UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
PORTLAND, OREGON 97232

Refer to NMFS No: WCRO-2019-00114

June 11, 2019

Scott Smithline
Federal Highway Administration
Western Federal Lands Highway Division
610 East Fifth Street
Vancouver, Washington 98661

Lieutenant Colonel Christian Dietz
U.S. Army Corps of Engineers
Walla Walla District
201 North Third Avenue
Walla Walla, Washington 99362-1826

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the South Fork Salmon River Bank Stabilization, Payette National Forest, Valley County, Idaho, HUC 170602080412 and 170602080409

Dear Mr. Smithline and Lt. Col. Dietz:

Thank you for your letter of March 18, 2019, requesting initiation 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 South Fork Salmon River bank stabilization project. The Federal Highways Administration (FHWA) submittal included a final biological assessment that analyzed the effects of the proposed action on Snake River Basin steelhead (*Oncorhynchus mykiss*), Snake River spring/summer Chinook salmon (*O. tshawytscha*), and designated critical habitat for Snake River spring/summer Chinook salmon and Snake River Basin steelhead. The U.S. Army Corps of Engineers' (COE) will also issue a Section 404 of the Clean Water Act permit for the project.

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 (MSA)(16 U.S.C. 1855(b)) for this action.

In this biological opinion (Opinion), NMFS concludes that the action, as proposed, is not likely to jeopardize the continued existence of Snake River spring/summer Chinook salmon (Chinook salmon) or Snake River Basin steelhead (steelhead). NMFS also determined the action will not destroy or adversely modify designated critical habitat for Chinook salmon or steelhead. 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 nondiscretionary terms and conditions, including reporting requirements, that the FHWA, COE, and any permittee who performs any portion of the action, must comply with to carry out the RPM. Incidental take from actions that meet these terms and conditions will be exempt from the ESA take prohibition.

Although the FHWA and COE did not make ESA determinations for Southern Resident killer whales (*Orcinus orca*) and their critical habitat, NMFS' analysis identified potential impacts on the whale's prey base. For this reason, and in accordance with NMFS' policy on marine mammals, the attached document concludes the proposed action "may affect," but is "not likely to adversely affect" Southern Resident killer whales and their critical habitat.

This document also includes the results of our analysis of the action's effects on EFH pursuant to section 305(b) of the MSA, and includes two Conservation Recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. These Conservation Recommendations are a non-identical set of 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 FHWA or COE 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 Jim Morrow, Snake River Basin Office at 208-378-5695 or jim.morrow@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Michael P. Tehan
Assistant Regional Administrator
Interior Columbia Basin Office

Enclosure

cc: C. Nalder – PNF
G. Martinez – COE
S. Blihovde – USFWS
M. Lopez – NPT

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

South Fork Salmon River Bank Stabilization – Payette National Forest, Valley County, Idaho, HUCs 170602080412 and 170602080409

NMFS Consultation Number: WCRO-2019-00114

Action Agencies: Federal Highways Administration (Lead)
U. S. Army Corps of Engineers

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
Snake River spring/summer Chinook salmon (*O. tshawytscha*)	Threatened	Yes	No	Yes	No
Southern Resident Killer Whale (*Orcinus orca*)	Endangered	No	-	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:

Michael P. Tehan
Assistant Regional Administrator

Date: June 11, 2019

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

ACRONYMS

ACRONYM	DEFINITION
BA	Biological Assessment
BLM	Bureau of Land Management
BMP	Best Management Practice
cfs	cubic feet per second
Chinook Salmon	Snake River spring/summer Chinook salmon
COE	U.S. Army Corps of Engineers
DPS	Distinct Population Segment
DQA	Data Quality Act
EFH	Essential Fish Habitat
EFSFSR	East Fork South Fork Salmon River
ESA	Endangered Species Act
ESU	Evolutionarily Significant Units
FHWA	Federal Highway Administration
FR	U.S. Forest Service Road
HAPC	Habitat Areas of Particular Concern
IDFG	Idaho Department of Fish and Game
ITS	Incidental Take Statement
MP	Mile Post
MPG	Major Population Group
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NPT	Nez-Perce Tribe
NTU	Nephelometric Turbidity Unit
OHWM	Ordinary High Water Mark
Opinion	Biological Opinion
PBF	Physical and Biological Features
PCE	Primary Constituent Elements
PFMC	Pacific Fisheries Management Council
PNF	Payette National Forest
RM	River Mile
RPM	Reasonable and Prudent Measures
SFSR	South Fork Salmon River
SRKW	Southern Resident Killer Whale
Steelhead	Snake River Basin steelhead
USFS	U.S. Forest Service
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

The 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.), and implementing regulations at 50 CFR 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 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). A complete record of this consultation is on file at the Snake Basin Office.

1.2 Consultation History

The South Fork Salmon River (SFSR) bank stabilization project will be funded by the Federal Highway Administration (FHWA) and will occur on Payette National Forest (PNF) land. The project will affect Snake River spring/summer Chinook salmon (Chinook salmon), Snake River Basin steelhead (steelhead), designated critical habitat for both species, and Chinook salmon EFH. The project was presented to the PNF Level 1 team on March 7, 2018; however, because the FHWA is the lead action agency, the project did not go through the streamlining process[1].

On September 19, 2018, FHWA sent a letter transmitting a draft biological assessment (BA) on the SFSR bank stabilization project, to NMFS. NMFS requested additional information in an October 3, 2018, letter to FHWA. Between October 3, 2018 and March 1, 2019, NMFS and FHWA exchanged information via e-mail and phone conservations and on March 18, 2019, FHWA sent a letter transmitting a final BA to NMFS, thus initiating formal consultation. Minor changes agreed to during consultation include: extension of work windows to facilitate construction during the lowest flows; additional monitoring during excavation and rock placement; incorporation of willow plantings into the riprap; supervision of rock placement by a natural resource professional; and incorporation of measures to minimize impacts on active Chinook salmon redds. Because the project requires a Clean Water Act permit, the U.S. Army Corps of Engineers (COE) is a secondary action agency.

[1] The process described in a series of memorandums of understanding among the U.S. Forest Service (USFS), Bureau of Land Management (BLM), NMFS, and the U.S. Fish and Wildlife Service wherein USFS and BLM projects are reviewed by interagency teams with the goals of reducing impacts on listed species and shortening consultation times.

Although the FHWA and COE did not make ESA determinations for Southern Resident killer whales (SRKW) (*Orcinus orca*) and their critical habitat[2], NMFS' review of the action's effects on Chinook salmon and steelhead identified potential impacts on the prey availability for the whales. For this reason, and in accordance with NMFS' guidance on marine mammal consultations (Stelle 2013), this document also provides an analysis of effects, concluding with a determination of "may affect, not likely to adversely affect" for SRKW and their critical habitat (Section 2.12).

This project will likely affect tribal trust resources. Because the action is likely to affect tribal resources, a copy of the draft of the proposed action and terms and conditions was sent to the Nez Perce Tribe (NPT) and Shoshone-Bannock Tribes on May 1, 2019. The NPT personnel provided comments via phone on May 17, 2019, that resulted in an addition of one term and condition. The Shoshone-Bannock Tribes did not provide comments.

1.3 Proposed Federal Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies (50 CFR 402.02). Under the MSA, "federal action" means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a federal agency (50 CFR 600.910).

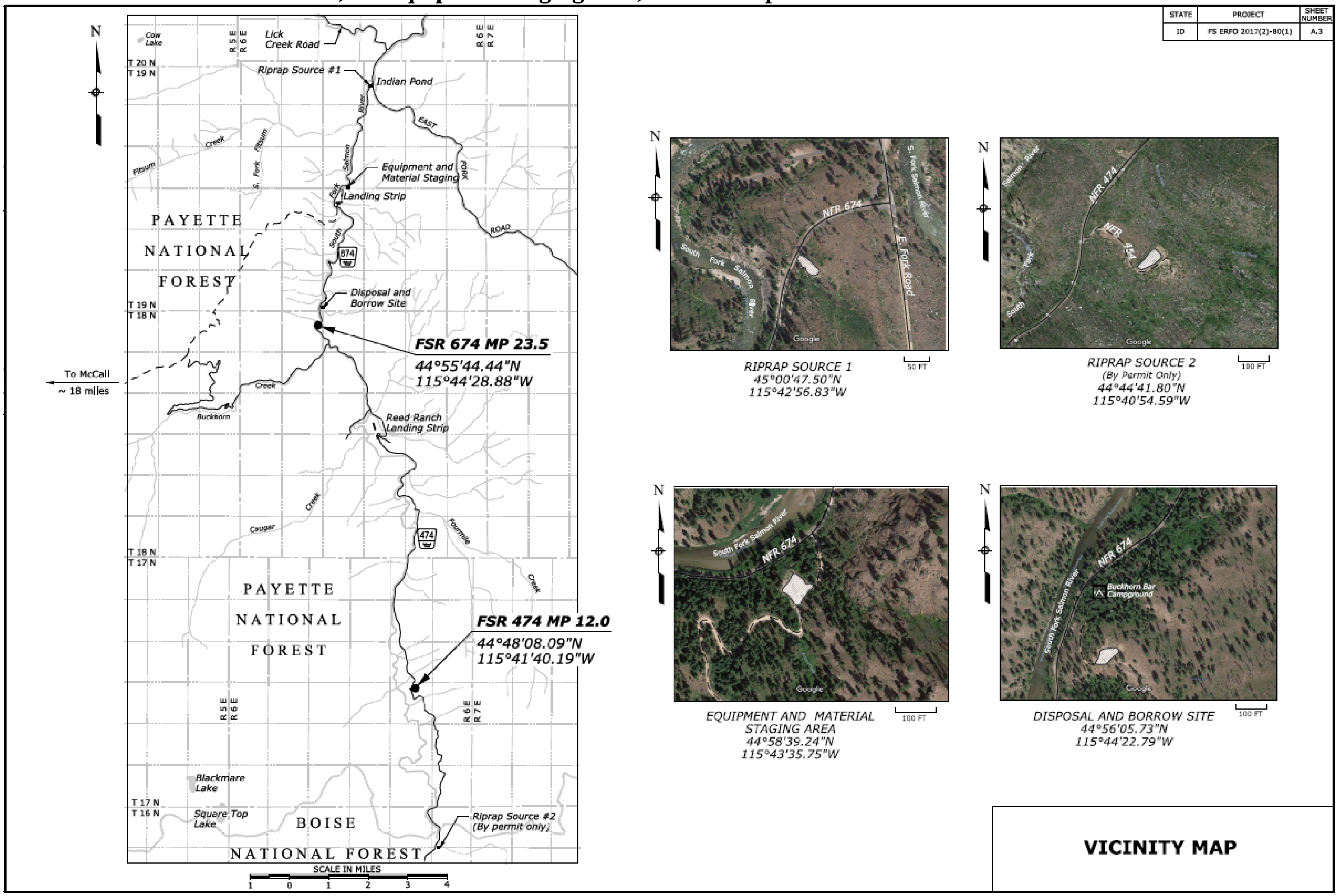
"Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02). No interrelated or interdependent activities were identified by the FHWA, COE, or NMFS. The proposed repair will not change the size, straightness, or traffic capacity of the road, and therefore should not result in higher rates of rural growth, levels of commerce, or higher levels of recreational activities.

The federal actions covered by this Opinion are the funding of the SFSR bank stabilization project by FHWA and permitting of fill associated with the project by the COE. The project will occur on PNF land and the PNF is providing technical assistance to minimize adverse effects on aquatic resources.

The project entails repair of a total of 275 linear feet of roadway at two sites, one at mile post (MP) 12 site and one at MP 23.5 site. The location of the two repair sites, staging areas, rock source area, and the disposal site for excavated material is in Figure (1). Descriptions of the sites and specific activities that will occur at each site are in Sections 1.3.1 and 1.3.2.

[2] The SRKW were listed as endangered on November 18, 2005 (70 FR 69903); critical habitat was designated on November 29, 2006 (71 FR 69054).

Figure 1. Map showing location of the MP 12 site and the MP 23.5 site and area photographs and locations of the riprap source material sites, the equipment staging area, and the disposal site.



1.3.1 Mile Post 12 Site

The coordinates of the MP 12 site are 44° 48' 08.09" N, 115° 41' 40.19" W. The site is approximately 58 miles upstream from the confluence of the SFSR and the main Salmon River. The site is approximately 1,600 feet east of, and 435 feet above, the mainstem SFSR. The closest surface water is Silver Creek, a small tributary of the SFSR that is located approximately 500 feet north, and 80 feet below, the site. The slopes adjacent to the road exceed 30°, which is a factor in the need for repairs.

Runoff and saturated soils at MP 12 site has led to the formation of a rotational slump within the road fill. The length of the damage, and the length of the proposed repair, is approximately 75 feet. The slump resulted in complete loss of the road shoulder and has reduced the pavement width by approximately 4 feet. The proposed repairs at this site include some roadway excavation, installation of a reinforced soil slope, replacement of road fill, and replacing the asphalt surface and ditch-relief culverts. Work at this site may last up to 6 weeks. Work will occur during daylight hours only and will not occur when snowmelt and/or precipitation is expected to result in surface runoff. Equipment used at this site will include hydraulic excavators, dump trucks, bulldozers, motor graders, backhoe loaders, and rollers. All equipment will be cleaned and inspected for weeds and weed seeds prior to transport into the SFSR drainage.

Although the site is approximately 500 feet from the nearest surface water, it is on a steep slope and there is therefore some risk of sediment reaching flowing water. Sediment control best management practices (BMPs) that will be employed include: Fiber rolls on the upper perimeter of the work area to prevent stormwater from running onto the project; fiber rolls and/or wire-backed silt fence around the down-slope perimeter of the work area; minimizing the time that soils are exposed to potential erosion (no more than 10 days); installing fiber rolls along the contours of the completed project; and stabilizing all disturbed ground with mulch and an appropriate, weed free native seed mix. In addition, a supply of erosion-control materials will be kept onsite to respond to erosion emergencies. All sediment control materials will be certified weed-free.

All equipment used onsite will be maintained in a leak free condition and will be inspected for leaks at the beginning of each workday. Fueling of equipment will not occur closer than 150 feet from surface water and spill kits will be maintained at the site, and at fueling locations, if fueling occurs offsite. All BMPs for sediment control, weed control, and fueling will be posted at the project site.

1.3.2 Mile Post 23.5 Site

The coordinates of the MP 23.5 site are 44° 55' 44.44" N, 115° 44' 28.88" W. This site is on the east side of the SFSR 45 miles upstream from the confluence of the SFSR and the main Salmon River. This section of the road is immediately adjacent to the river and has been protected from erosion by riprap bank armoring, which likely was installed when the road was originally constructed. High flow has damaged the historic riprap and road fill, resulting in loss of approximately 200 linear feet of riprap, some road fill, and some damage to the road shoulder.

Some wear of the existing bank armoring has probably been ongoing since the road was originally constructed, but the need for repair became apparent after the unusually high flows in spring of 2017, which resulted in the PNF adding 30–40 cubic yards of riprap as part of an emergency repair (PNF 2017). As of summer 2018, the roadway pavement was in acceptable condition, but the streambank has been oversteepened by past erosion, is currently protected entirely by the rock added in 2017, and may not withstand another high flow event without additional damage (Figure 2). High flows in spring of 2019 could therefore result in need for repair of the road surface.

Figure 2. Mile post 23.5 project area showing riprap added by the PNF in 2017, a lack of riparian vegetation along the water's edge, and an oversteepened condition due to historic erosion.

The proposed work at the MP 23.5 site includes removal of slumped material, replacement of riprap armoring, replacement of road fill, repairing the road shoulder, and replacing and/or repairing the road pavement as needed. When feasible, work will be completed from the bank, but a substantial amount of in-water work will be required. A more detailed description of the proposed work, and measures to minimize adverse impacts, are in Sections 1.3.2.1–1.3.2.5. Additional measures to minimize adverse impacts are in Section 1.3.3.

1.3.2.1 Installation of Riprap

Approximately 200 linear feet of the streambank will be revetted with class 6 riprap[3]. The streambed adjacent to the east bank will be excavated, allowing the riprap to extend down to a depth approximately 6 feet below the current level of the streambed. The riprap will be

[3] Class 6 riprap is 13–45 inches diameter angular rock, with the majority in the 20–32 inches diameter range, 15 percent in the 13–20 inches diameter range, and 15 percent in the 32–45 inches diameter range.

approximately 6 feet thick and the top of the riprap will be approximately 7 feet below the road surface. Unclassified borrow will be used to bring the damaged portions of the roadway up to grade. Excavated streambed material will be stored at an upland location until it is needed to cover the riprap toe.

The completed riprap will have a slope of 1.5 Horizontal:1 Vertical. The riprap toe will be covered with the excavated streambed material to approximately the same level as the pre-project streambed. Excavated material that is not used will be will be taken to the designated disposal site located at 44° 56’ 05.73” N, 115°44’22.79” W (Figure 1). All disturbed areas above the streambed level will be seeded with an appropriate native plant mix. Willow poles will be planted in the riprap, as practicable, and will be planted along the streambank, where appropriate.

1.3.2.2 Isolation and Fish Salvage

The work area within the river channel will be isolated from flowing water with a temporary coffer dam consisting of sand-filled Super Sacs, smaller sandbags, and plastic sheeting. The dam will be constructed from the upstream to the downstream end of the work area with the downstream end left open so fish can be driven out. Prior to completing the downstream end, fish will be driven out of the work area, from the upstream end, and then the work area will be seined, from the upstream to the downstream end. Immediately after seining, the downstream end of the coffer dam will be put in place and electrofishing will be conducted, within the work area, in accordance with NMFS guidelines (NMFS 2000). All captured fish will be transported to suitable release areas that will be designated prior to commencing salvage.

Water will not be pumped out of the work area until fish salvage is complete. Water will be pumped to a suitable upland site (i.e., a site with suitable vegetation) if one is available. If a suitable upland site is not available, water will be pumped into settling tanks, or a combination of settling tanks and filter media. Due to the nature of the substrate, some pumping of water out of the project area may be required throughout the work period. The isolated area, including the footprint of the coffer dam, will be approximately 12,200 square feet.

1.3.2.3 Coffer Dam Removal and Turbidity Monitoring

Any surface water entering the SFSR due to pumping from the work area will be visually monitored for turbidity. If any turbidity is seen, samples will be taken at the discharge point. If measured turbidity levels are greater than 35 nephelometric turbidity units (NTUs) over background levels, measured 100 feet downstream from the discharge point, then measures will be taken to reduce turbidity. Measures to reduce turbidity might include: reducing the rate of pumping from the project area; increasing settling tank capacity (i.e., more and/or bigger storage tanks); increasing the amount of filter media; or a combination of measures.

The coffer dam will be removed after the work is complete. Prior to removal, water inside the coffer dam will be raised to the level of water outside of the dam. This might require removing a small section of the dam or it might occur entirely from seepage when pumping is stopped. Regardless, after the water levels equalize, sediment inside the coffer dam will be allowed to settle before removal of the rest of the dam. Turbidity will be measured at, 30 minute intervals, 300 feet downstream from the work site while the coffer dam is being removed and will continue, after removal, until two subsequent turbidity measurements are less than 35 NTUs over background. If, during dam removal, measured turbidity is greater than 35 NTUs over background, then the removal will cease until turbidity drops below 35 NTUs over background.

1.3.2.4 Monitoring for Chinook Salmon Redds

No in-water work will take place prior to July 15. If the in-water portion of the project can be completed before August 16, then no monitoring for Chinook salmon redds will be required. If in-water work cannot be completed before August 16, then all in-water work will be completed during an alternate work window of September 14 through October 15. If in-water work will be completed during the alternate work window, then monitoring for Chinook salmon redds will be completed before in-water work commences.

If in-water work will be completed during the alternate work window, then the reach of the SFSR, from 100 feet upstream from the upstream extent of in-water work to 1,200 feet downstream from the downstream extent of in-water work, will be surveyed for Chinook salmon redds. If the Idaho Department of Fish and Game (IDFG) and/or the NPT conducts ground based redd surveys throughout this reach of the SFSR, and if those surveys record location data for each Chinook salmon redd identified, and if those location data are made available to Western Federal Lands prior to commencement of in-water work, then IDFG and/or NPT redd surveys will fulfill the Chinook salmon redd monitoring requirements. If IDFG and NPT redd location data are not available, then FHWA must ensure that experienced fisheries workers[4] survey for redds. This survey must be ground based (including wading) and must occur between September 7 and the commencement of in-water work.

If no redds are found in the reach of the SFSR extending from 50 feet upstream from the upstream extent of in-water work to 1,000 feet downstream from the downstream extend of in-water work, then in-water work can proceed with the turbidity monitoring described in Section 1.3.2.3. If a redd or redds are found closer than 1,000 feet, but not less than 500 feet downstream from the downstream extent of in-water work, or within 50 feet of the upstream end of the extent of in-water work, then in-water work will only proceed after FHWA meets with NMFS to identify and implement additional measures to protect the redds. Additional measures may include, but are not limited to, measuring turbidity closer to the downstream end of the coffer dam and taking action to reduce turbidity at levels less than 35 NTUs over background. If a redd is found closer than 500 feet downstream from the downstream extent of in-water work, then FHWA will meet with NMFS to determine if the project will proceed on schedule or be postponed until the next in-water work window. The project could proceed on schedule if 250 or more redds are counted in the SFSR during the construction year and if additional minimization measures can ensure that no more than one Chinook salmon redd is adversely affected.

[4] At least one of the surveyors must be a fisheries biologist or fisheries technician who has completed IDFG redd count training and has conducted redd surveys within the past 3 years.

1.3.2.5 Access Route

A temporary access route, approximately 250 feet in length, will be built from the road down to the riverbank. Most of the route will be built on a historic river access that has minimal woody vegetation. The route will follow slope contours to minimize erosion, and will avoid woody vegetation to the extent practicable, although up to three small trees will be removed. Willow and dogwood shrubs currently present on the route will be removed with the root balls intact, stored, and replanted after construction is complete. The route will also be used as a storage/staging area for the Super Sacs, visqueen sheeting, and sand bags used in the coffer dam.

1.3.3 Best Management Practices

The following BMPs will be in place throughout the construction phase of the project:

- Minimize vegetation clearing to the maximum extent possible.
- Ensure equipment used onsite is free of weeds, weed seeds, and soil that may contain weeds or weed seeds prior to entering USFS lands.
- Revegetate all disturbed areas with native ground cover.
- For the MP 23.5 site, use the staging area located at: 44° 58’ 39.24 N, 115° 43’ 35.75” W; for the MP 12 site, use staging areas that are already disturbed/developed and that are located at least 150 feet from surface water.
- Divert stream flow around the work area and maintain downstream flow during construction.
- Isolate in-water work areas prior to in-water activities. Dewater work area as necessary for construction and to minimize turbidity. Do not discharge turbid water to streams.
- Conduct fish salvage prior to in-water work.
- Provide a natural resource professional (biologist, hydrologist, or fluvial geomorphologist) on-site during substrate placement and placement of lower layers of riprap.
- Comply with applicable Clean Water Act permits for work in wetlands or streams.
- Restrict construction vehicles and equipment to roads and designated work areas.
- Biodegradable hydraulic fluids will be used in equipment working below the ordinary high water mark (OHWM).
- Return temporary disturbance areas to pre-project contours.

- Dispose of waste material generated from road work at the designated disposal site located at: 44° 56’ 05.73” N, 115° 44’ 22.79” W.

- Develop and implement a spill prevention and spill response plan.

- For the MP 23.5 site, store, fuel, and maintain all vehicles and other heavy equipment (when not in use) in the designated staging area located at: 44° 58’ 39.24 N, 115° 43’ 35.75” W; for the MP 12 site, store, fuel, and maintain all vehicles in an upland staging area located a minimum of 150 feet away from any stream, waterbody, or wetland, and where any spilled material cannot enter natural or manmade drainage conveyances.

- Confirm equipment is clean (e.g., power-washed) and that it does not have fluid leaks prior to contractor mobilization of heavy equipment to site. Inspect equipment and tanks for drips or leaks daily and make necessary repairs within 24 hours.

- In the event of a spill, immediately contain the spill, eliminate the source, and deploy appropriate measures to clean and dispose of spilled materials in accordance with federal, state, and local regulations.

- Maintain emergency spill control materials, such as oil booms and spill response kits, onsite at each work area at all times and ready for immediate deployment.

- No blasting will occur as part of this project.

- No pesticides or herbicides would be applied as part of this project

- Riprap material placed below OHWM will be clean and free of fine sediments.

- Turbidity monitoring will occur downstream of the project during all in-stream work. Turbidity monitoring will occur approximately 300 feet downstream from the work area. If a sediment plume is released and turbidity exceeds 35 NTUs above background (upstream from work area) levels, activities will be halted and, if needed, additional mitigation measures will be employed to bring turbidity back in compliance.

All BMPs for sediment control, weed control, and fueling will be posted at the project sites and staging areas.

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 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 provides 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 non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This Opinion includes both a jeopardy analysis and/or an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of" a listed species, which is "to engage in an action that 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 relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (81 FR 7214).

The designations of critical habitat for Snake River Basin steelhead and Snake River spring/summer Chinook salmon use the term primary constituent element (PCE) or essential features. The new critical habitat regulations (81 FR 7414) replace 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.

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

- Identify the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors by: (1) Reviewing the status of the species and critical habitat; and (2) adding the effects of the action, the environmental

baseline, and cumulative effects to assess the risk that the proposed action poses to species and critical habitat.

- Reach a conclusion about whether species are jeopardized or critical habitat is adversely modified.

- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This Opinion examines the status of each species that would 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 (Table 1). 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' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. This Opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds that make up the designated area, and discusses the current function of the PBF that help to form that conservation value.

Table 1. Listing status, status of critical habitat designations and protective regulations, and relevant Federal Register decision notices for ESA-listed species considered in this opinion.

Species	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon *(Oncorhynchus tshawytscha)*			
Snake River spring/summer-run	T 6/28/05; 70 FR 37160	10/25/99; 64 FR 57399	6/28/05; 70 FR 37160
Steelhead (*O. mykiss*)			
Snake River Basin	T 1/05/06; 71 FR 834	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160

Note: Listing status: 'T' means listed as threatened under the ESA.

2.2.1 Status of the Species

This section describes the present condition of the Snake River spring/summer Chinook salmon evolutionarily significant unit (ESU) and the Snake River Basin steelhead distinct population segment (DPS). NMFS expresses the status of a salmonid ESU or DPS in terms of likelihood of persistence over 100 years (or risk of extinction over 100 years). NMFS uses McElhaney 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 viable salmonid population, or VSP, are: (1) Abundance (number of adult spawners in natural production areas); (2) productivity (adult progeny per parent); (3) spatial structure; and (4) diversity. 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.

2.2.1.1 Snake River Spring/Summer Chinook Salmon

The Snake River spring/summer Chinook salmon ESU was listed as threatened on April 22, 1992 (57 FR 14653). This ESU occupies the Snake River basin, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Several factors led to NMFS' conclusion that Snake River spring/summer Chinook were threatened: (1) Abundance of naturally produced Snake River spring and summer Chinook runs had dropped to a small fraction of historical levels; (2) short-term projections were for a continued downward trend in abundance; (3) hydroelectric development on the Snake and Columbia Rivers continued to disrupt Chinook runs through altered flow regimes and impacts on estuarine habitats; and (4) habitat degradation existed throughout the region, along with risks associated with the use of outside hatchery stocks in particular areas (Good et al. 2005). On May 26, 2016, in the agency's most recent 5-year review for Pacific salmon and steelhead, NMFS concluded that the species should remain listed as threatened (81 FR 33468).

Life History. Snake River spring/summer Chinook salmon are characterized by their return times. Runs classified as spring Chinook salmon are counted at Bonneville Dam beginning in early March and ending the first week of June; summer runs are those Chinook adults that pass Bonneville Dam from June through August. Returning adults will hold in deep mainstem and tributary pools until late summer, when they move up into tributary areas and spawn. In general, spring-run type Chinook salmon tend to spawn in higher-elevation reaches of major Snake River tributaries in mid- through late August; and summer-run Chinook salmon tend to spawn lower in Snake River tributaries in late August and September (although the spawning areas of the two runs may overlap).

Spring/summer Chinook salmon spawn follow a "stream-type" life history characterized by rearing for a full year in the spawning habitat and migrating in early to mid-spring as age-1 smolts (Healey 1991). Eggs are deposited in late summer and early fall, incubate over the following winter, and hatch in late winter and early spring of the following year. Juveniles rear through the summer, and most overwinter and migrate to sea in the spring of their second year of life. Depending on the tributary and the specific habitat conditions, juveniles may migrate extensively from natal reaches into alternative summer-rearing or overwintering areas. Snake River spring/summer Chinook salmon return from the ocean to spawn primarily as 4- and 5-year-old fish, after 2 to 3 years in the ocean. A small fraction of the fish return as 3-year-old "jacks," heavily predominated by males (Good et al. 2005).

Spatial Structure and Diversity. The Snake River ESU includes all naturally spawning populations of spring/summer Chinook in the mainstem Snake River (below Hells Canyon Dam) and in the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins (57 FR 23458), as well as the progeny of 15 artificial propagation programs (70 FR 37160). The hatchery programs include the South Fork Salmon River (McCall Hatchery), Johnson Creek, Lemhi River, Pahsimeroi River, East Fork Salmon River, West Fork Yankee Fork Salmon River, Upper Salmon River (Sawtooth Hatchery), Tucannon River (conventional and captive broodstock programs), Lostine River, Catherine Creek, Lookingglass Creek, Upper Grande Ronde River, Imnaha River, and Big Sheep Creek programs. The historical Snake River ESU likely also included populations in the Clearwater River drainage and extended above the Hells Canyon Dam complex.

Within the Snake River ESU, the Interior Columbia Technical Recovery Team (ICTRT) identified 28 extant and four extirpated or functionally extirpated populations of spring/summer-run Chinook salmon, listed in Table 2 (ICTRT 2003; McClure et al. 2005). The ICTRT aggregated these populations into five MPGs: Lower Snake River, Grande Ronde/Imnaha Rivers, South Fork Salmon River, Middle Fork Salmon River, and Upper Salmon River. For each population, Table 2 shows the current risk ratings that the ICTRT assigned to the four parameters of a VSP (spatial structure, diversity, abundance, and productivity).

Spatial structure risk is low to moderate for most populations in this ESU (NWFSC 2015) and is generally not preventing the recovery of the species. Spring/summer Chinook salmon spawners are distributed throughout the ESU albeit at very low numbers. Diversity risk, on the other hand, is somewhat higher, driving the moderate and high combined spatial structure/diversity risks shown in Table 2 for some populations. Several populations have a high proportion of hatchery-origin spawners—particularly in the Grande Ronde, Lower Snake, and South Fork Salmon MPGs—and diversity risk will need to be lowered in multiple populations in order for the ESU to recover (ICTRT 2007; ICTRT 2010; NWFSC 2015). Diversity risk for the SFSR Chinook salmon population is moderate due to a high proportion of hatchery spawners.

Table 2. Summary of viable salmonid population parameter risks and overall current status for each population in the Snake River spring/summer Chinook salmon ESU (NWFSC 2015).

MPG	Population	VSP Risk Parameter		Overall Viability Rating
		Abundance/ Productivity	Spatial Structure/ Diversity	
South Fork Salmon River (Idaho)	Little Salmon River	*Insf. data*	Low	High Risk
	South Fork Salmon River mainstem	High	Moderate	High Risk
	Secesh River	High	Low	High Risk
	East Fork South Fork Salmon River	High	Low	High Risk
Middle Fork Salmon River (Idaho)	Chamberlain Creek	Moderate	Low	Maintained
	Middle Fork Salmon River below Indian Creek	*Insf. data*	Moderate	High Risk
	Big Creek	High	Moderate	High Risk
	Camas Creek	High	Moderate	High Risk
	Loon Creek	High	Moderate	High Risk

MPG	Population	VSP Risk Parameter		Overall Viability Rating
		Abundance/ Productivity	Spatial Structure/ Diversity	
	Middle Fork Salmon River above Indian Creek	High	Moderate	High Risk
	Sulphur Creek	High	Moderate	High Risk
	Bear Valley Creek	High	Low	High Risk
	Marsh Creek	High	Low	High Risk
Upper Salmon River (Idaho)	North Fork Salmon River	*Insf. data*	Low	High Risk
	Lemhi River	High	High	High Risk
	Salmon River Lower Mainstem	High	Low	High Risk
	Pahsimeroi River	High	High	High Risk
	East Fork Salmon River	High	High	High Risk
	Yankee Fork Salmon River	High	High	High Risk
	Valley Creek	High	Moderate	High Risk
	Salmon River Upper Mainstem	High	Low	High Risk
	Panther Creek			***Extirpated***
Lower Snake (Washington)	Tucannon River	High	Moderate	High Risk
	Asotin Creek			***Extirpated***
Grande Ronde and Imnaha Rivers (Oregon/ Washington)	Wenaha River	High	Moderate	High Risk
	Lostine/Wallowa River	High	Moderate	High Risk
	Minam River	High	Moderate	High Risk
	Catherine Creek	High	Moderate	High Risk
	Upper Grande Ronde River	High	High	High Risk
	Imnaha River	High	Moderate	High Risk
	Lookingglass Creek			***Extirpated***
	Big Sheep Creek			***Extirpated***

Abundance and Productivity. Historically, the Snake River drainage is thought to have produced more than 1.5 million adult spring/summer Chinook salmon in some years (Matthews and Waples 1991), yet by the mid-1990s counts of wild fish passing Lower Granite Dam dropped to less than 10,000 (IDFG 2007). Wild returns have since increased somewhat but remain a fraction of historic estimates. Between 2005 and 2015, the number of wild adult fish passing Lower Granite Dam annually ranged from 8,808 to 30,338 (IDFG 2016). Natural origin abundance has increased over the last 5 years for most populations in this ESU, but the increases have not been large enough to change population viability ratings for abundance and productivity; all but one population (Chamberlain Creek) remain at high risk of extinction over the next 100 years (NWFSC 2015). Many populations in Table 2 will need to see increases in abundance and productivity in order for the ESU to recover.

The proposed action will affect individuals in the SFSR Chinook salmon population. Population trend data for most of the Chinook salmon populations in the Idaho portion of the ESU date to 1957, when IDFG started annual Chinook salmon index reach redd counts. Like all of the populations in the ESU, the number of redds in the SFSR Chinook salmon population dropped between 1957 and the mid-1980s. Index reach redd counts for most of the populations in the ESU dropped to dramatically low levels, often fewer than 10 redds, in the early to mid-1990s. In contrast, the lowest count on record for the SFSR population is 97, an order of magnitude higher than the low counts for most of the populations, and the low point for the population (measured as 5-year geomean) occurred in the mid-1980s instead of the mid-1990s (Figure 3). The relative "abundance," compared to other populations in the ESU, is probably due to a combination of extensive hatchery supplementation that began in the mid-1970s, and relatively high quality spawning and rearing habitat (see Section 2.2.2). The quality of spawning/rearing habitat is further evidenced by the number of naturally produced SFSR smolts reaching Lower Granite Dam, which during some years, is among the highest in the ESU (Walters et al. 2013). Although more abundant than most populations, the SFSR Chinook salmon population continues to be rated as high risk of extinction due to low abundance and productivity.

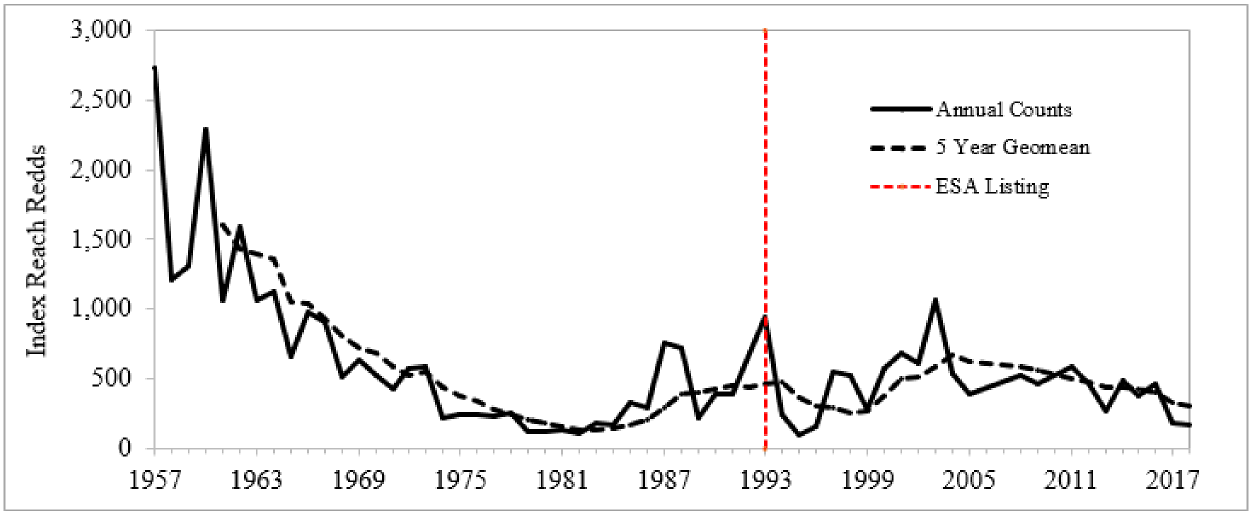


Figure 3. Index reach redds counted in the South Fork Salmon River Chinook salmon population area from 1957 through 2018.

2.2.1.2 Snake River Basin Steelhead

The Snake River Basin 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). 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, and widespread habitat degradation and reduced streamflows 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 Snake River Basin steelhead over Lower Granite Dam (Good et al. 2005; Ford 2011). On May 26, 2016, in the agency's most recent 5-year review for Pacific salmon and steelhead, NMFS concluded that the species should remain listed as threatened (81 FR 33468).

Life History. Adult Snake River Basin 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 six artificial propagation programs (71FR834). The hatchery programs include Dworshak National Fish Hatchery, Lolo Creek, North Fork Clearwater River, East Fork Salmon River, Tucannon River, and the Little Sheep Creek/Imnaha River steelhead hatchery programs. The Snake River Basin steelhead listing does not include resident forms of *O. mykiss* (rainbow trout) co-occurring with steelhead.

The 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 parameters of a VSP (spatial structure, diversity, abundance, and productivity).

The Snake River Basin DPS steelhead exhibit a diversity of life-history strategies, including variations in fresh water and ocean residence times. Traditionally, fisheries managers have classified Snake River Basin 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. New information shows that 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.

Diversity risk for populations in the DPS is either moderate or low. Large numbers of hatchery steelhead are released in the Snake River, and the relative proportion of hatchery adults in natural spawning areas near major hatchery release sites remains uncertain. Moderate diversity risks for some populations are thus driven by the high proportion of hatchery fish on natural spawning grounds and the uncertainty regarding these estimates (NWFSC 2015). Reductions in hatchery-related diversity risks would increase the likelihood of these populations reaching viable status.

The diversity risk for the SFSR steelhead population is low. This population has a relatively large proportion of B-run fish, is well distributed throughout most[5] of the population area, and has never been supplemented with hatchery fish. From a diversity standpoint, the SFSR steelhead population is one of the stronger populations in the DPS.

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). Historical estimates of steelhead passing Lewiston Dam (removed in 1973) on the lower Clearwater River were 40,000 to 60,000 adults (Ecovista et al. 2003), and the Salmon River basin likely supported substantial production as well (Good et al. 2005). In contrast, at the time of listing in 1997, the 5-year mean abundance for natural-origin steelhead passing Lower Granite Dam, which includes all but one population in the DPS, was 11,462 adults (Ford 2011). Counts have increased since then, with between roughly 23,000 and 44,000 adult wild steelhead passing Lower Granite Dam in the most recent 5-year period (2011–2015) (NWFSC 2015).

Population-specific abundance estimates exist for some but not all populations. Of the populations for which we have data, three (Joseph Creek, Upper Grande Ronde, and Lower Clearwater) are meeting minimum abundance/productivity thresholds and several more have likely increased in abundance enough to reach moderate risk. Despite these recent increases in abundance, the status of many of the individual populations remains uncertain, and four out of the five MPGs are not meeting viability objectives (NWFSC 2015). In order for the species to recover, more populations will need to reach viable status through increases in abundance and productivity.

The proposed action would affect individuals in the SFSR steelhead population. The SFSR steelhead population is one of the few that has never been supplemented with hatchery fish and it has the highest proportion of B-run individuals. These two attributes make the SFSR steelhead population very important for recovery of the DPS. Estimates of the number of steelhead spawners returning to the SFSR are available for the 2011–2012 through the 2015–2016 runs and ranged from 602 spawners in 2103–2014 to 1,184 spawners in 2014–2015, with a 5-year geomean of 786 spawners (Copeland et al. 2014; Copeland et al. 2015; Stark et al. 2016; Stark et al. 2017; Stark et al. 2018). These abundance estimates suggest that the tentative abundance/productivity risk ranking of “Moderate?” (Table 3) is likely correct.

[5] There are no steelhead in the East Fork South Fork Salmon River upstream from the Stibnite Mine site but essentially all of the other historically accessible habitat is probably occupied.

Table 3. Summary of viable salmonid population parameter risks and overall current status for each population in the Snake River Basin steelhead DPS (NWFSC 2015). Risk ratings with "?" are based on limited or provisional data series.

MPG	Population	VSP Risk Parameter		Overall Viability Rating
		Abundance/ Productivity	Spatial Structure/ Diversity	
Lower Snake River	Tucannon River	High?	Moderate	High Risk?
	Asotin Creek	Moderate?	Moderate	Maintained?
Grande Ronde River	Lower Grande Ronde	N/A	Moderate	Maintained?
	Joseph Creek	Very Low	Low	**Highly Viable**
	Wallowa River	N/A	Low	Maintained?
	Upper Grande Ronde	Low	Moderate	**Viable**
Imnaha River	Imnaha River	Moderate?	Moderate	Maintained?
Clearwater River (Idaho)	Lower Mainstem Clearwater River*	Moderate?	Low	Maintained?
	South Fork Clearwater River	High?	Moderate	High Risk?
	Lolo Creek	High?	Moderate	High Risk?
	Selway River	Moderate?	Low	Maintained?
	Lochsa River	Moderate?	Low	Maintained?
	North Fork Clearwater River			*Extirpated*
Salmon River (Idaho)	Little Salmon River	Moderate?	Moderate	Maintained?
	South Fork Salmon River	Moderate?	Low	Maintained?
	Secesh River	Moderate?	Low	Maintained?
	Chamberlain Creek	Moderate?	Low	Maintained?
	Lower Middle Fork Salmon R.	Moderate?	Low	Maintained?
	Upper Middle Fork Salmon R.	Moderate?	Low	Maintained?
	Panther Creek	Moderate?	High	High Risk?
	North Fork Salmon River	Moderate?	Moderate	Maintained?
	Lemhi River	Moderate?	Moderate	Maintained?
	Pahsimeroi River	Moderate?	Moderate	Maintained?
	East Fork Salmon River	Moderate?	Moderate	Maintained?
	Upper Mainstem Salmon R.	Moderate?	Moderate	Maintained?
Hells Canyon	Hells Canyon Tributaries			*Extirpated*

*Current abundance/productivity estimates for the Lower Clearwater Mainstem population exceed minimum thresholds for viability, but the population is assigned moderate risk for abundance/productivity due to the high uncertainty associated with the estimate.

2.2.2 Status of Critical Habitat

In evaluating the condition of designated critical habitat, NMFS examines the condition and trends of PBFs which are essential to the conservation of the ESA-listed species because they support one or more life stages of the species. Proper function of these PBFs is necessary to support successful adult and juvenile migration, adult holding, spawning, incubation, rearing, and the growth and development of juvenile fish. Modification of PBFs may affect freshwater spawning, rearing or migration in the action area. Generally speaking, sites required to support one or more life stages of the ESA-listed species (i.e., sites for spawning, rearing, migration, and foraging) contain PBF essential to the conservation of the listed species (e.g., spawning gravels, water quality and quantity, side channels, or food) (Table 4).

Table 4. Types of sites, essential physical and biological features, 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 & 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
Snake River Spring/Summer Chinook Salmon		
Spawning & Juvenile Rearing	Spawning gravel, water quality and quantity, cover/shelter (Chinook only), food, riparian vegetation, space (Chinook only), water temperature and access (sockeye only)	Juvenile and adult
Migration	Substrate, water quality and quantity, water temperature, water velocity, cover/shelter, food[d], riparian vegetation, space, safe passage	Juvenile and adult

[a] Additional PBFs pertaining to estuarine, nearshore, and offshore marine areas have also been described for Snake River steelhead and Middle Columbia 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.
[d] Food applies to juvenile migration only.

Table 5 describes the geographical extent, within the Snake River, of critical habitat for Snake River spring/summer Chinook salmon and Snake River basin steelhead. Critical habitat includes the stream channel and water column with the lateral extent defined by the ordinary high-water line, or the bankfull elevation where the ordinary high-water line is not defined. In addition, critical habitat for Chinook salmon includes the adjacent riparian zone, which is defined as the area within 300 feet of the line of high water of a stream channel or from the shoreline of standing body of water (58 FR 68543). The riparian zone is critical because it provides shade, streambank stability, organic matter input, and regulation of sediment, nutrients, and chemicals.

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 basin (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.

Table 5. Geographical extent of designated critical habitat within the Snake River for ESA-listed salmon and steelhead.

ESU/DPS	Designation	Geographical Extent of Critical Habitat
Snake River spring/summer Chinook salmon	58 FR 68543; December 28, 1993. 64 FR 57399; October 25, 1999.	All Snake River reaches upstream to Hells Canyon Dam; all river reaches presently or historically accessible to Snake River spring/summer Chinook salmon within the Salmon River basin; and all river reaches presently or historically accessible to Snake River spring/summer Chinook salmon within the Hells Canyon, Imnaha, Lower Grande Ronde, Upper Grande Ronde, Lower Snake-Asotin, Lower Snake-Tucannon, and Wallowa subbasins.
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's geographical range that are excluded from critical habitat designation.

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 Snake River Basin 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 2011). 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 run-of-river dams on the mainstem lower Snake and lower Columbia Rivers, have altered biological and physical attributes of the mainstem migration corridor. These alterations have affected juvenile migrants to a much larger extent than adult migrants. However, changing temperature patterns have created passage challenges for summer migrating adults in recent years, requiring new structural and operational solutions (i.e., cold water pumps and exit "showers" for ladders at Lower Granite and Lower Monumental dams). Actions taken since 1995 that have reduced negative effects of the hydrosystem on juvenile and adult migrants including:

- Minimizing winter drafts (for flood risk management and power generation) to increase flows during peak spring passage;
- Releasing water from storage to increase summer flows;
- Releasing water from Dworshak Dam to reduce peak summer temperatures in the lower Snake River;
- Constructing juvenile bypass systems to divert smolts, steelhead kelts, and adults that fall back over the projects away from turbine units;
- Providing spill at each of the mainstem dams for smolts, steelhead kelts, and adults that fall back over the projects;
- Constructing "surface passage" structures to improve passage for smolts, steelhead kelts, and adults falling back over the projects; and,
- Maintaining and improving adult fishway facilities to improve migration passage for adult salmon and steelhead.

The proposed action would affect Chinook salmon designated critical habitat in the SFSR Chinook salmon population area and steelhead designated critical habitat in the SFSR steelhead population area. The SFSR Chinook salmon population is one of three independent Chinook salmon populations in the SFSR drainage. The other two are the East Fork SFSR Chinook salmon population and the Secesh River Chinook salmon population. The SFSR steelhead population is one of two independent steelhead populations in the SFSR drainage, the other one being the Secesh River steelhead population. The SFSR drainage encompasses approximately 850,320 acres, 99 percent of which is administered by the USFS, 0.16 percent by the BLM, 0.27 percent is owned by the state of Idaho, and approximately 0.62 percent is privately owned.

Habitat in the SFSR drainage has been severely impacted by historic grazing; historic timber harvest; extensive road building, mostly associated with timber harvest; mining, although mostly confined to the East Fork of the South Fork Salmon River (EFSFSR) drainage; and wildland fire. Also, topography in the drainage is very steep and soils have high levels of decomposed granite, resulting in habitat that is especially vulnerable to grazing, timber harvest, and road building. This vulnerability was obvious by the 1960s and the USFS implemented a timber harvest and road construction moratorium in 1965, and closed most of the grazing allotments before 1970. The USFS also started implementing habitat restoration actions in the mid-1970s and continues to restore habitat throughout the drainage.

Although elevated levels of fine sediment continue to be an issue throughout the drainage, the approximately 50 years without large scale grazing; approximately 50 years without timber harvest and road building; forty years of active habitat restoration, including road obliteration; and increased recruitment of large woody debris due to wildland fire; has resulted in generally good to excellent quality of Chinook salmon designated critical habitat in within the SFSR Chinook salmon population area (NMFS 2017). Because the SFSR steelhead population area includes the EFSFSR, SFSR steelhead designated critical habitat is more affected by legacy effects historic mining than the SFSR Chinook salmon population. However, due to the factors described above, condition of SFSR steelhead designated critical habitat, outside of the EFSFSR drainage is generally good to excellent (NMFS 2017).

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. Several studies have revealed that climate change has the potential to affect ecosystems in nearly all tributaries throughout the Snake River (Battin et al. 2007; ISAB 2007). While the intensity of effects will vary by region (ISAB 2007), climate change is generally expected to alter aquatic habitat (water yield, peak flows, and stream temperature). As climate change alters the structure and distribution of rainfall, snowpack, and glaciations, each factor will in turn alter riverine hydrographs. Given the increasing certainty that climate change is occurring and is accelerating (Battin et al. 2007), NMFS anticipates salmonid habitats will be affected. Climate and hydrology models project significant reductions in both total snow pack and low-elevation snow pack in the Pacific Northwest over the next 50 years (Mote and Salathé 2009) changes that will shrink the extent of the snowmelt-dominated habitat available to salmon. Such changes may restrict our ability to conserve diverse salmon life histories.

In the Pacific Northwest, most models project warmer air temperatures, increases in winter precipitation, and decreases in summer precipitation. Average temperatures in the Pacific Northwest are predicted to increase by 0.1 to 0.6°C (0.2°F to 1.0°F) per decade (Mote and Salathé 2009). Warmer air temperatures will lead to more precipitation falling as rain rather than snow. As the snow pack diminishes, seasonal hydrology will shift to more frequent and severe early large storms, changing stream flow timing which may limit salmon survival (Mantua et al. 2009). The largest driver of climate-induced decline in salmon populations is projected to be the impact of increased winter peak flows, which scour the streambed and destroy salmon eggs (Battin et al. 2007).

Higher water temperatures and lower spawning flows, together with increased magnitude of winter peak flows are all likely to increase salmon mortality. The Independent Scientific Advisory Board (ISAB 2007) found that higher ambient air temperatures will likely cause water temperatures to rise. Salmon and steelhead require cold water for spawning and incubation. As climate change progresses and stream temperatures warm, thermal refugia will be essential to persistence of many salmonid populations. Thermal refugia are important for providing salmon and steelhead with patches of suitable habitat while allowing them to undertake migrations through or to make foraging forays into areas with greater than optimal temperatures. To avoid waters above summer maximum temperatures, juvenile rearing may be increasingly found only in the confluence of colder tributaries or other areas of cold water refugia (Mantua et al. 2009).

Climate change is expected to make recovery targets for salmon and steelhead populations more difficult to achieve. Climate change is expected to alter critical habitat by generally increasing temperature and peak flows and decreasing base flows. Although changes will not be spatially homogenous, effects of climate change are expected to decrease the capacity of critical habitat to support successful spawning, rearing, and migration. Habitat action can address the adverse impacts of climate change on salmon. Examples include restoring connections to historical floodplains and freshwater and estuarine habitats to provide fish refugia and areas to store excess floodwaters, protecting and restoring riparian vegetation to ameliorate stream temperature increases, and purchasing or applying easements to lands that provide important cold water or refuge habitat (Battin et al. 2007; ISAB 2007).

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 proposed action includes repair of USFS Road (FR) 474 at MP 12 and repair of FR 674 at MP 23.5. These two sites are approximately 9.3 miles apart, and effects at both sites will be localized, so the action area therefore consists of two disjunct areas. The action area at the MP 12 site includes approximately 75 feet of FR 474, including the area approximately 20 feet upslope, and 200 feet downslope, from the road. The action area at the MP 23.5 site includes approximately 150 feet of FR 674, including the area approximately 20 feet upslope from the road and the area downslope from the road to the SFSR. The action area at the MP 23.5 site also includes the mainstem SFSR extending from a point approximately 100 feet upstream from the upstream extent of in-water work, to a point approximately 600 feet downstream from the downstream extent of in-water work. The action area at the MP 12 site does not include any streams or riparian habitat conservation areas. The approximately 850 feet of the mainstem SFSR within the action area at the MP 23.5 site, is the only stream reach in the action area.

The portion of the mainstem SFSR within the action area is used by all freshwater life stages of threatened Snake River spring/summer Chinook salmon and Snake River basin steelhead and the one stream reach in the action area is designated critical habitat for both species (Table 1). Designated critical habitat for steelhead, within the action area, includes the mainstem SFSR channel up to the ordinary high water line (70 FR 52630). Designated critical habitat for Chinook salmon, within the action area, includes the mainstem SFSR channel and 300 feet slope distance upstream from the streambank. The action area is also EFH for Chinook salmon (PFMC 1998), and is in an area where environmental effects of the proposed project may adversely affect Chinook salmon EFH.

2.4 Environmental Baseline

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 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The proposed action would affect a short reach of the mainstem SFSR near RM 45. Many of the historic roads in the SFSR drainage have been closed, obliterated, or moved away from aquatic resources. This includes a large portion of the South Fork Salmon River Road (FR roads 474 and 674) (SFSR Road) that was moved away from the mainstem SFSR and paved, to reduce sediment impacts, in the late-1990s. However, due to very steep topography, the lower 11[6] miles of the SFSR Road was not moved and remains adjacent to the mainstem SFSR. The project reach is within this road segment that is adjacent to the SFSR.

Within the project reach, the east bank of the SFSR was historically revetted with riprap, most of which has washed away and, as is typical with failed riprap, there is little riparian vegetation and very poor quality fish habitat (Figure 2). Information on the amount of historic bank revetment on the SFSR is not available. The proximity of the lower eleven miles of the SFSR Road to the SFSR indicates that there are likely other areas with historic bank revetment. However, the erosive conditions at the MP 23.5 site suggests that adverse impacts of historic bank revetment are probably the most pronounced at that location.

Sediment levels and substrate embeddedness have historically been high in the SFSR due to historic timber harvest, road building, and grazing. Substrate condition has generally improved over the past 5 decades, although the large fires in the 2000s and 2010s have caused temporary increases in sediment levels in some stream reaches. Substrate condition in the mainstem SFSR ranges from functioning at risk to functioning appropriately, and is probably slowly trending toward functioning appropriately (USFS 2008).

Water temperature within the mainstem SFSR portion of the action area are currently near optimum for Chinook salmon and steelhead (Isaak et al. 2018). As the climate warms, lower reaches of the mainstem SFSR will become less suitable for salmonids, but the action area, located in the upper SFSR, will likely remain near optimal temperature for salmonids for 50 years or more (Isaak et al. 2018). Continued recovery of riparian vegetation, on both the mainstem SFSR and tributary streams, could extend the time that temperatures in the action area remain suitable for Chinook salmon and steelhead.

Mean monthly flow, measured approximately 3.8 miles downstream from the action area, ranges from 146 cubic feet per second (cfs) in September to 1,800 cfs in May. There are no storage reservoirs in the SFSR drainage and water use is very light, especially in the reaches upstream from the action area. Flow conditions in the action area are very close to natural and should support all freshwater life stages of Chinook salmon and steelhead. As vegetation recovers in burned areas, snow cover may persist further into the growing season and flow conditions during late summer/fall might improve somewhat.

Due to the proximity of the road and the past bank revetment, habitat conditions within the project area are degraded. However, conditions in the project area are not typical, and there is good quality habitat as close as the opposite bank. Overall habitat conditions in the mainstem SFSR are generally very good, are probably improving, and are probably conducive to recovery of Chinook salmon and steelhead.

[6] "Lower" from the standpoint of RMs and elevation. The northern terminus of the SFSR Road is at RM 37.5, and from there upstream to RM 48, the road is adjacent to the river.

2.5 Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

The proposed action is repair of two sections of the SFSR Road. The proposed activities at the MP 12 site involve relatively extensive excavation, fill, etc., on a steep slope where such activities could result in sediment being mobilized downslope. However, the MP 12 site is approximately 500 feet from the nearest surface water and the proposed action includes erosion control measures expected to effectively minimize amount of sediment mobilized downslope during construction, and over the long term after construction. The proposed action also includes measures expected to effectively minimize the chance of adverse effects due to fuel spills, lubricating and hydraulic oil leaks, and introduction of noxious weeds. These minimization measures will reduce chance that adverse effects on anadromous salmonids and habitat will occur, and will reduce magnitude of any effects that might occur. Therefore, effects generated from proposed activities at the MP 12 site, are expected to be either very unlikely to occur (e.g., fuel spills, chemical contamination) or very minor (e.g., sediment delivery) and are not expected to reach levels that will harm Chinook salmon or steelhead, or measurably affect designated critical habitat for either species. The effects for the MP 23.5 site will be described in more detail in Sections 2.5.1 and 2.5.2 below.

2.5.1 Effects on Chinook Salmon and Steelhead

At MP 23.5, the proposed action involves excavation, fill, installation of rock revetment, and repair/replacement of the road surface. Adverse effects on Chinook salmon and steelhead will likely occur when the coffer dam is installed, when fish are moved out of the work area, while water is being pumped out of the work area, and when the coffer dam is removed. The proposed action was designed to: (1) Minimize chance of adverse effects due to fuel spills and oil leaks; (2) minimize chance of adverse effects due to spread of invasive plants; (3) minimize adverse effects due to mobilization of sediment; (4) quickly reestablish vegetation on disturbed ground; and (5) protect, and if feasible increase amount of, woody riparian vegetation. Most of the effects of the proposed action will be temporary, ending soon after the in-water work is complete, but some habitat-related effects will be long term. Long-term effects may be both adverse and positive.

2.5.1.1 Fuel spills, Oil Leaks, Noxious Weeds, and Sediment from Staging Areas

The BA described BMPs[7] that will be employed to minimize the chance of adverse impacts associated with use of heavy equipment near flowing water. Implementation of these BMPs will result in a low risk of adverse impacts due to fuel spills, hydraulic and lubrication oil leaks, sediment delivery from disturbed staging areas, introduction of invasive plants, etc. Because the BMPs that will be employed have proven effective in many past projects, we do not expect

[7] The BMPs are also listed in Section 1.3.3 of this Opinion.

adverse effects due to fuel spills, oil leaks, sediment delivery from staging areas, or introduction of noxious weeds.

2.5.1.2 Turbidity Due to In-water Work

The proposed action will result in delivery of fine sediment into, and mobilization of fine sediment within the mainstem SFSR, which will result in increased turbidity in occupied habitat and sedimentation on substrates in occupied habitat. Placement of rock below the OHWM will occur in the dry, and will therefore not cause turbidity in the SFSR. However, some small pulses of turbidity will occur when the Super Sacs and smaller sandbags are placed in the river to dewater the work area. These pulses will be small and localized, will quickly dissipate, and are not likely to reach levels expected to harm Chinook salmon or steelhead.

Some sediment may be introduced into the river when water is pumped out of the in-water work area and other sediment may be suspended in or delivered to the river when the coffer dam is removed and flow is reintroduced to the in-water work area. Turbidity associated with reintroduced flows should be reduced by the proposed placement of clean riprap free of fine sediments below the OHWM. Water pumped out of the in-water work area could result in turbidity of up to 35 NTUs over background levels measured 100 feet downstream from the outflow. This small sediment plume could be present periodically throughout the duration of in-water work. However, because the water will be pumped through upland vegetation, and/or filter media, and/or settling tanks, prior to entering the river; any sediment deposited on the substrates will be minimal, very fine, and will likely flush out during the next high flow event.

The largest turbidity plume will probably occur when the coffer dam is removed and flow is reintroduced to the in-water work area. Based on documented effects of past projects involving in-water work, the measures to minimize sedimentation, described in Section 1.3, are expected to be effective (AWRC 2009; AWRC 2010; Eisenbarth 2011). We therefore expect turbidity levels in excess of 35 NTUs over background levels, measured 300 feet downstream from the project area, to be of extremely short duration, if they occur at all. We also expect turbidity plumes to be no more than 500 feet long and we expect turbidity levels to quickly return to background levels after the coffer dam is removed (AWRC 2010; Eisenbarth 2011).

Depending on duration and intensity, elevated turbidity due to suspended sediment can cause lethal, sublethal, and behavioral effects in juvenile and adult salmonids (Newcombe and Jensen 1996). Because turbidity would be limited in duration and extent, lethal effects are unlikely. However, some sublethal adverse effects could occur. Sublethal effects of turbidity due to suspended sediment include: gill flaring, coughing, avoidance, and increase in blood sugar levels (Bisson and Bilby 1982; Sigler et al. 1984; Berg and Northcote 1985; Servizi and Martens 1992). Although turbidity may cause stress, Gregory and Northcote (1993) have shown that moderate levels of turbidity (35 to 150 NTUs) accelerate foraging rates among juvenile Chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect). This suggests that the turbidity expected due to the proposed action is not likely to result in long-term adverse effects on adult Chinook salmon or rearing juvenile Chinook salmon or steelhead. However, adverse effects on Chinook salmon eggs and pre-emergent fry are possible. Adult steelhead, steelhead eggs, and steelhead pre-emergent fry are unlikely to be in the action area while in-water work is occurring.

Chinook salmon begin spawning in the SFSR in mid-August and spawning has been documented in the action area, so Chinook salmon eggs could be in the action area during in-water work. Turbidity, in and of itself, will not affect Chinook salmon eggs. However, turbidity plumes due to in-water work is an indication that fine sediments are being mobilized and will be deposited on substrates within the plume area. Any increase in fine sediments in spawning substrates will reduce survival of Chinook salmon eggs (Reiser and White 1988; Newcombe and Jensen 1996) and the proposed in-water work will result in turbidity plumes caused by mobilized fine sediment. Therefore, the proposed action has the potential to harm Chinook salmon eggs.

If in-water work is completed during the preferred work window of July 15 through August 15, then Chinook salmon eggs are unlikely to be in the action area. If no Chinook salmon redds are identified within 1,000 feet of the downstream end of the coffer dam, then adverse effects on Chinook salmon eggs are possible, but unlikely given the minimization measures described in Section 1.3.2.3. If Chinook salmon redds are identified within 1,000 feet, but greater than 500 feet downstream from the downstream end of the coffer dam, then adverse effects on eggs will be unlikely due to the additional minimization measures that will be implemented to protect Chinook salmon eggs (see Section 1.3.2.4). If redds are identified within 500 feet downstream from the downstream end of the coffer dam, and the project proceeds during the alternate work window (see Section 1.3.2.4) then adverse effects on Chinook salmon eggs are likely.

Sediment deposited on salmonid redds can impact incubating eggs and pre-emergent fry by reducing oxygen delivery or waste removal, or by physically entrapping fry due to formation of sediment caps (Fudge et al. 2008). Exposure of redds to sedimentation will be of short duration and will therefore be unlikely to result in formation of sediment caps. However, fine sediment could settle into redds and harm eggs and larvae by reducing oxygen delivery and/or the removal of waste products. When all fine sediment <1 millimeter in diameter is considered, survival to emergence can exceed 25 percent with as much as 25 percent of the spawning substrates composed of fine sediment (Julien and Bergeron 2006). However, when sediment consists of very fine sand, silt, and clay, much smaller amounts will harm eggs in redds (Greiga et al. 2005; Julien and Bergeron 2006; Levasseur et al. 2006). Models developed by Newcombe and Jensen (1996) suggested that even short duration and low intensity exposures to suspended sediment will cause egg mortality; Greiga et al. (2005) found that 0.5 grams of clay particles in a 50 milliliter sample (i.e., approximately 1 percent) reduced oxygen consumption of eggs to near zero; and Levasseur et al. (2006) found that above a threshold of 0.2 percent very fine sand and silt, egg to emergent survival dropped sharply below 50 percent. Sediment that remains suspended long enough to be deposited on a redd is likely to be very fine, and we therefore assume that even a short duration exposure could cause increased mortality of eggs in exposed redds. Although the amount of sediment that would be deposited on a redd due to the proposed action is likely to be very small, because it would probably be very fine sediment, and would occur near the beginning of incubation, we assume that approximately 50 percent of eggs in exposed redds could be killed.

2.5.1.3 Dewatering and Fish Salvage

Rearing Chinook salmon and steelhead are present in the area that will be dewatered during construction. The measures described in the BA for minimizing adverse effects of dewatering the construction reaches include: slow drawdown of water to encourage egress, actively driving fish out, capturing fishes with seines and moving them out of the construction reach, and capturing fishes via electrofishing and moving them out of the construction reach. These measures will be implemented in order of harmfulness to fishes, thereby moving as many fish as possible out of the project area with the least harmful methods (i.e., voluntary egress and active driving) before proceeding to methods that require handling of fishes. All fish captured would be released in a suitable area designated prior to commencement of dewatering.

The in-water work area, including the footprint of the coffer dam, will be approximately 12,200 square feet. There are 19 years of snorkel survey data for the mainstem SFSR between river miles (RMs) 37.5 and 45.8 (Appendix A). Assuming average density, there will be approximately 79 juvenile Chinook salmon (95 percent confidence interval 38–120) and approximately 35 juvenile steelhead (95 percent confidence interval 23–47) in the in-water work area, prior to dewatering. Monitoring reports from other habitat restoration projects that required fish salvage indicate that a combination of gradual dewatering and driving fish, as described above, successfully moved at least 50 percent of Chinook salmon and steelhead out of the project areas. Based on these estimates, approximately 40 juvenile Chinook salmon (95 percent confidence interval 19–60) and 18 juvenile steelhead (95 percent confidence interval 12–24) will likely be captured when the in-water work area is dewatered. McMichael et al. (1998) found that juvenile Chinook salmon and steelhead captured by electrofishing had injury rates of 2.0 percent and 5.1 percent, respectively. Information on effects of injury on long-term survival of Chinook salmon and steelhead is lacking. In the absence of information, we assumed that none of the fish injured as juveniles would reach maturity and therefore, mortality rate of fish captured during salvage would be 2.0 percent and 5.1 percent, respectively, for Chinook salmon and steelhead. Based on the estimated number of juvenile Chinook salmon and steelhead that will be captured during salvage operations, and injury rates described by McMichael et al. (1998), no more than two juvenile Chinook salmon and two juvenile steelhead will be killed due to dewatering and salvage associated with the proposed action.

2.5.1.4 Fish Passage and Adult Disturbance

The project is unlikely to impair upstream or downstream fish passage during or after construction. Because the in-water work area will be isolated with a coffer dam, and the coffer dam will not extend across the entire width of the river, disturbance of upstream migrating adults or downstream migrating juveniles, is not likely. Although the coffer dam will constrain flows somewhat, the resultant water velocity increase will be very small and will not impair upstream fish migration. After removal of the coffer dam, water velocities should be essentially the same as before the project.

2.5.1.5 Habitat-related Effects on Chinook salmon and Steelhead

The proposed action will armor approximately 200 feet of the east bank of the mainstem SFSR with rock riprap. Armoring banks with riprap can adversely affect Chinook salmon and steelhead by destroying desirable habitat features, such as undercut banks, riparian vegetation, scour pools, etc. Over the long term, bank armoring can also prevent formation of desirable habitat features, resulting in long-term adverse effects on Chinook salmon and steelhead. Because the project site was historically riprapped and is currently eroding, it lacks desirable habitat features, and the habitat alteration, due to the proposed project, is therefore unlikely to harm Chinook salmon or steelhead. The project site is on a very steep slope, where potential lateral migration of the river is naturally extremely limited, and the proposed action is therefore unlikely to preclude formation of desirable habitat features. Specific effects of the proposed action on habitat are described in Section 2.5.2.

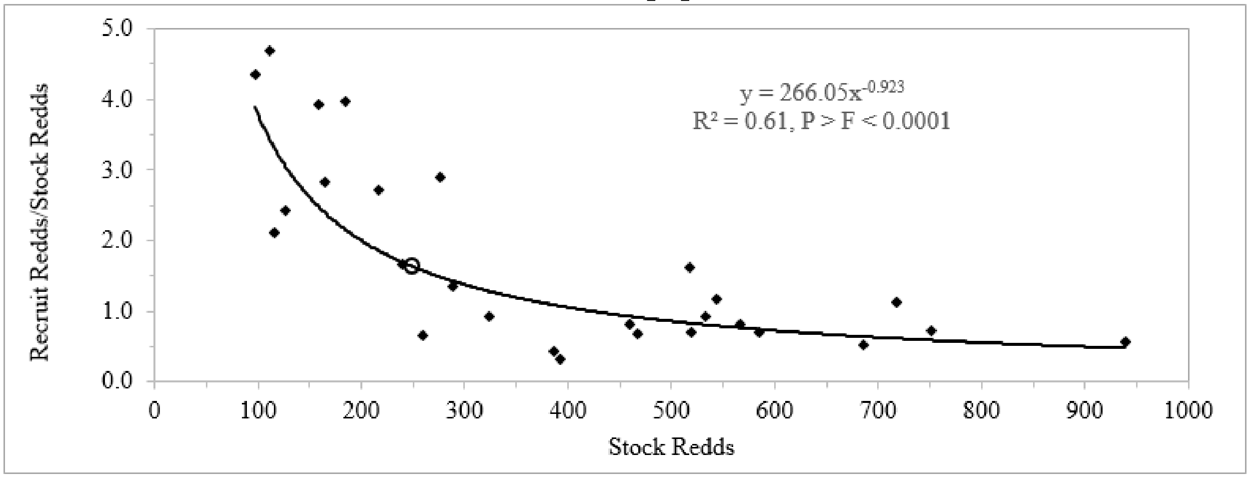
2.5.1.6 Effects of Potential Egg and Juvenile Mortality on Adult Returns

Approximately one juvenile steelhead is likely to be killed due to the proposed action. Assuming a smolt to adult return rate of 1.58 percent (Tuomikoski et al. 2013), the proposed action will reduce steelhead adult returns by fewer than 0.02 individuals. Because adverse effects of the proposed action on steelhead would occur during only one year, an actual reduction on steelhead adult returns, due to the proposed action, is unlikely.

Similarly, no more than two juvenile Chinook salmon could be killed during the dewatering and fish salvage portion of the project. Assuming a smolt to adult return rate of 1.1 percent (Tuomikoski et al. 2013), this effect would reduce Chinook salmon adult returns by approximately 0.02 individuals. Because dewatering and fish salvage will only occur during one year, an actual reduction in Chinook salmon adult returns, due to this adverse effect, is unlikely. However, if more than 250 redds are counted in the SFSR during the construction year, then construction could proceed with redds within 500 feet of the project area, which could result in death of approximately 50 percent of eggs in one redd.

Although the SFSR Chinook salmon population is hatchery influenced (Felts et al. 2018), a plot of population productivity against stock year redds shows a density dependent relationship that is typical for salmonid populations (Figure 4). This relationship indicates that a loss of half of the eggs in one redd at a stock size of 250 redds, would result in a loss of 0.82 return year redds, or one to two adult Chinook salmon. This relationship also indicates that the magnitude of the adverse effect, measured as returning adults, decreases as the number of redds counted during the construction year increases. Therefore, the adverse effect at a stock size of 250 redds represents a worst-case scenario.

Figure 4. Relationship of whole life cycle productivity and stock year redds for the South Fork Salmon River Chinook salmon population.



2.5.1.7 Population Level Effects

The proposed action is not likely to reduce the number of returning steelhead. The proposed action could reduce the number of returning Chinook salmon by one to two adults. Because only one year class would be affected and the effect would only occur if stock size is equal or greater than 250 redds, long-term impacts on population size and genetic diversity, are unlikely.

2.5.2 Effects on Designated Critical Habitat

Adverse effects on Chinook salmon and steelhead designated critical habitat include: Mobilization of sediment, resulting in increased turbidity and sedimentation on substrates downstream from the in-water work area; and temporary reduction in riparian vegetation. Riprap can prevent lateral migration of the stream, resulting in long-term adverse impacts on stream habitat. However, because the project site is on a steep slope where the potential for lateral migration is extremely limited, those types of adverse effects are not likely. Positive effects of the proposed action include: reduction of fine sediment inputs into the SFSR over the long term; possible long-term increases in riparian vegetation in the project area; and possible increase in cover due to replacing relatively small riprap with larger riprap. As described in Section 2.5.1, adverse effects due to fuel or oil spills, or due to spread of invasive weeds, are unlikely. Other possible effects on Chinook salmon and steelhead designated critical habitat are described in Sections 2.5.2.1–2.5.2.2. These effects are described in terms of the PBFs listed in Table 4.

2.5.2.1 Effects of In-water Work

In-water work would temporarily block access to approximately 0.25 acres of rearing habitat and would temporarily reduce quality, due to mobilization of fine sediment, of up to 1.5 acres of spawning and rearing habitat. Turbidity may also affect juvenile migration habitat but, due to the low magnitude of turbidity and positive effects of low levels of turbidity on migrating juveniles, the increased turbidity might temporally improve juvenile migration habitat for a very short reach. Access to blocked rearing habitat would be restored when in-water work is complete and the coffer dam is removed. Reduced water quality, for rearing Chinook salmon and steelhead, due to increased turbidity would end soon after in-water work is complete, but some reduced quality of substrates, due to deposition of fine sediments, could persist until the next high water event. The reduced quality of substrate could adversely affect spawning gravel for one year class of Chinook salmon. Because steelhead will not spawn until the spring following in-water work, the action will not measurably affect steelhead spawning gravel.

2.5.2.2 Effects of Bank Armoring and Woody Vegetation Planting

The proposed action will armor an actively eroding bank that currently has very little vegetation, with large rock riprap. Because the current habitat has virtually no cover, and large rocks provide some cover, the proposed action will probably result in a very small increase in cover for rearing Chinook salmon and steelhead. The proposed planting of woody vegetation within the riprap could eventually result in a small increase in riparian vegetation. Because the project site is on a very steep slope where there is essentially no potential for lateral movement, the proposed bank armoring would not likely reduce the potential for development of habitat features through normal riverine functions. By reducing or stopping erosion in the project area, the proposed action could have a long-term positive effect on quality of spawning substrates.

2.5.2.3 Population Level Effects of the Proposed Action on Designated Critical Habitat

The short-term adverse impact of the proposed action on steelhead designated critical habitat will be very small, probably too small to reduce abundance of productivity of the SFSR steelhead population. Due to differences in timing of Chinook salmon and steelhead spawning, Chinook salmon designated critical habitat is more vulnerable to the short-term adverse effects of the proposed action. Those adverse effects could be enough to reduce abundance of one year class of the SFSR Chinook salmon population by approximately 0.25%. Positive effects on cover, riparian vegetation, and spawning substrates will likely be very small and will be confined to the project area and the river reach immediately downstream.

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). 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. The entire action area is managed by the PNF and no future private activities are anticipated.

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 in the environmental baseline (Section 2.3).

2.7 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. 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 diminishes the value of designated or proposed critical habitat for the conservation of the species.

As previously described, up to 79 juvenile Chinook salmon and 35 juvenile steelhead might be entrained during placement of the coffer dam. This potential entrainment necessitates salvage operations that will likely result in capture of 40 juvenile Chinook salmon and 18 juvenile steelhead, and death of two juvenile Chinook salmon and two juvenile steelhead. The small number of juvenile Chinook salmon and steelhead that might be killed due to isolating and dewatering the project area is not likely to reduce abundance of the SFSR Chinook salmon or the SFSR steelhead populations.

Additional juvenile and adult Chinook salmon and juvenile steelhead could be temporarily displaced by turbidity plumes resulting from the proposed action. NMFS did not quantify the number of Chinook salmon and steelhead that could be displaced due to turbidity plumes. Although a number of very short turbidity plumes may occur periodically during project implementation, they will be low in magnitude and will cover a very small area, and are therefore likely to have relatively minor effects. The larger plumes, that will occur when the coffer dam is removed and water is restored to the in-water work area, will be managed to not exceed 35 NTUs, will be of short duration and low magnitude, probably eliciting only temporary behavior responses. NMFS therefore does not expect harm to juvenile or adult Chinook salmon, or to juvenile steelhead, to be sufficient to influence productivity of the SFSR Chinook salmon or steelhead populations. Adult steelhead will not be in the action area when the increased turbidity would occur.

Although the effects on mobile life stages will be minor, sediment mobilized by the proposed action could settle on Chinook salmon redds, potentially killing approximately half of the eggs in one redd. However, this effect will only occur if there are 250, or more, redds counted in the SFSR during the construction year (see Section 1.3.2.4). This effect would reduce abundance of one year class of SFSR Chinook abundance by approximately 0.25 percent. Subsequent year classes would not be affected.

The SFSR steelhead population is not meeting VSP criteria. The potential increased mortality, due to the proposed action, will not likely influence the number of adult steelhead returning to the SFSR. Therefore, the proposed action should not influence the abundance, productivity, spatial structure, or genetic diversity of the SFSR steelhead population. Considering the existing condition of the environmental baseline and the lack of potential cumulative effects, NMFS has determined that the loss of no more than two juvenile steelhead, due to the proposed action, should not appreciably reduce the likelihood that the SFSR steelhead population will achieve its desired status. Because the effects will not be substantial enough to negatively influence VSP criteria at the population scale, the proposed action would also not likely reduce viability of the Salmon River MPG or the Snake River basin steelhead DPS.

The SFSR Chinook salmon population is not meeting VSP criteria. The proposed action could result in mortality of one juvenile Chinook salmon, which would not likely reduce the number of Chinook salmon adult returns. If 250 or more redds are counted in the SFSR during the project year, then the proposed action could also result in mortality of half of the Chinook salmon eggs in one redd, which would reduce Chinook salmon returns by approximately 0.25 percent for 1- year class. Considering the existing condition of the environmental baseline, the lack of potential cumulative effects, and the relative strength of the 1-year class that would be affected, NMFS has determined that the death of juveniles and eggs, due to the proposed action, should not appreciably reduce the likelihood that the SFSR Chinook salmon population will achieve its desired status. Because the effects will not be substantial enough to negatively influence VSP criteria at the population scale, the proposed action would also not likely reduce viability of the South Fork Salmon River MPG or the spring/summer Chinook salmon ESU.

The proposed action will likely have short-term adverse effects on PBFs for water quality and substrate for rearing and spawning Chinook salmon and steelhead. The proposed action will also affect water quality for migration, but at the turbidities expected, that effect might be positive. The proposed action will have a long-term positive, albeit very small, effect on substrate, cover, and riparian vegetation PBFs for spawning and rearing Chinook salmon and steelhead. The BMPs summarized in Section 1.3.3 should ensure that negative impacts are minimized to the greatest extent possible.

The entire action area is on land managed by the PNF and no additional state or private activities are likely to occur. Coupling the potential effects of the proposed action with the baseline condition and cumulative effects within the action area, NMFS concludes that the proposed action is not likely to appreciably diminish the function and conservation role of the PBFs within the action area.

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, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' Opinion that the proposed action is not likely to jeopardize the continued existence of Snake River spring/summer Chinook salmon and Snake River Basin steelhead; and is not likely to 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). On an interim basis, NMFS interprets "harass" to mean "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

The proposed action is reasonably certain to result in incidental take of ESA-listed species. NMFS is reasonably certain the incidental take described here will occur because: (1) The proposed action will occur in occupied habitat and will result in dewatered habitat, capture, movement, and injury/death of ESA-listed fishes; (2) the project will result in mobilized sediment that will cause turbidity plumes that could harm rearing ESA-listed fishes; (3) the project could result in deposition of fine sediment on redds, possibly killing eggs of ESA-listed Chinook salmon. In the Opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

2.9.1.1 Dewatering and Fish Salvage

Dewatering within the mainstem SFSR during construction would displace approximately 79 juvenile Chinook salmon and 35 juvenile steelhead. Up to half of displaced fishes could be captured during salvage activities, for a total of 40 juvenile Chinook salmon and 18 juvenile steelhead. Approximately 2.0 percent of captured Chinook salmon and 5.1 percent of captured steelhead would die due to effects of electrofishing, stress of handling, etc., for a total of two juvenile Chinook salmon and two juvenile steelhead killed due to dewatering and fish salvage during construction. NMFS will consider the amount of take exceeded if more than two juvenile Chinook salmon or steelhead are killed as a result if fish salvage efforts.

2.9.1.2 Turbidity

For turbidity, the number of individual fish of each species that experience harm from exposure to plumes cannot be accurately determined. There is no feasible way to quantify how many fish will be affected, how long they will be affected, or what injury levels or behavioral modifications may be incurred. These uncertainties make it impossible to quantitatively identify the amount of turbidity-related take that will occur due to the proposed action. Because circumstances causing take are likely to arise, but cannot be quantitatively evaluated in the field, the extent of incidental take is described, pursuant to 50 CFR 402.14[I].

Turbidity plumes will generally not exceed 35 NTUs over background levels at the monitoring points. Plumes will progressively diminish in intensity moving downstream, will likely affect only a portion of the channel, and will likely extend less than 500 feet downstream from the in-water work area. We expect Chinook salmon (juveniles and adults) and steelhead (juveniles) to volitionally seek temporary refugia in adjacent, less turbid habitats; thereby avoiding prolonged direct turbidity exposure and minimizing potential harm. If fish do not move out of plumes, they are likely to experience an intermittent range of minor sublethal effects limited to minor physiological stress and increased rates of coughing and respiration, or increased foraging behavior. NMFS does not anticipate any turbidity-related mortality and no turbidity-related mortality is exempted.

For turbidity produced during in-water work and removal of the coffer dam, NMFS will consider the extent of take exceeded if: (1) Turbidity readings in a plume resulting from pumping water out of the in-water work area exceeds 35 NTUs over background for more than two consecutive readings, measured 100 feet downstream from the source; or (2) turbidity readings in a plume resulting from removal of the coffer dam and rewatering of the in-water work area exceeds 35 NTUs over background for more than two consecutive readings, measured 300 feet downstream from the source.

2.9.1.3 Deposition of Fine Sediment

Sedimentation, due to the proposed action, is expected to be light and confined to an area within 500 feet downstream from the in-water work area. However, if sediment is deposited on an established Chinook salmon redd, it will result in death of approximately half of the eggs in the redd. Accurately determining the number of eggs that would be killed due to a sedimentation event is not feasible. Because circumstances causing take are likely to arise, but cannot be quantitatively evaluated in the field, the extent of incidental take is described, pursuant to 50 CFR 402.14[I].

For sedimentation due to in-water work and removal of the coffer dam, NMFS will consider the extent of take exceeded if: (1) A turbidity plume caused by the proposed action extends over any established Chinook salmon redds, downstream from the in-water work area, when there are fewer than 250 active Chinook salmon redds in the SFSR; or (2) a turbidity plume caused by the proposed action extends over more than one established Chinook salmon redds, downstream from the in-water work area, when there are 250 or more active Chinook salmon redds in the SFSR.

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

The FHWA and COE (for those measures relevant to the Section 404 Clean Water Act permit) shall:

1. Minimize the mobilization of fine sediment, and the resultant turbidity plumes and sediment deposition caused by the action.

2. Minimize the adverse impacts of sediment deposition on incubating Chinook salmon.

3. Minimize the adverse impacts of temporarily dewatering habitat and fish salvage due to the action.

4. Monitor the proposed action to confirm the terms and conditions in this ITS effectively avoid and minimize incidental take from the proposed activities and ensure the amount and extent of incidental take are not exceeded.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the FHWA, COE, or any applicant must comply with them in order to implement the RPMs (50 CFR 402.14). The FHWA, 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 FHWA, COE, or any applicant 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. The following terms and conditions implement RPM 1 (minimize turbidity and sediment):

    a. The FHWA and the COE shall ensure that contracts and permits authorizing work shall stipulate successful implementation of all minimization measures, BMPs, and monitoring described in Section 1.3 of this document.

    b. Personnel with natural resource training who are knowledgeable of turbidity monitoring and with the effects of turbidity on salmonid habitat, will be present whenever activities that are likely to produce sediment are being conducted.

2. The following terms and conditions implement RPM 2 (minimize effects on incubating Chinook salmon eggs): FHWA shall ensure:

    a. If in-water work will be conducted during the September 14–October 15 work window, the location of Chinook salmon redds is identified prior to commencement of any in-water work.

    b. If in-water work will be conducted during the September 14–October 15 work window, the number of active Chinook salmon redds that are in the SFSR is determined prior to commencement of in-water work.

c. If work will be conducted during the September 14–October 15 work window and Chinook salmon redds are identified closer than 1,000 feet, but not less than 500 feet, from the in-water work area, the project can proceed during the work window after NMFS is contacted to identify additional measures that may be necessary to protect Chinook salmon redds.

d. If work will be conducted during the September 14–October 15 work window and Chinook salmon redds are identified closer than 500 feet from the in-water work area, NMFS will be contacted to determine if the project can be completed on schedule or if it will need to be postponed until the next in-water work period.

e. If in-water work will be conducted during the September 14–October 15 work window, the proximity of turbidity plumes to Chinook salmon redds in the action area will be monitored and appropriate measures, possibly including cessation of work causing the plumes, will be taken to ensure that measures and/or limits determined through communications described in c and d, above, are not exceeded.

3. The following terms and conditions implement RPM 3 (minimize dewatering and fish salvage impacts): FHWA shall ensure:

    a. The size of the dewatered work areas shall be minimized to the extent necessary to successfully complete the proposed activities.

    b. The cofferdam shall be installed slowly and flow shall be incrementally reduced to encourage fish to leave the area volitionally.

    c. All electrofishing will be done in accordance with NMFS electrofishing guidance (NMFS 2000).

    d. All captured fish shall be held in thermally regulated, air-bubbler equipped containers, filled with stream water, for a period only long enough to transport fish to the release location.

    e. A suitable release location will be identified prior to commencement of dewatering.

4. The following terms and conditions implement RPM 4 (monitoring and reporting):

    a. The FHWA or their designee will monitor turbidity levels while water is being pumped out of the in-water work area, as described in Section 1.3, and will stop or delay pumping, and/or or increase filtration or settling capacity, as needed to ensure that turbidity limits (35 NTUs over background levels, measured 100 feet downstream from the discharge) are not exceeded.

    b. The FHWA or their designee will monitor turbidity levels while water the coffer dam is being removed, as described in Section 1.3, and will stop or delay coffer dam removal as needed to ensure that turbidity limits (35 NTUs over background levels, measured 300 feet downstream) are not exceeded.

c. The FHWA or their designee will record number and species of fish captured during salvage operations, condition of fish captured and released, and number of fish killed during salvage operations.

d. If work will be conducted during the alternate work window, the FHWA or their designee will record locations of all Chinook salmon redds in the action area.

e. The FHWA or their designee, will submit a monitoring report to NMFS within eight weeks of completion of the project that will include:

   i. Results of required turbidity monitoring (term and conditions 4.a and 4.b), including notes regarding proximity of turbidity plumes to Chinook salmon redds (if applicable).

   ii. The number, size, and species of all salmonids captured and handled, and any mortalities that occur during salvage.

   iii. If work will be conducted during the alternate work window, the location of all Chinook salmon redds identified in the action area.

f. The FHWA shall submit the monitoring report to:

National Marine Fisheries Service
Attention: WCRO-2019-00114
800 Park Boulevard
Plaza IV, Suite 220
Boise, Idaho 83712-7743

g. If monitoring during in-water work indicates that the amount of extent of take described above will be exceeded if work continues, then work will stop and the FHWA or their designee will contact NMFS.

h. NOTICE: If a steelhead or salmon becomes sick, injured, or killed as a result of project-related activities outside the scope of that analyzed in this Opinion, and if the fish would not benefit from rescue, the finder should leave the fish alone, make note of any circumstances likely causing the death or injury, location and number of fish involved, and take photographs, if possible. If the fish in question appears capable of recovering if rescued, photograph the fish (if possible), transport the fish to a suitable location, and record the information described above. Adult fish should generally not be disturbed unless circumstances arise where an adult fish is obviously injured or killed by proposed activities, or some unnatural cause. The finder must contact NMFS Law Enforcement at (206) 526-6133 as soon as possible. The finder may be asked to carry out instructions provided by Law Enforcement to collect specimens or take other measures to ensure that evidence intrinsic to the specimen is preserved.

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 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).

The FHWA should adopt and implement the following conservation recommendations:

1. Plant appropriate woody vegetation along the water's edge, in the project area and within 100 feet upstream and downstream from the project area, where feasible and where vegetation is currently lacking.

2. Monitor survival of plantings during the summer of the year following the project and replant as needed to replace plantings that did not survive.

Please notify NMFS if the FHWA or another entity carries out 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 South Fork Salmon River bank stabilization project. As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the ITS is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

2.12 "Not Likely to Adversely Affect" Determinations

On November 18, 2005, NMFS listed the SRKW DPS as endangered under the ESA (70 FR 69903). The SRKW DPS (*Orcinas orca*) is composed of a single population that ranges as far south as central California and as far north as Southeast Alaska. Although the entire DPS has the potential to occur along the outer coast at any time during the year, occurrence along the outer coast is more likely from late autumn to early spring. SRKWs have been repeatedly observed feeding off the Columbia River plume in March and April during peak spring Chinook salmon runs (Krahn et al. 2004; Zamon et al. 2007; Hanson et al. 2008; and Hanson et al. 2010). For this reason, the eastern Pacific Ocean, where SRKW overlap with Chinook salmon from the Columbia River basin is also included in the action area due to potential impacts on the whale's prey base.

The final listing rule identified several potential factors that may have resulted in the decline or may be limiting recovery of SRKW including: quantity and quality of prey, toxic chemicals which accumulate in top predators, and disturbance from sound and vessel traffic. The rule further identified oil spills as a potential risk factor for the small population of SRKW. The final recovery plan includes more information on these potential threats to SRKW (73 FR 4176).

NMFS designated critical habitat for the SRKW DPS on November 29, 2006 (71 FR 69054). Designated critical habitat for SRKW includes approximately 2,560 square miles of Puget Sound, excluding areas with water less than 20 feet deep relative to extreme high water. The SRKWs spend considerable time in the Georgia Basin from late spring to early autumn, with concentrated activity in the inland waters of Washington State around the San Juan Islands, and typically move south into Puget Sound in early autumn (NMFS 2008b). While these are seasonal patterns, SRKW have the potential to occur throughout their range (from Central California north to the Queen Charlotte Islands) at any time during the year.

Southern Resident killer whales consume a variety of fish species (22 species) and one species of squid (Ford et al. 1998; Ford et al. 2000; Ford and Ellis 2006; Hanson et al. 2010; Ford et al. 2016), but salmon are identified as their primary prey. Southern Residents are the subject of ongoing research, including direct observation, scale and tissue sampling of prey remains, and fecal sampling. Scale and tissue sampling from May to September indicate that their diet consists of a high percentage of Chinook salmon (monthly proportions as high as >90 percent) (Hanson et al. 2010; Ford et al. 2016). The diet data also indicate that the whales are consuming mostly larger (i.e., older) Chinook salmon. Deoxyribonucleic acid (DNA) quantification methods are also used to estimate the proportion of different prey species in the diet from fecal samples (Deagle et al. 2005). Ford et al. (2016) confirmed the importance of Chinook salmon to the Southern Residents in the summer months using DNA sequencing from whale feces. Salmon and steelhead made up to 98 percent of the inferred diet, of which almost 80 percent were Chinook salmon. Coho salmon (*O. kisutch*) and steelhead are also found in the diet in spring and fall months when Chinook salmon are less abundant. Specifically, coho salmon contribute to over 40 percent of the diet in late summer, which is evidence of prey shifting at the end of summer towards coho salmon (Ford et al. 1998; Ford and Ellis 2006; Hanson et al. 2010; Ford et al. 2016). Less than 3 percent each of chum salmon (*O. keta*), sockeye salmon (*O. nerka*), and steelhead were observed in fecal DNA samples collected in the summer months (May through September). Prey remains and fecal samples collected in inland waters during October through December indicate that Chinook and chum salmon are primarily contributors to the whales' diet (NWFSC unpubl. data). Observations of whales overlapping with salmon runs (Wiles 2004; Zamon et al. 2007; Krahn et al. 2009), and collections of prey and fecal samples have also occurred in the winter months. Preliminary analysis of prey remains and fecal samples sampled during the winter and spring in coastal waters indicated that the majority of prey samples were

Chinook salmon (80 percent of prey remains and 67 percent of fecal samples were Chinook salmon), with a smaller number of steelhead, chum salmon, and halibut (NWFSC unpubl. data). The occurrence of K and L pods off the Columbia River in March suggests the importance of Columbia River spring-run stocks of Chinook salmon in their diet (Hanson et al. 2013) at that time of year. Chinook salmon genetic stock identification from samples collected in winter and spring in coastal waters included 12 U.S. west coast stocks, and over half of the Chinook salmon consumed originated in the Columbia River (NWFSC unpubl. data) for the K and L pods (primarily fall-run stocks). Based on genetic analysis of feces and scale samples, Chinook salmon from Fraser River stocks dominate the diet of Southern Residents in the summer (Hanson 2011).

The proposed action will not have any direct effects on SRKW; however, it may indirectly affect the quantity of prey available to them. As described in the above Opinion and ITS, the proposed action may result in the loss of one to two Chinook salmon from 1-year class. The ocean range of Snake River spring/summer Chinook salmon (Weitkamp 2010) overlaps with the known range and designated critical habitat of SRKW. The loss of one to two Chinook salmon from 1- brood year could reduce the SRKW's available prey base when the affected brood would otherwise have been present in the Pacific Ocean.

Given the total quantity of prey available to SRKWs, the reduction in prey due to the proposed action will be extremely small and will be temporary. The above Opinion did not identify any potential for the proposed action to influence the quality (size) and/or quality (contaminant levels) of Chinook salmon. NMFS finds that the proposed action will not have anything more than minimal effects on productivity, diversity, or distribution of ESA-listed Chinook salmon, and therefore the effects to the quantity of prey available to the whales in the long term across their vast range is expected to be very small. For these reasons, the proposed action will have an insignificant effect on SRKW, and therefore, NMFS finds that the proposed action may affect, but is not likely to adversely affect SRKW. Likewise, because so few of the SRKW prey will be affected by the action, the effect to the prey base PBF is insignificant.

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. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." 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) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the FHWA 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 action and action area for this consultation are described in Section 1.3 of this document. Juvenile (rearing and migratory) and adult (migratory and spawning) spring/summer Chinook salmon EFH is present in the action area. The action will have temporary major effects on approximately 200 feet of the mainstem SFSR due to dewatering, excavation, and placement of rock riprap; and up to an additional 500 feet due to turbidity and sedimentation effects. The action will temporally degrade habitat within the project area but may have long-term positive, albeit small, effects. Affected EFH area is identical to the spring/summer Chinook salmon critical habitat affected and discussed in Section 2.5.1 of the preceding Opinion.

The action area includes areas designated as EFH for spawning, rearing, and migration life-history stages of Chinook salmon. The PFMC (2014) has identified five habitat areas of particular concern (HAPC), which warrant additional focus for conservation efforts due to their high ecological importance. Three of the five HAPC are applicable to freshwater and include: (1) Complex channels/floodplain habitats; (2) thermal refugia; and (3) spawning habitat. Implementation of the proposed action has the potential to affect the complex channel/floodplain habitat and spawning habitat HAPCs.

3.2 Adverse Effects on Essential Fish Habitat

The proposed action will dewater approximately 12,200 square feet of the SFSR channel for up to one month and will produce temporary turbidity plumes affecting an additional 500 feet of the SFSR. Salmon spawning and rearing habitat exists, and is moderately utilized, in the action area. The dewatering will render rearing habitat in the project area temporarily unusable and will temporarily displace rearing salmon. Mobilization of fine sediment will degrade spawning and rearing over the short-term and may temporarily displace rearing salmon. Because habitat in the project area is currently degraded from past bank stabilization and ongoing erosion, armoring of the bank in the project area will have minimal long-term adverse effects on Chinook salmon EFH. However, armoring of the bank in the project area will also address a current chronic source of sediment delivery, and therefore may have minor long-term positive effects on spawning habitat in downstream reaches.

3.3 Essential Fish Habitat Conservation Recommendations

To minimize the adverse effects in Section 3.2, NMFS proposes the following EFH conservation recommendations:

1. Plant appropriate woody vegetation along the water’s edge, in the project area and within 100 feet upstream and downstream from the project area, where feasible and where vegetation is currently lacking.

2. Monitor survival of plantings during the summer of the year following the project and replant as needed to replace plantings that did not survive.

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in Section 3.2 approximately 1.5 acres of designated EFH for Pacific Coast salmon.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the FHWA must provide a detailed response in writing to NMFS within 30 days after receiving an EFH 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' EFH 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 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 FHWA or COE 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 DQA 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 the FHWA and the COE. Other interested users could include contractors implementing the project and government agency personnel providing technical assistance to FHWA or the COE. Individual copies of this Opinion were provided to the FHWA, COE, and the PNF. The format and naming adheres 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 NMFS' ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 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 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.

5. REFERENCES

American Water Resources Company (AWRC). 2009. Environmental Compliance Monitoring Report, Idaho Transportation Department District 6, Salmon River Bridge West of Clayton Replacement Project, State Highway 75, MP 220. Custer County, Idaho. Project No. ST-6390(607) Key No. 6504. January 2009. 13 pp.

AWRC. 2010. Environmental Compliance Monitoring Report, Idaho Transportation Department District 6, Watts Bridge, Custer County Salmon River Bridge Replacement Project, State Highway 75, MP 265.49-257.25. Project No. ST-6350(653) Key No. 07811. March 2010. 44 pp.

Battin, J., and coauthors. 2007. Projected impacts of climate change on salmon habitat restoration. Proceedings of the National Academy of Sciences of the United States of America 104(16):6720-6725.

Berg, L. and T.G. Northcote. 1985. Changes in territorial, gill-flaring, and feeding behavior in juvenile Coho salmon (Oncorhynchus kisutch) following short-term pulses of suspended sediment. Canadian Journal of Fisheries and Aquatic Sciences 42:1410-1417.

Bisson, P.A. and R.E. Bilby. 1982. Avoidance of suspended sediment by juvenile coho salmon. North American Journal Fisheries Management 4: 371-374.Bjornn, T.C. 1978. Survival, production, and yield of trout and Chinook salmon in the Lemhi River, Idaho. University of Idaho, College of Forestry, Wildlife and Range Sciences Bulletin 27, Moscow, Idaho, USA.

Bjornn, T. C. and D. W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages 83–138 *in* W.R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society, Special Publication 19. Bethesda, Maryland.

Copeland, T., J. D. Bumgarner, A. Byrne, L. Denny, J. L. Hebdon, M. Johnson, C. A. Peery, S. Rosenberger, E. R. Sedell, G. E. Shippentower, C. Stiefel, and S. P. Yundt. 2014. Reconstruction of the 2011/2012 steelhead spawning run into the Snake River basin. Report to Bonneville Power Administration, Portland, Oregon.

Copeland, T., J. D. Bumgarner, A. Byrne, P. Cleary, L. Denny, J. L. Hebdon, C. A. Peery, S. Rosenberger, E. R. Sedell, G. E. Shippentower, C. Warren, and S. P. Yundt. 2015. Reconstruction of the 2012/2013 steelhead spawning run into the Snake River basin. Report to Bonneville Power Administration, Portland, Oregon.

Deagle, B. E., D. J. Tollit, S. N. Jarman, et al. 2005. Molecular scatology as a tool to study diet: analysis of prey DNA in scats from captive Steller sea lions. Molecular Ecology 14:1831- 1842. DOI: 10.1111/j.1365-294X.2005.02531.x.

Ecovista, Nez Perce Tribe Wildlife Division, and Washington State University Center for Environmental Education. 2003. Draft Clearwater Subbasin Assessment, Prepared for Nez Perce Tribe Watersheds Division and Idaho Soil Conservation Commission. 463 p. http://www.nwcouncil.org/fw/subbasinplanning/clearwater/plan/Default.htm

Eisenbarth, S. 2011. Water Quality and Fisheries Monitoring Report, Idaho Transportation District 4. Old Slate Creek Bridge Removal, State Highway 75, MP 213.47. Custer County Idaho. Project No. STP-2390(133), Key No. 07799. November 2011. 14 pp. Attachment.

Everest, F. H. and D. W. Chapman. 1972. Habitat selection and spatial interaction by juvenile Chinook salmon and steelhead trout in two Idaho streams. Journal of the Fisheries Research Board of Canada 29(1):91-100.

Felts, E. A., B. Barnett, M. Davison, M. J. Belnap, K. A. Apperson, R. Hand, M. Peterson, and E. Brown. 2018. Idaho adult Chinook Salmon monitoring. Annual report 2017. Idaho Department of Fish and Game Report 18-08.

Ford, J. K. B., G. M. Ellis, L. G. Barrett-Lennard, et al. 1998. Dietary specialization in two sympatric populations of killer whales (Orcinus orca) in coastal British Columbia and adjacent waters. Canadian Journal of Zoology 76:1456-1471.

Ford, J. K. B., G. M. Ellis, and K. C. Balcomb. 2000. Killer whales: the natural history and genealogy of Orcinus orca in British Columbia and Washington. Second edition. UBC Press, Vancouver, British Columbia.

Ford, J. K. B. and G. M. Ellis. 2006. Selective foraging by fish-eating killer whales Orcinus orca in British Columbia. Marine Ecology Progress Series 316:185-199. DOI: 10.3354/meps316185, 7/3/2006.

Ford, M.J. (ed.). 2011. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-113, 281 p. http://www.westcoast.fisheries.noaa.gov/publications/status_reviews/salmon_steelhead/multiple_species/5-yr-sr.pdf

Ford, M. J., J. Hempelmann, M. Hanson, et al. 2016. Estimation of a Killer Whale (Orcinus orca) Population's Diet Using Sequencing Analysis of DNA from Feces. PLoS ONE 11(1):e0144956. DOI: 10.1371/journal.pone.0144956, 1/6/2016.

Fudge, T. S., K. G. Wautier, R. E. Evans, and V. P. Palace. 2008. Effect of different levels of fine-sediment loading on the escapement success of rainbow trout fry from artificial redds. North American Journal of Fisheries Management 28:758–765.

Good, T.P., R.S. Waples, and P. Adams (editors). 2005. Updated status of federally listed ESUs of West Coast salmon and steelhead. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-NWFSC-66, 598 p.

Gregory, R. S. and T. S. Northcote. 1993. Surface, planktonic, and benthic foraging by juvenile chinook salmon (Oncorhynchus tshawytscha) in turbid laboratory conditions. Canadian Journal of Fisheries and Aquatic Sciences 50: 223-240.

Greiga, S. M., D. A. Searb, and P. A. Carling. 2005. The impact of fine sediment accumulation on the survival of incubating salmon progeny: Implications for sediment management. Science of the Total Environment 344: 241– 258.

Hanson, M. B. and C. K. Emmons. 2008. Annual residency patterns of Southern Resident killer whales in the inland waters of Washington and British Columbia. October 2, 2008. Unpublished report. NWFSC, Seattle, Washington.

Hanson, M. B., R. W. Baird, J. K. B. Ford, J. Hempelmann-Halos, D. M. Van Doornik, J. R. Candy, C. K. Emmons, G. S. Schorr, B. Gisborne, K. L. Ayres, S. K. Wasser, K. C. Balcomb, K. Balcomb-Bartok, J. G. Sneva, and M. J. Ford. 2010. Species and stock identification of prey consumed by endangered Southern Resident killer whales in their summer range. Endangered Species Research 11:69–82. DOI: 10.3354/esr00263.

Hanson, B. 2011. Southern Residence Killer Whale diet as determined from prey remains and fecal samples. In: Evaluating the Effects of Salmon Fishereis on Southern Resident Killer Whales: Workshop 1, September 21-23, 2011. NOAA Fisheries and DFO (Fisheries and Oceans Canada) Seattle, Washington.

Hanson, M. B., J. A. Nystuen, and M. O. Lammers. 2013. Assessing the coastal occurance of endangered killer whales using autonomous passive acoustic recorders. Journal of the Acoustical Society of America 134(5):3486-3495. DOI: 0001-4966/2013/134(5)/3486/10/, 11/1/2013.

Healey, M. C. 1991. Life history of chinook salmon (*Oncorhynchus tshawytscha*). Pages 80 *in* C. Groot, and L. Margolis, editors. Pacific salmon life histories. University of British Columbia Press, Vancouver, Canada.

Interior Columbia Technical Recovery Team (ICTRT). 2003. Working draft. Independent populations of Chinook, steelhead, and sockeye for listed evolutionarily significant units within the Interior Columbia River domain. NOAA Fisheries. July.

ICTRT. 2007. Viability Criteria for Application to Interior Columbia Basin Salmonid ESUs, Review Draft March 2007. Interior Columbia Basin Technical Recovery Team: Portland, Oregon. 261 pp. Website, https://www.nwfsc.noaa.gov/research/divisions/cb/genetics/trt/trt_documents/ictrt_viability_criteria_reviewdraft_2007_complete.pdf

ICTRT. 2010. Status Summary – Snake River Spring/Summer Chinook Salmon ESU. Interior Columbia Technical Recovery Team: Portland, Oregon.

Idaho Department of Environmental Quality (IDEQ). 2001. Middle Salmon River-Panther Creek Subbasin Assessment and TMDL. IDEQ: Boise, Idaho. 114 p.

IDEQ. 2011. Idaho's 2010 Integrated Report, Final. IDEQ: Boise, Idaho. 776 p.

IDEQ and U.S. Environmental Protection Agency (EPA). 2003. South Fork Clearwater River Subbasin Assessment and Total Maximum Daily Loads. IDEQ: Boise, Idaho. 680 p.

Idaho Department of Fish and Game (IDFG). 2007. Annual returns to Lower Granite Dam, Idaho Department of Fish and Game data provided to NMFS by Peter Hassemer, December 2007. IDFG: Boise, Idaho.

IDFG. 2016. "Hatchery and Wild Chinook Salmon Return to Lower Granite Dam." Follow Idaho Salmon Home (F.I.S.H) website, http://216.206.157.62/idaho/web/apps/MAIN_LGRchinadultreturn_spsu_wild.php, accessed 6-3-16.

Independent Scientific Advisory Board (ISAB). 2007. Climate change impacts on Columbia River Basin fish and wildlife. ISAB Climate Change Report, ISAB 2007-2, Northwest Power and Conservation Council, Portland, Oregon.

Isaak D. J., C. H. Luce, D. L. Horan, G. L. Chandler, S. P. Wollrab, and D. E. Nagel. 2018. Global warming of salmon and trout rivers in the Northwestern U.S.: Road to ruin or path through purgatory? Transactions of the American Fisheries Society 147:566–587.

Julien, H. P. and N. E. Bergeron. 2006. Effect of fine sediment infiltration during the incubation period on Atlantic salmon (Salmo salar) embryo survival. Hydrobiologia 563:61–71.

Krahn, M. M., M. J. Ford, W. F. Perrin, P. R. Wade, R. P. Angliss, M. B. Hanson, B. L. Taylor, G. M. Ylitalo, M. E. Dahlheim, J. E. Stein, R. S. Waples. 2004. 2004 Status Review of Southern Resident Killer Whales (Orcinus orca) under the Endangered Species Act. US Department of Commerce, NOAA Tech. Memo. NMFS-NWFSC-62, Seattle, WA, xvii+73pp.

Krahn, M. M., M. B. Hanson, G.S. Schorr, et al. 2009. Effects of age, sex and reproductive status on persistent organic pollutant concentrations in "Southern Resident" killer whales. Marine Pollution Bulletin 58: 1522-1529.

Levasseur, M., N. E. Bergeron, M. F. Lapointe, and F. Bérubé. 2006. Effects of silt and very fine sand dynamics in Atlantic salmon (Salmo salar) redds on embryo hatching success. Canadian Journal of Fisheries and Aquatic Sciences 63:1450-1459.

Mantua, N., I. Tohver, and A. Hamlet. 2009. Impacts of climate change on key aspects of freshwater salmon habitat in Washington State. Climate Impacts Group, University of Washington, Seattle, Washington.

Matthews, G. M., R. S. Waples. 1991. Status Review for Snake River Spring and Summer Chinook Salmon. U.S. Dept. of Commerce, NOAA Tech. Memo., NMFS-F/NWC-200. https://www.nwfsc.noaa.gov/publications/scipubs/techmemos/tm201/

McClure, M., T. Cooney, and ICTRT. 2005. Updated population delineation in the interior Columbia Basin. May 11, 2005 Memorandum to NMFS NW Regional Office, Co-managers, and other interested parties. NMFS: Seattle, Washington. 14 p.

McElhany, P., M.H. Ruckelshaus, M.J. Ford, T.C. Wainwright, and E.P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-42, Seattle, Washington, 156 p.

McMichael, G.A., A.L. Fritts, and T.N. Pearsons. 1998. Electrofishing injury to stream salmonids; injury assessment at the sample, reach, and stream scales. North American Journal of Fisheries Management 18:894-904.

Mote, P. W. and E. P. Salathé. 2009. Future climate in the Pacific Northwest. Climate Impacts Group, University of Washington, Seattle, Washington.

National Marine Fisheries Service (NMFS). 2000. Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act. National Marine Fisheries Service. Portland, Oregon and Santa Rosa, California.

NMFS. 2008. Recovery Plan Module Mainstem Columbia River Hydropower Projects, September 24, 2008. NMFS: Portland, Oregon. 40 p. http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/hydro-module.pdf

NMFS. 2008b. Recovery plan for southern resident killer whales (Orcinus orca). Prepared by the National Marine Fisheries Service, Northwest Regional Office. https://www.westcoast.fisheries.noaa.gov/publications/protected_species/marine_mammals/killer_whales/esa_status/srkw-recov-plan.pdf

NMFS. 2015. ESA Recovery Plan for Snake River Sockeye Salmon (*Oncorhynchus nerka*), June 8, 2015. NOAA Fisheries, West Coast Region. 431 p. http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/interior_columbia/snake/snake_river_sockeye_recovery_plan_june_2015.pdf

NMFS. 2017. ESA Recovery Plan for Snake River Spring/Summer Chinook & Steelhead. NMFS. http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/interior_columbia/snake/Final%20Snake%20Recovery%20Plan%20Docs/final_snake_river_spring-summer_chinook_salmon_and_snake_river_basin_steelhead_recovery_plan.pdf

Newcombe, C. P. and J. O. Jensen. 1996. Channel Suspended Sediment and Fisheries: A Synthesis for Quantitative Assessment of Risk and Impact. North American Journal of Fisheries Management 16, No. 4.

Northwest Fisheries Science Center (NWFSC). 2015. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. 356 p.

NWFSC. Unpublished data used in the 2019 FCRPS Biological Opinion regarding Southern Resident Killer Whales.

Pacific Fishery Management Council (PFMC). 1998. Description and identification of essential fish habitat for the Coastal Pelagic Species Fishery Management Plan. Appendix D to Amendment 8 to the Coastal Pelagic Species Fishery Management Plan. Pacific Fishery Management Council, Portland, Oregon. December.

PFMC. 2014. Appendix A to the Pacific Coast Salmon Fishery Management Plan, as modified by Amendment 18. Identification and description of essential fish habitat, adverse impacts, and recommended conservation measures for salmon.

Payette National Forest (PNF). 2017. South Fork Salmon River Road Emergency Temporary Armoring. PNF report attached to a request for emergency consultation submitted by the PNF to the NMFS on April 25, 2017. Report prepared by C. Zurstadt, East Zone fisheries biologist, and B. Dreier, Engineer.

Reiser, D. W. and R. G. White. 1988. Effects of two sediment size-classes on survival of steelhead and Chinook salmon eggs. North American Journal of Fisheries Management 8:432-437.

Servizi, J. A. and D. W. Martens. 1992. Sublethal responses of coho salmon (Oncorhynchus kisutch) to suspended sediments. Canadian Journal of Fisheries and Aquatic Sciences 49: 1389-1395.

Sigler, J. W., T. C. Bjornn, and F. H. Everest. 1984. Effects of chronic turbidity on density and growth of steelheads and Coho salmon. Transactions of the American Fisheries Society 113: 142-150.

Spence, B., G. Lomnicky, R. Hughes, and R. P. Novitski. 1996. An ecosystem approach to salmonid conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp.: Corvallis, Oregon.

Stark, E. J., C. Bretz, A. Byrne, P. Cleary, T. Copeland, L. Denny, R. Engle, T. Miller, S. Rosenberger, E. R. Sedell, G. E. Shippentower, and C. Warren. 2016. Snake River basin steelhead 2013/2014 run reconstruction. Report to Bonneville Power Administration, Portland, Oregon.

Stark, E. J., A. Byrne, P. J. Cleary, T. Copeland, L. Denny, R. Engle, T. Miller, D. Nemeth, S. Rosenberger, E. R. Sedell, G. E. Shippentower, and C. Warren. 2017. Snake River basin steelhead 2014/2015 run reconstruction. Report to Bonneville Power Administration, Portland, Oregon.

Stark, E. J., A. Byrne, P. J. Cleary, J. Ebel, T. Miller, D. Nemeth, S. Rosenberger, E. R. Sedell, and C. Warren. 2018. Snake River Basin 2015-2016 steelhead run reconstruction. Report to Bonneville Power Administration, Portland, Oregon.

Stelle, W. 2013. Memo to Northwest Region Assistant Regional Administrators Re: Guidance on ESA Consultation for Southern Resident Killer Whales and Other Listed Marine Mammals. National Marine Fisheries Service, Seattle Washington.

Tuomikoski, J., J. McCann, B. Chockley, H. Schaller, S. Haeseker, J. Fryer, R. Lessard, C. Petrosky, E. Tinus, T. Dalton, and R. Ehlke. 2013. Comparative Survival Study of PIT-tagged Spring/Summer/Fall Chinook, Summer Steelhead, and Sockeye. 2013 Annual Report, BPA Contract #19960200. 47 pp. Appendices.

United States Forest Service (USFS). 2008. Biological Assessment for the Potential Effects of Managing the Payette National Forest in the South Fork Salmon River Section 7 Watershed on Snake River Spring/Summer Chinook Salmon, Snake River Steelhead, and Columbia River Bull Trout and Westslope Cutthroat Trout. Volume 28, Ongoing and New Actions, May 8, 2007, Payette National Forest, McCall, Idaho. 300 pp.

Walters, A. W., T. Copeland, and D. A. Venditti. 2013. The density dilemma: limitations on juvenile productions in threatened salmon populations. Ecology of Freshwater Fish 22(4):508-519.

Weitkamp, L. A. 2010. Marine Distributions of Chinook Salmon from the West Coast of North America Determined by Coded Wire Tag Recoveries. Transactions of the American Fisheries Society 139:147-170.

Wiles, G. J. 2004. Washington State Status Report for the Killer Whale. Washington Department of Fish and Wildlife, Olympia, 3/1/2004.

Zamon, J. E., T. J. Guy, K. Balcomb, and D. Ellifrit. 2007. Winter observation of southern resident killer whales (Orcinus orca) near the Columbia River plume during the 2005 Chinook salmon (Oncorhynchus tshawtscha) spawning migration. Northwestern Naturalist, 88(3): 193-198.

6. APPENDIX A

Appendix A

Table A-1. Estimated density of rearing Chinook salmon and steelhead in the South Fork Salmon River between river mile 37.5 (confluence of the East Fork South Fork Salmon River) upstream to river mile 45.8 (approximately one mile upstream from the in-water work area), from Idaho Department of Fish and Game snorkeling surveys. Data obtained through the Idaho Fish and Wildlife Information Systems.

Year	Number of Fish per Square Meter		Number of Fish in the 9095 square foot (837.6 square meter) Work Area	
	Chinook salmon	Steelhead and Unidentified Oncorhynchus Fry	Chinook salmon	Steelhead and Unidentified Oncorhynchus Fry
1995	0.01327	0.00982	11.1	8.2
1996	0.00346	0.00740	2.9	6.2
1998	0.10299	0.01133	86.3	9.5
1999	0.03423	0.02079	28.7	17.4
2000	0.00769	0.00435	6.4	3.6
2001	0.03498	0.03102	29.3	26.0
2002	0.10217	0.03547	85.6	29.7
2003	0.29859	0.06143	250.1	51.5
2004	0.09896	0.08152	82.9	68.3
2005	0.10012	0.07480	83.9	62.7
2006	0.03941	0.01995	33.0	16.7
2009	0.08216	0.02500	68.8	20.9
2010	0.04548	0.01034	38.1	8.7
2012	0.04105	0.01582	34.4	13.3
2014	0.00752	0.01982	6.3	16.6
2015	0.02741	0.04481	23.0	37.5
2016	0.03666	0.04191	30.7	35.1
2017	0.10054	0.03634	84.2	30.4
2018	0.00511	0.01627	4.3	13.6
Ave	**0.06220**	**0.02990**	**52.1**	**25.0**
Min	**0.00346**	**0.00435**	**2.9**	**3.6**
Max	**0.29859**	**0.08152**	**250.1**	**68.3**
Lower CI	**0.02937**	**0.01907**	**24.6**	**16.0**
Upper CI	**0.09503**	**0.04074**	**79.6**	**34.1**