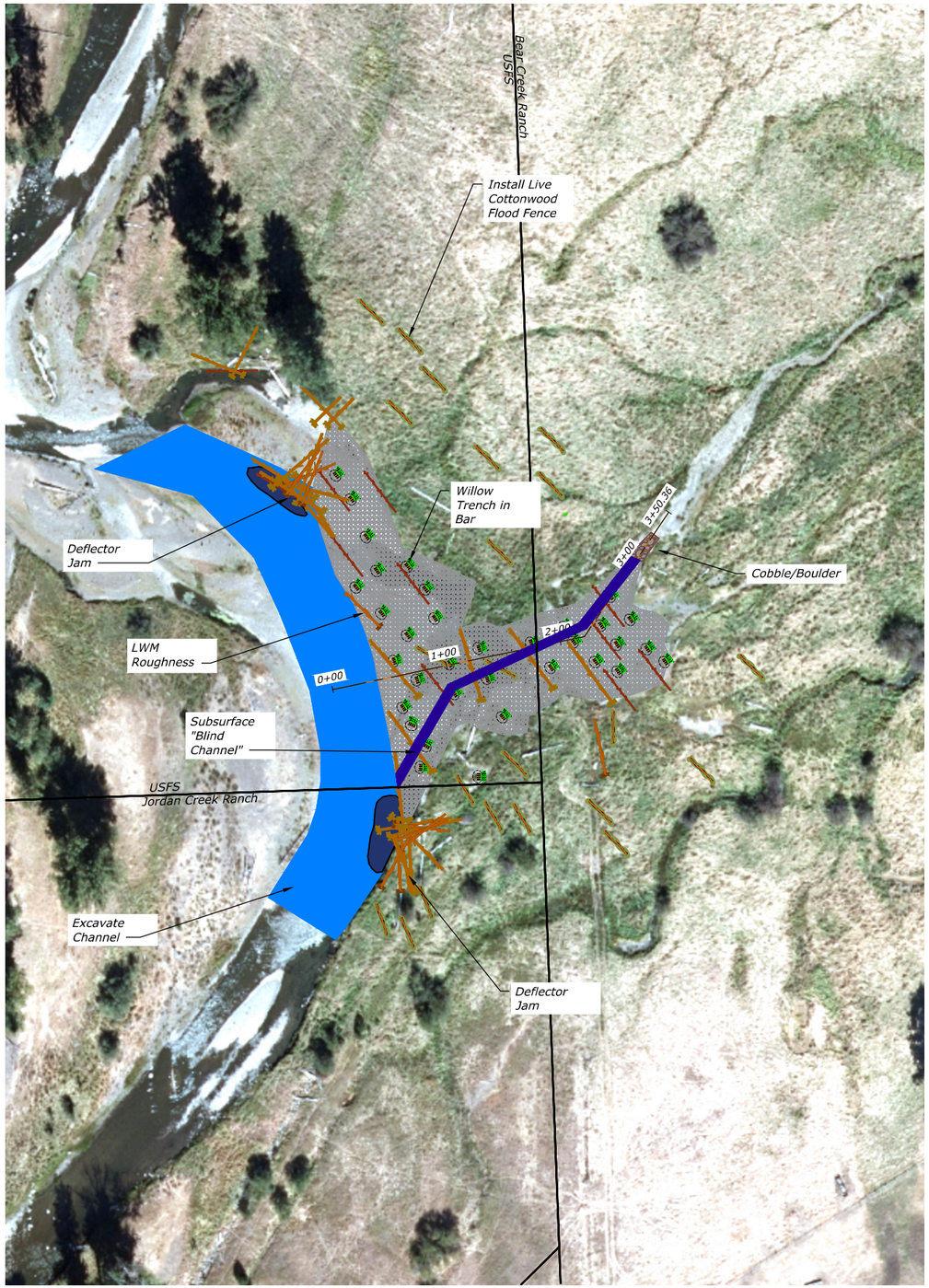
1 inch = 583 feet

- Final APE Boundary as of 11-18-2016
- Channel Fill
- Dewatering and Fish Rescue Channels
- Channel Realignment Area
- Excess Fill Permanent Spoil Areas
- Staging/Storage Areas
- Gravel Bar
- Access Roads
- Access Roads Buffer

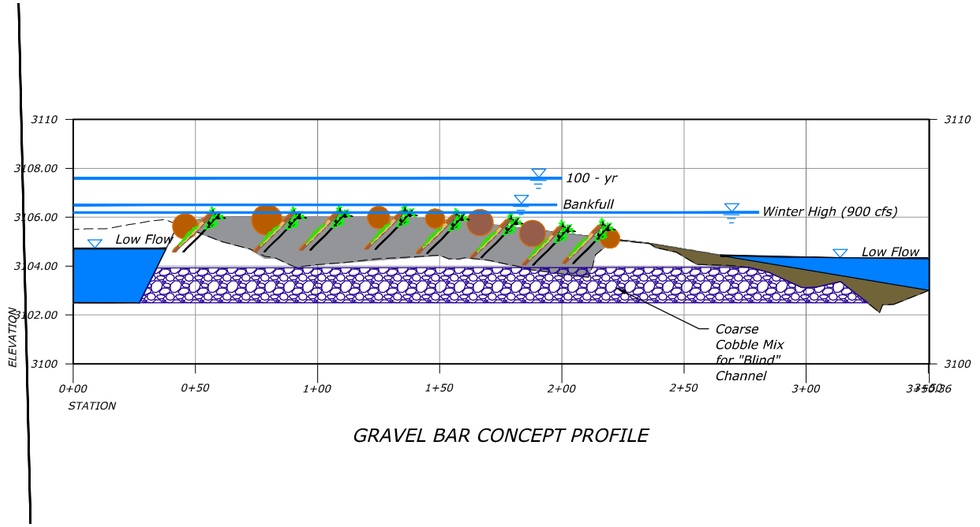
NHD Stream Category

- Category 1 Stream
- Category 2 Stream
- Category 4 Stream

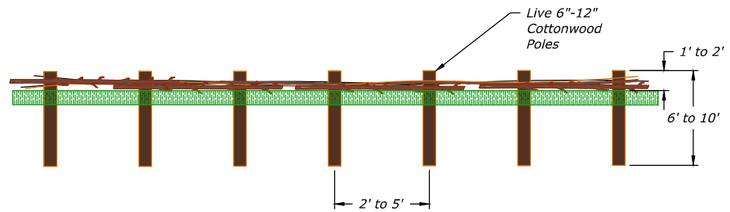
- US or State Highway
- Major Road
- Local Road
- Off Forest Road
- Ranger District
- U.S. Forest Service
- Other Land



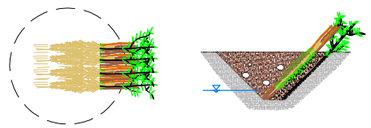
BTS Project - BCR Side Channel Bar Conceptual Plan
1" = 60-feet



GRAVEL BAR CONCEPT PROFILE



Live Cottonwood Flood Fence
NTS



Willow Trench Detail
NTS

Willow Trench Construction

Example - Live Cottonwood Flood Fence (after first flood) - B. Aldrich, Snohomish County, WA

C:\Users\mknutson\Desktop\flood fence.jpg

Example - Live Cottonwood Flood Fence (after 6-years) - B. Aldrich, Snohomish County, WA

RECLAMATION
Managing Water in the West

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
PROJECT NAME
DIVISION
BTS Project
Concept
SUB FEATURE
(TWO LINE MAXIMUM)

For Information Only
Draft
Not For Distribution

X DESIGNED
X DRAWN
X CHECKED
X TECH. APPR.
X APPROVED
ADMIN APPROVAL - TITLE

STATION NAME (CITY, ST) YYYY-MM-DD

BTS Project

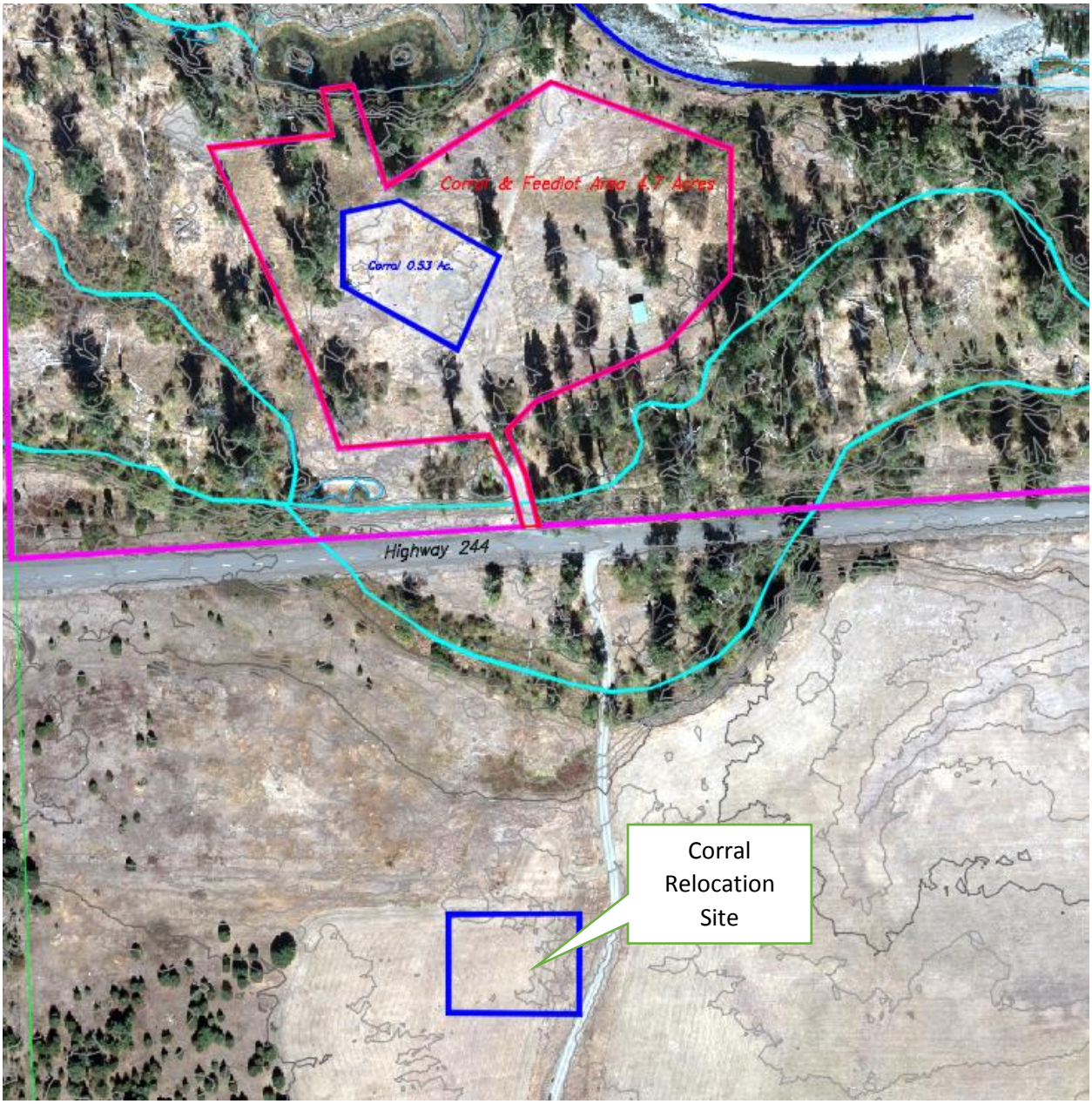
BCR Side Channel
Gravel Bar Concept

PRJ-STA-SEQ

SHEET 1

DATE AND TIME PLOTTED
SEPTEMBER 12, 2016 12:51
PLOTTED BY
JHNIELSEN

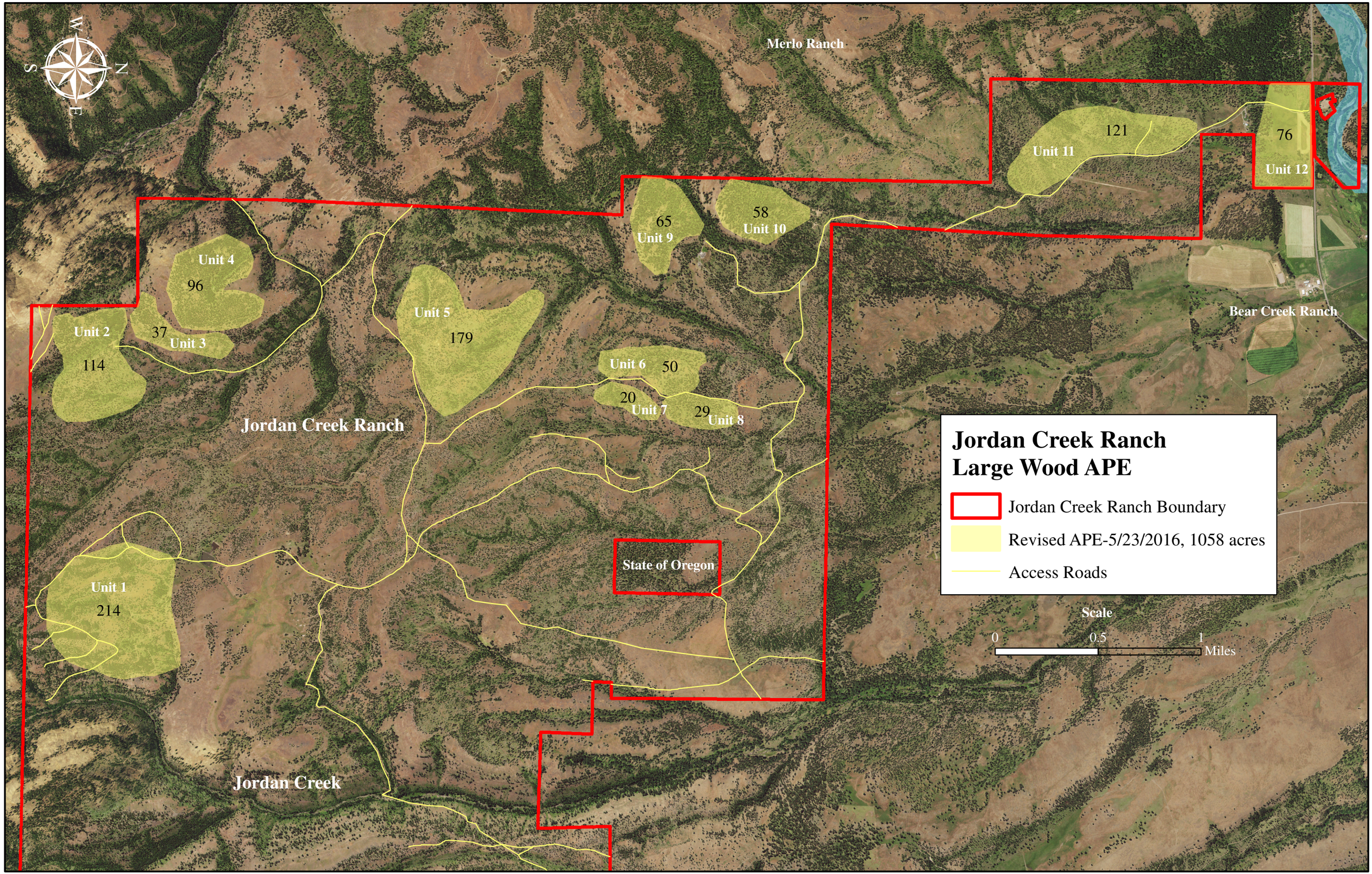
CAD SYSTEM
AutoCAD Rel. 20.0s
CAD FILENAME
BEAR CREEK CONCEPT_WITH BLIND CHANNEL.DWG



Appendix A – Lowe Corral Relocation Site

New Location: T6S, R36E, Section 15 SW ¼ of the SW 1/4

North


N
W
E
S
Merlo Ranch
Unit 11
121
76
Unit 12
65
Unit 9
58
Unit 10
Unit 4
96
Unit 5
179
Unit 2
37
Unit 3
114
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
0
0.5
1
Miles

Date: 11/23/2016

Bird Track Springs
Fish Habitat Enhancement Project

Project Area as of 11-18-2016

1:24,000

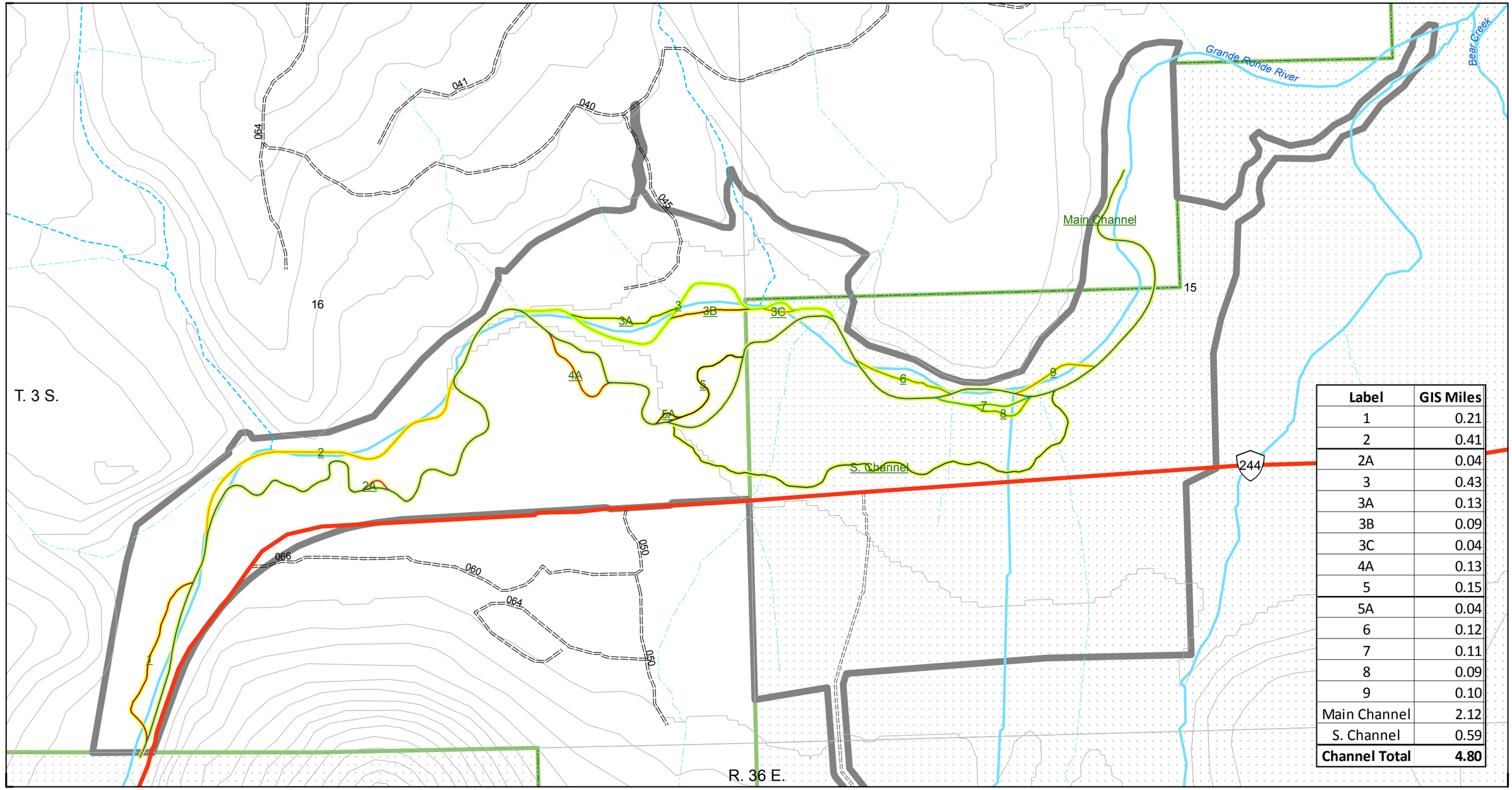
Miles

0 0.9 1.8 2.7

1 inch = 2,000 feet

Final APE Boundary as of 11-18-2016
Uncategorized Stream
Category 1 Stream
Category 2 Stream
Category 4 Stream
US or State Highway
Major Road
Local Road
Off Forest Road
Subwatershed (HUC12)
Ranger District
Bureau of Land Management
Bureau of Reclamation
State Agency
U.S. Forest Service
Other Land

Coleman Ridge-Grande Ronde River 170601040307
Rock Creek 170601040306
Whiskey Creek 170601040305
Jordan Creek 170601040303
Lower Beaver Creek 170601040302



Label	GIS Miles
1	0.21
2	0.41
2A	0.04
3	0.43
3A	0.13
3B	0.09
3C	0.04
4A	0.13
5	0.15
5A	0.04
6	0.12
7	0.11
8	0.09
9	0.10
Main Channel	2.12
S. Channel	0.59
Channel Total	**4.80**

Date: 11/28/2016

Bird Track Springs
Fish Habitat Enhancement Project

Stream Channel Map

1:7,000

Miles

0 0.15 0.3 0.45

1 inch = 583 feet

- Final APE Boundary
- Category 1 Stream
- Category 2 Stream
- Category 4 Stream
- Channel Streams from BOR
- US or State Highway
- Major Road
- Local Road
- Off Forest Road
- Ranger District
- U.S. Forest Service
- Other Land

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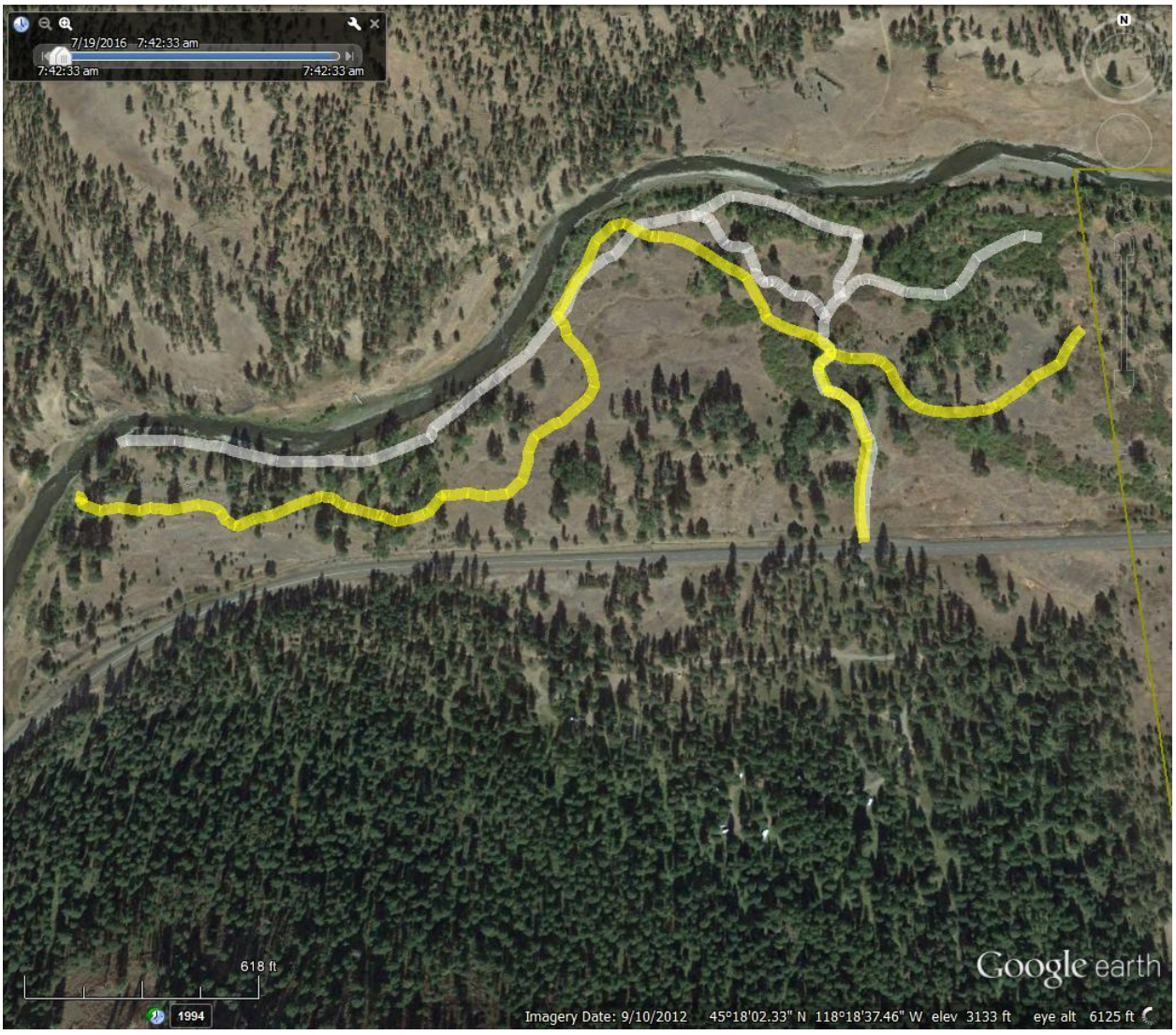
Appendix A – Bird Track Springs Fish Enhancement Project

Hiking Trail Relocation/Redesign Map



Legend:

Existing hiking trail location
New hiking trail location

Location: T6S, R36E, Section 16 N ½ of SE ¼

North

Appendix B

Alternative 1 – Existing Stream Channel Map

Bird Track Springs (BTS)
Fish Habitat Enhancement Project

Existing Condition

Geomorphic Properties:
(approximate)

Parameter	Existing
Length	10,250-feet
Vertical Rise	48-feet
Slope	0.47%
Sinuousity	1.17

Notes:

1. Source aerial photography - 2013 USBR LiDAR acquisition.
2. Conceptual draft plan for discussion purposes only.
3. Existing wood, barbs, and weirs are approximately located.
4. Geomorphic properties are estimated from LiDAR and measured between points as depicted.
5. Property boundaries are approximate and from Union County Assessor's spatial dataset.
6. No access or disturbance will occur on non-participating private lands.
7. Inundation area based on 2D model results, March 2016.

N

0 250 500 1,000 Feet

Upstream Boundary

Downstream Boundary

US Forest Service

Private Property

OR State of Parks & Rec

OR Hwy 244

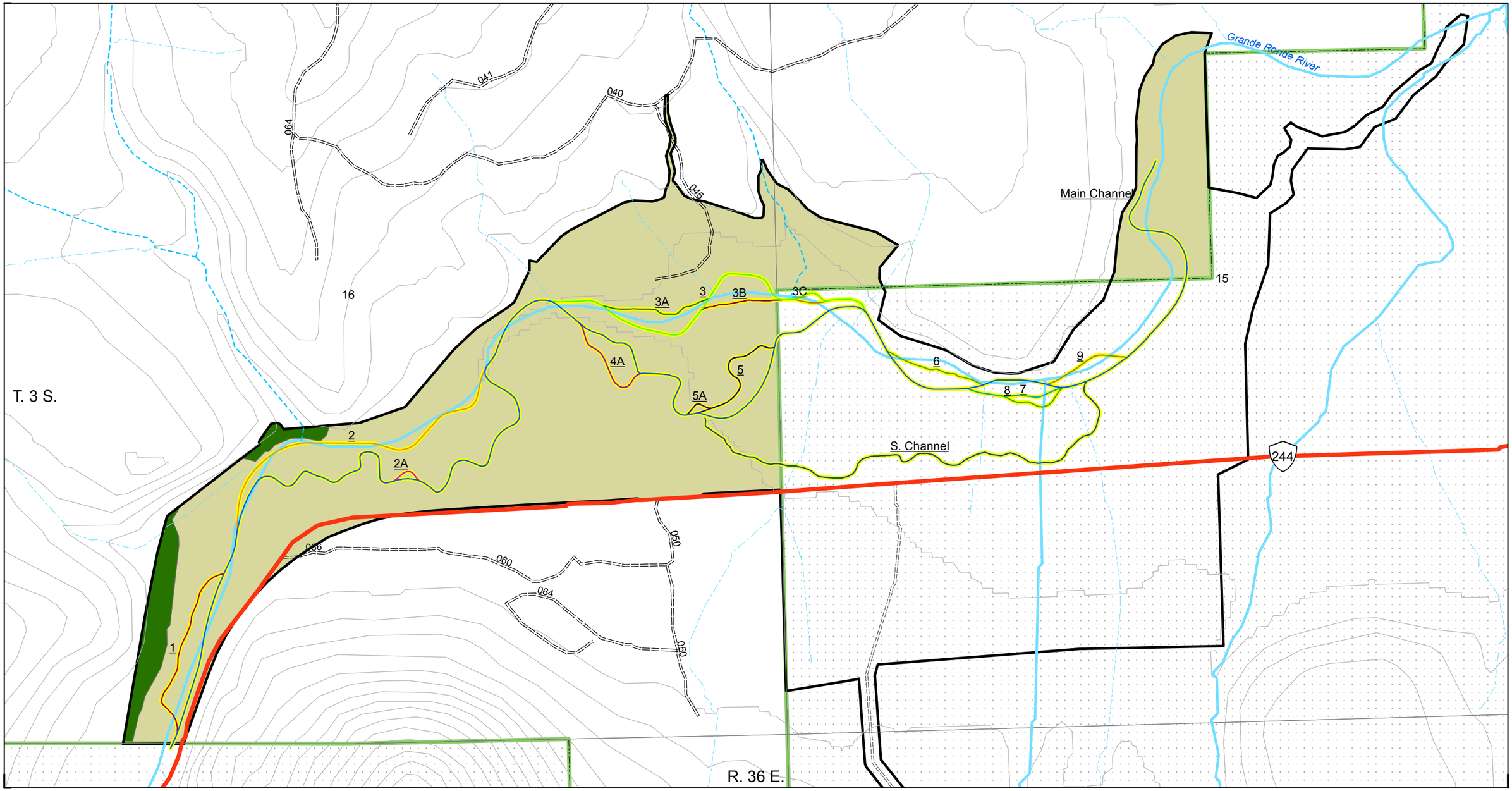
146 145.9 145.8 145.7 145.6 145.5 145.4 145.3 145.2 145.1 145 144.9 144.8 144.7 144.6 144.5 144.4 144.2 144.1 144

Legend

- Existing_Wood_Approx
- Existing_Barbs
- Existing_Wiers
- Grande Ronde River Mile
- Moss_Creek
- Project_Boundary
- BTS_Union_County_Parcels
- 1p25yr_Existing_Inundation

Appendix C

WWNF Forest Plan Management Direction Map



Date: 1/12/2017

Bird Track Springs Fish Habitat Enhancement Project

Management Area Map

1:7,000

Miles

0 0.15 0.3 0.45

1 inch = 583 feet

Final APE Boundary

Management Areas on USFS Land

Old Growth Preserve

Wildlife/Timber Winter Range

Category 1 Stream

Category 2 Stream

Category 4 Stream

Channel Streams from BOR

US or State Highway

Major Road

Local Road

Off Forest Road

Ranger District

U.S. Forest Service

Other Land

Document Path: T:\FS\NFS\WallowaWhitman\Project\lagBirdtrkLongley2015\GIS\MXD\BaseMap_USFSAreaOnly_11_2016.mxd

Appendix D

Cumulative Effects Analysis

Bird Track Springs Fish Enhancement Appendix D
Cumulative Effects Analysis
Process and Project Area Activities

The following process and assumptions were used by the Bird Track Springs 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 and above Bird Track Springs Campground
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. Moving of Lowe Family Ranch corrals to new location, construction of new corrals
14. Bear Creek Ranch gravel bar construction (including willow trenches and live cottonwood flood fencing)

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 Bird Track Springs 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.
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
Recreation			
Bird Track Springs Interpretive Trail	Coleman Ridge-GRRiver	Ongoing	1.5 mile interpretive hiking trail and small parking area for trail access.
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.
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

Project Name	SWS	Year	Activity
			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 Sheep allotment authorized grazing of 1569 ewe/lamb units of domestic sheep from June 1-October 25 each year.
Water Quality and Fisheries			
51 Road/Upper Grande Ronde Instream Enhancement	Warm Springs Creek-Grande Ronde River	2019-2020	Instream enhancement project including work on USFS lands with LWD placement, gravel and boulder placement, instream enhancement work, and riparian planting
Longley Meadows 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.

Project Name	SWS	Year	Activity
Fisheries Enhancement			
Fish Logs from BTSprings Campground	Coleman Ridge-GRRiver	2017-2018	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	2015-2020	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: Birdtrack Springs Precommercial thinning and prescribed burning		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		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 is 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

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
					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.
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		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		Yes	Yes	No	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.
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 if spraying guidelines are followed.
Vegetation Management: Bird Track Springs precommercial thinning and prescribed burning		No	No	No	
Special Uses: OTEC Powerline Fly Fishing O/G Permit		Yes	Yes	No	Powerline is suspended over river; no impacts are expected from this powerline or fly fishing on the GRR.
Recreation: Bird Track Springs Interpretive Trail		Yes	Yes	No	This trail would be moved as a part of this project; therefore, this is direct/indirect impact, not cumulative.
Recreation: Dispersed camping		Yes	Yes	No	No 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:		Yes	Yes	No	No impacts to water resources expected.

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Danger Tree Removal					
Grazing Allotment: Spring Creek Sheep Allotment		No	No	No	
Fisheries Enhancement: Fish logs from Bird Track Springs Campground Longley Meadows	Short-term water quality impacts from restoration construction activities possible	Yes	Yes	Bird Track Springs Campground – No Longley Meadows – Yes	Some large tree removal is planned within the campground area for another fish enhancement project. Trees will 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. Longley Meadows 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.

Old Growth

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management W-W Invasive Species Treatment ROD		Yes	Yes	No	No cumulative effects because there are not direct or indirect effects to old growth in this project and none of the present or reasonably foreseeable future actions would affect old growth habitat in the project area.
Vegetation Management: Birdtrack Springs Precommercial thinning and prescribed burning		Yes	Yes	No	
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit		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	
Grazing Allotment – Spring Creek Sheep Allotment		Yes	Yes	No	
Fisheries Enhancement – Fish logs from BTS Campground		Yes	Yes	No	
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	No cumulative effects because there are not direct or indirect effects to old growth in this project and none of the present or reasonably foreseeable future actions would affect old growth habitat in the project area.

Big Game

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: Birdtrack Springs Precommercial thinning and prescribed burning					
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit		Yes	Yes		
Recreation – BTS Interpretive Trail		Yes	Yes		
Recreation- Dispersed Camping		Yes	Yes		
Recreation- Snowmobile Trails		No	No		
Recreation -Firewood Cutting		Yes	Yes		
Recreation – OHV Use		Yes	Yes		
Recreation – BTS Campground		Yes	Yes		
Roads & Trails – Travel Management Plan		Yes	Yes		
Road Maintenance On Hwy 244					
Roads – Danger Tree Removal		Yes	Yes		
Grazing Allotment – Spring Creek Sheep Allotment		Yes	Yes		
Fisheries Enhancement – Fish logs from BTS Campground					
Wildlife Enhancement – GG Owl Platforms Aspen Enhancement		Yes	Yes		
Mining		No	No	No	No approved plans of operation
Private Land Activities • Private Structures • Roads • Grazing		Yes	Yes		

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: Bird Track Springs precommercial thinning and prescribed burning		No	No	No	
Special Uses: OTEC Powerline Fly Fishing O/G Permit		Yes	Yes	No	Powerline is suspended over the river; no impacts expected 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

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
					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		No	No	No	
Fisheries Enhancement: Fish logs from Bird Track Springs Campground Longley Meadows	Short-term soils impacts from restoration activities	Yes	Yes	Bird Track Springs Campground – No Longley Meadows – 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 additional detrimental soil impacts are anticipated. The Longley Meadows 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 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	There are either no actions which would impact any of the PETS wildlife species or this project would not impact any of the habitat for these species and therefore, would not contribute toward a measureable effect on the species or their habitat.
Vegetation Management: Birdtrack Springs Precommercial thinning and prescribed burning				No	
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit		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				No	
Roads – Danger Tree Removal		Yes	Yes	No	
Grazing Allotment – Spring Creek Sheep Allotment		Yes	Yes	No	
Fisheries Enhancement – Fish logs from BTS Campground				No	
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: Birdtrack Springs Precommercial thinning and prescribed burning		Yes	No		
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit		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		Yes	Yes	No	
Fisheries Enhancement – Fish logs from BTS Campground		Yes	No		
Wildlife Enhancement – GG Owl Platforms Aspen Enhancement		Yes	No		
Mining		No	No	No	No approved plans of operation
Private 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: Birdtrack Springs Precommercial thinning and prescribed burning		No	No	No	
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit		Yes	Yes	No	
Recreation – BTS Interpretive Trail		Yes	Yes	No	Direct effect on the interpretive trail and construction of parking lot, no cumulative effects.
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		No	No	No	
Fisheries Enhancement – Fish logs from BTS Campground		No	No	No	
Wildlife Enhancement – GG Owl Platforms		No	No	No	

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Aspen Enhancement					
Mining		No	No	No	No approved plans of operation
Private Land Activities • Private Structures • Roads • Grazing		Yes	Yes	No	Reduced need to move cattle across Highway 244 once the corral and feed lot is moved to the south side of the highway. Very limited impacts though.

Management Indicator Species – Terrestrial

Goshawk and Pileated Woodpeckers

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	No known goshawk nests within the areas proposed for treatment on private lands and proposed treatments would not affect source habitat for goshawk; therefore, no cumulative effects. Project would not impact existing snag levels; therefore, the project would not affect Pileated woodpecker habitat and would not contribute to cumulative effects.
Vegetation Management: Birdtrack Springs Precommercial thinning and prescribed burning		Yes	Yes	No	
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit		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	
Grazing Allotment – Spring Creek Sheep Allotment		Yes	Yes	No	
Fisheries Enhancement – Fish logs from BTS Campground		Yes	Yes	No	
Wildlife Enhancement – GG Owl Platforms Aspen Enhancement		Yes	Yes	No	

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Mining		No	No	No	No approved plans of operation
Private Land Activities • Private Structures • Roads • Grazing		Yes	Yes	No	Same as above.

Management Indicator Species – Terrestrial

American Marten

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management W-W Invasive Species Treatment ROD		Yes	No		No marten or source habitat within the project area; therefore, no effect to marten and no cumulative effects.
Vegetation Management: Birdtrack Springs Precommercial thinning and prescribed burning		Yes	No		
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit		Yes	No		
Recreation – BTS Interpretive Trail		Yes	No		
Recreation- Dispersed Camping		Yes	No		
Recreation- Snowmobile Trails		No	No		
Recreation -Firewood Cutting		Yes	No		
Recreation – OHV Use		Yes	No		
Recreation – BTS Campground		Yes	No		
Roads & Trails – Travel Management Plan		Yes	No		
Road Maintenance On Hwy 244			No		
Roads – Danger Tree Removal		Yes	No		
Grazing Allotment – Spring Creek Sheep Allotment		Yes	No		
Fisheries Enhancement – Fish logs from BTS Campground			No		
Wildlife		Yes	No		

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Enhancement – GG Owl Platforms Aspen Enhancement					
Mining		No	No	No	No approved plans of operation
Private Land Activities • Private Structures • Roads • Grazing		Yes	No		Same as above

Management Indicator Species – Terrestrial Primary Cavity Excavators

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management W-W Invasive Species Treatment ROD		Yes	Yes	No	No snags would be impacted by project activities; therefore, this project would not impact PCE habitat. Firewood cutting by the public is not permitted on private lands within the project area; therefore, would not impact snag habitat.
Vegetation Management: Birdtrack Springs Precommercial thinning and prescribed burning		Yes	Yes	No	
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit		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	
Grazing Allotment – Spring Creek Sheep Allotment		Yes	Yes	No	
Fisheries		Yes	Yes	No	

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Enhancement – Fish logs from BTS Campground					
Wildlife Enhancement – GG Owl Platforms Aspen Enhancement		Yes	Yes	No	
Mining		No	No	No	
Private Land Activities • Private Structures • Roads • Grazing		Yes	Yes	No	

Neotropical Migratory Birds (NTMB)

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: Birdtrack Springs Precommercial thinning and prescribed burning		Yes	Yes	No	
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit		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	
Grazing Allotment – Spring Creek Sheep		Yes	Yes	No	

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Allotment					
Fisheries Enhancement – Fish logs from BTS Campground		Yes	Yes	No	
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	Nest parasitism	Yes	Yes	Yes-Grazing	Due to possible increased access of cattle and brown-headed cowbirds increases in nest parasitism could occur near grazing operations.

Noxious Weeds

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 TriCounty would contribute more resources to manage invasives.
Vegetation Management: Birdtrack Springs Pre-commercial thinning and prescribed burning	Thinning, which would remove over-story density, and prescribed burning potentially increase invasive plant establishment and spread.	Yes	Yes	No	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	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.
Recreation – BTS Interpretive Trail	Foot/pet travel and trail maintenance could spread invasive seed and create	Yes	Yes	No	Trail is a stable native surface trail that will be removed and relocated as a part of this project. Foot travel has a low impact. This sort of recreation site would have a higher invasive plant management priority.

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
	ground disturbance.				
Recreation- Dispersed Camping	Vehicle and foot traffic carrying invasive seed.	Yes	Yes	No	Dispersed camping within project area is very limited.
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 very limited due to the limited amount of materials available – this area is fairly picked over due to proximity to La Grande.
Recreation – OHV Use	Introduction of invasive seeds, ground disturbance from OHV use, and user built trail construction	Yes	Yes	Yes	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 BTS project and implementation of travel management which will restrict motor vehicle use to designated roads, trails and areas will 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	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.

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
	materials and maintenance equipment.				
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	Sheep transporting invasive seeds into project area. Sheep eating invasive plants.	Yes	Yes	No	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 area.
Fisheries Enhancement – Fish logs from BTS Campground	Ground disturbance from root wad removal.	Yes	Yes	No	Root wad removal from campground would create 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: Birdtrack Springs Precommercial thinning and prescribed burning	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		Yes	Yes	No	
Recreation – BTS Interpretive Trail		Yes	Yes	No	Direct effected by project actions.
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	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		Yes	Yes	No	
Fisheries Enhancement – Fish logs from BTS Campground	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

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
					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: Bird Track Springs Precommercial thinning and prescribed burning		Yes	Yes	Yes	Machinery, smoke, and dust will cumulatively effect work being done as part of fish habitat project.
Special Uses: • OTEC Powerline • Fly Fishing O/G Permit		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	

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Grazing Allotment – Spring Creek Sheep Allotment		Yes	Yes	No	
Fisheries Enhancement – Fish logs from BTS Campground		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: Bird Track Springs Precommercial thinning and prescribed burning		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		Yes	Yes	No	No ground disturbance.
Recreation – BTS Interpretive Trail		Yes	Yes	No	Existing trail within APE – will be redesigned during this project. Existing trail was built avoiding known cultural sites.
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	Yes	No	
Roads & Trails – Travel Management Plan		Yes	Yes	No	

Project	Potential Effects	Overlap APE in:		Measurable Cumulative Effect?	Effects
		Time	Space		
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		Yes	Yes	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 Activities •Private Structures •Roads •Grazing		Yes	Yes	No	

Appendix E

BTS Section 106 Mitigation MOA

BONNEVILLE POWER ADMINISTRATION
DOE/BP-4803 ▪ September 2017