UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Blvd., Suite 1100
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Refer to NMFS No.: WCRO-2022-00857

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February 17, 2023

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Nez Perce–Clearwater National Forests
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Lt. Col. ShaiLin KingSlack
U.S. Army Corps of Engineers
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Brenda Aguirre
Environmental Protection Specialist
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Portland, OR 97208-3621

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Reinitiation of the Crooked River Valley Rehabilitation Project, Crooked River, HUC 170603050302 (45.806786, -115.529237), Idaho County, Idaho, (WCR-2014-01389)

Dear Ms. Probert, Lt. Col. KingSlack, and Ms. Aguirre:

Thank you, Ms. Probert, for your letter of April 5, 2022, requesting reinitiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Crooked River Valley Rehabilitation Project. This Opinion also addresses the U.S. Army Corps of Engineers issuance of a permit under section 404 of the Clean Water Act (CWA) (33 U.S.C. 1251 et seq.). Funding for the project is provided by the Bonneville Power Administration, and the Nez Perce Tribe is the project sponsor.

Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)) for this action.

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the biological opinion (opinion) and incidental take statement would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

In this opinion, NMFS concludes that the action, as proposed, is not likely to jeopardize the continued existence of SRB steelhead (*Oncorhynchus mykiss*). NMFS also determined the action will not destroy or adversely modify its designated critical habitat. Rationale for our conclusions is provided in the attached opinion.

As required by section 7 of the ESA, NMFS provides an incidental take statement (ITS) with the opinion. The ITS describes reasonable and prudent measures (RPM) NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action. The take statement sets forth terms and conditions, including reporting requirements that the Nez Perce–Clearwater National Forest (NPCNF), the U.S. Army Corps of Engineers (COE), the Bonneville Power Association (BPA), and the Nez Perce Tribe (NPT) as project sponsor, must comply with in order to be exempt from the ESA take prohibition.

This document also includes the results of our analysis of the action's effects on EFH pursuant to section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act (MSA), and includes two EFH Conservation Recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. These Conservation Recommendations are similar, but not identical to the ESA terms and conditions. Section 305(b)(4)(B) of the MSA requires federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations. If the response is inconsistent with the EFH Conservation Recommendations, the NPCNF must explain why the recommendations will not be followed, including the justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many Conservation Recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, in your statutory reply to the EFH portion of this consultation, NMFS asks that you clearly identify the number of Conservation Recommendations accepted.

Please contact Jennifer Gatzke, Northern Snake River Branch, 208-596-2969, or at jennifer.gatzke@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Nancy L. Munn, Ph.D.
Acting Assistant Regional Administrator
Interior Columbia Basin Office

Enclosure

cc: K. Urbanek – COE
T. Peak – COE
W. Schrader – COE
M. Lopez – NPT
J. Harris - NPT
E. Grinde – NPCNF
C. Johnson-Hughes – USFWS
M. Dobos – IDFG

Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response

Reinitiation of the Crooked River Valley Rehabilitation Project

NMFS Consultation Number: WCRO-2022-00857

Action Agencies: USDA USFS Nez-Perce Clearwater Forest, U.S. Army Corps of Engineers Walla Walla District, Bonneville Power Administration

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely to Destroy or Adversely Modify Critical Habitat?
Snake River steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	Yes	No

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By: Nancy L Munn

Nancy L. Munn, Ph.D.
Acting Assistant Regional Administrator
Interior Columbia Basin Office

Date: February 17, 2023

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BA	Biological Assessment
BMP	Best Management Practice
BPA	Bonneville Power Administration
CFR	Code of Federal Regulations
CHaMP	Columbia Habitat Monitoring Program
COE	U.S. Army Corps of Engineers
Cu ft.	Cubic Feet
CWA	Clean Water Act
dB	Decibles
DPS	Distinct Population Segment
DQA	Data Quality Act
EFH	Essential Fish Habitat
ESA	Endangered Species Act
EPA	Environmental Protection Agency
ESU	Evolutionarily Significant Unit
FR	Federal Register
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
ICTRT	Interior Columbia Technical Recovery Team
ISAB	Independent Scientific Advisory Board
ITS	Incidental Take Statement
LWD	Large Woody Debris
MPG	Major Population Group
MSA	Magnuson–Stevens Fishery Conservation and Management Act
MWMT	Maximum Temperature and Maximum Weekly Maximum Temperature
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPCNF	Nez Perce–Clearwater National Forest
NPDES	National Pollutant Discharge Elimination System
NPT	Nez Perce Tribe
NTU	Nephelometric Turbidity Unit
Opinion	Biological Opinion
OHWM	Ordinary High-Water Mark
PAH	Polycyclic Aromatic Hydrocarbon
PBF	Physical or Biological Feature
PFMC	Pacific Fisheries Management Council
PCE	Primary Constituent Element
PAH	Polycyclic Aromatic Hydrocarbon
RPM	Reasonable and Prudent Measure
SFCR	South Fork Clearwater River

SRB	Snake River Basin
SFCR	South Fork Clearwater River
SWPPP	Storm Water Pollution Prevention Plan
TMDL	Total Max Daily Load
USGCRP	U.S. Global Change Research Program
TSS	Total Suspended Solids
VSP	Viable Salmonid Population

1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3, below.

1.1. Background

National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.), as amended, and implementing regulations at 50 CFR part 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson–Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR part 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within 2 weeks at the NOAA Library Institutional Repository (https://repository.library.noaa.gov/welcome). A complete record of this consultation is on file at the NMFS Snake River Office, Boise, Idaho.

1.2. Consultation History

On October 26, 2021, the Nez Perce–Clearwater National Forest (NPCNF) (lead action agency) and the Nez Perce Tribe (NPT) (project sponsor), began reinitiating consultation on the 2015 Crooked River Valley Rehabilitation Project (Project). The original project opinion (WCR-2014-01389) was published on June 17, 2015. During the summer of 2021, take specified in the 2015 opinion was exceeded for handling of steelhead during both salvage and increased turbidity. In addition, the NPCNF proposes modifications to the final phase of the project. Because of take exceedances and proposed project modifications, the NPCNF decided to request reinitiation of consultation.

On November 4, 2021, NMFS received a draft proposed action for reinitiation of consultation. Between November 4, 2021, and March 23, 2022, the NPT, NPCNF, and NMFS, through meetings, emails, and phone calls, refined the proposed action, including: revisions to best management practices (BMPs) and turbidity protocols, and addition of a rock weir. Additional information needed for consultation was also generated and shared, including: engineering drawings; updated baseline conditions; Snake River Basin (SRB) steelhead (*Oncorhynchus mykiss*) densities in the action area; and cumulative, species, and critical habitat effects analyses. Agreement on the proposed action for the reinitiation of consultation was reached in the March 23, 2022, Level 1 meeting. On April 5, 2022, NMFS received a request for consultation and final consultation package, including a Biological Assessment (BA) for the project. Consultation was initiated on April 8, 2022.

The NPCNF concluded the proposed action is "likely to adversely affect" the Snake River steelhead trout and its designated critical habitat. The NPCNF also concluded that EFH for Chinook and coho salmon, as designated by Section 305 of the Magnuson–Stevens Fishery Conservation and Management Act, is likely to be adversely affected.

1.3. Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (see 50 CFR 402.02). We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not. Under the MSA, "Federal action" means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal agency (see 50 CFR 600.910). We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not.

The NPCNF is the lead action agency for implementing the proposed action on Federal lands administered by the U.S. Forest Service (USFS). The U.S. Army Corps of Engineers (COE) will provide a Clean Water Act section 404 permit for the project. The project is funded by the Bonneville Power Administration. The Nez Perce Tribe is project sponsor.

The NPT and NPCNF propose construction of five large wood in-stream structures (1.3.3), construction of one rock weir (1.3.4), roughening 4.2 acres of floodplain (1.3.5), regrading 5 acres of floodplain (1.3.5), filling eight dredge ponds with local material (1.3.6; Figure 1), and riparian plantings along all disturbed sites (1.3.7). The project is located on the lower Crooked River, tributary to the South Fork Clearwater River (SFCR), approximately 6.5 miles downstream of Elk City, Idaho (Figure 1). Stream habitat was degraded by historic dredge mining activities. To increase anadromous and resident fish densities in the Crooked River, this project aims to complete the restoration of channel and floodplain functions, the riparian area, water quality, and fish habitat complexity for spawning and rearing.

1.3.1 Project Timing

The Project is located in the lower Crooked River, a tributary to the SFCR (Figure 1). The NPCNF proposes completing all work in 2023. All work below the ordinary high-water mark (OHWM) will occur during the in-water work window, July 15–August 15.

Figure 1. Plan view of the Crooked River Valley Rehabilitation Project. The Project is located on the Crooked River, tributary to the South Fork Clearwater River, approximately 6.5 miles downstream of Elk City, Idaho.

1.3.2 Pre-construction Activities

1.3.2.1 Staging

Staging will occur in a previously disturbed area adjacent to a campground near the upstream end of the project reach. This staging area is already disturbed and was used during previous phases of the Project.

1.3.2.2 Work Area Dewatering, Fish Salvage, and Rewatering

The project reach serves as rearing and migratory habitat for steelhead. Spawning has only been observed upstream from the reach. Work area dewatering and fish salvage will occur in approximately 7,275 square feet prior to installation of five log structures, installation of the rock weir, and filling eight dredge ponds with gravel (Table 1). Qualified personnel from the NPCNF and NPT, who are experienced with work area isolation and competent to ensure the safe handling of all fish, will supervise these activities. Dewatering, salvage, and rewatering will follow the BMPs listed in Section 1.3.8.3.

Table 1. Estimated area of fish salvage for each element of the Crooked River Valley Rehabilitation Project in 2023.

Element	Number of Elements	Salvage Area of Each Element (square feet)	Total Salvage Area (square feet)
Log Structures	5	375	1,875
Rock Weir	2	450	900
Dredge Ponds	8	(variable)	4,500
Total	15		7,275

1.3.2.3 Crooked River Isolations

Work area isolation and salvage will occur where large woody debris (LWD) structures and the rock weir are to be constructed. This will occur in a sequenced approach to minimize adverse effects to steelhead, and include the following:

- Block nets installed as needed and maintained in a secured position on the stream bottom and banks to exclude fish from entering any project areas.
- Fish herded out of work areas using seines or block nets.
- Cofferdams installed with heavy machinery operating from the streambank, to slowly dewater in-channel work areas to approximately 20 percent of their flow.
- Fish seined or dip-netted from deeper areas, followed by fish dip-netted from shallower areas.
- All areas electrofished according to NMFS electrofishing guidelines (NMFS 2000).
- Following salvage, in-channel work areas completely isolated with cofferdams.
- Work areas dewatered to the greatest extent possible.
- After construction, flow will slowly be returned to isolated areas.

The salvage supervisor will adjust the use, order, or duration of fish salvage methods to best clear the areas of fish while minimizing fish handling.

1.3.2.4 Dredge Pond Isolations

The dredge ponds that will be filled with local substrate are blocked and isolated from the Crooked River by tailings. Water will be slowly pumped from the dredge ponds and over the floodplain to filter sediment before it enters Crooked River. Fish in ponds will be salvaged by seining, and electrofishing.

1.3.3 Large Wood Structure Installation

Five LWD structures will be installed during the 2023 in-water work window. The woody debris structures will be constructed with large enough trees so they will remain in place with higher flows while protruding into or spanning the channel (2 times channel width without rootwad or 1.5 times channel width with rootwad). Two of the structures are designed to withstand a 100-year flood event and are tall enough to help capture wood. The other three structures are designed to withstand a 10- to 25-year flow event. For the largest structure, the streambank will be excavated to install the logs in a crib formation that will protrude into the river about 10–15 feet. The remaining four LWD structures will have excavation limited to 1 to 2 individual logs. Individual narrow trenches will be dug for installation of each log, followed by backfilling with local coarse materials. Approximately 360 cubic feet (cu ft.) of material will be excavated, using an excavator operating from the streambank, per log structure (1,800 cu ft. total). The excavated material will be used to backfill the log structures.

1.3.4 Rock Weir Installation

Fish passage in the action area has been impaired annually by public campground users creating recreational swimming pools. To provide fish passage for SRB steelhead at all life stages and flows, a rock weir will be constructed using large boulders, sized to withstand high spring flows. Machinery used may include an excavator, loader, haul truck, bulldozer, and/or hand machinery. Footer boulders will be partially buried in the channel and banks, with a second layer of boulders keyed in on top of the footer boulders (Figure 2). The weir will create a pool upstream of the weir. A low notch in the center of the weir will concentrate the river thalweg in the middle of the river.

Installation will occur in two sections, and disturb approximately 2,500 linear feet (1,250 feet on each side of the river) of streambank. The work area on one side of the river will be isolated using cofferdams (bladder coffer if bulk bags are not effective) placed using an excavator operating from the streambank. One half of the weir will be constructed using machinery such as an excavator, loader, haul truck, bulldozer, and/or hand machinery. Cofferdams will be removed and the work area slowly rewatered. After rewatering, the second half of the construction site on the opposite stream bank will be isolated using a cofferdam, the remainder of the weir constructed, the cofferdam removed, and the site slowly rewatered.

There is minimal streambank vegetation where the rock weir will be installed. Streambanks primarily consist of tailings piles. Disturbed stream banks will be replanted with native vegetation and allowed to rebuild naturally (see Section 1.3.7).

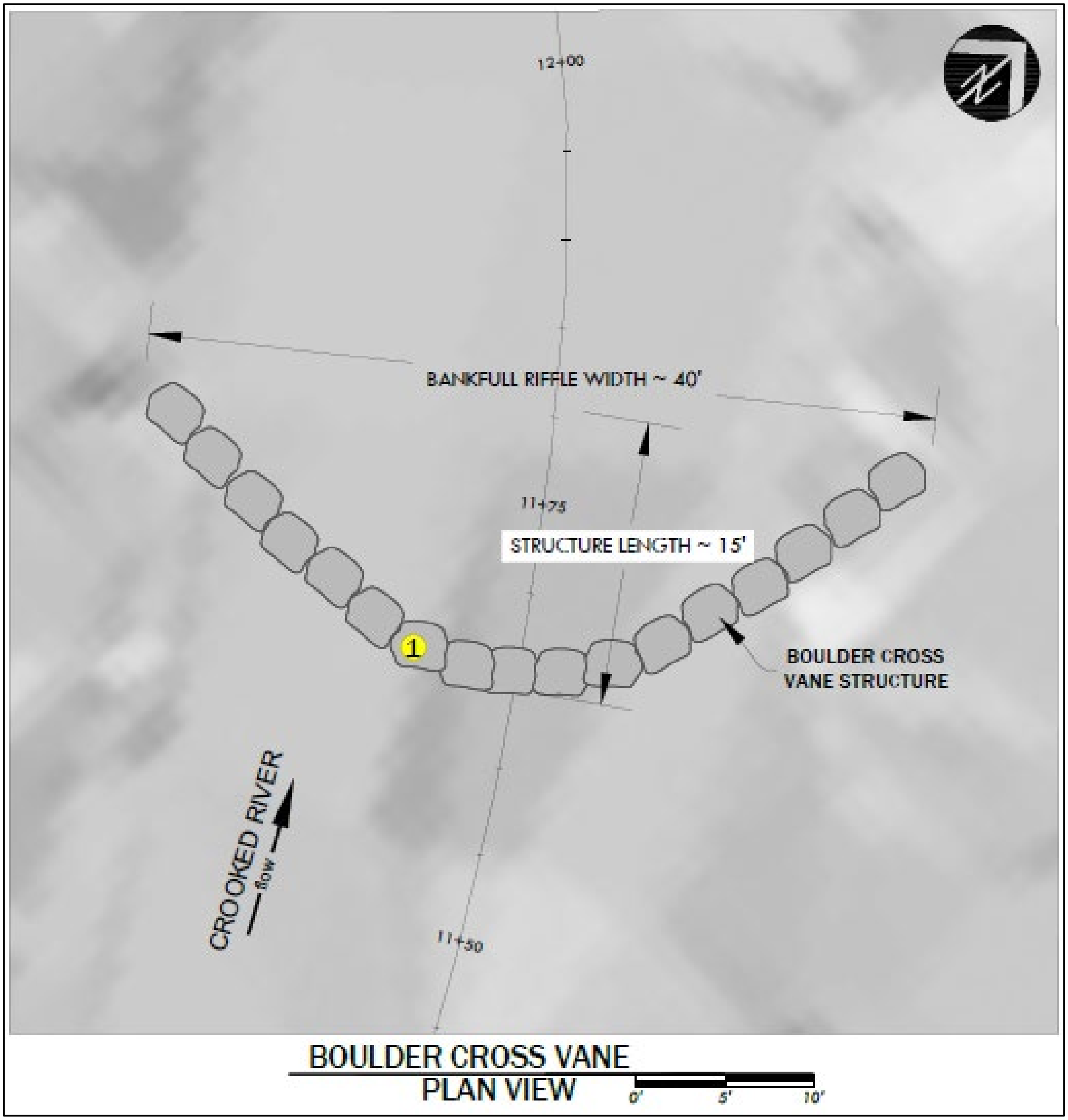

Figure 2. Plan view of the proposed rock weir for the Crooked River Valley Restoration Project. The river thalweg and low water fish passage are through the center of the weir.

1.3.5 Floodplain Roughening and Regrading

The floodplain will be roughened and regraded over the valley width to restore hydrologic processes and riparian areas. Construction will require use of an excavator, loader, haul truck, bulldozer, and hand machinery, operating from the floodplain and outside the active channel. Floodplain construction activities will include:

- Removing and salvaging 5 acres of existing shrub, tree, and sod materials and stockpile boulders, cobbles, gravels, sand, and soil.
- Re-grading up to 5 acres of floodplain (13,000 cubic yards) to create a floodplain (200–300 feet wide), inundated at a 1.1-year return interval, and an upland floodplain inundated at a 25-year recurrence interval.
- Constructing secondary floodplain features, including swales, depressions (filling in ponds), and wetlands to trap sediment and encourage natural recruitment of vegetation.
- Roughening 4.2 acres of floodplain by adding LWD and creating ridges, swales and furrows to trap sediment and encourage natural recruitment of vegetation, to help create stability and provide organic material in the floodplain, and to increase its water holding capacity.

1.3.6 Dredge Pond Filling

After fish salvage, eight dredge ponds will be filled with local native material (stockpiled from other activities) using an excavator operating from the floodplain (not in waterway). These pond features may become secondary floodplain features, such as shallow depressions with better access to the water table, and wetlands to trap sediment and encourage natural recruitment of vegetation.

1.3.7 Riparian Planting

All disturbed stream banks, depressions and swales, and uplands will be replanted with native salvaged plants, or plants grown in containers known as “container plants” (1- to 2-gallon). Approximately 1,500 native plants (total for this phase of the project), including natural grasses, alders, spruce, cottonwoods, water birch, and a variety of willows will be planted. Treatment of noxious weeds will occur as needed, following protocols in the Biological Opinion for Herbicide Treatment of Invasive and Noxious Weeds on the Nez Perce National Forest (NMFS 2009).

1.3.8 Best Management Practices

1.3.8.1 Staging

- Staging area (used for construction equipment storage, vehicle storage, fueling, servicing, and hazardous material storage) will be 150 feet or more from any natural water body or wetland, or on an adjacent, established road area in a location and manner that will preclude erosion into or contamination of the stream or floodplain.
- Native materials to be used for aquatic restoration, such as large wood and channel substrate material, will be staged within the 100-year floodplain at a specifically identified and flagged area.
- Any material not used in restoration, and non-native to the floodplain, will be removed to a location outside of the 100-year floodplain for disposal.

1.3.8.2 Erosion and Sediment Control

- Stormwater pollution prevention techniques will be implemented according to the 404 permit, National Pollutant Discharge Elimination System (NPDES) permit, or Stormwater Pollution Prevention Plan (SWPPP) to minimize site preparation impacts and earth moving related erosion.
- Site clearing areas, staging area, access routes, stockpile areas, and material handling areas will be identified and confined to the minimum area necessary to minimize ground and riparian vegetation disturbance, and preclude sediment delivery to stream channels.
- Silt fences, straw bales, straw wattles, or other sediment barriers will be placed prior to construction to reduce the potential for sediment to enter a stream directly or indirectly, including from roads and ditches.
- Erosion control materials (e.g., silt fence and wattles) will be kept on site to respond to sediment emergencies.
- Prevention measures will be used to control erosion and intercept and settle runoff of sediment-laden waters during dewatering, excavation, and stockpiling earth and rock materials.
- The construction site will be prepared with sediment control and minimization measures when the threat of storm activity is foreseen.
- Activities will cease when wet conditions exist and erosion may occur.
- Erosion controls will be monitored and inspected, and placed, repaired, or reinstalled as necessary to control erosion.
- NMFS water drafting guidelines (NMFS 2022b) will be followed when drafting water for dust abatemement.
- Water seeping into the project area will be pumped to settling ponds in the construction area and allowed to percolate through soil or to filter through vegetation prior to reentering the stream channel.
- Sumps may be constructed to pump groundwater away from excavations to reduce groundwater turbidity from reaching the river.

1.3.8.3 Fish Salvage

- Dewatering will proceed slowly to allow species to naturally migrate out of the work area.
- Work area isolation, fish capture, and electrofishing will be performed during periods of the coolest air and water temperatures possible, normally early in the morning, to reduce fish stress and mortality.
- Cofferdams and block nets will be installed and maintained in a secured position on the stream bottom and banks to exclude fish from entering the project area during isolation, dewatering, fish salvage, and transport.

- Nets will be monitored hourly anytime there is instream disturbance to ensure they are secured to the banks, free of organic accumulation, and to minimize fish predation.
- Deep pools will be pumped, using NMFS' pumping and screening criteria (NMFS 2022b), to reduce the water volume and increase dip net catch rates before electroshocking.
- Fish will be herded away from work areas (i.e., using seines or blocknets) as the area is slowly dewatered to allow fish to either move out of the project reach without being captured and handled or be concentrated in pools, from which they can be seined or electrofished. Seines will have a mesh size to ensure capture of the ESA-listed fish. Fish will then be dip-netted from shallow areas to minimize the number of fish subjected to electroshocking.
- Bucket transport of fish will be done frequently enough from the salvage area to avoid crowding in the bucket, and minimize the time in the bucket.
- Fish will be released from buckets into areas of cold water and velocity refugia such as identified upwelling areas, tributary mouths, or below the project area if possible.
- Fish will not be held for more than 10 minutes to reduce stress and warming of the water.
- Dead fish will not be stored in transport buckets, but will be left on the stream bank for counting and to avoid mortality counting errors.
- Electrofishing will be used only after other salvage methods have been employed.
- Electrofishing will proceed following NMFS' electrofishing guidelines (NMFS 2000).

1.3.8.4 Hazardous Material Control

- The project will follow all provisions of the Clean Water Act (CWA), water quality standards as described the Idaho Department of Environmental Quality (IDEQ), permits (section 404 and NPDES), and SWPPP.
- Federal and Idaho state regulations regarding spills will be followed (see https://www2.deq.idaho.gov/admin/LEIA/api/document/download/14968). Any spills resulting in a detectable sheen on water shall be reported to the U.S. Environmental Protection Agency (EPA) National Response Center (1-800-424-8802). Any spills over 25 gallons will be reported to the IDEQ (1-800-632-800), and clean-up will be initiated within 24 hours of the spill.
- Only fish friendly fuels and hydraulic fluids will be used in the equipment working within the water.
- A description of hazardous materials that will be used, including inventory, storage, and handling procedures will be available on-site. Written procedures for notifying environmental response agencies will be posted at the work site.
- Oil-absorbing floating booms and other equipment, such as absorbent pads appropriate for the stream size, will be available onsite during all construction phases. Booms will be placed in a location that facilitates an immediate response to potential petroleum leakage.

- Spill containment kits (including instructions for cleanup and disposal) adequate for the types and quantity of hazardous materials used at the site will be available at the work site. Workers will be trained in spill containment procedures and will be informed of the location of spill containment kits.
- Gas-powered equipment with tanks larger than 5 gallons will be refueled in a vehicle staging area placed 150-feet or more from a natural waterbody or wetland, or in an isolated hard reach, such as an established road. Equipment used for in-stream or riparian work will be fueled and serviced in the established staging area. When not in use, vehicles will be parked in the designated staging area.
- All equipment used for in-stream work will be cleaned of external oil, grease and dirt, and mud and leaks will be repaired prior to arriving at the project site. All equipment will be inspected before unloading at site. Any leaks or accumulations of grease will be corrected before entering streams or areas that drain directly to streams or wetlands. Equipment shall not have damaged hoses, fittings, lines, or tanks with the potential to release pollutants into any waterway.
- All vehicles and other mechanized equipment will be inspected daily for fluid leaks before leaving the vehicle staging and thoroughly cleaned before operation below ordinary high water, and as often as necessary during operation, to remain grease free.
- Any waste liquids generated at the staging area will be temporarily stored under an impervious cover, such as a tarpaulin, greater than 150 feet from water until they can be properly transported to and disposed of at a facility that is approved for receipt of hazardous materials.
- Measures outlined in the Environmental Assessment Program will be followed if mercury is found in the project area. Measures include containing, storing, and transporting mercury in a vapor proof, sturdy, unbreakable container by the Fish Biologist or qualified personnel to a safe disposal or recycle facility.
- Weed treatments in the project area will follow the Nez Perce National Forest Noxious Weed Opinions for Herbicide Treatment of Invasive and Noxious Weeds on the Nez Perce National Forest (NMFS 2009). The methods and effects of treatment are incorporated by reference. If new BAs and opinions are developed before the project is complete, weed treatment procedures will follow those specified in the most recent BAs/opinions.
- The use of herbicides will be minimized by planting large trees and shrubs upon project completion.

1.3.8.5 Invasive Species Control

- Water will not be dumped by water tenders from one stream or pond into another stream or pond.
- Driving equipment through or wading across water bodies will be minimized whenever possible.
- Equipment will be disinfected prior to bringing equipment to the forest.

- Equipment and supplies will be kept as clean as possible to reduce the spread of undesirable aquatic organisms and thoroughly clean equipment if it is used in another area.
- All plant parts, soil, and other materials that may carry noxious weed seeds from all equipment and vehicles will be removed before entering the forest or moving from one forest to another.
- Cleaning and sanitation will be conducted in areas where there is no potential to deliver effluent to waterways.
- All erosion control materials will be certified weed free, including straw bales, wattles, straw, and seed mixes.

1.3.8.6 Herbicides

Weed treatments in the project area will follow the Opinion for Herbicide Treatment of Invasive and Noxious Weeds on the Nez Perce National Forest (NMFS# P/NWR/2008/03330; NMFS 2009). The BMPs for treatment are incorporated by reference and include:

- Herbicides will be applied using only a ground-based single nozzle device.
- Only the minimum area necessary will be treated.
- Application will be limited to when conditions are dry, and when dry conditions are forecast.
- Herbicide use will be limited to the list of herbicides, and associated specified no-spray buffer distances from water, found in the Herbicide Opinion.
- Herbicide mixing will be at least 100 feet from water and in an area with no connection to water unless there is a special local condition (Note the previous BMP in the Crooked River action specifying fuel or chemical storage be a minimum of 150 feet from water or riparian areas).
- A spill cleanup kit will be available at the temporary storage sites and in all vehicles carrying herbicides. All handlers will be instructed on the mandatory spill contingency plan.
- Reporting requirements to NMFS on all applications of herbicide.

1.3.9 Monitoring and Reporting

Turbidity will be monitored according to the following methods:

- Turbidity will be measured using an FTS DTS-12 turbidity sensor connected to a Waterlog 500Xl data recorder. The continuous monitor will be set to take turbidity readings every 10 minutes.
- A turbidity meter will be used to monitor turbidity during any activity with the potential to cause turbidity in the Crooked River. Turbidity monitoring may also occur near the mouth of Crooked River.

- Turbidity will be monitored (1) at least 100 feet upstream of the turbidity generating activity to establish the background level of turbidity, (2) 250 to 300 feet downstream of the activity, and (3) 1,500 to 2,000 feet downstream of the ongoing activity.
- Work causing turbidity will cease immediately if 30 or greater Nephelometric Turbidity Units (NTU) are detected at the 250- to 300-foot monitoring station. Best Management Practices or methods may be adjusted at this time to reduce the potential for turbidity. Work may resume when NTUs at this station are less than 30 NTU. If this monitoring station fails to give instantaneous NTU readings, work will cease immediately until monitoring is restored at this station. Readings and thresholds from the 1500- to 2000-foot monitoring station will not be substituted for the 250- to 300-foot station readings and thresholds.
- Work causing turbidity will cease immediately if 5 NTU or greater over background may be adjusted at this time to reduce the potential for turbidity. Work may resume when NTU at this station are less than 5 NTU above background.
- An annual monitoring report that includes turbidity, fish salvage, vegetation data, and BMP effectiveness, will be provided to NMFS in January 2024.

The following BMPs and protocols will be used for early detection and control of turbidity escaping the ponds via subsurface and surface pathways during pond filling:

- Record the time when pond filling begins.
- Turbidity monitoring will be continuous while ponds are being filled. Monitoring will include continuous surveying of all the dry, wet, lateral, and downstream areas of the floodplain and banks within one-quarter mile from the margin of the pond. The purpose of this monitoring is early detection of turbidity escaping from the ponds by either subsurface or surface pathways.
- Work will cease immediately if visible turbidity is found. Record the time between initiation of pond filling and first detection of turbidity. Work will cease for that same amount of time to ensure that turbidity can be controlled. During this time, the turbidity meter at the 250- to 300-foot station will be recorded every 10 minutes to document and understand the timing of peak and subsidence of turbidity at the station. A protocol including changes in BMPs, and work and no-work intervals will be developed and implemented to avoid exceedance of 30 NTU at the 300-foot turbidity monitoring station.
- Work will resume under the developed protocol after turbidity has cleared from the found source and turbidity is under 30 NTU at the 300-foot monitoring station.
- To avoid lapses in monitoring, at least one additional functioning turbidity meter, data recorder, fully charged power supply, and necessary accessories will be on site prior to groundbreaking. This complete monitoring unit must be on site and accessible to immediately replace any failing component(s) of a turbidity monitoring station.

If at any time turbidity 5 NTU or greater over background turbidity is detected at the monitoring station at 1500 to 2000 feet, work will cease immediately and NMFS will be contacted. Filling the pond will not resume until NMFS and the NPCNF have agreed on a protocol to allow work to continue.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS, and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provide an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

The NPCNF determined the proposed action is likely to adversely affect SRB steelhead and their critical habitat.

2.1. Analytical Approach

This opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "jeopardize the continued existence of" a listed species, which is "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This opinion also relies on the regulatory definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02).

The designation of critical habitat for SRB steelhead uses the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414) that revised the critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The ESA Section 7 implementing regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision does not change the scope of our analysis, and in this opinion, we use the terms "effects" and "consequences" interchangeably.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their critical habitat using an exposure–response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species; or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2. Rangewide Status of the Species and Critical Habitat

In this opinion we examine the status of each species that is likely to be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution" for the jeopardy analysis. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the function of the PBFs that are essential for the conservation of the species.

2.2.1 Status of the Species

In this section we describe the present condition of the SRB steelhead distinct population segment (DPS). NMFS expresses the status of a salmonid Evolutionarily Significant Unit (ESU) or DPS in terms of likelihood of persistence over 100 years (or risk of extinction over 100 years). NMFS uses McElhany et al.'s (2000) description of a viable salmonid population (VSP) that defines "viable" as less than a 5 percent risk of extinction within 100 years and "highly viable" as less than a 1 percent risk of extinction within 100 years. A third category, "maintained," represents a less than 25 percent risk within 100 years (moderate risk of extinction). To be considered viable, an ESU or DPS should have multiple viable populations so that a single catastrophic event is less likely to cause the ESU/DPS to become extinct, and so that the ESU/DPS may function as a metapopulation that can sustain population-level extinction and recolonization processes (ICTRT 2007). The risk level of the ESU/DPS is built up from the aggregate risk levels of the individual populations and major population groups (MPGs) that make up the ESU/DPS.

Attributes associated with a VSP are: (1) abundance (number of naturally-produced adult spawners in natural production areas); (2) productivity (number of naturally-spawning adults per parent); (3) spatial structure (both the spatial distribution of individuals in the population and the processes that generate that distribution); and (4) diversity (distribution of traits within and among populations). A VSP needs sufficient levels of these four population attributes in order to: safeguard the genetic diversity of the listed ESU or DPS; enhance its capacity to adapt to various environmental conditions; and allow it to become self-sustaining in the natural environment (ICTRT 2007). These viability attributes are influenced by survival, behavior, and experiences throughout the entire salmonid life cycle, characteristics that are influenced in turn by habitat and other environmental and anthropogenic conditions. The present risk faced by the ESU/DPS informs NMFS' determination of whether additional risk will appreciably reduce the likelihood that the ESU/DPS will survive or recover in the wild.

In the following sections we describe the status of SRB steelhead and their designated critical habitat within the geographic area of this proposed action and are considered in this opinion. More detailed information on the status and trends of SRB steelhead, and their biology and ecology, are in the listing regulations and critical habitat designations published in the Federal Register, applicable recovery plan (NMFS 2017), viability analysis prepared by the Northwest Fisheries Science Center for the 5-year reviews (Ford 2022), and the latest 5-year review (NMFS 2022a). These three documents are incorporated by reference and are available on the NMFS West Coast Region website (https://www.westcoast.fisheries.noaa.gov).

2.2.1.1 Snake River Basin Steelhead

The SRB steelhead was listed as a threatened ESU on August 18, 1997 (62 FR 43937), with a revised listing as a DPS on January 5, 2006 (71 FR 834). On August 18, 2022, in the agency's 5-year review for SRB steelhead, NMFS concluded that the species should remain listed as threatened (NMFS 2022a).

This DPS occupies the Snake River Basin, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Reasons for the decline of this species include substantial modification of the seaward migration corridor by hydroelectric power development on the mainstem Snake and Columbia Rivers, loss of habitat above the Hells Canyon Dam complex on the mainstem Snake River, and widespread habitat degradation and reduced streamflow throughout the Snake River Basin (Good et al. 2005). Another major concern for the species is the threat to genetic integrity from past and present hatchery practices, and the high proportion of hatchery fish in the aggregate run of SRB steelhead over Lower Granite Dam (Good et al. 2005; Ford 2011). Despite implementation of restoration projects, widespread areas of degraded habitat persist, and further habitat degradation continues across the basin, with a lack of habitat complexity, simplified stream channels, disconnected floodplains, impaired instream flow, and a lack of cold water refugia continue to threaten the persistence of this DPS (NMFS 2022a). Other new or continuing threats include climate change, harvest and hatchery management, predation, and hydropower.

Life History

Adult SRB steelhead enter the Columbia River from late June to October to begin their migration inland. After holding over the winter in larger rivers in the Snake River Basin, steelhead disperse into smaller tributaries to spawn from March through May. Earlier dispersal occurs at lower elevations and later dispersal occurs at higher elevations. Juveniles emerge from the gravels in 4 to 8 weeks, and move into shallow, low-velocity areas in side channels and along channel margins to escape high velocities and predators (Everest and Chapman 1972). Juvenile steelhead then progressively move toward deeper water as they grow in size (Bjornn and Rieser 1991). Juveniles typically reside in fresh water for 1 to 3 years, although this species displays a wide diversity of life histories. Smolts migrate downstream during spring runoff, which occurs from March to mid-June depending on elevation, and typically spend 1 to 2 years in the ocean.

Spatial Structure and Diversity

This species includes all naturally-spawning steelhead populations below natural and manmade impassable barriers in streams in the Snake River Basin of southeast Washington, northeast Oregon, and Idaho, as well as the progeny of the following six artificial propagation programs: Dworshak National Fish Hatchery, Salmon River B-run, South Fork Clearwater River B-run, East Fork Salmon River Natural, Tucannon River, and the Little Sheep Creek/Imnaha River (85 FR 81822). The SRB steelhead listing does not include resident forms of *O. mykiss* (rainbow trout) co-occurring with steelhead.

The Interior Columbia Technical Recovery Team (ICTRT) identified 24 extant populations within this DPS, organized into five MPGs (ICTRT 2003). The ICTRT also identified a number of potential historical populations associated with watersheds above the Hells Canyon Dam complex on the mainstem Snake River, a barrier to anadromous migration. The five MPGs with extant populations are the Clearwater River, Salmon River, Grande Ronde River, Imnaha River, and Lower Snake River. In the Clearwater River, the historic North Fork population was blocked from accessing spawning and rearing habitat by Dworshak Dam. Current steelhead distribution extends throughout the DPS, such that spatial structure risk is generally low. For each population in the DPS, Table 3 shows the current risk ratings for the four parameters of a VSP (spatial structure, diversity, abundance, and productivity).

Snake River Basin steelhead exhibit a diversity of life-history strategies, including variations in fresh water and ocean residence times. Traditionally, fisheries managers have classified these steelhead into two groups, A-run and B-run, based on ocean age at return, adult size at return, and migration timing. A-run steelhead predominantly spend 1 year in the ocean; B-run steelhead are larger with most individuals returning after 2 years in the ocean. Most Snake River populations support a mixture of the two run types, with the highest percentage of B-run fish in the upper Clearwater River and the South Fork Salmon River; moderate percentages of B-run fish in the Middle Fork Salmon River; and very low percentages of B-run fish in the Upper Salmon River, Grande Ronde River, and Lower Snake River (NWFSC 2015). Maintaining life history diversity is important for the recovery of the species.

The spatial structure risk is considered to be low or very low for the vast majority of populations in this DPS. This is because juvenile steelhead (age-1 parr) were detected in 97 of the 112 spawning areas (major and minor) that are accessible by spawning adults. Diversity risk for populations in the DPS is either moderate or low. Large numbers of hatchery steelhead are released in the Snake River, and while new information about the relative abundance of natural-origin spawners is available, the relative proportion of hatchery adults in natural spawning areas near major hatchery release sites remains uncertain (Ford 2022). Reductions in hatchery-related diversity risks would increase the likelihood of these populations reaching viable status. Steelhead in the Crooked River are part of the SFCR population, which is part of the Clearwater River MPG.

Table 2. Summary of viable salmonid population (VSP) parameter risks and overall current status and proposed recovery goals for each population in the Snake River Basin steelhead distinct population segment (Ford 2022; NMFS 2017; NMFS 2022a).

Major Population Group	Population[2]	VSP Risk Rating[1]		Viability Rating	
		Abundance/ Productivity	Spatial Structure/ Diversity	2022 Assessment	Proposed Recovery Goal[3]
Lower Snake River[4]	Tucannon River	High	Moderate	High Risk	Highly Viable or Viable
	Asotin Creek	Low	Moderate	Viable	Highly Viable or Viable
Grande Ronde River	Lower Grande Ronde	High	Moderate	High Risk	Viable or Maintained
	Joseph Creek	Low	Low	Viable	Highly Viable, Viable, or Maintained
	Wallowa River	High	Low	High Risk	Viable or Maintained
	Upper Grande Ronde	Very Low	Moderate	Viable	Highly Viable or Viable
Imnaha River	Imnaha River	Very Low	Moderate	Viable	Highly Viable
Clearwater River (Idaho)	Lower Mainstem Clearwater River	Very Low	Low	Highly Viable	Viable
	South Fork Clearwater River	Very Low	Moderate	Viable	Maintained
	Lolo Creek	High	Moderate	High Risk	Maintained
	Selway River	Moderate	Low	Maintained	Viable
	Lochsa River	Moderate	Low	Maintained	Highly Viable
	North Fork Clearwater River			*Extirpated*	*N/A*

Major Population Group	Population[2]	VSP Risk Rating[1]		Viability Rating	
		Abundance/ Productivity	Spatial Structure/ Diversity	2022 Assessment	Proposed Recovery Goal[3]
Salmon River (Idaho)	Little Salmon River	Very Low	Moderate	Viable	Maintained
	South Fork Salmon River	Moderate	Low	Maintained	Viable
	Secesh River	Moderate	Low	Maintained	Maintained
	Chamberlain Creek	Moderate	Low	Maintained	Viable
	Lower Middle Fork Salmon River	Moderate	Low	Maintained	Highly Viable
	Upper Middle Fork Salmon River	Moderate	Low	Maintained	Viable
	Panther Creek	Moderate	High	High Risk	Viable
	North Fork Salmon River	Moderate	Moderate	Maintained	Maintained
	Lemhi River	Moderate	Moderate	Maintained	Viable
	Pahsimeroi River	Moderate	Moderate	Maintained	Maintained
	East Fork Salmon River	Moderate	Moderate	Maintained	Maintained
	Upper Mainstem Salmon River	Moderate	Moderate	Maintained	Maintained
Hells Canyon	Hells Canyon Tributaries			*Extirpated*	

[1]Risk ratings are defined based on the risk of extinction within 100 years: High = greater than or equal to 25 percent; Moderate = less than 25 percent; Low = less than 5 percent; and Very Low = less than 1 percent.
[2]Populations shaded in gray are those that occupy the action area.
[3]There are several scenarios that could meet the requirements for Evolutionarily Significant Unit recovery (as reflected in the proposed goals for populations in Oregon and Washington). What is reflected here for populations in Idaho are the proposed status goals selected by NMFS and the State of Idaho.
[4]At least one of the populations must achieve a very low viability risk rating.

Abundance and Productivity

Historical estimates of steelhead production for the entire Snake River basin are not available, but the basin is believed to have supported more than half the total steelhead production from the Columbia River basin (Mallet 1974, as cited in Good et al. 2005). The Clearwater River drainage alone may have historically produced 40,000 to 60,000 adults (Ecovista et al. 2003), and historical harvest data suggests that steelhead production in the Salmon River was likely higher than in the Clearwater (Hauck 1953). In contrast, at the time of listing in 1997, the 5-year geometric mean abundance for natural-origin steelhead passing Lower Granite Dam, which includes all but one population in the DPS, was 11,462 adults (Ford et al. 2011). Abundance began to increase in the early 2000s, with the single year count and the 5-year geometric mean both peaking in 2015 at 45,789 and 34,179, respectively (Ford 2022). Since 2015, the 5-year geometric means have declined steadily with only 11,557 natural-origin adult returns for the most recent 5-year geometric mean (Ford 2022).

Based on 20-year geometric means, productivity for all populations remains above replacement. But cyclical spawner-to-spawner ratios, which reflect the combined impacts of habitat, climate change, and density dependence, have been strongly below replacement since 2010. Productivity is also expected to decline in the coming years due to recent declines in abundance (NMFS 2022a).

Recovery

NMFS completed a recovery plan for SRB steelhead in 2017 (NMFS 2017). The proposed recovery targets for each population are summarized in Table 2. The greatest opportunities for advancing recovery include: (1) prioritizing actions that improve habitat resilience to climate change; (2) reconnecting stream channels with floodplains; (3) developing local- to basin-scale frameworks that prioritize restoration actions and integrate a landscape perspective; (4) implementing restoration actions at watershed scales; and (5) connect tributaries to mainstem migration corridors (NMFS 2022a).

For SRB steelhead, the life stage that appears to be the most vulnerable to climate change is juvenile rearing (Crozier et al. 2019). Summer habitats may have reduced flow, or loss of tributary access, from irrigation withdrawals. High summer water temperatures are also prevalent. Climate change has and will cause earlier snowmelt timing, reduced summer flows, and higher air temperatures; all of which will exacerbate the low flows and high-water temperatures for juvenile SRB steelhead. This DPS is also considered to have only moderate capacity to adapt to climate change impacts. Given the extrinsic factors currently increasing the vulnerability of many populations to climate change impacts, it is unclear whether their adaptability would be sufficient to mitigate the risk climate change poses to the persistence of this DPS.

Species Summary

Based on information available for the 2022 viability assessment (Ford 2022), none of the five MPGs are meeting their recovery plan objectives and the viability of many populations remains uncertain. The recent, sharp declines in abundance are of concern and are expected to negatively affect productivity in the coming years. Overall, available information suggests that SRB steelhead continue to be at a moderate risk of extinction within the next 100 years. This DPS continues to face threats from tributary and mainstem habitat loss, degradation, or modification; predation; harvest; hatcheries; and climate change (NMFS 2022a).

2.2.2 Status of Critical Habitat

In this section, NMFS examines the status of the designated critical habitat by examining the condition and trends of the essential PBFs of that habitat throughout the designated area (Table 3). These features are essential to the conservation of the ESA-listed species because they support one or more of the species' life stages (e.g., spawning gravels, water quality and quantity, side channels, or food). The proposed actions affect freshwater spawning, rearing and migration habitats.

Table 3. Types of sites, essential physical and biological features (PBFs) of critical habitat designated for Snake River basin steelhead, and the species life stage each PBF supports.

Site	Essential Physical and Biological Features	Species Life Stage
Snake River Basin steelhead[a]		
Freshwater spawning	Water quality, water quantity, and substrate	Spawning, incubation, and larval development
Freshwater rearing	Water quantity and floodplain connectivity to form and maintain physical habitat conditions	Juvenile growth and mobility
	Water quality and forage[b]	Juvenile development
	Natural cover[c]	Juvenile mobility and survival
Freshwater migration	Free of artificial obstructions, water quality and quantity, and natural cover[c]	Juvenile and adult mobility and survival

[a] Additional PBFs pertaining to estuarine areas have also been described for Snake River steelhead. These PBFs will not be affected by the proposed action and have therefore not been described in this opinion.
[b] Forage includes aquatic invertebrate and fish species that support growth and maturation.
[c] Natural cover includes shade, large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

Table 4 describes the geographical extent of critical habitat within the Snake River basin for steelhead. Critical habitat includes the stream channel and water column with the lateral extent defined by the OHWM, or the bankfull elevation where the OHWM is not defined.

Table 4. Geographical extent of designated critical habitat within the Snake River basin for ESA-listed steelhead.

Distinct Population Segment	Designation	Geographical Extent of Critical Habitat
Snake River Basin steelhead	70 FR 52630; September 2, 2005	Specific stream reaches are designated within the Lower Snake, Salmon, and Clearwater River basins. Table 21 in the Federal Register details habitat areas within the DPS' geographical range that are excluded from critical habitat designation.

Spawning and rearing habitat quality in tributary streams in the Snake River varies from excellent in wilderness and roadless areas to poor in areas subject to intensive human land uses (NMFS 2015; NMFS 2017). Critical habitat throughout much of the Interior Columbia (which includes the Snake River and the Middle Columbia River) has been degraded by intensive agriculture, alteration of stream morphology (i.e., channel modifications and diking), riparian vegetation disturbance, wetland draining and conversion, livestock grazing, dredging, road construction and maintenance, logging, mining, and urbanization. Reduced summer streamflows, impaired water quality, and reduction of habitat complexity are common problems for critical habitat in non-wilderness areas. Human land use practices throughout the basin have caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations.

In many stream reaches designated as critical habitat in the Snake River basin, streamflows are substantially reduced by water diversions (NMFS 2015; NMFS 2017). Withdrawal of water, particularly during low-flow periods that commonly overlap with agricultural withdrawals, often increases summer stream temperatures, blocks fish migration, strands fish, and alters sediment transport (Spence et al. 1996). Reduced tributary streamflow has been identified as a major limiting factor for Snake River spring/summer Chinook and SRB steelhead in particular (NMFS 2017).

Many stream reaches designated as critical habitat for these species are listed on the Clean Water Act 303(d) list for impaired water quality, such as elevated water temperature (IDEQ 2020). Many areas that were historically suitable rearing and spawning habitat are now unsuitable due to high summer stream temperatures, such as some stream reaches in the Upper Grande Ronde. Removal of riparian vegetation, alteration of natural stream morphology, and withdrawal of water for agricultural or municipal use all contribute to elevated stream temperatures. Water quality in spawning and rearing areas in the Snake River has also been impaired by high levels of sedimentation and by heavy metal contamination from mine waste (e.g., IDEQ and EPA 2003; IDEQ 2001).

The construction and operation of water storage and hydropower projects in the Columbia River basin, including the eight run-of-river dams on the mainstem lower Snake and lower Columbia Rivers, have altered biological and physical attributes of the mainstem migration corridor. Hydrosystem development modified natural flow regimes, resulting in warmer late summer and fall water temperature. Changes in fish communities led to increased rates of piscivorous predation on juvenile salmon and steelhead. Reservoirs and project tailraces have created opportunities for avian predators to successfully forage for smolts, and the dams themselves have created migration delays for both adult and juvenile salmonids. Physical features of dams, such as turbines, also kill out-migrating fish. In-river survival is inversely related to the number of hydropower projects encountered by emigrating juveniles. However, some of these conditions have improved. The Bureau of Reclamation and U.S. Army Corps of Engineers (COE) have implemented measures in previous Columbia River System hydropower consultations to improve conditions in the juvenile and adult migration corridor including 24-hour volitional spill, surface passage routes, upgrades to juvenile bypass systems, and predator management measures. These measures are ongoing and their benefits with respect to improved functioning of the migration corridor PBFs will continue into the future.

2.2.3 Climate Change Implications for ESA-listed Species and their Critical Habitat

One factor affecting the rangewide status of Snake River salmon and steelhead, and aquatic habitat at large, is climate change. As observed by Siegel and Crozier in 2019, long-term trends in warming have continued at global, national, and regional scales. The five warmest years in the 1880 to 2019 record have all occurred since 2015, while 9 of the 10 warmest years have occurred since 2005 (Lindsey and Dahlman 2020). The year 2020 was another hot year in national and global temperatures; it was the second hottest year in the 141-year record of global land and sea measurements and capped off the warmest decade on record (https://www.ncdc.noaa.gov/sotc/global202013). Events such as the 2014–2016 marine heatwave (Jacox et al. 2018) are likely exacerbated by anthropogenic warming, as noted in the annual special issue of Bulletin of the American Meteorological Society on extreme events (Herring et al. 2018). The U.S. Global Change Research Program (USGCRP) reports average warming in the Pacific Northwest of about 1.3ºF from 1895 to 2011, and projects an increase in average annual temperature of 3.3ºF to 9.7ºF by 2070 to 2099 (compared to the period 1970 to 1999), depending largely on total global emissions of heat-trapping gases (predictions based on a variety of emission scenarios including B1, RCP4.5, A1B, A2, A1FI, and RCP8.5 scenarios). The increases are projected to be largest in summer (USGCRP 2018).

Climate change generally exacerbates threats and limiting factors, including those currently impairing salmon and steelhead survival and productivity. The growing frequency and magnitude of climate change related environmental downturns will increasingly imperil many ESA-listed stocks in the Columbia River basin and amplify their extinction risk (Crozier et al. 2019, 2020, 2021). This climate change context means that opportunities to rebuild these stocks will likely diminish over time. As such, management actions that increase resilience and adaptation to these changes should be prioritized and expedited. For example, the importance of improving the condition of and access and survival to and from the remaining functional, high-elevation spawning and nursery habitats is accentuated because these habitats are the most likely to retain remnant snowpacks under predicted climate change (Tonina et al. 2022).

Climate change is already evident. It will continue to affect air temperatures, precipitation, and wind patterns in the Pacific Northwest (ISAB 2007; Philip et al. 2021), resulting in increased droughts and wildfires and variation in river flow patterns. These conditions differ from those under which native anadromous and resident fishes evolved and will likely increase risks posed by invasive species and altered food webs. The frequency, magnitude, and duration of elevated water temperature events have increased with climate change and are exacerbated by the Columbia River hydrosystem (EPA 2020a, 2020b; Scott 2020). Thermal gradients (i.e., rapid change to elevated water temperatures) encountered while passing dams via fish ladders can slow, reduce, or altogether stop the upstream movements of migrating salmon and steelhead (e.g., Caudill et al. 2013). Additional thermal loading occurs when mainstem reservoirs act as a heat trap due to upstream inputs and solar irradiation over their increased water surface area (EPA 2020a, 2020b, 2021). Consider the example of adult sockeye salmon in 2015, when high summer water temperatures contributed to extremely high losses of Columbia River and Snake River stocks during passage through the mainstem Columbia and Snake River (Crozier et al. 2020), and through tributaries such as the Salmon and Okanogan rivers, below their spawning areas. Some stocks are already experiencing lethal thermal barriers during a portion of their adult migration. The effects of longer or more severe thermal barriers in the future could be catastrophic. For example, Bowerman et al. (2021) concluded that climate change will likely increase the factors contributing to prespawn mortality of Chinook salmon across the entire Columbia River basin.

Columbia River basin salmon and steelhead spend a significant portion of their life-cycle in the ocean, and as such the ocean is a critically important habitat influencing their abundance and productivity. Climate change is also altering marine environments used by Columbia River basin salmon and steelhead. This includes increased frequency and magnitude of marine heatwaves, changes to the intensity and timing of coastal upwelling, increased frequency of hypoxia (low oxygen) events, and ocean acidification. These factors are already reducing, and are expected to continue reducing, ocean productivity for salmon and steelhead. This does not mean the ocean is getting worse every year, or that there will not be periods of good ocean conditions for salmon and steelhead. In fact, near-shore conditions off the Oregon and Washington coasts were considered good in 2021 (NOAA 2022). However, the magnitude, frequency, and duration of downturns in marine conditions are expected to increase over time due to climate change. Any long-term effects of the stressors that fish experience during freshwater stages that do not manifest until the marine environment will be amplified by the less-hospitable conditions there due to climate change. Together with increased variation in freshwater conditions, these downturns will further impair the abundance, productivity, spatial structure, and diversity of the region’s native salmon and steelhead stocks (ISAB 2007; Isaak et al. 2018). As such, these climate dynamics will reduce fish survival through direct and indirect impacts at all life stages (NOAA 2022).

All habitats used by Pacific salmon and steelhead will be affected by climate dynamics. However, the impacts and certainty of the changes will likely vary by habitat type. Some changes affect salmon at all life stages in all habitats (e.g., increasing temperature), while others are habitat-specific (e.g., stream-flow variation in freshwater, sea-level rise in estuaries, upwelling in the ocean). How climate change will affect each individual salmon or steelhead stock also varies widely, depending on the extent and rate of change and the unique life-history characteristics of different natural populations (Crozier et al. 2008). The continued persistence of salmon and steelhead in the Columbia basin relies on restoration actions that enhance climate resilience (Jorgensen et al. 2021) in freshwater spawning, rearing, and migratory habitats, including access to high elevation, high quality cold-water habitats, and the reconnection of floodplain habitats across the Interior Columbia River basin.

2.3. Action Area

"Action area" means 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).

The action area includes the staging area, Crooked River valley (including lateral riparian areas and extending to Forest System Road 233), river, and floodplain from the downstream extent of the Narrows to the confluence with the SFCR, a distance of approximately 2 miles. The upstream extent of the action area is 100 feet above the upper extent of instream work, near the lower end of the Narrows section of the Crooked River, where background turbidity levels will be taken (Figure 1). The downstream extent of the action area is the lower 2 miles of the Crooked River, before the confluence with the SFCR, the downstream extent of turbidity generated by the proposed action.

2.4. Environmental Baseline

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

The proposed action will take place within the Clearwater MPG boundary and will affect the South Fork Clearwater River (SFCR) population of SRB steelhead.

2.4.1 Clearwater Major Population Group

The Clearwater River MPG is not viable. The only large population (Lower Mainstem) in the MPG is considered highly viable. However, for the MPG to be viable, two additional populations must be considered viable and the remaining populations must be considered maintained. The SFCR population is rated as viable; however, the Lolo population is rated high risk, and the Lochsa and Selway populations are rated as maintained. The Lolo population is a small size ("basic") population expected to maintain a mean abundance of at least 500 adults for viability; however, this population apparently has had less than 200 adults in each of the last 5 years, through the 2020/21 return. With current viability assessments, minimum abundance must improve enough to make one more population "viable" and the remaining two populations "maintained."

2.4.2 South Fork Clearwater River Population

Steelhead runs were eliminated in the SFCR in 1927 by the construction of the Harpster Dam. The dam was removed in 1962 and B-run steelhead, along with Chinook salmon populations were reestablished in the watershed. Steelhead spawning occurs throughout the SFCR population area and has been documented in all of the larger tributaries to the SFCR, including the Crooked River. Run reconstruction models estimated 82 percent of steelhead spawners in the SFCR were hatchery origin in run year 2019 (Stark et al. 2021). Habitat limiting factors for this population include sediment, riparian condition and large wood, habitat complexity, floodplain connectivity, and stream temperature (NMFS 2017; NMFS 2022a).

The Crooked River serves as an important spawning and rearing tributary for the SFCR population. The Crooked River watershed is part of one of three major spawning areas for the SFCR population. The Crooked River sees a modest amount of steelhead spawning. Between 1992 and 2013, an average of 21 wild steelhead adults returned per spawn year (complete weir count data not available in all years). Returning adult hatchery steelhead were somewhat more numerous, and were 68 percent of the total adult return during those years (unpublished data from the Nez Perce Tribe, November 4, 2021). From 2014 to 2019, adult returns in Crooked River were very low, averaging six total adults (hatchery and wild combined), with none to one returning in 2017 to 2021 (NPT 2021; IDFG 2022).

The SFCR population is considered viable, exceeding its recovery goal of maintained or moderate risk (NMFS 2017; NMFS 2022a). However, high levels of hatchery spawners in the SFCR population, and Crooked River, and low numbers of return spawners for the most recent 5-year review period 2016 to 2020 (NMFS 2022a), are concerning.

Out-migrating juvenile steelhead counts at the screw trap at the mouth of Crooked River from 2007 to 2019 (3 years with no data), averaged 1,075 (IDFG 2022, unpublished data). During earlier phases of the restoration project, fish salvage occurred for approximately 1 mile of river each year from 2017 to 2020. An average of 10 juvenile steelhead were captured annually (NPT 2021). In 2021, an SRB steelhead egg box was planted in the project area resulting in salvage of 791 juvenile steelhead (NPT 2021).

2.4.3 Habitat Conditions

Historic mining reshaped the lower 2 miles of the Crooked River watershed, transforming the river into a simple deep channel with no accessible floodplain. Since 2017, the Crooked River Valley Rehabilitation Project has drastically altered these habitat conditions. Project work began with the construction of an annually inundated floodplain in the lower 0.25 miles of the valley, which included grading 12,000 cubic yards of tailing piles and removing 17,000 cubic yards of tailing piles (NPT 2021). Thus far, the floodplain has been activated each year since construction in 2017. Deposition of sediment is evident along the floodplain, and new side channel and alcoves are active at high flows.

Ten large wood structures were constructed along the mainstem channel to create pools and instream habitat complexity. Scour pools have been created and maintained since wood structure construction. Approximately 100 1-gallon rooted alder and cottonwoods, 200 10-cubic inch spruce and Douglas fir, 100 sedge and rush plugs, and over 1,000 willow and dogwood cuttings were planted in the project area. The majority of these plants have survived and are greater than 10 feet tall. It will take many more years before the vegetation is effective at providing shade or large wood inputs. The entire 0.25-mile floodplain was also seeded with native riparian grasses, and natural recovery of forbs and shrubs is evident. The remaining 1.75 mile of valley was graded to create a floodplain that will also be activated annually.

A new 7,500-foot river channel, with a width of 30–45 feet, was constructed with a natural sinuosity pattern and a 40:60 pool riffle ratio. Approximately 62 large wood jams and pools up to 5 feet deep were constructed along the outer meander banks of this new channel. Over 7,000 feet of large bank attached wood was installed between the large wood jams to promote bank stabilization, and to provide overhead habitat and instream complexity for fish. Two side channels approximately 2,000 feet long were also constructed. These side channels were routed through existing pools and wetland areas to provide habitat complexity. These side channels currently express groundwater elevations, but do not have much flow.

Sixteen thousand large plants were planted across approximately 60 acres of floodplain along the new channel. The primary species planted were alders, spruce, cottonwoods, water birch, and a variety of willows. The entire floodplain was seeded with natural grasses, which have not yet sprouted. The vegetation planted along the river channel is about 6 feet tall, but is yet too sparse to provide shade

Many deeper ponds and areas with native vegetation exist across the landscape, and will function as wetlands. Approximately 5 additional acres of wetlands/ponds were created due to a shortage of fill material. These wetlands express the groundwater table and have been connected to the main channel via side channels. These areas function as off-channel habitat for juvenile fish and lamprey as long as access is maintained.

There are numerous off-channel and open water areas in the project area consisting of small and large ponds as well as a few interconnected channels. The majority of the ponds, including those to be filled, do not have a surface water connection to the Crooked River. However, some ponds have a connection during high spring flows and a few are connected perennially. Only dace have been found in the ponds during previous project salvage operations.

At the proposed site of rock weir construction, public campers annually construct swimming pools by building rock walls. The river at this location is approximately 45 feet wide. This section of river does not provide ideal substrate or resting pools for spawning adult steelhead. However, this annual rock wall construction does alter the stream dynamics, impeding the safe passage of fish at low water. This activity also causes bank erosion.

Figure 3. Looking downstream at the Crooked River post construction (2017–2021). Project construction includes developing wetlands in low areas along the left bank of Crooked River. Some of these low areas have been connected to the main channel via side channels to provide more off channel habitat.

2.4.4 Water Temperature

The IDEQ developed a list of impaired waters across the state of Idaho to comply with section 303(d) of the CWA. The IDEQ's 2009 Integrated 303(d)/305(b) Report lists the SFCR and all tributaries stream segments, including the Crooked River, under section 4a (EPA-approved Total Max Daily Loads (TMDLs)) for temperature (IDEQ 2003). Reduction in streamside shading is discussed in the report as a cause for increases in water temperature. Disturbed riparian conditions alongside Crooked River have resulted in altered plant communities and reduced canopy cover. Reduced canopy cover decreases effective shade, resulting in increased solar heating of the river. Currently, effective shade is only about 30 percent and on average, about 70 percent of solar radiation reaches the stream. This indicates surface water temperatures are elevated due to high solar radiation and low percent effective shade. The Maximum Daily Maximum Temperature and Maximum Weekly Maximum Temperature (MWMT) can exceed 68°F in the action area, and are generally unsuitable for steelhead rearing from late June through late August.

2.4.5 Heavy Metal Toxicity

Concentrations of heavy metals in both soil and water in the action area are generally equivalent to background levels or below detection limits (IDEQ 2011). Heavy metals monitoring data collected within the project area in 2013 by the NPT did not exceed cold water biota water quality standards (NMFS 2015).

2.5. Effects of the Action

Under the ESA, "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 (see 50 CFR 402.02). 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 (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered the factors set forth in 50 CFR 402.17(a) and (b).

Effects to ESA-listed SRB steelhead and their critical habitat include: (1) water quality impacts from elevated total suspended solids (TSS), increases in turbidity, and releases of small amounts of chemicals during project construction; (2) behavior modifications and physiological responses of juvenile steelhead from temporary increases in turbidity, (3) injury and death due to work area isolation and fish salvage operations, (4) crushing during installation of coffer dams, and (5) temporary loss of benthic habitat and forage from work area isolation and tree removal. The proposed Project will also provide long-term beneficial effects to SRB steelhead and their critical habitat by improving fish passage and the quality of critical habitat.

2.5.1 Effects on ESA-listed Species

Presence and Exposure

Project construction is expected to be completed in 2023. All in-water work and work below the OHWM will occur during the in-water work window, July 15–August 15. Throughout the year, steelhead use the action area for migration, holding, and rearing, and potentially spawning. The project reach has very little suitable spawning habitat and steelhead will likely move above the action area into the upper watershed to spawn. Although spawning has not been documented in the action area, with recent restoration actions and increases in available spawning gravel, NMFS expects that some limited steelhead spawning in the action area is possible prior to and after project construction. Steelhead enter the Crooked River between March and late May[1]. Steelhead emergence in the Crooked River occurs prior to the July 15 start of the in-water work window. Juvenile rearing occurs year-round in the action area. Based on the life history of steelhead in Crooked River, we expect that only rearing juvenile steelhead will be present in the action area during project construction.

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[1] Records from the Crooked River fish weir from 1992 to 2014.

Water Quality

Suspended sediment and turbidity. The proposed action will affect water quality by temporarily increasing sediment delivery to the Crooked River and suspended sediment (turbidity) in the water column, from:

- Heavy machinery operating in the stream channel to install and remove cofferdams to isolate 2,725 square feet of in-water work areas.
- Pumping water onto the floodplain to drain dredge ponds and dewater work areas.
- Heavy machinery operating from the streambank to install five LWD structures and one rock weir, and to place logs in/on streambanks and the streambed.
- Re-watering 2,275 square feet of isolated work sites.
- Subsurface seepage from filling of dredge ponds.
- Erosion and runoff from staging and travel areas.
- Stormwater runoff.

Suspended sediment can affect fish through a variety of direct pathways: abrasion (Servizi and Martens 1992); gill trauma (Bash et al. 2001); behavioral effects such as gill flaring, coughing, and avoidance (Berg and Northcote 1985; Bisson and Bilby 1982; Servizi and Martens 1992; Sigler et al. 1984); interference with olfaction and chemosensory ability (Wenger and McCormick 2013); and changes in plasma glucose levels (Servizi and Martens 1987). These effects of suspended sediment on salmonids generally decrease with sediment particle size and increase with particle concentration and duration of exposure (Bisson and Bilby 1982; Gregory and Northcote 1993; Servizi and Martens 1987; Newcombe and Jensen 1996). The severity of sediment effects is also affected by physical factors such as particle hardness and shape, water velocity, and effects on visibility (Bash et al. 2001). Although increased amounts of suspended sediment cause numerous adverse effects on fish and their environment, salmonids are relatively tolerant of low to moderate levels of suspended sediment. Gregory and Northcote (1993) have shown that moderate levels of turbidity (35 to 150 NTU) can accelerate foraging rates among juvenile Chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect). When testing steelhead response to turbidity exposures from 38 to 265 NTU for 14 to 21 days, Sigler et al. (1984) observed that steelhead remained at or below carrying capacity in water with turbidities up to 80 NTU, but newly-emerged steelhead had reduced growth rates when exposed to constant turbidity as low as 48 NTU for 14 days (i.e., minimum days tested).

Salmon and steelhead typically avoid suspended sediment where possible. Avoidance behavior can mitigate adverse effects when fish are capable of moving to an area with lower concentrations of suspended sediment. To avoid turbid areas, salmonids may move laterally (Servizi and Martens 1992) or downstream (McLeay et al. 1987). Avoidance of turbid water may begin as turbidities approach 30 NTU (Sigler et al. 1984; Lloyd 1987) or 37 NTU (Servizi and Martens 1992). However, Berg and Northcote (1985) provide evidence that juvenile coho salmon did not avoid moderate turbidity increases when background levels were low, but exhibited significant avoidance when turbidity exceeded a threshold that was relatively high (greater than 70 NTU).

Based on gage data from the SFCR at the mouth of Crooked River, flows are expected to be less than 10 percent of bankfull flow by July 15, and at baseflow by early August. Sediment transport is maximized at bankfull flows and higher. At the expected lower flows during project construction, the river will have a greatly reduced capacity to suspend sediment in the water column and generally will carry only fine sand sediments or smaller; a sediment size which is less harmful to fish than larger particle sizes (Newcombe and Jensen 1996). Larger particles such as coarse sand is expected to settle out of the water quickly during in-water work. Because clay and fine sand pockets are present in the action area and will be disturbed by project construction, NMFS expects these sediments will be transported downstream creating turbidity, and require a longer period to settle out.

Best Management Practices (e.g., silt fences, straw wattles, staging areas located 150 feet or more from any natural water body, etc.) will be implemented to minimize erosion, sediment delivery, and turbidity. Stormwater pollution prevention techniques will be implemented to minimize site preparation impacts and earth moving related erosion. In addition, activities will be stopped when wet conditions exist. Therefore, NMFS does not expect erosion and sediment delivery from staging and travel areas, or from stormwater runoff, to result in appreciable turbidity levels that will adversely affect SRB steelhead.

Water in the dredge ponds will be slowly pumped onto the floodplain, where it will settle and suspended particles filtered before returning to the river channel. NMFS expects that any sediment deposited on the floodplain will be washed away during the first high flows that access the floodplain, and turbidity generated from mobilization of these sediments to be indistinguishable from baseline levels. All eight dredge ponds are currently isolated from the Crooked River. However, three of the eight dredge ponds are large and located close enough to the Crooked River to contribute turbidity to the stream during pumping and dewatering. In addition, based on what occurred in earlier phases of the project, we expect that as the dredge ponds are filled, the weight of the fill material will displace subsurface water, and some of that subsurface water will travel through subsurface clays and surface in the river 100 feet or more downstream. Installation of isolation materials will result in resuspension of sediment. Construction of the LWD structures and rock weir will contribute sediment to the isolated work areas, which will settle on channel substrates. As the work area isolation barriers are removed and water is returned to the channel, some residual sediment release associated with substrate disturbance is also likely to occur. NMFS expects that turbidity generated by installation of coffer dams, construction of LWD structures and the rock weir, and dredge pond dewatering and filling will last a few minutes to a few hours, and cause temporary behavioral changes to steelhead, including changes in feeding behavior, and physiological responses.

Turbidity monitoring will occur for all turbidity generating activities. Continuous turbidity monitoring will occur approximately 300 feet and 2,000 feet below project activities. Work will cease if turbidity exceeds 30 NTU at 300 feet or 5 NTU above baseline at 2,000 feet, and will only resume when turbidities have returned to less than 30 NTU at 300 feet or less than 5 NTU above baseline at 2,000 feet. Given these thresholds and the implementation of sediment/turbidity BMPs identified in Section 1.3.8.2 (project implemented according to SWPPP, installation of sediment barriers and erosion control materials, water drafting guidelines, and use of settling ponds, etc.), NMFS anticipates turbidity generated by the project will temporarily, adversely affect juvenile SRB steelhead up to 300 feet below any turbidity generating activity.

NMFS expects 15 activities to cause stream turbidity (Table 1): installation of large wood structures (5), installation of the rock weir (2), and filling of dredge ponds (8). These activities include operation of heavy machinery in the stream channel and from the streambank; placement and removal of cofferdams; dewatering and rewatering in-channel work areas; and dewatering, filling, and subsurface seepage from filling of dredge ponds. Since installation of the LWD structures and rock weir will produce turbidity both upon dewatering and again upon rewatering, we doubled the area affected by turbidity for these seven elements. This brings the total number of elements producing turbidity to 22. Multiplying 22 elements by the 300-foot length of affected stream, and by the average stream width of 40 feet, NMFS estimates a total of 264,000 square feet of stream area in which steelhead will be exposed to adverse effects from turbidity during project construction.

The NPCNF conducted snorkel surveys in the upper Crooked River and estimated the average juvenile steelhead density to be 0.001 steelhead per square foot of water surface area (NMFS 2015). Based on an estimated fish density of 0.001 fish per square foot, NMFS estimates 264 juvenile steelhead may be adversely affected by project-generated turbidity. Expected effects include changes in behavior, including feeding activity, and physiological responses (e.g., gill flaring, coughing, etc.) Therefore, NMFS estimates 264 juvenile steelhead will alter their behavior and exhibit physiological responses from increased turbidity generated by the Project.

Deposited sediment and substrate quality. Turbidity generated from the project activities described above has the potential to result in sediment deposition onto streambed substrate. Excessive sediment deposited onto the substrate can reduce the flow of water and supply of oxygen to eggs and alevins in redds, which can decrease egg survival and fry emergence rates (Bash et al. 2001; Cederholm and Reid 1987; Chapman 1988), delay development of alevins (Everest et al. 1987), and reduce growth causing premature hatching and emergence (Birtwell 1999). Steelhead enter the Crooked River between March and late May[2], with spawning completed by late May. The action area currently has very little suitable spawning habitat and most steelhead spawn in the upper watershed above the action area. Based on water temperature data and 1,200 degree-days for steelhead fry emergence, emergence in the Crooked River will occur prior to the July 15 start of the in-water work window. In addition, stream flow in the action area steadily increases from 2 to 10 times greater than baseflow late-February through mid-April.[3] The increase in flow, and associated increase in water depth and velocity, will mobilize deposited fine sediment from river substrates (Leopold et al. 1964). This mobilization of deposited fine sediment will likely occur before steelhead spawning in the spring. We also expect turbidity generated by mobilization of fine sediment in high spring flows would be too small to adversely affect migrating and holding adults or rearing juvenile steelhead. Because BMPs will be implemented to minimize sediment delivery to the water column, fry emergence will occur prior to project construction, and the timing of fine sediment flushing flows, NMFS

[2] Records from the Crooked River fish weir from 1992 to 2014.
[3] Daily flow statistics from the South Fork Clearwater gage (USGS gauge No. 13337500).

does not expect adverse effects to eggs, alexines, juvenile, or adult SRB steelhead from sediment deposition.

Temperature. Heat stress increases the susceptibility of juvenile fish to disease (EPA 2003). Sustained water temperatures of 70°F or greater can cause death of cold-water species such as salmon and steelhead within hours or days (EPA 2003). Density of rearing steelhead is strongly negatively related to water temperature at temperatures greater than 68°F (Ebersole et al. 2001) with avoidance occurring at 72°F or above (Nielsen et al. 1994). Migrating adult steelhead are impaired by water temperatures greater than 66.2°F (Keefer et al. 2009).

Removal of riparian vegetation and work area isolation and dewatering could cause temporary water temperature changes. Past dredge mining activities removed all the woody debris and vegetation throughout the valley bottom. Riparian vegetation will be removed to install the weir (2,500 linear feet) and large wood structures, and 5 acres of existing shrub, tree, and sod materials will be removed and salvaged to facilitate floodplain roughening and regrading. All areas of stream bank disturbance will be replanted with native vegetation including salvaged and containerized plants. Riparian plantings occurred with earlier phases of the project, and natural vegetation recruitment and growth is occurring throughout the action area. Although it will take several years for planted vegetation to establish and provide shade, we do not think vegetation impacts from project construction will be sufficient to measurably increase water temperatures in the action area. Therefore, NMFS does not expect impacts to riparian vegetation to result in adverse effects to SRB steelhead from increased water temperatures.

Increased water temperatures during work area isolation could affect fish during salvage. As water levels are reduced in areas where fish salvage occurs, water temperatures will rise. However, all fish salvage activities will comply with NMFS' fish salvage guidelines, and fish salvage will not occur if water temperatures are at, or expected to exceed, 68ºF. In addition, BMPs will be implemented including safely and expeditiously transferring salvaged fish from in-water work areas to open stream channels. Therefore, NMFS does not expect increased temperatures during fish salvage to impact SRB steelhead.

Petroleum-based contaminants. Additional impairment of water quality may result from accidental releases of fuel, oil, and other contaminants that can injure or kill aquatic organisms. Petroleum-based contaminants such as fuel, oil, and some hydraulic fluids, contain polycyclic aromatic hydrocarbons (PAH), which can cause chronic sublethal effects to aquatic organisms (Neff 1985). Ethylene glycol (the primary ingredient in antifreeze) has been shown to result in sublethal effects to rainbow trout at concentrations of 20,400 mg/L (Beak Consultants Ltd., 1995 as cited in Staples 2001). Brake fluid is also a mixture of glycols and glycol ethers, and has about the same toxicity as antifreeze. The operation of multiple pieces of equipment and heavy machinery will occur from streambanks, the floodplain, in live water when placing some sections of the cofferdams, and within sections of the isolated stream channel, which will pose a risk of chemical fluid contamination to water and riparian areas.

NMFS anticipates that only very small quantities (ounces) of PAH are likely with each accidental release or spill. In addition, project actions will follow all provisions and standards of the IDEQ, the CWA (permits for section 404 and NPDES), and project SWPPP. The proposed action includes BMPs and pollution control measures that will be implemented to prevent contamination of project areas waters and wetlands and to enable a quick response in the event of a spill. Fueling, staging, and storage areas will be at least 150 feet from natural waterbody or wetland or they will be on a hardened surface such as a road. Spill prevention and containment equipment (booms and oil-absorbing pads) will be available on site for immediate response. Workers will be trained in spill containment procedures. All equipment will be washed free of mud, petroleum products, and plant and seed material, and leaks and damaged fittings will be repaired prior to arriving on site. If a spill does occur, we expect containment will occur quickly with emergency spill kits located on site, and BMPs will minimize its dispersal, limiting exposure and related impacts to juvenile steelhead. For these reasons, NMFS does not expect any fish to be injured or killed by exposure to accidental releases of fuel, oil, and other contaminants caused by this proposed action.

Herbicides. The NPCNF may use herbicides and other weed treatments to control noxious weeds in the action area. Weed treatments would follow the Biological Opinion for Herbicide Treatment of Invasive and Noxious Weeds on the Nez Perce National Forest (NMFS 2009), including the BMPs, which are incorporated here by reference. By following the BMPs, peak water concentrations of herbicides likely to occur under the proposed action are far less than the lowest concentrations where lethal or sublethal effects have been reported, and the duration of exposure under the proposed action is likely too short to cause sublethal effects. Therefore, NMFS does not expect any adverse effects to SRB steelhead from weed treatments or application of herbicides.

Sediment toxicity. Mercury, because of its historic application in mining and/or natural occurrence in some mined areas, may be unearthed when disturbing soils and substrate during floodplain reconstruction. Mercury is toxic to fish and other aquatic life in low concentrations. Mercury in water can accumulate in fish tissue and become toxic to fish. Mercury's primary path as a toxin to fish is in the form of methylmercury. Methylmercury is formed with organic matter in oxygen-poor conditions such as deep fine sediments in ponds (Rhea 2008). The effects to fish from mercury or methylmercury are permanent damage to the olfactory, visual, and nervous systems; and adverse effects to growth and development, reproduction, and osmoregulation (Baatrup 1991; Rhea 2008).

There is little potential for mercury to enter waters of the Crooked River in concentrations toxic to fish. Mercury was not used in dredge mining in the upper SFCR watershed and several studies have found mercury in soils or water in the action area to be equivalent to background levels or below detection limits. Project actions include specific BMPs for containment and disposal of mercury if encountered, and it is very unlikely that project actions will unearth or release toxic metals in concentrations harmful to fish. Therefore, NMFS does not expect adverse effects to SRB steelhead from mercury.

Noise from Construction Equipment

There will be noise generated from heavy equipment operation and truck traffic in the project area. When operating in or near live water, heavy equipment (e.g., excavators, dump trucks) may create noise, vibration, and water surface disturbances. Popper et al. (2003) and Wysocki et al. (2007) discussed potential impacts to fish from long-term exposure to anthropogenic sounds, predominantly air blasts and aquaculture equipment, respectively. Effects to caged fish unable to move away from noise included temporary, and potentially permanent, hearing loss (via sensory hair cell damage), reduced ability to communicate with conspecifics due to hearing loss, and masking of potentially biologically important sounds (Popper et al. 2003). Wysocki et al. (2007) did not identify any adverse impacts to rainbow trout from prolonged exposure to three sound treatments common in aquaculture environments (115, 130, and 150 decibels [dB]).

The Federal Highway Administration (2009) indicates backhoe and truck noise production ranges between 80 and 84 dB. Because the dB scale is logarithmic, noise levels expected from machinery are expected to be 100 times less than any noise levels known to have generated adverse effects to surrogate species, as discussed above. In addition, the majority of machinery use and truck traffic will be away from water's edge. In-water work will be limited to placing or removing materials for cofferdams, including several trips into live water lasting several minutes. Work adjacent to live water may occur during some floodplain grading or during LWD placement or weir installation. However, blocknets will exclude fish from the immediate area and, as confirmed by recent fish surveys, few juvenile steelhead are expected to be present in the area during work area isolation. It is unknown if the expected dB levels will cause fish to temporarily move away from the disturbance or if fish will remain present. However, if fish do move away from noise, they should still find similar cover from predation in the native adjacent habitat. Therefore, NMFS does not expect noise-related disturbances from machinery to result in injury, other adverse physiological or behavioral effects, or death of SRB steelhead.

Alterations of Habitat Access and Fish Passage During Work Area Isolation

Upstream and downstream fish passage will be maintained throughout Project construction. Access to 450 square feet of in-stream habitat at a time will be temporarily denied when the rock weir structure is installed on each side of the stream. A cofferdam will be placed on one side of the stream at a time, continuously leaving the center thalweg and opposite stream bank open for fish passage. Cofferdams will also be used for short time periods to isolate 5 in-water work areas, totaling 1,875 square feet, during installation of LWD structures. However, passage in these locations will also be maintained. Therefore, NMFS does not expect project construction to adversely affect fish passage, or steelhead to be adversely affected by temporarily blocked access to up to 2,325 square feet of habitat.

Fish Salvage Operations

Project construction includes dewatering and fish salvage of 15 areas, totaling 7,275 square feet, to facilitate construction of LWD structures, the rock weir, and the filling of eight dredge ponds. Fish salvage will be supervised by Tribal and Idaho Department of Fish and Game (IDFG) biologists, who will ensure the best methods are employed to minimize adverse effects to steelhead.

Many factors influence the success of fish salvage efforts, including water depth, habitat complexity, temperature, salvage methods, crew experience, and care of fish after capture. At best, all fish are captured without injury and successfully released. However, in many cases some fish are difficult to capture, sustain injuries, and experience high stress after capture. Capturing and handling fish by any means subjects the fish to physiological stress and possibly injury and death. Slowly dewatering in-water work areas and herding fish will minimize the risk of injury and mortality to listed fish to the extent possible. However, seining, netting, capture, and handling may injure fish and can increase stress, resulting in harm or death to some individuals. Additionally, a fish may not be found by the fish capture crew and could be stranded during dewatering.

All fish captured by electrofishing are likely to experience at least temporary injury, but may suffer permanent injury or death. Only juvenile steelhead will be present during the instream work window and fish salvage. Although zero steelhead were captured in dredge ponds during earlier work phases, NMFS assumes juvenile steelhead will be present in the Crooked River, and also present in the dredge ponds because high water can inundate the ponds. Fish salvage will occur in 7,275 square feet (Table 5). Using the same steelhead density applied above to estimate the number of juveniles that will be exposed to increased turbidity (0.001 per square foot), NMFS estimates a combined total of eight juvenile steelhead will be present in all areas proposed for salvage.

Table 5. Estimated number of juvenile steelhead that will be harmed or killed during fish salvage associated with the Crooked River Valley Rehabilitation Project in 2023.

Element	Total Salvage Area (square feet)	Juvenile Steelhead in Salvage Locations	Juvenile Steelhead Incidental Take
Log Structure	1875	2	4
Rock Weir	900	1	2
Ponds	4500	5	10
Total	7,275	8	16

Because the actual number of steelhead expected to be present for all salvage areas is unknown, NMFS will double the number for its effects analysis to 16. Also, as a worst-case scenario, NMFS assumes all 16 juvenile steelhead will be captured and harmed or killed during fish salvage. Therefore, NMFS expects 16 juvenile steelhead will be harmed or killed during fish salvage.

Crushing from driving in the river. While placing and removing cofferdams used to isolate in-water work areas, heavy machinery will drive in the stream which may crush juvenile fish seeking shelter in the channel substrate. During past Project phases, machinery operated from the banks to place coffer dams, with only occasional driving in the stream if needed. Based on earlier phases of the project, the NPT estimated that machinery may need to drive in the river a maximum of 20 times to install or remove diversion structures. To calculate mortality of juvenile steelhead from crushing, NMFS assumes that a tracked excavator (two 2-foot-wide tracks, 4 feet total) will make 20 roundtrips across half the river (20 feet each way, 40 feet total) to place or remove diversion structures. Using the same average river width (40 feet) and juvenile steelhead density (0.001 fish per square foot) used to calculate effects from turbidity, 20 round trips of 40 feet each, and a 4-foot track width, NMFS estimates 3.2 juvenile steelhead will be crushed by machinery operating in the river channel. This number is rounded up to 4 for purposes of potential mortality.

Forage. Food availability has the potential to limit stream salmonid production (McCarthy et al. 2009; Rosenfeld et al. 2005; Wipfli and Baxter 2010). In lotic environments, salmonids primarily forage on aquatic and terrestrial invertebrates drifting in the water column (Allan et al. 2003;

Dedual and Collier 1995; Elliott 1973; Cada et al. 1987; Nielsen 1992; Romaniszyn et al. 2007; Weber et al. 2014; Wipfli 1997). Salmonids may also forage epibenthically, especially during periods of low flow or low drift abundance (Angradi and Griffith 1990; Nakano et al. 1999; Tippets and Moyle 1978).

The proposed action will affect benthic invertebrates by desiccation during dewatering of 7,275 square feet of work areas; and crushing, covering or dislodging them during heavy machinery operation on 3,200 square feet (20 40-feet long trips with 4-foot wide tracks) of stream channel. Vegetation removal along 2,500 linear feet during rock weir installation; and removing and salvaging 5 acres of existing shrub, tree, and sod materials prior to floodplain regrading and roughening, will affect forage by decreasing terrestrial invertebrate production and allochthonous input.

An additional 180,000 square feet of channel may be disturbed by settling of suspended sediment up to 300 feet below turbidity-generating activities. Fine sediment accumulation can cause a loss of abundance and diversity in macroinvertebrate communities and many macroinvertebrate taxa belonging to the Ephemeroptera, Plecoptera, and Trichoptera orders, which provide the most productive and available food for stream fishes, are particularly affected by sedimentation (Waters 1995; Wood et al. 2005). We expect the deposited sediment to flush out with the first high flow event.

The alteration of 190,475 square feet of riverbed (7,275 square feet dewatered, 3,200 square feet of heavy machinery operation, and 180,000 square feet of sediment deposition) will cause temporary, localized reduction in macroinvertebrates that serve as the principle food source for juvenile steelhead. We expect invertebrate drift will maintain a source of forage for steelhead throughout the action area. We also expect forage species will begin to recolonize disturbed areas via drift and migration within a few days, and will fully recolonize the area within months after project completion (Bêche et al. 2005; Kreutzweiser et al. 2005). Therefore, in a worst-case scenario, benthic habitat disturbance will slightly decrease forage production and availability to migrating and rearing steelhead for a few months. We do not expect the small, temporary localized losses of forage will be sufficient to increase competition for food among steelhead juveniles, or affect growth or survival of fish. Therefore, NMFS does not expect adverse effects to juvenile steelhead from loss of forage.

Species Effects Summary

NMFS estimates 264 juvenile SRB steelhead will alter their behavior, including feeding behavior, and exhibit physiological responses from increased turbidity generated by the Project. NMFS also expects 16 juvenile SRB steelhead will be harmed or killed from fish salvage, and 4 will die from crushing.

<u>2.5.2 Effects on Critical Habitat</u>

Critical habitat for SRB steelhead is designated for the Crooked River. The action area includes PBFs for freshwater spawning, migration, and rearing. The project will have short-term adverse effects and substantial long-term beneficial effects on critical habitat. The essential features of these PBFs in the action area that will be affected by the proposed action include: (1) water quality (suspended sediment, temperature, chemical contamination); (2) substrate/spawning gravel (deposited sediment); (3) forage; (4) free of artificial obstructions/fish passage; (5) natural cover; and (6) floodplain connectivity. The effects of the proposed action on these features are summarized below.

Water Quality (suspended sediment, temperature, chemical contamination)

Water quality will be reduced by the project in several ways, as discussed above in Section 2.5.1 (Effects on Species).

Suspended sediment is expected during installation of coffer dams, dewatering and rewatering in-water work areas, seepage from dredge pond filling, and during construction of LWD structures and the rock weir. The amount of sediment, and the duration and intensity of turbidity pulses, will be greatly reduced by employment of BMPs (e.g., minimizing disturbance areas, use of erosion control materials, turbidity monitoring, etc.) Peak turbidity is expected not to exceed 30 NTU at 300 feet below the work activity sediment sources. We expect all project-related turbidity episodes to be temporary, lasting a few minutes to a few hours, with no long-term loss of conservation value to steelhead critical habitat at the scale of the action area. NMFS also expects minor leaks and spills of petroleum-based fluids (not more than ounces) that will be contained on site. Numerous BMPs to address the potential for chemical contamination will be used (SWPPP, spill prevention and cleanup equipment, equipment washing, storage areas at least 150 feet away from live water and wetland areas, and work area isolation, etc.) that will minimize the risk of petroleum-based chemical contaminants reaching the river or riparian areas. Because mercury levels in sediments and water are equal to background, uncovering additional toxic metals is very unlikely. The use of herbicides will follow protocols and BMPs which will minimize the risk of toxic concentrations of the herbicides reaching the river. Therefore, NMFS expects small, temporary, and intermittent adverse effects to water quality for the duration of the project at the scale of the action area.

Currently, a lack of vegetative shade, and channel form and floodplain characteristics allow for excessive solar heating. Summer water temperatures in the action area are high for juvenile rearing, and emigration from the Crooked River may be interrupted due to high water temperatures in late summer and early fall. Riparian vegetation will be removed to install the weir (2,500 linear feet) and large wood structures, and 5 acres of existing shrub, tree, and sod materials will be removed and salvaged to facilitate floodplain roughening and regrading. All areas of stream bank disturbance will be replanted with native vegetation including salvaged and containerized plants. Because of the small area affected by removal of trees, NMFS does not expect stream temperatures to increase.

In the long term, NMFS expects the proposed project will improve water quality by lowering water temperatures. Removal of dredge ponds, increased channel length, increased channel complexity, and increased floodplain connectivity are expected to reduce solar heat loading, increase hyporheic exchange, and improve floodplain and groundwater functions, resulting in cooler summer water temperatures. Floodplain grading will eliminate dredge ponds and the associated surface exposure to solar heat loading. This will allow cool groundwater or hyporheic flow to remain subsurface and insulated from solar heating, until it intersects with warmer surface flow. Without the dredge ponds, NMFS expects groundwater and hyporheic exchange to act as a more effective buffer against high surface water temperatures (Poole and Berman 2001). Planting of large container shrubs and trees, and natural streambank vegetation recruitment (because of improved sediment deposition and soil retention patterns) should help provide some shading. Any resulting decrease in water temperature could increase the length of time that suitable rearing habitat is available within the project reach. Although it is unknown whether these anticipated decreases in water temperature will be measurable, three 3-year cycles of post-project monitoring (Columbia Habitat Monitoring Program [CHaMP]; NOAA and BPA, https://www.champmonitoring.org/) of water temperatures may reveal if there is change. Any project-related decrease in water temperature will improve habitat conditions for steelhead and help to buffer habitat from climate change.

Substrate (deposited sediment) and forage. Substrate within the affected stream reaches are expected to experience minor levels of fine sediment deposition, which has the potential to reduce available spawning substrate and invertebrate forage. NMFS expects deposited fine sediment to remobilize during higher flows in the months prior to spring spawning. Therefore, NMFS expects short term, localized adverse effects on the substrate PBF (days) at the scale of the action area.

The proposed action will negatively affect the short-term availability of benthic invertebrates by crushing, covering, or temporarily displacing them from up to 190,475 square feet from installation of coffer dams (3,200 square feet), work area isolation and dewatering (7,275 square feet), and settling of suspended sediment (180,000 square feet). Invertebrate communities can change in response to changes in substrate condition; however, added fines are only expected for a few months, and invertebrates will continue to drift through affected areas (Bjornn et al. 1977) and quickly recolonize (Bêche et al. 2005; Kreutzweiser et al. 2005). In addition, increases in bank and floodplain vegetation should add leaf litter to the nutrient cycle in the project area which would add forage for macroinvertebrates. Because effects to substrate are temporary, any reduction of invertebrates is likely to be short term and minor. Therefore, NMFS expects short term, localized adverse effects on the forage PBF (months) at the scale of the action area.

NMFS expects long-term improvements in vegetation and floodplain access will increase nutrient inputs and increase the forage area resulting in an increase in the forage PBF at the scale of the action area.

Free of Artificial Obstructions/Fish Passage

As described in Section 2.5.1 (Effects to Species), fish passage will be maintained throughout project construction, and NMFS does not expect project construction to adversely affect the free of artificial obstruction PBF. NMFS also expects the project will improve fish passage at low flows. The rock weir will contain a designed elevation notch that consistently allows fish passage past the structure at all flows, including during low water periods. The rock weir will also eliminate the need for recreational users to construct pools, by providing a pool for recreational use. Therefore, the proposed Project will improve the free of artificial obstruction PBF at the scale of the action area.

Natural Cover and Floodplain Connectivity

There is a lack of cover in the Project reach due to channel simplification from legacy dredge mining. The Project will add habitat complexity such as more frequent floodplain access, a more natural riffle pool morphology, LWD structures, and increased riparian and streambank vegetation. Therefore, NMFS expects the proposed Project will increase habitat complexity and restore more natural geomorphic processes improving the floodplain connectivity and natural cover PBFs at the scale of the action area.

Long-term Beneficial Effects

Currently, the Crooked River floodplain in the action area has reduced function due to intensive legacy dredge mining of the valley floor. The dominance of large armoring substrates has nearly eliminated natural geomorphic processes, altered surface and subsurface flow pathways, and reduced riparian vegetation. Project actions will improve stream function and address all of the primary limiting factors for SRB steelhead in the SFCR, including riparian and floodplain conditions, water temperature, migration barriers, sediment, and habitat complexity.

Riparian plantings and physical changes to the channel and floodplain to encourage soil retention and natural vegetation recruitment will improve shading once riparian trees establish. Physical changes to the channel and floodplain will reduce the surface area, residence time, and consequent solar heating of water flowing through the Project reach, providing short-term, interim, and long-term reductions in water temperatures.

Grading the floodplains for full inundation at appropriate peak flow intervals should restore more natural flow paths and water storage. Construction of secondary floodplain features such as swales, depression, and wetlands will promote natural recruitment of vegetation. Roughening the floodplain surface and adding LWD to stabilize the surface will provide organic material and increase water holding capacity, which will have benefits to forage and habitat by slowing water velocity and increasing low-velocity rearing habitat. Installing LWD structures will stabilize streambanks for several years until vegetation becomes established, reducing potential suspended sediment and delivery as well as turbidity. Replanting streambanks, and floodplain will stabilize these areas and increase shade, which, in the long term, should decrease stream temperatures. Instream LWD structures have short- and long-term benefits for pool formation, water retention, instream cover, channel migration, bank erosion, and recruitment of LWD. This will vastly improve habitat complexity over the existing simplified habitat. Therefore, NMFS expects the proposed project to improve the water quality, substrate, forage, natural cover, unobstructed passage, and floodplain connectivity PBFs at the scale of the action area.

Summary of Effects on Critical Habitat

The proposed action will cause small, temporary, and intermittent negative effects to water quality from turbidity, sediment, and chemical contamination at the scale of the action area. Peak turbidity is expected not to exceed 30 NTU at 300 feet below work activity sediment sources, and persist for a few minutes to a few hours. NMFS expects small (no more than 180,000 square feet), temporary (a few months), negative effects to substrate in the action area from sediment deposition as turbidity plumes settle out within 300 feet downstream. We expect deposited sediment to flush out with the first high spring flows. Minor leaks and spills of petroleum-based fluids (not more than ounces) will be contained on site.

Given the area of temporary benthic habitat disturbance (190,475 square feet), the small area of tree and vegetation removal, riparian plantings, the amount of available local habitat, and the supply of forage from invertebrate drift, NMFS expects the Project to have a small, negative effect on forage at the scale of the action area.

The proposed action will complete this stream restoration project, which has various long-term beneficial effects to the PBFs of critical habitat in this reach of the Crooked River. NMFS expects the Project will improve water quality (decrease summer water temperatures), substrate (reduce erosion and sediment deposition), freedom from artificial obstructions (improved fish passage at low flows), natural cover (LWD and riparian plantings), forage (riparian plantings and reduced sediment deposition), and floodplain connectivity (increased access) PBFs at the scale of the action area.

2.6. Cumulative Effects

"Cumulative effects" 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 402.02 and 402.17(a)). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline vs. cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described earlier in the discussion of environmental baseline (Section 2.4).

There are two larger parcels of private land that were historically or are currently mined. The Champion Mine is about 6 miles upstream from the mouth of Crooked River and has not been developed, and no known mining or development is proposed. Premium Exploration owns about 1 mile near the town of Orogrande, also about 6 miles south and upstream of the Crooked River Project. The mining company has been conducting exploration activities on this land for the past few years including building roads and drilling test pits. Full scale mining operations have been proposed on these lands. These activities have the potential to increase sediment delivery into Crooked River and the action area, but these would be regulated under IDEQ/EPA NPDES permitting for stormwater and would need to meet the stipulations of the SFCR TMDL for sediment.

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step in assessing the risk that the proposed action poses to species and critical habitat. In this section, we add the effects of the action

(Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

2.7.1 Species

Snake River basin steelhead from the SFCR population inhabit the action area and depend on it to support critical life functions of spawning, rearing, feeding, and migration. Juveniles from the SRB steelhead DPS will be affected by the proposed action. Snake River basin steelhead are listed as threatened, and while some populations are viable, most populations within this DPS remain at maintained (Ford 2022). Although the overall risk rating of the SFCR population is viable, SRB steelhead are considered to have a moderate risk of extinction. The SFCR population is part of the Clearwater River MPG of SRB steelhead. The Clearwater River MPG is considered not viable. The only large population (Lower Mainstem) is rated at highly viable. However, for the MPG to be viable, two additional populations must be viable and the remaining populations must be rated as at least maintained. The SFCR population is rated as viable; however, the Lolo population is rated high risk, and the Lochsa and Selway populations are rated as maintained. To achieve recovery, one more population must reach "viable" and the remaining two populations must be considered maintained.

Snake River basin steelhead juveniles use the action area for rearing and migration. Adults may spawn within the action area, but primarily use the area for migration to spawning upstream in the Crooked River. As described in Section 2.5.1, the proposed action will have effects on juvenile SRB steelhead from temporary increases in suspended sediment and turbidity, fish salvage, and crushing by equipment during installation of coffer dams. NMFS estimates sediment plumes and resulting turbidity will cause behavioral changes—including feeding, or physiological responses—in 264 juvenile SRB steelhead. NMFS also estimates 16 juvenile SRB steelhead will be harmed or killed from fish salvage activities, and 4 juvenile SRB steelhead will die from crushing. Based on the location of these activities and turbidity plumes, affected steelhead are members of the SFCR population.

These effects and reductions are not expected to appreciably alter the abundance, productivity, spatial structure, or diversity of the SFCR population or the Clearwater MPG. Therefore, it is NMFS' opinion that when the effects of the action and cumulative effects are added to the environmental baseline, and in light of the status of the species, the effects of the action will not cause reductions in reproduction, numbers, or distribution that would reasonably be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of SRB steelhead.

2.7.2 Critical Habitat

Critical habitat in the action area is degraded due to historic mining. As noted in Section 2.2.3, climate change is likely to further impact designated critical habitat. Increases in water temperature and changes to the hydrological regime will reduce suitable salmon habitat and cause earlier migration of smolts. The potential effects of the proposed action on SRB steelhead critical habitat are described in Section 2.5.2. NMFS expects adverse effects to water quality, sediment, and forage PBFs for SRB steelhead from installation and removal of coffer dams, operation of machinery within and adjacent to the Crooked River, installation of LWD structures and the rock weir, filling of dredge ponds, and roughening and regrading floodplains. The proposed action will have small, temporary negative effects to water quality (turbidity, sediment, chemical contamination) at the scale of the action area. Peak turbidity is expected not to exceed 30 NTU at 300 feet below the work activity sediment sources, and to persist for a few minutes to a few hours. Small, negative effects to substrate will occur from sediment deposition as turbidity plumes settle out within 300 feet downstream. Deposited sediment is expected to be flushed out by high spring flows. Minor leaks and spills of petroleum-based fluids (not more than ounces) will be contained on site. NMFS also expects a small, temporary effect to the forage PBF within 190,475 square feet from dewatering, crushing, and covering; with forage returning to pre-project levels within a few months after project completion.

NMFS expects the Project will have long-term beneficial effects to various critical habitat PBFs by increasing floodplain connectivity, available rearing habitat, and channel habitat complexity; decreasing summer water temperatures; improving substrate and forage; and by improving fish passage at low flow.

Based on our analysis that considers the current status of PBFs, adverse effects from the proposed action will cause a small, localized, a temporary decline in the quality and function of PBFs in the action area, and a long-term improvement in floodplain connectivity and other PBFs. Because of the scale and extent of the effects to PBFs, we do not expect a reduction in the conservation value of critical habitat in the action area. Therefore, as we scale up from the action area to the designation scale, the proposed action is not expected to appreciably reduce the conservation value of critical habitat for SRB steelhead at the designation scale.

2.8. Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and the cumulative effects, it is NMFS' opinion that the proposed action is not likely to jeopardize the continued existence of SRB steelhead or destroy or adversely modify its designated critical habitat.

2.9. Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Harass" is further defined by interim guidance as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns, which include, but are not limited to, breeding, feeding, or sheltering." "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1 Amount or Extent of Take

In this opinion, NMFS determined that incidental take of juvenile steelhead is reasonably certain to occur and will include harm and harassment as follows: (1) behavioral changes—including feeding, and physiological responses—to 264 juvenile steelhead due to temporary increases in turbidity, (2) mortality of 16 steelhead from fish salvage activities in 7,275 square feet, and (3) mortality of 4 steelhead in 3,200 square feet from crushing during installation of coffer dams. NMFS is reasonably certain the incidental take described here will occur because: (1) ESA-listed SRB steelhead are known to occur in the action area; and (2) the proposed action includes in-water activities that are reasonably certain to harm or kill juvenile steelhead.

NMFS estimates 264 juvenile steelhead will be harmed by temporary increases of turbidity caused by installation of cofferdams, dewatering and rewatering, construction of LWD structures and the rock weir, dredge pond filling, and floodplain regrading and roughening. For each event, turbidity plumes are expected to last a few minutes to a few hours. These sediment plumes will likely cause changes in behavior, including feeding, or physiological responses with no acute mortality.

Monitoring or measuring the number of steelhead actually affected by turbidity during project activities is not possible; therefore, the number of fish affected via this pathway cannot be quantified. However, turbidity that causes this form of take is readily measurable and it is directly related to the amount of take. Therefore, the extent and duration of downstream turbidity is a suitable surrogate measure of incidental take caused by turbidity. For take exceedance thresholds, monitoring and downstream extent distances are measured from the source point of turbidity, and specified below.

NMFS estimates 16 juvenile steelhead will be harmed or killed from fish salvage activities, and four will die from crushing. Incidental take caused by fish salvage includes both sublethal and lethal take. Lethal take can be counted directly (number dead). However, all sublethal take from fish salvage is not observable through captured fish, but the number of fish captured can be counted and used as a surrogate measure of sublethal take from fish salvage.

The estimated mortality of up to four juvenile steelhead from construction equipment driving across the river substrate cannot be practicably verified through observations of dead fish within substrate material. However, the proposed number of crossings of the stream by the heavy equipment serves as a measurable surrogate for this form of take.

The amount or extent of take allowed in the opinion is exceeded if:

1. Turbidity is greater than 5 NTU above background at a monitoring distance no greater than 2,000 feet downstream of the downstream extent of the sediment source.

2. Turbidity is greater than or equal to 50 NTU above background instantaneously or above 30 NTU for more than 2 hours, at a monitoring distance of between 250 and 300 feet downstream of the downstream extent of the turbidity source.
3. Capture and mortality of juvenile steelhead exceeds 16 juvenile steelhead.
4. Crossings of the stream by the heavy equipment for the cofferdam work exceeds 20 crossings.

The amount of take and the extent of take are the thresholds for reinitiating consultation. If any of these limits are exceeded during project activities, the amount of take would increase beyond that examined in this consultation, and thus the reinitiating provisions of this opinion apply.

2.9.2 Effect of the Take

In the opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

The NPCNF, BPA, NPT, and COE (for those measures relevant to the CWA section 404 permit) shall comply with the following RPMs:

1. Minimize the potential for incidental take resulting from implementation of the proposed action.
2. Ensure completion of a monitoring and reporting program to confirm that the terms and conditions in this ITS were effective in avoiding and minimizing incidental take from permitted activities, and ensure incidental take is not exceeded.

2.9.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. The NPCNF, BPA, NPT, and COE or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. To implement RPM 1, the NPCNF, BPA, NPT, and COE (for those measures relevant to the CWA section 404 permit) shall ensure that:
    - All vehicle operators (including truck operators) are educated on proper deployment of spill kits.

2. To implement RPM 2 (monitoring and reporting), the NPCNF, BPA, NPT, and COE (as relevant to the CWA section 404 permit) shall ensure that:
    a. NMFS will be notified if any adverse environmental effects occur from implementation of the action that were not considered in the BA or this opinion.
    b. If the amount or extent of take as described above is exceeded, the NPCNF shall cease take-causing activities and contact NMFS within 24 hours.
    c. Reports shall include any adaptations not included in the proposed action that reduce turbidity take.
    d. A project report summarizing the results of the monitoring shall be submitted to NMFS by December 31, 2023. The post-project report shall also include a statement on whether all the terms and conditions of this opinion were successfully implemented.

       Submit post-project reports to both:

       Snake Basin Area Office National Marine Fisheries Service
       Plaza IV, Suite 220
       800 East Park Boulevard Boise, Idaho 83712-7743
       AND
       nmfswcr.srbo@noaa.gov

2.10. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, "conservation recommendations" (CRs) are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

1. To mitigate the effects of climate change on ESA-listed salmonids, follow recommendations by the Independent Scientific Advisory Board (2007) to plan now for future climate conditions by implementing protective tributary and mainstem habitat measures. In particular, implement measures to protect or restore riparian buffers, wetlands, and floodplains; remove stream barriers; and to ensure late summer and fall tributary streamflows.
2. The COE should continue to work with local planning and zoning bodies to protect sensitive streamside areas from future development and subsequent need for streambank protection measures.

Please notify NMFS if the action agencies or designated Federal representative carries out any of these recommendations so that we will be kept informed of actions that minimize or avoid adverse effects and those that benefit listed species or their designated critical habitats.

2.11. Reinitiation of Consultation

This concludes formal consultation for the Reinitiation of the Crooked River Valley Rehabilitation Project.

Under 50 CFR 402.16(a): "Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action."

3. MAGNUSON–STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH (CFR 600.905(b)).

This analysis is based, in part, on the EFH assessment provided by the NPCNF and descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the Pacific Fisheries Management Council (PFMC) and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

The proposed project action area includes EFH for various life-history stages of Chinook salmon (*O. tshawytscha*) and coho salmon (*O. kitsutch*) (PFMC 2014).

3.2. Adverse Effects on Essential Fish Habitat

Based on the information provided in the BA and the analysis of effects presented in the ESA portion of this document (Section 2.5), NMFS concludes that the proposed action will have the following adverse effects on designated Chinook and coho salmon EFH: There will be short-term increased sediment affecting water quality and substrate.

3.3. Essential Fish Habitat Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH.

We provide the following conservation recommendations:

The NPCNF, BPA, and COE (for those measures relevant to the CWA section 404 permit) shall ensure that:

a. All vehicle operators (including truck operators) are educated on proper deployment of spill kits.

b. Implement RPM 2, and its terms and conditions described in the ITS in the ESA portion of this document, to ensure completion of monitoring and reporting to confirm that these terms and conditions are effective for avoiding and minimizing adverse effects to EFH.

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in Section 3.2 above, designated EFH for Pacific Coast salmon (PFMC 2014).

3.4. Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, NPCNF must provide a detailed response in writing to NMFS within 30 days after receiving a conservation recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' conservation recommendations, unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of the measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5. Supplemental Consultation

The NPCNF must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l)).

4. Data Quality Act Documentation and Pre-Dissemination Review

The Data Quality Act specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are NPCNF, NPT, COE, IDFG, and contractors. Individual copies of this opinion were provided to the NPCNF, and COE. The document will be available within 2 weeks at the NOAA Library Institutional Repository (https://repository.library.noaa.gov/welcome). The format and naming adhere to conventional standards for style.

4.2. Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3. Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR part 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation, if applicable contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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