UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
Portland, Oregon 97232-1274

Refer to NMFS No: WCRO-2023-00378

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June 27, 2023

Linda Jackson
Forest Supervisor
Payette National Forest
500 N. Mission Street
McCall, ID 83638

Lt. Col. ShaiLin KingSlack
U.S. Army Corps of Engineers
Walla Walla District
201 N. Third Avenue
Walla Walla, Washington 99362

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Boulder Creek Bridge Replacement Project; Boulder Creek Subwatershed (HUC 170602100501); Adams County, ID

Dear Ms. Jackson and Lt. Col. KingSlack:

Thank you for your letter of March 31, 2023, 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 Boulder Creek Bridge Replacement Project on the Payette National Forest. Implementation of this project will entail placement of fill material below the ordinary high-water mark. The U.S. Army Corps of Engineers (COE) will issue a Clean Water Act (CWA) Section 404 permit; the U.S. Forest Service is the lead agency for this consultation.

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

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 code of Federal regulations (CFR) part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the

Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the biological opinion (opinion) and incidental take statement would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

In this opinion, NMFS concludes that the action, as proposed, is not likely to jeopardize the continued existence of Snake River spring/summer Chinook salmon or Snake River Basin steelhead. NMFS also determined the action will not destroy or adversely modify designated critical habitat for Snake River spring/summer Chinook salmon or 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 terms and conditions (T&Cs), including reporting requirements, that the United States Department of Agriculture's Forest Service, the COE and any permittee who performs any portion of the action, must comply with in order to be exempt from the ESA take prohibition.

This document also includes the results of our analysis of the action's effects on EFH pursuant to Section 305(b) of the MSA, and includes two Conservation Recommendations (CR) to avoid, minimize, or otherwise offset potential adverse effects on EFH. These CRs are similar, but not identical, to the ESA T&Cs. Section 305(b)(4)(B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations. If the response is inconsistent with the EFH CRs, the action agencies 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 CRs 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 CRs accepted.

Please contact Cortney Brown, Fish Biologist in the Southern Snake Branch of the Snake River Area Office, at 208-398-0053 or at cortney.brown@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Nancy L Munn

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

Enclosure

cc: C. Nalder – PNF
A. Gonzalez – USFWS
M. Lopez – NPT
C. Colter – SBT
M. Griffith – COE
K. Urbanek - COE

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

Boulder Creek Bridge Replacement, HUC 170602100501, Adams County, Idaho

NMFS Consultation Number: WCRO-2023-00378

Action Agencies: USDA Forest Service, Payette National Forest
U.S. Army Corps of Engineers

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely to Destroy or Adversely Modify Critical Habitat?
Snake River spring/summer Chinook salmon (*Oncorhynchus tshawytscha)*	Threatened	Yes	No	Yes	No
Snake River Basin steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No

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

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

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

Date: June 27, 2023

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ACRONYMS

BA	Biological Assessment
BMP	Best Management Practice
CFS	Cubic Feet Per Second
COE	United States Army Corps of Engineers
COR	Contracting Officer Representative
CR	Conservation Recommendation
CWA	Clean Water Act
DPS	Distinct Population Segment
DQA	Data Quality Act
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
$ft.^2$	Square Feet
FA	Functioning Appropriately
FAR	Functioning at Risk
FMP	Fishery Management Plans
FOREST PLAN	PNFs Land and Resource Management Plan
FR	Federal Register
FS	Forest Service
FUR	Functioning at Unacceptable Risk
GSI	Genetic Stock Identification
HAPC	Habitat Area of Particular Concern
HEC-RAS	Hydrologic Engineering Center's River Analysis System
HUC	Hydrologic Unit Code
ICTRT	Interior Columbia Technical Recovery Team
IDFG	Idaho Department of Fish and Game
ISAB	Independent Scientific Advisory Board
ITS	Incidental Take Statement
LSR	Little Salmon River
LWD	Large Woody Debris
MATRIX	Matrix of Pathways and Watershed Condition Indicators
MPG	Major Population Group
MSA	Magnuson–Stevens Fishery Conservation and Management Act
MWMT	Maximum Weekly Maximum Temperature
n. d. a.	Non-Disclosure Agreement
NMFS	National Marine Fisheries Service
NTU	Nephelometric Turbidity Units
OHWM	Ordinary High-Water Mark
opinion	Biological Opinion
PBF	Physical or Biological Feature
PCE	Primary Constituent Element

PDC	Project Design Criteria
PFMC	Pacific Fishery Management Council
PIT	Passive Integrated Transponder
PNF	Payette National Forest
RCA	Riparian Conservation Areas
RPA	Reasonable and Prudent Alternative
RPM	Reasonable and Prudent Measure
SRB	Snake River Basin
SRS	Snake River spring/summer
T&Cs	Terms and Conditions
U.S.C.	U.S. Code
USDA	United States Department of Agriculture
USGCRP	U.S. Global Change Research Program
VSP	Viable Salmonid Population
WCI	Watershed Condition Indicator

1. INTRODUCTION

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

1.1. Background

National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with Section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.), as amended, and implementing regulations at 50 CFR 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 within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at the Snake River Area Office, Southern Snake River Branch, Boise, ID.

1.2. Consultation History

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

The Boulder Creek Bridge Replacement Project (occasionally referred to as the Project) was originally presented by the Payette National Forest (PNF) at a Level 1 virtual meeting on June 8, 2022. Pre-consultation for this project began with a site visit with NMFS that occurred on July 7, 2022, when it was determined that the project was outside the scope of the Idaho Stream Crossing Programmatic and required separate consultation. Technical discussions regarding the riprap and bank stabilization occurred during June and July of 2022. The Level 1 Team was updated on December 14, 2022, regarding a draft Biological Assessment (BA) review, and a draft BA was received on February 6, 2023. Email communications were made regarding aspects of channel fill, riprap, revegetation, and work window to clarify the proposed action during February and March of 2023. A virtual Level 1 meeting on February 15, 2023 included discussion of key comments. A revised draft BA was provided on March 08, 2023, and NMFS reached closure on the project's BA after providing final comments. An electronic copy of the PNFs final BA was received on March 31, 2023 and consultation was initiated.

The PNFs consultation initiation package included a BA describing potential effects of the proposed action on Snake River spring/summer (SRS) Chinook salmon (*Oncorhynchus tshawytscha)*, Snake River Basin (SRB) steelhead (*O. mykiss*), and designated critical habitats for both species. In addition, the PNF requested EFH consultation for Pacific Coast salmon (Chinook salmon). NMFS sent a 30-day letter requesting additional information on April 12, 2023. NMFS requested further clarification on two minor items on April 20, 2023, and received a response from the PNF the same day.

On May 16, 2023, NMFS provided a copy of the proposed action and terms and conditions (T&Cs) sections of the draft opinion to the PNF, Nez Perce Tribe, and Shoshone Bannock Tribes. NMFS received comments from the PNF on May 17, 2023. NMFS received comments from the PNF on May 17, 2023. In response to those comments, NMFS modified the T&Cs, and revised the action area extent in the opinion. No comments were received from either the Nez Perce Tribe or the Shoshone Bannock Tribes.

In preparing this opinion, NMFS relied on information from the BA (PNF 2023) and its supporting documentation, published scientific literature, and other scientific literature (e. g., government reports). This information provided the basis for our determinations as to whether the PNF can insure that its proposed action is not likely to jeopardize the continued existence of ESA-listed species, and is not likely to result in the destruction or adverse modification of designated critical habitat.

1.3. Proposed Federal Action

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

The PNF proposes to replace an undermined and aging bridge on Boulder Creek and concurrently stabilize the eastern streambank. The Boulder Creek subwatershed (Hydrologic Unit Code [HUC] 170602100501) is located within the Little Salmon watershed (HUC 17060210; Figure 1). The bridge is located at milepost 17.88 on Forest Service (FS) Road 50074.

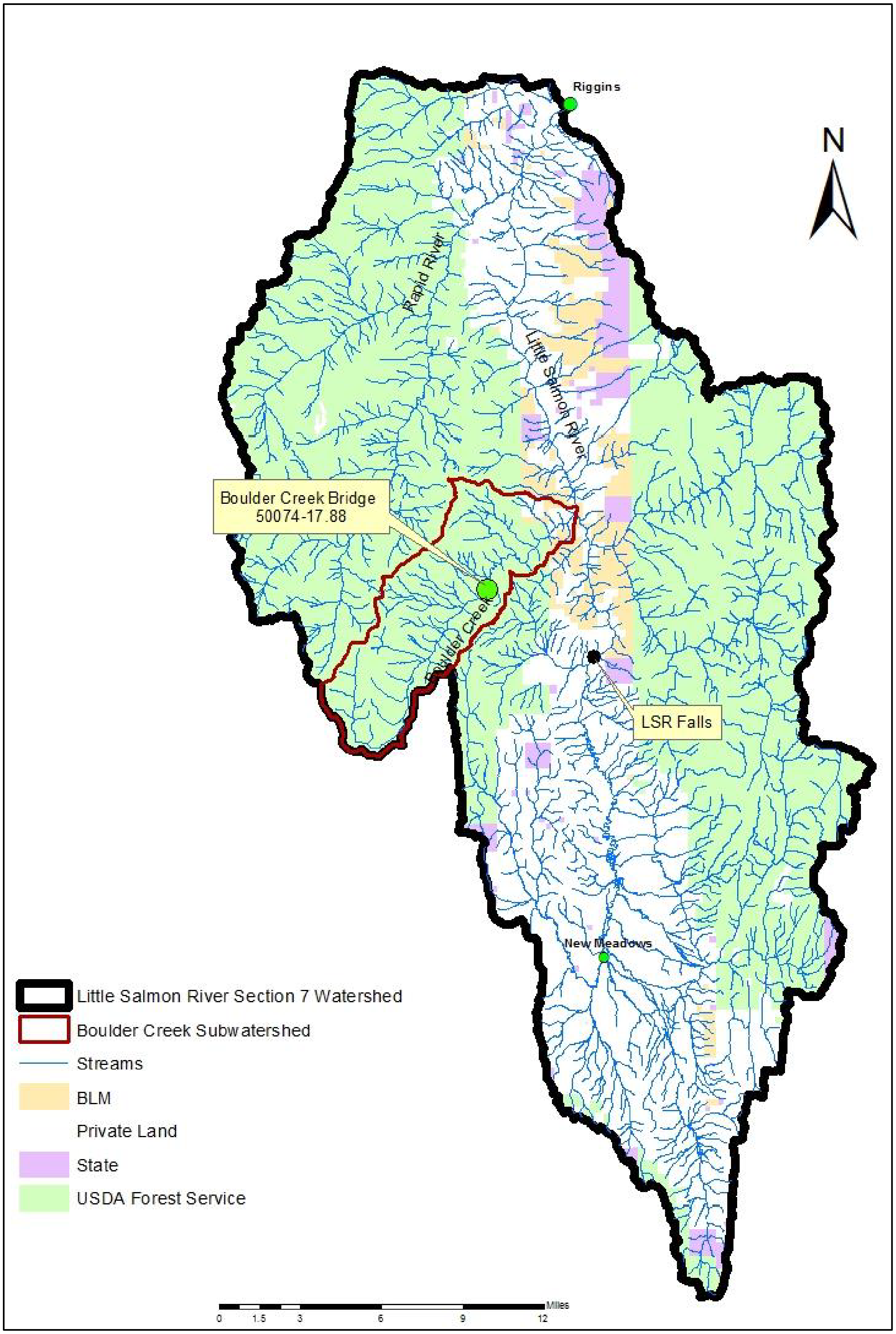

Figure 1. Boulder Creek Bridge 50074-17.88 in the Boulder Creek subwatershed and Little Salmon watershed.

The current bridge is a 40-foot-long timber bridge with timber and concrete abutments (Figure 2). The bridge's integrity has been compromised by channel scouring under the eastern bridge abutment, resulting in concern for structural safety. The structure will be replaced with a longer, 70-foot modular steel structure with pre-cast concrete grade beams to accommodate the stream channel and 100-year floods. Bridge abutments and the adjacent prism will be armored using Class IV riprap (Figure 3). The approaches on either side of the bridge will be reconstructed to accommodate the longer span.

Figure 2. Photos of Boulder Creek Bridge 50074-17.88 with views of the: (a) downstream side of the bridge; (b) upstream side of the bridge; (c) east abutment; and (d) west abutment.

The action also involves a channel redesign, including filling of the eastern scour pool underneath the bridge, removal of fill material from the western point bar, and a general regrading of channel to match the natural channel bed characteristics and elevations 15 feet upstream and 15 feet downstream of the bridge. Native material and vegetation from 17 feet to 56 feet along the eastern upstream bank will be removed and replaced with a Class V riprap spur that will promote bank stabilization and structure protection (Figure 4). This upstream riprap spur will be revegetated during the construction process.

One piece of woody debris on the upstream end of the bridge will be removed to decrease the chance of eastern channel scour (depicted in Figure 4). There is potential for several trees to be removed during the riprap spur construction and reused in an engineered large wood structure that is designed to dissipate flow energy directed toward the eastern bank. The work will take place during a window from July 15 to October 30 during low flows and last up to six weeks.

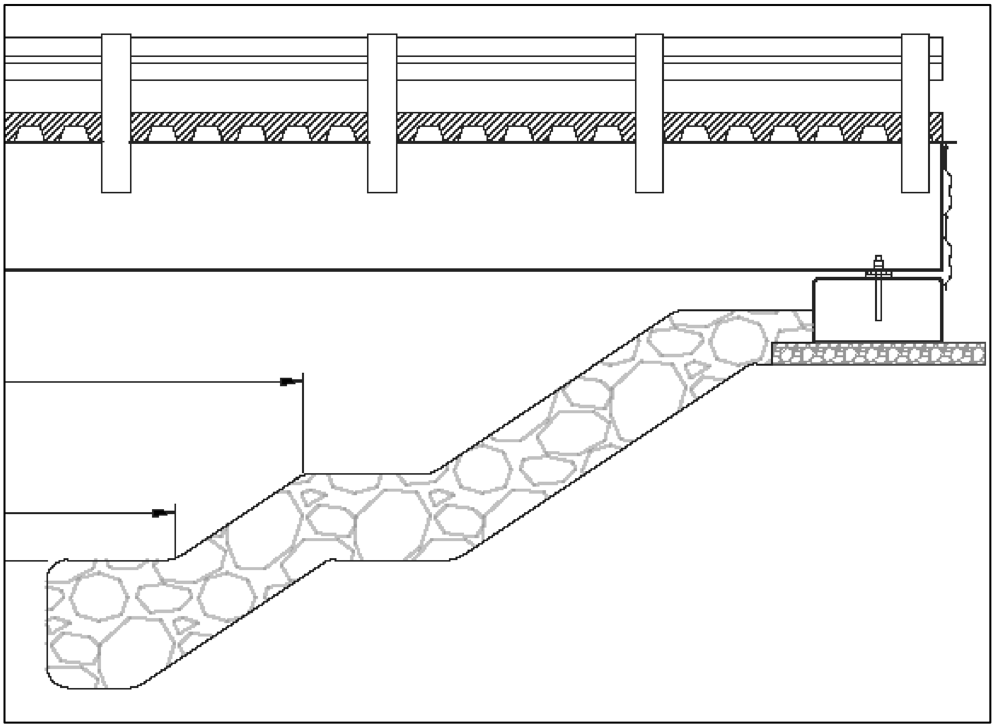

Figure 3. Cross section of the Boulder Creek bridge bank and structure stabilization design.

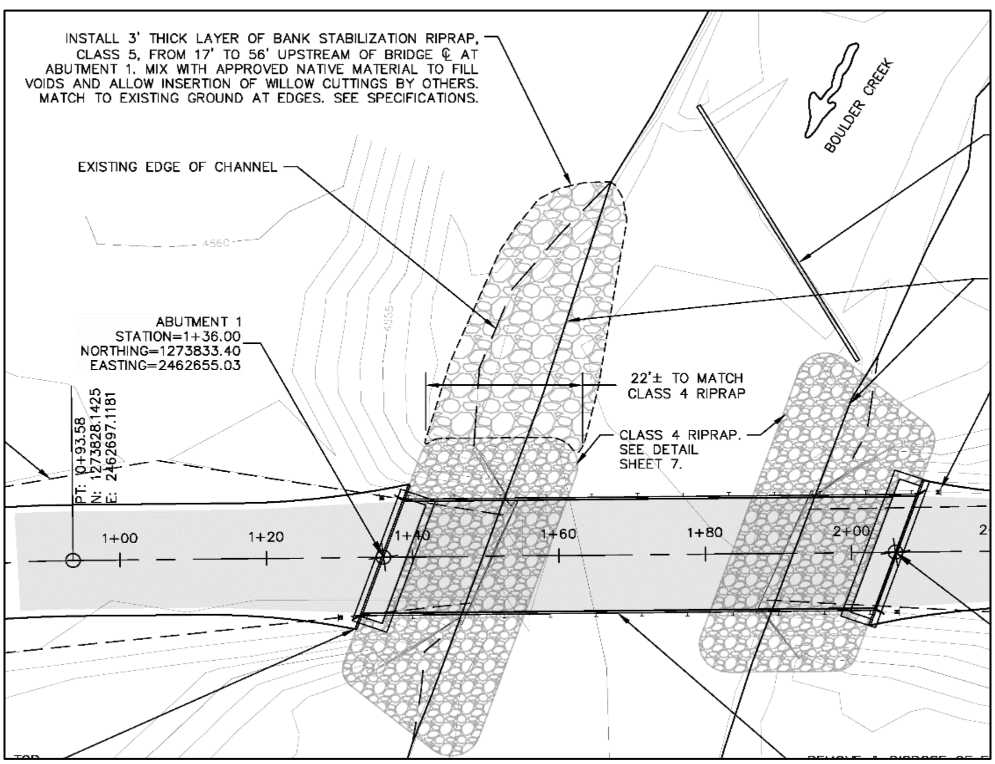

Figure 4. Design plan view of the Boulder Creek bridge riprap bank and structure stabilization, bridge shoulder, and eastern berm design.

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not.

1.3.1. Project Design Criteria

The following measures are project design criteria (PDC) proposed by the PNF to avoid or minimize effects to ESA-listed species and their habitats, to protect the natural environment, and ensure a quality end product for the Boulder Creek Bridge Replacement Project. Only PDCs relevant to avoiding or minimizing effects on fish or fish habitat are included. A complete list of all PDCs is available in the BA (PNF 2023).

PDCs include:

Sedimentation

- The contractor shall prepare and submit a soil erosion and sediment control plan to the PNF for approval prior to any work. This plan will require erosion control (e.g., silt fences, weed free straw bales, sandbags, etc.) around disturbed areas (e.g., stockpile and staging areas) prior to disturbance and monitoring/altering erosion control for the duration of the project.
- Staging areas, stockpile areas, and other locations where ground disturbance or disturbance to ground cover or vegetation might be anticipated will be designated and flagged (existing disturbed areas such as the roadbed or dispersed campsite immediately to the east of the site would be used as staging and/or material stockpile areas as applicable).
- Instream work areas will be isolated, preventing any work in live stream flow. Cofferdam material will be clean and contained to minimize sediment or turbidity. The contractor will submit a dewatering plan, which will be approved by the PNF.

Fish

- Water pumps will have a fish screen installed/operated and maintained in accordance with NMFS' fish screen criteria (NMFS 2022a). Any water pumped from the project site will be pumped to an area with adequate filtering to prevent turbid water returning to Boulder Creek.
- Project work will be conducted during base flow conditions, between July 15 and October 30, to minimize effect to or delay movement of ESA-listed species.
- The action area will be surveyed for adult Chinook salmon and/or redds prior to (within 5 days) of implementation.
- A maximum of two round trips with heavy equipment (tracked excavator) may occur across the live stream channel; fish removal would occur prior to equipment crossings.
- Fish salvage will occur prior to diverting stream flows or fording the stream channel. Passive methods (i.e., slow dewatering), then electrofishing will be used following NMFS Electrofishing Guidelines (2000). Species and length of salvaged fish will be recorded. When fish have fully recovered, they will be released downstream of the project area.

- A salvaged fish release location will be determined upon implementation, but a pool or slow water habitat will be selected to release fish that is outside of the extent of any potential physical stream disturbance from construction activities, but within the action area.

Riparian Area and Habitat

- Trees/brush/soil that are removed in order to facilitate structure placement, will be stockpiled for use in stream channel or floodplain rehabilitation or maintenance (see riprap placement below).
- All disturbed areas will be seeded with an approved seed mix with all remaining salvaged organic material placed to roughen the disturbed area.

Hazardous Materials

- A hazardous spill plan will be submitted by the contractor and approved by the PNF. Refueling of equipment will occur outside of riparian conservation areas (RCAs) or in established staging areas.
- Equipment use for instream work will be clean and free of external oil, grease, leaks, dirt and mud prior to arriving at the site.
- Service equipment storage and on-site fuel storage (if applicable) will occur outside of the RCA or in an established staging area recommended by the Contracting Officer Representative (COR), located in an area that will not deliver fuel, oil, or other hazardous chemicals to streams.
- A fuel/chemical spill containment kit will be available at the worksite during all phases of construction that includes oil absorbent materials such as booms, pads, or absorbent "peanuts" appropriate for the size of stream.

1.3.2. Construction Sequence

1.3.2.1. Schedule

Instream work will occur during low flows (typically from mid-July until winter). The Project will occur sometime between July 15 and October 30, and last up to six weeks. The required completion date is October 30.

1.3.2.2. General Construction Sequence

General construction sequencing will occur as follows:

- Removal of the current deck.
- Isolation of abutments using cofferdams and fish salvage prior to diverting stream flow. Cofferdam configuration and type will be addressed in the dewatering plan submitted by the contractor, (which is reviewed by the PNF), which will adhere to applicable PDC and best management practices (BMPs).
- Water isolated in, or that infiltrates the work area(s), will be pumped to a vegetated location nearby to provide for sediment filtering and deposition.
- Excavation/removal of either the eastern, or western abutment and placement of new precast abutment and riprap.

- Modification of cofferdam/diversion to opposite side.
- Isolation of other abutment using a cofferdam and fish salvage prior to diverting stream flow.
- Excavation/removal of eastern or western abutment and placement of new pre-cast abutment and riprap.
- Removal of all cofferdams and diversion material.
- Placement of new bridge deck.
- Placement of crushed aggregate on bridge deck and approaches.
- Final rehabilitation.

1.3.3. Individual Project Element Descriptions

1.3.3.1. Bridge Specifications

The new steel structure will span 70 feet and allow for a stream simulation channel, matching channel structure similarities upstream and downstream of the current bridge. The new structure will be 30 feet longer than the existing structure and was designed for bankfull flows of 297 cubic feet per second (cfs) and 100-year flows of 734 cfs at 41 feet bankfull width.

1.3.3.2. Channel Re-design and Bank Stabilization

Channel re-design will occur according to the design plans for the Boulder Creek Bridge Replacement Project (Appendix 1). The COE Hydrologic Engineering Center's River Analysis System (HEC-RAS) software was used to model streamflow for the channel design and riprap size class. The bankfull width used for the design was 41 feet with a channel (bottom) width of 34 feet, matching the width of Boulder Creek in the vicinity of the bridge. An existing pool (currently undermining the east abutment) will be filled with material removed from the point bar on the west side of the channel. The re-graded channel will match channel characteristics upstream and downstream of the site. One piece of large woody debris (LWD) that is in the channel immediately upstream of the existing bridge (Figure 4) will also be removed from the channel to allow for channel and streamflow alignment with the new structure.

Riprap is needed around the abutments and immediately upstream of the eastern abutment to protect the shallow foundation from long-term flood flows and scour. Class IV riprap (50% of the rock being 14 to 17 inches in its longest dimension) will be placed around both abutments. Class V riprap (50% of the rock being 17 to 20 inches in its longest dimension) will extend from 17 up to 56 feet (from the centerline of the road) upstream of the eastern abutment (Figure 4).

This riprap section will include:

- *Two root wads with attached trunks (not shown in design)* - Root wads will be roughly flush with the face of the riprap with the trunk of the tree extending into the constructed bank as directed by the COR. The boles of the trees will be dug into the bank angled down and away from the channel with the exposed rootwad upstream, protruding slightly from the riprap. Up to three trees will be removed from the east bank and will be used if possible. Root wads will be sourced farther than 300 feet from streams if salvaged trees cannot be used.

- *Willow bundles* - During installation of the upstream riprap the contractor will allow the PNF to install up to 10 willow bundles (*Salix* spp.; not shown in design) into the riprap and extending down to the waterline using the willow bundle method (Figure 5; VDOT TRB 2004). Willow stems will be sourced in the general vicinity but not within 10 feet of stream channels.
- *Native organic material and soil* - Salvaged material includes shrubs removed from the streambank. This material will be incorporated into riprap voids to allow areas for vegetation to become established over time.

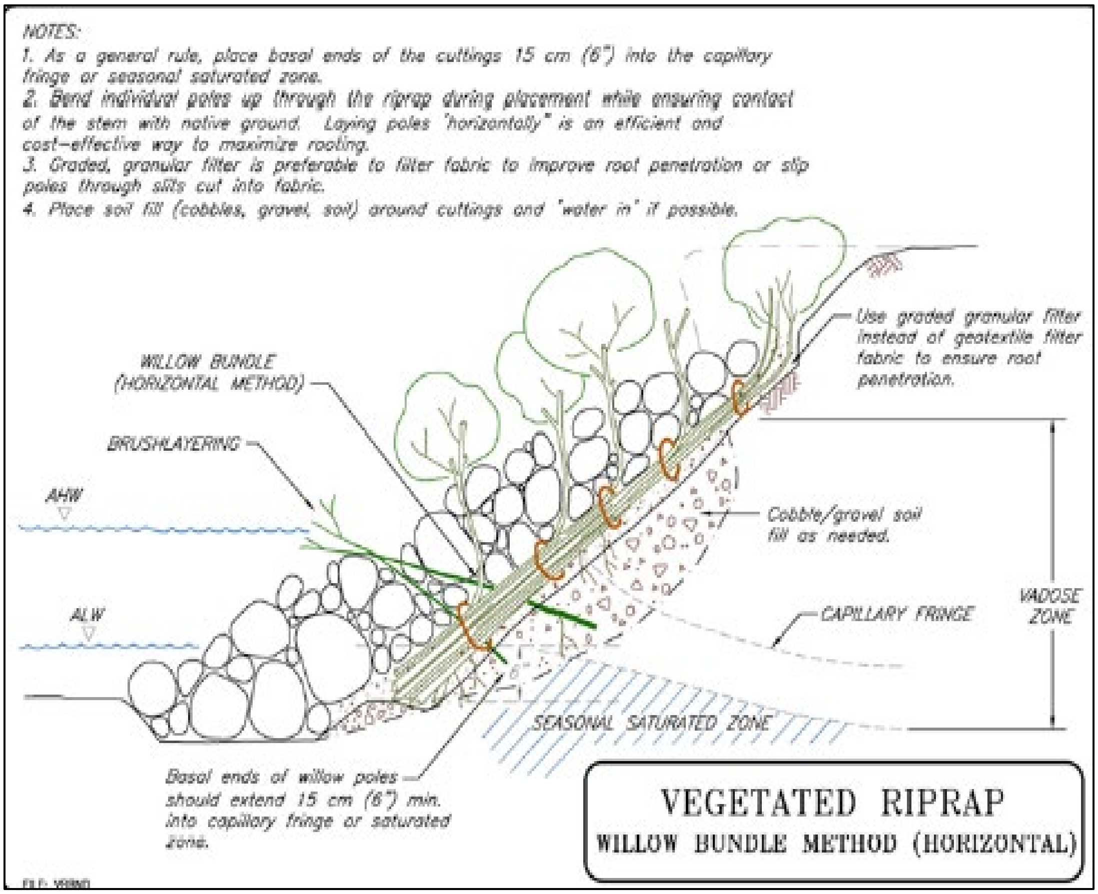

Figure 5. Vegetated riprap willow bundle diagram (VDOT TRB 2004).

1.3.3.3. Stream Diversion and Dewatering

The contractor must submit a stream dewatering plan that will be approved by the PNF. It is anticipated that to dewater the stream, Boulder Creek will likely be diverted entirely to one side of the current channel to allow in channel work, then diverted to the other side to allow that work to occur. Flow diversion/dewatering will likely be accomplished by constructing a cofferdam in the middle of the channel (parallel to stream flow that will stay in place throughout the instream work). Cofferdams will most likely be constructed using a combination of sandbags and plastic sheeting (or similar materials). Streamflow will then be diverted to one side (and subsequently the other) by constructing a smaller cofferdam to divert flow to one side of the center structure. Fish salvage (Section 1.3.3.3) will occur in the work area prior to instream dam construction.

Water infiltration is anticipated in work areas. Water from these areas will be pumped to a vegetated area to allow sediment filtration and deposition prior to the water flowing back into Boulder Creek. Water infiltration will be addressed in the dewatering plan submitted by the contractor, (which is reviewed by the PNF), which will adhere to applicable PDC and BMPs. Streamflow will be re-introduced to reconstructed channels slowly to reduce fine sediment and turbidity that is mobilized from the work area and transported downstream. The duration of flow diversion could extend up to three weeks per side. Total length of Boulder Creek that could be affected is approximately 150 feet.

1.3.3.4. Fish Salvage

Block nets will likely be used to isolate areas during electrofishing prior to any live water work. Use of block nets will be temporary (likely only for a few hours at a time). Nets will be used when electrofishing occurs and when cofferdam materials are placed in the water to isolate those areas and prevent fish from re-entering that location. Block nets will not be employed when streamflow is concentrated to one side of the stream or the other, unless to allow for equipment crossing the live stream (Section 1.3.3.5). Fish will be able to pass through the work area in the actively flowing channel. Electrofishing methods will be used to remove fish from work areas and will likely be used three times to remove fish as stages of instream cofferdam construction and streamflow diversion occur. Fish removal will occur from the area where the center cofferdam is placed first. Fish removal will then occur in the portion of the stream to be dewatered, then in turn, the same will occur on the opposite side when construction. Slow dewatering of work areas will be used to encourage passive movement of fish from dewatered areas. A minimum of three passes will be used when flows are reduced to remove as many fish as possible. Electrofishing may continue if fish are present after three passes. The use of handheld nets or capture by hand will be used for any fish (and any other aquatic organisms including macroinvertebrates and amphibians) that may remain in pools after the entirety of the streamflow is diverted. Fish and other organisms will be released downstream of the site in a pool or other slow water habitat that is outside of the extent of any potential physical stream disturbance from construction activities

1.3.3.5. Equipment Crossings

There may be the need to cross the live stream channel with heavy equipment (i.e., a tracked excavator). This may occur up to two round trips, if necessary. Fish removal will be conducted by the PNF prior to any equipment fording a live portion of the stream. The amount of stream isolated with block nets and electrofished to allow equipment passage will be as small as reasonably possible, depending on location and stream configuration (i.e., riffle or pool habitat or depth), although the length of stream isolated and electrofished for an equipment crossing will likely be approximately 30 feet.

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 provide an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, Section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes reasonable and prudent measures (RPMs), and T&Cs to minimize such impacts.

2.1. Analytical Approach

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

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

The designations of critical habitat for SRS Chinook salmon and SRB steelhead use the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the critical habitat regulations (50 CFR 424.12) replaced these terms with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

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

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

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their critical habitat using an exposure–response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species; or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative (RPA) 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' "reproduction, numbers, or distribution" for the jeopardy analysis. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds that make up the designated area, and discusses the function of the PBFs that are essential for the conservation of the species. Relevant SRS Chinook salmon and SRB steelhead Federal Register (FR) notices and critical habitat listings are considered in this opinion (Table 1).

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

Species	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon (*Oncorhynchus tshawytscha*)			
Snake River spring/summer-run	T 4/22/92; 57 FR 14653	12/28/93; 58 FR 68543	6/28/05; 70 FR 37160
Steelhead (*O. mykiss*)			
Snake River Basin	T 8/18/97; 62 FR 43937	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]The listing status for Snake River spring/summer Chinook salmon was corrected on 6/3/92 (57 FR 23458).
[2]Critical habitat for Snake River spring/summer Chinook salmon was revised on 10/25/99 (64 FR 57399).

2.2.1. Status of the Species

This section describes the present condition of the SRS Chinook salmon evolutionarily significant unit (ESU) and the SRB 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 McElhany et al. (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.

The following sections summarize the status and available information on the species and designated critical habitats considered in this opinion based on the detailed information provided by the ESA Recovery Plan for Snake River Spring/Summer Chinook Salmon & Snake River Basin Steelhead (NMFS 2017); Biological Viability Assessment Update for Pacific Salmon and Steelhead Listed Under the ESA: Pacific Northwest (Ford 2022); 2022 5-Year Review: Summary & Evaluation of Snake River Spring/Summer Chinook Salmon (NMFS 2022b); and 2022 5-Year Review: Summary & Evaluation of Snake River Basin Steelhead (NMFS 2022c). These four documents are incorporated by reference here. Additional information that has become available since these documents were published, as well as population and drainage specific information that was not included in these documents, is also summarized in the following sections and contributes to the best scientific and commercial data available.

2.2.1.1. Snake River Spring/Summer Chinook Salmon

The SRS 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. Large portions of historical habitat were blocked in 1901 by the construction of Swan Falls Dam, on the Snake River, and later by construction of the three-dam Hells Canyon Complex from 1955 to 1967. Dam construction also blocked and/or hindered fish access to historical habitat in the Clearwater River basin as a result of the construction of Lewiston Dam (removed in 1973 but believed to have caused the extirpation of native Chinook salmon in that subbasin). The loss of this historical habitat substantially reduced the spatial structure of this species. The production of SRS Chinook salmon was further affected by the development of the eight Federal dams and reservoirs in the mainstem lower Columbia/Snake River migration corridor between the late 1930s and early 1970s (NMFS 2017).

Several factors led to NMFS' 1992 conclusion that SRS Chinook salmon 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 and reduced streamflows existed throughout the region, along with risks associated with the use of outside hatchery stocks in particular areas (Good et al. 2005). NMFS completed its 5-year review for Pacific salmon in 2022 and concluded the species should remain listed as threatened (NMFS 2022b).

Since SRS Chinook salmon were listed in 1992, there have been improvements in abundance/productivity in several populations. Relative to the time of listing, the majority of populations experienced sharp declines in abundance in the recent 5-year period, primarily due to variation in ocean survival, and declines for all populations in the 15-year trends. Limiting factors continue to include widespread areas of degraded habitat that persist across the basin, with simplified stream channels, disconnected floodplains, impaired instream flow, loss of cold water refugia, conditions increasingly favoring non-native predator fish, and other limiting factors, despite improving habitat conditions for spring/summer Chinook salmon spawning, rearing, and migration in many reaches (Ford 2022; NMFS 2022b). Predation by pinnipeds continues to pose a negative threat to the persistence of this ESU (NMFS 2022b). Climate change is a significant threat, particularly in the marine and freshwater rearing life stages (NMFS 2022b).

Life History. SRS 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 salmon adults that pass Bonneville Dam from June through August. Returning adults will hold in deep mainstem and tributary pools until late summer, when they move up into tributary areas and spawn. In general, spring-run type Chinook salmon tend to spawn in higher-elevation reaches of major Snake River tributaries in mid- through late August, and summer-run Chinook salmon tend to spawn lower in Snake River tributaries in late August and September (although the spawning areas of the two runs may overlap).

Spring/summer Chinook spawn typically 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. Portions of some populations also exhibit "ocean-type" life history, migrating to the ocean during the spring of emergence (Connor et al. 2001; Copeland and Venditti 2009). 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 13 artificial propagation programs (85 FR 81822). The hatchery programs include the McCall Hatchery (South Fork Salmon River), South Fork Salmon River Eggbox, Johnson Creek, Pahsimeroi River, Yankee Fork Salmon River, Panther Creek, Sawtooth Hatchery, Tucannon River, Lostine River, Catherine Creek, Lookingglass Creek, Upper Grande Ronde River, and Imnaha River programs. The historical Snake River ESU 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 (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, the spatial structure/diversity and abundance/productivity VSP parameters are evaluated for current risk (Table 2).

Spatial structure risk is low to moderate for most populations in this ESU (Ford 2022) 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 for some populations (Table 2). 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; Ford 2022).

The Little Salmon River (LSR) population of the South Fork Salmon River Major Population Group is the only SRS Chinook salmon unit affected by the action (Table 2). The VSP parameters for this population are discussed in the environmental baseline (Section 2.4.1.1).

Table 2. Summary of viable salmonid population (VSP) parameter risks, current status, and proposed recovery goal for each population in the Snake River spring/summer Chinook salmon evolutionarily significant unit (Ford 2022; NMFS 2017).

Major Population Group	Population[2]	VSP Risk Rating[1]		Viability Rating	
		Abundance/ Productivity	Spatial Structure/ Diversity	2022 Assessment	Proposed Recovery Goal[3]
South Fork Salmon River (Idaho)	Little Salmon River	*Insuf. data*	Low	High Risk	Maintained
	South Fork Salmon River Mainstem	High	Moderate	High Risk	Viable
	Secesh River	High	Low	High Risk	Highly Viable
	East Fork South Fork Salmon River	High	Low	High Risk	Maintained
Middle Fork Salmon River (Idaho)	Chamberlain Creek	High	Low	High Risk	Viable
	Middle Fork Salmon River below Indian Creek	High	Moderate	High Risk	Maintained
	Big Creek	High	Moderate	High Risk	Highly Viable
	Camas Creek	High	Moderate	High Risk	Maintained
	Loon Creek	*Insuf. data*	Moderate	High Risk	Viable
	Middle Fork Salmon River above Indian Creek	High	Moderate	High Risk	Maintained
	Sulphur Creek	High	Moderate	High Risk	Maintained
	Bear Valley Creek	Moderate	Low	Maintained	Viable
	Marsh Creek	Moderate	Low	Maintained	Viable
Upper Salmon River (Idaho)	North Fork Salmon River	*Insuf. data*	Low	High Risk	Maintained
	Lemhi River	High	High	High Risk	Viable
	Salmon River Lower Mainstem	High	Low	High Risk	Maintained
	Pahsimeroi River	High	High	High Risk	Viable
	East Fork Salmon River	High	High	High Risk	Viable
	Yankee Fork Salmon River	High	High	High Risk	Maintained
	Valley Creek	High	Moderate	High Risk	Viable
	Salmon River Upper Mainstem	High	Low	High Risk	Highly Viable
	Panther Creek[4]	*Insuf. data*	High	High Risk	***Reintroduction***
Lower Snake (Washington)	Tucannon River	High	Moderate	High Risk	Highly Viable
	Asotin Creek			***Extirpated***	***Consider Reintroduction***
Grande Ronde and Imnaha Rivers (Oregon/ Washington)[5]	Wenaha River	High	Moderate	High Risk	Highly Viable or Viable
	Lostine/Wallowa River	High	Moderate	High Risk	Highly Viable or Viable
	Minam River	Moderate	Moderate	Maintained	Highly Viable or Viable
	Catherine Creek	High	Moderate	High Risk	Highly Viable or Viable
	Upper Grande Ronde River	High	High	High Risk	Maintained
	Imnaha River	High	Moderate	High Risk	Highly Viable or Viable
	Lookingglass Creek			***Extirpated***	***Consider Reintroduction***
	Big Sheep Creek			***Extirpated***	***Consider Reintroduction***

[1]Risk ratings are defined based on the risk of extinction within 100 years: High = greater than or equal to 25 percent; Moderate = less than 25 percent; Low = less than 5 percent; and Very Low = less than 1 percent.
[2]Populations shaded in gray are those that occupy the action area.
[3]There are several scenarios that could meet the requirements for ESU recovery (as reflected in the proposed goals for populations in Oregon and Washington). What is reflected here for populations in Idaho are the proposed status goals selected by NMFS and the State of Idaho.
[4]Although considered functionally extirpated in the late 1960s, redds have been documented in Panther Creek every year since 2005. Considering the natural spawning that has occurred, the role of the Panther Creek population in the MPG recovery scenario may be reevaluated (NMFS 2022b).
[5]At least one of the populations must achieve a very low viability risk rating.

Abundance and Productivity. Historically, the Snake River drainage is thought to have produced more than 1.5 million adult spring/summer Chinook salmon in some years (Matthews and Waples 1991), yet in 1994 and 1995, fewer than 2,000 naturally produced adults returned to the Snake River (ODFW and WDFW 2022). From the mid-1990s and the early 2000s, the population increased dramatically and peaked in 2001 at 45,273 naturally produced adult returns. Since 2001, the numbers have fluctuated between 32,324 (2003) and 4,183 (2019) ;(ODFW and WDFW 2022). Productivity is below recovery objectives for all of the populations (NMFS 2017) and has been below replacement for nearly all populations in the ESU since 2012 (Nau et al. 2021). The returns over Lower Granite Dam in 2021 and 2022 suggest that most of the populations will likely achieve replacement for the 2017 stock year, for the first time in five years, and suggest that most populations will likely also achieve replacement for the 2018 stock year. However, even with the recent increases, abundance and productivity remain very low across the ESU.

As reported in the most recent viability assessment (Ford 2022), the five-year (2015-2019) geometric mean abundance estimates for 26 of the 27 evaluated populations are lower than the corresponding estimates for the previous five-year period by varying degrees, with an average decline of 55 percent. The consistent and sharp declines in 15-year population trends for all populations in the ESU are concerning, with the abundance levels for some populations approaching similar levels to those of the early 1990s when the ESU was listed (NMFS 2022a). No populations within the ESU meet the minimum abundance threshold designated by the ICTRT (NMFS 2022a), and the vast majority of the extant populations are considered to be at high risk of extinction due to low abundance/productivity (Ford 2022). Therefore, all currently extant populations of Snake River spring/summer Chinook salmon will likely have to increase in abundance and productivity in order for the ESU to recover (Table 2). Information specific to populations within the action area is described in the environmental baseline section.

Summary. Overall, this ESU is at a moderate-to-high risk of extinction. While there have been improvements in abundance/productivity in several populations since the time of listing, the majority of populations experienced sharp declines in abundance in recent years. If productivity remains low, the ESUs viability will become more tenuous. If productivity improves, populations could increase again, similar to what was observed in the early 2000s. This ESU continues to face threats from disease; predation; harvest; habitat loss, alteration, and degradation; and climate change (NMFS 2022b).

2.2.1.2. Snake River Basin Steelhead

The SRB steelhead was listed as a threatened ESU on August 18, 1997 (62 FR 43937), with a revised listing as a DPS on January 5, 2006 (71 FR 834). This DPS occupies the Snake River basin, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Reasons for the decline of this species include substantial modification of the seaward migration corridor by hydroelectric power development on the mainstem Snake and Columbia Rivers, loss of habitat above the Hells Canyon Dam complex on the mainstem Snake River, and widespread habitat degradation and reduced 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 SRB steelhead over Lower Granite Dam (Good et al. 2005; Ford 2011). NMFS completed its 5-year review for steelhead in 2022 and concluded the species should remain listed as threatened (NMFS 2022c).

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

Spatial Structure and Diversity. This species includes all naturally-spawning steelhead populations below natural and manmade impassable barriers in streams in the Snake River basin of southeast Washington, northeast Oregon, and Idaho, as well as the progeny of six artificial propagation programs (85 FR 81822). The artificial propagation programs include the Dworshak National Fish Hatchery, Salmon River B-run, South Fork Clearwater B-run, East Fork Salmon River Natural, Tucannon River, and the Little Sheep Creek/Imnaha River programs. The SRB steelhead listing does not include resident forms of rainbow trout (*O. mykiss*) 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, the spatial structure/diversity and abundance/productivity VSP parameters are evaluated for current risk (Table 3).

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

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

The LSR population of the Salmon River Major Population Group is the only SRB steelhead unit affected by the action (Table 3). The VSP parameters for this population are discussed in the environmental baseline (Section 2.2.1.2).

Table 3. Summary of viable salmonid population (VSP) parameter risks and overall current status and proposed recovery goals for each population in the Snake River Basin steelhead distinct population segment (Ford 2022; NMFS 2017; NMFS 2022c).

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

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

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

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

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

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 PBFs 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 (PBFs), and the species life stage each PBF supports.

Site	Essential Physical and Biological Features	Species Life Stage
Snake River Basin steelhead[a]		
Freshwater spawning	Water quality, water quantity, and substrate	Spawning, incubation, and larval development
Freshwater rearing	Water quantity and floodplain connectivity to form and maintain physical habitat conditions	Juvenile growth and mobility
	Water quality and forage[b]	Juvenile development
	Natural cover[c]	Juvenile mobility and survival
Freshwater migration	Free of artificial obstructions, water quality and quantity, and natural cover[c]	Juvenile and adult mobility and survival
Snake River spring/summer Chinook salmon		
Spawning and juvenile rearing	Spawning gravel, water quality and quantity, cover/shelter (Chinook only), food, riparian vegetation, space (Chinook only), water temperature	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 areas have also been described for Snake River steelhead. These PBFs will not be affected by the proposed action and have therefore not been described in this opinion.
[b] Forage includes aquatic invertebrate and fish species that support growth and maturation.
[c] Natural cover includes shade, large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
[d] Food applies to juvenile migration only.

Table 5 describes the geographical extent of critical habitat within the Snake River basin for each of the 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 mark (OHWM), or the bankfull elevation where the OHWM is not defined. In addition, critical habitat for 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 basin for ESA-listed salmon and steelhead relevant to the Boulder Creek Bridge Replacement Biological Opinion.

Evolutionarily Significant Unit (ESU)/ Distinct Population Segment (DPS)	Designation	Geographical Extent of Critical Habitat
Snake River spring/summer Chinook salmon	58 FR 68543; December 28, 1993 64 FR 57399; October 25, 1999	All Snake River reaches upstream to Hells Canyon Dam; all river reaches presently or historically accessible to Snake River spring/summer Chinook salmon within the Salmon River basin; and all river reaches presently or historically accessible to Snake River spring/summer Chinook salmon within the Hells Canyon, Imnaha, Lower Grande Ronde, Upper Grande Ronde, Lower Snake–Asotin, Lower Snake–Tucannon, and Wallowa subbasins.
Snake River Basin steelhead	70 FR 52630; September 2, 2005	Specific stream reaches are designated within the Lower Snake, Salmon, and Clearwater River basins. Table 21 in the Federal Register details habitat areas within the DPS 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 SRS Chinook and SRB steelhead in particular (NMFS 2017).

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

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

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

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

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

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

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

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

2.3. Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The proposed action includes implementation of a bridge replacement in the PNF (Figure 6). The project site is located at milepost 17.88 on National Forest Road 50074 in the Boulder Creek subwatershed (HUC 170602100501). The action area for the Boulder Creek Bridge Replacement Project includes the construction extent of the project site: the instream area below the bridge; equipment access roads; the road approaches and road prisms on either side of the bridge; and streambank construction extent. Specifically, this comprises approximately 60 linear feet of road on the western side of the bridge and approximately 122 linear feet on the eastern side; and ground disturbance limits of approximately 150 linear feet of streambank. The action area also includes the expected extent of the turbidity plume, i.e., 1,000[1] feet downstream of the project site. Equipment staging areas will occur on either side of the road next to Boulder Creek Bridge.

[1] NMFS extended the action area to 1,000 feet in this opinion based on a discussion with the PNF.

Figure 6. Action area (yellow) of the Boulder Creek Bridge Replacement Project as depicted in the BA. The action area was extended an additional 400 feet downstream for this opinion[2].

2.4. Environmental Baseline

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early Section 7 consultations, and the impact of State or private actions, which are contemporaneous with the consultation in process. The consequences to listed species

[2] See Footnote 1.

or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

The environmental baseline is described first as an overview of the ESA-listed species that utilize the action area (Section 2.4.1), then in terms of the biological requirements for habitat features and processes necessary to support all life stages of each listed species within the action area (Section 2.4.2). The SRS Chinook salmon and SRB steelhead reside in and migrate through the action area. Thus, the biological requirements are the PBFs essential to spawning, rearing, and freshwater migration.

2.4.1. Anadromous Salmonids in the Action Area

The action area is used by all freshwater life history stages of SRS Chinook salmon and SRB steelhead. Streams within the action area are designated critical habitat for both species. The condition of the listed species and designated critical habitats in the action area are described further below.

2.4.1.1. Snake River Spring/Summer Chinook Salmon

Little Salmon River Population. SRS Chinook salmon in the action area are part of the South Fork Salmon River MPG. Within that MPG, the LSR population's minimum desired status is moderate risk or "maintained." The population is currently lacking in abundance and productivity metrics, and as a default is given an integrated rating of high risk. Spatial structure and diversity metrics for the population are given a low integrated rating. Overall risk rating is, therefore, high risk and does not meet the "maintained" population status recovery goal (Table 8; Ford 2022).

Table 6. Viability of the Little Salmon River Chinook salmon population. The abundance threshold is 750 returning adults.

		Little Salmon River Population
Abundance/productivity metrics	Natural Spawning ICTRT productivity	Insufficient data Insufficient data
	Integrated A/P risk	*High*
Spatial structure/diversity (SS/D) metrics	Natural Processes Diversity Risk	Low Low
	Integrated SS/D risk	*Low*
	Overall risk rating	**High**

Note: Natural spawning = most recent 10-yr geometric mean (range). ICTRT productivity = 20-yr geometric mean for parent escapements below 75 percent of population threshold. Range in annual abundance, standard error, and number of qualifying estimates for productivities in parentheses. Data from Ford 2022.

The LSR population includes the Little Salmon River watershed and tributaries to the lower Salmon River, and contains both spring and summer run fish. The Rapid River Hatchery, 2.5 miles upstream of the LSRs confluence with the Salmon River, produces spring-run fish. Most natural spawning in this population occurs upstream of the Rapid River confluence in the mainstem LSR and its tributaries. In the LSR, a complete barrier to passage occurs at Little Salmon River Falls, upstream of Boulder Creek's confluence with the river.

Presence of adult spring-run Chinook salmon in the LSR would begin with migration from the sea and arrival to holding areas in the mainstem Salmon River and lower tributaries until late summer, followed by movement upstream and spawning in mid- through late August. Eggs incubate overwinter and hatch in late winter and early spring. Juveniles rear though summer, overwinter, and typically migrate to seas in spring of their second year of life, though some may spend an additional year in freshwater.

Diversity risk is high for this population because of the influences of out-of-basin hatchery fish on genetic variation. Genetic samples of natural spawners in the LSR have been indistinguishable from Rapid River Hatchery fish, which originated from an out-of-population stock (ICTRT 2010). Substantial numbers of hatchery Chinook salmon are released into the LSR. In most years since adult fish began returning to Rapid River Hatchery, returning adults have likely strayed into the LSR upstream of Rapid River and spawned naturally. It is likely that hatchery returns comprise a high proportion of spawners in this population (ICTRT 2010).

Chinook salmon use Boulder Creek for spawning and juvenile rearing. Boulder Creek contains a partial fish passage barrier at approximately 4.4 miles above the confluence with the LSR. The natural falls were previously 9 feet high, but in 1985, the Idaho Department of Fish and Game (IDFG) removed sections of the rock to allow for incremental stepping pools to improve passage for Chinook salmon (Petrosky and Holubetz 1985, 1988). The falls represent complete passage barrier to Chinook salmon in lower water years, but researchers reported Chinook salmon passage in higher water years even before the barrier modification project occurred (Petrosky and Holubetz 1985). Juvenile life stages have been observed above and below the natural falls (and thus below the action area) in Boulder Creek, but Chinook salmon adults have only been documented above the falls in the 1980s during high water years (Rich et al. 1993).

IDFG has established parr monitoring of Chinook salmon on four consistently monitored sites in Boulder Creek since the 1980s. Two of the four sites occur above ("Above") the falls and two of the sites occur below ("Below"). In the most recent six years of snorkel survey data, Chinook salmon parr densities have varied from 0–44.5 parr per 100 square meters (m^2) (Figure 7; Belnap et al. 2016; Stark et al. 2017; Putnam et al. 2018, 2022; Roth et al. 2019; Poole et al. 2020), but were only detected above the falls during one year (i.e., 2017). The PNF has also documented some Chinook salmon presence above the falls during surveys conducted from 1989 to 2019, but the last detection occurred in 1997 (PNF 2023).

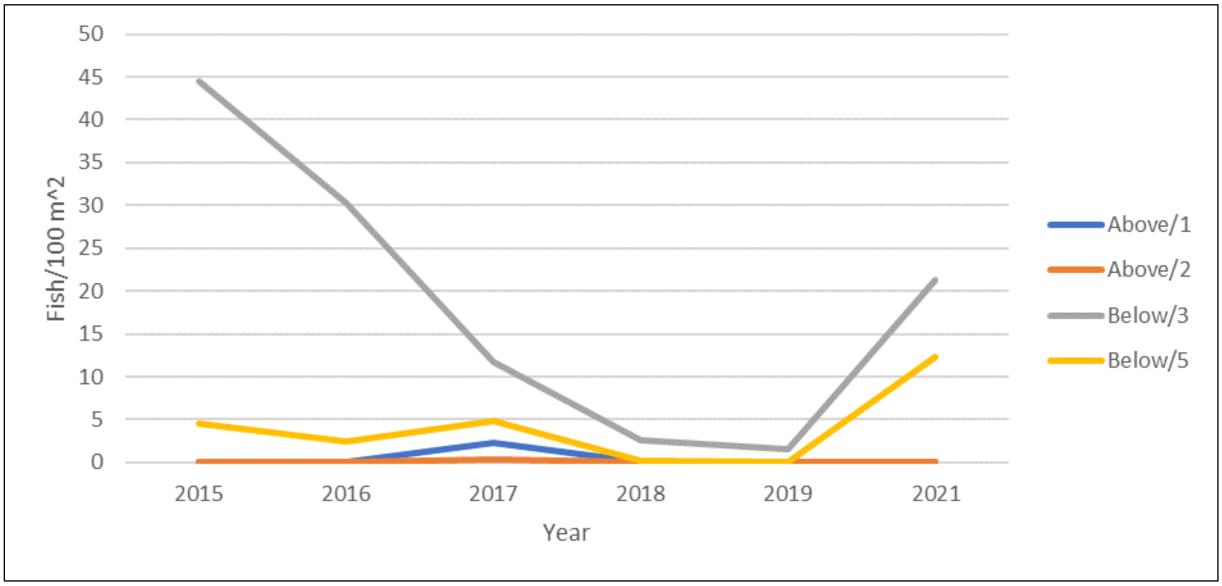

Figure 7. Densities (fish/100 m^2) of Chinook salmon parr observed from 2016–2021 in Boulder Creek, Little Salmon River, Idaho. The four survey sites include two sites above ("Above") and below ("Below) a partial natural falls passage barrier at approximately river mile 4.4 on Boulder Creek. Data from Idaho Anadromous Salmonid Monitoring Reports (Belnap et al. 2016; Stark et al. 2017; Putnam et al. 2018, 2022; Roth et al. 2019; Poole et al. 2020).

Snake River Spring/summer Chinook Critical Habitat. Designated critical habitat for SRS Chinook salmon occurs throughout the Boulder Creek subwatershed (Figure 8).

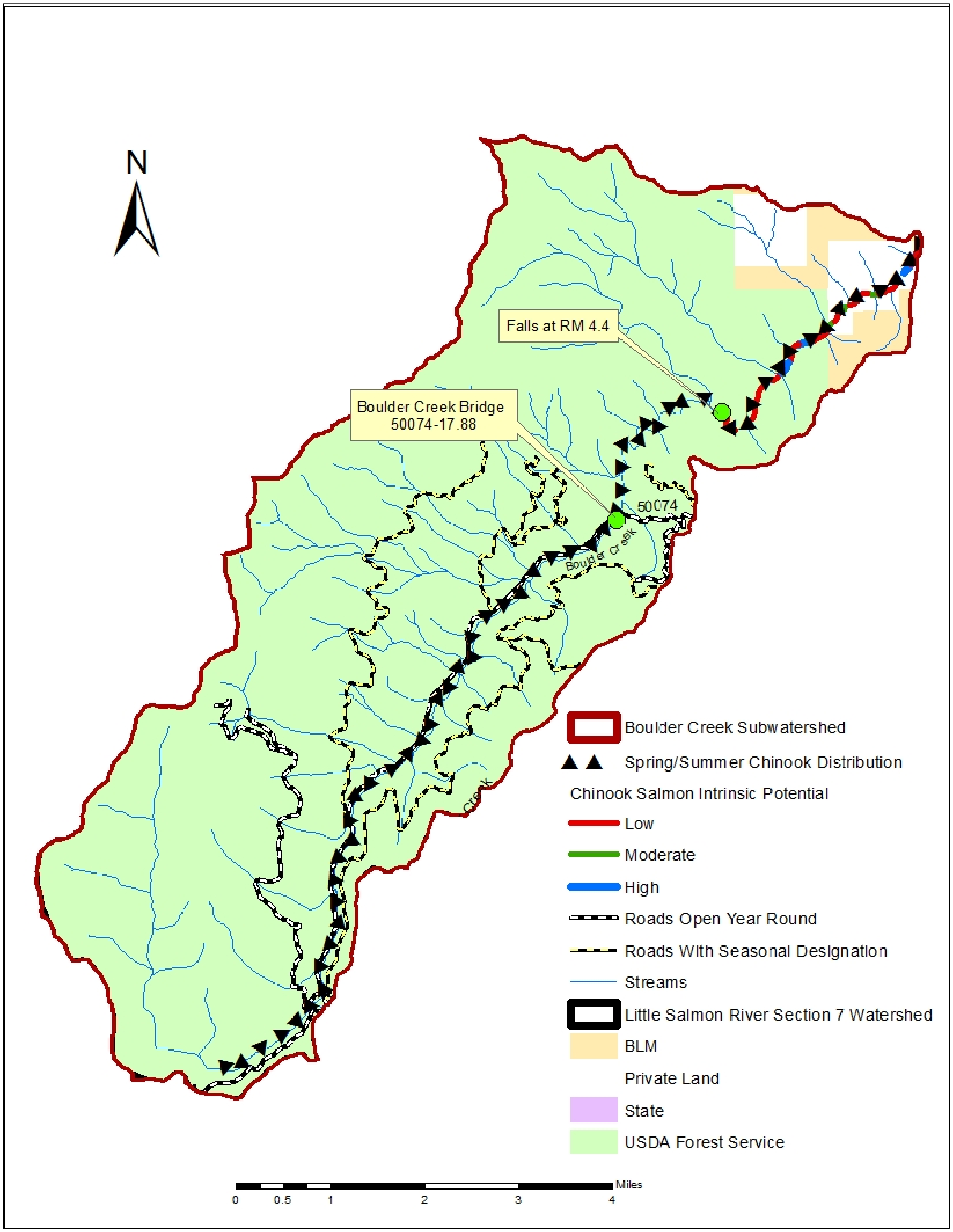

Figure 8. Snake River spring/summer-run Chinook salmon designated critical habitat within the Boulder Creek subwatershed, displayed as Spring/Summer Chinook Distribution. Figure from PNF 2023.

2.4.1.2. Snake River Basin Steelhead

Little Salmon River Population. The action area houses the LSR steelhead population, which is part of the Salmon River MPG. This population of A-run fish includes the LSR and its tributaries, as well as steelhead-supporting tributaries to the lower Salmon River, downstream from the mouth of the LSR (Whitebird Creek, Skookumchuck Creek, Slate Creek, and several smaller tributaries). Little Salmon River Falls has been identified as a complete barrier to steelhead (NMFS 2017).

Adult SRB steelhead generally reach mainstem and tributary areas in early fall. They hold overwinter and spawn the following spring, and emergence of fry occurs by early June. Juveniles out-migrate by age two or three.

Direct estimates of current abundance (total number of adults spawning in natural production areas) are not available for the entire population. Estimates of natural-origin abundance have been constructed from two methods: (a) genetic stock identification (GSI) and run reconstruction from aggregate Lower Granite Dam returns; and (b) population trajectories based on Passive Integrated Transponder (PIT) tags (Ford 2022). The most recent 5-year (2015–2019) geometric mean of natural origin spawners in this population was 400 (GSI estimation), which is lower than that reported for the time period when the species was listed (Table 7). Direct estimates of natural-origin spawners for this population are limited to weir passage counts for the Rapid River tributary, located downstream of the Boulder Creek tributary.

Table 7. Five-year geometric mean of natural spawners (and total spawners) for the Little Salmon Rapid River population of Snake River Basin steelhead.

	Estimation Method	
Year	**GSI**	**PIT-tag**
1990-94	599 (4,251)	-
1995-99	338 (2,400)	-
2000-04	1,044 (7,403)	-
2005-09	683 (4,847)	-
2010-14	1,403 (9,947)	49 (57)
2015-19	400 (2,840)	18 (21)
Percent change between two most recent time periods	-71 (-71)	-63 (-63)

Note: GSI-based counts are super-population groups from GSI-based run partitioning of the run-at-large over Lower Granite Dam. PIT-tag-based population estimation method is based on mixture model and tag detection network across the DPS. Table adapted from Ford 2022.

The LSR 10-year natural origin counts and productivity estimates indicate low demographic risk (Table 8), however, hatchery spawner contributions into natural areas is high. The diversity risk for this population is driven by the potentially high proportion of hatchery-origin fish spawning naturally in the population and the uncertainty regarding the effectiveness of hatchery spawners. Hatchery fish are released into the LSR both for harvest augmentation, and for supplementation of the natural population. The resultant productivity for the population needs to be assessed further (Ford 2022).

Table 8. Viability of the Little Salmon River steelhead population. The abundance threshold is 500 returning adults.

		Little Salmon River Population
Abundance/productivity metrics	Natural Spawning ICTRT productivity	750 2.53
	Integrated A/P risk	*Very Low*
Spatial structure/diversity (SS/D) metrics	Natural Processes Diversity Risk	Low Moderate
	Integrated SS/D risk	*Moderate*
	Overall risk rating	***Viable***

Note: Natural spawning = most recent 10-yr geometric mean (range). ICTRT productivity = 20-yr geometric mean for parent escapements below 75% of population threshold. Data from Ford 2022.

Steelhead use Boulder Creek for spawning, migration, and juvenile rearing. The natural falls at river mile 4.4 has not impeded fish passage for steelhead (Petrosky and Holubetz 1985). Both wild and hatchery-augmented classes of steelhead have been identified in Boulder Creek (Rich et al. 1993).

All life stages of steelhead/redband trout have been observed above and below the action area in Boulder Creek (Petrosky and Holubetz 1985; USDA FS 2022). Steelhead have been observed in all four IDFG survey sections in Boulder Creek in densities varying from 0 – 21.35 fish per 100 m^2, with the greatest densities occurring generally every year at the Below/3 survey site (Figure 9; Belnap et al. 2016; Stark et al. 2017; Putnam et al. 2018, 2022; Roth et al. 2019; Poole et al. 2020).

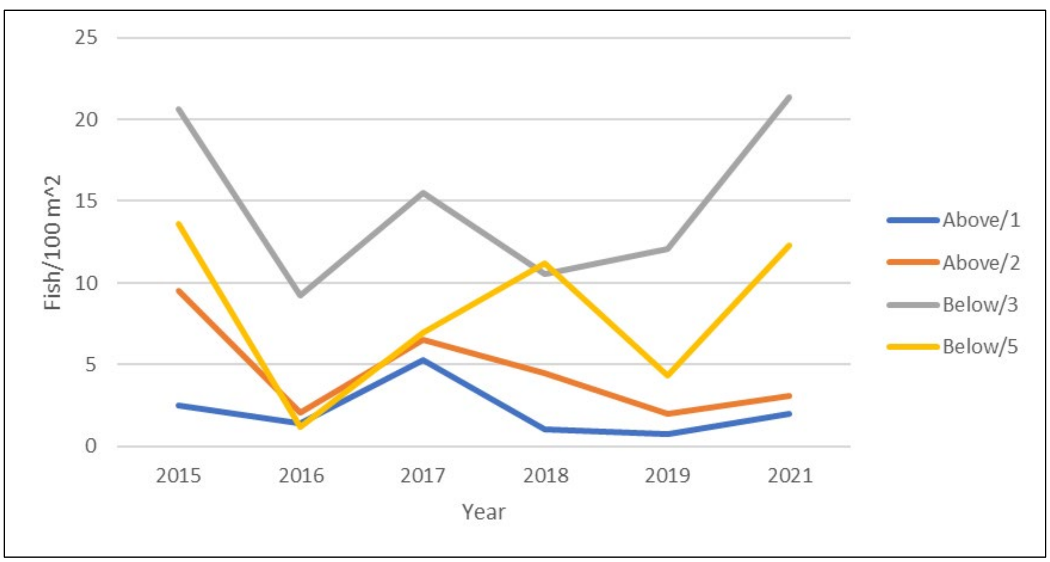

Figure 9. Densities (fish/100 m^2) of steelhead observed from 2016–2021 in Boulder Creek, Little Salmon River, Idaho. Trout fry (all trout <50 mm that could not be distinguished between steelhead) were not included in steelhead counts.

Snake River Basin Steelhead Critical Habitat. Designated critical habitat for SRB steelhead occurs throughout Boulder Creek and its tributaries (Figure 10).

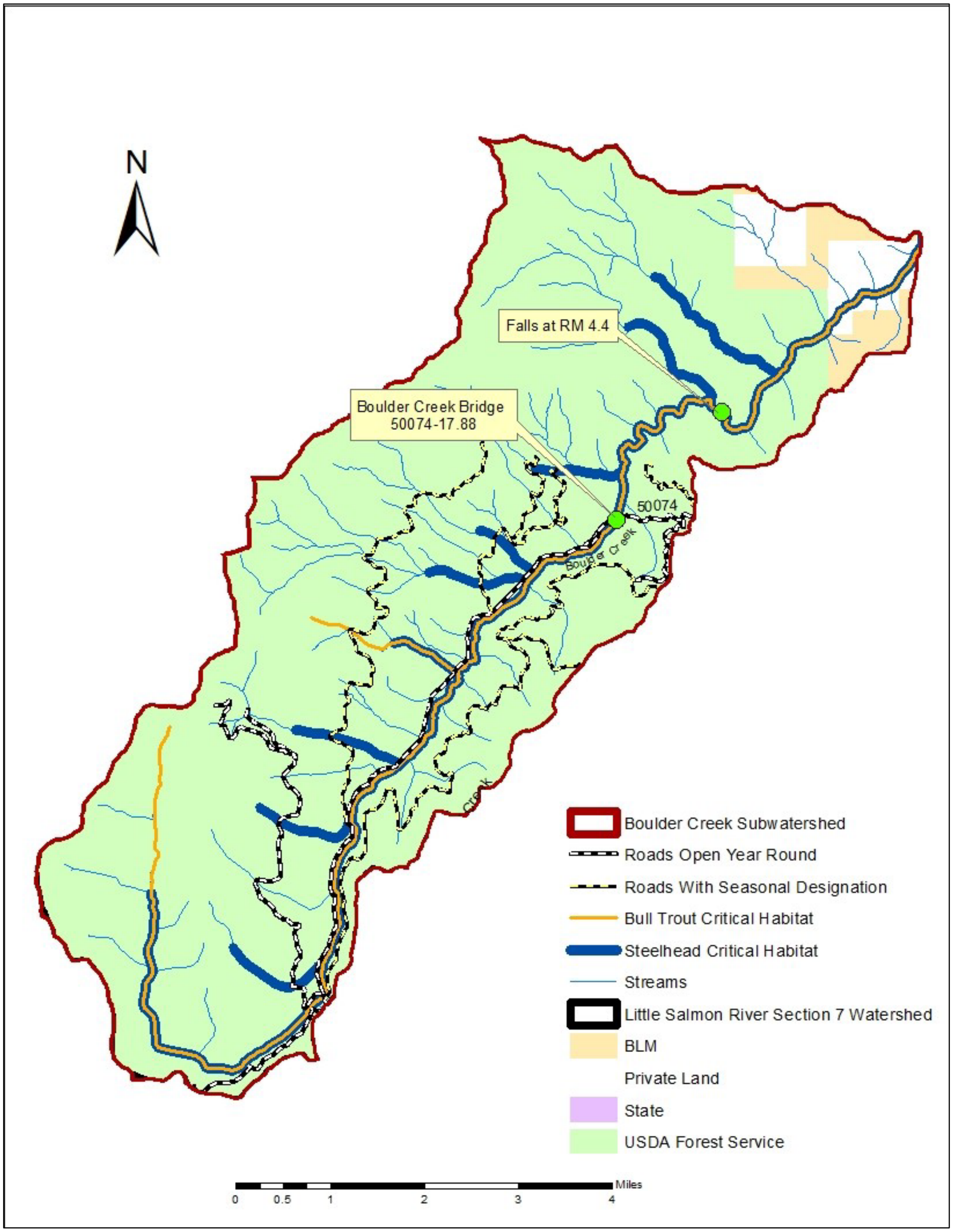

Figure 10. Snake River Basin steelhead designated critical habitat within the Boulder Creek subwatershed. Figure from PNF 2023.

2.4.2. Environmental Conditions in the Action Area

2.4.2.1. Subwatershed Baseline

All of the PBFs for Chinook salmon and steelhead are represented to varying degrees in the PNFs Land and Resource Management Plan (hereinafter referred to as the Forest Plan) Matrix of Pathways and Watershed Condition Indicators (hereinafter referred to as the Matrix; Appendix B in USDA FS 2003). A WCI is a particular aquatic, riparian, or hydrologic measure that is relevant to the conservation of ESA-listed salmonids. In some instances, a WCI is synonymous with a PBF, temperature being a prime example. In other instances, many WCIs comprise a PBF. For example, the LWD, pool frequency and quality, large pools/pool quality, and off-channel habitat WCIs provide insight into the natural cover and cover/shelter PBFs.

The PNF uses the Matrix as a tool for assessing environmental baseline conditions and evaluating the potential effects of an action on WCIs, which as described above are representative of the PBFs essential for the conservation of ESA-listed species. The WCIs are described in terms of their functionality, that is, Functioning Appropriately (FA), Functioning at Risk (FAR), or Functioning at Unacceptable Risk (FUR). A watershed comprised of WCIs that are FA is considered to be meeting the biological requirements of listed anadromous species (whereas WCIs that are FR or FUR suggest that the relevant PBF is not adequately provided for). The PNF describes an intersection of the Forest Plan's WCI Matrix and NMFS' Matrix of Pathways and Indicators (NMFS 1996) for both SRS Chinook salmon and SRB steelhead in the BA for this Project (PNF 2023).

The PNF evaluated the baseline conditions of the action area using the Matrix (PNF 2023). Habitat is generally "FR" in the Boulder Creek watershed, particularly in relation to the habitat access, habitat elements, flow/hydrology, and watershed condition matrix pathways. More specifically, Boulder Creek WCIs that were rated as "FR" include: water temperature, physical barriers, large pools/pool quality, off-channel habitat, refugia, floodplain connectivity, change in peak/base flows, drainage network increase, disturbance history, RCAs, and disturbance regime. Substrate embeddedness and road density/location are "FUR," and the remaining indicators are "FA." Please see page 15 in the BA for a more detailed discussion of the condition of each of these WCIs. The WCIs most likely to be affected by a project of this nature and scale include water temperature, sediment and turbidity, chemical contamination, substrate embeddedness, large woody debris, refugia, streambank condition, floodplain connectivity, and RCAs.

The analysis performed by the PNF represents some of the best available science in regards to the environmental baseline within the action area. Detailed descriptions of the environmental baseline for individual WCIs for Chinook salmon and steelhead are included. Within the action area, habitat-related limiting factors include degraded riparian conditions and instream habitat complexity, excess sediment, passage barriers, low summer flows, and elevated water temperatures (NMFS 2017).

2.4.2.2. Climate Change Considerations

Climate change will affect future baseline conditions, particularly by influencing hydrologic processes through decreased snowpack, earlier spring runoff, greater frequency of winter flooding, and lower summer baseflows (Rieman and Isaak 2010). These projected changes may have far-reaching effects on aquatic ecosystems, especially as frequency of drought and large-scale wildfire increases. Chinook salmon, whose eggs overwinter in streambed gravels, could be especially impacted by increased winter flooding and greater movement of streambed gravels and cobbles during winter rain-on-snow events. Lower summer base flows and higher water temperatures will likely impact all ESA-listed fish species in the action area as perennial streams shrink during the summer dry period, forcing fish into smaller wetted channels and less diverse habitats. These changes to habitat conditions driven by climate change will occur after the proposed action is completed, but likely during the replacement bridge's lifespan.

Water Temperature. The importance of temperature in defining aquatic environments is arguably second only to the presence of water (Isaak et al. 2017). Temperature: (1) dictates metabolic rates, physiological processes, and life history events across taxa; (2) constrains the distribution and abundance of ectothermic species that constitute most aquatic communities; (3) is used to measure habitat impairment; and (4) serves as the basis for regulatory actions (multiple sources cited in Isaak et al. 2017).

Boulder Creek is not currently on the 303(d) list for impaired water quality under the CWA. Temperature maximum data for 2013 through 2022 are available for three monitoring sites located on Boulder Creek (PNF 2023). Sites include the approximate vicinity of the project area (W064), and two sites further upstream. Maximum weekly maximum temperatures (MWMT) ranged from 15.5 - 18.8° Celsius (C) (Figure 11). The upper limit for FAR for spawning Chinook salmon and steelhead is 15.6°C and is 17.8°C for migration and rearing. Temperatures above 15.6°C and 17.8°C indicate a FUR condition. Temperatures remained below FUR levels for migration and rearing in all years except 2015 and 2021 but were above FUR levels for spawning in most years (Figure 11). Above the FUR temperatures, adult fish are at a high risk of disease and may experience reduced swimming performance, delays in their migration, and reduced gamete viability.

The Boulder Creek upper to lower subbasin was reported to have mean August temperatures of 10-14°C in an inventory of compiled water temperature data from across the interior Columbia River for the 1993-2011 period (supplemental information in Isaak et al. 2017). Researchers estimated future water temperatures using models and climate projections after applying the effects of expected climate change scenarios. Temperatures were estimated for the 2040s (2030-2059) and 2080s (2070-2099). For the action area, mean August water temperature were estimated to be approximately 13.3-17.3°C by the 2040s and 15.5-19.5°C by the 2080s.

Depending on life stage, salmonids can die at water temperatures ranging from 14.0-25.4°C (multiple citations in Crozier et al. 2019), but physiological and behavioral impacts can occur at lower temperatures in absence of appropriate refugia. For migration and rearing habitat, water temperatures greater than 17.8°C are FR (USDA FS 2003). Current temperatures have occasionally exceeded this value. Future projections suggest average temperatures will exceed "FA" and even "FR" temperatures by the long-term climate scenario (2080s), potentially with lethal consequences for fish. Boulder Creek has served as migration corridor, spawning habitat, and rearing habitat for salmonid species, and the upper watershed may provide cooler temperature refugia for salmonids. However, given that particularly adult Chinook salmon may not be able to pass the natural falls in most years, water temperatures in the lower watershed may have a bigger impact on these spawning and rearing populations that utilize the creek.

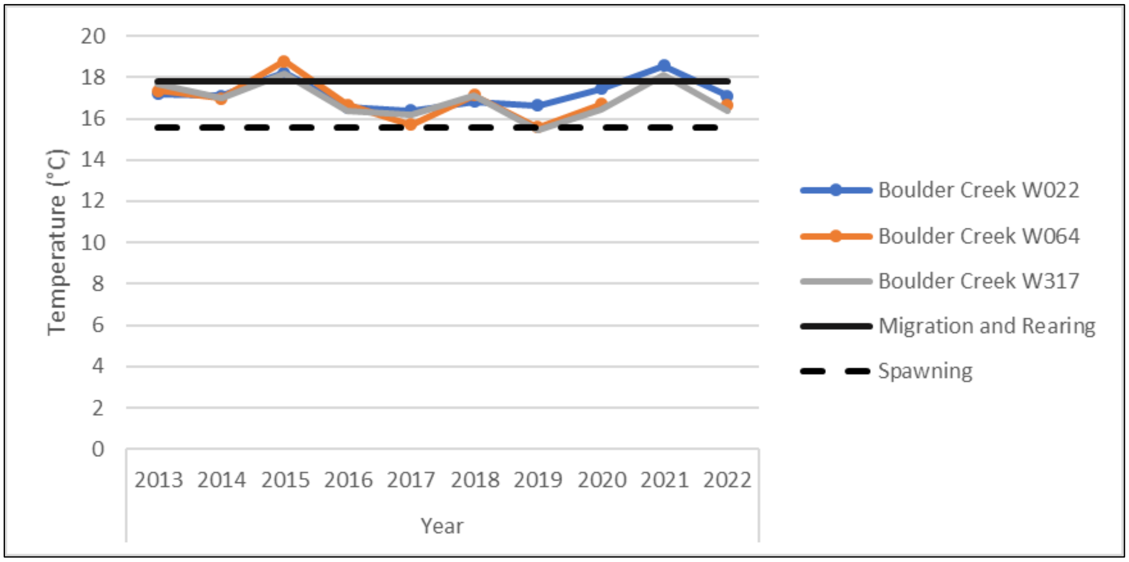

Figure 11. Annual maximum values of averaged weekly maximum temperatures for 2013 through 2022 from three monitoring sites on Boulder Creek. Boulder Creek site W064 (orange) is located approximately at the project site and the other two sites are further upstream. No data were collected for site W064 in 2021. WCI thresholds for the upper limits of the FR category for salmon spawning (black dashed line) and migration and rearing (black solid line) are 15.6 and 17.8°Celsius, respectively. Water temperature data taken from PNF 2023.

2.4.3. Environmental Baseline Summary

Habitat conditions of Boulder Creek are influenced by land use activities within and upstream of the action area. Land use activities impacting habitat quality include livestock grazing; reduced streamflows and increased water temperatures from irrigation diversions; accelerated sediment delivery from roads; recreation; timber harvest; and fires.

The Lower Boulder Creek subwatershed has been identified as a high-priority area for active restoration (USDA FS 2003). Though major restoration actions have been completed to improve aquatic organism passage - including six culvert replacements that improved fish passage and reconnected six miles of stream habitat in the Boulder Creek subwatershed (PNF 2020, as cited in NMFS 2022c) - most WCIs are still FR or FUR. Past management has reduced habitat quality, resulting in increased sediment, high road densities, decreased aquatic connectivity, and degraded RCAs. These factors are consistent with the habitat-related issues affecting salmonids in the Little Salmon River (NMFS 2017).

2.5. Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action (see 50 CFR 402.02). A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered the factors set forth in 50 CFR 402.17(a) and (b).

2.5.1. Effects on Listed Species

The Project will have both temporary, construction-related effects and long-term effects associated with bridge replacement and habitat alteration along the bank. Construction activities will occur between July 15 and October 30 during low flows, and may take up to six weeks. Work is required to be completed by October 30.

Salmonids may be present in the action area during project construction. Juvenile steelhead have the greatest potential of being in the action area because they have been documented throughout Boulder Creek (Section 2.4.1.2). Only one year of snorkel surveys out of the last six contains documented presence of juvenile Chinook salmon above the falls; therefore, there is a very minor chance they will be present at the project site. Adult steelhead use the action area as a migration corridor to reach upper areas of Boulder Creek from January through May, but this occurs pre-and post-work window; therefore, it will be extremely unlikely that adult steelhead will be in the action area during project activities. Adult Chinook salmon migrate upriver to spawn during August and may be present below the falls, but there have been no known documented sightings of adult Chinook above the natural falls since the 1980s that we know of. Therefore, while an adult Chinook salmon may be present in the action area during construction, it is unlikely.

Considering the type of work, timing of construction, and salmonid use of the action area, anadromous salmonids may experience the following pathways of effect:

- Death or injury to juveniles from fish salvage and cofferdam placement.
- Temporary displacement from habitat from construction noise/disturbances.
- Exposure to minor and temporary turbidity increases from construction and stormwater runoff events, and increased fine sediment deposition and its related effects to cover and food.
- Exposure to potential chemical contaminants.
- Further reduction/simplification of aquatic habitat due to bank hardening.
- Temporary blockage of fish passage during fish salvage events.

Since 2016, IDFG fish surveys have found a maximum density of 2.3 juvenile Chinook salmon and 9.5 juvenile steelhead per 100 m^2 (or 0.21 Chinook salmon and 0.88 steelhead per 100 square feet [ft^2]) in the Boulder Creek drainage above the natural falls. When calculating the effect to fish, NMFS has rounded up any calculations to whole fish (e.g., 1.25 fish would round up to 2.0

fish). This method of take calculation will ensure that the maximum number of affected fishes is considered in NMFS jeopardy analysis.

2.5.1.1. Fish Salvage and Cofferdam Placement

Cofferdam Placement. Isolating and dewatering the streambank to repair the existing bridge first requires fish salvage from the work area, which will adversely impact individual juvenile steelhead and Chinook salmon. Electrofishing will be the main form of fish salvage. Block nets will be placed first and fish will be cleared with electrofishing before construction work begins. A minimum of three passes will occur during electrofishing efforts, and may involve more passes if fish still remain in the blocked salvage area. Some fish may remain in the work areas after electrofishing is complete, requiring capture with dip nets and downstream relocation. Electrofishing guidelines are expected to be followed for all fish salvage efforts (NMFS 2000).

After salvage is complete, cofferdams (a combination of gravel filled super sacks and plastic sheeting) will be placed parallel to the streambank to prepare the work area for dewatering. A smaller, diverting part of the cofferdam will be placed on the upstream end to divert flow to the opposite side of the first work area, and water will be pumped out of the work area to a vegetated location to minimize sediment delivery to the stream. Water pumps will have a fish screen installed/operated and maintained in accordance with NMFS' fish screen criteria (NMFS 2022a). Blocknets will be removed following fish salvage and cofferdam placement, and Boulder Creek will allow fish passage on one side of the channel. This will allow the contractor to work on one side of the bridge structure replacement before switching Boulder Creek to the other bank. Once the first abutment is placed and streambank work is complete, block nets will be placed in the flowing channel upstream and downstream of the site. Electrofishing salvage will occur again, but this time in the other half of the channel. The diverting cofferdam section will be moved to this side. Block nets will be removed following fish salvage. Flow will allow passage on the side of the channel where initial streambank and abutment construction took place. After the second abutment and streambank area is finished, block nets will be set up and electrofishing will occur a final time in one half of the stream before final removal of the cofferdams and slow rewatering of the channel occurs.

Handling and Electrofishing. Captured fish are typically transferred to buckets for holding and/or relocation. Effects of electrofishing on fish are associated with exposure to an electric field, or through capture by netting and handling of fish during their transfer to an alternate location. Harmful effects of electrofishing are detailed by Snyder (2003) and can potentially include internal and external hemorrhaging, fractured spines, and death. The primary contributing factors to stress and death from handling are differences in water temperatures (between the river and the holding tank), dissolved oxygen concentrations, the amount of time that fish are held out of the water, and physical trauma. Stress on salmonids increases rapidly from handling if the water temperature exceeds 64°F (17.8°C) or dissolved oxygen is below saturation. Fish that are transferred to holding tanks can experience trauma if care is not taken in the transfer process, and fish can experience stress and injury from overcrowding in tanks if the tanks are not emptied on a regular basis. Electrofishing may also harm embryos, particularly early in their developmental stage. Injury and stress may also reduce short-term growth (Snyder 2003), which may result in lower survival for salmonids during migrations to the ocean and back.

Most of the studies on the effects of electrofishing have been conducted on adult fish greater than 12 inches in length (Dalbey et al. 1996). The relatively few studies that have been conducted on juvenile salmonids indicate that spinal injury rates are substantially lower than they are for large fish. Smaller fish intercept a smaller head-to-tail potential than larger fish (Sharber and Carothers 1988) and may therefore be subject to lower injury rates (Dalbey et al. 1996; Thompson et al.1997). The incidence and severity of electrofishing damage is partly related to the type of equipment used and the waveform produced (Sharber and Carothers 1988; Dalbey et al. 1996; Dwyer and White 1997). Continuous direct current or low-frequency (equal or less than 30 Hertz) pulsed direct current have been recommended for electrofishing because lower spinal injury rates, particularly in salmonids, occur with these waveforms (Fredenberg 1992; Dalbey et al. 1996; Ainslie et al. 1998). Only a few recent studies have examined the long-term effects of electrofishing on salmonid survival and growth (Ainslie et al. 1998; Dalbey et al. 1996). These studies indicate that although some of the fish suffer spinal injury, few dies as a result. However, severely injured fish grow at slower rates and sometimes they show no growth at all. In addition to injury, electrofishing may cause elevated stress leading to increased plasma levels of cortisol and glucose (Frisch and Anderson 2000; Hemre and Krogdahl 1996), and short-term handling may cause reduced predatory avoidance for up to 24 hours (Olla et al. 1995).

When electrofishing long-term index reaches, McMichael et al. (1998) found that up to five percent of sampled fish can be injured and or die, including delayed mortality. Although some listed salmonids may die from electroshocking, the majority of captured fish will only be exposed to the stress caused by biological sampling/handling once. Fish experiencing stress are expected to recover fairly rapidly.

For this project, NMFS makes the following assumptions about injury and death rates during fish salvage activities:

- Instances of adult Chinook salmon have been recorded, but at sporadic intervals and in low densities; however, it is possible that adult Chinook salmon may be present in the action area during the proposed work window. However, the PNF proposes to survey the action area for adult Chinook salmon and/or redds prior to project implementation. NMFS expects that if Chinook salmon redds are found in the action area, the PNF will stop work and contact NMFS to determine if or how the action will proceed.
- Due to their size and ability to quickly and easily relocate from the work area, adult Chinook are expected to simply relocate to similar, nearby suitable habitat to avoid construction activities and are not expected to be harmed.
- An estimated 50 percent of the stream channel will remain uninhibited by construction activities at one time or another; therefore, passage through the action area for adults and juveniles will be effectively unimpeded, promoting their avoidance response. The exception to this is when block nets are in place during the fish salvage windows for likely a few hours at a time.
- NMFS assumes that all handled fish will be held in 5-gallon buckets filled with stream water for a period only long enough to transport fish to an appropriate release site immediately downstream of the project site. Buckets will likely be placed into the water and slowly inverted to allow captured fish to move into the selected release sites. Handling fish in this manner will reduce the potential stress fish experience.

In the first phase of the project, block nets will be installed, and the area where the center cofferdam will be installed will be electrofished (approximately 81 feet long by 41 feet wide, or 3,321 ft^2). Once the central cofferdam is placed, second phase will dewater the first side of the channel, an area approximately half of the channel width, or 1,661 $ft.^2$. The third phase will dewater and electrofish the other half of the stream, another 1,661 ft^2 of stream. Additional fish salvage may also occur if live water equipment crossing is necessary (maximum of two round trips). Should this occur, block nets may be placed and fish salvage may be conducted to facilitate this project component (four single trip crossings of an area 30 feet long by 41 feet wide, or 1,230 ft^2). These area estimates are conservative because they assume the entire area below the OHWM will be a wetted channel.

Applying the carrying capacities previously identified, the total numbers of juvenile fish that may be affected by this aspect of the proposed action were estimated to be 25 juvenile Chinook salmon and 102 juvenile steelhead. Some of these fish may be injured or killed as a result of electroshocking. In addition, some fish may be stranded and subsequently killed (either from the being stranded or by being crushed by riprap). Because Boulder Creek will not be continuously dewatered, it is likely that water will re-enter the isolated area overnight. Although unlikely, it is possible that fish may also re-enter the isolated area. Also, because the PNF proposes to partially dewater work areas before salvaging fish, it is likely that some volitional emigration of fish present may occur prior to electrofishing in Phases 2 and 3, so the estimates are likely conservative.

To be conservative, NMFS assumes that all fish evading capture will be stranded and killed as a result of subsequent construction work performed in the isolated area (i.e., excavation and placement of riprap). In total, NMFS assumes a stranding rate of 8 percent, an injury rate of 15 percent from electrofishing (Ainslie et al. 1998), and a mortality rate of 5 percent from electrofishing (McMichael et al. 1998). Thus, NMFS concludes that up to 4 juvenile Chinook salmon and 16 juvenile steelhead could be injured, and up to 4 juvenile Chinook and 14 juvenile steelhead could be killed as a result of fish salvage efforts and subsequent construction (Table 9).

Table 9. Estimates of Snake River spring/summer Chinook salmon (CH) and Snake River Basin steelhead (ST) electrofishing injuries and mortalities for the Boulder Creek Bridge Project.

Construction Phase	**Area Dewatered (x100 ft^2)**	**Fish Densities (per 100 ft^2)**		**# Fish Present**		**# Fish Injured (15%)**		**# Fish Killed[1] (13%)**	
		CH	**ST**	**CH**	**ST**	**CH**	**ST**	**CH**	**ST**
Central Cofferdam Installation and Diversion Side 1	33.21	0.21	0.88	6.97	29.22	1.05	4.38	0.91	3.80
Diversion Side 2	16.61			3.49	14.62	0.52	2.19	0.45	1.90
Cofferdam Removal and Rewatering	16.61			3.49	14.62	0.52	2.19	0.45	1.90

Construction Phase	Area Dewatered (x100 ft²)	Fish Densities (per 100 ft²)		# Fish Present		# Fish Injured (15%)		# Fish Killed[1] (13%)	
		CH	ST	CH	ST	CH	ST	CH	ST
Equipment Crossing 1	12.30			2.58	10.82	0.39	1.62	0.34	1.41
Equipment Crossing 2	12.30			2.58	10.82	0.39	1.62	0.34	1.41
Equipment Crossing 3	12.30			2.58	10.82	0.39	1.62	0.34	1.41
Equipment Crossing 4	12.30			2.58	10.82	0.39	1.62	0.34	1.41
Totals[2]	**115.63**			**24.27**	**101.74**	**3.65**	**15.24**	**3.17**	**13.24**

[1] The number of fishes killed is a combination of those fish estimated to be killed by electrofishing (5% of fish exposed) and those stranded (8%).
[2] Fish estimate totals are rounded up to the nearest whole number for take analyses.

2.5.1.2. Construction Noise and Disturbance

Operation of heavy equipment near streams creates noise, water disturbance (e.g., as the excavator bucket removes or places material within the water along the bank), and visual stimulus. Adult Chinook, if present, are expected to be mobile and able to quickly relocate out of the work area before experiencing harm. As such, we do not expect adult Chinook to be disturbed or measurably impacted by construction activities based on timing of construction work and presence documentation. Juvenile Chinook salmon and steelhead, on the other hand, may be present in the vicinity of construction activities. We do not expect juvenile fish to be harmed as a result of construction noise because noise levels associated with operation of heavy equipment are at least an order of magnitude lower than established underwater sound pressure thresholds (FHWA 2008; FHWG 2008). However, juvenile fish may be disturbed by the noise, visual stimulus, or in-water activity.

Disturbance can lead to behavioral changes resulting in indirect effects through altered feeding success, increased exposure to predators, and/or displacement into less suitable habitat. Several studies have shown that juvenile salmonids are sensitive to overhead movements and usually hide under cover when approached by observers (Chapman and Bjornn 1969; Hoar 1958). The key question is how long will fish be displaced and whether the displacement be frequent enough to significantly alter normal behavior patterns (e.g., breeding, feeding, and sheltering). Grant and Noakes (1987) concluded that younger fish are less wary than older fish and thus take more risks while foraging to maximize growth. These authors also showed that smaller fish returned to foraging locations faster than larger fish, usually within about ten minutes of the disturbance. These studies suggest that while smaller fish quickly move into adjacent habitat after each disturbance, they are more likely to remain in areas with limited cover to maximize forage. Smaller fish are also less wary of disturbances and return to foraging sites faster after each disturbance with no long-term displacement. Predation risk is likely low due to the small number of ESA-listed fish present in the action area, small area affected, short periods of affect, anticipated short movement distances of exposed fish, and presence of adjacent similar habitat for escape cover nearby. Considering the densities of fish in the action area (and thus, more available foraging space in the event fish are displaced from preferred habitat) and the low risk of predation, we believe short-term movements caused by construction equipment noise and activities will be minor and will not significantly alter normal behavior patterns.

2.5.1.3. Turbidity/Sediment Deposition

The proposed action could degrade water quality and habitat in Boulder Creek within the action area by increasing sediment delivery to and/or by re-suspending instream sediments. Excavation and placement of material within and adjacent to the stream channel has the potential to temporarily increase levels of suspended sediment in the water column thereby increasing turbidity, as well as cause increased sediment deposition in the downstream aquatic habitat. Because work below the OHWM will occur between July 15 and October 30, only the following life stages of fish are at greatest risk of being affected: adult Chinook, and juvenile Chinook salmon and steelhead.

Elevated turbidity can cause lethal, sublethal, and behavioral effects in juvenile and adult salmonids, depending on the duration, frequency, and intensity of the exposure (Newcombe and Jensen 1996). Increased turbidity levels in the action area may result in temporary displacement of fish from preferred habitat or potentially 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). Lloyd (1987) suggested that salmonids reacted negatively, by moving away, when turbidity reached 50 nephelometric turbidity units (NTU). Although elevated turbidity levels may cause stress, Gregory and Northcote (1993) have shown that moderate levels of turbidity (35 to 150 NTU) can also accelerate foraging rates among juvenile Chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect).

The activities with the greatest potential for mobilizing sediment in Boulder Creek are bank riprap placement, cofferdam placement and removal, and equipment crossings. Implementation of proven sediment control BMPs (e.g., dewatering of the inwater work areas, etc.) is expected to effectively minimize sediment delivery to Boulder Creek. Temporary turbidity pulses are expected to occur primarily during placement and removal of the cofferdams. Construction activities along the bank (e.g., sloping of the existing bank and placing of riprap) are also expected to result in some turbidity pulses, but those effects will be limited by dewatering the work area. Equipment crossings will occur outside of dewatered areas and are also expected to create some turbidity pulses. NMFS expects that any suspended sediment resulting from project implementation will be low in intensity, of short duration, will not extend across the entire width of Boulder Creek, and should not extend farther than 1,000 feet downstream.

NMFS expects that sediment plumes associated with rewatering the stream channel that was isolated during project construction could extend up to 1,000 feet downstream from the project site. This assumption is based on turbidity monitoring reports from past projects in Idaho, which involved reconstruction of stream channels, including culvert, bridge, and diversion replacement projects (Eisenbarth 2013; Connor 2014). In many cases the turbidity plume upon rewatering will last less than 2 hours, but the plume may last for up to 24 hours (Connor 2014; Jakober 2002; Casselli 2000; Eisenbarth 2013). Similar turbidity monitoring results have been reported for rewatering reconstructed side channels (CH2MHill 2012). However, based on review of turbidity monitoring reports for habitat restoration projects completed between 2015 and 2017, turbidity plumes in excess of 50 NTUs were usually of short duration of 15 to 30 minutes, but may have lasted up to just under 6 hours. Giving the proposed conservation measures to address turbidity, turbidity plumes are rarely expected to reach levels where they mix across entire stream channels, more typically tending to hug one streambank. Juvenile fish will likely respond to a turbidity plume for this distance along the streams edge by avoiding the plume and temporarily seeking refuge nearby. Fish present downstream from the project are therefore expected to be able to readily avoid or reduce their exposure to turbidity by swimming to adjacent, less turbid habitat (i.e., behavioral response only). However, harm to juveniles is still likely to occur as a result of increased turbidity, as exposure of juveniles to predators will likely increase as they seek alternate rearing habitat.

Based on similar projects in Idaho, NMFS expects that the project will have turbidity levels of up to 50 NTUs over background levels for 1.5 hours after site rewatering or in-water equipment crossings, with turbidity plumes lasting up to 6 hours. Implementation of BMPs and adaptive management practices will help to minimize the extent of turbidity impacts and NMFS does not expect turbidity concentrations to reach levels that will directly kill or injure ESA-listed fish. Furthermore, although turbidity concentrations may reach levels that cause fish to leave or avoid the area, these temporary behavioral modifications are not expected to cause injury to fish. This is because turbidity pulses will be temporary in nature (less than 1-hour) and infrequent. Furthermore, fish may already evacuate the area as a result of fish removal activities or equipment operation adjacent to Boulder Creek.

2.5.1.4. Chemical Contamination

Stormwater runoff from road networks can deliver a variety of chemical and sediment pollutants to streams. However, the project is located on a forest road with a gravel surface and low volumes of traffic. Overland runoff from the project will be minimal due to the current aggregate, unpaved road approaches; proposed aggregate bridge replacing a treated timber bridge; and surrounding vegetated surfaces that will filter contaminants; ultimately reducing pathways for stormwater runoff contamination of Boulder Creek. Removing the previous treated wood bridge and replacing with the aggregate-topped steel bridge will reduce chemical contamination associated with treated wood and redirect stormwater pathways. We conclude the low risk of chemical contamination, reduction in treated wood contamination, and minimal change of long-term stormwater pathways will have only minor effects on ESA-listed fish species present in the action area.

Use of construction equipment and heavy machinery adjacent to stream channels poses the risk of an accidental spill of fuel, lubricants, hydraulic fluid, or similar contaminants into the riparian zone, or directly into the water. Petroleum-based contaminants such as fuel, oil, and some hydraulic fluids contain poly-cyclic aromatic hydrocarbons, which can cause chronic sublethal effects to aquatic organisms (Neff 1985). Ethylene glycol, the primary ingredient in antifreeze, has been shown to result in sublethal effects to rainbow trout at concentrations of 20,400 milligrams/liter (Beak Consultants Ltd. 1995, as cited in Staples 2001). Brake fluid is also a mixture of glycols and glycol ethers, and has about the same toxicity as antifreeze. Effects to fish related to absorption of petroleum-based products may include immune suppression, effects on deoxyribonucleic acid and ribonucleic acid, liver lesions, and reduced reproductive potential.

If these contaminants enter the water, these substances could adversely affect habitat, injure or kill aquatic food organisms, or directly impact ESA-listed species; however, the proposed action includes multiple conservation measures aimed at minimizing the risk of fuel, oil, or other contaminant leakage into the stream. Equipment may only enter the stream channel up to two round trip crossings during low flow, which limits the potential for chemical contamination. All equipment fueling, maintenance, and staging will occur outside of RCAs or in established staging areas. Service equipment storage and on-site fuel storage (if applicable) would occur outside of the RCA or in an established staging area recommended by the COR, located in an area that will not deliver fuel, oil, or other hazardous chemicals to streams. A fuel/chemical spill containment kit will be available at the worksite during all phases of construction that includes oil absorbent materials such as booms, pads, or absorbent "peanuts" appropriate for the size of stream. NMFS assumes that fuel spill and equipment leak contingencies and preventions described in the proposed action will be sufficient to minimize the risk of negative impacts to ESA-listed fish and fish habitat from toxic contamination.

2.5.1.5. Reduction in Quality and Quantity of Rearing Habitat

The quality and quantity of rearing habitat influences productivity of anadromous salmonid populations, even at very low population densities (Arthaud et al. 2010; Walters et al. 2013). Although the mechanisms are not precisely understood, the statistical relationships between population productivity and rearing habitat indicate that reducing quality and/or quantity of rearing habitat reduces fitness of rearing Chinook salmon and steelhead. The proposed action would reduce quality of Chinook salmon and steelhead rearing habitat by armoring approximately 131 feet of streambank.

The placement of riprap typically causes adverse effects to stream morphology, salmonid habitat, and salmonid populations (USFWS 2000; Schmetterling et al. 2001; Garland et al. 2002). As reported by WDFW et al. (2002), juvenile life stages of salmonids are especially affected by riprap. Rearing juveniles depend on cover provided by undercut banks and overhanging vegetation for resting, feeding, and protection from predation. Riprapping streambanks replaces these types of habitat features with rock, which typically results in poorer quality habitat that supports fewer rearing juvenile salmonids (Garland et al. 2002). Over time, woody vegetation can encroach on riprapped streambanks and partially restore some of the habitat function. Some vegetation will be around the road prism and underneath the new bridge, but recovery of vegetation is likely to be minimal. However, the armored streambank on the eastern upstream side of the project will include willow bundles and root wads. The proposed action will reduce quality of rearing habitat in the affected area; streambank armoring will include willow placement; and some of the affected area has been impacted by historic construction activities. In summary, the placement of riprap will reduce the quality of rearing habitat in the action area and may impact juvenile salmon survival.

2.5.1.6. Passage

The project is not likely to impair upstream or downstream fish passage. The in-water work area will be isolated with a cofferdam and only involve dewatering one side of the stream at a time. The cofferdam will not extend across the entire width of the river, therefore, disruption of upstream or downstream migration is not likely. Although the cofferdam will constrain flows somewhat, the resultant water velocity increase will be very small and will not impair upstream fish migration. After removal of the cofferdam, water velocities should be essentially the same as before the project. Passage will be temporarily blocked during temporary fish salvage activities, but will be restored once salvage is complete.

2.5.1.7. Population/MPG/ESU Viability

Effects to individual fish may, in turn, affect the attributes associated with a VSP (levels of abundance, productivity, spatial structure, and genetic diversity that support the species' ability to maintain itself naturally at a level to survive environmental stochasticity). The most significant effects to individuals from the proposed action will be injury and death of juvenile Chinook salmon and steelhead that result from fish removal activities and subsequent construction activities that will occur below the OHWM.

To better understand what this means to these populations, NMFS evaluated how this would translate to the number of adult equivalents that might be lost from each population under the proposed action. NMFS estimated that up to 4 juvenile Chinook salmon and 14 juvenile steelhead could be killed as a result of fish removal efforts and subsequent construction in the isolated areas. For Chinook salmon, if fry-to-smolt survival is approximately 10.1 percent (Quinn 2005), and smolt to adult return is approximately 0.87 percent, fewer than one adult Chinook salmon equivalent (i.e., <0.004) may be lost from the population from fish salvage. For steelhead, assuming steelhead fry-to-smolt survival is approximately 13.5 percent (Quinn 2005), and smolt to adult survival is approximately 0.8 percent (USFWS 1998), we calculated that fewer than one adult steelhead equivalent (i.e., <0.02) may be lost from the population as a result of this level of juvenile mortality.

Based on this information, we have concluded the proposed action will have a small influence on adult abundance within either the LSR Chinook salmon or the LSR steelhead populations. Therefore, the proposed action will not diminish the viability of these populations.

2.5.2. Effects on Critical Habitat

Critical habitat within the action area has an associated combination of PBFs essential for supporting rearing and migrating salmon and steelhead populations (Table 4). Proper function of these PBFs is necessary to support successful adult and juvenile migration, spawning and rearing, and the growth and development of juvenile fish. The PBFs most likely to be affected by the proposed action include water quality (temperature/chemical/turbidity), substrate (sediment related), cover/shelter, riparian vegetation, water velocity/floodplain connectivity, and fish passage. Any modification of these PBFs may affect freshwater spawning, rearing, or migration in the action area. All remaining PBFs will not be affected by the proposed action.

2.5.2.1. Spawning Substrate/Rearing Habitat

Following short-term turbidity increases, a small amount of sediment is expected to settle out on substrate in localized areas (i.e., pools) within 1,000 feet of any sediment inputs. The small quantity of sediment introduced to, or resuspended in, Boulder Creek during construction activities is expected to be very minimal due to the anticipated effectiveness of the proposed PDCs and erosion control BMPs. Such a small quantity of sediment is not expected to decrease the quality of foraging and holding habitats. The timing, duration, and low sediment concentrations likely to occur in the action area from project activities are expected to cause only minor, localized effects to the stream substrate will not be great enough to affect the long-term functioning of this critical habitat PBF.

2.5.2.2. Water Quality

Placement of cofferdams, excavation of the existing streambank, equipment crossings, and placement of riprap is likely to generate periodic turbidity pulses. The intensity and duration of these turbidity pulses will be minimized to the maximum extent practicable by implementing the project during low flows and successfully implementing the proposed erosion and sediment control BMPs (i.e., using sediment filtration controls such as silt fences, inwater work isolation, filtering pumped water through vegetation, etc.). NMFS expects sediment plumes to occur upon reintroduction of streamflow to the reach. NMFS expects that turbidity plumes associated with rewatering the stream channel could extend up to 1,000 feet downstream from the project area, exceeding 50 NTUs over background levels for 1.5 hours following rewatering of dewatered areas with visible plumes possibly persisting for up to 6 hours.

As discussed in the species effects section, stormwater runoff from road networks can affect water quality by delivering a variety of chemical and sediment pollutants to streams. However, this project is located on a graveled forest road. Overland runoff from the project will be minimal due to the current aggregate, unpaved road approaches; proposed aggregate bridge replacing a treated timber bridge; and surrounding vegetated surfaces that will filter contaminants; ultimately reducing pathways for stormwater runoff contamination of Boulder Creek. Traffic is relatively low on Boulder Creek and is not expected to change as a result of the action. NMFS believes that stormwater runoff events will have minimal to no effect on water quality, and may have minor benefits due to removal of the current treated timber bridge.

There is potential for temporary toxic chemical contamination from leaks or spills of petroleum-based fuels and lubricants throughout the project and the dewatered work area. However, proposed PDFs will minimize the risk of chemical contamination. Equipment will only enter the stream channel up to two round trip crossings during low flow, which limits the potential for chemical contamination. All equipment fueling, maintenance, and staging will occur outside of RCAs or in established staging areas. Service equipment storage and on-site fuel storage (if applicable) would occur outside of the RCA or in an established staging area recommended by the COR, located in an area that will not deliver fuel, oil, or other hazardous chemicals to streams. A fuel/chemical spill containment kit will be available at the worksite during all phases of construction that includes oil absorbent materials such as booms, pads, or absorbent "peanuts" appropriate for the size of stream. NMFS believes that fuel spill and equipment leak contingencies and preventions are sufficient to effectively minimize the risk of negative impacts to critical habitat from toxic contamination.

2.5.2.3. Water Quantity

The proposed action will not introduce any changes to water quantity from measurable changes in peak/base flows, disturbance history, and riparian management areas. No new roads will be created, and no hydrograph changes are anticipated to occur. NMFS believes there will be no measurable change as a result of these actions to the water quantity PBF.

2.5.2.4. Water Temperature

The proposed action has the potential to reduce streamside shade through the removal of bankside vegetation and trees during riprap installation. Reductions in shade can increase the amount of solar radiation reaching the stream surface and lead to increases in steam temperatures. Elevated water temperatures may adversely affect salmonid physiology, growth, and development, alter life history patterns, induce disease, and may exacerbate competitive predator-prey interactions (Spence et al. 1996). The project is located in a previously disturbed location, at the site of an old bridge. Current streamside vegetation along the affected banks includes several trees (including one snag), shrubs, and low vegetation. Trees, brush, and soil that are removed will be stockpiled for used in stream channel or floodplain rehabilitation. The riprap will be vegetated with willows, all disturbed areas will be seeded, and native fill material (including shrubs removed from the streambank) will be used amongst riprap. Therefore, long-term growth will likely provide equivalent or greater shade than the currently existing shade based on the current state of vegetation, reuse of removed vegetation, and additional plantings and seeding measures. The stream shade reduction from the loss of the established vegetation will be minimal and will not measurably affect stream temperatures.

2.5.2.5. Natural Cover/Shelter/Riparian Vegetation

The proposed action would adversely affect the cover/shelter PBF primarily through effects on riparian habitat and in-water LWD in the project area. The proposed action includes installing riprap along approximately 131 feet of streambank (approximately 81 feet on the east side of the stream and approximately 50 feet on the west side). An estimated 40 feet of streambank on each side of the stream is within the current bridge footprint. The remainder of the area has riparian vegetation that would be removed and replaced with riprap during the new bridge alignment and streambank armoring. Replacing riparian vegetation with riprap typically reduces the amount and quality cover available for rearing juvenile and holding adult salmonids. However, given the bridge is being constructed in the footprint of the existing bridge, most of the riparian vegetation that would be affected is relatively small and does not currently provide much cover or shelter.

The proposed action includes removal of two to three trees on the eastern upstream bank, which if left in place would have eventually fallen into the river and provided cover/shelter. However, because two root wads will be used in riprap armoring of the bridge, removing these trees will have negligible effect on cover/shelter in the form of less LWD recruited to the stream channel and minor temporary increase in localized instream temperature. One tree will also be removed from the channel, resulting in a minor adverse effect to long-term cover/shelter.

Current vegetation in the affected streambank will be removed along the bank outside of the current bridge footprint. However, because more than half of the riprapped area is within the footprint of the current bridge and will not have affected vegetation, the effect of the proposed action on cover/shelter will have a minor, short-term effect on instream temperatures. Finally, over the long term, planted willow bundles and reseeding of disturbed areas will effectively minimize the localized effects realized to the instream temperature and cover/shelter PBFs along the armored streambank. Removal of a few trees will locally affect LWD recruitment at the scale of the project area. However, given the forested character of riparian vegetation in the action area, the removal of a small number of trees is not expected to significantly affect LWD recruitment or natural cover at the action area or stream reach scales.

2.4.2.6 Water Velocity/Floodplain Connectivity

The temporary placement of gravel bags for the cofferdams will encroach into the existing channel and has the potential to result in increased flow velocity in the remainder of the channel. However, cofferdam placement will only occur on one side of Boulder Creek at a time. Therefore, the level of encroachment is not expected to be substantial enough to affect water velocities through the reach to a degree that will prevent or impede fish passage due to anticipated low water levels.

Under the proposed action, the contractor will install riprap on the eastern embankment and around the abutments and road prism. As demonstrated by the scour pool near the eastern bridge abutment, it is likely that the stream channel in the project area would naturally cut into the east bank. Both the addition of riprap around both abutments and riprap on the eastern bank may reduce floodplain connectivity at the bridge. Riprap can constrain flow within a channel, increasing velocity and through altered areas of stream, which can subsequently cause erosion of unarmored banks in the vicinity.

Foundations for the new bridge structure will be located farther away from the OHWM than those of the existing structure, given that the new bridge is 30 feet longer than the current structure. The riprap armoring around the bridge abutments will be sloped back, whereas the current structure maintains vertical abutments on either side of the channel; therefore, the channel will be less constricted in the vicinity of the new bridge. NMFS does not anticipate that an increase in water velocity or adjacent bank erosion will result as a response to riprap installation. Although the bridge and its associated riprap will lock the stream into place for the long term and affect the stream's ability to interact with its floodplain, installation will only affect 39 feet of the stream channel outside of the bridge vicinity on one bank. Therefore, the effect of riprap on the water velocity and floodplain connectivity PBFs is expected to be minor, very localized at the action area scale, and will not threaten the hydrologic function of the watershed.

2.5.2.7 Fish Passage/Free of Artificial Obstructions

Fish passage conditions may be temporarily impaired by turbidity and presence of equipment and personnel in or near the stream channel. An estimated 50 percent of the channel near the bridge abutment will be blocked throughout the project; therefore, at least 50 percent of the channel will remain open for fish to pass freely through. Visual and noise effects (e.g., turbidity, operation of project machinery, installation of coffer dams and riprap) may create disturbance that could discourage upstream or downstream movement of Chinook salmon and steelhead past the project site. However, as described earlier in the species effect section, this impairment will be minor, and passage is expected to be maintained outside of fish salvage efforts for a majority of the project for volitional emigration out of the area. Project effects on the fish passage PBF will be both minor and temporary.

2.6. Cumulative Effects

"Cumulative effects" are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation [50 CFR 402.02 and 402.17(a)]. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

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

There are no State, tribal, or private lands within the action area. Therefore, additional development or growth within the action area is unlikely. Although the number of PNF visitors may increase over time, NMFS expects that lands in the action area will continue to be used much the same as it is used today, primarily for access and recreation. NMFS is not aware of any specific future non-Federal activities within the action area that would cause greater effects to a listed species than presently occurs.

2.7. Integration and Synthesis

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

The Boulder Creek Bridge Replacement Project will have short-term, minor adverse effects. Localized effects to shade and water temperature will at least partially be offset in the long term as vegetation placed and planted during the project becomes established. The project site is located in Chinook salmon and steelhead designated critical habitat and will improve the passage at the stream crossing. However, the implementation of many activities in the proposed action will have some minor, unavoidable, short-term adverse effects to ESA-listed species and their habitat. Short-term adverse effects of the proposed activities will result from riparian and instream construction and fish handling when isolating inwater work sites.

Effects on individual fish include handling, exposure to turbidity and sediment, and potential exposure to chemical contamination (i.e., fuels, lubricants, etc.). The primary effect on individual fish from the proposed action is the possibility of injury or death from fish handling. Electrofishing and the other fish handling procedures are included in the action specifically in order to reduce the potential for harm, injury, or death to ESA-listed fish, but these protocols will nonetheless kill or injure a small number of individuals.

The second effect of the action will be to expose fish to small amounts of turbidity and sediment. At individual project sites, the proposed action will cause water quality degradation in the short term (usually 6 hours or less). Temporary turbidity increases exceeding 50 NTUs above background will affect habitat up to 1,000 feet downstream of individual project sites during rewatering of isolated instream work areas. Juveniles within 1,000 feet downstream of the project site are likely to migrate out of the most turbid waters, thereby avoiding the highest levels of sublethal effects. Sediment-related impacts are not expected to cause mortality or create long-term reduction of critical habitat value. Instream work windows are designed to minimize impacts on Chinook salmon and steelhead.

A third potential effect of the action is exposure to toxic chemicals from the use of construction equipment and heavy machinery adjacent and in the stream channel and from stormwater runoff. Accidental spill of fuel, lubricants, hydraulic fluid, or similar contaminants could enter the riparian zone or water directly and adversely affect habitat, injure or kill aquatic food organisms, or directly impact ESA-listed species. However, the BMPs described in the proposed action should minimize the risk of negative impacts on ESA-listed fish and fish habitat due to spills of toxic substances, and stormwater runoff events are not expected to degrade water quality from the current baseline.

The SRS Chinook salmon ESU is at a moderate-to-high risk of extinction. The LSR Chinook salmon population is the only population of this ESU that may be affected by the proposed action. This population does not currently meet VSP criteria. The SRB steelhead DPS is at a moderate risk of extinction within the next 100 years. The LSR steelhead population is the only population of this DPS that may be affected by the proposed action. While this population is currently considered to meet its VSP criteria, there is substantial uncertainty about this due to the limited amount of data. As previously described, up to 8 juvenile Chinook salmon and up to 30 juvenile steelhead may be injured or killed as a result of fish salvage or construction activities below the OHWM within the isolated area. However, the relatively small number of juvenile steelhead and Chinook salmon that could potentially die as a result of project implementation is not likely to influence the number of adult fishes returning to the action area three or four years later. Any realized mortality should not influence the abundance, productivity, spatial structure, or genetic diversity of the affected ESA-listed populations.

The environmental baseline incorporates effects of restoration actions implemented to date. It also reflects impacts that have occurred as a result of historic land use, road density, and encroachment on RCAs. There are no State, tribal, or private lands within the action area. Therefore, additional development or growth within the action area is unlikely and cumulative effects from state and private actions are unlikely to be greater than they currently are. The environmental baseline also incorporates the impacts of climate change on both the species and the habitat they depend on. Several of the ongoing habitat issues that impact VSP parameters (i.e., increased summer temperatures and decreased summer flows) will continue to be affected by climate change.

The proposed action includes placement of riprap material below the OHWM and removing some vegetation (including trees) within the RCA. Because the action area comprises such a small proportion of Boulder Creek, these localized impacts will not alter the PBFs to a degree that will affect the value of the critical habitat in this drainage.

Considering the existing condition of the environmental baseline and the potential cumulative effects, NMFS has determined that the loss of a very small number of juvenile steelhead and Chinook salmon that may be caused by the proposed action will not appreciably reduce the likelihood of the LSR Chinook salmon and steelhead populations achieving their desired status. Because the effects will not be substantial enough to negatively influence VSP criteria at the population scale, the viability of the MPGs and ESU/DPS are also not expected to be reduced. Furthermore, reductions in riparian vegetation and hardening of the streambank at the scale of the action area but when considered at the designation scale, the effects will not appreciably diminish the value of the critical habitat for the conservation of the species.

2.8. Conclusion

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

2.9. Incidental Take Statement

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

2.9.1. Amount or Extent of Take

In the opinion, NMFS determined that incidental take is reasonably certain to occur as follows. Only juvenile fish are expected to be killed/injured/harmed:

Fish Salvage/Dewatering. The placement of riprap will locally reduce the quality of rearing habitat in the action area and may impact juvenile salmon survival. NMFS was able to quantify the take associated with fish salvage and subsequent dewatering and construction activities below the OHWM within isolated areas of the Boulder Creek. NMFS estimated that up to 25 juvenile Chinook salmon and up to 102 juvenile steelhead may be subjected to fish salvage activities (e.g., herding, netting, or electrofishing). Of these, up to 4 juvenile Chinook and 16 juvenile steelhead could be injured, and up to 4 juvenile Chinook salmon and 14 juvenile steelhead may be injured or killed during fish removal or construction activities below the OHWM. Biologists may not observe fish that experience delayed mortality (e.g., mortality from an injury sustained during electrofishing) or fish that evade capture or re-enter the isolated area and are subsequently killed due to construction activities within the wetted channel. However, the estimated total mortality is a proportion of the total number of fish subject to electrofishing. Therefore, NMFS will consider the extent of take exceeded if more than 25 juvenile Chinook salmon or 102 juvenile steelhead are salvaged during electrofishing activities.

It is likely that this take estimate is extremely conservative of the actual take that might occur because: (1) estimates are based on area and full wetted width of the channel; (2) some percentage of the fish estimated to be handled will leave the work area on their own volition as the stream is slowly dewatered prior to electrofishing; (3) parr density estimates used are the greatest density estimates observed over the course of six years; and (4) juvenile Chinook salmon are not typically observed above the natural falls barrier in every year.

Elevated Turbidity. NMFS expects that sediment plumes associated with rewatering the sections of stream channel that are isolated during project construction, and plumes associated with inwater equipment crossings, will extend up to 1,000 feet downstream. Juvenile fish will likely respond to a turbidity plume for this distance along the streams edge by avoiding the plume and temporarily seeking refuge nearby. However, harm to juveniles is still likely to occur as a result of increased turbidity, as exposure of juveniles to predators will likely increase as they seek alternate rearing habitat. The amount of take will be exceeded if the project exceeds turbidity levels of 50 NTUs over background levels, for 1.5 hours or more, with turbidity plumes potentially lasting longer than 6 hours.

2.9.2. Effect of the Take

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

2.9.3. Reasonable and Prudent Measures

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

The PNF and COE shall:

1. Minimize the adverse impacts of fish salvage and temporarily dewatering habitat due to the action.
2. Minimize the mobilization of fine sediment, and the resultant turbidity plumes and sediment deposition caused by the action.

3. Monitor the proposed action to confirm that the T&Cs in this ITS were effective in avoiding and minimizing incidental take from proposed activities and ensure the amount and extent of incidental take are not exceeded.

2.9.4. Terms and Conditions

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

1) *The following T&Cs implement RPM 1 – Minimize Fish Salvage and Dewatering Impacts:*
   a) The PNF shall ensure work is completed in a timely manner to minimize the duration of the channel isolation as well as demolition and construction below the OHWM. This will minimize the potential for fish to move into the isolated area through gaps in or under the gravel bags during breaks in construction.
   b) Should the PNF surveys for Chinook salmon redds conducted prior to electrofishing locate any Chinook salmon redds in the action area, work shall be halted, and the PNF shall contact NMFS to discuss the specifics and to determine how or if the action can proceed.
2) *The following T&Cs implement RPM 2 – Minimize Turbidity and Sediment:*
   a) The PNF or their designee will implement suspended sediment monitoring to assure that incidental take associated with suspended sediment has not been exceeded. Monitoring will assess the duration and intensity of turbidity to verify the extent of take exempted in this ITS. The NTU values shall not exceed the Idaho water quality turbidity standard (50 NTUs instantaneous over background [IDEQ non-disclosure agreement (n.d.a)]) 1.5 hours after site rewatering.
      i) NTUs will be recorded at the following locations: (a): Above the project work site; (b) immediately downstream of the project worksite; and (c) approximately 600 feet downstream of the project worksite.
      ii) NTU measurements shall be recorded at the following times: (a) Prior to rewatering of the worksite; and (b) at 30-minute intervals after rewatering begins.
      iii) Monitoring of NTUs shall continue until values have decreased below the state NTU standard (IDEQ n.d.a.) or for 6 hours, whichever is achieved first.
      iv) If the results of the monitoring effort indicate that the extent of take may have been exceeded, then the action agencies shall coordinate with NMFS to determine if further action or additional monitoring efforts may be necessary.

3) *The following T&Cs implement RPM 3 – Monitoring and Reporting:*

   a) The PNF or their designee will record number and species of fish captured during salvage operations, life stage (juvenile, adult, etc.), condition of fish captured and released, and number of fishes killed during salvage operations.

   b) The PNF or their designee shall submit a post-project report summarizing the results of the monitoring to NMFS within three months of project completion. The post-project report shall also include a statement that all the T&Cs of this opinion were successfully implemented. The post-project report shall be submitted to:

      NOAA Fisheries
      Snake Basin Area Office
      Attention: WCRO-2023-00378
      nmfswcr.srbo@noaa.gov

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

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" (CR) 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 this obligation and therefore should be carried out by the PNF:

1. Seek opportunities to supplement or restore riparian areas of Boulder Creek within the action area with any excess seed or mulch remaining from project activities.
2. Where possible, without compromising the desired benefit of structural integrity related to the existing bridge, use bioengineered solutions to stabilize the banks instead of riprap.

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

2.11. Reinitiation of Consultation

This concludes formal consultation for the Boulder Creek Bridge Replacement Project.

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

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

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

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

3.1. Essential Fish Habitat Affected by the Project

The action area (Section 2.3), except for areas above natural barriers to fish passage, is also EFH for Chinook salmon (PFMC 2014). The PFMC designated the following five habitat types as habitat areas of particular concern (HAPCs) for salmon: complex channel and floodplain habitat, spawning habitat, thermal refugia, estuaries, and submerged aquatic vegetation (PFMC 2014). The proposed action may adversely affect the following HAPCs: complex channel and floodplain habitat.

3.2. Adverse Effects on Essential Fish Habitat

Based on the information provided in the BA and the analysis of effects presented in the ESA portion of this document, NMFS concludes that the proposed action will have the following adverse effects on EFH designated for Chinook salmon: (1) short-term increases in sediment and turbidity affecting water quality; (2) temporary alteration of rearing habitat by dewatering

50 percent of the channel in the action area; and (3) temporary alteration of cover/shelter and floodplain connectivity associated with the bridge structure and bank hardening.

3.3. Essential Fish Habitat Conservation Recommendations

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

1. The PNF or their designee will implement suspended sediment monitoring to assure that incidental take associated with suspended sediment has not been exceeded. Monitoring will assess the duration and intensity of turbidity to verify the extent of take exempted in this ITS. The NTU values shall not exceed the Idaho water quality turbidity standard (50 NTUs instantaneous over background [IDEQ n.d.a]) 1.5 hours after site rewatering.
    a. NTUs will be recorded at the following locations: (a): Above the project work site; (b) immediately downstream of the project worksite; and (c) approximately 600 feet downstream of the project worksite.
    b. NTU measurements shall be recorded at the following times: (a) Prior to rewatering of the worksite; and (b) at 30-minute intervals after rewatering begins.
    c. Monitoring of NTUs shall continue until values have decreased below the state NTU standard (IDEQ n.d.a.) or for 6 hours, whichever is achieved first.
    d. If the results of the monitoring effort indicate that the extent of take may have been exceeded, then the action agencies shall coordinate with NMFS to determine if further action or additional monitoring efforts may be necessary.
2. The PNF should seek opportunities to supplement or restore riparian areas of Boulder Creek within the action area with any excess seed or mulch remaining from project activities.

Fully implementing these EFH CRs would protect, by avoiding or minimizing adverse effects (Section 3.2) for Pacific Coast salmon.

3.4. Statutory Response Requirement

As required by Section 305(b)(4)(B) of the MSA, the PNF and COE must provide a detailed response in writing to NMFS within 30 days after receiving an EFH CR. 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 CR unless NMFS and the Federal agency have agreed to use alternative timeframes for the Federal agency response. The response must include a description of the measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the CRs, 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 CRs 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 CRs accepted.

3.5. Supplemental Consultation

The Forest Service 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 CRs (50 CFR 600.920[l]).

4. Data Quality Act Documentation and Pre-Dissemination Review

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

4.1. Utility

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

4.2. Integrity

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

4.3. Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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6. Appendices

Appendix 1. Boulder Creek Bridge No. 50074-17.88 Plan Index and Project Description.

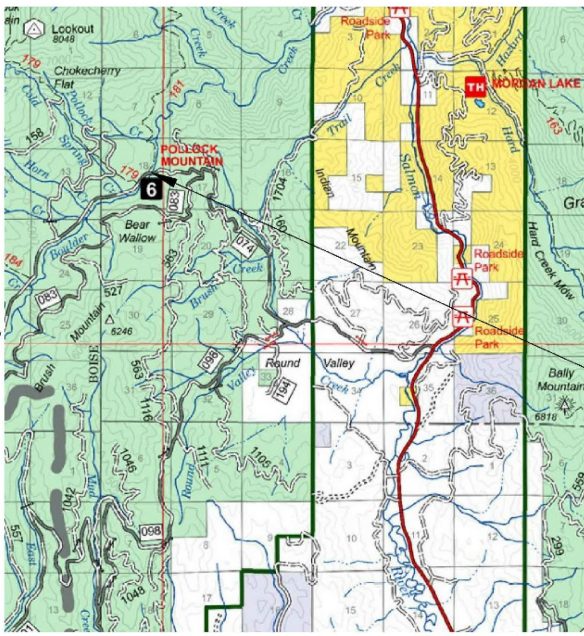
BOULDER CREEK BRIDGE

BRIDGE No. 50074–17.88

PAYETTE NATIONAL FOREST

HWY 95
TO RIGGINS, ID
18 MILES

TO HWY 95
14 MILES



PROJECT LOCATION
LAT/LONG: 45.15991382, -116.37830239

HWY 95
TO NEW MEADOWS, ID
6.5 MILES

PROJECT DESCRIPTION

1) REMOVE AND DISPOSE OF EXISTING TIMBER BRIDGE AND ABUTMENTS.
2) INSTALL PRECAST GRADE BEAMS.
3) RECONSTRUCT CHANNEL & INSTALL RIPRAP.
4) INSTALL NEW MODULAR STEEL BRIDGE SUPERSTRUCTURE, DECK, BACKWALLS, & RAIL.
5) CONSTRUCT NEW APPROACHES.
6) INSTALL AGGREGATE WEAR SURFACE ON BRIDGE AND APPROACHES. SEE ADDITIONAL AGGREGATE AND ASPHALT OPTION ITEMS.
7) INSTALL TYPE 3 OBJECT MARKERS.

INDEX TO PLANS

APPROVED

FOREST SUPERVISOR

CHAD PORTER Digitally signed by CHAD PORTER Date: 2022.05.23 07:22:19 -06'00'

for DIRECTOR, ENGINEERING

BRIDGE PLAN G–073

U. S. Department of Agriculture
FOREST SERVICE
Intermountain Region 4 Engineering
PAYETTE NATIONAL FOREST

DESIGN	BY: T. STONE
	CHECK: C. PORTER
DRAWING	BY: T. STONE
	CHECK: C. PORTER

APPROVED: /s/ Chad Porter, PE for DIRECTOR, ENGINEERING DATE 5/23/2022

BOULDER CREEK BRIDGE
BRIDGE No. 50074–17.88
PLAN INDEX & PROJECT DESCRIPTION

SHEET 1 OF 7

DRAWING NUMBER G–073

NOTES:

GENERAL
MATERIALS, CONSTRUCTION, & WORKMANSHIP SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS, FP-14 U.S. CUSTOMARY UNITS AND APPLICABLE FOREST SERVICE SUPPLEMENTAL SPECIFICATIONS.

DESIGN
1. THE SUPERSTRUCTURE DESIGN SHALL BE PERFORMED BY THE CONTRACTOR TO THE GEOMETRY SHOWN ON THESE DRAWINGS AND SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND THE DESIGN LOADS SHOWN ON THIS DRAWING.
2. DESIGN CALCULATIONS AND SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL 2 WEEKS PRIOR TO FABRICATION.
3. FINAL BRIDGE SIZES AND DIMENSIONS TO BE PROVIDED IN MANUFACTURER SHOP DRAWINGS. CONTRACTOR MAY SUBMIT ALTERNATE SIZES AND DIMENSIONS OF BRIDGE COMPONENTS, INCLUDING AN ALTERNATE BEARING PLATE CONNECTION, FOR APPROVAL BY COR.
4. DESIGN LOADINGS:
   LIVE LOAD: HL-93
   LIVE LOAD DEFLECTION NOT TO EXCEED L/800
5. THE CONTRACTOR SHALL PROVIDE THE FOREST SERVICE WITH A LOAD RATING COMPLETED BY A LICENSED PROFESSIONAL ENGINEER IN ACCORDANCE WITH THE AASHTO MANUAL FOR BRIDGE EVALUATION. THE LOAD RATING SHALL INCLUDE THE INVENTORY AND OPERATING RATING FACTORS FOR THE HL-93 DESIGN VEHICLE. IT SHALL ALSO INCLUDE THE SAFE LOAD CAPACITY IN TONS FOR THE TYPE 3, TYPE 3S2, TYPE 3-3, AND NRL LEGAL VEHICLES.

BULKHEAD
1. STEEL SHEET PILE BULKHEAD TO BE GALVANIZED AND COATED WITH COLD TAR EPOXY (BLACK; SHERWIN WILLIAMS TARGUARD OR APPROVED EQUAL).

HARDWARE AND STRUCTURAL STEEL
1. ALL STEEL SHAPES, PLATES, AND BARS SHALL CONFORM TO AASHTO M270 GRADE 36 (ASTM A36).
2. ALL BOLTS AND NUTS SHALL CONFORM TO ASTM A307 EXCEPT AS NOTED.
3. HARDWARE AND STEEL ELEMENTS ARE TO BE UNCOATED (BLACK).

ELASTOMERIC BEARING PADS
1. BEARING PADS SHALL BE PLAIN ELASTOMERIC PAD 1" THICK, 60 DUROMETER, LOW TEMPERATURE, ZONE D.

CONCRETE
1. CLASS A(AE) f'c = 4000 psi MIN.
2. CONCRETE SHALL BE GIVEN A CLASS 1 "ORDINARY SURFACE FINISH" IN ACCORDANCE WITH FP-14 SECTION 552.
3. CONCRETE SHALL BE AIR ENTRAINED 5% ± 1%.
4. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4" UNLESS OTHERWISE NOTED.
5. ALL CONCRETE SHALL BE MADE IN ACCORDANCE WITH AN APPROVED MIX DESIGN.

STEEL SUPERSTRUCTURE
1. WEATHER A588 STEEL GIRDERS

REINFORCING STEEL
1. ALL NON-PRESTRESSED REINFORCING SHALL BE OF THE DEFORMED BAR TYPE CONFORMING TO AASHTO M31 (ASTM A615), GRADE 60.
2. ALL DIMENSIONS TO REINFORCING STEEL ARE TO THE CENTERLINE OF BAR. CONCRETE COVER MEASURED FROM THE FACE OF THE CONCRETE TO THE FACE OF ANY REINFORCING BAR SHALL BE 2" UNLESS SHOWN OTHERWISE ON THE DRAWINGS.
3. REINFORCING STEEL SPLICE LENGTHS SHALL BE IN ACCORDANCE WITH ACI 315 AND AASHTO SPECIFICATIONS.

DIMENSIONS
1. ALL LONGITUDINAL DIMENSIONS FOR THE STRUCTURE ARE MEASURED HORIZONTALLY AND INCLUDE NO CORRECTION FOR GRADE.

STRUCTURE EXCAVATION
1. STRUCTURE EXCAVATION SHALL BE COMPLETED IN ACCORDANCE WITH FP-14, SECTION 208.
2. CONTRACTOR SHALL SUBMIT AN EXCAVATION PLAN TO THE CONTRACTING OFFICER (CO) FOR APPROVAL. PLAN SHALL INCLUDE DRAWINGS AND WRITTEN OUTLINE ILLUSTRATING AND DESCRIBING PROPOSED EXCAVATION LIMITS, METHODS, EQUIPMENT, LOCATION OF STOCKPILES, METHODS TO REMOVE THE EXISTING BRIDGE AND ESTIMATED QUANTITIES AND COMPLY WITH OSHA EXCAVATION SOIL TYPING AND REQUIREMENTS. CHANGES TO THE EXCAVATION LIMITS SHOWN ON THIS SHEET FOR CONTRACTOR'S DEWATERING METHODS OR OTHER CONTRACTOR CONVENIENCES, MUST BE SHOWN ON THE PLAN AND ARE THE RESPONSIBILITY OF THE CONTRACTOR AND INCIDENTAL TO THE WORK.

STRUCTURAL BACKFILL
1. SUITABLE STRUCTURE EXCAVATION MATERIAL MAY BE USED FOR STRUCTURAL BACKFILL MATERIAL. STRUCTURAL BACKFILL MATERIAL SHALL MEET FP-14, 704.04, STRUCTURAL BACKFILL. STRUCTURE BACKFILL SHALL BE PLACED AND BE COMPACTED IN ACCORDANCE WITH FP-14, 208.10 AND 208.11 (AASHTO T99, METHOD C AND AASHTO T310).

ROADWAY EMBANKMENT
1. USE MATERIAL FROM EXCAVATION THAT IS APPROVED BY COR.
2. CONSTRUCT ROADWAY EMBANKMENTS ACCORDING TO FP-14 SECTION 204.

DEWATERING AND SOIL EROSION CONTROL
1. PROTECT AGAINST SOIL EROSION AND SEDIMENTATION DURING CONSTRUCTION IN ACCORDANCE WITH FP-14, SECTION 157 AND THE PROJECT PERMITS. CONTRACTOR SHALL PREPARE AND SUBMIT A SOIL EROSION AND SEDIMENT CONTROL PLAN TO CO FOR APPROVAL. PLAN SHALL INCLUDE DRAWINGS AND WRITTEN OUTLINE ILLUSTRATING AND DESCRIBING PROPOSED LAYOUT, METHODS AND EQUIPMENT.
2. CONTRACTOR SHOULD ANTICIPATE WATER INFILTRATING THE EXCAVATIONS.
3. SUBGRADE EXCAVATION, FOOTING PLACEMENT, RIPRAP PLACEMENT, AND BACKFILL ARE TO BE COMPLETED PER THE CONTRACT SPECIFICATIONS AND STANDING OR RUNNING WATER IN THE WORK AREA DOES NOT RELIEVE THE CONTRACTOR FROM MEETING THE SPECIFICATIONS.

SCHEDULE OF ITEMS

Item No.	Description	Unit	Quantity
15101	Mobilization	Lump Sum	1
15221	Construction Survey and Staking	Lump Sum	1
15713	Soil erosion and pollution control	Lump Sum	1
20102	Clearing and Grubbing, Slash Treatment Methods for Tops and Limbs (f), Logs (f), and Stumps (f)	Lump Sum	1
20305	Removal of Existing Bridge, Disposal Method (a)	Lump Sum	1
20401	Roadway Excavation and Embankment, Placement Method 6	Lump Sum	1
20806	Structure Excavation and Backfill	Lump Sum	1
25101	Placed Riprap, Class 4 (Commercial Source)	Cubic Yard	130
25102	Placed Riprap, Class 5 (Commercial Source)	Cubic Yard	75
32203	Aggregate surface course, Grading (S), Compaction (B), (Commercial Source). Compaction D under asphalt sections if option exercised.	Cubic Yard	65
55201	18'x18"x30" Precast Concrete Grade Beam	Each	2
57102	16'x70' Prefabricated Bridge Superstructure-Design, Fabricate, Transport, & Install (includes railing & bulkhead)	Lump Sum	1
62503	Seeding with Mulch, Method (a) Dry Method	Lump Sum	1
63306	Object Markers (Type 3)	Each	4
40401	OPTION ITEM A: Minor Hot Asphalt, wearing surface on deck & approaches, Sta 0-86 to 2+56. See specifications.	Ton	64
32204	OPTION ITEM B: Additional Aggregate Surface Course, Grading & Compaction Per Item 32203	Cubic Yard	7000

U. S. Department of Agriculture
FOREST SERVICE
Intermountain Region 4 Engineering
PAYETTE NATIONAL FOREST

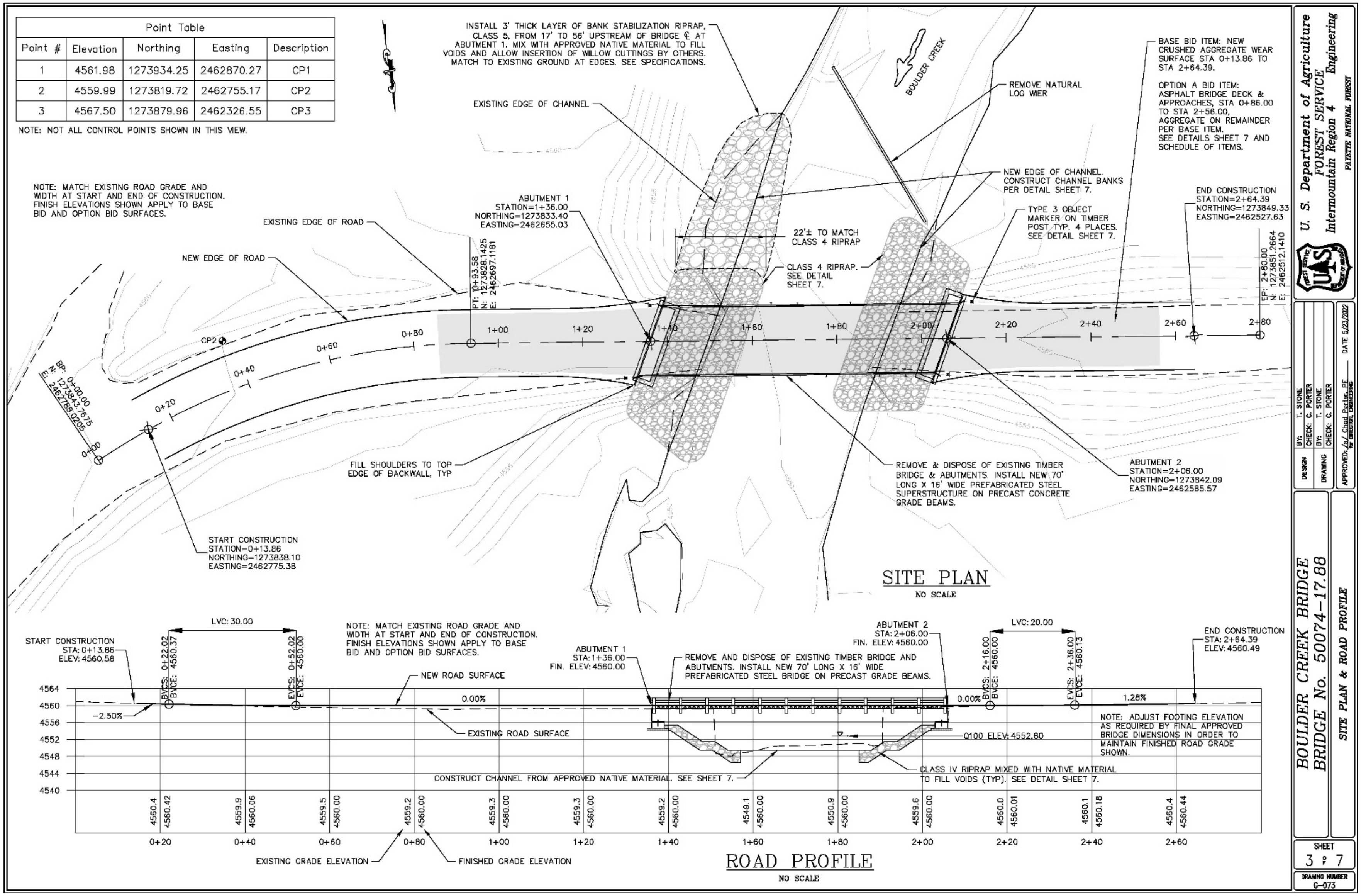
DESIGN BY: T. STONE CHECK: C. PORTER
DRAWING BY: T. STONE CHECK: C. PORTER
APPROVED: /s/ Chad Porter, PE DATE 5/23/2022

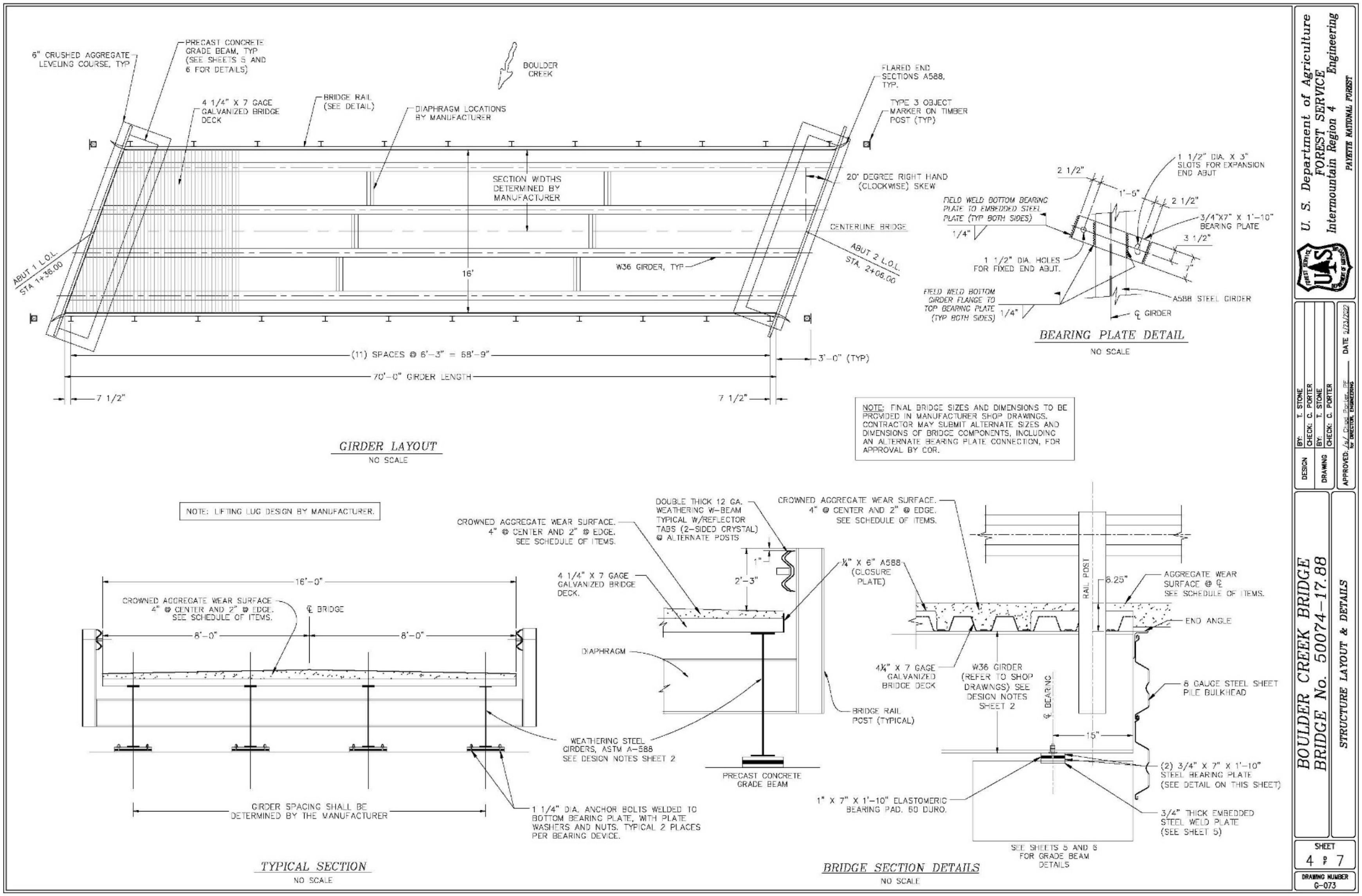
BOULDER CREEK BRIDGE
BRIDGE No. 50074-17.88
SPECIFICATIONS & SCHEDULE OF ITEMS

SHEET 2 of 7
DRAWING NUMBER G-073

Point #	Elevation	Northing	Easting	Description
1	4561.98	1273934.25	2462870.27	CP1
2	4559.99	1273819.72	2462755.17	CP2
3	4567.50	1273879.96	2462326.55	CP3

NOTE: NOT ALL CONTROL POINTS SHOWN IN THIS VIEW.




GIRDER LAYOUT
NO SCALE
TYPICAL SECTION
NO SCALE
BRIDGE SECTION DETAILS
NO SCALE
BEARING PLATE DETAIL
NO SCALE
NOTE: FINAL BRIDGE SIZES AND DIMENSIONS TO BE PROVIDED IN MANUFACTURER SHOP DRAWINGS. CONTRACTOR MAY SUBMIT ALTERNATE SIZES AND DIMENSIONS OF BRIDGE COMPONENTS, INCLUDING AN ALTERNATE BEARING PLATE CONNECTION, FOR APPROVAL BY COR.
NOTE: LIFTING LUG DESIGN BY MANUFACTURER.
(11) SPACES @ 6'-3" = 68'-9"
70'-0" GIRDER LENGTH
20° DEGREE RIGHT HAND (CLOCKWISE) SKEW
W36 GIRDER, TYP
SECTION WIDTHS DETERMINED BY MANUFACTURER
GIRDER SPACING SHALL BE DETERMINED BY THE MANUFACTURER
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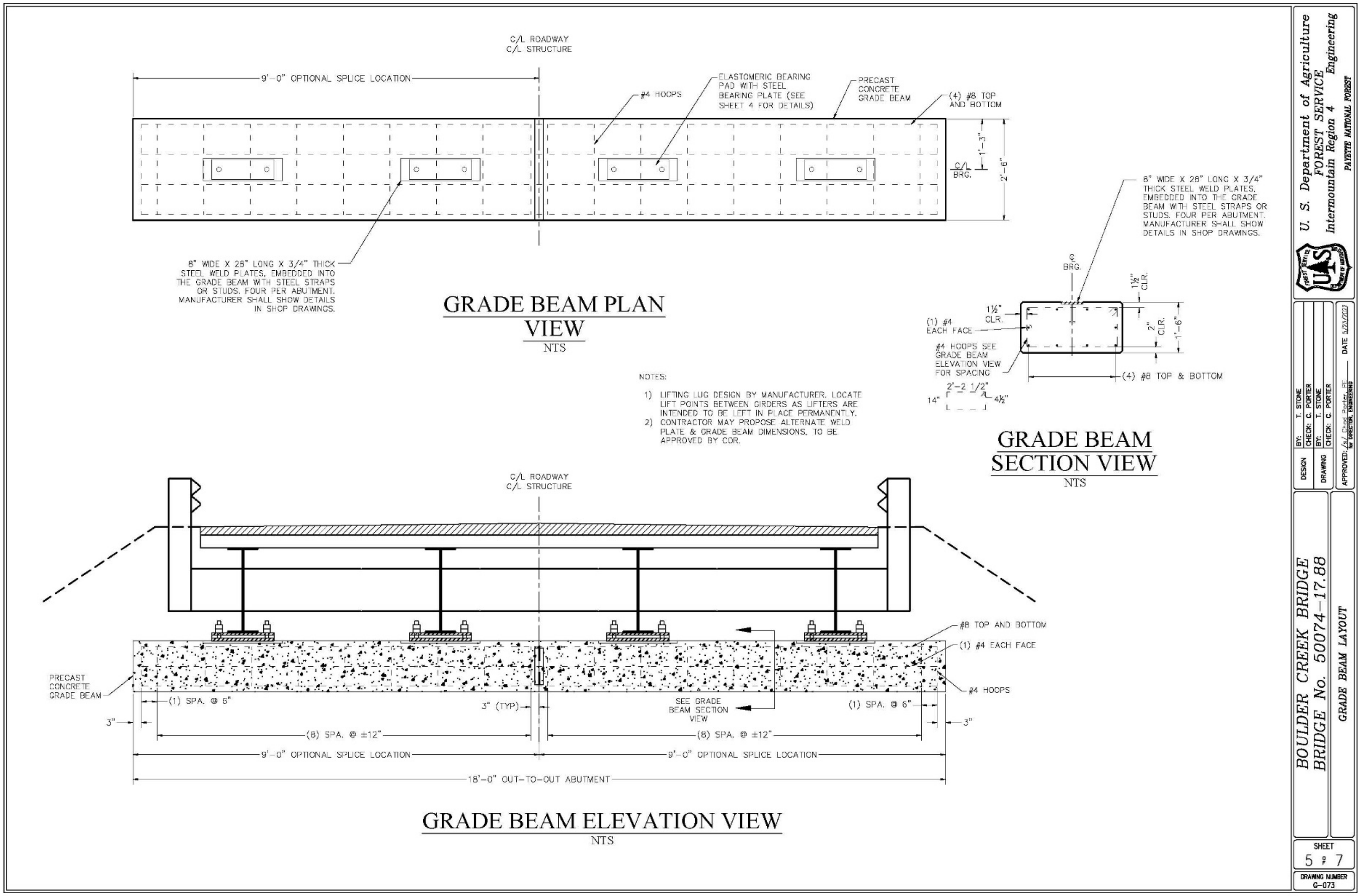
Engineering
PAYETTE NATIONAL FOREST
BOULDER CREEK BRIDGE
BRIDGE No. 50074-17.88
STRUCTURE LAYOUT & DETAILS
SHEET 4 of 7
DRAWING NUMBER G-073


C/L ROADWAY
C/L STRUCTURE
9'-0" OPTIONAL SPLICE LOCATION
#4 HOOPS
ELASTOMERIC BEARING PAD WITH STEEL BEARING PLATE (SEE SHEET 4 FOR DETAILS)
PRECAST CONCRETE GRADE BEAM
(4) #8 TOP AND BOTTOM
1'-3"
2'-6"
C/L BRG.
8" WIDE X 28" LONG X 3/4" THICK STEEL WELD PLATES, EMBEDDED INTO THE GRADE BEAM WITH STEEL STRAPS OR STUDS. FOUR PER ABUTMENT. MANUFACTURER SHALL SHOW DETAILS IN SHOP DRAWINGS.
GRADE BEAM PLAN VIEW
NTS
NOTES:
1) LIFTING LUG DESIGN BY MANUFACTURER. LOCATE LIFT POINTS BETWEEN GIRDERS AS LIFTERS ARE INTENDED TO BE LEFT IN PLACE PERMANENTLY.
2) CONTRACTOR MAY PROPOSE ALTERNATE WELD PLATE & GRADE BEAM DIMENSIONS, TO BE APPROVED BY COR.
8" WIDE X 28" LONG X 3/4" THICK STEEL WELD PLATES, EMBEDDED INTO THE GRADE BEAM WITH STEEL STRAPS OR STUDS. FOUR PER ABUTMENT. MANUFACTURER SHALL SHOW DETAILS IN SHOP DRAWINGS.
C/L BRG.
1½" CLR.
1½" CLR.
2" CLR.
1'-6"
(1) #4 EACH FACE
#4 HOOPS SEE GRADE BEAM ELEVATION VIEW FOR SPACING
(4) #8 TOP & BOTTOM
2'-2 1/2"
14"
4½"
GRADE BEAM SECTION VIEW
NTS
C/L ROADWAY
C/L STRUCTURE
#8 TOP AND BOTTOM
(1) #4 EACH FACE
#4 HOOPS
PRECAST CONCRETE GRADE BEAM
(1) SPA. @ 6"
3" (TYP)
SEE GRADE BEAM SECTION VIEW
(1) SPA. @ 6"
3"
3"
(8) SPA. @ ±12"
(8) SPA. @ ±12"
9'-0" OPTIONAL SPLICE LOCATION
9'-0" OPTIONAL SPLICE LOCATION
18'-0" OUT-TO-OUT ABUTMENT
GRADE BEAM ELEVATION VIEW
NTS
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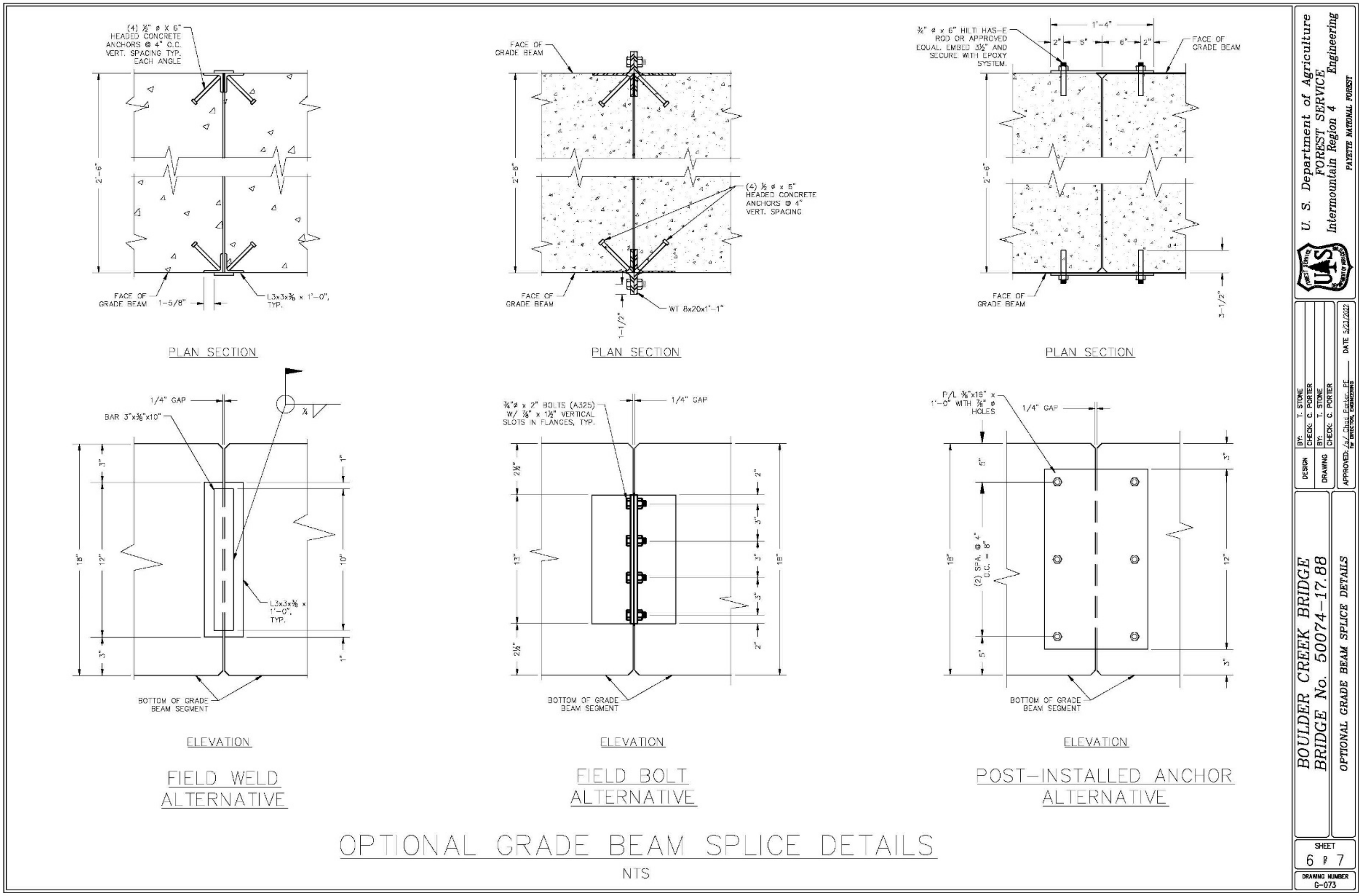
DESIGN BY: T. STONE CHECK: C. PORTER
DRAWING BY: T. STONE CHECK: C. PORTER
APPROVED:
DATE
BOULDER CREEK BRIDGE
BRIDGE No. 50074-17.88
GRADE BEAM LAYOUT
SHEET
5 OF 7
DRAWING NUMBER
G-073



PLAN SECTION
PLAN SECTION
PLAN SECTION
FACE OF GRADE BEAM
L3x3x3/8 x 1'-0", TYP.
WT 8x20x1'-1"
(4) 1/2" ø x 5" HEADED CONCRETE ANCHORS @ 4" VERT. SPACING
3/4" ø x 6" HILTI HAS-E ROD OR APPROVED EQUAL. EMBED 3 1/2" AND SECURE WITH EPOXY SYSTEM.
1/4" GAP
BAR 3"x3/8"x10"
3/4"ø x 2" BOLTS (A325) W/ 7/8" x 1 1/2" VERTICAL SLOTS IN FLANGES, TYP.
P/L 3/8"x18" x 1'-0" WITH 7/8" ø HOLES
(2) SPA. @ 4" O.C. = 8"
BOTTOM OF GRADE BEAM SEGMENT
ELEVATION
ELEVATION
ELEVATION
FIELD WELD ALTERNATIVE
FIELD BOLT ALTERNATIVE
POST-INSTALLED ANCHOR ALTERNATIVE
OPTIONAL GRADE BEAM SPLICE DETAILS
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DESIGN BY: T. STONE CHECK: C. PORTER
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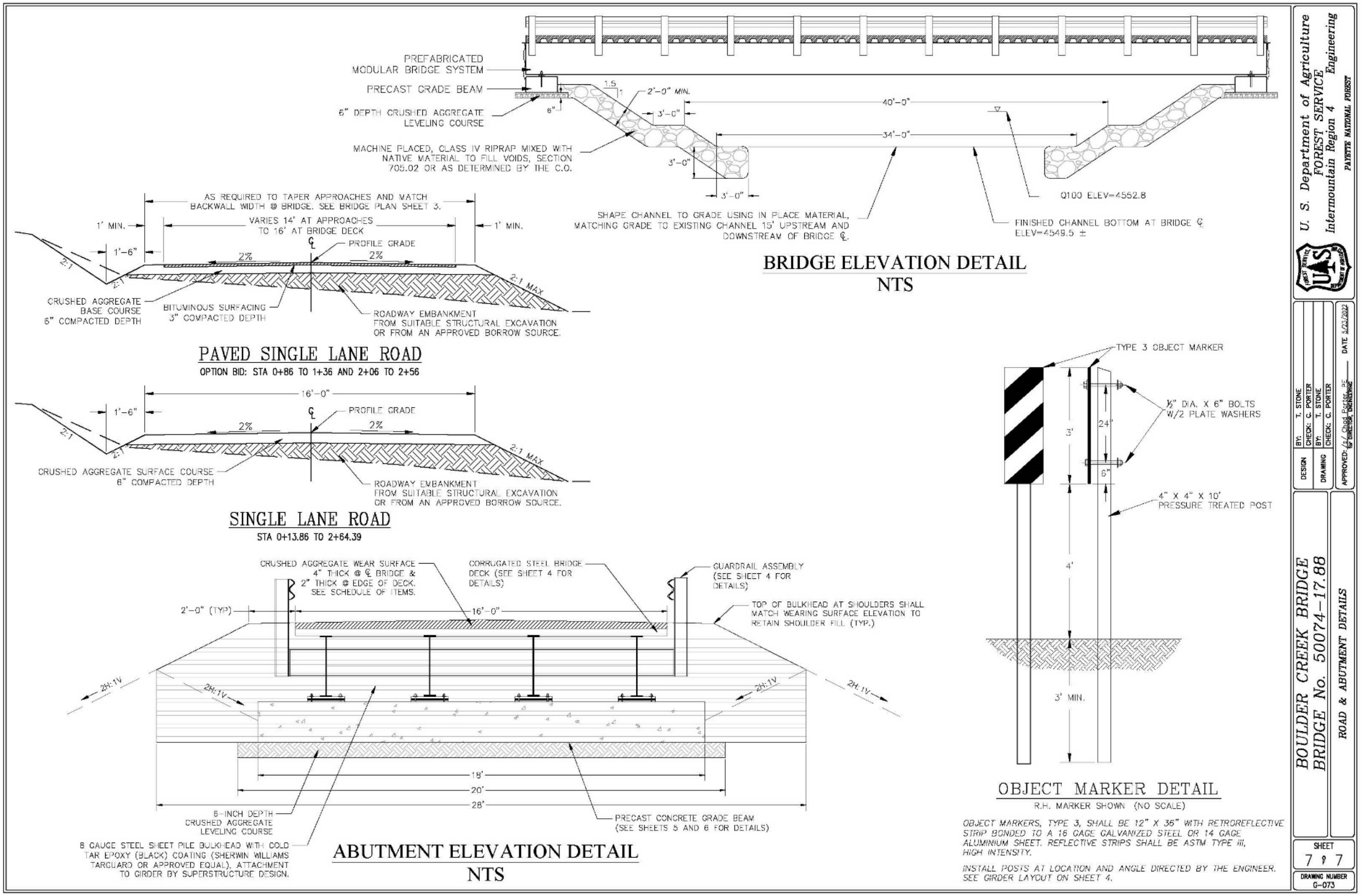
DATE 5/23/2022
BOULDER CREEK BRIDGE
BRIDGE No. 50074-17.88
OPTIONAL GRADE BEAM SPLICE DETAILS
SHEET 6 OF 7
DRAWING NUMBER G-073


PREFABRICATED MODULAR BRIDGE SYSTEM
PRECAST GRADE BEAM
6" DEPTH CRUSHED AGGREGATE LEVELING COURSE
MACHINE PLACED, CLASS IV RIPRAP MIXED WITH NATIVE MATERIAL TO FILL VOIDS, SECTION 705.02 OR AS DETERMINED BY THE C.O.
2'-0" MIN.
40'-0"
34'-0"
3'-0"
Q100 ELEV=4552.8
SHAPE CHANNEL TO GRADE USING IN PLACE MATERIAL, MATCHING GRADE TO EXISTING CHANNEL 15' UPSTREAM AND DOWNSTREAM OF BRIDGE ℄.
FINISHED CHANNEL BOTTOM AT BRIDGE ℄ ELEV=4549.5 ±
BRIDGE ELEVATION DETAIL
NTS
AS REQUIRED TO TAPER APPROACHES AND MATCH BACKWALL WIDTH @ BRIDGE. SEE BRIDGE PLAN SHEET 3.
VARIES 14' AT APPROACHES TO 16' AT BRIDGE DECK
1' MIN.
1'-6"
PROFILE GRADE
2%
2:1
2:1 MAX
CRUSHED AGGREGATE BASE COURSE 6" COMPACTED DEPTH
BITUMINOUS SURFACING 3" COMPACTED DEPTH
ROADWAY EMBANKMENT FROM SUITABLE STRUCTURAL EXCAVATION OR FROM AN APPROVED BORROW SOURCE.
PAVED SINGLE LANE ROAD
OPTION BID: STA 0+86 TO 1+36 AND 2+06 TO 2+56
16'-0"
CRUSHED AGGREGATE SURFACE COURSE 6" COMPACTED DEPTH
SINGLE LANE ROAD
STA 0+13.86 TO 2+64.39
CRUSHED AGGREGATE WEAR SURFACE 4" THICK @ ℄ BRIDGE & 2" THICK @ EDGE OF DECK. SEE SCHEDULE OF ITEMS.
CORRUGATED STEEL BRIDGE DECK (SEE SHEET 4 FOR DETAILS)
GUARDRAIL ASSEMBLY (SEE SHEET 4 FOR DETAILS)
TOP OF BULKHEAD AT SHOULDERS SHALL MATCH WEARING SURFACE ELEVATION TO RETAIN SHOULDER FILL (TYP.)
2'-0" (TYP)
2H:1V
18'
20'
28'
6-INCH DEPTH CRUSHED AGGREGATE LEVELING COURSE
8 GAUGE STEEL SHEET PILE BULKHEAD WITH COLD TAR EPOXY (BLACK) COATING (SHERWIN WILLIAMS TARGUARD OR APPROVED EQUAL), ATTACHMENT TO GIRDER BY SUPERSTRUCTURE DESIGN.
PRECAST CONCRETE GRADE BEAM (SEE SHEETS 5 AND 6 FOR DETAILS)
ABUTMENT ELEVATION DETAIL
NTS
TYPE 3 OBJECT MARKER
½" DIA. X 6" BOLTS W/2 PLATE WASHERS
3'
24"
6"
4'
3' MIN.
4" X 4" X 10' PRESSURE TREATED POST
OBJECT MARKER DETAIL
R.H. MARKER SHOWN (NO SCALE)
OBJECT MARKERS, TYPE 3, SHALL BE 12" X 36" WITH RETROREFLECTIVE STRIP BONDED TO A 16 GAGE GALVANIZED STEEL OR 14 GAGE ALUMINIUM SHEET. REFLECTIVE STRIPS SHALL BE ASTM TYPE III, HIGH INTENSITY.
INSTALL POSTS AT LOCATION AND ANGLE DIRECTED BY THE ENGINEER. SEE GIRDER LAYOUT ON SHEET 4.
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DRAWING BY: T. STONE CHECK: C. PORTER
DATE 5/23/2022
BOULDER CREEK BRIDGE
BRIDGE No. 50074-17.88
ROAD & ABUTMENT DETAILS
SHEET 7 of 7
DRAWING NUMBER G-073