UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Blvd., Suite 1100
PORTLAND, OREGON 97232-1274

**Refer to NMFS No: WCR-2018-9469**

September 10, 2018

Lt. Col. Christian N. Dietz
U.S. Army Corps of Engineers
Walla Walla District
201 North Third Avenue
Walla Walla, Washington 98362-1836

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Carmen Levee Rehabilitation Project, Salmon River Lemhi County, Idaho, HUC 170602030404

Dear Lt. Col. Dietz:

Thank you for your biological assessment May 2, 2018, 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 effects of the U.S. Army Corps of Engineers (COE) proposal to issue a permit to Lemhi County under section 404 of the Clean Water Act for the Carmen Levee Rehabilitation 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 sockeye salmon, Snake River spring/summer Chinook salmon, and Snake River Basin steelhead. NMFS also determined that the proposed action will not destroy or adversely modify designated critical habitat for Snake River sockeye salmon, Snake River spring/summer Chinook salmon, and Snake River Basin 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 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.

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 eleven 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 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 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.

If you have questions regarding this consultation, please contact David Molenaar, Southern Snake Branch Office, at (208) 378-5677, or david.molenaar@noaa.gov.

Sincerely,

Michael P. Tehan

for Barry A. Thom
Regional Administrator

Enclosure

cc: B. Tice – COE
E. Ohr – USFWS
C. Colter – SBT

**Endangered Species Act – Section 7 Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation Management Act Essential Fish Habitat Consultation**

Carmen Levee Rehabilitation Project
Salmon River Lemhi County, Idaho
HUC 170602030404

NMFS Consultation Number: WCR-2018-9469

Action Agency: 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 |
|---|---|---|---|---|---|
| Snake River Basin steelhead (*Oncorhynchus mykiss*) | Threatened | Yes | No | Yes | No |
| Snake River spring/summer Chinook salmon (*O. tshawytscha*) | Threatened | Yes | No | Yes | No |
| Snake River sockeye (*O. nerka*) | Endangered | No | N/A | No | N/A |

| 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:**

Barry A. Thom
Regional Administrator

**Date:** September 10, 2018

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## ACRONYMS

| ACRONYM | DEFINITION |
|---|---|
| BA | Biological Assessment |
| BMP | Best Management Practices |
| COE | U.S. Army Corps of Engineers |
| CWA | Clean Water Act |
| dB | Decibels |
| DPS | Distinct Population Segment |
| DQA | Data Quality Act |
| EFH | Essential Fish Habitat |
| EPP | Environmental Protection Plan |
| ESA | Endangered Species Act |
| ESU | Evolutionarily Significant Units |
| GSI | Genetic Stock Identification |
| HAPC | Habitat Areas of Particular Concern |
| ICTRT | Interior Columbia Technical Recovery Team |
| IDEQ | Idaho Department of Environmental Quality |
| ITS | Incidental Take Statement |
| MPG | Major Population Group |
| MPI | Matrix of Pathways and Indicators |
| MSA | Magnuson-Stevens Fishery Conservation and Management Act |
| NMFS | National Marine Fisheries Service |
| NTU | Nephelometric Turbidity Unit |
| *O.* | *Oncorhynchus* |
| OHWM | Ordinary High Water mark |
| Opinion | Biological Opinion |
| PBF | Physical or Biological Features |
| PCE | Primary Constituent Elements |
| RPM | Reasonable and Prudent Measures |
| 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). The document will be available through NMFS' Public Consultation Tracking System https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts. A complete record of this consultation is on file at the Snake Basin Boise Office.

## 1.2 Consultation History

This Opinion is based on information provided in the U.S. Army Corps of Engineers' (COE) April 11, 2018, consultation initiation package, including: The final biological assessment (BA) for the Carmen Levee Rehabilitation Project was received by NMFS by email on April 11, 2018, and clarifications were provided to NMFS for the proposed action by the COE on May 31, 2018. Additional information reviewed and relied on to complete this Opinion included email correspondence and revised design plans.

The BA analyzed the effects of the proposed action on Snake River spring/summer Chinook salmon, Snake River Basin steelhead, and Snake River sockeye salmon, designated critical habitats for all three species and EFH for Chinook salmon. Table 1 displays the listing status for these species and designated critical habitats. The COE determined the proposed action is: (1) Likely to adversely affect Snake River spring/summer Chinook and sockeye salmon and Snake River Basin steelhead; (2) likely to adversely affect designated critical habitat for these same species; and (3) will adversely affect EFH for Snake River spring/summer Chinook salmon.

Because this action has the potential to affect tribal trust resources, NMFS provided copies of the draft proposed action and terms and conditions for this Opinion to the Nez Perce and Shoshone-Bannock and Tribes on August 16 and 21, respectively, 2018. Neither tribe responded.

**Table 1. Federal Register notices for final rules that list threatened and endangered species, designate critical habitats, or apply protective regulations to listed species considered in this consultation.**

| 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 |
| **Sockeye salmon *(O. nerka)*** | | | |
| Snake River | E 6/28/05; 70 FR 37160 | 12/28/93; 58 FR 68543 | ESA section 9 applies |
| **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; 'E' means listed as endangered.

## 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 COE, Lemhi County, or NMFS.

For purposes of this consultation, the proposed action is the COE's issuance of a Clean Water Act (CWA) Section 404 permit to Lemhi County to discharge rock fill below the ordinary high water mark (OHWM) of the Salmon River to stabilize an eroded levee on the right riverbank. The COE would authorize the action under Public Law 84-99, Flood and Coastal Storm Emergencies. The levee is currently maintained by the COE. However, Lemhi County has been removing vegetation from the levee face in the recent past. The project would encompass replacing approximately 1,000 linear feet of bank armoring of a 4,400-foot long levee, including reusing remnants of previously placed riprap, and constructing new mini-rock barbs (Figure 1) along the length of the newly stabilized area. The project area is located on the Salmon River, just upstream of the U.S. Highway 93 Bridge, outside of the town of Carmen, Idaho, approximately 4.0 miles north of the town of Salmon, Sections 17 and 18, Township 22 North, Range 22 East, Boise Meridian, in Lemhi County, Idaho (Figure 2).

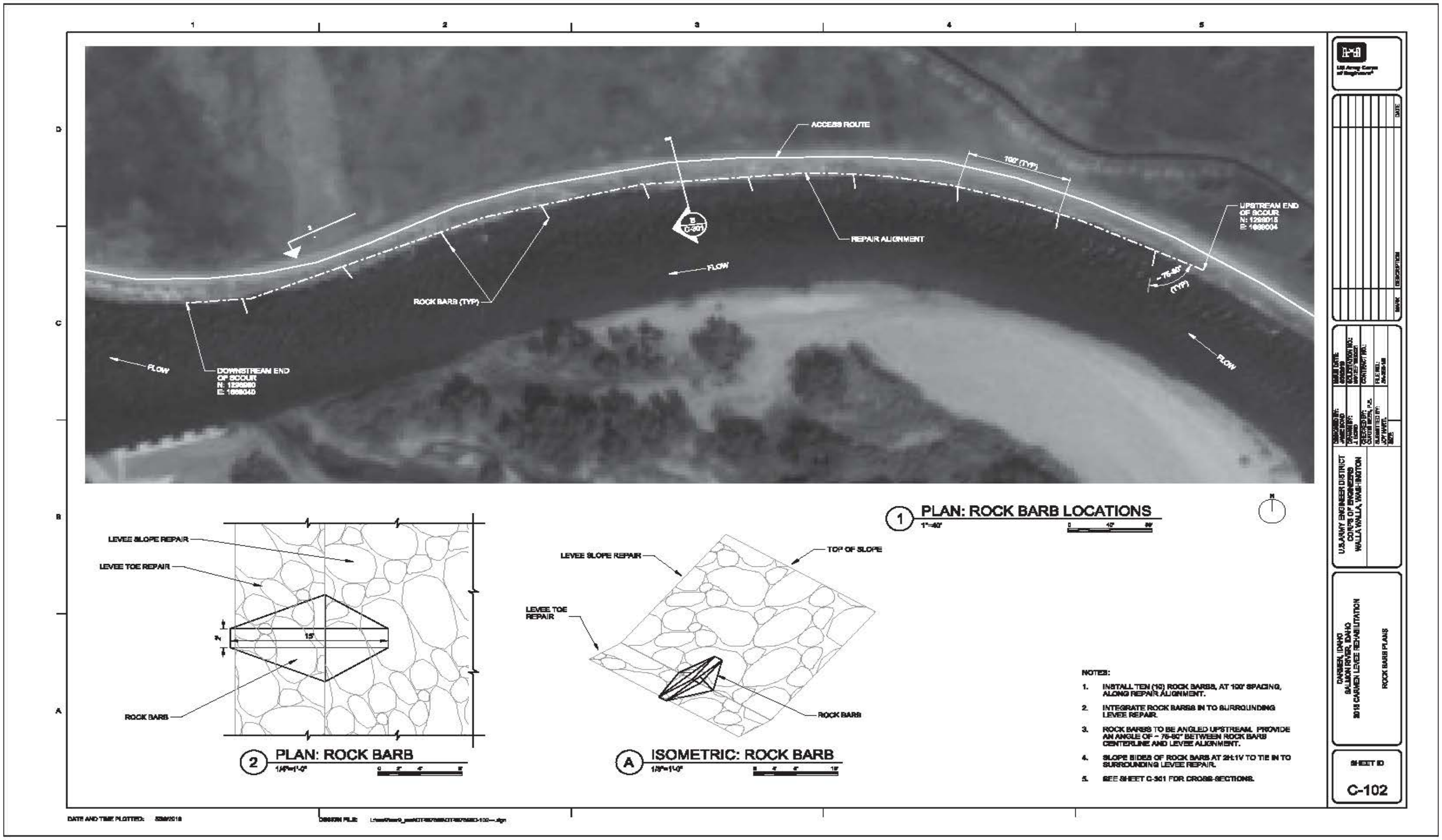


**Figure 1. Rock Barbs.**

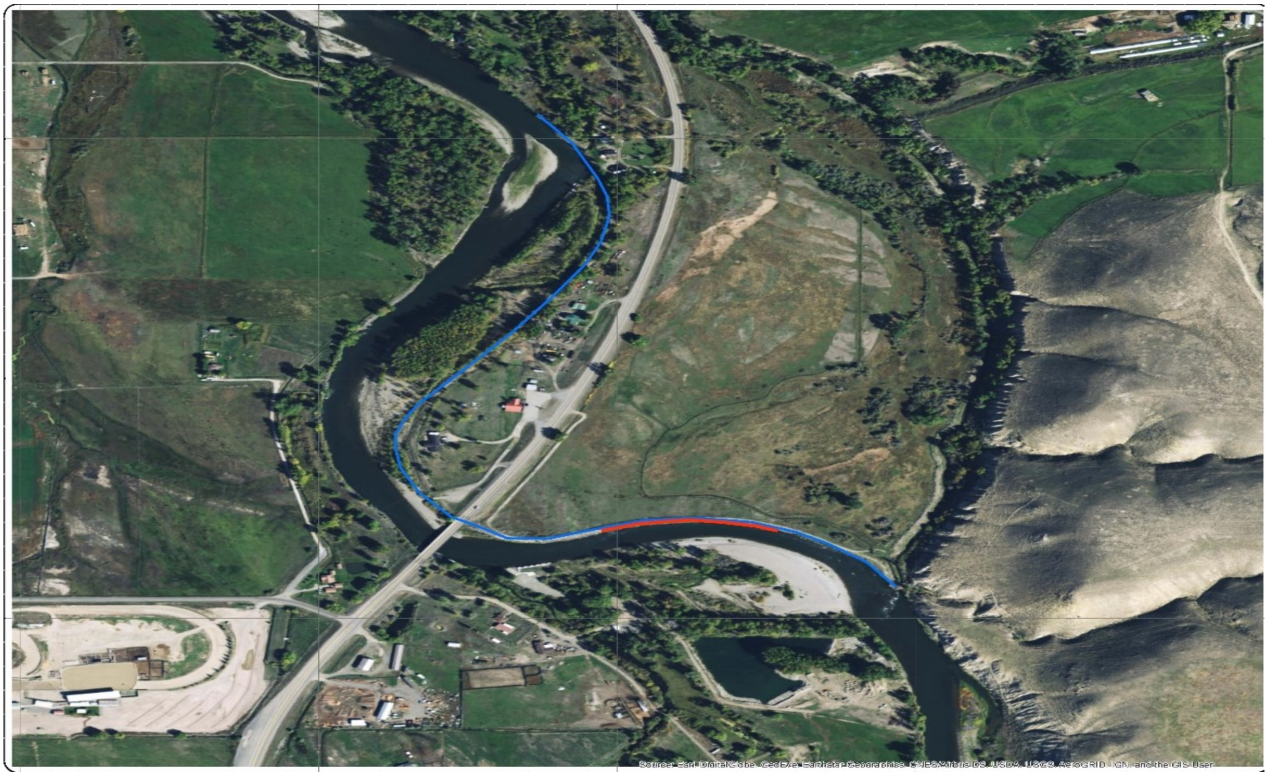

**Figure 2. Project location in Idaho.**

1.3.1 Basic Construction Sequencing

The proposed project sequence for the levee repair will include the following:

1. The work window the COE is targeting is July 14, 2018 to March 14, 2019, as recommended by NMFS. Work is anticipated to take up to 4 weeks to complete.

2. The project will not construct any access roads, relying instead upon existing access routes.

3. Approximately 1,900 cubic yards of riprap and 415 cubic yards of quarry spalls will be hauled to the repair site from a nearby quarry with dump trucks. The rock material will be unloaded on top of the levee and placed on the levee with an excavator operating from the top of the levee.

4. An excavator will excavate and place large riprap in the river at the toe of the levee. Riprap will extend from the toe up the face of the levee to the top of the levee. The riprap will be placed with the excavator bucket. It will not be dumped directly into the water from a truck or the excavator bucket. Only the bucket will enter the water.

5. Ten rock barbs, approximately 10-foot on-center spacing, will be constructed within the footprint of the reconstructed levee.

6. There is little to no vegetation growing on the levee, so there is not anticipated to be much, if any, vegetation removal.

1.3.2 Construction Equipment and Methods

Equipment expected to be used for the proposed actions includes:  Trucks to haul quarry spalls to project site from nearby quarry; and excavators to excavate, remove existing debris and riprap, and place riprap.

1.3.3 Turbidity Standards

The Idaho Department of Environmental Quality (IDEQ) standard for turbidity is instantaneous measurements less than 50 nephelometric turbidity units (NTU) above background or more than 25 NTU increase for more than 10 consecutive days (IDAPA 58.01.02; Section 250(02)(e)).  To ensure consistency with IDEQ water quality standards, the COE will require that turbidity monitoring, using a turbidity meter, occur during all instream work to ensure any turbidity discharges from the projects remain below IDEQ standards.  The COE will also require that background turbidity levels be measured 100 feet upstream of the work area to determine baseline turbidity levels, with turbidity measurements taking place approximately every 30 minutes during instream and bank construction activities.  Measurements will be taken approximately 150 feet downstream of each sediment source (e.g., location of excavator bucket and riprap placement) with efforts made to prevent an increase of 50 NTUs over background levels, or to limit the time period that turbidity levels exceed 50 NTUs over background to less than 60 minutes.  The IDEQ's turbidity monitoring process requires construction activities cease if turbidity levels approach 50 NTUs over background levels (35–40 NTUs).

1.3.4 Proposed Best Management Practices and Design Measures to Minimize Impacts

The following sections highlight specific best management practices (BMPs) and other conservation measures that will be implemented and incorporated into the final construction plans.  The conservation measures described here and in the consultation initiation package as parts of the proposed action are intended to reduce or avoid adverse effects on ESA-listed species and their habitats.  NMFS regards these conservation measures as integral components of the proposed action and expects that all proposed project activities will be completed consistent with those measures.  We have completed our effects analysis accordingly.  Any deviation from these conservation measures will be beyond the scope of this consultation and will not be exempted from the prohibition against take as described in the attached ITS.  Further consultation will be required to determine what effect the modified action may have on ESA-listed species or designated critical habitats.

*1.3.4.1 General Construction Best Management Practices*

The BMPs proposed to be implemented to minimize direct, short-term construction impacts include, but are not limited to, the following:

1. An Environmental Protection Plan (EPP) will be developed and implemented for this project. The EPP will be made available onsite and available for review at any time.

2. Temporary erosion controls (i.e., silt fences, silt curtains) will be implemented according to the final construction designs. Erosion controls will generally be in place along the toe of the embankment, above the OHWM nearest to any material stockpiling areas, and in active working or fueling areas.

3. Construction equipment fueling areas will be located more than 150 feet from surface water. Tanks larger than 150 gallons will be stored at least 300 feet from any waterbody. If this distance cannot be achieved, all refueling must take place within a spill containment basin capable of holding the entire fuel load capacity of the equipment.

4. All equipment will be inspected daily for fluid leaks, any leaks detected will be repaired before operation is resumed.

5. The project will include regular onsite observation of work and temporary erosion controls. Any deficiencies in erosion controls will be addressed immediately.

6. A BMP inspection and maintenance plan will be developed and implemented. At a minimum, BMPs will be inspected and maintained daily for project's duration.

7. The COE will provide access to the project site upon request by any regulatory agency personnel for site inspections, monitoring, and/or to ensure that conditions of the BMPs and any other conservation measures are being met.

*1.3.4.2 Instream Work*

The BMPs proposed for implementation during instream work include but are not limited to the following:

1. Vegetable-based hydraulic fluid will be used on equipment operating in or directly adjacent to the active river channel.

2. Any instream or riverbank work will only occur within the recommended work windows with the following exceptions:

    a. Where water levels are expected to remain low enough that the work will only be conducted in dry for the duration of the work.

3. All heavy equipment (i.e., dump trucks and excavators) will access the project sites via existing roadways and the tops of levees.

4. A 150-foot downstream mixing zone will be monitored daily during instream construction activities. Data will be used to help attain IDEQ water quality standards (see Section 1.3.3).

*1.3.4.3 Water Quality Protection*

The BMPs proposed to be implemented to protect water quality during construction activities include but are not limited to the following:

1. Sediment containment measures, such as sediment basins and silt fencing, will be installed and properly maintained to minimize sediment release to streams and the resulting turbidity. These containment measures will not be removed until soil is stabilized and/or all stock piling of fill and riprap used is removed from project site.

2. The COE will be required to monitor turbidity levels as described in Section 1.3.7 and take steps to ensure IDEQ surface water quality standards are met for the duration of the project.

*1.3.4.4 Management of Hazardous or Deleterious Materials*

In addition BMPs in Section 1.3.4.1, the BMPs proposed to manage, handle and dispose of hazardous materials include but are not limited to the following:

1. In accordance with IDAPA 58.01.02.850, in the event of an unauthorized release of hazardous material to water or land such that there is a likelihood that it will enter waterways, the responsible persons in charge must:

    a. Make every reasonable effort to abate and stop a continuing spill.

    b. Make every reasonable effort to contain spilled material in such a manner that it will not reach surface or ground waters of the State.

    c. Immediately notify IDEQ of the spill by calling the Idaho State Communications Center at 1-800-632-8000.

    d. Collect, remove, and dispose of the spilled material in a manner approved by IDEQ.

2. In accordance with IDAPA 58.01.02.851.04, any aboveground spill or overfill of petroleum that results in a release that exceeds 25 gallons or that causes a sheen on a nearby surface water will be reported to IDEQ within 24 hours and corrective action in accordance with IDAPA 58.01.02.852 shall be taken.

3. Any spills reported to the agencies above will also be reported to NMFS.

4. Excavated materials, concrete rubble, and other waste material generated during construction will be removed from the project site and hauled to an approved waste area.

1.3.5 Monitoring and Reporting Plan

Turbidity monitoring (see Section 1.3.3) will be performed during instream construction activities. Any violation of the IDEQ water quality standard must be reported to the IDEQ regional office immediately. The COE's turbidity monitoring process indicates that construction activities will cease if turbidity levels approach 50 NTUs (35–40 NTUs) over background.

Monitoring frequency will be adequate to document that all design criteria and BMPs are implemented as described in this Opinion. The COE will complete a monitoring report and provide it to NMFS by December 31 of the year the project is completed.

# 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 spring/summer Chinook and sockeye salmon and Snake River Basin steelhead 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 alternatives 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. 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 essential PBF that help to form that conservation value.

### 2.2.1 Status of the Species

This section describes the present condition of the Snake River spring/summer Chinook salmon and Snake River sockeye salmon evolutionarily significant units (ESUs), 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 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.

Populations present or migrating through the action area include: the Upper Salmon River mainstem, Lemhi River, Pahsimeroi River, East Fork Salmon River, Yankee Fork Salmon River, and Valley Creek Snake River spring/summer Chinook salmon populations; the Redfish Lake Snake River sockeye salmon population; and the Upper Mainstem Salmon River, Lemhi River, Pahsimeroi River, and East Fork Salmon River Snake River Basin steelhead populations.

#### *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).

Snake River spring/summer Chinook 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 4 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 viable salmonid population (spatial structure, diversity, abundance, and productivity).

**Table 2. Summary of viable salmonid population parameter risks and overall current status for each population in the Snake River spring/summer Chinook salmon evolutionarily significant units (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 |
| | 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*** |

**Note:** Shaded cells indicate populations occurring or migrating through the action area.

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).

***Abundance and Productivity.*** Historically, the Snake River drainage is thought to have produced more than 1.5 million adult Snake River 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 2006 and 2016, the number of wild Snake River spring/summer Chinook adult fish passing Lower Granite Dam annually ranged from 7,093 to 16,161 (JCRMS 2017). 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.

For Snake River spring/summer Chinook, these salmon populations represent six of eight populations in the MPG. The Lemhi River is a very large population; the Pahsimeroi River, East Fork Salmon River and Upper Salmon River Mainstem are large populations; and the Yankee Fork Salmon River and Valley Creek are Basic in population size. As such, the Lemhi River, Pahsimeroi River, East Fork Salmon River and Upper Salmon River Mainstem are identified as four of the five populations that will need to be viable for the MPG to be viable (NMFS 2017).

The most recent 5-year status review of these populations indicates the Upper Salmon River Mainstem Chinook salmon population (NWFSC 2015) reported the 5-year geometric mean natural adult abundance as 411; although an improvement since the previous review, it was less than half the targeted minimum abundance threshold of 1,000 adults. Productivity of the population is estimated as 1.22 (standard error = 0.19), lower than the threshold productivity of 2.30 recruits per spawner in order to attain a 1 percent or less risk ("very low risk") of extinction over a 100-year timeframe. The 5-year status review (NWFSC 2015) of the Lemhi River Chinook salmon population geometric mean natural adult abundance is 143, also an improvement since the previous review but less than the minimum abundance threshold of 2,000 adults. Productivity of the population is estimated as 1.3 (standard error = 0.19), lower than the threshold productivity of 1.73 recruits per spawner in order to attain a 1 percent or less risk ("very low risk") of extinction over a 100-year timeframe (ICTRT 2010). The 5-year status review (NWFSC 2015) of the Pahsimeroi River salmon population geometric mean natural adult abundance is 267, also an improvement since the previous review but less than the minimum abundance threshold of 1,000 adults. Productivity of the population is estimated as 1.37 (standard error = 0.16), lower than the threshold productivity of threshold productivity of 2.30 recruits per spawner in order to attain a 1 percent or less risk ("very low risk") of extinction over a 100-year timeframe (ICTRT 2010). The 5-year status review (NWFSC 2015) of the East Fork Salmon River population geometric mean natural adult abundance is 347, an improvement since the previous review but less than the minimum abundance threshold of 1,000 adults. Productivity of the population is estimated as 1.08 (standard error = 0.28), lower than the threshold productivity of threshold productivity of 2.30 recruits per spawner in order to attain a 1 percent or less risk ("very low risk") of extinction over a 100-year timeframe (ICTRT 2010). The 5-year status review (NWFSC 2015) of the Yankee Fork Salmon River salmon population geometric mean natural adult abundance is 44, a decline since the previous review and less than the minimum abundance threshold of 500 adults. Productivity of the population is estimated as 0.72 (standard error = 0.39), lower than the threshold productivity of threshold productivity of

4.8 recruits per spawner in order to attain a 1 percent or less risk ("very low risk") of extinction over a 100-year timeframe (ICTRT 2010).

### *2.2.1.2 Snake River Sockeye Salmon*

This ESU includes all anadromous and residual sockeye salmon from the Snake River basin in Idaho, as well as artificially propagated sockeye salmon from the Redfish Lake captive propagation program. The ESU was first listed as endangered under the ESA in 1991, and the listing was reaffirmed in 2005 (70 FR 37160). Reasons for the decline of this species include high levels of historic harvest, dam construction including hydropower development on the Snake and Columbia Rivers, water diversions and water storage, predation on juvenile salmon in the mainstem river migration corridor, and active eradication of sockeye from some lakes in the 1950s and 1960s (56 FR 58619; ICTRT 2003). 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 endangered (81 FR 33468).

***Life History.*** Snake River sockeye salmon adults enter the Columbia River primarily during June and July, and arrive in the Sawtooth Valley peaking in August. The Sawtooth Valley supports the only remaining run of Snake River sockeye salmon. The adults spawn in lakeshore gravels, primarily in October (Bjornn et al. 1968). Eggs hatch in the spring between 80 and 140 days after spawning. Fry remain in the gravel for 3 to 5 weeks, emerge from April through May, and move immediately into the lake. Once there, juveniles feed on plankton for 1 to 3 years before they migrate to the ocean, leaving their natal lake in the spring from late April through May (Bjornn et al. 1968). Snake River sockeye salmon usually spend 2 to 3 years in the Pacific Ocean and return to Idaho in their 4$^{th}$ or 5$^{th}$ year of life.

***Spatial Structure and Diversity.*** Within the Snake River ESU, the ICTRT identified historical sockeye salmon production in five Sawtooth Valley lakes, in addition to Warm Lake and the Payette Lakes in Idaho and Wallowa Lake in Oregon (ICTRT 2003). The sockeye runs to Warm, Payette, and Wallowa Lakes are now extinct, and the ICTRT identified the Sawtooth Valley lakes as a single MPG for this ESU. The MPG consists of the Redfish, Alturas, Stanley, Yellowbelly, and Pettit Lake populations (ICTRT 2007). The only extant population is Redfish Lake, supported by a captive broodstock program. Hatchery fish from the Redfish Lake captive propagation program have also been outplanted in Alturas and Pettit Lakes since the mid-1990s in an attempt to reestablish those populations (Ford 2011). With such a small number of populations in this MPG, increasing the number of populations would substantially reduce the risk faced by the ESU (ICTRT 2007). NWFSC (2015) reports some evidence of very low levels of early-timed returns in some recent years from outmigrating naturally-produced Alturas Lake smolts, but the ESU remains at high risk for spatial structure.

Currently, the Snake River sockeye salmon run is highly dependent on a captive broodstock program operated at the Sawtooth and Eagle Hatcheries. Although the captive broodstock program rescued the ESU from the brink of extinction, diversity risk remains high without sustainable natural production (Ford 2011; NWFSC 2015).

***Abundance and Productivity.*** Prior to the turn of the 20th century (ca. 1880), around 150,000 sockeye salmon ascended the Snake River to the Wallowa, Payette, and Salmon River basins to spawn in natural lakes (Evermann 1896, as cited in Chapman et al. 1990). The Wallowa River sockeye run was considered extinct by 1905, the Payette River run was blocked by Black Canyon Dam on the Payette River in 1924, and anadromous Warm Lake sockeye in the South Fork Salmon River basin may have been trapped in Warm Lake by a land upheaval in the early 20th century (ICTRT 2003). In the Sawtooth Valley, the Idaho Department of Fish and Game eradicated sockeye from Yellowbelly, Pettit, and Stanley Lakes in favor of other species in the 1950s and 1960s, and irrigation diversions led to the extirpation of sockeye in Alturas Lake in the early 1900s (ICTRT 2003), leaving only the Redfish Lake sockeye. From 1991 to 1998, a total of just 16 wild adult anadromous sockeye salmon returned to Redfish Lake. These 16 wild fish were incorporated into a captive broodstock program that began in 1992 and has since expanded so that the program currently releases hundreds of thousands of juvenile fish each year in the Sawtooth Valley (Ford 2011).

With the increase in hatchery production, adult returns to Sawtooth Valley have increased, ranging from 272 to 1,579 during the most recent 5-year period (2010–2014) (NWFSC 2015). The increased abundance of hatchery reared Snake River sockeye reduces the risk of immediate loss, yet levels of naturally produced sockeye returns remain extremely low (NWFSC 2015). The ICTRT's viability target is at least 1,000 naturally produced spawners per year in each of Redfish and Alturas Lakes and at least 500 in Pettit Lake (ICTRT 2007). Very low numbers of adults survived upstream migration in the Columbia and Snake Rivers in 2015 due to unusually high water temperatures. The implications of this high mortality for the recovery of the species are uncertain and depend on the frequency of similar high water temperatures in future years (NWFSC 2015).

The species remains at high risk across all four risk parameters (spatial structure, diversity, abundance, and productivity). Although the captive brood program has been highly successful in producing hatchery *O. nerka*, substantial increases in survival rates across all life history stages must occur in order to reestablish sustainable natural production (NWFSC 2015). In particular, juvenile and adult losses during travel through the Salmon, Snake, and Columbia River migration corridor continue to present a significant threat to species recovery (NMFS 2015).

Snake River sockeye in the action area belong to the Redfish Lake population, the only extant population of the original 10 populations in the ESU. The three identified forms of sockeye salmon in Redfish Lake make the population unique within the range of the species: (1) An anadromous, shoal spawning population; (2) a resident, shoal spawning population with the same genetic haplotype as the anadromous form; and (3) a resident "kokanee" (with a similar but different haplotype) that spawns in Fishhook Creek (Waples et al. 1991). This ESU was updated in 1993 to include these residual sockeye salmon in Redfish Lake and progeny of fish that are propagated artificially in the captive broodstock program (58 FR 17573). The most proximate spawning area remaining for sockeye salmon from the proposed action area occurs within Redfish Lake, approximately 120 river miles upstream of the project area.

The population is largely dependent on hatchery brood stocking efforts. Estimates of annual returns are now available through 2014. Adult returns in 2008 and 2009 were the highest since the current captive brood based program began with a total of 650 and 809 adults counted back to the Stanley basin. The ongoing reintroduction program is still in the phase of building sufficient returns to allow for large scale reintroduction into Redfish Lake, the initial target for restoring natural production. Initial releases of adult returns directly into Redfish Lake have been observed spawning in multiple locations along the lake shore as well as in Fishhook Creek. There is some evidence of very low levels of early timed returns in some recent years from outmigrating naturally produced Alturas Lake smolts. At this stage of the recovery efforts, the ESU remains rated at High Risk for both spatial structure and diversity (NMFS 2015).

*2.2.1.3 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).

**Table 3. Summary of viable salmonid population parameter risks and overall current status for each population in the Snake River Basin steelhead distinct population segment (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.
Note: Shaded cells indicate populations occurring or migrating through the action area.

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.

***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 Upper Mainstem Salmon River, Lemhi River, Pahsimeroi River, and East Fork Salmon River steelhead populations are four of 12 populations in the MPG, and within a single aggregate stock group (North Fork Salmon River, Pahsimeroi River, Lemhi River, East Fork Salmon River, and Upper Salmon River) in the genetic stock identification (GSI) analysis. Steelhead populations in the Snake River DPS are all summer run and can be classified as either A-run or B-run based on their size and ocean life history. The Upper Mainstem Salmon River and Lemhi steelhead populations are A-run populations. This stock group has relatively high potential for misclassification in the GSI mixture analysis. In addition, there are ongoing hatchery releases into habitats associated with most of the populations in this grouping. The distribution of these potential spawners relative to natural origin adults is not well understood (NWFSC 2015). The minimum threshold for this intermediate sized population is 1,000 adults, but because of the influence of hatchery practices the natural spawning abundance remains unknown. Spatial structure risk is very low and diversity risk is rated as moderate due to historical hatchery influence. Returns are still well below minimum abundance and the population is tentatively rated as moderate risk of extinction (i.e., 10–25 percent risk of extinction in 100 years).

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, & Sockeye 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 each of the three ESA-listed salmon and steelhead species. 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 the two salmon species 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.

**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 sockeye salmon | 58 FR 68543; December 28, 1993 | Snake and Salmon Rivers; Alturas Lake Creek; Valley Creek, Stanley Lake, Redfish Lake, Yellowbelly Lake, Pettit Lake, Alturas Lake; all inlet/outlet creeks to those lakes |
| 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. |

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

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

Many stream reaches designated as critical habitat for these species are listed on the CWA 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.

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

One factor affecting the range wide 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). Sediment generated by in-channel work during bridge removal and construction is not expected to affect more than 600 feet of stream channel downstream of any worksite. For purposes of this consultation, the action area includes: (1) The levee access road; (2) the top or crest of the levee; (3) the area of repair to the levee face (25,000 square feet); and (4) the 600-foot reach of the Salmon River downstream from the project area that will be affected by the anticipated sediment plume. The project is located just upstream of the Highway 93 Bridge, outside of the town of Carmen, Idaho, approximately 4.0 miles north of the town of Salmon, Sections 17 and 18, Township 22 North, Range 22 East, Boise Meridian, in Lemhi County, Idaho.

The Salmon River, including the action area, is designated critical habitat for all three species (Table 5). Designated critical habitat for the Snake River spring/summer Chinook includes all river reaches presently or historically accessible to the species (64 FR 57399) as well as their adjacent riparian zone (area within 300 feet of the line of high water of the stream channel.) Designated critical habitat for the Snake River sockeye salmon includes all river reaches presently or historically accessible to the species (58 FR 68543), also including the adjacent riparian zone. Designated critical habitat for the Snake River Snake River Basin steelhead identifies specific reaches of streams and rivers, as published in the Federal Register (70 FR 52630). The action area, is also EFH for Chinook salmon (PFMC 2014), and is in an area where environmental effects of the proposed project may adversely affect EFH for this species.

The action area for this consultation provides freshwater rearing and migration for Snake River spring/summer Chinook salmon and Snake River Basin steelhead. The Salmon River, in the action area, also provides migratory habitat for Snake River sockeye salmon. The action area does not support Chinook or steelhead reproduction. All sockeye reproduction and rearing occurs upstream of the proposed project area. Chinook, sockeye, and steelhead adult migration may overlap with at least a portion of the work window depending on when in-water project activities occur. It is possible some juvenile Chinook salmon may rear and migrate within the action area during the work windows. Juvenile sockeye salmon will migrate through the action area in two pulses, with the earlier pulse occurring prior to the start of the work window. The later pulse of sockeye juveniles will likely occur during the proposed timing of the project in late summer, early fall. Adult steelhead are also likely to migrate through the action area during the work window, although possibly later into the fall season as compared to adult Chinook and sockeye adults. Juvenile steelhead, have an extended juvenile rearing in freshwater and similar outmigration times to Chinook salmon and sockeye, so are likely to be in the action area.

## 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 action area is located on the banks of the Salmon River, north of Salmon, Idaho, between Wallace Creek and the confluence of the Lemhi River. The Salmon River, immediately upstream of the confluence with the Lemhi River, has a mean annual flow of 1,900 cubic feet per second (cfs), with a mean monthly flow range of 1,060 cfs (September) to 5,640 cfs (June) (IDEQ 2001). Within the action area there is a mixture of historic floodplains converted to farms, ranches, residential dwellings, a federal highway and pockets of commercial activity. The natural sinuosity of the river has been limited in an effort to protect residential dwellings, pockets of commercial activity and agricultural lands.

Current and historical vegetation along the action area of the Salmon River is typical of the Salmon River floodplain. Dominant riparian trees are black cottonwood and quaking aspen. Common shrubs include willow, water birch, mountain alder, red-osier dogwood, and currant. The dominant riparian herbaceous species are Nebraska and beaked sedge, and Baltic rush. The extent of riparian vegetation within the action area is considerably limited, with some intact stands of riparian trees and shrubs, and other areas with little or no vegetation due to levee maintenance practices.

Recovery plans for Chinook and steelhead (NMFS 2017) identify four potential habitat limiting factors and threats. They include: (1) Reduction of flows from new water developments; (2) floodplain and riparian degradation; (3) noxious weeds; and (4) loss of beaver. Major threats affecting conditions in the action area created by the levee include restricted access of the river to its floodplain, degraded riparian functions, degraded water quality, and lack of access to thermal refugia and cover.

### 2.4.1 Floodplain Development

The Carmen Levee is the only riprap project permitted by the COE within the action area. It appears the levee has been repaired by the COE at least two previous times since 1986. The primary cause of damage in 1986 and 1989, was due to frazil ice, creating up to 700 feet and 250 feet of damage and repairs, respectively. Although it appears much of the reach has been previously armored by non-COE actions, there are no local records documenting such (Personal Communication, T. Morton, Lemhi County Building Examiner, June 28, 2018).

The Carmen Levee restricts peak flows and restricts channel access to the historic floodplain, degrading baseline conditions. Within the approximate 6.5-mile reach from Wallace Creek to the confluence with the Lemhi River, the historic floodplain width is variable, but appears to average approximately 4,500 feet. In most of this section, levees within the action area constrain the active floodplain to approximately 11 percent of its historical width (estimated by NMFS from aerial photography).

Effects of floodplain development and the levee system in the action area include: (1) An extensive restriction of the channel migration zone, reducing or eliminating large wood and sediment recruitment and other processes which help create aquatic habitat; and (2) blocked access to the floodplain, impairing or preventing many ecological processes (e.g., fish access to off channel habitats, nutrient exchange, hyporheic zone function).

2.4.2 Riparian Function and Thermal Refugia

The Carmen Levee has resulted in an extensive reduction in riparian zone vegetation and correspondingly negatively affects riparian functions and processes, including the food, shade, and overhead cover it would naturally provide for fish. Along the approximate 15-foot wide face of the existing levee, little or no vegetation exists.

Water temperatures in the action area are routinely high enough to stress adult Snake River Basin steelhead, Snake River spring/summer Chinook, and Snake River sockeye salmon, as well as juvenile and steelhead. Many stream segments including this one along the Salmon River exceed State criteria. High value thermal refugia are likely present only where groundwater spring influence and deep pools provide adequate conditions. High water temperatures are likely a product of irrigation withdrawals throughout the basin and the described modifications to riparian vegetation, streambank modifications, and loss of floodplain connectivity. As such, high temperatures exceed optimal conditions for salmonids making migratory passage through the reach and action area. The lack of thermal refugia offered by complex habitat qualities (i.e., shade and overhead cover) characteristic of normal floodplains is not present onsite, creating thermal stress on migrating juvenile and adult ESA-listed salmon and steelhead.

2.4.3 Water Quality

Section 303(d) of the Clean Water Act establishes requirements for prioritizing waterbodies that do not meet water quality standards. Water quality standards have been established by the Idaho legislature and are designed to protect, restore, and preserve water quality in areas designated for specific uses. In addition to the high water temperatures described above, the IDEQ 2008 Integrated Report (IDEQ 2008), lists this reach of the Salmon River as impaired for unknown pollutants.

2.4.4 Cover

The levee-face edge habitat is currently very poor rearing habitat because it provides little cover and supports only sparse riparian vegetation. Riprapped banks without wood or roughness support lower forage densities and less habitat complexity for salmonids than historically existed at this location resulting in reduced scour pool formation for velocity and thermal refugia.

Overall, much of the action area exhibits degraded habitat features not suitable for spawning for Chinook salmon or steelhead, nor does it provide high quality rearing habitat for Chinook salmon or steelhead.

## 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 following sections discuss effects pathways NMFS determined are most likely to affect habitat or species. Effects are framed under NMFS' Matrix of Pathways and Indicators (MPI) (NMFS 1996), which facilitates logical evaluation of the action's effects to habitat in the action area. Section 2.5.2 discusses effects to habitat in context of how the described habitat-related effects may influence the species and any direct project related effects to fish (e.g., turbidity and disturbance/displacement of fish from preferred habitat, etc.).

### 2.5.1 Effects to Critical Habitat

The BMPs associated with the proposed action were designed to: (1) Minimize the amount of in-water work at each site; (2) minimize bank disturbance and sediment producing activities which could affect water quality or substrate condition; (3) minimize risk of chemical contamination. The following subsections will analyze the potential effects of the proposed action on PBFs necessary to support anadromous spawning, rearing, and migration within the action area (Table 4). Discussion will follow the major pathways of NMFS' MPI.

#### *2.5.1.1 Effects on Water Quality*

Potential adverse effects to water quality are from suspended sediment (turbidity) and from risk of chemical contamination from equipment operation and fueling.

**Turbidity**. Turbidity is expected to temporarily increase multiple times during construction of the levee. Turbidity will occur primarily as the excavator removes and repositions orphaned rock from the existing levee and keys in and rebuilds the face of the levee with new rock. Turbidity plumes are expected to be sporadic and are not expected to extend across the entire width of the river; not extending farther than about 20 feet from the face of the levee. The magnitude of turbidity plumes is expected to be effectively minimized by proposed BMPs intended to reduce sediment inputs into the river, including using washed riprap and quarry spalls to minimize release of fine-grained material, accessing the project site with construction equipment via existing roadways, and working from the top of the levee above the OHWM.

Based on review of the literature, NMFS expects that any resulting sediment plumes from this type of activity should be limited to less than 600 feet and should dissipate within a few minutes to hours (Casselli et al. 2000; Jakober 2002; USFWS 2004; USFS 2005). In addition to effects remaining within 600 feet of the disturbance, suspended sediment levels are likely to quickly return to background considering the expected small volume of sediment likely to be introduced and suspended (Jakober 2002; Casselli 2000). NMFS cannot accurately determine how far turbidity plumes are likely to persist; therefore, using a worst-case scenario, NMFS has assumed the turbidity plumes approaching 50 NTUs associated with this action may extend up to 600 feet downstream and extending approximately 20 feet waterward before dissipating.

As outlined above in Section 1.3.3, the COE will monitor turbidity every 30 minutes 150 feet downstream of turbidity generating work to try and limit increases to less than 50 NTUs over background levels or to limit exceedances of 50 NTU to no more than 60 minutes. The monitoring proposal indicates that if turbidity reaches 35–40 NTUs over background construction activities generating the turbidity will temporarily stop. The intent is to prevent exceeding the 50 NTU State standard (IDAPA 58.01.02). However, we recognize that as turbidity levels approach the threshold and adaptive measures are taken, a potential exceedance could occur. Levels greater than 50 NTU are not expected to persist more than 60 minutes. The described protocol is expected to successfully identify turbidity increases and prescribe corrective actions for the COE to implement before negatively affecting critical habitats in the action area. Because the action would take place during daylight hours only and only when the machinery is actively working the riprap in the water, any turbidity effects will be temporal, and limited to within the 600 feet of the disturbance and mostly under 60 minutes in duration throughout the approximate 2 to 4 week work window. Given the proactive BMPs to encourage minor impacts as described above, neither individual nor collective turbidity plumes are expected to reduce the conservation value of the affected critical habitats. As such water quality and sedimentation over substrate and subsequent effect to benthic productivity (forage-rearing habitat) is anticipated to be minimal, based on the relatively short duration and intensity of turbidity plumes.

**Chemical Contamination**. In order to avoid chemical contamination of the Salmon River, the COE will follow general conservation measures/BMPs as noted in Section 1.3.10.4. Key BMPs intended to address the risk of chemical contamination include: (1) Locating equipment fueling sites more than 150 feet from surface water, or if equipment fueling must occur closer to water, fueling will occur within a spill containment basin capable of holding the entire fuel load capacity of the equipment; (2) regular equipment inspections and maintenance; (3) strict adherence to emergency spill cleanup protocol, including on-site chemical response and cleanup materials; (4) restricting equipment from working in the live channel. Collectively, these mitigations are expected to result in very low potential for chemical contamination of action area waterways. In the event equipment refueling cannot occur more than 150 feet from water, proposed BMPs requiring Lemhi County to have a containment basin with capacity for all fuel load in the equipment in place should prevent most fuel deliveries to water. Although a spill during refueling could overtop the containment basin and reach surface water if not installed level, such an event is not expected to occur, and if it were, only small quantities are likely to be spilled. For this reason, direct adverse effects from chemical contamination are generally not expected to occur during project implementation, but if such spills did occur they would be of small amounts.

#### *2.5.1.2 Effects on Substrate*

Substrate could potentially be affected by project-generated sediment increases. As discussed above (Section 2.5.1.1), proposed BMPs and mitigation measures, combined with the type of activities proposed are not anticipated to generate meaningful increases in turbidity. For the same reasons discussed previously, substrate conditions within the affected stream reach are expected to experience only minor levels of deposition as the small turbidity plumes settle out within 600 feet. No more than a fine film of surface project-generated sediment is expected to settle out of suspension in the area away, and downstream of the levee.

All existing bank riprap will be incorporated into the repaired levee face, ensuring the proposed design quantity of riprap is not exceeded. Design elements include incorporation of “mini-barbs" within the rebuilt levee face, adding roughness to the baseline hydrology and velocity refuge. However, the reconstructed levee in the in-water footprint will be sterile riprap, temporarily impacting existing benthic production of juvenile salmonid prey species. The hardened levee banks will prevent spawning gravel recruitment that would otherwise occur via bank erosion and entrainment in an unconfined channel. Bank erosion also provides a sediment source that creates riparian habitat, creates and maintains diverse structure and habitat functions, and modulates changes in channel morphology and pattern (Florsheim et al. 2008). Approximately 40,000 square feet of the levee will be rebuilt with existing or import of new riprap, of which 25,000 square feet of repairs will occur below the OHWM to toe of the levee. While this is likely not prime macroinvertebrate producing habitat, it does provide the only remaining salmonid forage base existing at this location.

*2.5.1.3 Riparian Vegetation*

Current vegetation consists of sparsely shrubby woody species, grasses, sedges, and forbs with some unvegetated areas, from the OHWM to the top of the levee and along the approximately 1,000 feet length of repair (approximately 15,000 square feet, measured from the approximate OHWM and the crown of the levee). Because vegetation growth on levees is routinely cut back to maintain the integrity of the levy, and that appears to have been the case on the existing structure, we presume similar activities will continue into the future longer than it likely would have had the levee not be repaired. There are no plans to incorporate vegetation into the riprap during construction. This will extend the time that this stretch of river does not receive the benefits of riparian vegetation. Any stream shade provided by the current vegetation within the action area is minimal given the described vegetation types present on the levee face and the width of the Salmon River. Leaves and insects can frequently fall from terrestrial vegetation to streams which influences stream productivity and available food resources for salmonids (Cummings 1974; Gregory et al. 1991). Due to the limited area occupied by existing vegetation, these allochthonous contributions to the aquatic food web as well as future woody debris contributions, and other influences riparian vegetation have on habitat conditions in the action area perpetuate poor riparian conditions and ensure that degraded conditions will persist into the future. As described above, in the Environmental Baseline and Effects sections, a lack of riparian vegetation reduces cover and forage for salmon and steelhead and contributes to high water temperatures that affect salmon and steelhead growth and survival.

*2.5.1.4 Effects on Floodplain Connectivity*

The levee is located in historic floodplain habitat. The environmental baseline within the project site area has been degraded by over 50 years of flood control levee development, maintenance, and human activity. As described in the Environmental Baseline section, the Carmen Levee has a profound localized effect on the function of the river system and reduces its ability to provide habitat for ESA-listed salmon and steelhead populations in the action area. These are ongoing effects of past actions to construct and maintain the levee. Over time, as floods, erosion, and other events occur, levees can be damaged and their ability to function as originally constructed may be reduced. Thus, as the levee deteriorates, levee function and attendant effects on the environment change unless it is maintained and repaired.

The 2017 flood reduced the level of protection provided by the Carmen Levee, as were the flood and frazil ice damages from 1986 and 1989. The purpose of the proposed repairs is to ensure that the levee functions as it was constructed far into the future. Therefore, one potential effect of the proposed action is that the levee will exist in a functional state in the long term, instead of falling into disrepair over time. The proposed work site contains a 4,400-foot long flood control levee, armored with large riprap, of which 1,000 feet will be repaired. The 4,400-foot long levee has disconnected the river from much of its historic floodplain. But for the levee, the floodplain habitat would provide many of the essential PBF, including, but not limited to, spawning, rearing and migration of ESA listed salmon and steelhead populations. Maintaining the levee will perpetuate and exacerbate existing baseline conditions, continuing to restrict the river's interaction with its floodplain, reducing forage, natural cover, and velocity refugia for ESA-listed salmon and steelhead species.

*2.5.1.5 Effects on Free Passage*

The Carmen Levee does not block fish passage. Existing confinement may have some influence on upstream fish passage at high discharge levels, but any such effects would likely be very small. However, in the context of historic baseline conditions, repairing the levee will extend the life of the levee in a meaningful way such that any potential future development of complex side channels, typical of floodplain systems, will be precluded. Complex side channel formation is beneficial in creating multiple salmonid critical habitat PBFs, including spawning, rearing, cover, and shelter.

*2.5.1.6 Natural Cover*

As discussed in Section 2.5.1.2, substrate conditions within the affected stream reach are expected to experience only temporary minor levels of deposition as the small turbidity plumes settle out within 600 feet. No more than a fine film of surface project-generated sediment is expected to settle out of suspension in the action area. Design elements include incorporation of "mini-barbs" within the rebuilt levee face, adding roughness to the baseline hydrology and velocity refuge; although the improvement will be marginal as compared to historical conditions. As noted in Section 2.5.1.3, along the approximate 15-foot wide face of the existing levee, little or no vegetation exists. The Carmen Levee has resulted in an extensive reduction in riparian zone vegetation and this correspondingly negatively affects riparian functions and processes. This includes overhead cover that it would naturally provide for fish otherwise. There are no plans to incorporate vegetation into the riprap during construction. This will extend the time that this stretch of river does not receive the benefits of riparian vegetation. Any stream shade provided by the current vegetation within the action area is minimal given the described vegetation types present on the levee face and the width of the Salmon River.

Although these effects will persist into the future, due to their small magnitude, they are unlikely to greatly reduce the conservation value of designated critical habitat in the action area. Due to the low level of impact within the action area, the level of effects on the critical habitat designations of the affected species will be even smaller.

2.5.2 Effects on Species

*2.5.2.1 Turbidity/Sediment Effects*

The proposed action will have the potential to temporarily degrade the water quality of the Salmon River during ground disturbing activities. The use of machinery adjacent to the river and placement of riprap along the river has the potential to increase sediment delivery to the Salmon River, resulting in potential increases in turbidity. The proposed action may also have localized long-term beneficial effects to water quality by stabilizing an actively eroding streambank and reducing sediment loads within the action area.

As described in the critical habitat effects analysis, NMFS expects that any resulting sediment plumes should be limited to less than 600 feet and should dissipate within a few minutes to an hour (Casselli et al. 2000; Jakober 2002; USFWS 2004; USFS 2005). In addition to effects remaining within 600 feet of the disturbance, suspended sediment levels are likely to quickly return to background considering the expected small volume of sediment likely to be introduced and suspended (Jakober 2002; Casselli 2000). NMFS cannot accurately determine how far turbidity pulses are likely to persist; therefore, using a worst-case scenario, NMFS has assumed the turbidity plumes associated with this action may extend up to 600 feet downstream before dissipating.

Primary turbidity minimization measures included in the action include: (1) Conducting inwater work during preferred low water work windows; (2) equipment will operate from the top of the bank using only the bucket of the machinery for placement of riprap rock below the waterline; and (3) implementing BMPs intended to reduce sediment inputs into the river, including using washed riprap and quarry spalls to minimize release of fine-grained material, accessing the project site with construction equipment via existing roadways, and working from the top of the levee above the OHWM. The action also calls for the use of silt fences, hay bales, etc. to minimize discharge of sediment into the river. These measures have been effectively applied on similar projects within the Salmon River, and have resulted in the minor levels of turbidity reported above. For this reason, NMFS believes they will also be effective in limiting the duration, intensity, and frequency of turbidity pulses to levels consistent with the cited monitoring report.

Turbidity can cause lethal, sublethal, and behavioral effects in juvenile and adult salmonids depending on the duration and intensity (Newcombe and Jensen 1996). Increased turbidity levels in the action area may result in temporary displacement of fish from preferred habitat or potential sublethal effects such as 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). Accumulated fine sediment in the gravel can restrict intergravel flow and block emergence of fry (Lisle and Lewis 1992), decrease growth and survival of juvenile fish, and decrease the availability of invertebrate prey species (Alexander and Hansen 1986). Turbidity can also result in reduced predation from piscivorous fish, likely due to reduced visibility (Gregory and Northcote 1993; Gregory and Levings 1998). Construction will occur from the top of the streambank and with sediment control measures (e.g., sediment fences, straw or hay bales) in place. Turbidity plumes are expected to be sporadic and temporary in nature, and will not extend across the width of the Salmon River. The small amount of sediment expected to be generated, combined with the localized and discontinuous nature of the turbidity pulses should ensure turbidity remains at sublethal levels.

NMFS has assumed the sublethal turbidity plumes associated with this action may extend approximately 20 feet out into the channel and up to 600 feet downstream of the project area before becoming dissipating (600 feet long x 20 feet wide = 12,000 square feet). The action area and reach on the Salmon River where the project is located is rearing and a migratory corridor for juvenile and adult Snake River spring/summer Chinook salmon and steelhead, and primarily a migratory corridor for Snake River juvenile and adult sockeye salmon. Direct sublethal effects from the turbidity plume (as noted above) are most likely to occur to any juvenile salmonids within the action area. Adult salmonids are highly mobile and can readily avoid turbid water conditions. Even if fish are displaced, it is anticipated they will migrate only short distances to an area with better water quality conditions and only for a few hours in any given day, potentially only shifting to the other side of the river. Each day fish are routinely disturbed by passing birds, walking mammals, and other fish. NMFS does not anticipate short-term movements caused by increases in turbidity will result in effects substantially different than those typically experienced by fish. The effect of localized turbidity plumes and the potential displacement of adult salmon and steelhead will be minimal.

Any fish exposed to the temporary sediment pulses are expected to be able to migrate to adjacent, less turbid habitats. In addition, the overall low numbers of fish expected to be present during the proposed work window further reduces the likelihood of potential lethal effects to fish.

*2.5.2.2 Substrate/Habitat Alteration (Riprap)*

Riprap is commonly used to stabilize and armor eroding streambanks. Streambank hardening with riprap is known to cause adverse effects to natural fluvial processes, ecological diversity, fish habitat, and fish populations (Schmetterling et al. 2001). Bank stabilization, with the addition of hard surfaces such as riprap, often negatively affects channel conditions and morphology (Schmetterling et al. 2001; Garland et al. 2002). The addition of riprap prevents stream lateral migration and modifies hydraulic regimes by transferring hydraulic energy which can lead to increased erosion on opposite streambanks downstream. With certain hardening treatments, nearshore topography is scoured, critical fish habitats can be degraded or destroyed, terrestrial/riparian habitat can be lost, and erosion of downstream streambanks can be accelerated (WDFW et al. 2002). Although permitting of individual projects and incorporation of the mini-barbs may attenuate localized negative effects of chronically eroding streambanks, it may not effectively curtail cumulative effects to a watershed (Schmetterling et al. 2001).

The linear extent of riprap will not change from the existing footprint of the levee as a result of project implementation. However, placement of riprap along 1,000 feet (25,000 square feet) of the mainstem Salmon River will perpetuate degraded streambank conditions in the project area. Riprap will continue to lock this section of streambank in place for the foreseeable future and will prevent the recruitment of riparian vegetation on the face of the levee (see Section 2.5.1.3) and natural expression of geomorphic processes (i.e., channel migration, pool formation/maintenance and large woody debris recruitment) that are typical of floodplain function and essential for healthy fish habitat over time. As reported by Washington Department of Fish and Wildlife et al. (2002), juvenile life stages of salmonids are especially affected by bank stabilization projects. In low flows, juveniles depend on cover provided by undercut banks and overhanging vegetation to provide locations for resting, feeding, and protection from predation. During periods of high streamflow, juveniles often seek refuge in low velocity microhabitats, including undercut banks and off-channel habitat. Bank stabilization structures may preclude the future development of new off-channel rearing habitats by fixing the channel in its current location. Because of the large degree of existing documented and undocumented anthropogenic modifications in the Salmon River (i.e., riprap), the proposed action is expected to promulgate negative channel morphology impacts downstream and further degrade the baseline condition. Streambank function at the work site is already less than ideal in terms of fish refuge and cover. Undercut banks and overhanging vegetation are not currently characteristic of the site.

Installation of ten rock barbs along the length of the levee will reduce the erosive forces on the streambank, reduce width/depth ratios, and increase mid-channel velocities such that sediment is more effectively transported through the reach. Riprap tends to transfer energy downstream and increase bank erosion in adjoining reaches. The addition of ten rock barbs along the stabilized bank is anticipated to reduce downstream energy transfer. The ten rock barbs are also anticipated to locally improve stream depths and possibly improve habitat complexity, when compared to the existing conditions at the site. Improved width/depth ratios should marginally increase rearing habitat. Barbs also provide increased channel roughness, creating microhabitats which may contain areas for energy dissipation, turbulence, and scour holes. These scour holes provide additional cover for fish at low flows, particularly useful in streams with high width to depth ratios (WDFW et al. 2002), such as the Salmon River.

The placement of riprap into flowing water also has the potential to crush and kill rearing salmonids should they be present along the channel margins. However, habitat complexity along the channel margins in the project area is currently poor, offering little in terms of juvenile refugia. This is characteristic of shorelines with chronically eroding streambanks. Timing of work will minimize exposure of juvenile salmonids to project effects. In addition, their response to noise and movement generated on the streambank prior to construction, is likely to cause these small fish to seek refuge in nearby habitat and out of the shallow stream margins where rock placement will occur.

*2.5.2.3 Forage*

The COE will disturb or cover about 25,000 square feet of existing substrate, which will reduce forage availability of macroinvertebrates along the existing bankline substrate in the short term. The existing baseline riparian functions are minimal (see Section 2.5.1.4), continued maintenance required by the COE prevents any substantial natural growth of woody or brushy riparian vegetation within the approximate 15,000 square feet area of the levee above the OHWM. There are no proposed post-project conservation measures to enhance riparian functions. Riparian vegetation provides allochthonous input into the aquatic environment. Allochthonous input supports productivity, which results in forage for salmon and steelhead (e.g., aquatic insects). Terrestrial insects which also provide forage for fish rely on riparian vegetation. Reduction of macroinvertebrate productivity along the existing bankline substrate and long-term removal of riparian vegetation will reduce food availability for juvenile salmonids. Reducing food availability generally leads to reduced growth, and ultimately survival (Spence et al. 1996).

*2.5.2.4 Natural Cover*

At moderate and low flows, riparian vegetation provides overhead cover, reducing predation from birds. During higher flows, riparian vegetation can be inundated and provide critical velocity refuge and instream cover that can mitigate, to some degree, the relatively fast flows that occur on levees during high flows. Over time, riparian vegetation provides in-stream cover after trees and shrubs droop into or fall into the river. Continued maintenance, as is required by the COE, prevents any substantial natural growth of woody or brushy riparian vegetation at the project site. Riparian vegetation provides overhead cover, shade, and a source of woody material that provides complex cover instream. The existing baseline conditions support no substantive woody material or riparian functions. There are no proposed post-project conservation measures to enhance riparian functions. As noted in Section 2.5.1.3, this will extend the time that this stretch of river does not receive the benefits of riparian vegetation.

The existing conditions have minimal natural cover due to lack of a natural eroding bank and associated input of varied sized sediment and large woody material that may form bars and riffles and scour holes. The inclusion of mini-barbs (see Section 2.5.2.2) in the levee will reduce the erosive forces on the streambank, reduce width/depth ratios, and increase mid-channel velocities such that sediment is more effectively transported through the reach. Riprap tends to transfer energy downstream and increase bank erosion in adjoining reaches. The addition of ten rock barbs along the stabilized bank is anticipated to reduce downstream energy transfer. The ten rock barbs are also anticipated to locally improve stream depths and possibly improve habitat complexity, when compared to the existing conditions at the site. Improved width/depth ratios should marginally increase rearing habitat. Barbs also provide increased channel roughness, creating microhabitats which may contain areas for energy dissipation, turbulence, and scour holes. These scour holes provide additional cover for fish at low flows, particularly useful in streams with high width to depth ratios (WDFW et al. 2002), such as the Salmon River.

In summary, continued maintenance of the levee will perpetuate degraded natural cover conditions into the foreseeable future, in particular cover afforded by riparian vegetation. Although there will be some benefit from inclusion of the 10 mini-barbs into the levee within the project site, the continued maintenance of the levee will maintain negative effects to naturally erodible banks into the future.

*2.5.2.5 Noise*

Heavy equipment (i.e., excavator, dump trucks) operation near the Salmon River will create visual, noise, vibration and water surface disturbances. Popper et al. (2003) and Wysocki et al. (2007) discussed potential impacts to fish from long-term exposure to anthropogenic sounds, predominantly air blasts and aquaculture equipment, respectively. Popper et al. (2003) identified possible effects to fish including temporary, and potentially permanent hearing loss (via sensory hair cell damage), reduced ability to communicate with conspecifics due to hearing loss, and masking of potentially biologically important sounds. Studies evaluated noise levels ranging from 115 to 190 decibels (dB). Wysocki et al. (2007) did not identify any adverse impacts to rainbow trout from prolonged exposure to three sound treatments common in aquaculture environments (115, 130, and 150 dB). In the studies identified by Popper et al. (2003) that caused ear damage in fishes, all evaluated fish were caged and thus incapable of moving away from the disturbance.

The Federal Highway Administration (2008) indicates backhoe and truck noise production ranging between 80 and 84 dB. Because the decibel scale is logarithmic, there is nearly a 100-fold difference between noise levels expected from the action and noise levels known to have generated adverse effects to surrogate species, as discussed above. Therefore, noise related disturbances of this magnitude are unlikely to result in injury or death. It is unknown if the expected dB levels will cause fish to temporarily move away from the disturbance or if fish will remain present. Even if fish move, they are expected to migrate only short distances to an area they feel more secure and only for a few hours in any given day. Each day fish are routinely disturbed by passing birds, walking mammals, and other fish. For the proposed action, NMFS does not anticipate short-term movements caused by construction equipment noise will result in adverse effects substantially different than those typically experienced by fish.

#### *2.5.2.6 Chemical Contamination*

Use of heavy machinery from the roadway, levee approach, and existing levee access road increases the risk for potential spills of fuel, lubricants, hydraulic fluid, or other similar contaminants directly into the water where they could adversely affect habitat, injure or kill aquatic food organisms, or directly impact ESA-listed species.

There are multiple BMPs designed to avoid chemical contamination from equipment or fueling spills and/or leaks (see Sections 1.3.4.1 and 1.3.4.4). Key BMPs include: (1) Locating equipment fueling sites more than 150 feet from surface water or if equipment fueling must occur closer to water, fueling will occur within a spill containment basin capable of holding the entire fuel load capacity of the equipment; (2) regular equipment inspections and maintenance; (3) strict adherence to Emergency Spill Cleanup Protocol including on-site chemical response and cleanup materials; (4) restricting equipment from working in the live channel except when operating within dewatered areas. Collectively, these mitigations are expected to result in very low potential for chemical contamination of action area waterways. In the event equipment refueling cannot occur more than 150 feet from water, the requirement to have a containment basin with capacity for all fuel load in the equipment in place should prevent most fuel deliveries to water. However, a spill during refueling could overtop the containment basin and reach surface water if not installed level and all the fuel spilled. Such an event is not generally expected to occur and if it did occur, only small quantities of fuel are likely to be spilled. For this reason, direct adverse effects from chemical contamination are generally not expected to occur during project implementation, but if such spills did occur they would be of small amounts.

*2.5.2.7 Water Temperature*

Published literature contains many citations documenting how elevated water temperatures typically lead to adverse effects on salmonids. Adverse effects may occur via multiple pathways, both direct and indirect (Spence et al. 1996; Richter and Kolmes 2005). Increased water temperature can influence salmonid growth (Sullivan et al. 2000; Marine and Cech 2004), disease rates or susceptibility (Schaaf et al. 2017; Bruneaux et al. 2017), competitive displacement (Richter and Kolmes 2005), predatory avoidance (Mesa et al. 2002), or death (Bjornn and Reiser 1991). Elevated water temperatures may adversely affect salmonid physiology, growth, development, alter life history patterns, induce disease, and may exacerbate competitive predator-prey interactions (Spence et al. 1996). Reductions in growth can in turn lead to reduced survival at later life-stages as fish are less able to tolerate environmental or manmade stressors (Wedemeyer et al. 1980; Wedemeyer and Mcleay 1981; Zabel and Achord 2004; Scheuerell et al. 2009). As described in Section 2.4, the reach and action area currently offer little thermal refugia for migrating ESA-listed salmon and steelhead.

As proposed, strengthening the levee will ensure the levee is in place longer than it would be absent the action. Therefore, the levee will continue to limit channel development and floodplain functions in the project area, limiting access to off-channel habitat that can provide thermal refugia. In addition, continued maintenance of the levee prevents any substantial natural growth of woody or brushy riparian vegetation, perpetuating denuded streambanks and affecting available shade locally, which could further increase water temperatures in the Salmon River. Most vegetation near the stream reaches is low sedges, forbs, and some woody species. No large trees exist. Any stream shade provided by the current vegetation is likely minor given the described vegetation types present and the width of the Salmon River. Continuing to maintain these baseline conditions as described in Sections 2.4 and 2.5.1.4, will likely continue to perpetuate degraded baseline thermal refugia within the action area, and cumulatively within the reach.

In summary, responding to confinement by the levee system, the river is eroding the levees as it attempts to reestablish sinuosity and a floodplain. These normal river processes provide the critical habitat PBFs required to recover and sustain the ESA-listed salmonids. The proposed action will continue to keep these processes from occurring in the project area. The proposed action will continue to depress the amount of side channel that would otherwise develop in the medium to long term, but for the presence of the levee. The proposed action will impair the forage and natural cover PBFs in the long term via impacts to riparian and benthic productivity. Lack of any woody or brushy riparian vegetation, will continue to exacerbate these effects.

Although these effects will persist into the future, they are unlikely to rise to the level where the abundance, productivity, spatial structure, or diversity of the affected populations will be greatly impacted. Because of this small impact on these populations, the effects on the affected species, as a whole, will be even smaller.

## 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.

Some continuing non-federal activities are reasonably certain to continue 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 2.4).

Carmen, Idaho, the town closest to the project site, does not have a population census on any population trends. There are 39 structures in the leveed area, which includes 23 residences and 16 outbuildings. However, growth has generally been stagnant in the region, with growth in Salmon, Idaho, located approximately 5 miles upstream from Carmen, increasing only from 3,052 to 3,059 (an increase of 0.23 percent) between 2015 and 2016. This is true also of Lemhi County, in which Carmen and Salmon, Idaho occur, where the population decreased slightly between 2010 and 2017 (-0.8 percent).[1] Most of the action area is adjacent to privately owned agricultural lands. Should the human population in the action area begin to grow, demand for agricultural, commercial, or residential properties could also grow. If the population continues to decline, existing agricultural practices are expected to continue at levels similar to that today.

NMFS also contacted Lemhi County planning and zoning staff (personal communication T. Morton, Lemhi County, 2018) to help identify any proposed zoning changes or private development proposals that have not yet been implemented. We requested any information they had regarding projects that may be occurring in the same reach we evaluated for offered real estate. No proposed zoning changes or land use changes were identified by Lemhi County (personal communication T. Morton, Lemhi County, 2018).

From the available information, activities on private lands within the action area or capable of affecting the action area, are presumed to include continued residential development, existing road maintenance, ranching activities (including grazing, irrigation, and haying), and maintenance of existing infrastructure. All of these activities could adversely affect ESA-listed fish and their designated critical habitat. Given the local human population has been declining and no reasonably foreseeable new future State or private actions were identified current or historic use is representative of what will likely occur in the future. Therefore, future impacts from private or State activities are expected to continue at rates similar to those occurring under baseline conditions.

Recovery plans for Chinook and steelhead (NMFS 2017) identify four potential habitat limiting factors and threats. They include: (1) Reduction of flows from new water developments; (2)

[1] U.S. Census Bureau : https://www.census.gov/quickfacts/fact/table/lemhicountyidaho,id/PST045217

floodplain and riparian degradation; (3) noxious weeds; and (4) loss of beaver. Given ranching is the largest current and expected future use of lands adjacent to the action area and the expected long-term continuation of the activity, future private land use may have some continued impact on action area habitat and the species.

We searched the Idaho Department of Water Resources' website for new water right applications and water right transfers that were submitted between January 1, 2018 and June 28, 2018. No new water right applications or transfers were identified for that time period. Further, active fish recovery groups continue to pursue water efficiency projects on private lands. Overall, the available information suggests there is a low risk of new water developments occurring.

The threat from herbicide treatment of noxious weeds likely remains high. Lemhi County participates in a local weed collaborative with private, state, and federal partners endeavoring to minimize the expansion of existing weeds and prevent new invaders from becoming established. Those efforts are largely successful, but remain dependent on consistent funding and effective administration to be successful in reducing the threat. The fourth threat, loss of beaver, is likely to persist in the main valley bottom due to conflicts with private ranching operations and their desire to apply water to hay fields and pastures. Recently, federal agencies or federal funds, have been used to construct beaver dam mimicry structures in headwater streams. Those efforts are geared toward restoring floodplain and riparian processes to areas historically utilized by beaver but degraded by historical land practices.

Adverse cumulative effects to salmon and steelhead habitat will result from the COE's levee maintenance activities. However, Lemhi County has been removing vegetation in the recent past. Cutting shrubs and emerging trees on the 4,400-foot long levee in the action area perpetuates poor riparian conditions and ensures that degraded conditions will persist. As described above, in Sections 2.4 and 2.5, a lack of floodplain habitat and riparian vegetation reduces foraging and rearing and cover for salmon and steelhead and contributes to high water temperatures that threaten salmon and steelhead growth and survival. In total, cumulative effects in the action area will generally perpetuate existing degraded conditions in the action area.

## 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.

The action area currently provides rearing, foraging, and migratory habitat for ESA-listed Upper Salmon River mainstem, Lemhi River, Pahsimeroi River, East Fork Salmon River, Yankee Fork Salmon River, and Valley Creek Chinook salmon populations; the Snake River sockeye salmon population; and the Upper Mainstem Salmon River, Lemhi River, Pahsimeroi River, and East

Fork Salmon River steelhead populations. Integrated baseline habitat conditions are functioning at risk, with several indicators functioning at unacceptable risk (i.e., water temperature, nutrients, width to depth ratio, peak/base flow discharge, spawning, rearing and foraging and riparian vegetation). Causes of impairment are widespread and present within and outside of the action area reaches. Causal factors are generally related to historical and some ongoing land management practices including agricultural uses (e.g., irrigation), floodplain habitat depression (flood control facility maintenance), channel armoring, grazing, road construction and maintenance, and rural housing development, historical and existing mining practices, etc.

As noted above, successful implementation of the proposed action, including the described design criteria and BMPs, will have the following adverse effects on salmon and steelhead and their designated critical habitats:

1. Within the action area, the primary impacts limiting recovery of Snake River salmon and steelhead populations and their critical habitat are human development in the floodplain, including the existing 4,400-foot long Carmen Levee. By repairing the levee, habitat function at the reach scale is expected to continue in its degraded condition.

2. Effects include burying 25,000 square feet of benthic habitat and, in the long term, the continual maintenance of the levee, which reduces the conservation benefits of riparian vegetation habitat function to 15,000 square feet of riparian habitat on the face of the levee. Both of these effects perpetually reduce food availability, shade, and cover for juvenile salmonids. Reducing food availability and shade at this scale is likely to reduce growth, and ultimately survival, for juvenile salmon and steelhead, although it is unknown how many fish will be affected. But the long-term adverse effects to abundance and productivity are expected to be ongoing and affect every generation of salmon and steelhead into the foreseeable future.

3. Potential behavioral modifications from exposure to multiple low intensity turbidity plumes. Individual plumes are anticipated to last less than 1-hour, rarely exceed a 50 NTU net increase, and extend approximately 600 feet downstream from each project location. These temporary and low intensity turbidity plumes are likely to cause minor behavioral modifications to exposed fish. Most exposed fish are expected to simply temporarily relocate to non-turbid water during the exposure. Timing of plumes may expose juvenile and adult fish from each DPS and/or ESU being evaluated. Habitat conditions will return to baseline levels within minutes (10 to 60) when turbidity levels exceed 50 NTUs throughout the approximate 2- to 4-week duration of the project.

4. Temporary reduction in cover due to minor turbidity plumes noted above.

5. Indirect effects include meaningfully extending the useful life of the levee. The NMFS estimates that this will result in preventing the eventual formation of floodplain habitat (i.e., formation of channels that would support salmon and steelhead spawning, rearing cover/shelter, food, riparian vegetation, water temperature and access). Based on the historical level of protection identified at this site, NMFS anticipates floodplain functions

would reestablish within two to three decades if levee repairs were not continued into the future

In summary, the proposed action will essentially maintain existing levee baseline conditions, perpetuating long-term indirect degraded habitat conditions. Riprap placement along the repaired levee will maintain existing habitat structure, particularly at high flows, but of lesser quality than would be provided by natural streambanks. Although the ten rock barbs are anticipated to locally improve stream depths and possibly improve habitat complexity, when compared to the existing conditions at the site. Maintaining existing degraded levee vegetation standards will continue to negatively affect cover, rearing, and foraging opportunities for ESA-listed salmon and steelhead populations. Indirect effects from providing the existing level of protection at this levee will prevent floodplain connectivity formation in the long term.

## 2.8 Conclusion

After reviewing the current status of the listed species and their designated critical habitats, the environmental baseline within the action area, the effects of the proposed action, 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, Snake River sockeye salmon, and Snake River Basin steelhead, or destroy or adversely modify their designated critical habitats.

## 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 Lemhi County (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: Snake River spring/summer Chinook, Snake River sockeye, and Snake River Basin steelhead are known to occur in or migrate through the action area and will likely be present during and where project generated stressors may affect fish. In the Opinion, NMFS determined that incidental take of aforementioned adult and juvenile ESA-listed salmon and steelhead is reasonably certain to occur due to exposure to turbidity generated during levee repairs and reduced benthic productivity and loss of riparian vegetation function from continued levee maintenance activities.

Because it would be nearly impossible to count the number of individual fish that may be affected and because of the uncertainty in estimating the number of individuals that will be affected by increased turbidity, and benthic productivity. These will be used as habitat surrogates to account for this take. The amount of take will increase as the area disturbed by construction activities increases. Therefore, the extent of take is best identified by the total area the COE is proposing to excavate and fill (25,000 square feet), and turbidity plumes (600 feet) the effects of which have been analyzed in this Opinion. The amount of take will increase as the area disturbed by construction activities increases.

Although these surrogates could be considered coextensive with the proposed action, monitoring and reporting requirements will provide opportunities to check throughout the course of the proposed action whether the surrogates are exceeded. For this reason, the surrogates function as effective reinitiation triggers. The COE shall reinitiate consultation if their inwater construction footprint exceeds 25,000 square feet, or if turbidity-related effects lasts more than 1-hour, exceeds a 50 NTU net increase over background levels, or extends visually, more than 600 feet downstream from the source.

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 Snake River spring/summer Chinook salmon, Snake River sockeye salmon, Snake River Basin steelhead, or adverse modification of critical habitat for any of these species.

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 COE (for those measures relevant to the CWA section 404 permit) and applicant (i.e., Lemhi County) shall minimize the taking of individual Snake River spring/summer Chinook salmon, Snake River sockeye salmon, and Snake River Basin steelhead by completing the following RPMs.

The COE shall:

1. Minimize the extent of construction activities (footprint of levee);
2. Minimize effects to and enhance riparian vegetation;
3. Minimize the potential for incidental take resulting from water quality impacts;

4. Ensure completion of a monitoring and reporting program to confirm that the terms and conditions in this ITS are effective in avoiding and minimizing incidental take from permitted activities and ensure incidental take is not exceeded.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the COE and any applicant (i.e., Lemhi County) must comply with them in order to implement the RPMs (50 CFR 402.14). The 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 COE or any applicant 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 (footprint of levee):

    a. Do not exceed an in-water construction footprint of 25,000 square feet.

2. The following terms and conditions implement RPM 2 (riparian vegetation): The COE shall:

    a. Replace native vegetation disturbed by rehabilitation below the crown of the levee, as outlined in 2.b.

    b. Install soil substrate in the interstitial spaces between rock in a volume not to exceed 10 yards of native soil from the OHWM up the waterward side of the levee 2 feet.

    c. Seed the soils placement with native riparian grass along the 1,000-foot repaired section of the levee.

    d. Monitor establishment of grass until the spring following installation and report establishment via photos.

3. The following terms and conditions implement RPM 3 (water quality): The COE shall:

    a. Ensure project implementation, including all design criteria/BMPs, adheres to the proposed action as described within the BA and this Opinion.

    b. Ensure the limits of the project area are clearly marked to ensure that areas adjacent to the project site are not accidentally impacted.

    c. Use large clean riprap material of sufficient size to withstand high flow velocities at the site and minimize the need for future maintenance activities.

    d. Ensure that riprap shall not be dumped or dropped, but shall be individually and gently placed to minimize the amount of sediment suspended by rock placement and minimize the risk of crushing any individual fish.

e. Ensure that all construction equipment shall be cleaned, inspected, and free of leaks prior to arriving on site.

4. The following terms and conditions implement RPM 4 (monitoring and reporting), the COE will submit a project completion report that includes the following:

   a. Water Quality

      i. Monitor the downstream extent and duration of any turbidity plumes created by the actions.

      ii. Cease construction activity immediately if any plume lasts more than 1-hour that exceeds 50 NTUs over background levels, or visually extends more than 600 feet downstream from the source sediment.

      iii. Notify NMFS of any environmental effects of the action that were not considered in the BA or this Opinion.

      iv. A post-project report shall be submitted to NMFS by the end of the calendar year in which the project is completed. The report will provide the information requested above and confirm the project's design criteria, BMPs, and this Opinion's terms and conditions were successfully implemented.

   b. Construction details

      i. Total area (square feet) of inwater construction footprint

   c. If take is exceeded, contact NMFS promptly to determine a course of action.

   d. Submit post-project report electronically to Snake Basin Office email at nmfswcr.srbo@noaa.gov, or by mail:

      National Marine Fisheries Service
      Attn: WCR-2018-9469
      800 E. Park Boulevard
      Plaza IV, Suite 220
      Boise, Idaho 83712-7768

   e. NOTICE: If a steelhead or salmon becomes sick, injured, or killed as a result of project-related activities, 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 following recommendations are discretionary measures that NMFS believes are consistent with these obligations and therefore should be carried out by the COE or the applicant (i.e., Lemhi County):

1. To mitigate the effects of climate change on ESA-listed salmonids, follow recommendations by the ISAB (2007) to plan now for future climate conditions by implementing protective tributary, mainstem, and estuarine habitat measures; as well as protective hydropower mitigation measures.

2. The COE should work with Lemhi County, Idaho Transportation Department, and other local partners to develop a corridor plan for the mainstem Salmon River that identifies the following: (1) Segments of US-93, along the Salmon River (from US-75, downstream to the town of North Fork), that are subject to chronic damage and will need to be repaired within the next 10 years; (2) areas of the Salmon River (on private or public land) that have been engineered with riprap material or other engineered structures to prevent bank erosion or limit floodplain connectivity; (3) areas along the mainstem Salmon River upstream from the town of North Fork that may be used for future restoration activities (e.g., restore floodplain connectivity and/or enhance off-channel habitat) to mitigate for adverse effects of future streambank stabilization projects; and (4) identify potential funding sources for restoration actions.

3. For future levee stabilization projects, the COE should work with the Lemhi County and NMFS early in the design phase to determine if there are opportunities to increase flood storage capacity (e.g., levee setback or overbuild options), or to develop a variance request that will allow the planting of native willows/shrubs within the 15-foot vegetation-free management zone immediately adjacent to anadromous streams.

4. The Walla Walla District of the COE should coordinate with its Division and NMFS West Coast Region to develop a regional strategy to address long-term impacts associated with stabilizing streambanks and clearing of vegetation from levees in watersheds occupied by ESA-listed anadromous fishes. This strategy should consider, but not necessarily be limited to, approaches for incorporating bioengineering techniques, and a

process to consider variance approvals for woody vegetation planting, levee setbacks/over-build, off-channel habitat enhancement, etc.

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

### 2.11 Reinitiation of Consultation

This concludes formal consultation for Carmen Levee Rehabilitation 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.

## 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 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 COE and descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce.

### 3.1 Essential Fish Habitat Affected by the Project

The proposed action (Section 1.3) and action area (Section 2.3) for this consultation are described earlier in this Opinion.

The action area includes areas designated as EFH for spawning, rearing, and migration life-history stages of Chinook salmon. The Pacific Fishery Management Council (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 and floodplain habitats; (2) thermal refugia; and (3) spawning habitat.

Implementation of the proposed action has the potential to affect the following HAPCs: complex channel and floodplain habitat and thermal refugia.

### 3.2 Adverse Effects on Essential Fish Habitat

Because the action area's designated critical habitat for Snake River spring/summer Chinook salmon is identical to EFH for Snake River spring/summer Chinook salmon the effects are also the same. Effects to critical habitat were discussed in the previous Opinion (Section 2.5.1) and are incorporated as reference for the effects to EFH. To summarize the conclusions in the Opinion, the following adverse effects to EFH will occur:

1. Continued suppression of riparian functions will decrease cover and allochthonous input.

2. In-water excavation and fill will reduce benthic productivity, reducing the forage base.

3. The levee repair will perpetuate the restriction of normal river processes such as channel migration and floodplain access, preventing side channel formation, limiting erosion of natural banks, and negatively affecting future large woody debris recruitment.

### 3.3 Essential Fish Habitat Conservation Recommendations

We provide the following Conservation Recommendations:

1. Repaired levee footprint and materials:

    a. The COE should stay within the in-water construction footprint of 25,000 square feet.

    b. Jetty-sized rock (greater than existing proposed standards) should be used to withstand higher flow velocities at the site and minimize the need for future maintenance activities at this location.

2. Riparian vegetation. The face of the levee should be planted with the following native vegetation and planting methods:

    a. Native vegetation disturbed by rehabilitation should be replaced below the crown of the levee, as outlined in 2.b.

    b. Soil substrate should be installed in the interstitial spaces between rock in a volume not to exceed 10 yards of native soil from the OHWM up the waterward side of the levee 2 feet.

    c. The soils placement should be seeded with native riparian grass along the 1,000-foot repaired section of the levee.

d. Establishment of grass should be monitored until the spring following installation and report establishment via photos.

3. Water quality:

   a. Project implementation, including all design criteria/BMPs, should adhere to the proposed action as described within the BA and this Opinion.

   b. Lemhi County should clearly mark the limits of the project area to ensure that areas adjacent to the project site are not accidentally impacted.

   c. Large clean riprap material of sufficient size to withstand high flow velocities should be used at the site to minimize the need for future maintenance activities.

   d. Riprap should not be dumped or dropped, but should be individually and gently placed to minimize the amount of sediment suspended by rock placement and minimize the risk of crushing any individual fish.

   e. All construction equipment should be cleaned, inspected, and free of leaks prior to arriving on site.

Fully implementing these EFH Conservation Recommendations would protect, by avoiding or minimizing the adverse effects described in Section 3.2, approximately 0.92 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 COE 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 timeframes 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 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 COE and any applicants are the intended users of this Opinion. Other interested users could include the contractors. Individual copies of this Opinion were provided to the COE. This Opinion will be posted on the Public Consultation Tracking System website (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts). 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 contain more background on information sources and quality.

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

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

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