BIOLOGICAL ASSESSMENT

OR FS ERFO 2020(1)-14(1), Walla Walla South-Umatilla Repairs 2020, Phase 1

Department of Transportation, Federal Highway Administration, Western Federal Lands Highway Division

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Prepared for

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Prepared by

DOWL

David DeKrey, Primary Author

Austin Bloom, Senior Reviewer

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Acronyms & Abbreviations

AOP... Aquatic Organism Passage
BA ....Biological Assessment
cfs ....cubic feet per second
CMP .... Corrugated Metal Pipe
CTUIR.. Confederated Tribes of the Umatilla Indian Reservation
DCH ....Designated Critical Habitat
DPS ....Distinct Population Segment
ECA...Equivalent Clearcut Area
EFH .... Essential Fish Habitat
EPA ....Environmental Protection Agency
ERFO .... Emergency Relief for Federally Owned Lands
ESA .... Endangered Species Act
FHWA...Federal Highway Administration
FSR .... Forest Service Road
HUC ....Hydrologic Unit Code
ICTRT .... Interior Columbia Basin Technical Recovery Team
INFISH..Inland Fish (Interior Native Fish Strategy)
IPaC... Information for Planning and Consultation
LWD ....Large Woody Debris
LWM...Large Woody Material
MCR.. Middle Columbia River
MP .... Milepost
MPG.. Major Population Group
MSA..Magnuson-Stevens Act
NMFS..National Marine Fisheries Service
NOAA.. National Oceanic and Atmospheric Administration
NWFSC... Northwest Fisheries Science Center
NWPCC .... Northwest Power and Conservation Council
ODFW... Oregon Department of Fish and Wildlife
ODSL ....Oregon Department of State Lands
ORBIC ....Oregon Biodiversity Information Center
PACFISH .... Pacific Anadromous Fish (Pacific Anadromous Fish Strategy)
PBF .... Physical or Biological Features
PCE .... Primary Constituent Elements
RM .... River Mile
SF Umatilla ....South Fork Umatilla
USFS ....United States Forest Service
USFWS .... United States Fish and Wildlife Service
USGS .... United States Geological Survey
WFLHD .... Western Federal Lands Highway Division

Executive Summary

Western Federal Lands Highway Division, in cooperation with Umatilla National Forest, proposes to repair roadway locations on Forest Service Road 32 (also known as FS 3200) damaged by a flood on February 5 and 6, 2020. Funding for the Project will be provided by the Federal Highway Administration. This federal funding and authorization represent the federal nexus for the Project.

This BA analyzes the potential effects of the FS 32 Repair and Streambank Stabilization Project (the Project) in compliance with Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended. Section 7 of the ESA assures that, through consultation (or conferencing for proposed species), with NMFS or USFWS, federal actions do not jeopardize the continued existence of any threatened, endangered, or proposed species, or result in the destruction or adverse modification of critical habitat. Specific Project design elements are identified that avoid or minimize adverse effects of the proposed Project on listed species and/or critical habitat.

The Project is located primarily on FS 32, along the South Fork Umatilla River, just upstream of the confluence of the North and South Forks. Buck Creek joins the SF Umatilla River in the Project area, directly across from the most downstream in-water work zone (see below). The Project is located in the Buck Creek-South Fork Umatilla watershed.

Seventeen work zones are included in the Project. Eight discreet road damage locations will involve in-water work in the South Fork Umatilla to reconstruct FS 32 between Milepost (MP) 1.30 and MP 3.53. Of the eight in-water work zones, four involve partial road reconstruction, and four involve rebuilding complete road washouts. In addition, a culvert replacement at MP 2.54 (where a 4-foot diameter corrugated metal pipe culvert was washed out and will be replaced with an Aquatic Organism Passage culvert) occurs in an unnamed tributary to the South Fork Umatilla River, but may have indirect impacts on the South Fork Umatilla River. The remainder of the work zones in Oregon are uplands and involve the removal of landslide debris on FS 3200 and FS 3738 and reconstruction of the road surface. In Washington FS 4700, FS 4712, and FS 4713 involve uplands repair of the road failure caused by overland flow. FS 4700 at MP 3.92 was damaged when the Tucannon River overtopped its banks and ran overland, down FS 4700 and across the road washing out the opposite road shoulder and roadside ditch. FS 4712 and FS 4713 suffered damage during the flood event when an upland cross-drain culvert became plugged with debris, causing runoff to overtop the culvert and flow across the road, washing out the road shoulder and embankment on the downslope side of the road. Because no ESA-listed wildlife species will be affected by the Project, these upland work zones are described but not analyzed in this BA. Repairs to the complete road washouts at MP 2.02 to 2.14, MP 3.08, MP 3.23, and MP 3.53 will require relocating the current post-flood river channel and reconstructing the road in its pre-flood location. Road reconstruction will involve bank armoring with Class 6 riprap, bank reinforcement with Large Woody Material, roadbed filling and surfacing, and bank restoration with the placement of growing medium and riparian plantings/live stakes.

In assessing the potential effects of the proposed Project on listed fish, wildlife, and plant species, and their habitats, the environmental baseline was documented, and the proposed action was evaluated to assess the effect on the environmental baseline, listed species, and their critical

habitats. The results of these evaluations were used to arrive at a determination of effect. Direct, indirect, interrelated, interdependent and cumulative effects of the various Project components were considered.

Based on the analysis of effects and consideration of conservation measures that would be implemented to avoid and reduce effects we determined the following:

Fish Species

One ESA-listed species, Middle Columbia River steelhead (*Oncorhynchus mykiss*), and its Designated Critical Habitat is known to occur in the Project area. A second listed species, Columbia River Bull trout (*Salvelinus confluentus*) is present in the watershed and therefore may access the Project location, but no recent records of Bull trout in the Project vicinity were identified (Personal Communication Josh Hanson, former ODFW District Fish Biologist). Designated Critical Habitat for Bull trout is present immediately downstream in the mainstem Umatilla. Both MCR steelhead and Bull trout are listed as Threatened under the ESA.

The primary effects of the action will be stress from fish salvage, direct disturbance, and habitat alteration from in-water work, short-term and localized sediment disturbance during and immediately following construction, and a short- to medium-term decrease in aquatic invertebrates in in-water work zones.

The road repairs involve engineered log jams and boulder clusters and may improve habitat complexity within the South Fork of the Umatilla River, but the chronic negative influence of the existing road network on the South Fork Umatilla River will have direct and indirect effects.

After completing analyses of the potential effects of the proposed Project on listed species and their habitat, the following effects determinations were made:

Bull trout:

The water in the South Fork Umatilla is very warm (typically over 20° C) during the proposed in-water work window of July 1 to September 30, largely precluding the presence of ESA-listed fish species. Although there are no recent records of Bull trout presence in the SF Umatilla (there has been no documented spawning of Bull trout in the SF Umatilla since 1996, and extensive electrofishing surveys in 2012 identified no Bull trout in the Buck Creek-South Fork Umatilla Watershed [Sankovich and Anglin, 2013]), dispersing or migrating Bull trout could be present in the Action Area during cooler parts of the year, when they would encounter habitat alterations resulting from the Project. Given this potential for seasonal presence of Bull trout, the Project ***May Affect, but is Not Likely to Adversely Affect*** Columbia River Bull trout.

The Project area does not contain critical habitat for Bull trout, and the Project-related effects are not expected to extend downstream to Bull trout critical habitat.

Mid-Columbia River steelhead:

Although water temperatures are expected to be above 20°C during the in-water work window, steelhead juveniles could be present during in-water work. Those steelhead present would be exposed to direct harassment from fish salvage and in-water work, and subject to the effects of increased turbidity and habitat modification. Therefore, the Project is ***Likely to Adversely Affect*** Mid-Columbia River steelhead. These adverse effects are not expected to be of a magnitude that would affect the species at the population scale.

Mid-Columbia River steelhead Critical Habitat would also be affected. The Project will alter stream morphology long-term and negatively affect substrate, water quality, and forage essential Physical and Biological Features of Critical Habitat in the short term. Therefore, the Project is ***likely to adversely affect*** MCR steelhead DCH. The adverse effects are not expected to result in the *"destruction or adverse modification"* of designated critical habitat.

Invertebrate, Wildlife, and Plant Species:

No ESA-listed invertebrate, wildlife or plant species were identified that are likely to be present in the Project area. Therefore, the Project will have ***no effect*** on ESA-listed invertebrate, wildlife, or plant species.

Essential Fish Habitat:

Based on consideration of the EFH requirements of the Coastal Pelagic Species (CPS) fishery, West Coast groundfish fishery, and the Pacific coast salmon fishery, the potential direct, indirect, and cumulative effects of the proposed Project are ***Likely to Adversely Affect*** identified EFH for Pacific Salmon (coho salmon and spring Chinook) in the short-term. The implementation of appropriate conservation measures would help avoid and minimize impacts to EFH.

Chapter 1.0 Project Overview

The purpose of this biological assessment (BA) is to evaluate the potential effects of the OR FS Emergency Repair of Federally Owned Roads (ERFO) 2020(1)-14(1), Walla Walla South-Umatilla Repairs 2020, Phase 1 (the "Project," also referred to as the U.S. Forest Service (USFS) Road [FSR] 32 Repair and Streambank Stabilization Project) on species listed under the Endangered Species Act (ESA) and on Designated Critical Habitat (DCH) in the South Fork Umatilla River (SF Umatilla). This Project will be carried out by the Western Federal Lands Highway Division (WFLHD) and the USFS and funded by the Federal Highway Administration (FHWA).

The Project will occur entirely on public lands managed by the Walla Walla Ranger District, a portion of the Umatilla National Forest, and will be implemented either directly by USFS personnel or by a private company under contract to the FHWA. USFS projects must adhere to guidance found in the Land and Resource Management Plan, Umatilla National Forest (1990), as amended in 1995 by the Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH).

1.1 Federal Nexus

Section 7(a)(2) of the ESA (16 USC 1531-1544 and Section 1536) requires that each Federal agency shall, in consultation with the "Services" (National Marine Fisheries Service [NMFS] and the US Fish and Wildlife Service [USFWS]) ensure that any action authorized, funded, or carried out by such agency, is not likely to jeopardize the continued existence of an endangered or threatened species, or result in the destruction or adverse modification of critical habitat.

WFLHD, in cooperation with Umatilla National Forest, proposes to repair 17 roadway locations, 13 of which are on Forest Service Road 32 (FS 32, also known as FS 3200) damaged by a flood on February 5 and 6, 2020. The proposed repairs have been included in the ERFO program, administered by WFLHD. WFLHD is the lead federal agency for repair efforts at the proposed sites, and funding for the Project will be provided by the FHWA. This federal funding and authorization represent the federal nexus for the Project. As such, consultation with NMFS and USFWS regarding potential effects of the Project on species listed under the ESA is required. This consultation involves a review of all potential impacts of the Project that could result in "take" of a listed species and/or loss or degradation of designated critical habitat. A BA is required as part of the consultation process and must be submitted with the USACE Section 404 permit application.

This BA analyzes the potential effects of the FS 32 Repair and Streambank Stabilization Project in compliance with Section 7(c) of the ESA of 1973, as amended. Section 7 of the ESA assures that, through consultation (or conferencing for proposed species), with NMFS or USFWS, federal actions do not jeopardize the continued existence of any threatened, endangered or proposed species, or result in the destruction or adverse modification of critical habitat. Specific project design elements are identified that avoid or minimize adverse effects of the proposed Project on listed species and/or critical habitat.

One ESA-listed species, Middle Columbia River (MCR) steelhead (*Oncorhynchus mykiss*), and its DCH is known to occur in the Project area. A second listed species, Columbia River (CR) Bull trout is present in the watershed and therefore may access the Action Area, but no recent records of Bull trout in the Action Area were identified. DCH for Bull trout is present downstream in the mainstem Umatilla. Both MCR steelhead and Bull trout are listed as Threatened under the ESA.

The Magnuson-Stevens Act (MSA), which was reauthorized and amended in 1996, requires NMFS to recommend conservation and enhancement measures for any federal or state activity that may adversely affect Essential Fish Habitat (EFH). A description of EFH potentially impacted by the Project is included in Appendix A.

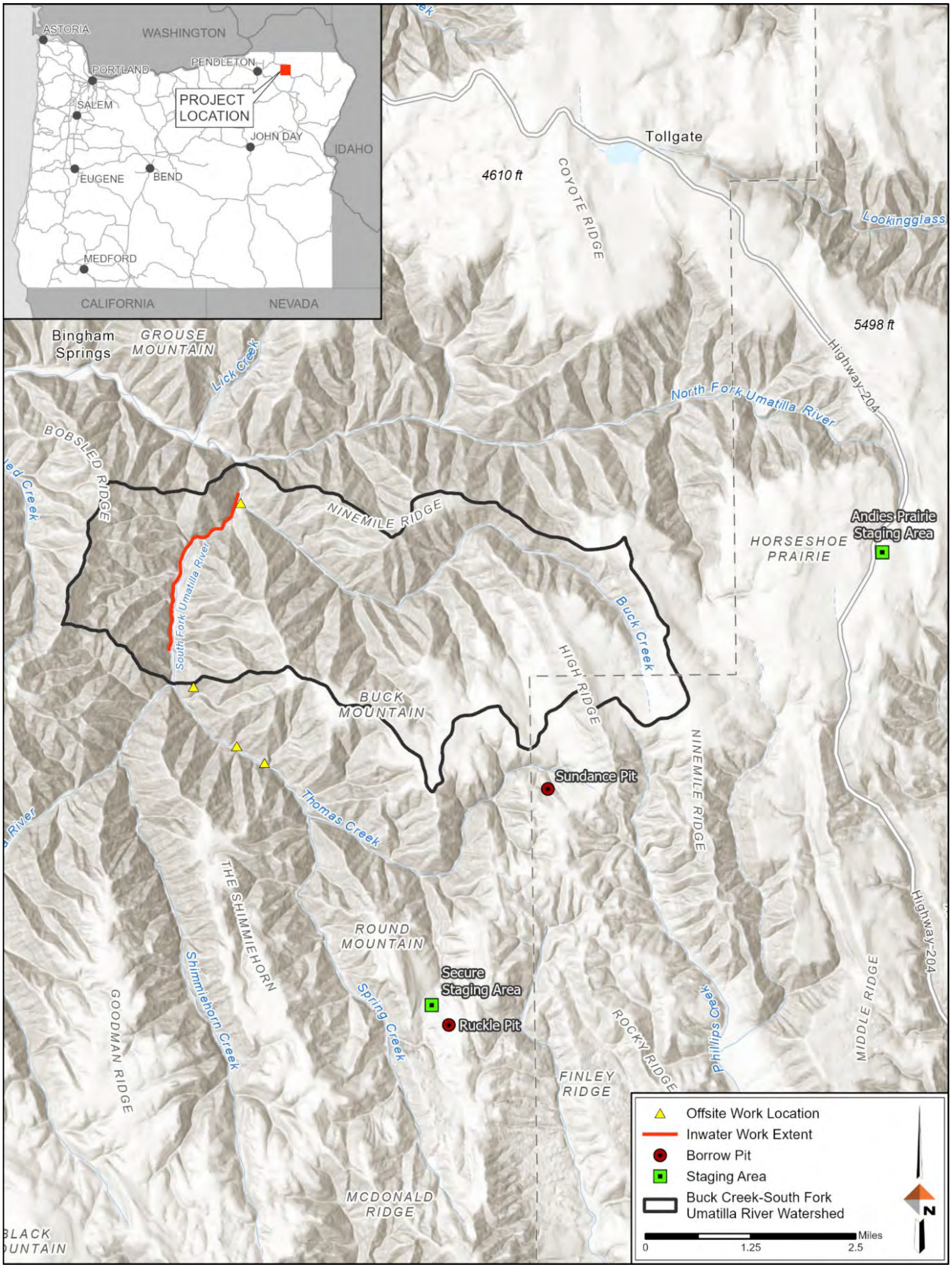
This BA was prepared in accordance with the following guidance and direction:

- Section 7(a)(2) of the Endangered Species Act of 1973 (as amended);
- 50 CFR § 402.12 (Interagency Cooperation, Biological Assessments);
- Endangered Species Consultation Handbook (USFWS and NMFS, March 1998);
- Streamlined Consultation Procedures for Section 7 of the Endangered Species Act (USFS, NMFS, BLM, & USFWS, July 1999); and
- Magnuson-Stevens Fishery Conservation and Management Act (§ 305(b)) and its implementing regulations (50CFR § 600).

1.2 Proposed Action

In the context of ESA consultation, “action” means all activities or programs of any kind, authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). The WFLHD is proposing to authorize, fund, and carry out actions to repair flood damage to FS 32 (also referred to as FS 3200) and its fill slope and re-stabilize the adjacent streambank of the SF Umatilla River. As stated above, the proposed repairs are funded and will be implemented through the ERFO Program. The intent of the ERFO program is to pay the unusually heavy expenses for the repair and reconstruction of eligible facilities, which are found to have suffered serious damage by a natural disaster over a wide area or by a catastrophic failure (23 CFR §668.201 and 23 CFR §668.205 (a)) and restore facilities to their pre-disaster conditions. The scope of the Project is constrained by the requirements of the ERFO funding, which requires least cost, environmentally viable project that will meet the minimum requirements in consultation with regulatory agencies. The scope of the Project is also constrained by the topography. The FS 3200 Road hugs the west canyon of the South Fork Umatilla River landward, and adjustment of the road is constrained by bedrock and canyon walls. The primary damage in the Project Area includes debris flows blocking the road, road washouts, culvert damage, and bank erosion along the SF Umatilla River. The damage is not continuous, but the in-water work will occur at eight work zones over 2.23 road miles. Because the road closely follows the SF Umatilla, the number of river miles (RM) affected is similar. The Project location is depicted on Figure 1-1. Potential staging areas and borrow pits (aggregate sources) are also depicted on Sheets A.3, A.5., A.6. and A.7. of the Project Plans found in Appendix B. The sites are existing and do not require development or site clearing. Riprap will be sourced by the Contractor from commercial rock pits in NE Oregon or SE Washington, as there is no appropriate-sized riprap available locally.

Figure 1-1: Project Area



Of the eight in-water work zones, four involve partial road reconstruction, and four involve the repair of complete road washouts. Repairs to the complete road washouts at MP 2.02, MP 3.08, MP 3.23, and MP 3.53 will require relocating the current post-flood river channel and reconstructing the road in its pre-flood location. One washed-out corrugated metal pipe (CMP) culvert at MP 2.54 will be replaced with an Aquatic Organism Passage culvert. The culvert is on a drainage with ephemeral or intermittent flow, and it will be constructed in the dry. However, the drainage served by the culvert may be accessible to fish during wet periods of the year, and stormwater through the culvert may carry sediment which could affect the SF Umatilla River.

The upland work (aside from the culvert replacement above, which will be completed in the dry) includes removing landslide debris from FS 32 at MPs 1.26, 4.47, 5.58, and 6.0. The four remaining upland construction locations funded by WFLHD and included as part of the larger Project involve road repair damaged by overland flow and removing landslide debris from locations on four other minimum maintenance roads (3738, 4700, 4712, and 4713). Two of the damaged roads (FS 4712 and FS 4713) were needed for fire-fighting access, and repairs to those roads to make the roads passable were completed in 2021. Long-term repair to the road subgrade and road drainage system is still required. The upland repairs are limited in scope and will be/were confined to the road prism. These locations are located far enough from streams that no sediment is expected to reach waters containing ESA-listed species. The locations of all work zones are included in Appendix B.

Although work will occur along 2.23 miles of FS 32, the lateral extent of the repairs is much more limited and confined to the former road prism. The primary area of impact to FS 32 is constrained on the west by a steep basalt cliff and on the east by the South Fork Umatilla River. The current bed and banks of the SF Umatilla will be the primary area of impact. See Section 1.3 for construction details.

Project activities will include:

- Landslide debris removal;
- Road reconstruction and rehabilitation (including aggregate surfacing);
- install and remove stream isolation measures during construction;
- Bank stabilization and reconstruction (including grading, placement of riprap and Large Woody Material [LWM], and a new embankment with reinforced soil slopes);
- Culvert replacement; and
- Turf establishment/revegetation

1.2.1.1 Purpose and Need

On February 4 and 5, 2020, 10 to 20 inches of snow fell at locations between 1,500 to 4,000 feet, with even greater snow totals at higher elevations of the Blue and Wallowa Mountains of northeast Oregon and southeast Washington. During the afternoon of February 5, the snow transitioned to rain at elevations up to 5,000 feet. Rainfall amounts of 3 to 6 inches fell across the Blue and Wallowa Mountains of northeast Oregon. The peak flow on the Umatilla River at Pendleton on February 6, 2020, was estimated to be over 19,000 cubic feet per second (cfs), significantly eclipsing the previous high flows of 13,300 cfs seen in February 1996 and 15,400 cfs seen in February 1949 (Harris and Hubbard, 1983). Moderate flooding occurs at 12,633 cfs

(National Weather Service, 2022). The 50-year flood discharge for the Umatilla River at Pendleton is 17,800 cfs, and a 100-year flood (a flood with a 1 percent chance of occurring in any given year) is 21,200 cfs (Cooper, 2006). This indicates that the February 2020 flood approached, and may have eclipsed, the magnitude of a 100-year flood.

The purpose of the Project is to restore storm-damaged roads that provide wildfire access and direct access to National Forest resources to serve local needs and communities dependent on activities on National Forest System lands. FS 32 provides the only access to the North Fork Wilderness, the South Fork Campground, and areas culturally important to the Confederated Tribes of the Umatilla Indian Reservation (CTUIR). The CTUIR were included in meetings and site visits during early consultation (Section 1.2.4).

1.2.2 Interrelated and interdependent actions and activities

An interdependent activity is an activity that has no independent utility apart from the proposed action. We did not identify interdependent actions or activities associated with the proposed action that would affect listed species.

Interrelated actions include "actions that are part of a larger action and depend on the larger action for justification." No interrelated or interdependent action were identified.

1.2.3 Project Area and Setting

The Umatilla River is located in northeastern Oregon. It drains approximately 2,360 square miles and is a direct tributary of the Columbia River. The basin is identified as United States Geological Survey (USGS) Hydrological Unit Code (HUC) 17070103. The Project is located in the Headwaters Umatilla River watershed (1707010301), and Buck Creek-SF Umatilla subwatershed (170701030103).

Table 1-1 includes information on each of the subwatersheds in the Headwaters Umatilla Watershed.

Table 1-1. Subwatersheds within the Headwaters Umatilla River Watershed and Fishbearing Stream Miles Present within each Subwatershead

Subwatershed Name	Hydrologic Unit Code (HUC12)	Steelhead distribution (miles)	Steelhead Critical Habitat (miles)	Bull trout distribution (miles)	Bull trout Critical Habitat (miles)
Bear Creek-Umatilla River	170701030106	6.9	6.1	10.2	10.2
Buck Creek-South Fork Umatilla	170701030103	8.3	8.3	2.6	0
Thomas Creek	170701030101	7.9	7.9	2.4	0
Upper SF Umatilla River	170701030102	7.8	7.8	6.9	0
NF Umatilla River	170701030104	17.7	14.4	8.8	13.5
Ryan Creek	170701030105	5.9	5.9	2.0	4.4

The Project is located primarily on FS 32, along the South Fork Umatilla River, just upstream of the confluence of the North and South Forks. Buck Creek joins the SF Umatilla River in the Project Action Area, directly across from the most downstream in-water work zone.

The “Project area” (Figure 1-1) is defined as all the areas in which project activities will occur. This includes the extent of clearing, road reconstruction, and revegetation, in-water work zones, and areas of temporary construction impacts along and adjacent to the roadway. Also included are some potential sources of aggregate rock and road embankment (the Ruckle and Sundance pits) and staging areas (Andies Prairie and a second staging area near the Ruckle Pit). Riprap will be Contractor sourced from a commercial rock pit. The baseline aquatic and terrestrial conditions presented in this document and the analysis of effects focus on an “Action Area.” “Action Area” is defined as “all areas affected directly or indirectly by the proposed action and not merely the immediate area involved in the action” (50 CFR § 402.02). The Action Area analyzed for effects to ESA-listed fish species and DCH is larger than the Project area and extends 100 feet upstream of the most upstream in-water work zone, downstream to the bridge over the SF Umatilla, approximately 760 feet downstream of the most downstream in-water work zone to account for construction-derived turbidity or other negative effects to water quality. Justification for the size of the Action Area is included in Chapter 4.

Because no ESA-listed wildlife species are expected to be adversely affected, there is no Action Area for wildlife species (see Chapter 2.2).

The specific location of the Project is:

- Legal Description: Township 3N Range 37E Sections 22, 27, 28, and 33
- Coordinates:
  - South end (upstream end in the South Fork Umatilla): 45° 43’12.96” N, 118° 11’ 18.42” W (45.69413333, -118.2059556);
  - North end (downstream end in the South Fork Umatilla): 45° 41’ 38.88” N, 118°12’ 21.44” W (45.72026667, -118.18845); and
- Sixth Field Hydraulic Unit Code (HUC): 170701030103 – Buck Creek-South Fork Umatilla River.

Important natural and human landmarks, and their river mile locations along the Umatilla River, are listed in Table 1-2. These landmarks are provided for context and to help inform later discussions of the Environmental Baseline and Project effects.

Table 1-2. Important landmarks by River Mile

Landmark	River Mile
Umatilla River	
Mouth of the Umatilla River	0
Umatilla River at outlet from the Bear Creek subwatershed (Meacham Creek confluence)	79
Forest Boundary (Corporation Guard Station)	89
Confluence of North and South Forks (upper end of Bear Creek subwatershed)	90
North Fork Umatilla River	
Confluence of North and South Forks	0
Coyote Creek	3
Source of the North Fork Umatilla River	10
South Fork Umatilla River	
Confluence of North and South Forks	0
Buck Creek	0.5
Thomas Creek	3
Shimmiehorn Creek	4
Source of the South Fork Umatilla River	10

1.2.4 Consultation History

The following meetings were held with the Services and other interested entities:

- A remote meeting was held on January 18, 2022. Agencies in attendance included: FHWA, USFS, USFWS, NMFS, USACE, Oregon Department of State Lands (ODSL), Oregon Department of Fish and Wildlife (ODFW), and the CTUIR.
    - It was determined at this meeting that the Project would require individual consultation.
    - NMFS expressed concern about recurrent washouts along this road that have led to repeating cycles of damage and repair which can harm ESA-listed species.
        - FWHA responded that hydraulic modeling for a 100-year flood event would drive design elements, including type and placement of LWM, and size and location of rip-rap bank armoring.
        - Based on past experiences and modeled flood flows, the log/root wads will be constructed in a jam formation, using logs as deflectors and footer logs to preserve root wad trees from debris flow damage and scour undermining the installed root wads. The jams would be located in the riverbank along the reconstructed road with the intent of breaking up turbulent flow against the bank, and in locations appropriate for the planform of the river.
    - NMFS asked about the need for a wetland delineation and the feasibility of revegetation.

        - FWHA responded that the Action Area is in a confined canyon and all work would take place from the road/upland side of the river. The opposite bank is less constrained with more opportunity for river migration and wetland formation but will not be affected by the Project.
        - It is a harsh climate with limited growing medium. Plantings are to be clumped in areas where sediment deposition will occur and areas where a growing medium (soil/compost) can be established and retained over time.
    - NMFS requested that all Project materials be submitted as early as possible, and that they be provided with a draft BA for review prior to final submittal.
- A remote meeting was held on June 22, 2022. Agencies in attendance included: FHWA, USFS, USFWS, NMFS, USACE, ODSL, and the CTUIR.
    - A "virtual site visit" was presented using drone aerial photography and concurrent on-the-ground video collected April 26-29, 2022. Design plans and approaches were presented, and site constraints and preliminary hydraulic models were discussed.
    - Topics discussed during the Q and A included:
        - Changes to stream morphology since the flood;
        - Channel restoration design and modeling;
        - Constraints to restoration (preserving the lodge, its pond, and Buck Creek alluvial fan);
        - Designing the Project for robust protection (ensuring road washouts are not a chronic problem);
        - Integrating vegetation into the design;
        - Status of the damaged bridge;
        - Options for public access should the road not be repaired; and
        - Constraints of ERFO funding
- An onsite meeting was held August 9, 2022. Agencies in attendance included USFS, USFWS, NMFS and CTUIR.
    - Topics discussed during the onsite included:
        - Assess scale and scope of the damage caused by the February 2020 flood event.
        - Discuss the purpose of the project is repair of the road washed out and damaged.
        - Discuss general schedule and timing of the repair work.
- A remote meeting was held on November 14, 2022. Agencies in attendance included: FHWA, USFS, USFWS & NMFS.
    - The meeting was to discuss the draft Biological Assessment, supplied to USFWS & NMFS October 26, 2022.

- Topics discussed during the Q and A included:
  - Project timing needs to complete construction in one vs. two summers
  - Agency schedule for review – there was no commitment that NMFS could complete review in time to put the Project out to bid in 2023
  - Clarify that the minimization measure for in-water work is stream diversion. Stream diversion will be to isolate the work area on the west bank and shunt active flow to the opposite side. At no time will the in-water isolation measures span the width of the river.
  - Agency needs for consultation regarding project design (70% design vs. 95% design).
    - Project design changes between 70% and 95% are to finalize work items and quantities to establish costs and begin right-of-way acquisition (if applicable).
    - Project proponents described that any changes that may occur between 70% design and construction would be minor tweaks that would not affect the amount or extent of in-water work.
  - The size and amount of riprap to be used
  - The amount of LWM to be installed, and the agencies' desire to maximize the amount of wood.
  - Agency guidance against installing rock barbs or weirs
  - Agency guidance to not include any cables or chains to secure rock

1.3 Detailed Project Description

Equipment to be used will include, but is not limited to, hydraulic excavators, graders, dump trucks, backhoes, front loaders, generators, and pumps (for surface water management).
All Project construction locations are provided in Table 1-3, followed by narrative descriptions of each work location. Specifications for different grades of riprap, referenced throughout this report, are included in Table 1-4. The Project will use Class 6 and 7 riprap. The maximum size of Class 7 riprap is 54 inches (on the intermediate dimension, i.e. the longest straight-line distance across the rock that is perpendicular to the longest axis on the face of the rock). Project plans and details are included in Appendix B. Permanent and temporary in-water impact quantities are included in Table 1-5. No blasting or pile driving will take place at any of the sites.

1.3.1 In-water Work Locations

Construction zones below the OHW line of the SF Umatilla will be isolated to the extent possible, with natural flow directed away from the in-water isolation area using materials such as sandbags, super sacks, or water bladders. The construction area below the OHWM will be isolated from the flows of the SF Umatilla River to minimize the effects of turbidity and allow construction in isolation. At no time will in-water isolation span the width of the SF Umatilla River, insuring continuous up- and downstream fish passage. Redd surveys will be completed prior to isolation and dewatering to ensure no active redds are impacted. The isolation structures will be placed starting at the upstream end first, then working downstream. The downstream end will remain open until the isolation area has been seined and blocked with nets to remove any fish that may be present, then the isolation structure will be completed, closing off the west bank of the river. The final isolation methodology will be determined by the Contractor. The in-water work area will be accessed from the roadway or stream bank as prescribed in the construction contract. Installing the temporary isolation berm and the reconfiguration of the channel away from FS 32 will require minor work “in the wet” (without the benefit of work area isolation). While all available minimization measures will be employed (see Appendix E), including using biodegradable vegetable-based oil in any heavy equipment that operates below the Ordinary High Water (OHW) line or reaches into SF Umatilla River, construction equipment will at the very least need to encroach on the active channel to install temporary isolation measures and complete construction. For instance, in areas where temporary isolation measures are installed, active stream flow would be shunted away from the isolation area, excavators could remove instream natural sediment to “set” the bottom of isolation structures and direct stream flow away from the berm. Any removal of river sediment to facilitate flow away from the isolation structure, such as from a gravel bar or debris jam would occur by excavator reaching from land and would be the minimum necessary to divert flow away from the isolation structure.

The Project in-water work window is July 1 to August 15.

Table 1-3. FS 32 Project Construction Locations

Site Name	Road Number	Hydrologic Unit Code	Legal Description	Latitude/Longitude
In-water Work				
Mile Post 1.30-1.36	FS 3200	1707010301	T3N, R37E, Sect 22	45°43’08.63” N -118°11’20.19” W
Mile Post 1.38-1.44	FS 3200	1707010301	T3N, R37E, Sect 22	45°43’05.94” N -118°11’21.99” W
Mile Post 1.52-1.69	FS 3200	1707010301	T3N, R37E, Sect 22	45°42’58.79” N -118°11’25.68” W
Mile Post 1.96-2.00	FS 3200	1707010301	T3N, R37E, Sect 22	45°42’46.88” N -118°11’50.61” W
Mile Post 2.02-2.14	FS 3200	1707010301	T3N, R37E, Sect 28	45°42’45.48” N -118°11’59.11” W
Mile Post 2.54	FS 3200	1707010301	T3N, R37E, Sect 28	45°42’23.04” N -118°12’10.48” W
Mile Post 3.08	FS 3200	1707010301	T3N, R37E, Sect 33	45°42’02.73” N -118°12’19.41” W
Mile Post 3.23	FS 3200	1707010301	T3N, R37E, Sect 33	45°41’53.18” N -118°12’18.83” W
Mile Post 3.53	FS 3200	1707010301	T3N, R37E, Sect 33	45°41’40.64” N -118°12’20.16” W
Upland Work				
Mile Post 1.26	FS 3200	1707010301	T3N, R37E, Sect 22	45°43’14.81” N -118°11’16.94” W
Mile Post 4.87	FS 3200	1707010301	T2N, R37E, Sect 5	45°41’00.90” N -118°12’03.58” W
Mile Post 5.58	FS 3200	1707010301	T2N, R37E, Sect 4	45°40’37.74” N -118°11’25.82” W
Mile Post 6.00	FS 3200	1707010301	T2N, R37, Sect 4	45°40’27.07” N

				-118°11’01.42” W
Mile Post 8.35	FS 3738	17070103	T1N, R38E, Sect 29	45°32’22.85” N -118°05’21.66” W
Mile Post 3.92	FS 4700	170601070603	T12N, R33E, Sect 10	46°32’22.85” N -117°40’23.75” W
Mile Post 0.87	FS 4712	170601070603	T8N, 41E, Sect 4	46°12’00.80” N -117°41’39.12” W
Mile Post 0.55	FS 4713	170601070603	T8N, R41E, Sect 5	46°12’01.25” N -117°42’35.81” W

Table 1-4: FHWA Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects; Riprap Gradation

Section 705

Table 705-1
Gradation Requirements for Riprap[1]

Class	% of Rock Equal or Smaller by Count, D_X	Range of Intermediate Dimensions,[2] inches (millimeters)	Range of Rock Mass,[3] pounds (kilograms)
1	100	9 – 15 (230 – 380)	59 – 270 (27 – 120)
	85	7 – 11 (180 – 280)	28 – 110 (13 – 50)
	50	5 – 8 (130 – 200)	10 – 42 (5 – 19)
	15	3 – 6 (80 – 150)	2 – 18 (1 – 8)
2	100	15 – 21 (380 – 530)	270 – 750 (120 – 340)
	85	11 – 15 (280 – 380)	110 – 270 (50 – 120)
	50	8 – 11 (200 – 280)	42 – 110 (19 – 50)
	15	6 – 8 (130 – 200)	10 – 42 (6 – 19)
3	100	21 – 27 (530 – 690)	750 – 1600 (340 – 730)
	85	15 – 19 (380 – 480)	270 – 560 (120 – 250)
	50	11 – 14 (280 – 360)	110 – 220 (50 – 100)
	15	8 – 10 (200 – 250)	42 – 81 (19 – 37)
4	100	27 – 33 (690 – 840)	1600 – 2900 (730 – 1300)
	85	19 – 23 (480 – 580)	560 – 990 (250 – 450)
	50	14 – 17 (360 – 430)	220 – 400 (100 – 180)
	15	9 – 12 (230 – 300)	59 – 140 (27 – 64)
5	100	33 – 39 (840 – 990)	2900 – 4850 (1300 – 2200)
	85	23 – 28 (580 – 710)	990 – 1800 (450 – 820)
	50	17 – 20 (430 – 510)	400 – 650 (180 – 290)
	15	11 – 15 (280 – 380)	110 – 270 (50 – 120)
6	100	39 – 45 (990 – 1140)	4850 – 7400 (2200 – 3350)
	85	28 – 32 (710 – 810)	1800 – 2650 (820 – 1200)
	50	20 – 23 (510 – 580)	650 – 990 (290 – 450)
	15	13 – 17 (330 – 430)	180 – 400 (82 – 180)
7	100	45 – 54 (1140 – 1370)	7400 – 12,800 (3350 – 5800)
	85	32 – 38 (810 – 970)	2650 – 4450 (1200 – 2000)
	50	23 – 28 (580 – 710)	990 – 1800 (450 – 820)
	15	15 – 20 (380 – 510)	270 – 650 (120 – 290)
8	100	54 – 66 (1370 – 1680)	12,800 – 23,400 (5800 – 10,600)
	85	38 – 47 (970 – 1190)	4450 – 8450 (2000 – 3850)
	50	28 – 35 (710 – 890)	1800 – 3500 (820 – 1600)
	15	19 – 25 (480 – 640)	560 – 250 (250 – 570)
9	100	66 – 78 (1680 – 1980)	23,400 – 38,600 (10,600 – 17,500)
	85	47 – 55 (1190 – 1400)	8450 – 13,500 (3850 – 6100)
	50	35 – 41 (890 – 1040)	3500 – 5600 (1600 – 2550)
	15	22 – 30 (560 – 760)	870 – 2200 (390 – 1000)
10	100	78 – 90 (1980 – 2290)	38,600 – 59,300 (17,500 – 26,900)
	85	55 – 64 (1400 – 1630)	13,500 – 21,300 (6100 – 9650)
	50	41 – 48 (1040 – 1220)	5600 – 9000 (2550 – 4100)
	15	26 – 36 (660 – 910)	1450 – 3800 (660 – 1700)

(1) Gradation includes spalls and rock fragments to provide a stable, dense mass.

(2) The intermediate dimension is the longest straight-line distance across the rock that is perpendicular to the rock's longest axis on the rock face with the largest projection plane.

(3) Rock mass is based on a specific gravity of 2.65 and 85 percent of the cubic volume as calculated using the intermediate dimension.

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Figure 1-2: Culvert and bank damage at MP 1.30

Mile Post 1.30-1.36

High water caused embankment erosion, and loss of road subgrade and surfacing. Debris flow blocked and washed out a 16 in corrugated metal pipe (CMP) culvert. Debris flow blocked a portion of the road and caused loss of subgrade and surfacing.

- Excavate ~242 yd^3 streambank and streambed material to set in-stream isolation measures and toe in riprap. Salvaged material to be used to form streambank and floodplain bench;
- Reconstruct embankment to obtain 14’ wide road with 2’ shoulders; road reconstruction will reclaim ~3,770 ft^2 of SF Umatilla River;
- Ditch reconditioning (~198 yd^3);
- Replace damaged pipe culvert with 24” diameter cross-culvert;
- 198 lineal feet of streambank treatment, including armoring, with ~245 yd^3 Class 6 riprap; and roughened toe incorporating larger (Class 7) riprap
- Incorporate floodplain bench development, buried log/rootwad jams
- Establish riparian area through turf establishment, tree, and shrub plantings (~1,585 ft^2)
- In-water Work, including stream isolation installation and removal, to take approximately 5-7 days to complete

Figure 1-3: Road and bank erosion at MP 1.38, looking upstream

Figure 1-4: Road and bank erosion at MP 1.38, looking downstream

Mile Post 1.38-1.44

High water caused embankment erosion, and loss of road subgrade and surfacing resulting in loss of 20% of the road.

- Excavate ~342 yd^3 streambank and streambed material to set in-stream isolation measures and toe in riprap. Salvaged material to be used to form streambank and floodplain bench;
- Reconstruct embankment to obtain 14' wide road with 2' shoulders; road reconstruction will reclaim ~8,530 ft^2 of SF Umatilla River;
- Ditch reconditioning (~336 yd^3);
- 336 lineal feet of streambank treatment, including armoring with ~445 yd^3 Class 6 riprap. Roughened toe incorporating larger (Class 7) riprap
- Incorporate floodplain bench development, buried log/rootwad jams
- Establish riparian area through turf establishment, tree, and shrub plantings (~1,585 ft^2)
- In-water Work, including stream isolation installation and removal, to take approximately 7-10 days to complete

Figure 1-5: Road and bank erosion at MP 1.52, looking upstream

Mile Post 1.52-1.69

High water caused embankment erosion, and loss of road subgrade and surfacing resulting in loss of 50% of the road.

- Excavate ~382 yd^3 streambank and streambed material to set in-stream isolation measures and toe in riprap. Salvaged material to be used to form streambank and floodplain bench;
- Reconstruct embankment to obtain 14’ wide road with 2’ shoulders; road reconstruction will reclaim ~9,550 ft^2 of SF Umatilla River;
- Ditch reconditioning (~410 yd^3);
- 392 lineal feet of streambank treatment, including armoring with ~451 yd^3 Class 6 riprap. Roughened toe incorporating larger (Class 7) riprap;
- Incorporate floodplain bench development, buried log/rootwad jams
- Establish riparian area through turf establishment, tree and shrub plantings (~3,920 ft^2)
- In-water Work, including stream isolation installation and removal, to take approximately 7-10 days to complete

Figure 1-6: Bank erosion at MP 1.96, looking downstream

<u>Mile Post 1.96-2.00</u>
High water caused embankment erosion, loss of 75% of the road, and loss of road subgrade and surfacing. Road reconstruction will require relocation of the thalweg of the river.

- Excavate ~783 yd^3 streambank and streambed material to construct a low flow channel during construction, set in-stream isolation measures and toe in riprap. Remove ~50 yd^3 of cobble off gravel bar to enlarge low flow channel. Salvaged material to be used to form streambank and floodplain bench Salvaged material to be used to form streambank and floodplain bench;

- Reconstruct embankment to obtain 14’ wide road with 2’ shoulders; road reconstruction will reclaim ~7,045 ft² of SF Umatilla River;
- 165 lineal feet of streambank treatment, including armoring with ~265 yd³ Class 6 riprap. Roughened toe incorporating larger (Class 7) riprap;
- Incorporate floodplain bench development, buried log/rootwad jams;
- Establish riparian area through turf establishment, tree, and shrub plantings (~2,475 ft²)
- In-water Work, including stream isolation installation and removal, to take approximately 10 days to complete

Figure 1-7: Road washout at 2.02, looking downstream

Mile Post 2.02-2.14

High water caused complete loss of road. The river is in the process of migrating to cut off the meander that washed out the road. Road reconstruction will require filling the side channel of the river.

- Excavate ~293 yd³ streambank and streambed material set in stream isolation measures and toe in riprap. Salvaged material to be used to form streambank and floodplain bench;
- Reconstruct embankment to obtain 14’ wide road with 2’ shoulders; road reconstruction will reclaim ~12,800 ft² of SF Umatilla River;
- 654 lineal feet of streambank treatment, including armoring with ~624 yd³ Class 6 riprap. Incorporate floodplain bench development, buried log/rootwad jams
- Establish riparian area through turf establishment, tree and shrub plantings (~6,540 ft²);

- In-water Work, including stream isolation installation and removal, to take approximately 10-15 days to complete

Figure 1-8: Road washout at MP 2.02, looking upstream. The main river channel is currently well to the east (left on this photo).

Figure 1-9: Washed out culvert at MP 2.54

<u>Mile Post 2.54</u>

High water caused blowout of 4’ diameter CMP culvert. Remove existing non-functional CMP, replace with 12’ diameter Aquatic Organism Passage (AOP) CMP.

- This drainage will be dry at the time of construction, but construction will occur below the OHW line;
- Reconstruct approximately 500 feet of roadway to obtain 14’ wide road with 2’ shoulders; and
- Inside culvert, install ~78 yd^3 appropriately-sized streambed material with bank stone and streambed sediment, incorporate embedded fish boulders within to form the low flow thalweg
- Establish riparian area through turf establishment, tree and shrub plantings (~1,200 ft^2);
- Work to take approximately 10 days to complete

Figure 1-20: Road washout at MP 3.08, looking downstream

<u>Mile Post 3.08</u>

High water caused complete loss of road. Road reconstruction will require relocation of the thalweg of the river. The flood created a pool against the cliff where the road was previously located. This pool will be filled by the new road construction. A large wetland between the road and the active channel just upstream of this washout will be preserved.

- Excavate ~93 yd³ streambank and streambed material set in-stream isolation measures and toe in riprap. Remove ~150 yd³ of cobble off gravel bar to enlarge low flow channel. Salvaged material to be used to form streambank and floodplain bench;
- Reconstruct embankment to obtain 14’ wide road with 2’ shoulders; road reconstruction will reclaim ~7,845 ft² of SF Umatilla River;
- 200 lineal feet of streambank treatment, including armoring with ~308 yd³ Class 6 riprap; Incorporate floodplain bench development, buried log/rootwad jams;
- Establish riparian area through turf establishment, tree and shrub plantings (~1,500 ft²);
- In-water Work, including stream isolation installation and removal, to take approximately 10 days to complete.

Figure 1-3: Road washout at MP 3.08, looking upstream

Figure 1-42: Road and bank erosion at MP 3.23

Mile Post 3.23

High water caused embankment erosion and loss of >50% of road. Road reconstruction will require relocation of the thalweg of the river.

- Excavate ~235 yd³ streambank and streambed material set in-stream isolation measures and toe in riprap. Salvaged material to be used to form streambank and floodplain bench;
- Reconstruct embankment to obtain 14' wide road with 2' shoulders; road reconstruction will reclaim ~5,425 ft² of SF Umatilla River;
- Ditch reconditioning;
- 175 lineal feet of streambank treatment, including armoring with ~278 yd³ Class 6 riprap; roughened toe incorporating larger (Class 7) riprap; Incorporate floodplain bench development, buried log/rootwad jams
- Establish riparian area through turf establishment, tree and shrub plantings (~875 ft²);
- In-water Work, including stream isolation installation and removal, to take approximately 10-15 days to complete

Figure 1-53: Washout at MP 3.53, looking downstream

Mile Post 3.53

High water caused complete loss of road. Road reconstruction will require relocation of the thalweg of the river.

- Excavate ~141 yd³ streambank and streambed material set in-stream isolation measures and toe in riprap. Remove ~150 yd³ of cobble off gravel bar to enlarge low flow channel. Salvaged material to be used to form streambank and floodplain bench;

- Reconstruct embankment to obtain 14’ wide road with 2’ shoulders; road reconstruction will reclaim ~9,080 ft^2 of SF Umatilla River;
- Ditch reconditioning;
- 258 lineal feet of streambank treatment, including armoring with ~445 yd^3 Class 6 riprap;
- Incorporate floodplain bench development, buried log/rootwad jams
- Establish riparian area through turf establishment, tree and shrub plantings (~2,580 ft^2);
- In-water Work, including stream isolation installation and removal, to take approximately 10-15 days to complete

Figure 1-64: Washout at MP 3.53, looking upstream

1.3.2 Upland Locations

The following upland locations do not involve any in-water work, and they are not expected to discharge any sediment or turbid water to any waterbodies that potentially contain ESA-listed fish.

Mile Post 1.26:
Large debris slide consisting of loose and broken rock, scree, and soil covering road.

- Remove debris (~374 yd^3);
- Reshape subgrade and embankment (~495 yd^3);
- Ditch reconditioning (~294 yd^3); and
- Aggregate surface reconditioning (~57 yd^3)
- Turf reestablishment and erosion control on disturbed area (~2,900 ft^2)
- Work to take approximately 5 days to complete

Figure 1-15: Debris slide at MP 1.26

Mile Post 4.87

Large debris slide consisting of loose and broken rock, scree, and soil covering road. Replace washed out cross-drain culvert

- Remove debris (~230 yd^3);
- Reshape subgrade and embankment (~230 yd^3);
- Ditch reconditioning (~177 yd^3); and
- Aggregate surface reconditioning (~35 yd^3)
- Turf reestablishment and erosion control on disturbed area (~1,750 ft^2)
- Work to take approximately 5 days to complete

Mile Post 5.58

Large debris slide consisting of loose and broken rock, scree, and soil covering road.

- Remove debris (~1,218 yd^3);
- Reshape subgrade and embankment (~103 yd^3);
- Ditch reconditioning (~103 yd^3); and
- Aggregate surface reconditioning (~20 yd^3)
- Turf reestablishment and erosion control on disturbed area (~1,640 ft^2)
- Work to take approximately 3-5 days to complete

Mile Post 6.00

Large debris slide consisting of loose and broken rock, scree, and soil covering road.

- Remove debris (~775 yd^3);
- Reshape subgrade and embankment (~55 yd^3);

- Ditch reconditioning (~61 yd^3); and
- Aggregate surface reconditioning (~4 yd^3);
- Turf reestablishment and erosion control on disturbed area (~610 ft^2)
- Work to take approximately 3-5 days to complete

<u>FS 3738 Mile Post 8.35</u>
Fill slope failure and roadway settlement due to slope failure. Excavate damaged road section, reconstruct embankment with a geogrid reinforced slope. Restore travel way width to 15'.

- Excavate damaged road section (~56 yd^3);
- Reshape subgrade and reconstruct embankment, including geogrid reinforcement (~60 yd^3); and
- Aggregate surface reconditioning (~50 yd^3)
- Turf reestablishment and erosion control on disturbed area (~500 ft^2)
- Work to take approximately 3-5 days to complete

<u>FS 4700 Mile Post 3.92</u>
High river flows overtopped road and eroded asphalt surface and base course and eroded road shoulder, road embankment, and roadside ditch.

- Excavate damaged road section (~12 yd^3),
- Reshape subgrade and asphalt concrete pavement (~10 yd^3), and
- Ditch reconditioning (~66 yd^3)
- Turf reestablishment and erosion control on disturbed area (~610 ft^2)
- Work to take approximately 5 days to complete

<u>FS 4712 Mile Post 0.87</u>
High flow and debris plugged cross-culvert, overtopping the road and resulted in fill slope failure at toe of embankment, resulting in loss of roadway width. Repair failed embankment slope from valley bottom up to road surface and restore the roadway width.

- Place imported riprap on hill slope and/or embankment material (~112 yd^3);
- Replace plugged cross culvert with 24" culvert; and
- Place aggregate surfacing (~7 yd^3)
- Turf reestablishment and erosion control on disturbed area (~210 ft^2)
- Work to take approximately 3-5 days to complete

<u>FS 4713 Mile Post 0.55</u>
Fill slope failure at toe, resulting in loss of roadway width. Repair failed embankment slope from valley bottom up to road surface and restore the roadway width.

- Place imported riprap on hill slope and/or embankment material (~1,620 yd^3);
- Replace culvert with 36" diameter culvert; and
- Place aggregate surfacing (~12 yd^3)
- Turf reestablishment and erosion control on disturbed area (~520 ft^2)
- Work to take approximately 5 days to complete

Table 1-5. Location and Amounts of Work Below OHW

FS 32 Mile Post	Lineal feet of bank treatment[1]	Temporary inwater impacts (ft^2) [1]	Permanent inwater impact (ft^2)	Class 6 riprap placement (yds^3)
1.30 – 1.36	198	3,026	3,770	303
1.38 – 1.44	336	4,273	8,530	428
1.52 – 1.69	392	8,210	9,550	454
1.96 – 2.00	165	5,530 (2 Seasons)	7,045	854
2.02 – 2.14	654	9,009 (2 Seasons)	20,505	741
2.54	221			50
3.08	200	4,073 (2 Seasons)	7,845	116
3.23	175	2,965 (2 Seasons)	5,425	294
3.53	258	3,145	9,080	176
Totals	**2,599**	**44,076 (1.01 acres)**	**71,750 (1.65 acres)**	**3,415**

[1] Sites with "2 Seasons" indicate where construction (stream isolation and fish salvage) will occur 2 times for the project. Season #2 and Season #3.

1.3.3 Project timeline and sequencing

The Project will likely begin in summer 2024 and be constructed over two seasons. Upland construction, debris removal, and construction access is not constrained by in-water work timing considerations and will likely commence in early summer. Road repair and reconstruction at each in-water work zone will be an isolated event, and construction will progress from downstream with each repair/reconstruction being completed prior to beginning the repair/reconstruction at the next upstream work zone. Isolation and fish salvage will be conducted independently at each work zone. In-water work will occur during the ODFW In-water Work Window of July 1 to August 15).

The site is remote, road and streambank construction materials will have to be brought in from distant sources. There are 9 sites that require in-water work. Each site will require 3-7 days to construct the stream isolation structure, conduct fish salvage and potentially de-water behind the isolation structure. The calendar limits of the in-water work window will require construction to take at least 3 seasons. Umatilla National Forest needs the FS 32 Road to be functional after Season 2 for administrative and emergency use, but closed to the general public.

It is anticipated that construction of the road repair would be performed concurrently at both the north end and south end of the action area (downstream and upstream ends of FS 32 repair project that parallels SF Umatilla River) working toward the middle of the action area. Umatilla National Forest needs the FS 32 Road to be functional after Season 2 for administrative and emergency use. It is anticipated that in-water work would be conducted in Season 2 and Season 3 at the following locations:

- FS 32 Mile Post 1.96-2.00
- FS 32 Mile Post 2.02-2.14
- FS 32 Mile Post 3.08
- FS 32 Mile Post 3.23

The tentative Project schedule is:

1) Initiate Section 7 formal consultation winter 2023;

2) Apply for regulatory permits winter 2023;

3) Complete design and advertise for construction fall 2023;

4) Contract award construction commence spring 2024;

5) Construction occurring during the IWWP (July 1 to Augst 15) in 2024 & 2025 & 2026.

1.3.4 Site preparation

Site preparation will be minimal and will primarily involve removing/reusing debris. In general, construction will proceed from downstream to upstream (north to south) and all impacts will be located within the former footprint of the roadbed. Few, if any (less than five), trees will be removed.

1.3.5 Construction access and staging

Construction access is from the north (downstream) via an un-damaged (or more lightly-damaged) section of FS 32. All construction staging will take place on the former road. Construction will proceed from downstream to upstream as the road is reconstructed. Known material sources and staging areas are included in Table 1-6.

Table 1-6. Known Material Sources and Staging Areas*

Site Name	Project Use	Legal Description	Latitude/Longitude
Ruckel Pit	Unconsolidated borrow, crushed aggregate	T2N, R37E, Sect 25	45°37’42.62” N -118°08’07.23” W
Sundance Pit	Unconsolidated borrow, crushed aggregate	T2N, R38E, Sect 7	45°40’08.81” N -118°06’30.07” W
Andies Prairie	Staging	T3N, R38E, Sect 26	45°42’18.83” N -118°01’52.81” W
Staging off FS 3145	Staging	T2N, R37E, Sect 28	45°37’48.66” N -118°11’16.94” W
Supplemental Staging Location	Staging	T3N, R37E, Sect 24	45°43’17.80” N -118°08’17.61 W
Umatilla Forks Campground	Contractor Camping	T3N, R37E, Sect 37	45°43’34.14” N -118°11’15.76” W

* *Riprap will be contractor sourced from commercial site. Most trees & trees w/rootwads will be sourced from other projects within the Umatilla National Forest; or private property/Contractor sourced.*

1.3.6 In-water Work

The ODFW in-water work period for the South Fork Umatilla River is July 1 – August 15. The Project would follow Washington Department of Transportation (WSDOT) Fish Exclusion Protocols and Standards (Appendix F). To the extent possible during in-water work, the work areas below the OHW line will be isolated from flowing water using temporary stream isolation to minimize the effects of turbidity and allow construction in isolation. At no time will isolation span the width of the SF Umatilla River The isolation structures will be placed after the areas to be isolated have been seined and blocked with nets to remove any fish that may be present. The temporary impact footprint for stream isolation will vary by the site and type of bank treatment; the more complex engineered log jam structures will require a larger stream isolation footprint. Although there are locations that will have two seasons of work (MP 1.96-2.00, MP 2.02-2.14, MP 3.08 & MP 3.23) the temporary impacts have been considered and will not have a larger net footprint of temporary impacts because the road prism built in Season 2 will be smaller than the finished road. When Season 3 commences, there will be an existing road prism (where in Season 2 it was considered in-water) where the finished road and bank treatments will be built upon. Details on potential in-water isolation methods are included in Appendix B.

Chapter 2.0 Federally Proposed and Listed Species and Designated Critical Habitat

2.1 Species Lists

2.1.1 USFWS Information for Planning and Consultation

Information on listed species and designated critical habitat potentially present in the Action Area was obtained from the USFWS Information for Planning and Consultation (IPaC) system (USFWS, 2022) on April 20, 2022. The IPaC species list for the Action Area is included in Appendix C. Species included on the IPaC list are listed in Table 2-1. The Monarch butterfly is a candidate for listing and is discussed in Appendix D.

Table 2-1. ESA-listed Species Potentially Present in the Action Area.

Species/Critical Habitat	Status	Listing agency
Fish		
MCR steelhead (*Oncorhynchus mykiss)*	Threatened	NMFS
CR Bull trout (*Salvelinus confluentus)*	Threatened	USFWS
Critical Habitat		
MCR steelhead	Established	NMFS
CR Bull trout	Established	USFWS

As indicated in Table 2-1, based on site-specific habitat conditions and species occurrence documentation, two listed species have the potential to occur within the Action Area. Designated critical habitat for one species would also be affected.

2.1.2 Oregon Biodiversity Information Center

DOWL submitted a rare species location data request to the Oregon Biodiversity Information Center (ORBIC) which maintains a database of specific locations known to be (or to have been) occupied by rare, threatened, and endangered species. The data request covered the area extending out two miles in all directions from the Action Area. Special status species identified withing two miles of the Action Area by ORBIC, include gray wolf, MCR steelhead and Bull trout in the Mid-Columbia recovery unit.

2.2 Species and Critical Habitat Occurrence

Listed fish species that may occur in the Umatilla River subbasin (HUC 17070103) include Bull trout and one Distinct Population Segment (DPS) of anadromous salmonid (MCR steelhead). A DPS is the smallest division of a taxonomic species permitted to be protected under the ESA, and for the purposes of the act, constitutes a “species”. DCH for MCR steelhead is also present in the Action Area. Listing dates, and the listing documents for these two species and their DCH are included in Table 2-2.

Table 2-2. ESA listed species and Critical Habitats in the Headwaters Umatilla River watershed

Species	Listing Status, Date and Reference	Critical Habitat Listing Date and Reference
Middle-Columbia River steelhead	*Threatened* 3/25/1999 (71 FR 834) 1/5/06 (71 FR 834) 8/5/11 (76 FR 50448)	*Designated* 9/2/05 (effective Jan 2, 2006) (70 FR 52630)
Bull trout	*Threatened* 6/10/1998 (63 FR 31647)	*Designated* 10/18/10 (effective November 17, 2010) (75 FR 63698)

2.2.1 Species Descriptions

2.2.1.1 Steelhead

The MCR steelhead DPS includes naturally spawned anadromous *Oncorhynchus mykiss* (*O. mykiss)* originating below natural and manmade impassable barriers from the Columbia River and its tributaries upstream of the Wind and Hood Rivers (exclusive) to and including the Yakima River; excluding steelhead originating from the Snake River Basin. This DPS does include steelhead from seven artificial propagation programs (USDC 2014). The Interior Columbia Basin Technical Recovery Team (ICTRT) identified 17 extant populations in this DPS (ICTRT 2003, McClure et al. 2005). The populations fall into four major population groups (MPGs) (ICTRT 2003, McClure et al. 2005):

- Cascade eastern slope tributaries (five extant and two extirpated populations);
- John Day River (five extant populations);
- Walla Walla and Umatilla rivers (one extirpated and three extant populations); and
- Yakima River (four extant populations).

Steelhead are widely distributed within the Umatilla River subbasin. ODFW and CTUIR have maintained an extensive hatchery steelhead program in the subbasin since 1981.

<u>Life History Characteristics</u>

O. mykiss may be resident, spending their entire lives in freshwater (in which case they are known as rainbow trout), or anadromous; rearing in fresh water before migrating to the ocean to mature, and then returning to freshwater to spawn (in which case they are known as steelhead). Steelhead may spend up to seven years in fresh water, but more typically outmigrate to the ocean after two to three years. Smolt trapping at Three Mile Falls Dam at RM 3.0 on the Umatilla River mainstem has shown that from 2003 to 2019, the proportion of 1-, 2-, 3-, and 4-year-old fish on average was 15.56%, 74.43%, 9.89%, and 0.13% respectively (Hanson et al., 2020).

After outmigration, steelhead spend up to three years in the ocean prior to making their first spawning run. Unlike most other salmonids, steelhead may return to the ocean after spawning (at which point they are known as “kelts”) and then complete a second, or even third spawning run in following years.

Steelhead of the Umatilla River subbasin are typical of A-run inland steelhead. Adult A-run fish enter the Columbia River from June to August and pass Bonneville Dam during the first of two peaks in the Columbia River steelhead run. The break point between these peaks is somewhat arbitrarily set at August 25, with A-run fish migrating past Bonneville before this date and B-run fish (which are destined for the Clearwater and Salmon Rivers) migrating after that date (Busby et al. 1996). After passing Bonneville Dam, steelhead destined for the Umatilla River will continue their migration up the Columbia through the remainder of the summer and fall until reaching the mouth of the river. Along their migration, MCR steelhead hold in deep, cooler pools awaiting the return of fall rains and higher, colder water so they can navigate upstream to their spawning sites in the smaller tributaries. Steelhead start to enter the Umatilla River with rising stream flows that typically occur in late November and December.

Spawning begins in March and peaks in April and May with fry typically emerging from the gravel in June and July (CTUIR 1990). Most young rear for two years in freshwater prior to out-migrating with the spring runoff. Table 2-3 illustrates the adult and juvenile timing of MCR steelhead in the Umatilla River above Cayuse (ODFW 2022b).

Table 2-3. Timing of ESA-listed Species and Life Stages in the Action Area

Species ESU/DPS	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Steelhead Trout												
Middle Columbia River												
Adult Migration												
Adult Holding												
Spawning												
Egg Incubation												
Juvenile Rearing												
Juvenile Migration												

Represents peak level of use.

Represents lesser level of use.

Represents known presence with uniform or unknown level of use.

Condition and Trend of the Umatilla River Population

Viability ratings for populations of MCR steelhead range from extirpated to viable (NMFS 2022). The Umatilla River population is one of three populations in the Umatilla/Walla Walla MPG. Based on the 2022: Middle Columbia River Steelhead 5-Year Status Review the Walla Walla and Umatilla Rivers MPG is not viable, and does not meet the viability criteria of:

- Two populations achieving viable status (low risk), with one highly viable (very low risk) population;
- The Umatilla River population as the only large population achieving viable status (low risk); and
- Either the Walla Walla River or Touchet population achieving viable status (low risk)

Currently, both the Umatilla and Walla Walla populations remain at maintained (MT) status (moderate risk) and the Touchet population remains not viable (high risk). The MT population status indicates that the population does not meet the criteria for a viable population but does support ecological functions and preserve options for DPS recovery.

The Middle Columbia River steelhead Recovery Plan (NMFS 2009) categorized the Umatilla River population as “large,” and the viability of this population is considered essential to future recovery and delisting. The Recovery Plan set the minimum abundance objective for the Umatilla population at 1,500 natural-origin spawners, with a minimum population productivity (returns per spawner) of 1.26.

Adult steelhead returns to the Umatilla Basin have been monitored at Three Mile Falls Dam, since 1967. Counts of MCR steelhead passing Three Mile Falls Dam from 1990 through 2018 averaged 2,962 fish per year, with a range of 1,111 (1991) to 6,072 (2015). The recent 5-year and 10-year annual average counts are 2,971 (85.2 percent wild or natural) and 3,110 (82.3 percent wild or natural), respectively (NMFS, 2020).

In 2019, the five-year mean of spawners for the Umatilla population was 2,451, a 22 percent decrease from the previous five-year mean (Ford, 2022). Figure 2-1 illustrates total adult returns to Three Mile Falls Dam from 2010 to 2021 (ODFW, 2022c), designated by origin. These counts represent returns to the entire Umatilla River system. Steelhead in SF Umatilla River represent a fraction of this total.

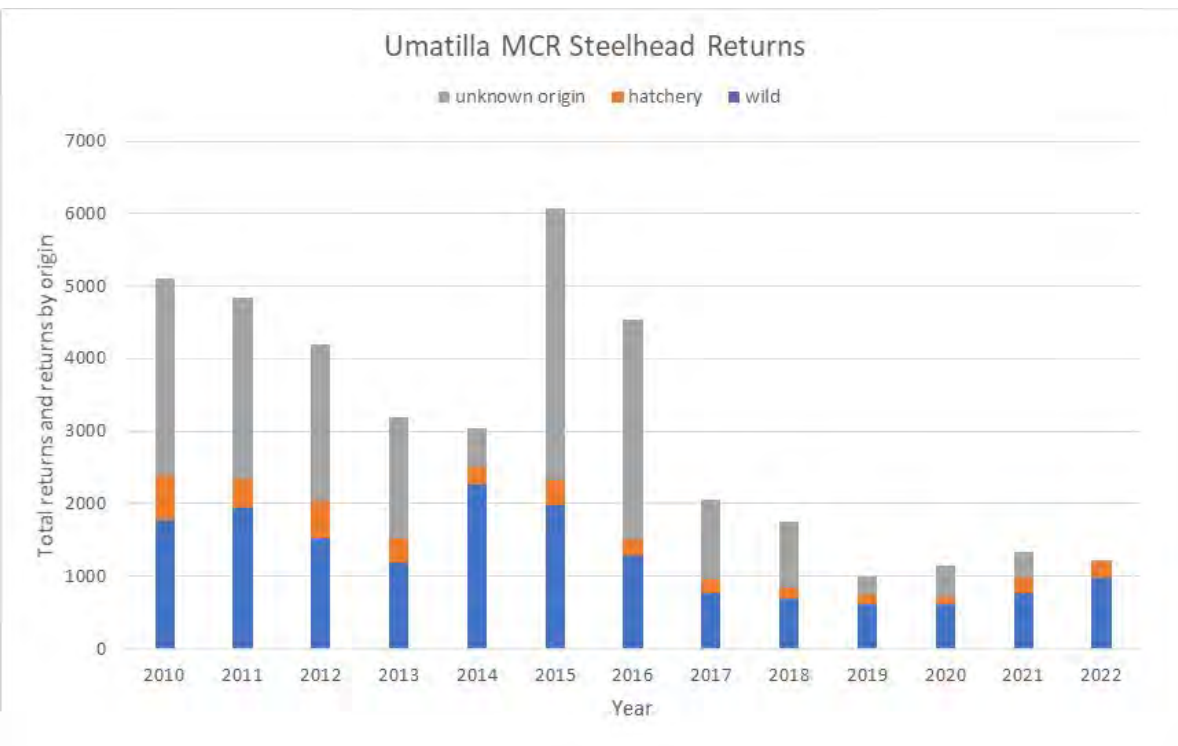


Figure 2-1: MCR Steelhead Returns by Origin, 2010-2021

Overall, the Umatilla River population of MCR steelhead continues to be viable, with the same viability rating (“MT”) as it was assigned by the ICTRT. Under this definition a population is considered “viable” if it has a five percent or less chance of extinction over a 100-year period.

The recent 10-year geometric mean of 2,899 for natural spawners (6,013 total spawners) is above the minimum abundance threshold of 1,500 for a "large" sized population. A large population must also have sufficient intrinsic productivity (greater than 1.26 recruits per spawner at the minimum abundance threshold) to achieve a five percent or less risk of extinction over a 100-year timeframe. Progeny to spawner ratios average 1.43 and range from 0.70 to 4.96 for brood years 1990 to 2012. The recent five-year geometric mean productivity is 0.99, which is below the minimum of 1.26 required for the target threshold abundance (NMFS, 2020).

No records of fish salvage in the South Fork Umatilla during previous instream work were identified (Bill Dowdy, USFS personal communication). The CTUIR conducted electrofishing in the South Fork Umatilla each year in July or August from 1997 to 2000 and again in 2002. Sampling was done at either RM 1, or RM 4. Between 233 and 884 m^2 were sampled in any one year. Water temperatures were reported three of the years and ranged from 17.0 to 18.6 °C. Between 4.0 and 32.9 juvenile steelhead were collected per $100m^2$, with an average of 18.8 per $100m^2$.

Location of Important Spawning and Rearing Areas

Streamnet (https://www.streamnet.org) identifies the Action Area as containing spawning and rearing habitat for MCR steelhead. This description is not meant to imply that every linear foot of "spawning and rearing" habitat in the channel network is capable of serving as a potential spawning site. Potential spawning sites require specific combinations of flow characteristics and gravel aggregations that tend to occur in microsites within a "spawning and rearing" reach due to variations in flow and channel morphology within the reach, unlike rearing habitat which can be described as uniformly distributed and available the length of such reaches.

Spawning habitat however, tends to be non-uniformly distributed within "spawning and rearing" reaches, being created in localized microsites where spawning gravels accumulate and are sorted differentially from larger substrate materials such as pool tails, mid-channel gravel bars or lateral gravel bars on the inside of channel meander bends, rather than in fast-flowing areas such as at the outer sides of meander bends, or in the thalwegs within those longer river and stream segments generally described as "spawning and rearing" habitat.

Designated spawning and rearing habitat for steelhead in the Headwaters Umatilla River watershed includes the North and South Forks of the Umatilla River, along with Coyote, Woodward, Johnson, Buck, Thomas, Spring, Shimmiehorn, and Ryan Creeks and the mainstem of the Umatilla upstream from Pendleton (CTUIR 1990a). Redd surveys from 2012 to 2017 showed the areas with the highest density of redds in the Umatilla Basin to be in the Meacham Creek watershed, Birch Creek watershed, and Isquulktpe Creek (a tributary of the mainstem Umatilla). The North Fork Umatilla did have areas with relatively high densities of redds, but in the SF Umatilla watershed, redds were only identified at relatively low densities in Spring Creek, Shimmiehorn Creek and Buck Creek. Redds in Shimmiehorn Creek were observed very near its confluence with the SF Umatilla. The confluence of Shimmiehorn Creek is at RM 4, 0.47 river miles upstream of the most upstream inwater work zone (Hanson et al., 2018). The CTUIR have been conducting redd surveys throughout the basin since 2008. Over the period of record, the Action Area has contained between 26 and 34 redds per km^2 .as depicted on a summary figure (only a range and not a precise number of redds is represented). This is the total number of redds summed for that period (personal communication with Jerimiah Bonifer, fisheries biologist for the CTUIR). If each year contained an equal number of redds (an unlikely occurrence) redd density would be between 1.7 and 2.25 redds per km^2 per year.

Designated Critical Habitat

The Critical Habitat designation for MCR steelhead (70 FR 52630) used the terms "primary constituent element (PCE)" or "essential feature" to describe key aspects of steelhead habitat. Current critical habitat regulations (81 FR 7414) replace these terms with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis. In this BA, the term PBF is used to refer to PCE or essential feature, except when citing an older document where the term PCE was used.

The steelhead DCH within the Umatilla River subbasin includes all river reaches accessible to listed steelhead (70 FR 52630). This includes the Action Area.

Freshwater spawning, rearing, and migration corridors are the PBFs present in the Action Area (Table 2-4).

Table 2-4. Types of Habitats and Essential PBFs for Steelhead Critical Habitat in the Action Area.

Habitat	Essential Physical and Biological Features	Species Life Stage
Freshwater Spawning	Substrate, water quantity and quality	Spawning, incubation and larval development
Freshwater rearing	Water quantity and floodplain connectivity	Juvenile growth and mobility
	Water quality and forage	Juvenile development
	Natural cover	Juvenile mobility and survival
Freshwater migration	Free of artificial obstructions, water quality and quantity, and natural cover	Juvenile and adult mobility and survival

Specifically, the critical habitat designation requires:

1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development. These features are essential to conservation because without them the species cannot successfully spawn and produce offspring.

2) Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks; and

3) Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic

vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

The potential effects on the critical habitat PBFs are discussed in Chapter 5.0. Although the entire suite of critical habitat PBFs also includes estuarine, nearshore marine, and offshore marine habitats, these habitat types do not occur within the Project Action Area and would not be affected by the proposed Project. Thus, no further information on these PBFs is supplied.

The Headwaters Umatilla River watershed provides 42.2 miles of spawning and rearing habitat PBFs as well as 25 miles of migration/rearing habitat PBFs (CHART 2005). The upper ends of numerous small tributaries provide the migration/rearing PBFs, while the main river upstream of Mission Creek confluence, along with main tributaries, provides the spawning/rearing PBFs. The Headwaters Umatilla River watershed provides high conservation value to the Umatilla River population (CHART 2005).

Limiting factors

Land-management associated threats in the watershed include agriculture, forestry, grazing and road building/maintenance activities. According to NMFS 2009 and 2011, primary limiting factors include:

- Degradation of floodplain connectivity and function, channel structure and complexity, riparian areas, fish passage, stream substrate, stream flow, and water quality;
- Mainstem Columbia River hydropower-related impacts;
- Degraded estuarine and nearshore marine habitat;
- Hatchery-related effects;
- Harvest-related effects; and
- Effects of predation, competition, and disease.

Other major limiting factors may include high water temperature, sediment load, habitat diversity, and the quantity of appropriate habitat (NWPCC 2004). The greatest opportunity to advance recovery of the Umatilla River steelhead population is to increase flows in the Yakima, Umatilla, Walla Walla, and John Day basins. Additional recommendations specific to the Umatilla River include efforts to upgrade irrigation intakes, and water conservation and passage improvements (NMFS 2016).

2.2.1.2 Bull trout

Bull trout (*Salvelinus confluentus*) are a native char found in the coastal and intermountain west of North America. Bull trout are listed as a single DPS within the five-state area (Washington, Oregon, Idaho, Nevada, Montana) of the coterminous United States. The single DPS is subdivided into six biologically-based recovery units (RU) (USFWS 2015a):

1. Coastal Recovery Unit;
2. Klamath Recovery Unit;
3. Mid-Columbia Recovery Unit;

4. Upper Snake Recovery Unit;

5. Columbia Headwaters Recovery Unit; and

6. Saint Mary Recovery Unit

A viable recovery unit should demonstrate that the three primary principles of biodiversity have been met: representation (conserving the genetic makeup of the species); resiliency (ensuring that each population is large enough to withstand stochastic events); and redundancy (ensuring enough populations to withstand catastrophic events) (USFWS 2015a).

Bull trout in the Umatilla River are part of the Mid-Columbia Recovery Unit (RU), which comprises 24 Bull trout core areas, as well as two historically occupied core areas and one research needs area. The recovery unit is located within eastern Washington, eastern Oregon, and portions of central Idaho. Major drainages include the Methow River, Wenatchee River, Yakima River, John Day River, Umatilla River, Walla Walla River, Grande Ronde River, Imnaha River, Clearwater River, and smaller drainages along the Snake River and Columbia River (USFWS 2015a).

The Mid-Columbia RU is divided into four geographic regions:

- the Lower Mid-Columbia, which includes all core areas that flow into the Columbia River below its confluence with the Snake River;

- the Upper Mid-Columbia, which includes all core areas that flow into the Columbia River above its confluence with the Snake River;

- the Lower Snake, which includes all core areas that flow into the Snake River between its confluence with the Columbia River and Hells Canyon Dam; and

- the Mid-Snake, which includes all core areas in the Mid-Columbia RU that flow into the Snake River above Hells Canyon Dam.

Conserving Bull trout in geographic regions allows for the maintenance of broad representation of genetic diversity, provides neighboring core areas with potential source populations in the event of local extirpations, and provides a broad array of options among neighboring core areas to contribute to recovery under uncertain environmental change (USFWS 2015b). The Umatilla population is near the upstream end of the Lower Mid-Columbia geographic region.

Life History Characteristics

Bull trout can adopt any one of four life history strategies:

- Resident Bull trout, which are smaller and live out their lives in headwater streams;

- Fluvial Bull trout, which are migratory, living as adults in large rivers but spawning in small tributary streams;

- Adfluvial Bull trout, which are also migratory, spawning in tributary streams but living as adults in lakes; and

- Anadromous Bull trout which generally live nearer the coast. Anadromous Bull trout spawn and rear in tributary streams and migrate to the ocean to mature.

Bull trout in the Umatilla River express both fluvial and resident life histories, with most believed to be resident. The CTUIR have trapped Bull trout in screw traps in both spring and fall in the mainstem Umatilla River downstream of USFS lands (Buchanan et al 1997), indicating that a fluvial life history is present in the population. Timing of Bull trout life stages in the Action Area is illustrated in Table 2-5 (ODFW, 2022b).

Table 2-5. Timing of ESA-listed Species and Life Stages in the Action Area

Species ESU/DPS	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Bull trout												
Columbia River												
Adult Migration												
Spawning												
Juvenile Rearing												
Juvenile Migration												

Represents peak level of use.

Represents lesser level of use.

Represents known presence with uniform or unknown level of use.

<u>Condition and Trend of the Umatilla River Population</u>

According to the most recent status review, the Umatilla River core area (Umatilla River subbasin) contains a Bull trout population "so depressed it is likely suffering from the deleterious effects of small population size" (USFWS, 2015b).

One local population has been identified for the Umatilla core area, the upper Umatilla Complex, which includes the North Fork and South Fork Umatilla Rivers. The Recovery Plan for Columbia River Bull trout found that demographic status (which considers size, age structure, and density) is the poorest in the Umatilla and Middle Fork John Day Core Areas. The Umatilla River core area is also likely isolated from other core areas in the Lower Mid-Columbia River region, considering that dams, high water temperatures, and low flow barriers in the lower Umatilla River all create hostile conditions for Bull trout in the migratory corridor downstream of the Action Area. Evidence suggests a significant decline in the resident and fluvial life history in the Umatilla River core area. Connection between the Umatilla, Walla Walla, and Touchet core areas is uncommon but has been documented (USFWS 2015b).

The best remaining Bull trout habitat in the Headwaters Umatilla River watershed is found in the North Fork Umatilla River and its tributaries, which are managed as wilderness by the USFS. In the SF Umatilla watershed, fair to good habitat quality is found in Buck Creek and Shimmiehorn Creek (Buck Creek-SF Umatilla River, SF Umatilla River subwatersheds respectively). The poorest habitat quality in the watershed is found in the mainstem Umatilla River, the lower reaches of the SF Umatilla River, and Spring Creek (Thomas Creek subwatershed). The Action

Area is located within the poorest habitat quality for Bull trout in the watershed, primarily due to warm summer water temperatures (USFWS 2015b).

During surveys in 1992, Bull trout were found to be uncommon in the SF Umatilla basin. According to Umatilla National Forest Fisheries Biologist Bill Dowdy, a total of 29 Bull trout were found in the lower 5 miles of the SF Umatilla. In the tributaries of the SF Umatilla, four Bull trout were found in the lower 4.5 miles of Shimmiehorn Creek, and five Bull trout were found in the lower 2.1 miles of Thomas Creek. However, by 2012, extensive electrofishing surveys in the basin found no Bull trout in Buck, Spring, Shimmiehorn, or North Fork Meacham creeks or in the South Fork Umatilla River. In fact, the only fish species collected were *O. mykiss* and sculpins, both at low densities. In the SF Umatilla, *O. mykiss* were found in four and sculpin were found in two of the seven sampled reaches. The study concluded that the Bull trout population known to exist in the North Fork Umatilla River may have been the only local population in the basin at that time (Sankovich and Anglin, 2013).

<u>Location of Important Spawning and Rearing Areas</u>

The Action Area is considered migration habitat for Bull trout (Streamnet, 2022). The U.S. Forest Service Rocky Mountain Research Station Climate Shield program modeled potential Bull trout habitat throughout its range based on water temperatures and species occurrence data. The Climate Shield habitat occupancy models provide stream-specific probabilistic predictions about the occurrence of juvenile Bull trout and Cutthroat trout throughout the northwestern U.S. (Isaak et al. 2017). Four short stream segments tributary to the SF Umatilla River had a greater than 0% probability of containing Bull trout (with up to a 25% chance of occurrence – the lowest mapped occurrence probability). These segments included the upper reaches of Buck Creek, an unnamed tributary of Buck Creek, and the upper reaches of Thomas and Shimmiehorn Creeks. Each of these are located well upstream of the Action Area.

Redd counts were done each year between 1998 and at least 2015 in the Umatilla basin. In 2003 and 2004, the North Fork Umatilla River appeared to support the core area's entire Bull trout spawning population, with no redds detected in the South Fork Umatilla or in North Fork Meacham Creek. No spawning has been documented in the SF Umatilla since 1996 (USFWS 2015b). Redd totals on the North Fork Umatilla River have fluctuated considerably and averaged about 50 redds between 1998 and 2015; however, the 5-year average between 2009 to 2013 was only 19 redds, suggesting the population is declining (USFWS 2015b).

The SF Umatilla River in the Action Area and the mainstem Umatilla River just downstream of the Action Area are thermally unsuitable for summer occupancy by adult or subadult Bull trout. As noted above, suitable rearing and possible spawning habitat for year-round occupancy is available in tributaries upstream of the Action Area. However, in the Action Area, Bull trout would likely only be present "occasionally" and only when water temperatures are cool (Josh Hanson, former ODFW district fish biologist in Pendleton, personal communication with DOWL 08/04/2022).

In 2012, the USFWS electrofished and collected habitat data in seven to nine 50-m sampling units within "patches" identified as most likely to contain Bull trout. In the SF Umatilla, seven units were sampled, with the nearest unit located approximately 4.25 RM upstream of the Action Area. Seventy-two transects were also completed in the SF Umatilla to assess spawning habitat using five criteria based on water velocity and substrate characteristics. None of the transects in the SF Umatilla met all five criteria, and all the transects had substrate deemed too large for Bull trout spawning (dominant substrate >77 mm in diameter, subdominant substrate >153 mm in diameter, or both). Spawning habitat in all sampled patches in the basin was described as "minimal to non-existent" (Sankovich and Anglin, 2013).

Designated Critical Habitat

As with steelhead, the designation of critical habitat for CR Bull trout (70 FR 52630) used the terms "primary constituent element (PCE)" or "essential feature" to describe key aspects of Bull trout habitat. Current critical habitat regulations (81 FR 7414) replace these terms with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis. In this BA, the term PBF is used to refer to PCEs or essential features, except when citing an older document where the term PCE was used.

PBFs for Bull trout critical habitat are:

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.

2. Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.

3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.

5. Water temperatures ranging from 2 °C to 15 °C (36 °F to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on Bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.

6. In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to Bull trout will likely vary from system to system.

7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.

8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.

9. Sufficiently low levels of occurrence of non-native predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from Bull trout.

In the Umatilla River watershed, 101.3 stream miles are DCH for Bull trout. This DCH occurs in the Umatilla River, Meachum Creek, the North Fork Umatilla River, and several tributaries to the North Fork Umatilla River. There is no designated critical habitat for Bull trout in the South Fork Umatilla River or any of its tributaries.

Limiting factors

The small population of Bull trout in this recovery unit is attributed to the adverse effects of climate change, agricultural practices (e.g. irrigation, water withdrawals, livestock grazing), fish passage (e.g. dams, culverts), nonnative species, forest management practices, and mining (USFWS, 2021a).

The Recovery Unit Implementation Plan for Bull trout in the Umatilla River core area identifies ongoing land use practices as slowing the recovery of the species. Existing transportation networks are one of several land uses in the subbasin that continue to impair riparian areas by eliminating or reducing riparian cover. This reduced riparian cover results in a loss of habitat complexity and leads to warmer water temperatures

In addition to transportation networks, agricultural practices along the mainstem Umatilla, downstream of the Action Area, have channelized and oversimplified the channel of the Umatilla River, eliminating important wetlands and floodplain interaction, decreasing instream flows, and increasing water temperatures.

High instream water temperatures due to natural factors, land use, water withdrawals, and other anthropogenic factors, significantly limit summer rearing habitat in the subbasin. Increased water temperatures and loss of available habitat due to climate change are predicted as a high risk to this core area. Conservation measures or recovery actions implemented to benefit Bull trout include road removal, channel restoration, mine reclamation, improved grazing management, removal of fish barriers, and instream flow requirements (USFWS, 2021b). The Bull trout recovery plan (USFWS 2015b) recommended that the USFS remedy or reduce impacts of the streamside road (FS 32) on the SF Umatilla and pursue opportunities to either remove the streamside road from Thomas Creek down to the North Fork Umatilla confluence or, if removal is infeasible, reduce habitat impacts resulting from the presence and use of this road, and restore channel complexity. The installation of bank treatments – namely abundant logs and rootwads, will increase channel complexity, and influence channel morphology (likely leading to the formation of pools and other channel features).

Chapter 3.0 Environmental Baseline

3.1 Introduction

In describing the existing baseline conditions for the proposed action, we have utilized NMFS' guidelines for "*Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale*" (NMFS 1996), and the USFS guidelines from "*A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull trout Subpopulation Watershed Scale*."

The Environmental Baseline is defined as the "past and present impacts of all Federal, State or private activities and other human activities in the Action Area, the anticipated impacts of all proposed Federal projects in the Action Area that have undergone formal or early Section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process." (50 CFR § 402.02). The Environmental Baseline is meant to illustrate a "snapshot in time" of the conditions faced by the listed species at the time of the consultation.

NMFS (1996) and USFWS (1998) outline the Matrix of Pathways and Indicators (MPI), a method designed to summarize important environmental parameters. The matrix is divided into six pathways:

- Water Quality;
- Habitat Access;
- Habitat Elements;
- Channel Condition and Dynamics;
- Flow/Hydrology; and
- Watershed Conditions

The pathways are further subdivided into indicators of two types: 1) metrics that can be empirically measured (e.g., "six pools per mile"); and 2) descriptions (e.g., "adequate habitat refugia do not exist"). Based on the metrics and descriptions, the indicators are then described as being: "properly functioning," "at risk," or "not properly functioning" for steelhead. The USFWS uses slightly different terms when assessing the environmental baseline for Bull trout: "functioning appropriately," "functioning at risk," and "functioning at unacceptable risk." Indicators in a watershed are "Properly Functioning/Functioning Appropriately" when they maintain strong and significant populations that are interconnected and promote recovery of a proposed or listed species or its critical habitat to a status that will provide self-sustaining and self-regulating populations. When the indicators are "At Risk", they provide for persistence of the species but in more isolated populations and may not promote recovery of a proposed or listed species or its habitat without active or passive restoration efforts. "Not Properly Functioning/Functioning at Unacceptable Risk" suggests the proposed or listed species continues to be absent from historical habitat or is rare or being maintained at a low population level; although the habitat may maintain the species at this low persistence level, active restoration is needed to begin recovery of the species. This BA uses the MPI in describing existing conditions and assessing project effects.

The MPI, described in detail below, was developed to rely on information available from Watershed Assessment Reports generated by the Bureau of Land Management or Watershed districts. These watershed assessment reports typically describe conditions within a 5^{th} field HUC watershed. The Action Area for the Project is located in the Headwaters of the Umatilla 5^{th} Field HUC, 1707010301 and the Buck Creek-South Fork Umatilla subwatershed (6th Field HUC) 170701030103.

The Pathways and Indicators potentially affected by the Project are included in Table 3-1. Each of these effects are discussed in detail in Chapter 5.0.

3.2 Natural Physical and Biological Characteristics

3.2.1 Vegetative Characteristics

The Action Area is located in the *Montane Forest* Biome; the *Northwest Forested Mountains* US Environmental Protection Agency (EPA) Level I Ecoregion; *Western Cordillera* Level II Ecoregion; *Blue Mountains* Level 3 Ecoregion; and *Mesic Forest* and *Maritime Influenced* Level 4 Ecoregions (Oregon Explorer, 2022).

Natural vegetation mapping was conducted in 1992 by ODFW, ORNHIC (currently ORBIC), and Idaho Cooperative Fish and Wildlife Research unit. The Project location contains or borders each of the following natural vegetation types (Oregon Explorer, 2022).

- Douglas fir-True fir-Ponderosa Pine-Western Larch;
- Western Larch-Douglas fir-True fir;
- Ponderosa Pine-Douglas fir-Western Larch-Lodgepole pine;
- True fir-Lodge pole pine-Western Larch-Douglas fir; and
- True fir-Douglas fir.

Vegetation within the Headwaters Umatilla River watershed varies with elevation and aspect. South-facing slopes and ridge tops contain shallow soils with limited water-holding capacity, resulting in mainly grass-forb or grass-shrub mixtures with a limited timber component. North-facing slopes contain deeper soils with higher water-holding capacity and are therefore heavily timbered with mixed conifer stands containing firs, spruce, larch, and pine. Mid-elevation vegetation is characterized by stringers (trees growing in moist draws through grasslands) and patches of timber, brush, and grass. Lower elevation areas outside the National Forest were once steppe-like grasslands that have largely been converted to dryland farming. This agricultural use has resulted in increased sediment load for waterways in the subbasin (CTUIR 1990)

Table 3-1. Pathways and Indicators Potentially affected by the Project

Pathway	Indicator	Potential Effect
Water Quality	Sediment	There will be a construction-related short-term increase in sediment delivery to the river
Habitat Access	Physical Barriers	During construction, habitat access to in-water work zones will be restricted
Habitat Elements:	Substrate	There may be a short-term increase in fine sediment from construction activities
	LWM	LWM will increase following construction
	Pool Frequency and Quality	Pool frequency and quality will be enhanced following construction
	Large pools	Additional large pools will be constructed
	Off-channel Habitat	One post-flood side channel will be lost.
	Refugia	Pools and LWM will increase refugia
Channel Condition & Dynamics:	Streambank Condition	Streambank condition will be impacted by riprap and LWM installation. However, the streambank condition should be stabilized long term reducing periodic flood effects (erosion and sediment delivery).
Flows/Hydrology	Increase in Drainage Network	The Project will increase the life of FS 32, thus maintaining a drainage network larger than would be present otherwise
Watershed Conditions:	Road Density & Location	The construction of the Project will be an added disturbance to the Environmental Baseline.
	Disturbance History	
	Disturbance Regime	

Streamside vegetation in the watershed consists of conifers, deciduous trees and shrubs, and grass. Riparian conditions are generally good at higher elevations. At lower elevations, brush, grass, and deciduous trees are the major types of bank vegetation. Riparian conditions at mid-elevations have been impacted by livestock grazing and roads. Riparian vegetation may have been influenced extensively by past beaver (*Castor canadensis*) activity, but current beaver activity is very limited.

3.2.2 Qualitative Description of major fish-bearing streams in the Headwaters Umatilla River watershed

The sections that follow provide a qualitative description of major streams in the Headwaters Umatilla River watershed. More detailed quantitative descriptions of habitat conditions for MCR steelhead and Columbia River Bull trout in the Buck Creek-Umatilla in the Action Area are included in Chapter 3.3.

3.2.2.1 Umatilla River (mainstem, Bear Creek-Umatilla River subwatershed)

The mainstem of the Umatilla River starts at the confluence of the North and South Forks (RM 90) at an elevation of 2,400 feet. It flows west then north through an approximately 300-foot-wide valley to the Meacham Creek confluence (RM 79). From the forks downstream to Meacham Creek, the channel is low-gradient and provides spawning and rearing habitat for steelhead and Chinook salmon. The lower reach of the Umatilla River, below the Forks is heavily impacted by farming, ranching, channelization, urbanization, and other anthropogenic factors.

3.2.2.2 North Fork Umatilla River (North Fork Umatilla subwatershed)

The North Fork of the Umatilla River originates at an elevation of 5,000 feet near Andies Prairie. From its origin, it flows north and then west for approximately 10 miles through a deep canyon before joining the South Fork at an elevation of 2,400 feet. The North Fork is located primarily within the North Fork Umatilla Wilderness Area. The lower 4.5 miles of the North Fork are paralleled by a hiking trail. Many springs along this part of the river add to the river's flow and help maintain its cool temperatures.

Oncorhynchus mykiss (Rainbow/Steelhead trout), Bull trout, and sculpins (*Cottus spp.)* are present in the North Fork Umatilla River, which is used for both spawning and rearing by steelhead and Bull trout. Spring Chinook salmon currently spawn in the lower three miles of the North Fork Umatilla River.

3.2.2.3 South Fork Umatilla River (Buck Creek-South Fork Umatilla Watershed)

The South Fork of the Umatilla River originates at an elevation of 5,400 feet. The river flows north and then northeast for about 10 miles before joining the North Fork. The upper seven miles of the stream are within the Hellhole Roadless Area. The lower several miles of the river are paralleled by FR 32 and include the Action Area. The forest canopy on the upper part of the stream is more open and provides less shade to the water than on the North Fork. The lower three miles of the South Fork show evidence of past channelization that occurred after the flood of 1964. Stream restoration work that occurred in the 1970s and early 1990s added pool structure to this part of the stream, but the stream is still very exposed to the sun. The hydrology of the South Fork is considered flashier than in the North Fork. As stated above, there is no known Bull trout spawning in the SF Umatilla River, and summer temperatures in most of its length are too high for any life stage of Bull trout.

3.2.3 Human-Caused Physical Characteristics and Current Conditions

Streams in the watershed with heavy human impacts include the mainstem of the Umatilla River, especially downstream from Pendleton; but also, the lower three miles of the South Fork Umatilla River. Impacts along the Umatilla River and South Fork Umatilla River started as early as 1864 with the construction of the Ruckell Toll Road. This road has since been replaced by FR 32. In 1964, flooding damaged the road and other human improvements and led to channelization and diking of the lower three miles of the South Fork Umatilla River. Extensive restoration efforts occurred in the early 1970s and late 1980s, mostly consisting of instream structure work, but this segment of the South Fork Umatilla River still has little shade.

Low summer flows, high water temperatures, changes in channel structure, high sediment loads, insufficient pools, and shortages of in-stream LWM are symptoms of reduced habitat quality, which are prevalent in the lower reaches of the Umatilla watershed. Water quality monitoring and stream inventories indicate that habitat conditions in some streams are so poor as to “render them incapable of sustaining salmonid populations” (Powell, 2001).

Additional information on current conditions in the Headwaters Umatilla River watershed and more particularly the Bear Creek-Umatilla River subwatershed are presented below.

3.3 Matrix of Pathways and Indicators

Tables 3-2 and 3-3 describe the matrix evaluation criteria for steelhead and Bull trout. They differ somewhat due to the habitat needs of the individual species, and because they were developed by different agencies.

Table 3-2. Properly Functioning Conditions and Matrix of Pathways and Indicators for steelhead

Pathway	Indicator	Properly Functioning	At Risk	Not Properly Functioning
Water Quality	Temperature	50-57° F[1]	57-60° (spawning) 57-64° (migration &rearing)[2]	> 60° (spawning) > 64° (migration & rearing)[2]
	Sediment/Turbidity	< 12% fines (<0.85mm) in gravel[3], turbidity low	12-17% (west-side)[3], 12-20% (east-side)[2], turbidity moderate	>17% (west-side)[3], >20% (east side)[2] fines at surface or depth in spawning habitat[2], turbidity high
	Chemical Contamination/ Nutrients	low levels of chemical contamination from agricultural, industrial and other sources, no excess nutrients, no CWA 303d designated reaches[5]	moderate levels of chemical contamination from agricultural, industrial and other sources, some excess nutrients, one CWA 303d designated reach[5]	high levels of chemical contamination from agricultural, industrial and other sources, high levels of excess nutrients, more than one CWA 303d designated reach[5]
Habitat Access	Physical Barriers	any man-made barriers present in watershed allow upstream and downstream fish passage at all flows	any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at base/low flows	any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows
Habitat Elements:	Substrate	dominant substrate is gravel or cobble (interstitial spaces clear), or embeddedness <20%[3]	gravel and cobble is subdominant, or if dominant, embeddedness 20-30%[3]	bedrock, sand, silt or small gravel dominant, or if gravel and cobble dominant, embeddedness >30%[2]
	Large Woody Debris (LWD)	Coast: >80 pieces/mile >24"diameter >50 ft. length[4]; East-side: >20 pieces/ mile >12"diameter >35 ft. length[2]; and adequate sources of woody debris recruitment in riparian areas	currently meets standards for properly functioning, but lacks potential sources from riparian areas of woody debris recruitment to maintain that standard	does not meet standards for properly functioning and lacks potential large woody debris recruitment
	Pool Frequency channel width # pools/mile[6] 5 feet 184 10 96 15 70 20 56 25 47 50 26 75 23 100 18	meets pool frequency standards (left) and large woody debris recruitment standards for properly functioning habitat (above)	meets pool frequency standards but large woody debris recruitment inadequate to maintain pools over time	does not meet pool frequency standards
	Pool Quality	pools >1 meter deep (holding pools) with good cover and cool water[3], minor reduction of pool volume by fine sediment	few deeper pools (>1 meter) present or inadequate cover/temperature[3], moderate reduction of pool volume by fine sediment	no deep pools (>1 meter) and inadequate cover/temperature[3], major reduction of pool volume by fine sediment
	Off-channel Habitat	backwaters with cover, and low energy off-channel areas (ponds, oxbows, etc.)[3]	some backwaters and high energy side channels[3]	few or no backwaters, no off-channel ponds[3]
	Refugia (important remnant habitat for sensitive aquatic species)	habitat refugia exist and are adequately buffered (e.g., by intact riparian reserves); existing refugia are sufficient in size, number and connectivity to maintain viable populations or sub-populations[7]	habitat refugia exist but are not adequately buffered (e.g., by intact riparian reserves); existing refugia are insufficient in size, number and connectivity to maintain viable populations or sub-populations[7]	adequate habitat refugia do not exist[7]
Channel Condition & Dynamics:	Width/Depth Ratio	<10[2,4]	10-12 (we are unaware of any criteria to reference)	>12 (we are unaware of any criteria to reference)
	Streambank Condition	>90% stable; i.e., on average, less than 10% of banks are actively eroding[2]	80-90% stable	<80% stable
	Floodplain Connectivity	off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession	reduced linkage of wetland, floodplains and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function, riparian vegetation/succession	severe reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas; wetland extent drastically reduced and riparian vegetation/succession altered significantly
Flows/Hydrology	Change in Peak/ Base Flows	watershed hydrograph indicates peak flow, base flow and flow timing characteristics comparable to an undisturbed watershed of similar size, geology and geography	some evidence of altered peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology and geography	pronounced changes in peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology and geography
	Increase in Drainage Network	zero or minimum increases in drainage network density due to roads[8,9]	moderate increases in drainage network density due to roads (e.g., .5%)[8,9]	significant increases in drainage network density due to roads (e.g., .20-25%)[8,9]
Watershed Conditions:	Road Density & Location	<2 mi/mi² [11], no valley bottom roads	2-3 mi/mi², some valley bottom roads	>3 mi/mi², many valley bottom roads

Pathway	Indicator	Properly Functioning	At Risk	Not Properly Functioning
	Disturbance History	<15% ECA (entire watershed) with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian area; and for NWFP area (except AMAs), 15% retention of LSOG in watershed[10]	<15% ECA (entire watershed) but disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian area; and for NWFP area (except AMAs), 15% retention of LSOG in watershed[10]	>15% ECA (entire watershed) and disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian area; does not meet NWFP standard for LSOG retention
	Riparian Reserves	the riparian reserve system provides adequate shade, large woody debris recruitment, and habitat protection and connectivity in all subwatersheds, and buffers or includes known refugia for sensitive aquatic species (>80% intact), and/or for grazing impacts: percent similarity of riparian vegetation to the potential natural community/ composition >50%[12]	moderate loss of connectivity or function (shade, LWM recruitment, etc.) of riparian reserve system, or incomplete protection of habitats and refugia for sensitive aquatic species (70-80% intact), and/or for grazing impacts: percent similarity of riparian vegetation to the potential natural community/composition 25-50% or better[12]	riparian reserve system is fragmented, poorly connected, or provides inadequate protection of habitats and refugia for sensitive aquatic species (<70% intact), and/or for grazing impacts: percent similarity of riparian vegetation to the potential natural community/composition <25%[12]

[1] Bjornn, T.C. and D.W. Reiser, 1991. Habitat Requirements of Salmonids in Streams. American Fisheries Society Special Publication 19:83-138. Meehan, W.R., ed.
[2] Biological Opinion on Land and Resource Management Plans for the: Boise, Challis, Nez Perce, Payette, Salmon, Sawtooth, Umatilla, and Wallowa-Whitman National Forests. March 1, 1995.
[3] Washington Timber/Fish Wildlife Cooperative Monitoring Evaluation and Research Committee, 1993. Watershed Analysis Manual (Version 2.0). Washington Department of Natural Resources.
[4] Biological Opinion on Implementation of Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH). National Marine Fisheries Service, Northwest Region, January 23, 1995.
[5] A Federal Agency Guide for Pilot Watershed Analysis (Version 1.2), 1994.
[6] USDA USFS, 1994. Section 7 Fish Habitat Monitoring Protocol for the Upper Columbia River Basin.
[7] Frissell, C.A., Liss, W.J., and David Bayles, 1993. An Integrated Biophysical Strategy for Ecological Restoration of Large Watersheds. Proceedings from the Symposium on Changing Roles in Water Resources Management and Policy, June 27-30, 1993 (American Water Resources Association), p. 449-456.
[8] Wemple, B.C., 1994. Hydrologic Integration of Forest Roads with Stream Networks in Two Basins, Western Cascades, Oregon. M.S. Thesis, Geosciences Department, Oregon State University.
[9] e.g., see Elk River Watershed Analysis Report, 1995. Siskiyou National Forest, Oregon.
[10] Northwest Forest Plan, 1994. Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. USDA USFS and USDI Bureau of Land Management.
[11] USDA USFS, 1993. Determining the Risk of Cumulative Watershed Effects Resulting from Multiple Activities.
[12] Winward, A.H., 1989 Ecological Status of Vegetation as a base for Multiple Product Management. Abstracts 42nd annual meeting, Society for Range Management, Billings MT, Denver CO: Society For Range Management: p277.

Table 3-3. Properly Functioning Conditions and Matrix of Pathways and Indicators for Bull trout

Pathway	Indicator[a]	Functioning Appropriately	Functioning At Risk	Functioning At Unacceptable Risk
Subpopulation Characteristics within subpopulation watersheds	Subpopulation Size	Mean total subpopulation size or local habitat capacity more than several thousand individuals. All life stages evenly represented in the subpopulation.[b]	Adults in subpopulation are less than 500 but >50.[b]	Adults in subpopulation has less than 50.[b]
	Growth and Survival	Subpopulation has the resilience to recover from short term disturbances (e.g. catastrophic events, etc) or subpopulation declines within one to two generations (5 to 10 years).[b] The subpopulation is characterized as increasing or stable. At least 10+ years of data support this estimate.[c]	When disturbed, the subpopulation will not recover to predisturbance conditions within one generation (5 years). Survival or growth rates have been reduced from those in the best habitats. The subpopulation is reduced in size, but the reduction does not represent a long-term trend[b]. At least 10+ years of data support this characterization.[c] If less data is available and a trend cannot be confirmed, a subpopulation will be considered at risk until enough data is available to accurately determine its trend.	The subpopulation is characterized as in rapid decline or is maintaining at alarmingly low numbers. Under current management, the subpopulation condition will not improve within two generations (5 to 10 years).[b] This is supported by a minimum of 5+ years of data.
	Life History Diversity and Isolation	The migratory form is present, and the subpopulation exists in close proximity to other spawning and rearing groups. Migratory corridors and rearing habitat (lake or larger river) are in good to excellent condition for the species. Neighboring subpopulations are large with high likelihood of producing surplus individuals or straying adults that will mix with other subpopulation groups. [1]	The migratory form is present but the subpopulation is not close to other subpopulations or habitat disruption has produced a strong correlation among subpopulations that do exist in proximity to each other[b]	The migratory form is absent and the subpopulation is isolated to the local stream or a small watershed not likely to support more than 2,000 fish[b]
	Persistence and Genetic Integrity	Connectivity is high among multiple (5 or more) subpopulations with at least several thousand fish each. Each of the relevant subpopulations has a low risk of extinction.[b] The probability of hybridization or displacement by competitive species is low to nonexistent.	Connectivity among multiple subpopulations does occur, but habitats are more fragmented. Only one or two of the subpopulations represent most of the fish production[b]. The probability of hybridization or displacement by competitive species is imminent, although few documented cases have occurred.	Little or no connectivity remains for rebounding subpopulations in low numbers, in decline, or nearing extinction. Only a single subpopulation or several local populations that are very small or that otherwise are at high risk remain[b]. Competitive species readily displace Bull trout. The probability of hybridization is high and documented cases have occurred.
Water Quality	Temperature	7 day average maximum temperature in a reach during the following life history stages[b,d] Incubation 2 - 5°C Rearing 4 - 12°C Spawning 4 - 9°C Also, temperatures do not exceed 15°C in areas used by adults during migration (no thermal barriers).	7 day average maximum temperature in a reach during the following life history stages[b,d] Incubation < 2°C or 6°C Rearing < 4°C or 13 - 15°C Spawning < 4°C or 10°C Also, temperatures in areas used by adults during migration sometimes exceed 15 ° C.	7 day average maximum temperature in a reach during the following life history stages[b,d] Incubation < 1°C or > 6°C Rearing > 15°C Spawning < 4°C or > 10°C Also, temperatures in areas used by adults during migration regularly exceed 15°C (thermal barriers present).
	Sediment	Similar to Chinook salmon[b]: for example (e.g.,): < 12% fines (< 0.85 mm) in gravel[e] e.g., < 20% surface fines of < 6 mm[f,g]	Similar to Chinook salmon[b] e.g. < 12-17% fines (<0.85 mm) in gravel[e] e.g., 12 - 20% surface fines[h]	Similar to Chinook salmon[b]: e.g. >17% fines (< 0.85 mm) in gravel; e.g. >20% fines at surface or depth in spawning habitat.[h]
	Chemical Contamination/ Nutrients	low levels of chemical contamination from agricultural, industrial and other sources, no excess nutrients, no CWA 303d designated reaches[i].	moderate levels of chemical contamination from agricultural, industrial and other sources, some excess nutrients, one CWA 303d designated reach [i].	high levels of chemical contamination from agricultural, industrial and other sources, high levels of excess nutrients, more than one CWA 303d designated reach[i].
Habitat Access	Physical Barriers	Manmade barriers present in watershed allow upstream and downstream fish passage at all flows.	Man-made barriers present in watershed do not allow upstream and/or downstream fish passage at base/low flows	Man-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows
Habitat Elements:	Substrate	Reach embeddedness <20%[j,k]	Reach embeddedness 20-30% [j,k]	Reach embeddedness >30% [e,k]
	Large Woody Debris (LWD)	Current values being maintained at: On the coast, >80 pieces/mile (>24-inch diameter, >50 ft length),[j] On the east side, >20 pieces/mile (>12-inch diameter, >35 ft length).[l] Adequate woody debris sources available for long- and short-term recruitment.	Current levels are being maintained at minimum levels desired for "functioning appropriately", but potential sources for long term woody debris recruitment is lacking to maintain these minimum values.	Current levels are not at those desired values for " functioning appropriately", and potential sources of woody debris for short- and/or long-term recruitment are lacking.

Pathway	Indicator[a]	Functioning Appropriately	Functioning At Risk	Functioning At Unacceptable Risk
	Pool Frequency and Quality	Pool frequency in a reach closely approximates[f]: wetted width (ft) # pools/mile 0-5 39 5-10 60 10-15 48 15-20 39 20-30 23 30-35 18 35-40 9 40-65 18 65-100 4 (can use formula: pools/mi = 5,280/wetted channel width #channel widths per pool); pools have good cover and cool water[e] and only minor reduction of pool volume by fine sediment.	Pool frequency is similar to values in "functioning appropriately", but pools have inadequate cover/ temperature, and/or there has been a moderate reduction of pool volume by fine sediment.	Pool frequency is considerably lower than values desired for "functioning appropriately"; also cover/temperature is inadequate, and there has been a major reduction of pool volume by fine sediment
	Large pools	Each reach has many large pools > than 1 meter deep [e].	Reaches have few large pools (>1 meter) present [e].	Reaches have no deep pool (>1 meter) [e].
	Off-channel Habitat	Watershed has many ponds, oxbows, backwaters, and other off-channel areas with cover; side-channels are low energy areas[m,n]	Watershed has some ponds, oxbows, backwaters, and other off-channel areas with cover; but side-channels are generally high-energy areas[m,n]	Watershed has few or no ponds, oxbows, backwaters, or other off-channel areas.
	Refugia	Habitats capable of supporting strong and significant populations are protected and are well distributed and connected for all life stages and forms of the species.	Habitats capable of supporting strong and significant populations are insufficient in size, number and connectivity to maintain all life stages and forms of the species.	Adequate habitat refugia do not exist[m]
Channel Condition & Dynamics:	Width/Depth Ratio	$\leq$10h[h,f]	11-20[f]	>20[f]
	Streambank Condition	>80% of any stream reach has > or equal to 90% stability[f].	50-80% of any stream reach has > or equal to 90% stability[f].	<50% of any stream reach has > or equal to 90% stability[f].
	Floodplain Connectivity	Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession	Reduced linkage of wetland, floodplains and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function, riparian vegetation/succession	Severe reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas; wetland extent drastically reduced and riparian vegetation/succession altered significantly
Flows/Hydrology	Change in Peak/ Base Flows	Watershed hydrograph indicates peak flow, base flow and flow timing characteristics comparable to an undisturbed watershed of similar size, geology and geography	Some evidence of altered peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology and geography	Pronounced changes in peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology and geography
	Increase in Drainage Network	Zero or minimum increases in active channel length correlated with human caused disturbance.	Zero or minimum increases in active channel length correlated with human caused disturbance.	Greater than moderate increases in active channel length correlated with human caused disturbance.
Watershed Conditions:	Road Density & Location	<1 miles per square mile[n], no valley bottom roads	1-2.4 miles per square mile[n], some valley bottom roads	> 2.4 miles per square mile[n], many valley-bottom roads
	Disturbance History	<15% Equivalent Clearcut Areas (ECA) (entire watershed) with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian area	<15% ECA (entire watershed) but disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian area	>15% ECA (entire watershed) and disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian area
	Riparian Habitat Conservation Areas (RHCA - PACFISH and INFISH) (riparian reserves from NW Forest Plan)	Riparian conservation areas provide adequate shade, large woody debris recruitment, and habitat protection and connectivity in subwatersheds, and buffers or includes known refugia for sensitive aquatic species (>80% intact), and adequately buffer impacts on rangelands: percent similarity of riparian vegetation to the potential natural community /composition >50%[p].	Moderate loss of connectivity or function (shade, large woody debris recruitment, etc.) of riparian conservation areas, or incomplete protection of habitats and refugia for sensitive aquatic species (70-80% intact), and adequately buffer impacts on rangelands: percent similarity of riparian vegetation to the potential natural community/ composition 25-50% or better[p].	Riparian conservation areas are fragmented, poorly connected, or provide inadequate protection of habitats for sensitive aquatic species (<70% intact, refugia does not occur), and adequately buffer impacts on rangelands: percent similarity of riparian vegetation to the potential natural community/ composition <25%[p].

Pathway	Indicator[a]	Functioning Appropriately	Functioning At Risk	Functioning At Unacceptable Risk
	Disturbance Regime	Environmental disturbance is short lived; predictable hydrograph, high quality habitat and watershed complexity providing refuge and rearing space for all life stages or multiple life history forms[b]. Natural processes are stable.	Scour events, debris torrents, or catastrophic fire are localized events that occur in several minor parts of the watershed. Resiliency of habitat to recover from environmental disturbances is moderate.	Frequent flood or drought producing highly variable and unpredictable flows, scour events, debris torrents, or high probability of catastrophic fire exists throughout a major part of the watershed. The channel is simplified, providing little hydraulic complexity in the form of pools or side channels[b]. Natural processes are unstable.
Habitat Summary	Habitat Conditions	Habitat quality and connectivity among subpopulations. Disturbance has not altered channel equilibrium. Fine sediments and other habitat characteristics influencing survival or growth are consistent with pristine habitat. Subpopulation has resilience to recover from short-term disturbance within one to two generations (5 to 10 years). Subpopulation fluctuating around an equilibrium or is growing[b].	Fine sediments, stream temperatures, or the availability of suitable habitats have been altered and will not recover to pre-disturbance conditions within one generation (5 years.) Habitats are more fragmented, but connectivity exists. The subpopulation is reduced in size, but the reduction does not represent a long-term trend. The subpopulation is stable or fluctuating in a downward trend. Connectivity among subpopulations occurs but habitats are more fragmented[b]	Cumulative disruption of habitat has resulted in a clear declining trend in the subpopulation size. Under current management, habitat conditions will not improve within two generations (5 to 10 years). Little or no connectivity remains among subpopulations. The subpopulation survival and recruitment responds sharply to normal environmental events[b]

[a]The values of criteria presented here are not absolute; they may be adjusted for local watersheds given supportive documentation.
[b]Rieman, B.E. and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of Bull trout. U.S.D.A. USFS, Intermountain Research Station, Boise, ID.
[c]Rieman, B.E. and D.L. Meyers. 1997. Use of redd counts to detect trends in Bull trout (*Salvelinus confluentus)* populations. Conservation Biology 11(4): 1015-1018.
[d]Buchanan, D.V. and S.V. Gregory. 1997. Development of water temperature standards to protect and restore habitat for Bull trout and other cold water species in Oregon. *In* W.C. Mackay, M.K. Brewin, and M. Monita, eds. Friends of the Bull trout Conference Proceedings. P8.
[e]Washington Timber/Fish Wildlife Cooperative Monitoring Evaluation and Research Committee, 1993. Watershed Analysis Manual (Version 2.0). Washington Department of Natural Resources.
[f]Overton, C.K., J.D. McIntyre, R. Armstrong, S.L. Whitewell, and K.A. Duncan. 1995. User's guide to fish habitat: descriptions that represent natural conditions in the Salmon River Basin, Idaho. U.S. Department of Agriculture, USFS, Intermountain Research Station, Gen Tech. Rep. INT-GTR-322.
[g]Overton, C.K., S.P. Wollrab, B.C. Roberts, and M.A. Radko. 1997. R1/R4 (Northern/Intermoutain Regions) Fish and Fish Habitat Standard Inventory Procedures Handbook. U.S. Department of Agriculture, USFS, Intermountain Research Station, Gen Tech. Rep. INT-GTR-346.
[h]Biological Opinion on Land and Resource Management Plans for the: Boise, Challis, Nez Perce, Payette, Salmon, Sawtooth, Umatilla, and Wallowa-Whitman National Forests. March 1, 1995.
[i]A Federal Agency Guide for Pilot Watershed Analysis (Version 1.2), 1994.
[j]Biological Opinion on Implementation of Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH). National Marine Fisheries Service, Northwest Region, January 23, 1995.
[k]Shepard, B.B., K.L. Pratt, and P.J. Graham. 1984. Life histories of westslope cutthroat and Bull trout in the Upper Flathead River Basin, MT. Environmental Protection Agency Rep. Contract No. R008224-01-5.
[l]Interior Columbia Basin Ecosystem Management Project Draft Environmental Impact Statement and Appendices.
[m]Frissell, C.A., Liss, W.J., and David Bayles, 1993. An Integrated Biophysical Strategy for Ecological Restoration of Large Watersheds. Proceedings from the Symposium on Changing Roles in Water Resources Management and Policy, June 27-30, 1993 (American Water Resources Association), p. 449-456.
[n]Lee, D.C., J.R. Sedell, B.E. Rieman, R.F. Thurow, J.E. Williams and others. 1997. Chapter 4: Broadscale Assessment of Aquatic Species and Habitats. *In* T.M. Quigley and S. J. Arbelbide eds "An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins Volume III". U.S. Department of Agriculture, USFS, and U.S. Department of Interior, Bureau of Land Management, Gen Tech Rep PNW-GTR-405.
[o]Northwest Forest Plan, 1994. Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. USDA USFS and USDI Bureau of Land Management.
[p]Winward, A.H., 1989 Ecological Status of Vegetation as a base for Multiple Product Management. Abstracts 42nd annual meeting, Society for Range Management, Billings MT, Denver CO: Society for Range Management: p277

3.4 Baselines for the South Fork Umatilla-Buck Creek subwatershed (HUC 1707010302) and for Headwaters Umatilla River Watershed (1707010301)

The Umatilla River watershed is predominantly comprised of Roadless and Wilderness areas which experience very limited management. The Roadless and Wilderness Areas encompass most of the watershed area upstream of the FS 32 Project.

Table 3-4 contains the most recent identified stream-specific data for matrix indicators for streams in the Umatilla River Watershed. This data was obtained from Powell, 2001.

Table 3-4. Summary of aquatic parameters for stream reaches surveyed by USFS in the Headwaters Umatilla River watershed

Stream and Reach	HUC	Survey Year	Large Wood/ Mile	Riffle Width/ Depth Ratio	Avg. wetted Width/ maximum Depth Ratio	Pools/m[i]	Large/Deep pools/mile	Percent Canopy Cover	Percent Embeddedness	Dominant Substrate	Subdominant substrate	Substrate % fines (<2mm)[4]	Avg. Wetted Width
SF Umatilla River 2[3]	170701030103	1997	27	30	7	15.6	nd	28	14	CO	nd	nd	90.6
SF Umatilla River 3[3]	170701030102	1997	30	21.7	7	20.9	nd	45	18	CO	nd[2]	nd	23.1
SF Umatilla River 4	170701030102	1997	34	21.7	7.5	16.8	nd	54	17	SB	nd	nd	13.5
Ryan Creek 1	170701030105	1994	16	nd[2]	6.0	16.78	3	88	20	CO	nd	nd	14.7
Ryan Creek 2[3]	170701030105	1994	77.0	11.8	6.0	36.57	4	85.0	8.0	CO	nd	nd	10.1
Ryan Creek 3[3]	170701030105	1994	41.0	8.4	4.9	21.33	-	79.0	10.0	CO	nd	nd	4.3
Umatilla River 1 (RM 89.1-RM 90)	170701030106	1997	26	21.3	9	8.9	7	19	15	CO	nd	nd	33.5
NF Umatilla River 1[3]	170701030104	2009	12.1	24.2	15.8	7.5	4.3	47.0	nd	GR	SA	15	32.4
NF Umatilla River 2[3]	170701030104	2009	25.1	18.1	10.2	12.1	2.9	69.0	nd	GR	nd	18	17.4
NF Umatilla River 3[3]	170701030104	2009	13.5	18.2	12.6	46.3	1.5	63.5	nd	GR	nd	25	15.5
NF Umatilla River 4[3]	170701030104	1993	45.4	7.8	5.2	17.23	nd	61.2	33.1	SB	nd	nd	11.4
Buck Creek 1[3]	170701030103	1993	56	14.3	7	28.2	1	84	19	CO	nd	nd	11.5
Thomas Creek 1[3]	170701030101	2013	18	33.1	6	42	59	54	nd	CO=BO	GR	0	12.8
Spring Creek 1[3]	170701030101	2013	25	17.1	6	51	1	58	nd	GR	CO	4	6.6
Spring Creek 2	170701030101	2013	22	14.5	6	44	nd	nd	nd	GR	CO	7	6.6
Shimmiehorn Creek 1[3]	170701030102	2009	4.6	11.71	6.3	39.2	1.8	62	nd	GR	CO	4	12.5
Shimmiehorn Creek 2[3]	170701030102	2009	2.8	10.4	4.5	57.5	7	nd	nd	GR	CO	12	11.1
Shimmiehorn Creek	170701030102	2009	7.4	12.74	5.1	51	7	nd	nd	GR	CO	15	10.4

[1] Blue Mountains expected pool frequencies apply for Bull trout matrix use, PACFISH RMOs apply for steelhead matrix use.
[2] nd=data not available
[3] Reaches located in Wilderness or Hellhole Roadless Area or both
[4] Substrate composition, based on Wolman pebble counts. Not directly comparable to percent surface fines or percent fines in gravels.

3.4.1 Water Quality

3.4.1.1 Water Temperature

Table 3-5 presents continuous recording thermograph data collected by the USFS at various locations in the watershed. Buck Creek merges with the SF Umatilla from river right near the north end of the Action Area.

Table 3-5. Continuous recording thermograph data summary (7-day average maximum)*

Subwatershed	Stream	Location	Years	Annual 7-day maximum
Buck Creek-SF Umatilla River	SF Umatilla River*	SF Umatilla R. above confluence with Buck Creek	1998-2019	66.3-69.6 °F (16.7-19.4 °C)
Buck Creek-SF Umatilla River	Buck Creek*	At confluence with SF Umatilla R.	1993	57.7 °F (14.3 °C)
Ryan Creek	Ryan Creek	RM 1.3	1993	63.9 °F. (17.6 °C.)
Bear Creek-Umatilla River	Umatilla River	Corporation stream gauge	2008-2019	61-64 °F. (16.1-17.8 C)
NF Umatilla River	NF Umatilla River*	USFS Gauge near confluence	1998-2019	57.2-60.1 °F (14-15.6 °C)
Thomas Creek	Spring Creek	Confluence with Thomas Creek	1994-2004	62-67 °F (16.7-19.4 °C)

* Denotes reaches located in Wilderness or Hellhole Roadless Area or both.

"Properly functioning" (PF) water temperature for steelhead is 50-57 °F and "Not Properly Functioning" (NPF) criteria for steelhead spawning and rearing is >64 °F. The South Fork Umatilla River has consistently exceeded 64 °F in summer months since 2009. Criteria for Bull trout are even colder, with a "Functioning appropriately" value of 4-12 °C (39.2-53.6 °F).

The SF Umatilla from Shimmiehorn Creek to Thomas Creek (upstream of the Action Area) is listed on the ODEQ 303d list of impaired water bodies for temperature year-round, while the SF Umatilla in the Action Area is included in a Total Maximum Daily Load (TMDL). The Umatilla River TMDL for the Umatilla was completed in 2001, and covers temperature, sediment, nitrate, ammonia and bacteria. The temperature TMDL expectation for protection and restoration of water quality in the Umatilla River Basin on National Forest System lands requires that the USFS follow Best Management Practices to protect and restore water temperatures in the Headwaters Umatilla River watershed.

Because of differences in various physical characteristics (soil depth, elevation, slope steepness, precipitation, and inherently lower base flows, along with a natural hot spring a short distance below the Buck Creek confluence) the South Fork of the Umatilla River is naturally warmer than the North Fork, but the inherently higher South Fork temperatures are likely increased further by roads and recreational facilities in the valley bottom (USFS, 1998). The 2015 Bull trout recovery plan states that a thermal barrier may exist in the lower end of SF Umatilla River that may be preventing Bull trout from accessing cold water tributaries upstream (USFWS 2015b).

Based on all available evidence, water temperatures in the Buck Creek-SF Umatilla River are "Not Properly Functioning/Functioning at Unacceptable Risk" for steelhead and Bull trout in the Action Area.

3.4.1.2 Fine Sediment

The Umatilla National Forest does not collect data on percent surface fines as defined in the MPI, and no empirical data was identified regarding sediments in the SF Umatilla. However, the SF Umatilla River is listed on the ODEQ 303d list as "impaired" for sedimentation and has large sediment inputs from flood erosion. During a site visit on July 18, sediments in the Action Area were observed to be primarily cobble, with low embeddedness, and spawning-sized gravels appeared to be abundant. Nonetheless, based on its 303d "impaired" status, fine sediment in the Action Area is At Risk/Functioning at Risk.

3.4.1.3 Chemical Contamination/Nutrients

The DEQ 2020 303(d) Water Quality Limited list includes the SF Umatilla River as being impaired for Iron (total)-Aquatic Life Toxics, and Excess Algal Growth. Nutrient sources such as grazing and animal feedlots are potential sources and nitrogen crop fertilizers are applied throughout much of the agricultural areas of the basin, but not in and upstream of the Action Area. The most negatively impacted areas are downstream of the forks in the mainstem Umatilla. Upstream of the Action Area, all land in the drainage area is owned by the USFS, and hence does not experience contaminant/nutrient inputs to the same degree as agricultural and urban areas. The Umatilla Basin TMDL Technical Committee discussions with the Natural Resource Conservation Service, the Soil and Water Conservation Districts, Agriculture Research Service, Oregon Department of Agriculture and CTUIR indicated that phosphorus is rarely applied as a crop nutrient within the Umatilla Basin above Pendleton because there is sufficient geologic source. The USFS has indicated that nitrogen fertilizer generally has not been applied in the Umatilla National Forest. Because of the relatively "natural" nature of the watershed, chemical contamination/nutrients are Properly Functioning/Functioning Appropriately.

3.4.2 Habitat Access

3.4.2.1 Physical Barriers

Three Mile Falls Dam is located at river mile 3.0 of the Umatilla mainstem. The construction of Three Mile Falls Dam, in combination with other upstream irrigation project development, eliminated all Chinook salmon and drastically reduced runs of summer steelhead (USBR, 1983). However, passage improvements at the dam currently allow both upstream and downstream passage of salmonid adults and juveniles.

In the Headwaters Umatilla River watershed as a whole, there are only two identified barrier culverts, one on Buck Creek near its confluence with the South Fork, and one on upper Thomas Creek. Because of their locations relative to known use by spawning steelhead, the two culverts are considered to be partial barriers rather than full barriers. Given these two partial barriers, and the existence of Three Mile Falls Dam, the Physical Barriers indicator is considered At Risk/Functioning at Risk for steelhead and Bull trout.

3.4.3 Habitat Elements

3.4.3.1 Substrate Embeddedness

Cobble embeddedness in the two survey reaches assessed by the USFS in the SF Umatilla River was 17%, and 18%, which meets criteria for Properly Functioning/Functioning Appropriately for both Bull trout and steelhead (Table 3-4).

Most stream reaches higher in the Headwaters Umatilla watershed have exhibited similar (< 20%) or lower values based on available data, with only Reach 1 of Ryan Creek and Reach 4 of the North Fork Umatilla River meeting or exceeding 20 % embeddedness, despite both streams being located in Roadless or Wilderness areas (Table 3-4). Given available data, the substrate embeddedness indicator was determined to be Properly Functioning/Functioning Appropriately for both steelhead and Bull trout.

3.4.3.2 Large Woody Material

USFWS (1996) refers to Large Wood Debris (LWD), which is synonymous with the term Large Woody Material (LWM) used throughout this document. The three surveyed reaches in the SF Umatilla River contained 27, 30, and 34 pieces LWM per mile respectively (reported as large and medium woody debris in Powell, 2001). The amount of LWM present in the Headwaters Umatilla River watershed ranged from 25 to 112 pieces per mile. Therefore, this indicator was judged to be Properly Functioning/Functioning Appropriately for both the Upper Umatilla Watershed, and the Buck Creek-South Fork Umatilla subwatershed for both Bull trout and steelhead.

3.4.3.3 Pool Frequency/Quality

Pool size and abundance in the Action Area was influenced by past pool habitat creation in the watershed by forest managers. Past habitat improvement projects added a number of instream boulder and log weirs in the first mile of the mainstem Umatilla River below the Forks. They also added pool-forming structures to the North and South Forks Umatilla River and to Thomas Creek. Those structures formed and maintained deeper pools than have developed naturally in reference reaches elsewhere in the watershed (Powell, 2001). Evidence of at least two (and likely three) structures were observed by DOWL during stream survey work in 2022. The structures in the Action Area were washed out by the floods in 2020. However, the flood also formed additional pools. The largest pool observed during the site visit in June 2022 was at RM 3.08, where the flood washed out FS 32 completely, leaving a pool at the outer bend of the river.

Pool frequency criteria have been modified for streams within the Blue Mountains Province (Table 3-4). The adjustments were made based on analysis of empirical data regarding inherent pool-forming capabilities of various stream sizes in the Province by USFS researchers, and used data collected according to regional USFS habitat inventory methodology. Data on other measures of pool quality are not available.

The three surveyed reaches of the SF Umatilla River had 15.6, 20.9 and 16.8 pools per mile (Table 3-4). The average width of the Lower SF Umatilla study sites was 30.0 feet, so a properly functioning condition would require 18-23 pools per mile for Bull trout, and 45 pools per mile for steelhead. Therefore, this indicator is Not Properly Functioning for steelhead but Functioning

Appropriately for Bull trout. Since the habitat surveys were done, the pool-forming engineered structures have been destroyed and the channel was completely re-worked by the flood.

3.4.3.4 Large/Deep Pools

Maximum pool depth was not collected under the regional USFS stream survey protocol in 1990s surveys. However, residual pool depth data are collected under regional USFS stream survey protocols, and that data was used as a surrogate for maximum pool depth. The analysis assumes that if the average residual pool depth is greater than 2.5 feet then it follows that there would be many pools (less than half, but still a significant number) of pools greater than one meter deep.

Average residual pool depth in the Headwaters Umatilla River watershed was 1.4 feet and this indicator was judged to be Not Properly Functioning/Functioning at Unacceptable Risk at watershed scale for steelhead and Bull trout. Nonetheless, some deep manmade pools are present in the Umatilla River (downstream of the Forest boundary), and in Thomas Creek and the NF Umatilla River. The SF Umatilla may also contain large and deep pools, but the morphology of the river has been completely altered since the surveys were done. Based on the uncertainty of the condition and abundance of large and deep pools in the watershed, this indicator is determined to be At Risk/Functioning at Risk.

3.4.3.5 Off-Channel Habitat

None of the identified sources contained information on off-channel habitat in the Action Area or Buck Creek/SF Umatilla watershed. One side channel was observed during the June 2022 site visit at RM 2.02, and it was formed by the 2020 flood. This off-channel area is in the former road location, and it will be affected by the Project. Given the uncertainty at the watershed-scale, the Action Area was determined to be At Risk/Functioning at Risk for side channel habitat.

3.4.3.6 Refugia

The two subwatersheds within the Headwaters Umatilla River watershed identified as Bull trout refugia (North Fork and Buck Creek), are in relatively good condition and are highly protected by Wilderness and Roadless Areas. They were identified as providing refuge habitat in the [Headwaters] Umatilla and Meacham Creek watershed analyses (Powell, 2001). However, the available refuge habitat is insufficient in size to support a strong and significant population within the watershed and is insufficient even at the scale of the larger Umatilla River subbasin. The entire Umatilla subbasin core area population is small and declining. This is despite the presence of both resident and migratory Bull trout life histories and three-season habitat connectivity between Headwaters Umatilla and the Meacham Creek watershed. Within the Meachum Creek watershed (which has cooler water temperatures). Four additional subwatersheds were identified as refugium-quality for Bull trout (Powell, 2001).

Powell (2001) does not provide data on steelhead refugia, generally, but does report on hiding and escape cover. USFS stream survey data indicated that 25 out of 27 of the sampled stream reaches in the larger basin had a cover class of 2 (6 to 20 percent) or 3 (21 to 40 percent). Two reaches rated below cover class two (< 5 percent cover), namely Spring Creek and the uppermost reach of the South Fork Umatilla River. The lower SF Umatilla (including the Action Area) had a cover rating of 3.

Steelhead spawning and rearing habitat is more widespread in the Headwaters Umatilla watershed than Bull trout spawning and rearing habitat. Nearly all fish-bearing reaches provide spawning and rearing habitat for steelhead, including within the Action Area, and most of the steelhead spawning and rearing habitat is well protected as wilderness and roadless areas. Summer rearing habitat is thermally limited in the lower SF Umatilla River but is otherwise connected throughout the rest of the watershed. Given high water temperatures which degrade all instream habitat, and a lack of adequate refugia for Bull trout, refugia in the Action Area subwatershed is rated as At Risk/Functioning at Unacceptable Risk for steelhead and Bull trout respectively.

3.4.4 Channel Condition and Dynamics

3.4.4.1 Width/Depth Ratio

The USFS surveys collect data on wetted widths of riffles and residual depth of pools. Average pool tail crest depths of 6 inches were added to residual scour pool depths to obtain maximum pool depth at wetted width. Wetted widths of deep pools were assumed to be comparable to wetted width of riffles. The ratio was calculated using these data and assumptions.

At watershed scale, all reaches fall below 10 for this metric (Table 3-4), with the exception of two reaches along the North Fork Umatilla River. Conditions for the North Fork Umatilla are considered natural condition, given its location in the wilderness. For these reasons, the entire Headwaters Umatilla watershed is considered Properly Functioning/Functioning Appropriately for both steelhead and Bull trout for this metric.

3.4.4.2 Streambank Condition

Limited data is available to evaluate this indicator on USFS-managed lands. The stability of the affected streambank in the Action Area is based on informal field observation of current conditions and was not determined as part of a systematic survey of the reach based on standard stream inventory protocols. The entire streambank within the Project Action Area has undergone repeated flood disturbance, and most recently delivered large volumes of sediment to the SF Umatilla. Given the status of the streambank where it parallels FS 32, the streambank condition indicator is Not Properly Functioning/Functioning at Unacceptable Risk.

Conditions throughout the larger watershed are likely better. Roadless/Wilderness streams are likely to be highly stable given the absence of recent wildfires and other disturbance regimes. Active timber management since 1996 has avoided removing trees with the exception of danger trees in recreational sites and along roads, which are left on-site.

3.4.4.3 Floodplain Connectivity

No published data sources were identified regarding floodplain connectivity. However, the SF Umatilla River is largely located in a canyon and likely did not historically have an extensive or active flood plain. Past channelization of the lower reaches of the SF Umatilla River has reduced linkages between that tributary and its floodplain. Given the limited data available, floodplain connectivity in the Action Area and the larger watershed is considered At Risk/Functioning at Risk for this metric.

3.4.5 Flows and Hydrology

3.4.5.1 Change in Peak/Base Flow

No data is available to evaluate this indicator on USFS-managed lands at either subwatershed or watershed scales. However, due to a lack of water withdrawals, diversions, and control structures in the watershed upstream of the Action Area, peak and base flows have likely not been altered substantially (except by climate change) and are Properly Functioning/Functioning appropriately.

3.4.5.2 Drainage Network Increase

There are a few draw and valley bottom roads in the watershed, primarily along the Umatilla River and the SF Umatilla in the Action Area. The existing road system is a chronic impact to shade and water temperatures, but in general much of the upper watershed is relatively unaffected by road development. Given the generally wilderness nature of the watershed, this indicator was judged to be Properly Functioning/Functioning Appropriately for steelhead and Bull trout in the Headwaters Umatilla watershed, but Not Properly Functioning/Functioning at Unacceptable Risk in the Action Area.

3.4.6 Watershed Conditions

3.4.6.1 Road Density and Location

Road densities provide another measure of watershed conditions and cumulative effects. Roads alter surface hydrology through several mechanisms; intercepting subsurface runoff, concentrating surface runoff, and extending channel networks which increases watershed "efficiency." Roads also accelerate erosion and sedimentation into streams (Megahan 1983). A road density "threshold", or level of concern, was identified by NMFS at 2.0 mi/mi^2. Road densities are over 2.0 in seven of the subwatersheds in the Umatilla Basin (Powell, 2001). In the SF Umatilla, the upper section has 0.75 miles of road per square mile, while the lower Sections have 2.26 mi/mi^2. These values, coupled with the outsized influence of FS 32 on habitat in the Action Area, the road density and location indicator is At Risk/Functioning at Risk for the watershed.

3.4.6.2 Disturbance History

Equivalent Clearcut Area (ECA) was used as a proxy for disturbance history. Overall, ECAs in the basin are at relatively low levels, below 10 percent, indicating harvesting alone is not likely to be measurably changing water yields or peak flows (Powell, 2001). Although this data is greater than 20 years old, no significant road building or clear cuts have occurred within the watershed since that time. Effects from associated activities including skidding, landing areas, and road systems are still present in the landscape and are more likely a greater influence on runoff, erosion, and sedimentation. ECA in the headwaters of the SF Umatilla was 0.0, while in the lower watershed it was 3.1 percent and in Buck Creek it was 4.7 percent (Powell, 2001). Based on this data, the watershed is Functioning Appropriately/Properly Functioning in regard to the disturbance history.

3.4.6.3 Riparian Reserves

Most fish-bearing streams on the USFS-managed portion of the watershed are in roadless areas or steep, inaccessible canyons. The exceptions are the mainstem Umatilla River, SF Umatilla River and Thomas Creek which have valley bottom roads for most of their lengths. Major recreational facilities (campgrounds and organizational camps) are located in the Buck Creek-Umatilla River subwatershed along the lower SF Umatilla River, and in the Bear Creek subwatershed along the mainstem Umatilla River (Powell, 2001). Riparian vegetation remains similar to undisturbed condition in terms of species composition. Light to moderate harvest activities occurred prior to 1996 on the most accessible streams, which have since been recovering. For these reasons this indicator was judged to be Properly Functioning/Functioning Appropriately for the watershed. However, due to the presence of SF 32 and recreational facilities, this indicator is At Risk/Functioning at Risk in the Action Area.

3.4.6.4 Disturbance Regime

The impacts of episodic large flood events in the South Fork and mainstem Umatilla rivers is likely exacerbated by the presence of FS 32 and the county road. Fire suppression has increased overall risk to Bull trout spawning and rearing habitat in the North Fork and Buck Creek subwatersheds due to risk of spread of high-severity fires in the majority of the Ryan Creek and Thomas Creek subwatersheds and portions of the North Fork subwatershed, where one or more natural fire cycles have been missed due to decades of fire suppression. High-severity fires that start in those subwatersheds may exceed fires that would naturally occur.

Powell (2001) noted that three major rain-on-snow events occurred during the winter of 1995/1996. During those storms, scour and debris torrents occurred in localized portions of the drainage, with trail damage occurring along the SF Umatilla. It is likely that FS 32 below the Forks also experienced damage from the winter of 1995-96, since flood events of lower magnitude (estimated 25-year events) damaged that section of road in 2013 as well as in 2018 to 2019, just prior to the catastrophic flood of 2020.

Several large fires (100 to 1000 acres) in the North Fork Umatilla River subwatershed and one of that size in the Buck Creek subwatershed occurred 100 to 200 years ago. No other fires larger than 100 acres have been documented anywhere in the Headwaters Umatilla River watershed to date. Fires have been suppressed per USFS policy over the past 100 years.

Most of the vegetation in the Buck Creek/SF Umatilla subwatershed is in balance with expected fire return intervals, while the North Fork is in moderate balance. Thomas Creek, Ryan Creek, and Bear Creek subwatersheds are at the greatest risk of high-severity forest fires due to most of their forest vegetation having missed one or more expected fire cycles. Fire suppression has likely played a contributing role in the absence of anticipated fire return intervals for larger wildfires (Powell 2001).

For these reasons, the Action Area and the Headwaters Umatilla River watershed both, are considered Functioning at Risk for Bull trout. This metric is not used in the steelhead matrix.

3.4.6.5 Riparian Habitat Conservation Areas (Bull trout only)

Riparian Habitat Conservation Areas (RHCAs) are portions of watersheds where aquatic and riparian dependent resources receive primary emphasis and where management activities are subject to specific standards and guidelines. RHCAs include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems by: (1) influencing the delivery of coarse sediment, organic matter, and woody debris to streams; (2) providing root strength for channel stability; (3) shading the stream; and (4) protecting water quality.

The Umatilla National Forest Plan 1995 amendment defines applicable Riparian Habitat Conservation Areas (RHCAs, equivalent to RCAs) based on geomorphic features, such as the edges of the active stream channel to the top of the inner gorge, the extent of the 100-year floodplain, the outer edges of riparian vegetation, the height of site-potential trees, and the extent of unstable soils. Generally, 300 feet on either side of fish-bearing streams, 150 feet on either side of permanent non-fish-bearing streams, and 100 feet in key watersheds (USFS, 1995).

To be Properly Functioning for Bull trout, riparian conservation areas must provide adequate shade, large woody debris recruitment, and habitat protection and connectivity in subwatersheds, and buffers or must include >80% intact known refugia for sensitive aquatic species. The percent similarity of riparian vegetation to the potential natural community /composition must also be >50%.

In the Action Area, the RCA is impacted on river left by FS 32. The presence of the road largely precludes the development of shade, large woody debris recruitment, habitat protection, and the development of refugia. Even in the absence of the road, river left would be constrained by a basalt cliff along most of its length in the Action Area. The RCA on river right is much more natural and is likely Properly Functioning. However, because only one side of the river has a largely undisturbed RHCA, this indicator is Functioning at Risk.

3.4.7 Subpopulation characteristics (Bull trout only)

3.4.7.1 Subpopulation Size

The entire Umatilla River population is rated at 50 to 250 individuals (USFWS 2008). According to the most recent status review, the Umatilla River core area (Umatilla River subbasin) contains a population “so depressed it is likely suffering from the deleterious effects of small population size” (USFWS, ibid). The population is considered to have “critically low abundance” (USFWS, 2015a). This indicates that the subpopulation is Functioning at Unacceptable Risk in terms of size.

The Recovery Plan for Columbia River Bull trout found that demographic status (which considers size, age, structure, and density) is the poorest in the Umatilla and Middle Fork John Day Core Areas. The Umatilla River core area is also likely isolated from other core areas in the Lower Mid-Columbia River region, considering that dams, thermal and low flow barriers in the lower Umatilla River all create hostile conditions for Bull trout in the migratory corridor downstream of the Action Area. Recent evidence suggests a significant decline in the resident and fluvial life history in the Umatilla River core area. Connection between the Umatilla, Walla Walla, and Touchet core areas is uncommon but has been documented (USFWS 2015b).

The best remaining Bull trout habitat in the Headwaters Umatilla River watershed is found in the North Fork Umatilla River and its tributaries, which are managed as wilderness by the USFS. Fair to good habitat quality is found in Buck Creek and Shimmiehorn Creeks (Buck Creek-SF Umatilla River, SF Umatilla River subwatersheds, respectively). The poorest habitat quality in the watershed is found in the mainstem Umatilla River, the lower reaches of the SF Umatilla River (Bear Creek-Umatilla River and Buck Cr-SF Umatilla subwatersheds), and Spring Creek (Thomas Creek subwatershed). The Action Area is located within the poorest habitat quality for Bull trout in the watershed, primarily due to warm summer water temperatures. Therefore, subpopulation size is Functioning at Unacceptable Risk in the Action Area.

3.4.7.2 Growth and Survival

There is little available data on the growth and survival of Bull trout in the Umatilla Population. The Recovery Plan states that no spawning has been documented in the SF Umatilla, since 1996 and that redd totals on the North Fork Umatilla River have fluctuated considerably but averaged about 50 redds between 1998 and 2013. However, the most recently available 5-year average (2009 to 2013) was only 19 redds, suggesting this population is declining (a new 5-year status update is currently being completed). The definition of "Functioning at Unacceptable Risk" for this indicator is: "The subpopulation is characterized as in rapid decline or is maintaining at alarmingly low numbers. Under current management, the subpopulation condition will not improve within two generations (5 to 10 years). This is supported by a minimum of 5+ years of data." Given the "critically low" that is so depressed it is likely suffering from the deleterious effects of small population size, and the documented decline, the Growth and Survival indicator is "Functioning at Unacceptable Risk."

3.4.7.3 Life History Diversity and Isolation

Recent evidence suggests a significant decline in the resident and fluvial Bull trout life history in the Umatilla River (USFWS 2015b). Connection between the Umatilla, Walla Walla, and Touchet core areas is uncommon but has been documented, and connectivity is possible between core areas in the John Day Basin. Connectivity between the John Day core areas and Umatilla/Walla Walla/Touchet core areas is unlikely. This suggested that the Umatilla population is isolated and has low and possibly decreasing life history diversity. Therefore, the Life History Diversity and Isolation of Bull trout in the SF Umatilla subwatershed is Functioning at Unacceptable Risk.

3.4.7.4 Persistence and Genetic Integrity

As stated above, the Umatilla River core area contains a population "so depressed it is likely suffering from the deleterious effects of small population size," including genetic isolation. This indicator is Functioning at Unacceptable Risk.

3.4.8 Habitat Summary

3.4.8.1 Bull trout

The criteria for overall Functioning at Risk is “fine sediments, stream temperatures, or the availability of suitable habitats have been altered and will not recover to pre-disturbance conditions within one generation (5 years). Habitats are more fragmented (than “Functioning Appropriately) but connectivity exists.”

Functioning at Unacceptable Risk criteria are: “Under current management, habitat conditions will not improve within two generations (5 to 10 years.) Little or no connectivity remains among subpopulations.”

According to Powell (2001), in the upper Umatilla and Meachem Creek Basin, “low summer flows, high water temperatures, changes in channel structure, high sediment loads, insufficient pools, and shortages of in-stream large down wood are symptoms of reduced habitat quality. Such conditions are particularly evident in the mid and lower elevations of the analysis area. Water quality monitoring and stream inventories indicate that habitat conditions in some streams are so poor as to render them incapable of sustaining salmonid populations.”

Based on the overall assessment of the Environmental Baseline discussed above, the environmental baseline in the Buck Creek-South Fork Umatilla subwatershed is Functioning at Unacceptable Risk due to high water temperatures, limited habitat diversity, lack of spawning habitat, a critically low population size, and anthropomorphic effects from roads and land uses. Even if all other habitat parameters were ideal, the water temperature in the SF Umatilla precludes use by Bull trout during the summer.

3.4.8.2 Steelhead

This indicator is not used in the steelhead matrix.

3.4.9 Matrix Summary

Tables 3-6 and 3-7 summarize the status of the Environmental Baseline for Bull trout and steelhead respectively in the Buck Creek – SF Umatilla subwatershed. Table 3-8 provides a crosswalk between current conditions of Matrix indicators and steelhead and Bull trout critical habitat conditions. The crosswalk is designed to show connections between the critical habit PBFs and the Pathways and Indicators used by the MPI to evaluate the Environmental Baseline.

Table 3-6. Current environmental baseline in the Action Area (steelhead).

Pathways Indicators	Environmental Baseline Properly functioning	At Risk	Not properly functioning
Water Quality			
Temperature			X
Sediment		X	
Contamination/Nutrients	X		
Habitat Access			
Physical Barriers		X	
Habitat Elements			
Substrate	X		
LWM	X		
Pool Frequency			X
Pool Quality		X	
Off-channel habitat		X	
Refugia		X	
Channel Condition			
Width/depth ratio	X		
Streambank condition			X
Flows/Hydrology			
Peak/base flows	X		
Drainage Network Incr.	X		
Watershed conditions			
Road density		X	
Disturbance history		X	
Riparian reserves	X		

Table 3-7. Current environmental baseline in the Action Area (Bull trout).

Pathways Indicators	Environmental Baseline		
	Functioning Appropriately	Functioning at Risk	Functioning at Unacceptable Risk
Subpopulation characteristics within subpopulations watersheds			
Subpopulation Size			X
Growth and Survival			X
Life History Diversity and Isolation			X
Persistence and genetic Integrity			X
Water Quality			
Temperature			X
Sediment		X	
Contamination/Nutrients	X		
Habitat Access			
Physical Barriers			X
Habitat Elements			
Substrate embeddedness	X		
LWM	X		
Pool Frequency and Quality	X		
Large pools		X	
Off-channel habitat		X	
Refugia			X
Channel Condition			
Width/depth ratio	X		
Streambank condition			X
Floodplain connectivity		X	
Flows/Hydrology			
Peak/base flows	X		
Drainage Network Incr.	X		
Watershed conditions			
Road density		X	
Disturbance history		X	
Riparian Habitat Conservation Areas		X	
Habitat Summary			
Habitat Conditions			X

Table 3-8. Matrix of Pathways and Indicators crosswalk with PBF criteria for current conditions in the Headwaters Umatilla watershed (specifically for Bull trout, but largely applicable to steelhead as well).

PBF	PBF Habitat Feature	Matrix Pathway	Matrix Indicator	Functionality
Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	Floodplain Connectivity	Channel Condition and Dynamics	Floodplain connectivity	At Risk
	Water Quantity	Flow/Hydrology	Change in peak/base flows	Acceptable
Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	Obstruction	Water Quality	Chemical contaminants/ nutrients, temperature	Unacceptable
		Flow/Hydrology	Change in peak/base flows	Acceptable
An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	Forage	Water Quality, Habitat Elements, Channel Condition and Dynamics, Habitat Access	All 13 indicators associated with these 4 pathways	At Risk
Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.	Complex Condition	Habitat Elements	Large woody debris	Acceptable
			Pool frequency and quality,	At Risk
			Large pools	At Risk
			Off channel habitat	At Risk
			Refugia	Unacceptable Risk
Water temperatures ranging from 2 to 15°C (36 to 59°F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on Bull trout life-history stage and form; geography; elevation, diurnal and seasonal variation; shade such as that provided by riparian habitat; and local groundwater influence.	Water Quality	Flow/Hydrology	Temperature	Unacceptable Risk
Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount (e.g. less than 12 percent) of fine substrate less than 0.85 mm (0.03 in) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions.	Suitable Substrate	Water Quality	Fine Sediment	At Risk
		Habitat Elements	Substrate embeddedness	At Risk
A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.	Water Quantity		Change in peak/base flows	Acceptable
Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	Water Quality	Water Quality	Temperature	Unacceptable Risk
			Fine Sediment	At Risk

PBF	PBF Habitat Feature	Matrix Pathway	Matrix Indicator	Functionality
			Chem. Contam./ Nutrients	Acceptable
			Change in Peak/Base Flows	Acceptable
	Water Quantity	Flow/Hydrology	Change in Peak/Base Flows	Acceptable
Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g. brown trout) species present.	Species	N/A	N/A	Acceptable

3.4.10 Climate

Climate is not included in the MPI, and yet the current state of the climate is an integral part of the environmental baseline. Given their preferred cold-water environments, salmonids are especially vulnerable to the effects of warming climates, changing precipitation, and hydrologic regimes.

Climate change in the Pacific Northwest includes rising air temperature, changes in the timing of streamflow related to changing snowmelt, increases in extreme precipitation events, lower summer stream flows, and other changes (Mote et al, 2014). During the last century, average annual air temperatures in the Pacific Northwest increased by 1 to 1.4°F, and up to 2°F in some seasons (Abatzoglou et al., Kunkel et al., 2013). Warming will continue in the 21st century, with average temperature increases of 3° to 10 °F predicted to occur in summer. Temperature increases shift timing of key life cycle events for salmonids and species forming the base of their aquatic foodwebs (Crozier et al. 2011, Tillmann and Siemann 2011, Winder and Schindler 2004). Higher stream temperatures will also cause decreases in dissolved oxygen and may also cause earlier onset of stratification and reduced mixing between layers in lakes and reservoirs.

Decreases in summer precipitation of as much as 30 percent by the year 2100 are predicted across many climate models (Mote et al. 2014). Shifts in timing are also predicted, with most rain forecast to fall from October through March and less during the already dry summer months. More winter precipitation is expected to be rain than snow (ISAB 2007, Mote et al. 2014). Earlier snowmelt will cause lower stream flows in late spring, summer, and fall, and water temperatures will be warmer (ISAB 2007, Mote et al. 2014).

Late summer streamflow in Pacific coastal ranges and the central Rockies have declined approximately 20 percent on average since the middle of the 20th century. This is caused by a combination of a warmer and drier climate, smaller snowpacks, and earlier melt (Leppi et al. 2012; Sawaske et al. 2014). In the Pacific Northwest during this period, high-elevation precipitation has decreased as westerly winds have slowed, and this decrease is projected to continue, if not increase, over the 21st century (Luce et al. 2013). Variability in annual streamflow has also increased as intense storms bring high flows, and drier summers lead to reductions in base flow (Luce and Holden 2009).

Overall, about one-third of the current cold-water salmonid habitat in the Pacific Northwest is likely to exceed water temperature thresholds by the end of the 21st century (Mantua et al. 2009).

Reduced flows will make it more difficult for migrating fish to pass physical and thermal obstructions, limiting their access to available habitat (Mantua et al. 2010).

Sensitivity of stream temperature to changes in air temperature is complex and is influenced by geological and vegetation factors, such as topography, groundwater recharge, glaciation history, and riparian vegetation (Isaak et al. 2010, Isaak and Rieman 2013). Nonetheless, the effects of climate change have contributed to salmonid range contractions; threats to redds and juvenile habitat from stream scouring caused by increased extreme winter precipitation events and increased rain in lower elevations; lower summer flows restricting rearing habitat and inhibiting movements from spawning and rearing habitat to foraging habitat. The increased frequency, intensity, and extent of wildfires is at least partially attributable to climate change, and has contributed to loss and fragmentation of habitat, increased sediment inputs, decreased LWM recruitment over time, and more intense exposure to solar radiation.

These are only the freshwater consequences of climate change. Predicted changes for coastal waters in the Pacific Northwest include increasing surface water temperature, increasing but highly variable acidity, and increasing storm frequency and magnitude (Mote et al. 2014). Elevated ocean temperatures already documented for the Pacific Northwest are highly likely to continue during the next century, with sea surface temperature projected to increase by 1.0 to 3.7°C by the end of the century (IPCC 2014). Habitat loss, shifts in species' ranges and abundances, and altered marine food webs could have substantial consequences to anadromous, coastal, and marine species in the Pacific Northwest (Tillmann and Siemann 2011).

3.5 Avoidance and Minimization Measures/Best Management Practices (BMPs)

3.5.1 Action Agency Review

Appropriate Umatilla National Forest staff will review the proposed action to ensure that it will be consistent with all applicable BMPs for general aquatic conservation measures, road maintenance, and storm/flood-damaged road repairs. Staff will verify that BMPs have been incorporated into the design and contract language for the Project. The Umatilla National Forest project manager will ensure BMPs prescribed for the repair work are followed and will also require compliance by any other person who completes all or part of the planned road repairs. Additional USFS National BMPs will also be applied as recommended by the project hydrologist to protect Water Quality in compliance with the Clean Water Act.

Throughout the design process, consideration was given to avoiding and minimizing effects on ESA-listed species, as well as other fish and wildlife in the Action Area. In every instance, priority was given to the least "impactful" materials and methods. As is generally the case, there is overlap between impact avoidance and minimization measures, BMPs, and conservation measures. Conservation measures are defined as "measures taken to help recover listed species" (USFWS and NMFS 1998) which could be interpreted as any of the above measures. Therefore, we use the term "conservation measures" to include avoidance and minimization measures, BMPs, and post-action mitigation.

Table 3-9 includes avoidance and minimization techniques and BMPs that will be implemented to avoid and reduce impacts to ESA-listed species. Additional detail on BMPs is provided in Appendix E.

Table 3-9. Impact Avoidance and Mitigation Measures and BMPs to be implemented during Project Construction

Activity	Avoidance and Minimization Measures/Best Management Practices (BMPs)
Direct upland disturbance during construction	BMPs such as wattles or silt fence will be used to prevent the discharge of any material into flowing water.
	Minimize clearing and grubbing activities when preparing staging, construction, or stockpile areas to the extent possible.
	Select heavy equipment that will have the least possible adverse effect to the environment, considering factors including, but not limited to, equipment that has the ability to conduct work from existing disturbed areas, exert the least soil compaction impact, and minimize the amount of vibration and noise that could disturb aquatic species.
	Establish staging areas for storage of equipment, project-derived material and supplies. Whenever possible, staging areas for any equipment with a fuel or other tank > 5 gallons in volume must be a minimum of 150 feet away from water bodies.
	Locate temporary construction/staging areas within already disturbed/developed areas and/or along the existing road.
	Restrict construction vehicles and equipment to roads and designated work areas.
	Conduct soil-disturbing activities during dry conditions to greatest extent practicable.
	To the extent feasible, work with heavy equipment from the top of the riverbank, unless work from another location would result in less habitat disturbance.
	Obtain a wildlife salvage permit from ODFW for salvage/relocation of non-listed wildlife.
	Vegetation removal required for access that is not part of the permanent impact limits will be cut, but not grubbed, to allow natural regeneration.
	Minimize construction noise to the extent possible by ensuring all equipment is outfitted with appropriate sound-control devices (mufflers).
	Store trash in wildlife-proof garbage containers and remove trash daily from the Project site.
	Return temporary disturbance areas for culvert/road work to pre-construction contours.
	Revegetate areas with ground disturbance with native ground cover.
In-water work	Adhere to seasonal timing restrictions for work below ordinary high water: The IWWP for the Action Area is July 1 through August 15. If in-water work cannot be completed within the IWWP an extension will be requested as soon as it is determined that an extension is required to complete the scope of work. Project proponents will request a July 1 to September 30 IWWP).
	All work below the OHWM will be conducted during the approved in-water work window to protect aquatic species.
	Isolate the work area, maintaining downstream flow by (preferably) diverting the stream around the work area, or by using pumps to transfer 100% of stream flow.
	Isolate in-water work zones prior to any work below Ordinary High Water (OHW).
	Make the in-water work zone as small as possible to complete the Project.
	With the exception of installing the work isolation system, associated channel work below the OHWM will only occur in an isolated condition.
	Dewater work area slowly to minimize turbidity and reduce stress to aquatic organisms.

Activity	Avoidance and Minimization Measures/Best Management Practices (BMPs)
	If small pumps are used to dewater holding pools or hyporheic flows are to be used, or to temporarily divert a stream to facilitate construction a compliant fish screen should be used to prevent entrainment or impingement of small fish (Section 8.7 in NOAA Fisheries West Coast Region Anadromous Salmonid Passage Design Manual 2022).
	Do not discharge turbid water to streams. Establish an upland location for discharge of Project-derived water (from dewatering, for instance), where water can infiltrate and not return to the stream.
	Worksite isolation and fish exclusion will be conducted by qualified biologists in accordance with the 2016 WSDOT Fish Exclusion Protocols and Standards.
	Attempts will be made to "herd" fish from the in-water work zones prior to installing isolation. Conduct fish salvage during dewatering and exclude fish from the in-water work zone following fish salvage using block nets or fish-tight turbidity curtains both upstream and downstream.
	Minimize incidental take due to capture of individual fish during work area isolation and salvage efforts by following NMFS's guidelines for safe fish capture and release, and NOAA Fisheries Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act (NMFS 2000).
	Comply with applicable Clean Water Act permits for work in wetlands or streams.
	During in-water work, water quality monitoring shall be conducted, turbidity will be a performance-based contract requirement that will ensure compliance with state water quality standards at all times.
	The contractor will be required to maintain state water quality standards at all times by preventing elevated turbidity beyond 500 feet from the work area.
	If water is drafted from the SF Umatilla River for dust suppression, washing down fines, or wildfire management, the following measures shall be implemented: • Operations are restricted to 1 hour after sunrise to 1 hour before sunset. • The pumping rate should not exceed the lesser of 350 gpm or 10% of the streamflow. The operator should measure streamflow prior to initiating pumping to ensure the pumping rate will not exceed 10% of streamflow. • Pumping should be restricted to locations where the water is deep and flowing; pumping from isolated pools should be avoided. • Pumping should not result in a drawdown of the water surface elevation by more than 10% in the area where pumping is taking place nor in any riffles downstream. • Pumping should be terminated when the water truck or tank is full. • An operator should be present during pumping operations and observe stream conditions during pumping to ensure the above restrictions are being met. • A fish screen should be used when pumping. Fish screens should meet guidelines for end-of-pipe screens (Section 8.5.7.5 NOAA Fisheries West Coast Region Anadromous Salmonid Passage Design Manual 2022). The operator should be capable of cleaning debris from the fish screen when needed and possess the equipment necessary to do so.
	Fines will be washed into areas of new streambed prior to the reintroduction of flows to ensure water stays on the surface, and to minimize downstream turbidity during rewatering.
	Water will be reintroduced to the isolation areas slowly during removal of containment measures to minimize turbidity and allow natural equilibration to occur.
Unanticipated spills and releases	Dispose of waste material generated from road work in a stable upland site approved by geotechnical engineer or other qualified personnel.
	Whenever possible, store, fuel, and maintain vehicles/heavy equipment in designated upland staging area at least 150 feet from stream, waterbody, or wetland.
	Confirm equipment is clean (e.g., power-washed) and that it does not have fluid leaks prior to contractor mobilization of heavy equipment to site. Inspect equipment and tanks for drips or leaks daily and make necessary repairs within 24 hours.

Activity	Avoidance and Minimization Measures/Best Management Practices (BMPs)
	All equipment that works over the river, or below the OHWM will contain vegetable oil or other biodegradable alternative to hydraulic fluid.
	An Engineer-approved SPCC plan to guard against the release of any harmful pollutant or product will be implemented.
	In the event of a spill, immediately contain the spill, eliminate the source, and deploy appropriate measures to clean/dispose of spilled materials in accordance with federal, state, and local regulations.
	Maintain a supply of sediment control materials and oil-absorbing floating booms at the Project site.
	Supply portable refueling storage tanks or station equipment containing fuel (i.e. generators or pumps) with portable containment facilities equal to at least 100% of the fuel tanks they contain.
	All equipment staging and fueling closer than 50 feet from the OHWM shall have secondary containment systems.
	Maintain emergency spill control materials, such as oil booms and spill response kits, on-site at each work area, ready for immediate deployment.

3.5.2 Post- Project site restoration

A major part of project design is the installation of LWM. While primarily a construction technique to protect the newly constructed road, the installation of LWM will have the add-on benefit of providing refugia for ESA-listed fish, and contributing to the channel-forming processes that should form and maintain pools and more diverse instream habitat over time. Finally, revegetation will be done across the newly constructed roadbed/stream channels with live stakes, shrub plantings and seeding of herbaceous vegetation. Additional detail on planting and other site restoration is included in Appendix B.

3.5.3 Operations

Following the Project, FS 32 will operate as it did pre-flood: as a minimum maintenance road from the Umatilla Forks Campground, upstream to the South Fork Campground and beyond to the headwaters of the SF Umatilla. There will be no differences from the pre-flood condition in the amount of riparian shade or stormwater inputs from FS 32 to the SF Umatilla River.

3.5.4 Maintenance

Provided the road performs to design standards and survives future floods in good condition (as is expected), maintenance will be minimal, and the road will be maintained as a USFS Maintenance Level 3 Road. Grading and aggregate resurfacing are expected on an eight-to-ten-year interval. Maintenance level 3 roads have the following attributes:

- Are passable to prudent drivers in passenger cars during the normal season of use;
- Usually do not consider user comfort and convenience priorities;
- Have standard signage requirements;
- Are typically single lane with turnouts visible from either direction;

- Typically must be driven at low speeds;
- May be local or collectors (collector roads are roads between local roads and arterials);
- Have low- to moderate-traffic volume;
- Typically connect to arterial and collector roads or other maintenance level 3 roads;
- May include some dispersed recreation roads;
- Provide drainage via a combination of dips and culverts; and
- Frequently have potholes or washboarding.

Maintenance activities on Level 3 Roads consists of:

- Traveled way and shoulder: Maintain to provide travel by prudent drivers in standard passenger cars during the normal season of use. Some surface roughness is acceptable. User comfort and convenience is a low priority. Maintain a traveled way crown or cross slope to provide adequate drainage. Replace the base course and surfacing as needed to protect the resources;
- Drainage: Drain as necessary to keep drainage facilities functional and prevent unacceptable environmental damage while maintaining passage for prudent drivers in standard passenger cars;
- Roadway: Control the vegetation to provide sight distance. Repair and/or remove slides and slumps to provide passage by prudent drivers in standard passenger cars and to control resource damage;
- Roadside: Clean up litter in accordance with road management objectives. Remove danger trees and maintain vegetation as required. Remove logs and debris when interfering with drainage or operation of maintenance equipment;
- Structure: Maintain all structures to provide for passage of planned traffic and to preserve structures for future use; and
- Traffic service: Install and maintain appropriate route markers, warning, regulatory, and guide signs and other traffic control devices as warranted in a sign plan.

Chapter 4.0 Project Action Area

The Action Area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). It extends outside of the Project site to the point where there are no measurable effects from Project activities (Figure 4-1). "Direct effects" are those effects felt directly by individuals of an ESA-listed species either immediately, or very close in time to the action. Direct effects include such things as stress or injury from electrofishing, or the effects of construction derived turbidity. "Indirect effects" (also known as "delayed consequences") are defined as "those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur. [50 CFR §402.02]." Examples of indirect effects include lingering effects to the forage base, long-term positive effects of habitat enhancements, etc.

As described in Chapter 3.0 Project Description, the Project includes six construction actions. Table 4-1 lists the construction actions and the types of effects each could generate. The effects in Table 4-1 assume that all BMPs are followed.

Table 4-1. Construction Actions with Potential Effects to ESA-listed Species

Construction activity	Potential direct effects	Potential indirect effects
Upland clearing and grubbing to establish work zones and staging areas	None	Possible future increases in turbidity due to runoff from disturbed areas.
Landslide debris removal	Handling stress from fish salvage	Changes to stream morphology short-term loss of benthic invertebrates.
Road Construction and rehabilitation	Handling stress from fish salvage, direct stress from noise or disturbance	Minor effects due to renewed access to the area including possible future increases in turbidity due to runoff from disturbed areas
Bank stabilization and reconstruction	Handling stress from fish salvage, direct stress from noise or disturbance	Minor effects due to renewed access to the area including possible future increases in turbidity due to runoff from disturbed areas
Culvert replacement	None (dry at the time of construction)	Replacing the culvert with an aquatic organism passage design will have only positive effects
Revegetation	None	None

4.1 Determining the Action Area

In delineating the Action Area, we evaluated the farthest reaching physical, chemical, and biotic effects of the action on the environment. Staging areas during Project construction will be on the roadway itself, so staging areas will not contribute to Project effects. Source areas for Project material (riprap) are established pits/quarries and are therefore not included in the Action Area. Likewise, because no ESA-listed terrestrial species will be affected, the upland areas where landslide debris will be removed from various roadways (Table 3-10 and Appendix B) are also not included in the Action Area.

The Action Area for this Project includes all areas of roadway and bank reconstruction, and downstream areas of SF Umatilla River where potential effects are likely to occur. Direct Effects are expected to have a larger footprint than indirect effects and include turbidity effects and effects to fish prey species from direct disturbance.

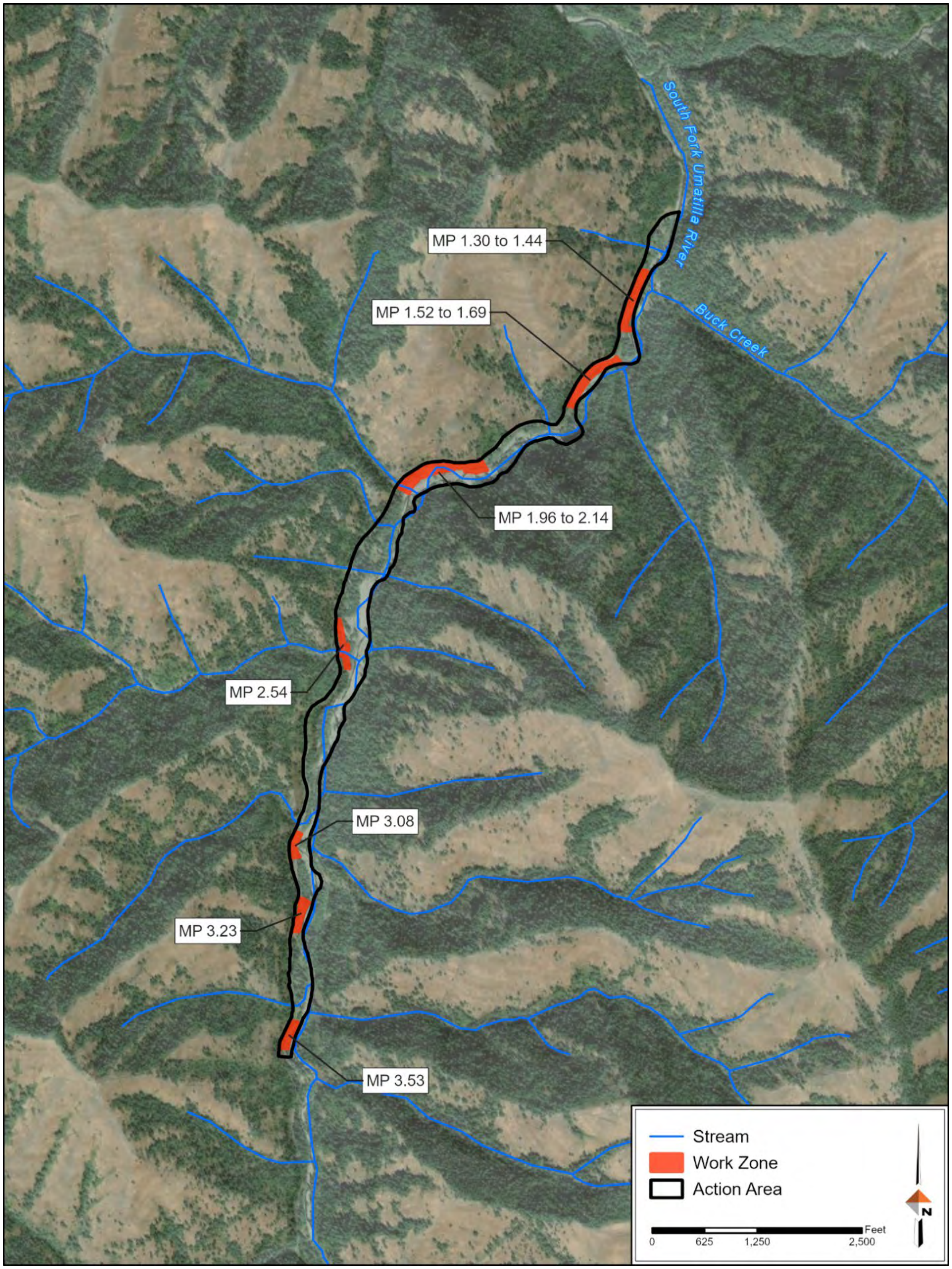
The potential for erosion, sedimentation, and increased turbidity during upland and in-water construction will be avoided or minimized to the extent possible by conservation measures. Specifically, a USFS Stormwater Pollution Prevention Plan, which includes the Erosion Prevention Plan, and Spill Prevention, Control and Countermeasures Plan (to be completed prior to construction), should effectively reduce the risk of erosion, sedimentation, and increased turbidity to the SF Umatilla. The substrate at the site is primarily cobble-sized and larger, with some sand but little silt. These large substrate sizes will produce less downstream turbidity than would finer sediments.

Determining the extent of downstream suspended sediment plumes (and their corollary, increased turbidity) prior to in-water work is complicated by multiple factors, including particle size and density, background turbidity levels, stream morphology, discharge, and velocity (Walwork et al., 2022). Many studies have examined the effects of elevated turbidity on salmonids and other fish (Bash et al., 2001), but due to the multitude of variables that may contribute to the degree of turbidity generated during in-water work, it is very difficult to determine the downstream extent of turbidity a priori. One identified study (Bilby et al. 1989) did note that the downstream transport of measurable in-stream sediment from road surface erosion in two southwest Washington streams was 95M (312 ft) and 125M (410 ft) respectively.

In previous consultations on similar projects, the Services have generally accepted that turbidity effects are likely to extend downstream 300 to 500 feet (USFWS 2021a, 2021b, NMFS 2022) In 2020, a sediment removal project was authorized on McKay Creek, a tributary of the Umatilla in Pendleton, that involved the dredging of 1,380 linear feet of McKay Creek, and the removal of over 8,000 cubic yards of cobble and sand. In their consultation on the McKay Creek project, NMFS stated that an action area from 100 feet upstream to 500 feet downstream of each in-water work zone would, "encompass the maximum expected sediment plumes that may occur during in-water work" (NMFS 2020). Based on the close proximity and similarly-sized substrate, it is reasonable to assume that substrate-disturbing activities in the Action Area would have a similar magnitude and similar effects on ESA-listed fish species as would the dredging that was approved for McKay Creek. The Project will be required to comply with Section 401 water quality permit, which will regulate the allowable extent of downstream turbidity plumes.

Based on the likely construction effects of the Project, **the Action Area includes all affected upland areas in the former roadbed, all affected riparian areas, and all instream areas from bank to bank 100 feet upstream and 760 feet downstream of the entire work zone from FS 32 MP 3.53 to the bridge over the SF Umatilla at approximately MP 1.16 within SF Umatilla River (Figure 4-1).** This Action Area encompasses the work areas and maximum expected sediment plumes that may occur during in-water work. Although 500 feet downstream would likely adequately protect listed species, we have extended the Action Area downstream to the bridge to be conservative, and for ease of identification. The size of the action area was determined by tracing the stream centerline in and extending the Action Area to a width of 80 feet. Where 80 feet did not cover an individual work zone, or its associated riparian area, the edge of the Action Area was extended to encompass the entire area of potential impact. While the SF Umatilla is likely wider in some areas and narrow in others, an 80-foot buffer is sufficiently accurate to make a size estimate. Given this method, the Action Area includes 61.8 acres, although the area of actual ground disturbance is much smaller (see Chapter 1.3).

Figure 4-1: Project Action Area



Chapter 5.0 Effects Analysis

"Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (50 CFR §402.17)."

These effects are considered along with the environmental baseline and the predicted cumulative effects to determine the overall effects to the species for purposes of preparing a biological opinion on the proposed action. (50 CFR §402.02)

Direct effects are the direct or immediate effects (both adverse and beneficial) of the Project on the species or its habitat.

Indirect effects (also known as delayed consequences) are those that are caused by or will result from the proposed action and are later in time but are still reasonably certain to occur.

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the Action Area; future Federal actions that are unrelated to the proposed action are not considered because they require separate consultation. Known future Federal actions that may affect the same Action Area are also considered.

5.1 Direct Effects

5.1.1 Bull trout and DCH

The Action Area is too warm for Bull trout during the normal work window, and they are therefore not expected to be present during Project construction. During extensive electrofishing in 2012, no Bull trout were found in Buck, Spring, Shimmiehorn, and North Fork Meacham creeks or in the SF Umatilla River; and in fact, the only fish species collected were *O. mykiss* and sculpins, both at low densities (Sankovich and Anglin, 2013). The sampling locations in the SF Umatilla were all upstream of the Action Area in locations more likely to contain Bull trout. Although the most summer water temperatures preclude Bull trout from being present and recent sampling has not confirmed the presence of Bull trout. Summer water temperatures preclude the presence of Bull trout in the Action Area, and therefore there will be no direct effects on Bull trout. However, Bull trout could be present during cooler periods of the year when they would encounter the stream bed and banks that have been altered by the Project. These potential effects are discussed in Section 5.2.

5.1.1.1 Critical habitat

Because there is no DCH for Bull trout in the Project Area, and because the Action Area does not extend downstream into Bull trout critical habitat, there will be no direct effect to Bull trout DCH.

5.1.2 MCR steelhead and DCH

During the in-water work periods, steelhead eggs are not expected to be present in the Action Area. Likewise, no adult steelhead are expected due to high water temperatures and life history timing. Therefore, the direct effects will be restricted to any rearing juvenile steelhead that are present in the Action Area. Although water temperatures in the SF Umatilla River are above the range preferred by juvenile MCR steelhead, some juveniles may be present during in-water work, especially if the Action Area receives groundwater upwelling or hyporheic flow, creating discontinuous cool-water refugia.

Therefore, a few MCR steelhead juveniles could experience direct effects, and the Project will adversely affect steelhead DCH in the Action Area. Conservation measures protective of rearing juveniles will be implemented, and these measures are expected to also be protective of other fish species present during in-water work. Potential effects to MCR steelhead and DCH include the following construction-related activities and changes to existing conditions:

- Fish salvage;
- Direct disturbance from construction activities;
- Physical habitat alteration;
- Effects to the food web;
- Construction noise;
- Water quality effects:
    - Increases in turbidity and suspended sediments;
    - Contamination of surface waters due to hazardous materials releases; and
- Impediments to fish passage

5.1.2.1 Fish salvage

Prior to initiation of construction, the construction zones will be isolated with block nets and/or “fish tight” turbidity curtains. Following isolation, any fish present within the construction zone will be removed. Specific methods for work area isolation are included in Appendix B and will be further refined in a Work Area Isolation and Fish Passage Plan to be completed prior to in-water construction by the Contractor. Consequently, the only potential direct take of MCR steelhead during salvage would be in the form of harassment or harm associated with electrofishing or other removal operations. Fish that are captured and transferred can experience trauma if care is not taken in the transfer process. The primary contributing factors to stress and death from handling are:

1) water temperature differences between the river and holding buckets;
2) dissolved oxygen conditions;

3) the amount of time that fish are held out of the water; and

4) physical trauma (from capture and handling).

Stress from handling increases rapidly if water temperature exceeds 15°C (59°F), or if dissolved oxygen is below saturation. All conditions of the Fish Salvage Plan will be diligently followed. Due to typically low water during the in-water work window, it is not anticipated that dewatering will be required to effectively salvage fish. Therefore, the potential effects typically associated with dewatering, such as turbid water discharging back to the stream, will not occur.

If fish are missed during the salvage operations, they would likely suffer harm or mortality from in-water work. The number of fish missed during the salvage operations will be minimized by following protocols designed to optimize removal efficiency for all conditions expected to be encountered in the Action Area. Conservation methods and BMPs to minimize harassment during fish salvage are presented below.

There are no records of fish salvage in the SF Umatilla in the NOAA/ODFW Authorizations and Permits for Protected Species on-line database (Authorizations and Permits for Protected Species (APPS) - Home< (noaa.gov), accessed 4/26/2022) and Bill Dowdy, fisheries biologist with the Umatilla National Forest also could not locate records of fish salvage. Information requests for fish sampling or salvage data from Trevor McCroskey with ODFW went unanswered. Josh Hanson, former ODFW District Fish Biologist, told DOWL that steelhead would likely be uncommon in the Action Area during the summer. He provided DOWL with steelhead redd survey data, but he could not locate any sampling or salvage data for the applicable stretch of the SF Umatilla.

The most recent density data available is 20 years old. Based on CTUIR electrofishing (see Section 2.2.1.1), densities ranged widely in the late 1990s and early 2000s with between 4.0 and 32.9 juvenile steelhead per 100 m^2. Permanent and temporary impacts will occur over a total of 2.81 acres of the SF Umatilla River (11,372 m^2). Based on the CTUIR sampling data, there could be between 454 and 3,741 steelhead present in construction zones.

However, accurately estimating the amount of take due to fish salvage is impossible because of the large number of variables and unknowns, including the patchiness of fish distribution (both geographic and temporal), the volume of water present at the time of construction, and the variable stream morphology throughout the Action Area. Due to typically high water temperatures, steelhead densities are expected to be low.

Conservation measures

Implementation of the Fish Salvage Plan (to be completed prior to Project construction) and the observance of BMPs, will minimize the negative impacts to individual fish and should limit “take” to harassment, avoiding mortality. In water activity (setting turbidity curtains, etc.) will likely cause most of the fish to move out of inwater construction areas on their own. Once the area is isolated on three sides, seines will be used to “herd” fish from the inwater work zones prior to complete isolation. This should leave a fraction of the fish within the work zones to be salvaged. Impacts to individual fish will be small and impacts to the DPS as a whole will be biologically insignificant. Fish salvage will not impact critical habitat or the Environmental Baseline.

5.1.2.1 Direct disturbance from construction activities

Construction zones below the OHW line of the SF Umatilla will be isolated to the extent possible (as described above), and this will directly affect any MCR steelhead present in the work zones. These effects will include harassment and possible direct harm from construction equipment and the associated temporary noise, vibration, and turbidity. While all available minimization measures will be employed, construction equipment will at the very least need to encroach on the active channel, and may need to completely cross the channel to complete construction. For instance, in areas where complete channel movement is required, excavators could first dig the new channels leaving "dams" of natural sediment at either end.

Conservation measures

All in-water construction will take place during the IWWP, minimizing effects to listed fish. All in-water work zones will be isolated when possible, and the area of work "in the wet" will be kept to the smallest possible footprint. Channel crossings will be kept to the absolute minimum. Given expected water temperatures during the IWWP, very few, if any, MCR steelhead area expected to be present.

5.1.2.2 Physical Habitat Alteration

The physical alteration of in-stream habitat will have both direct and indirect effects. While direct "take" from habitat alteration will be limited through isolation of the work area and fish salvage (as discussed above), the physical disturbance of instream habitat has the potential to impact the substrate and natural cover PBFs of critical habitat as well as numerous existing conditions, including: substrate, LWM, pool frequency and quality, presence of off-channel habitat and refugia, the width-depth ratio, and disturbance history. In their studies of two Alberta Streams, Brown et al. (2002) found that the most significant negative impacts to fish from instream construction had to do with alterations of instream morphology. They found that within pipeline construction rights-of-way, significant habitat diversity was lost. Stream width decreased, while stream depth and substrate composition post-construction had been simplified and were homogeneous across the entire width of the channel. Without careful planning, instream construction can alter or eliminate deep pools or undercut banks.

Reconstruction of FS 32 will change in-stream morphology and will lead to increased turbidity and sediment loading (discussed below). Instream morphology will be changed significantly. The thalweg and stream channel will be shifted at MP 1.96, 2.02, 3.08 and 3.53; all of the in-water work zones will alter stream morphology. Road reconstruction and excavation of the stream channel will fill or eliminate at least one large pool and one side channel. While these impacts are potentially serious, they will be avoided, minimized, and mitigated for in the Action Area through avoidance of sensitive areas as much as possible and through conscientious design and reconstruction of instream habitat.

Conservation measures

With proper channel reconstruction techniques, changes to the instream morphology will be primarily short term (only during active construction). Lateral migration of the river to the west where the road occupied, and is being rebuilt, is limited by bedrock and the canyon wall. The goal for the Project will be to return the banks and channels to pre-flood damage conditions with improved bank roughness and floodplain development. The SF Umatilla has a shortage of LWM and few pools. The installation of LWM will provide refugia for ESA-listed fish, and contribute to channel forming processes that should form and maintain pools and more diverse instream habitat over time. Overall, instream habitat alteration will be minimized through, careful project design, construction BMPs, and channel and bank restoration.

5.1.2.3 Effects to the food web

Benthic macroinvertebrates comprise an important component in the diet of juvenile salmonids. Many of the benthic invertebrates within the Action Area will suffer mortality during in-water work. In addition, increased turbidity and sedimentation downstream of in-water work zones are likely to negatively affect benthic invertebrates through alteration of water quality and substrate conditions. Benthic macroinvertebrates within the in-water work zones and areas immediately downstream are expected to recover following construction. Organisms that occur in the drift such as mayflies, caddisflies, and midge larvae are usually the first colonizers (Reid et al 2002). Full recovery of benthic invertebrate communities usually requires six months to a year after instream construction (Tsui and McCart, 1981; Young and Mackie, 1991; Vinikour and Schubert, 1987; Anderson et al, 1998). Due to the relatively small footprint of each in-water work zone that will be affected and the ability of juvenile salmonids to utilize other food resources (e.g., planktonic organisms and terrestrial insects) during the summer months. Few, if any, measurable effects on the growth or survival of listed juvenile salmonids are anticipated due to effects on forage in the Action Area.

Conservation measures

Conservation measures to avoid, minimize or mitigate negative effects to the food web include construction timing, restricting the extent of in-water work zone to the maximum extent possible, and construction BMPs.

5.1.2.4 Construction Noise

In-water work will generate increased vibration and sound. Most of the sound will be caused by removal and placement of riprap below the waterline. While MCR steelhead individuals may be exposed to vibration and elevated sound, we expect those exposures to be low-intensity and intermittent, and thus will not measurably affect normal steelhead behaviors (i.e., the ability to successfully feed, move, and/or shelter). Increased sound will also be short-term and episodic (rather than chronic throughout the construction period). Therefore, it is expected that construction noise will have no measurable effects on steelhead individuals, their prey base, or habitat. Therefore, these effects are considered discountable, and no conservation measures are warranted.

5.1.2.5 Water Quality Effects

Increased Turbidity and Sediment Loading

Salmon evolved in systems that experience both episodic increases in turbidity (such as from floods) and longer-term high turbidity (such as from glacial outwash and naturally turbid estuaries). Nonetheless, increased turbidity and sediment loading can result in multiple negative effects to salmonids, depending on its severity. Negative effects can include the siltation of gravel streambeds, embedding of spawning gravels, suffocation of embryos in the substrate, filling of pool habitat, reduction in benthic macroinvertebrate prey organisms, and alterations in the behavior of juvenile salmonids. Moderate to high levels of suspended sediments and turbidity can reduce salmonid feeding efficiency, clog gill rakers, and erode gill filaments (Bruton, 1985; Gregory, 1993). Salmon exposed to increased turbidity may experience physiological stress and reduced growth. Temporary stream turbidity caused by instream disturbance could make salmonids more vulnerable to predation, entrapment, displacement, or other stressors (Bash, et. al. 2001). In addition, episodic increases in turbidity may force salmonids into less favorable habitats with fewer resources. Dislocation from preferred habitats may reduce growth and expose ESA-listed juvenile fish to additional hazards, such as predators. Episodic increases in turbidity are expected to be intermittent and short-term in duration. While the work isolation structures are in place, construction activities are not expected to degrade water quality of SF Umatilla River because the work area will be isolated from the flowing waters of the river. However, during the installation and removal of the isolation structures a short term ‘pulse’ of turbidity is anticipated.

At moderate levels, turbidity has the potential to reduce primary and secondary productivity; at higher levels, turbidity may interfere with feeding and may injure and even kill both juvenile and adult fish (Berg and Northcote 1985; Spence et al. 1996). However, Bjornn and Reiser (1991) found that adult and larger juvenile salmonids appear to be little affected by the high concentrations of suspended sediments that may be experienced during storm and snowmelt runoff episodes.

Exposure duration is a critical determinant of the physical or behavioral turbidity effects on salmonids (Newcombe and Jensen 1996). Research indicates that chronic exposure can cause physiological stress responses that can increase maintenance energy and reduce feeding and growth (Servizi and Martens 1991). In a review of 80 published reports of fish responses to suspended sediment in streams and estuaries, Newcombe and Jensen (1996) documented increasing severity of ill effects with increases in dose (concentration multiplied by exposure duration).

The potential for erosion, sedimentation, and increased turbidity to adversely affect waterbodies and fish exists during all stages of construction in and around waterbodies; not just during in-water work. Clearing and grading of streambanks will result in exposed soils and an increased risk of runoff into waterways. While road repairs and streambank stabilization would stop the current ongoing erosion of the unstable road base and streambank that are currently creating elevated sediment inputs and potentially increasing substrate embeddedness downstream of the Project site in the Action Area, construction itself will increase turbidity in the short term.

The potential for erosion, sedimentation, and increased turbidity during upland construction activities, such as clearing of staging areas, alterations of banks above OHW, and road construction and rehabilitation, will be avoided or minimized to an insignificant level through construction BMPs. Turbidity will be a performance-based contract requirement that will ensure compliance with state water quality standards at all times. The USFS Stormwater Pollution Prevention Plan, Including Erosion Prevention Plan, Spill Prevention, Control and Countermeasures Plan, (to be developed prior to construction) should effectively eliminate the risk of erosion, sedimentation, and increased turbidity to waterbodies from upland construction.

Therefore, the primary sources of sediment and turbidity during construction will be associated with the following in-water activities:

- landslide debris removal;
- bank stabilization and reconstruction; and
- work "in the wet" when reconfiguring the channel away from FS 32.

The effects of each of these actions will be reduced through construction BMPs, but release of some sediments to the water, and the resultant increase in turbidity is unavoidable during in-water construction.

The turbidity generated by the Project will likely be episodic rather than chronic but determining the actual effect of increased turbidity and suspended sediments on fish is complicated by several factors. The impact of turbidity and suspended sediments is not only related to the turbidity levels or TSS concentrations but also to the particle size of the suspended sediments, physical/chemical properties of the sediments, water temperature, and life stage of the fish.

Based on the available published information, it is reasonable to assume that significant increases above background turbidity levels could extend from the worksite to approximately 100 to 300 feet downstream, primarily as isolated peaks during the most active periods of in-water construction. As stated in Chapter 5.1, in previous consultations on similar projects, the Services have generally accepted that turbidity effects are likely to extend downstream 300 to 500 feet (USFWS 2021a, 2021b, NMFS 2020, NMFS 2022).

To err on the side of caution, we have conservatively included areas 760 feet downstream in the Action Area. Because the majority of the in-water work area will be isolated from the flowing channel (except for minor effects during work area isolation, etc.), and erosion control measures will be implemented during construction, very little sediment is expected to be released from the Project site. As the work area isolation barrier is removed and water is returned to the channel, some residual sediment release associated with substrate disturbance is likely to occur. This impact will be localized and temporary and is expected to last minutes to hours, settling quickly in the expected low flows.

Should juvenile steelhead be present during in-water work (which is unlikely given summer water temperatures) increased turbidity in the Action Area will cause temporary behavioral changes that include changes in feeding and movement of fish within turbidity plumes (Berg and Northcote 1985). However, we do not expect any fish to be injured or killed by exposure to turbidity caused by this action. Localized elevations in turbidity associated with covered activities are not expected to result in mortality or to have any significant physiological effects on threatened or endangered salmonids, their habitat, or their prey resources

Conservation measures

Conservation measures and BMPs to will be implemented to address fine sediment and embeddedness concerns associated with Project implementation. Turbidity will be monitored in accordance with a Section 401 water quality permit. If any violations of permit conditions are noted, the contractor will stop work and implement/modify best management practices (BMPs) until plumes are reduced.

Additional conservation measures include work area isolation and avoidance of spawning periods through construction timing. Heavy equipment will operate from the road and side of the riverbank that the road. The streambank will be pulled back and reshaped, and slide materials will be disposed of in upland areas where runoff will not affect streams or will be reused as roadway fill. Riprap will be compacted upon installation, which will trap the majority of particles in the interspaces between larger angular particles of riprap. Work "in the wet" will be minimized to the extent possible.

5.1.2.6 Hazardous Materials Releases

Releases of diesel fuel, lubricants, hydraulic fluid, and other contaminants contained in construction equipment could potentially result in acute negative impacts to fish, invertebrates, and instream habitat. In addition, long-term effects could result if a spill were not properly remediated. The only potential sources of contaminants in the Action Area will be the construction equipment itself (lubricating oils and fuel). Construction staging will be on the FS 32 Road.

Conservation Measures

Because of the close proximity of the staged heavy equipment to the river, secondary containment measures will be implemented for fueling and maintenance of equipment. All equipment that works over the river, or below the OHWM, will contain vegetable oil or other biodegradable alternative to hydraulic fluid. Through implementation of the SPCC Plan and other conservation measures, no detrimental effects to listed salmonids are expected from hazardous materials releases.

5.1.2.7 Impediments to movement

Instream work will temporarily interfere with upstream and downstream fish passage. However, fish passage will be maintained during construction within the natural channel, as the work area isolation barriers will not extend across the entire width of the channel. Further, the duration of in-water work at any one of the construction locations will be a maximum of three days, reducing the potential impacts, and will not occur 24 hours a day. Following cessation of construction for the day, fish would be able to move freely into and out of the construction zone, aside from any areas of instream isolation. Therefore, individual MCR steelhead, and the DPS as a whole, are not expected to be negatively affected by restrictions on movement.

Conservation Measures

The in-water work zones will be kept as small as possible so that fish will have use of the maximum amount of habitat practicable.

5.2 Indirect Effects

Indirect Effects (also known as delayed consequences) are those that occur later in time, but still have the potential to affect ESA-listed species. Indirect effects will affect both MCR steelhead, and any Bull trout that access the Action Area during colder periods of the year. Potential delayed consequences of the Project include:

- Effects from in-stream habitat alteration including increased sedimentation, scour, and channel migration;
- Effects of clearing of, and construction in, the riparian zone, including increased sediment inputs, increased water temperatures, and reduction in large woody debris recruitment; and
- Effects associated with renewed access (due to re-establishment of a functional road)

5.2.1 Instream Habitat Alterations

In addition to the immediate effects from construction, the alteration of instream habitat will also have long-term effects, including:

- Lingering effects of increased turbidity;
- The potential for increased sedimentation from bank erosion and the initial inundation of the work zone; and
- Long-term habitat alteration.

5.2.1.1 Increased sedimentation

Following Project construction, FS 32 will be repaired and operational. The existence of the road could lead to future sedimentation in the near-term from re-watering of disturbed sediments during the first high water event, and in the long term from flood-related erosion. Construction practice will require the "washing down" of installed sediment within the AOP culvert at MP 2.54; however, the initial flow through the replaced culvert will likely deliver a pulse of sediment, though significantly reduced, to the SF Umatilla River.

After an extensive literature review, Anderson (1996) stated, "based on all of the information available, it is anticipated that minor accumulations of surficially deposited sediments downstream of instream construction would normally be removed by the stream during normal, high flow events such as large spate or spring freshet. Larger accumulations of surficial sediments, especially coarse-grained sand slugs [not likely in the Action Area], may require larger flood events, but in most cases should be removed within a year in areas which experience a spring freshet."

It is expected that natural river processes will clear fine sediments before the first spawning occurs the following fall and winter. However, in the unlikely event that some sedimentation persists, female salmonids are very effective at cleaning fine sediment from their redds. Therefore, any lingering effects of high turbidity, including sedimentation, are expected to be biologically insignificant. Given that the purpose of the Project is to protect the road from future erosion, the Project should reduce the potential for future scour and channel migration.

Conservation measures

Erosion, sedimentation and increased turbidity following in-water and upland construction activities with proper streambank restoration, armoring, and the institution of construction BMPs is not expected to occur. The Project is designed to stop the current ongoing erosion of the unstable road base and streambank that are currently increasing sediment loads and potentially increasing substrate embeddedness within and downstream of the Action Area. Conservation measures include proper project design, the timing of in-water work, and construction BMPs.

FS 32 has been an on-going source of negative effects to ESA-listed fish, primarily due to periodic sediment and turbidity inputs from floods and corresponding road failure. The Project has been designed to protect the FS 32 from a flood with a one-percent chance of occurring in any given year (a “one-hundred-year flood”). The flood of 2020 was nearly the magnitude of a predicted 100-year flood and was the largest flood on record – with 25 percent greater discharge at Umatilla than the previous maximum flood in 1949. While climate change may increase the frequency and magnitude of flooding, the degree and timing of those effects are impossible to predict. Therefore, this Project will have long-term benefits over the existing environmental baseline, and the baseline that existed prior to the road being washed out.

5.2.1.2 Changes to stream morphology

The road repair and streambank stabilization activities covered in this proposed action would increase bank armoring with riprap, but would also restore or approximate streambank, channel cross-sectional area, road and drainage conditions, channel morphology dimensions, and habitat characteristics as they existed prior to flooding in 2020. Installation of LWM will increase channel complexity, and while primarily designed to protect the road from future damage, may also provide a net benefit to rearing and migrating salmonids.

When returned to their pre-2020 dimensions, channel and habitat characteristics would likely persist during any floods of similar duration and magnitude. The upper bank reshaping and revegetation; the proposed riprap size classes, volumes, and placement; and LWM jam configurations and anchoring are designed specifically to avoid losses of streambank and road base from future floods.

Bank armoring with riprap is not a benign erosion control solution and can lead to negative instream effects. Riprap can preclude the establishment of riparian vegetation and provides cover for salmonid predators. However, the climate and soils at the Project site are not especially conducive to the establishment of herbaceous riparian vegetation, and the SF Umatilla is not known to contain predators on juvenile salmonids (aside from other salmonids).

Conservation measures

The installation of LWM is both a design element, and a conservation measure. LWM provides refuge for juvenile and adult fish at a wide range of river flows; it creates pools for juvenile fish and hydraulic complexity and roughness along the riverbank; it provides food sources and habitat for aquatic insects and wildlife along shorelines; and helps stabilize shorelines and reduce excessive erosion.

Following Project completion, bank armoring will increase. However, habitats in the Action Area were largely uniform with few pools, LWM, or undercut banks. Following construction, bank stability, habitat complexity, refugia, and possibly food resources will increase in the Action Area. Riprap will be utilized over as small a footprint as possible, and riparian areas will be planted where feasible. Plantings will be clumped in areas where sediment deposition will occur and areas where a growing medium (soil/compost) can be established and retained over time.

In addition to the above, passage during high water will be improved as a consequence of culvert replacement at MP 2.54. A former CMP culvert will be replaced with an AOP culvert. This will improve fish passage, natural sediment transport and aquatic habitat conditions over the Environmental Baseline.

5.2.2 Increased Access

Repairing FS 32 will restore access to currently inaccessible wilderness areas. Increased human access could lead to habitat degradation and increased water pollution, as well as additional negative impacts from both legal and illegal use. Improved access may increase the amount of off-road driving to collect firewood, camp, hike, and retrieve game. Road construction and maintenance activities contribute to the movement of non-native invasive species along road shoulders and ditches, and into previously inaccessible areas.

Restoring access to currently inaccessible areas is not a "new" effect, as access was previously possible prior to the 2020 flood. As such, the existence of FS 32 has already been included in the Environmental Baseline, and therefore no additional negative effects (above background) are anticipated.

5.2.3 Climate Change

While climate change is expected to have profound effects on salmonid species, it is not currently possible to accurately predict future, or assign current effects of gradual global climate change on a specific species or location. The Project will reopen access to wilderness areas that have been inaccessible since the flood. This will increase vehicle trips into the Umatilla National Forest, leading to an increase in fossil fuel use. However, it is unknown whether this will be a net increase or simply a redistribution of vehicle trips that would have occurred elsewhere had access not been reestablished. Maintenance of the road will preclude the establishment of riparian vegetation, which will maintain the current solar exposure, potentially worsening climate change derived increases in stream temperature. However, this increase in thermal loading is expected to have a *de minimus* effect on stream temperature. Overall, the Project will have no measurable effect on climate change.

5.3 Effects on the Environmental Baseline

The effects on the environmental baseline are summarized in tables 5-1 and 5-2. Comments on the potential Project impacts to the environmental baseline are provided in Table 5-3.

Table 5-1. Current environmental baseline and the potential effects of the project on the baseline (steelhead).

Pathways Indicators	Environmental Baseline			Project Effects		
	Properly functioning	**At Risk**	**Not properly functioning**	**Restore**	**Maintain**	**Degrade**
Water Quality						
Temperature			X		X	
Sediment		X				X
Contamination/Nutrients	X				X	
Habitat Access						
Physical Barriers		X			X	
Habitat Elements						
Substrate	X				X	
LWM	X			X		
Pool Frequency			X	X		
Pool Quality		X			X	
Off-channel habitat		X			X	
Refugia		X		X		
Channel Condition						
Width/depth ratio	X				X	
Streambank condition			X	X		
Flows/Hydrology						
Peak/base flows	X				X	
Drainage Network Incr.	X				X	
Watershed conditions						
Road density		X			X	
Disturbance history		X				X
Riparian reserves	X				X	

Table 5-2. Current environmental baseline and the potential effects of the Project on the baseline (Bull trout).

Pathways Indicators	Environmental Baseline			Project Effects		
	Functioning Appropriately	Functioning at Risk	Functioning at Unacceptable Risk	Restore	Maintain	Degrade
Subpopulation characteristics within subpopulations watersheds						
Subpopulation Size			X		X	
Growth and Survival			X		X	
Life History Diversity and Isolation			X		X	
Persistence and genetic Integrity			X		X	
Water Quality						
Temperature			X		X	
Sediment		X				X
Contamination/Nutrients	X				X	
Habitat Access						
Physical Barriers			X		X	
Habitat Elements						
Substrate embeddedness	X					X
LWM	X			X		
Pool Frequency and Quality	X			X		
Large pools		X			X	
Off-channel habitat		X			X	
Refugia			X	X		
Channel Condition						
Width/depth ratio	X				X	
Streambank condition			X	X		
Floodplain connectivity		X			X	
Flows/Hydrology						
Peak/base flows	X				X	
Drainage Network Incr.	X				X	
Watershed conditions						
Road density		X			X	
Disturbance history		X				X
Riparian Habitat Conservation Areas (RHCA - PACFISH and INFISH)		X			X	
Habitat Summary						
Habitat Conditions			X		X	

Table 5-3. Effects of the Project on the Environmental Baseline

Pathways: Indicators	**Comments**
Water Quality	
Water Temperature	No effect.
Sediment/Turbidity	Construction will cause short-term increases in turbidity. However, the number of MCR steelhead in the Action Area during the in-water work period is expected to be very low. No Bull trout are expected in the Action Area during in-water work.
Contamination/Nutrients	The Project is not expected to negatively affect the nutrient/contaminant load.
Habitat access	
Physical Barriers	Movement will be restricted to part of the stream channel during in-water work. However, the Project will not eliminate salmonid access for any period of time and therefore no change is anticipated.
Habitat elements	
Substrate	There will be no negative effects in substrate composition, quality or availability long term.
Large Woody Material	Because very few trees will be removed, there should be no effect to LWM recruitment. The installation of LWM will be a long-term benefit to instream habitat.
Pool Frequency/Quality	No negative effects anticipated.
Off-channel habitat	One side-channel formed by the flood will be affected.
Refugia	The Project will increase refugia.
Channel conditions	
Width/Depth Ratio	The Project will have no effect on W/D ratio long-term.
Streambank Condition	Much of the streambank will be recontoured and stabilized. In some areas, the streambank will be armored with riprap and LWM.
Floodplain Connectivity	The floodplain connectivity will be unaffected.
Flows/Hydrology	
Change in Peak/Base Flow	No effects are anticipated.
Increase in Drainage Network	No effects are anticipated.
Watershed conditions	
Road Density and Location	No effects are anticipated.
Disturbance History	The site will be further disturbed during construction. Construction and repair of FS 32 is an on-going disturbance.
Riparian Reserves	The riparian reserves in the Action Area will be unaffected by the proposed action.

5.4 Effects on Critical Habitat

In assessing effects on Critical Habitat, the Services must determine if a proposed action will result in the *destruction or adverse modification* of critical habitat. Destruction or adverse modification means a “direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species” (50 CFR 402.02).

5.4.1 Bull trout

Bull trout DCH does not occur in the Action Area and Project effects are not expected to extend downstream into Bull trout DCH. Therefore, the Project will have ***no effect*** on Bull trout DCH.

5.4.2 Steelhead

The PBFs for steelhead critical habitat in the Action Area include: water quantity, water quality, substrate, forage, natural cover, and free passage.

1) Water quantity: The Project will not affect water quantity for any life stage of MCR steelhead.

2) Water quality: The Project will cause short-term decreases in water quality due to construction-derived turbidity. In the long term, water quality should be improved, at least marginally, by eliminating on-going sediment inputs from flood-damaged banks and landslides. Effects to water quality are discussed in detail in Chapter 5.1.

3) Substrate: The Project may cause short-term increases in fine sediment deposition downstream of in-water work zones. However, there will be long-term improvement from reductions in streambank erosion and chronic sediment inputs from an unstable streambank. Effects to substrate are detailed in Chapters 5.1 and 5.2.

4) Forage: The Project may reduce forage in the Action Area short term. However, invertebrate communities are expected to recolonize and reestablish to background levels in less than one year. Affects to the forage base are discussed in Chapter 5.1.

5) Natural cover: The Project will increase natural cover through the installation of LWM.

6) Free passage: The Project will hinder free passage during instream work but will have no effect on passage long-term.

5.5 Cumulative Effects

Cumulative impacts are "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the Action Area of the Federal Action subject to consultation" (50 CFR Part 402.02). A standard of "reasonably certain to occur" is clarified as "those actions that are likely to occur, bearing in mind the economic, administrative, or legal hurdles which remain to be cleared". Further, NMFS provides that "speculative actions that are factored into the cumulative effects analysis add needless complexity into the consultation process…" (51 FR 19933). Actions that are reasonably certain to occur could be defined as those that have been discussed and planned at the local jurisdiction level, or projects that have applied for permits. Previous consultations have been conducted with the Services regarding road repair in the Umatilla National Forest, but there are currently no future state or private actions that are reasonably certain to occur within the Action Area. Furthermore, because the Action Area, and nearly all of the watershed, occur on Federal Lands, significant State or Private actions in the subwatershed are extremely unlikely.

5.6 Relevance of Effects on Individual Fish to Salmonid Population Viability

Any instream project affects individual fish. And while a given activity may harass, injure, or kill individual fish, it may still have no measurable effect to the status or viability of a DPS. Viable Salmonid Populations (VSPs) have sufficient abundance, productivity (population growth rate), spatial structure, and diversity. The same viability analysis is not used for Bull trout. Nonetheless, the Project is not expected to affect Abundance, Productivity, Spatial Structure, or Diversity of Bull trout.

5.6.1 Abundance

The only Project component that is likely to lead to direct or indirect mortality is fish salvage from inwater work zones. As outlined in Section 5.1.2.1, historic density data showed that given the size of the inwater work zones, between 454 and 3,741 (with an average of 2,137) juvenile steelhead could be present in the inwater work zones prior to construction. This estimate is speculative at best given the age of the data and the changes that have occurred in the intervening years. The average is likely an overestimate, given that water temperatures have increased since the most recent sampling in 2002 and juvenile steelhead tend to concentrate in pools, which are rare in the Action Area. In addition, exclusion activities, and "herding" fish out of the inwater work zones with seines should cause the majority of those fish present to voluntarily leave before isolation is complete. Assuming 20 percent remain and are subject to salvage, and ten percent of those suffer mortality, due to the effects of fish salvage and in-water work (a high mortality percentage unlikely to be reached with proper salvage technique), the proposed action would kill 43 juvenile MCR steelhead. The most recent data available, for the 2016 brood year, shows a smolt-to-adult return (SAR) of 2.7 percent, which was less than half the long-term average (Hanson et al., 2020 [the long-term average was referenced, but not provided]). If we assume SAR for the fish affected by the Project is equal to a long-term average of approximately 6.0 percent (a very conservative assumption), killing 43 juveniles would be expected to reduce returns of adult steelhead to the basin by between two and three fish.

This loss is not expected to appreciably alter the abundance of the Umatilla River population or appreciably affect population trends. Altered behavior from temporary increases in turbidity is not expected to reduce returns of adult steelhead to the basin, nor affect population trends.

5.6.2 Productivity.

The proposed action will have a very small effect on freshwater productivity by leading to the injury or death of a few juvenile steelhead during in-water work and fish salvage. However, the scale of impact is so small that it will not appreciably affect species productivity.

5.6.3 Spatial Structure.

The proposed action will not affect spatial structure.

5.6.4 Diversity

The proposed action will not affect genetic or life-history diversity.

Chapter 6.0 Effect Determinations

The purpose of a BA is to determine the effects of the proposed action on ESA-listed species and critical habitat. The USFWS and NMFS have published guidelines for making determinations of effect for listed species and critical habitats protected under the federal ESA.

For species, a determination of ***"no effect"*** is the appropriate conclusion when "the proposed action will not affect (i.e. harm or harass) listed species or critical habitat." "Harm" is an act that actually injures or kills listed species (50 CFR § 17.3). "Harassment" is defined as an "intentional or negligent act or omission which creates the likelihood of injury to listed species by annoying it to such an extent as to **significantly** disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering" (50 CFR § 17.3).

A determination of ***"is not likely to adversely affect"*** is "the appropriate conclusion when effects on listed species or critical habitats are expected to be discountable, or insignificant, or completely beneficial." The guidelines offer further clarification indicating that; "***insignificant effects"*** relate to the size of impact and should never reach the scale where take occurs. ***Discountable effects*** are those extremely unlikely to occur. Based on best judgment, a person would not (1) be able to <u>meaningfully measure, detect, or evaluate insignificant effects</u>; or (2) expect discountable effects to occur."

A ***"likely to adversely affect"*** determination is "the appropriate conclusion if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, <u>and the effect is not: discountable, insignificant, or beneficial</u>" (NMFS 1996, USFWS and NMFS 1998).

For critical habitat, "***Destruction or adverse modification*** means a direct or indirect alteration that **appreciably diminishes** the value of critical habitat as a whole for the conservation of a listed species."

In accordance with policy and regulation, a destruction or adverse modification determination relies on the following components:

1) The *Status of Critical Habitat*, which describes the range-wide condition of the DCH in terms of essential habitat features, primary constituent elements (PCEs), or physical and biological features (PBFs) that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of the DCH as a whole for the conservation/recovery of the listed species.

2) The *Environmental Baseline*, which refers to the current condition of DCH in the Action Area absent the consequences to DCH caused by the proposed action, the factors responsible for that condition, and the conservation value of CH in the Action Area for the conservation and/or recovery of the listed species.

3) The *Effects of the Action*, which represent all consequences to DCH that are reasonably certain to be caused by the proposed action, including the consequences of other activities that

are caused by the proposed action, and how those impacts are likely to influence the conservation value of the affected CH.

4) *Cumulative Effects,* which represent the consequences to DCH of future, non-federal activities that are reasonably certain to occur in the Action Area and how those impacts are likely to influence the conservation value of the affected DCH.

For purposes of making the destruction or adverse modification determination, the Services evaluate whether the consequences of the proposed federal action on DCH, taken together with cumulative effects, when added to the current range-wide condition of DCH, are likely to impair or preclude the capacity of DCH as a whole to serve its intended function for the conservation of the listed species. The key to making this finding is clearly establishing the role of DCH in the Action Area relative to the value of CH as a whole, and how the effects of the proposed action, taken together with cumulative effects, are likely to alter that role.

6.1 MCR steelhead

After evaluating the potential effects and available scientific and commercial data, we conclude that the proposed action is ***likely to adversely affect*** MCR steelhead.

A determination of *"likely to adversely affect"* is the appropriate conclusion since the potential Project effects cannot be classified as "discountable, insignificant, or beneficial" (NMFS 1996, USFWS and NMFS 1998). The potential Project effects can't be termed "insignificant" since insignificant effects are defined as "effects that should never reach the scale where take occurs" (*ibid*). Under the ESA definition, "take" includes both harm and harassment (50 CFR § 17.3). Because a few rearing or migrating juveniles may be present during the in-water work period, take in the form of harassment from increased turbidity levels and fish salvage could occur. However, no significant long-term adverse impacts (months to years) that would affect the survival and/or recovery of any listed salmonids that utilize the Project Action Area are anticipated.

6.2 CR Bull trout

Although there are no recent records of Bull trout presence in the SF Umatilla (there has been no documented spawning of Bull trout in the SF Umatilla since 1996, and extensive electrofishing surveys in 2012 identified no Bull trout in the Buck Creek-South Fork Umatilla Watershed [Sankovich and Anglin, 2013]), dispersing or migrating Bull trout could be present in the Action Area in cooler parts of the year, when they would encounter habitat alterations resulting from the Project. Given this potential for seasonal presence of Bull trout, the Project ***May Affect, but is Not Likely to Adversely Affect*** Columbia River Bull trout.

6.3 Effects determination for Designated Critical Habitat

6.3.1 MCR Steelhead

Following the implementation of conservation measures, no significant indirect, cumulative, interrelated or interdependent effects on listed salmonids or their critical habitats were identified within the proposed Project Action Area. However, the Project will alter stream morphology long-term and negatively affect substrate, water quality, and forage PBFs in the short term. Therefore, the Project is ***likely to adversely affect*** MCR steelhead DCH. The adverse effects are not expected to result in the *"destruction or adverse modification"* of designated critical habitat. The Project will remove a source of fine sediments, which could degrade spawning habitat for MCR steelhead, and by increasing stream complexity and refugia through the installation of LWM.

6.3.2 CR Bull trout

Because CR Bull trout DCH does not exist at the Project Site, and because Project effects will not extend downstream into CR Bull trout DCH, the Project will **not** result in the "*destruction or adverse modification*" of Bull trout DCH.

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Appendix A. Essential Fish Habitat

Chapter A-1.0 Essential Fish Habitat

A.1.1 Introduction to the MSA

The Magnuson-Stevens Act (MSA) requires proposed projects with a federal nexus to evaluate their impacts on habitat of commercially managed fish populations. EFH has been defined for the purposes of the MSA as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). NMFS has further added the following interpretations to clarify this definition:

- "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate;
- "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities;
- "Necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and
- "Spawning, breeding, feeding, or growth to maturity" covers the full life cycle of a species (50 CFR § 600.10).

The analysis of the effects provided below regarding the proposed Project is made pursuant to Section 305(b)(2) of the MSA. Under this act, Federal agencies are required to consult with NMFS regarding any of their actions authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken that may "adversely affect" EFH. "Adverse effect" means any impact that reduces the quality and/or quantity of EFH, which can include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR § 600.810).

Cumulative impacts are incremental impacts, occurring within a watershed or marine ecosystem context, which may result from individually minor but collectively significant actions. The assessment of cumulative impacts is intended in a generic sense to examine actions occurring within the watershed or marine ecosystem that adversely affects the ecological structure or function of EFH. The assessment should specifically consider the habitat variables that control or limit a managed species' use of a habitat. It should also consider the effects of all impacts that affect either the quantity or quality of EFH (50 CFR § 600.815).

For any Federal action that may adversely affect EFH (except those activities covered by a General Concurrence), federal agencies must provide NMFS with a written assessment of the effects of that action on EFH. EFH consultations can be completed using the ESA Section 7 consultation process provided that the action agency supplies the information required by 50 CFR § 600.920 (NMFS 2001).

An EFH assessment must contain:

1. A description of the proposed action;

2. An analysis of the effects, including cumulative effects, of the proposed action on EFH, the managed species, and associated species, such as major prey species, including affected life history stages;

3. The Federal agency's views regarding the effects of the action on EFH; and

4. Proposed mitigation, if applicable (50 CFR § 600.920).

The earlier sections of this document present a detailed description of the proposed Project and all potential impacts to species listed as threatened or endangered under the ESA. In broad terms, the effects and conservation measures discussed in earlier sections of this report in relation to MCR steelhead are also applicable to the species covered under the MSA. The following section presents an identification of EFH within the Project Action Area, an analysis of effects, and a determination of these effects on EFH.

A1.2 Identification of EFH

A1.2.1 Coastal Pelagic Fish Species

The Coastal Pelagic Fishery includes four finfish species [Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), northern anchovy (*Engraulis mordax*), and jack mackerel (*Trachurus symmetricus*)] and the invertebrate, market squid (*Logigo opalescens*) (NMFS 1998). All of these species are restricted to marine and saline estuarine waters and do not occur in the Action Area.

A1.2.2 West Coast Groundfish

The West Coast Groundfish Fisheries Management Plan (FMP) manages 83 species over a large and ecologically diverse area. The EFH for Pacific coast groundfish is defined as the aquatic habitat necessary to allow for groundfish production to support long-term sustainable fisheries for groundfish and for groundfish contributions to a healthy ecosystem. The boundaries for West Coast groundfish EFH are generally defined as all waters from the mean higher high water line, and the upriver extent of saltwater intrusion (>0.5 parts per thousand [ppt] salinity) in river mouths along the coasts of Washington, Oregon and California seaward to the boundary of the U.S. EEZ (64 FR 49092). West Coast Groundfish are nearly all obligate marine species. While starry flounder do occasionally enter, and can spend significant time in fresh water, the Action Area is located far upstream of known starry flounder habitat. No West Coast groundfish species occur in the Action Area.

A1.2.3 Pacific Coast Salmon

In September 2000, NMFS approved the Pacific Fishery Management Council's Amendment 14 to the Pacific Coast Salmon Plan. Appendix A to Amendment 14 defines freshwater EFH for Chinook salmon and Coho salmon as including all streams, lakes, ponds, wetlands, tributaries and other water bodies currently viable and most of the habitat historically accessible to these species in Washington, Oregon, and California within specific hydrologic units. The EFH final rule designates Watershed 17070103 – Umatilla, as Essential Fish Habitat, except for areas of McKay Creek upstream of McKay dam (70 FR 75449 and https://www.habitat.noaa.gov/apps/efhmapper/?page=page_4 Accessed 11/30/2022).

Streamnet indicates that the SF Umatilla River does not currently provide habitat for Chinook or Coho salmon, but the North Fork and mainstem Umatilla River just downstream of the Action Area both provide spawning and rearing habitat for Spring Chinook (Streamnet, 2022).

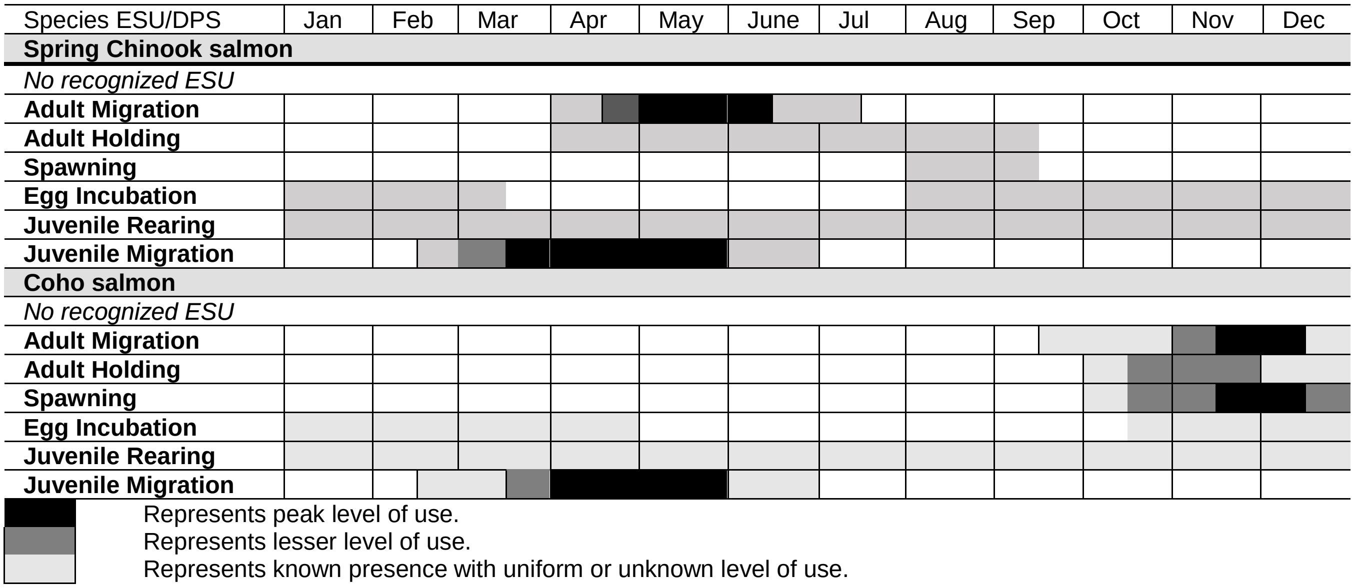
Coho salmon do not currently access areas in the Umatilla River much upstream of its confluence with Meachem Creek (over ten river miles downstream of the Action Area). Although they do not currently utilize the SF Umatilla River, potential seasonal usage of the Action Area by Chinook and Coho is illustrated on Table A1.3-1 (ODFW, 2022). Native Spring Chinook and Coho were extirpated from the Umatilla Basin early in the 20th century. Current naturally produced Chinook are offspring of out-of-basin hatchery stock reintroduced to the Umatilla River beginning in 1986. Currently naturally produced Coho in the basin are offspring of hatchery stock released from 1966 to 1968, and again beginning in 1987 (NWPCC 2004). Hatchery releases are on-going. The most recent Hatchery and Genetic Management plans proposed to release 660,000 smolts annually at Umatilla River Mile 79.5 (mouth of Meacham Creek) and 1 million Coho smolts annually at Umatilla RM 56 (ODFW 2010a and b). Furthermore, the Confederated Tribes of the Umatilla Indian Reservation brought a new hatchery online in 2021, with the goal of releasing up to half-a-million additional smolts into the river system each year beginning in 2022.

A1.3 EFH Effects Analysis

A1.3.1 Direct Effects

The EFH for Coho and Chinook salmon consists of the water and substrate within the Project Action Area. MCR steelhead, Coho and spring Chinook use very similar habitats for spawning, rearing and migration. There are some differences in, the degree of utilization of rearing habitats; timing of life stages; and preferences for substrate size and water depth at spawning sites. However, these different habitat preferences are not so dissimilar as to be affected differently by the potential Project effects. Therefore, the findings for MCR steelhead regarding potential effects are also applicable to spring Chinook and Coho salmon EFH. Direct effects to MCR steelhead are described in Chapter 5.1 above, and would be essentially identical to direct effects on Coho and Spring Chinook, should any Coho or spring Chinook be present during in-water work. Although the timing of use by Spring Chinook and Coho overlaps the in-water work period (see the Table below), Spring Chinook and Coho are not known to use the SF Umatilla River.

Timing of EFH Species and Life Stages in the Action Area



A1.3.2 Indirect and Cumulative Effects

Potential indirect and cumulative effects of the proposed Project on MCR steelhead were discussed in the BA (Chapters 5.2 and 5.3). The indirect effects, as discussed, are the same for MCR steelhead DCH and Coho and Spring Chinook EFH.

Cumulative effects associated with the proposed actions are unlikely to affect EFH. Any cumulative or indirect impacts associated with other projects planned in the vicinity of the Project area would be required to comply with existing or emerging development standards required to protect habitat for fish species. These standards are intended to protect water quality, hydrologic conditions, stream habitat conditions, riparian buffers, and wetlands.

A1.4 EFH Effects Determination

As with the effects to MCR steelhead, the potential direct, indirect, and cumulative effects of the proposed Project are "***likely to adversely affect***" identified EFH in the short-term for the Project Action Area evaluated, based on consideration of the EFH requirements of the CPS fishery, West Coast groundfish fishery, and the Pacific Coast salmon fishery. No adverse long-term effects on EFH are anticipated. It is expected that the conservation measures described in the BA are also applicable to EFH and would satisfy the requirements pursuant to Section 305(b)(4)(A) of the MSA.

A1.5 References

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Appendix B. Construction Plans and Specifications

Appendix C. IPAC database search

Appendix D. Other Species Potentially Affected

Chapter D.1 Species Potentially Present

Numerous sources were consulted to compile a list of sensitive species, species of concern, and species on Regional Forester's lists. The individual sources included:

- Oregon Biodiversity Information Center (ORBIC)
- USFWS Information for Planning and Consultation (IPaC) website and database search (attached below)
- USFWS District fish and wildlife biologists (Bill Dowdy and Holly Harris)
- USFWS Birds of Management Concern database
- USFWS Birds of Conservation Concern
- Regional Forester's lists obtained directly from the Umatilla National Forest

A Biological Evaluation has been prepared under separate cover that identifies which of these species are potentially present in the Project Area, and assess the likelihood of Project effects to those species. One Candidate for ESA listing was identified: Monarch butterfly.

D1.1 Monarch Butterfly

D1.1.1 Status of Species

Monarch butterflies (*Danaus plexippus*) are a candidate species for listing under the ESA. Candidate species are those for which the USFWS has enough information to warrant proposing them for listing as endangered or threatened, but have not yet been proposed for listing. In December 2020, the USFWS announced a 12-month finding on a petition to list the monarch butterfly as a threatened species. They found that listing the butterfly as endangered or threatened is warranted but precluded by higher priority actions (USFWS 2020a). With this decision, the monarch butterfly became a candidate for listing under the Endangered Species Act, and its status will be reviewed each year until it is no longer a candidate (USFWS 2020b). It was assigned a listing priority number of eight, indicating that the magnitude of threats is moderate to low, and those threats are imminent (USFWS 2020a).

Monarch butterflies are found in about 90 countries, islands, or island groups around the world. Two long-distance migratory monarch populations occur in North America and are thought to be the ancestral origin of the worldwide population; the largest is east of the continental divide and overwinters in the mountains of central Mexico (USFWS 2020a). Monarchs west of the continental divide overwinter primarily along coastal California. Other populations (including the southern Florida population) do not migrate long distances (USFWS 2020a).

Over the past 20 years, annual censuses have shown a general decline in the populations of North American monarchs overwintering in Mexico and California (USFWS 2020a). It is estimated that the eastern population fell from about 384 million in 1996 to a low of 14 million in 2013; the population in 2019 was about 60 million (USFWS 2020b). The western population declined from about 1.2 million in 1997 to fewer than 30,000 in 2019 (USFWS 2020b).

D1.2 Life History Information and Use of the Action Area

The monarch (*Danaus plexippus*) is a large butterfly with orange and black wings. The upper surfaces of the forewing and hindwing have black or dark brown veins outlining an orange background, with two rows of white and whitish-yellow spots at the margins. Monarchs lay their eggs exclusively on milkweed, the sole source of food for monarch caterpillars (USFWS 2020a). Adult monarch butterflies feed on nectar from flowers. The migratory North American populations migrate up to thousands of miles to and from overwintering and breeding areas each year (USFWS 2020b).

Monarch butterflies are found throughout Oregon, but require milkweed (*Asclepias spp*.) for reproduction. Two milkwood species are known to occur in Umatilla County: the narrow-leaved milkweed (*Asclepias fascicularis*) and showy milkweed (*Asclepias speciosa*), both of which are found in dry to moist soil in meadows, fields, roadsides, open woods, and along waterways (Xerces Society et al., 2012). While the action area does include roadsides and waterways, no milkwood was observed during a site visit on July 18 and 19. Given their unlikely presence in the Project and Action Areas, the Project is not likely to adversely affect Monarch butterflies.

D1.3 References

U.S. Fish and Wildlife Service. 2020a. Monarch (*Danaus plexippus*) Species Status Assessment Report. V2.1 96 pp + appendices.

U.S. Fish and Wildlife Service. 2020b. Endangered and Threatened Wildlife and Plants; 12-Month Finding for the Monarch Butterfly. 85 FR 81813

Xerces Society, Monarch Joint Venture, and Natural Resources Conservation Service. 2012. A guide to the native milkweeds of Oregon. Xerces Society, 9pp.

Appendix E. Detailed BMPs

Direct disturbance during construction will be avoided and minimized using the following actions and BMPs.

E1.1 Universal erosion controls

The USFS will establish and maintain erosion controls during the duration of construction. Temporary erosion controls will be in place before any significant alteration of the Action Area. Proposed temporary erosion controls include:

1) Clearly mark and protect critical riparian vegetation areas, wetlands, and other sensitive sites to minimize ground disturbance;
2) Designate staging areas to store and service:
   a) hazardous materials or fuel;
   b) heavy equipment, vehicles, and other power equipment with tanks larger than 5 gallons;
   c) topsoil, and native channel material displaced by construction; and
   d) other supplies and equipment necessary for construction or site restoration.
3) Locate staging areas the following distances from any natural waterbody or wetland:
   a. For sites with no topographic constraints, place staging area 150 feet or more from any natural water body or wetland;
   b. For sites with topographic constraints, such as constricted valleys, place staging area away from any natural water body or wetland to the greatest extent possible;
   c. Regardless of topography, all staging areas and equipment will be stored above the bankfull elevation and protected as necessary to prevent any leak, spill, or other contaminant from being deposited in the floodplain or stream; and
   d. Place temporary erosion controls around any area where significant levels of sediment may enter the stream directly, or through road ditches, e.g., fiber wattles, silt fences, jute matting, wood fiber mulch and soil binder, or geotextiles and geosynthetic fabric.
4) Remove sediment from erosion controls if it reaches 1/3 of the exposed height of the control
5) Whenever surface water is present, maintain a supply of sediment control materials and an oil-absorbing floating boom at the Project site.
6) Complete earthwork in wetlands, riparian areas, and stream channels as quickly as possible.
7) Stabilize all disturbed soils following any break in work unless construction will resume within four days.
8) If the above precautions are insufficient and eroded sediment appears likely to be deposited in the stream during construction, additional sediment barriers will be installed as necessary, and soil may be stabilized using wood fiber mulch and tackifier as needed (provided the materials are free of noxious weeds and nontoxic to aquatic and terrestrial animals, soil microorganisms, and vegetation);
9) Remove temporary erosion controls after construction is complete and the site is fully stabilized; and
10) Cease Project operations whenever high flows may inundate the Project area, except for efforts to avoid or minimize resource damage.

E.1.1.1 Heavy Equipment Use

Select, operate, and maintain all heavy equipment, vehicles, and power tools to minimize adverse effects to the environment. For example, use minimally-sized, low pressure tires, minimal hard turn paths for tracked vehicles, and temporary mats or plates to protect wet areas or sensitive soils.

Specifically:

1) Ensure that all equipment used for instream work is inspected and cleaned each day before leaving the staging area, and as often as necessary during operations, to ensure that it is free of petroleum accumulations, dirt, and plant material. "Equipment" includes large machinery, stationary power equipment (e.g., generators), and gas-powered equipment with tanks larger than five gallons;
2) Store and fuel equipment in staging areas after daily use;
3) Operate heavy equipment from the top of the bank, unless work instream would result in less damage to the aquatic ecosystem; and,
4) Minimize time in which heavy equipment is in wetlands, riparian areas, or stream channels by completing earthwork (e.g., compacting, drilling, excavation, grading, land filling, stockpiling of dirt or fill) as quickly as possible.

E.1.2 Temporary Access Roads and Stream Crossings

1) Whenever reasonable, use existing access roads and paths instead of creating new, temporary access;
2) Do not build temporary access roads or paths where grade, soil, or other features suggest slope instability;
3) Any road on a slope steeper than 30% will be designed by a civil engineer with experience in steep road design;
4) Minimize the number and length of temporary access roads and paths through riparian areas and floodplains;
5) When it is necessary to remove vegetation, cut at ground level without grubbing.
6) After Project completion, abandon/obliterate temporary stream crossings and restore stream channel and banks by:
    a) De-compacting road surfaces and drainage areas, pulling fill material onto the running surface, reshaping former roadway and streambank to match the original contours, and revegetating the area.
    b) Abandon/obliterate temporary roads and paths in wet areas or areas prone to by the end of the in-water work window.

E.1.2.1 Dust Abatement

1) Use dust abatement measures commensurate with soil type, and equipment use, wind conditions, and the effects of other erosion control measures;
2) Do not use petroleum-based products;
3) Do not apply dust-abatement chemicals, *e.g.*, magnesium chloride, calcium chloride salts, lignin sulfonate, within 25 feet of a water body, or in other area where they may runoff into a wetland or water body;
4) Do not apply dust-abatement chemicals within 24 hours of predicted rain;

5) Do not apply lignin sulfonate at rates exceeding 0.5 gallons per square yard of road surface, assuming a 50:50 solution of lignin sulfonate to water. Sequence and schedule work to reduce the exposure of bare soil to wind erosion;
6) Maintain spill containment supplies on-site whenever dust abatement chemical are applied; and
7) Treat all discharge water to remove debris, sediment, and petroleum products.

<u>E1.2.2 Road Maintenance</u>

1) Install, maintain, repair, or replace road drainage features, such as ditch lines, water dips or bars, cross drain culverts and non-fish bearing stream crossing culverts as follows:
    a) Minimize disturbance of existing vegetation in ditches and at stream crossings. Leave grass in the ditch if the ditch is properly functioning to minimize exposed soil and transport to fish-bearing streams;
    b) Do not remove vegetation in drainage ditches that discharge within one quarter mile of listed fish-bearing streams unless an effective sediment trap is installed and maintained until the vegetation is re-established; and
    c) Do not place sediment removed from drainage ditches onto the surface of any road that is hydrologically connected to a stream or wetland. Remove and place this material in a stable site which is not hydrologically connected to any stream or wetland.
2) Completely excavate and move all overburden (road fill material) to a suitable stockpiling area. Employ suitable erosion control measures (*e.g.*, tarping, silt fences, hay bales) to ensure that the stockpiled material does not erode into streams or wetland in the event of precipitation. After replacing a culvert, move any excess overburden material to a stable site away from riparian areas and floodplains;
3) Road cut and fill repair or stabilization.
    a) The following streambank stabilization methods may be used individually or in combination where needed to prevent scouring or down cutting of an existing culvert, road foundation, or bridge support due to storm damage:
        i) Log or roughened rock toe;
        ii) Vegetated riprap with large wood (vegetated riprap with large wood may only be used as necessary to prevent failure of a culvert, road or bridge foundation);
        iii) Partially-spanning porous weir;
        iv) Woody plantings;
        v) Herbaceous cover, in areas where the native vegetation does not include trees or shrubs;
        vi) Bank reshaping and slope grading;
        vii) Coir logs;
        viii) Deformable soil reinforcement;
        ix) Engineered log jams;
        x) Floodplain flow spreaders; and/or
        xi) Floodplain roughness.
4) Vegetated riprap with large wood will be installed as follows:
        i) When present, use natural hard points, such as large, stable trees or rock outcrops, to begin or end the toe of the revetment;
        ii) Develop rock size gradations for elevation zones on the bank, especially if the rock will extend above ordinary high water – place the largest rock at the toe of the slope, while small rock can be used higher in the bank where the shear stress is generally lower, most

upper bank areas will not require the use of any rock but can depend on the vegetation for erosion protection;

iii) In bank areas above OHW where rock is still deemed necessary, mix rock with soil to provide a better growing medium for plants;
iv) Develop an irregular toe and bank line to increase roughness and habitat value;
v) Use large, irregular rock to create large interstitial spaces and small alcoves to create planting spaces and habitat to mitigate for flood-refuge impacts – do not use geotextile fabrics as filter behind the riprap whenever possible, if a filter is necessary to prevent sapping, use a graduated gravel filter;
vi) Place large boulders in the channel to create roughness and pool habitat;
vii) Include large wood as an integral component to create roughness, pools and cover. Wood used will be intact, hard and undecayed to partly decaying with untrimmed root wads;
viii) Plant woody vegetation in the joints between the rocks to restore streambank vegetation;
ix) Use terracing and leave, restore, or enhance habitat features on the upper bank;
x) When possible, create or enhance a vegetated riparian buffer;

5) Small slide removal:
   a) Dispose of slide and waste material in stable, non-floodplain sites approved by a geotechnical engineer or other qualified individual. Use stable sites beyond floodplain within riparian areas only if an interdisciplinary process has identified the area as stable and not susceptible to delivery to the adjacent stream. Provide erosion control to minimize sediment delivery to streams.

E.1.2.3 Site Restoration

Site restoration is a final step in the construction sequence to return the site, as much as possible, to its pre-construction condition. Steps used to achieve site restoration include:

1) Begin to rehabilitate all disturbed areas to achieve similar or better than pre-work conditions by removing project related waste, spreading of stockpiled materials (e.g., soil, LW, trees) seeding, or planting with local native seed mixes or plants;
2) Decompact soil by scarifying the soil surface of roads and paths, stream crossings, staging, and stockpile areas so that seeds and plantings can root.
3) Within three days of completing construction, provide short-term stabilization measures as needed to minimize post-construction erosion, e.g., use of non-native sterile seed mix (when native seeds are not available), weed-free certified straw, jute matting, and other similar techniques;
   a) Maintain any short-term stabilization measures until permanent erosion control measures are effective.
4) Replant each area requiring revegetation before or at the beginning of the first growing season following construction.
5) Achieve re-establishment of vegetation in disturbed areas to at least 70% of pre-Project levels within three years.

a) Use an appropriate mix of species that will achieve establishment and erosion control objectives, preferably forb, grass, shrub, or tree species native to the Project area or region and appropriate to the site.[1]
b) Install barriers as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

E1.3 In=water work

E1.3.1 Timing

In-water work will occur during an In-water Work Period (IWWP) to be determined through consultation with ODFW. Project proponents will request an IWWP from July 1 to September 30 (as opposed to the approved IWWP of July 1 to August 15).

1. During construction, extensions or exceptions to the Oregon recommended IWWPs may be requested if work cannot be completed during the recommended work window.
2. If such an extension request needs to be made, NMFS will be contacted as soon as it appears likely that an extension or exception will be requested. The following information will be provided with the extension request
    a. dates for the applicable in-water work window;
    b. reason the Project cannot be completed during the approved period;
    c. a description of exactly which actions are proposed to occur to occur outside the approved period with sufficient details to allow NMFS to analyze the effects of the proposed activity;
    d. the location, timing, and duration for each action proposed to occur outside the approved period;
    e. present and historic water levels for the affected area;
    f. weather forecast;
    g. fish presence, timing, and use of the affected area;
    h. an assessment of any additional adverse impacts for listed species or their habitats;
    i. any management practices proposed to avoid or minimize additional adverse impacts to listed species and their habitats, including site monitoring;
    j. a contingency plan to avoid or minimize resource damage if the Action Area is inundated by precipitation or high streamflow including, if necessary, a plan to cease work and stabilize the site until work can resume during the next approved work period.

[1] NMFS recommends riparian planting guidance from the USFS as described in the Regional letter to Units, Use of Native and Nonnative Plants on National Forests and Grasslands May 2006 (Final Draft), and or BLM Instruction Memorandum No. OR-2001-014, Policy on the Use of Native Species Plant Material.

E1,4 Work Area Isolation

Isolate any work area within the wetted channel 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. The in-water work zone will be isolated according to the following criteria:

1) Engineering design plans for work area isolation will include all isolation elements and fish release areas;
2) Design the in-water work zone isolation area to leave the maximum amount of stream channel accessible to fish passage;
3) Leave the work area isolation in place for the shortest duration possible;
4) Monitor nets daily to ensure they remain effective for the duration of the instream work;
5) Dewater the shortest linear extent of work area practicable, unless wetted instream work is deemed to be minimally harmful to fish and is beneficial to other aquatic species;[2] and
6) Remove isolation block nets after construction has been completed to fully restore fish passage.

E.1.4.1 Fish Capture and Release

Capture and release of fish that may be present in the work area as follows:

1. If practicable, allow listed fish species to migrate out of the work area; otherwise remove fish from the exclusion area as described below, and prevent their return to the exclusion area with block nets.
2. A qualified fisheries biologist, with experience in work area isolation and competent to ensure the safe handling of all fish, will supervise any project requiring work area isolation.
3. Conduct fish capture activities during periods of the day with the coolest air and water temperatures possible, normally early in the morning to minimize stress and injury of species present.
4. Monitor the nets frequently enough to ensure they stay secured to the banks and free of organic accumulation.
5. Electrofishing may only be used after other means of fish capture are determined to be not feasible or ineffective, and will be carried out as follows:
    a. Never electrofish when:
    b. (i) in the vicinity of spawning fish or active redds;
    c. (ii) the water appears turbid so that objects are not visible at depth of 12 inches; or,
    (iii) water temperatures are above 18º C. or are expected to rise above 18ºC before concluding the fish capture.
    d. Do not intentionally contact fish with the anode.
    e. Follow NMFS (2000) electrofishing guidelines, including use of only direct current (DC) or pulsed direct current within the following ranges:
        (i) If conductivity is less than 100 MicroSiemens (µs), use 900 to 1100 volts.
        (ii) If conductivity is between 100 and 300 µs, use 500 to 800 volts.
        (iii) If conductivity greater than 300 µs, use less than 400 volts.

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[2] NMFS recommends following these instructions to dewater areas occupied by lamprey, see *Best management practices to minimize adverse effects to Pacific lamprey* (*Entosphenus tridentatus*) (USFWS 2010).

f. Begin electrofishing with a minimum pulse width and recommended voltage, then gradually increase to the point where fish are immobilized.

g. Immediately discontinue electrofishing if fish are killed or injured, *i.e.*, dark bands visible on the body, spinal deformations, significant de-scaling, torpid or inability to maintain upright attitude after sufficient recovery time. Recheck machine settings, water temperature and conductivity, and adjust or postpone procedures as necessary to reduce injuries.

6. If buckets are used to transport fish:
   a. Minimize the time fish are in a transport bucket.
   b. Keep buckets in shaded areas or, if no shade is available, covered by a canopy.
   c. Limit the number of fish within a bucket; fish will be of relatively comparable size to minimize predation.
   d. Use aerators or replace the water in the buckets at least every 15 minutes with cold clear water.
   e. Release fish in an area upstream with adequate cover and flow refuge; downstream is acceptable provided the release site is below the influence of construction.
   f. Be careful to avoid mortality counting errors.
7. Monitor and record fish presence, handling, and injury during all phases of fish capture and submit a fish capture and release report to the Level 1 team within 60 days of completing capture and release operations.

E1.4.2 Fish screens

The work isolation area must have fish screens, block nets, of fish-tight silt curtains above and below the work area. The mesh size of the fish screens must be small enough to block passage of the smallest fish expected to be present.

When pumps are necessary for dewatering, they must be equipped with a fish screen that conforms to NMFS fish screen criteria (NMFS 2011). NMFS criteria for fish screens include:

1) Design and Construction
   a) Circular Mesh Screens:
      i) openings must not exceed 3/32 inch in diameter. Perforated plate must be smooth to the touch with openings punched through in the direction of approaching flow.
   b) Slotted Screens:
      i) Slotted screen face openings must not exceed 1.75 mm (approximately 1/16 inch) in the narrow direction.
   c) Square Mesh Screens:
      i) Square screen face openings must not exceed 3/32 inch on a diagonal.
   d) Regardless of screen shape or construction, the screen material must be corrosion resistant and sufficiently durable to maintain a smooth uniform surface for the duration of its use.
   e) Other Components:
      i) Other components of the screen facility (such as seals) must not include gaps greater than the maximum screen opening defined above.
   f) Unobstructed Screen Area: The percent open area for any screen material must be at least 27%
   g) No single pump may withdraw more than 3 cfs.

2) Placement
   a) If multiple pumps are used that draw >3 cfs, place pumps so that a single point of attraction flow does not occur.
   b) End of pipe screens must be placed in locations with sufficient ambient velocity to sweep away debris from the screen face, or designed in a manner to prevent debris re-impingement and provide for debris removal.
   c) End of pipe screens must be submerged to a depth of at least one screen radius below the minimum water surface, with a minimum of one screen radius clearance between screen surfaces and natural or constructed features. For approach velocity calculations, the entire submerged effective screen area may be used.
   d) A clear escape route should exist for fish that approach the intake volitionally or otherwise. For example, if a pump intake is located off of the river (such as in an intake lagoon), a conventional open channel screen should be placed in the intake channel or at the edge of the river to prevent fish from entering a lagoon.

E1.4.3 Unanticipated spills and releases

Before construction begins, the contractor will identify a point of contact who will be responsible for carrying out the following pollution and erosion control measures:

1) Listing and describing any hazardous material that is proposed to be used at the Project site, including procedures for:
   a) inventory, storage, handling, and monitoring;
   b) notification procedures;
   c) specific clean-up and disposal instructions for different products available on the site;
   d) proposed methods for disposal of spilled material; and
   e) employee training for spill containment.
2) Establishing procedures based on best management practices (BMPs) to confine, remove, and dispose of trash and hazardous materials generated, used, or stored on-site. These materials include by are not confined to: construction waste, every type of debris, discharge water, concrete, cement, grout, washout facility wastes, welding slag, and petroleum products.
3) Establishing procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities.
4) Ensuring that materials for emergency erosion and hazardous materials control are onsite at all times (*e.g.*, silt fence, straw bales, oil-absorbing floating boom).

Appendix F. WSDOT Fish Exclusion Protocols and Standards