UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

September 14, 2023 **Refer to NMFS No:** WCRO-2023-02014

Aaron O. Allen, Ph.D.
U.S. Army Corps of Engineers – North Coast Branch
60 South California Street, Second Floor
Ventura, California 93001

Re: Endangered Species Act Section 7(a)(2) Biological Opinion for the Mid-Higuera Bypass Project in the City of San Luis Obispo, California (Corps' File No. SPL-2021-00528-GLH)

Dear Dr. Allen:

Thank you for your April 27, 2023, letter requesting re-initiation of formal 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 Mid-Higuera Bypass Project in the City of San Luis Obispo, California.

The biological opinion concludes the proposed action is not likely to jeopardize the continued existence of the threatened South-Central California Coast Distinct Population Segment of steelhead (*Oncorhynchus mykiss*) or destroy or adversely modify designated critical habitat for this species. NMFS believes the proposed action is likely to result in incidental take of steelhead, therefore, the attached incidental take statement includes the amount and extent of anticipated incidental take with reasonable and prudent measures and terms and conditions to minimize and monitor incidental take of threatened steelhead.

Please contact Matt McGoogan at matthew.mcgoogan@noaa.gov or (562) 980-4026 if you have a question concerning this consultation or if you require additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: Leison Bernstein, U.S. Army Corps of Engineers, Ventura, CA
Freddy Otte, City of San Luis Obispo, CA
Kate Shea, County of San Luis Obispo, CA
Copy to ARN File #: 151422WCR2022CC00224

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion

Mid-Higuera Bypass Project

NMFS Consultation Number: WCRO-2023-02014
Action Agency: U.S. Army Corps of Engineers

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely to Destroy or Adversely Modify Critical Habitat?
South-Central California Coat Steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	Yes	No

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

Issued By:

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: September 14, 2023

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

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

NMFS 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 two weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at the California Coastal NMFS office.

1.2. Consultation History

On August 29, 2022, NMFS received the U.S. Army Corps of Engineers' (Corps) request to initiate formal consultation under Section 7 of the ESA. The request involves the Corps' permitting of the City and County of San Luis Obispo's (hereafter collectively referred to as *applicant*, individually as *City* and *County*) Mid-Higuera Bypass Project, involving construction of two high-flow bypass channels and installation of habitat enhancements along San Luis Obispo Creek (*proposed action*). The Corps' written request included a habitat mitigation and monitoring plan (HMMP) (County 2021) and a biological assessment (BA) (Rincon 2021) describing the effects of the proposed action on the threatened South-Central California Coast (SCCC) Distinct Population Segment (DPS) of steelhead (*Oncorhynchus mykiss*) and designated critical habitat for the species in San Luis Obispo Creek. Based on review of these documents, NMFS determined the information provided was sufficient to initiate formal consultation.

On November 15, 2022, NMFS attended a meeting at the site of the proposed action with representatives from the Corps, City, and County. During this meeting various design elements of the proposed action were discussed, and habitat conditions and characteristics within the action area were assessed. Based on observations and discussions onsite, NMFS identified for the Corps, City and County additional data needed. During a teleconference on November 30, 2022, and in accordance with 50 CFR420.14(f), NMFS and the Corps mutually agreed to extend the consultation 90 days to account for exchange and analysis of this additional data. To this end, NMFS sent a letter to the Corps dated December 12, 2022, documenting the mutually agreed upon 90-day consultation extension.

In an email dated March 20, 2023, the Corps notified NMFS and the applicant that the Corps was withdrawing the request for ESA Section 7 consultation because more than 90 days had transpired without the applicant providing the information identified in NMFS' December 12, 2022, letter.

On April 27, 2023, NMFS received a letter from the Corps requesting formal consultation under Section 7 of the ESA for the proposed action. That request included the information requested in NMFS' December 12, 2022, letter. As such, formal consultation began on April 27, 2023.

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

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).

Overview of the Federal and Proposed Action

The federal action involves the Corps issuing a permit to authorize the applicant's project to construct two high-flow bypass channels and install habitat enhancements along San Luis Obispo Creek.

The proposed action is intended to (1) increase the flood capacity of the currently narrow and incised channel in the mid-Higuera reach of San Luis Obispo Creek to contain up to a 25-year storm event, and (2) improve biological and hydrologic conditions in the action area. The proposed action includes five general components: (1) construct two high-flow bypass channels (i.e., the Bianchi Lane Bypass Channel and the South Street Bypass Channel, hereafter referred to individually as *BLBC* and *SSBC*, respectively), (2) create four floodplain benches, (3) remove accumulated sediment at Marsh Street Bridge, (4) replace the Bianchi Lane Bridge, and (5) install riparian-habitat enhancements (additional details of the proposed action can be found in Rincon 2021 and as described below). Construction is expected to require up to 12 months to complete, with all in-creek work completed during a single dry season between June 1 and October 31.

While the proposed action involves many construction activities and incorporates an extensive number of best-management practices (BMP), we provide only the most salient of those activities and BMPs below.

Proposed construction activities

Specific construction activities relevant to this biological opinion's effects analysis on steelhead and critical habitat involve the following:

- The applicant proposes to install a temporary bridge crossing 100-feet downstream from the Marsh Street bridge to allow access of private property and project work sites while the new Bianchi Lane Bridge is installed;

- The applicant proposes to use heavy machinery (e.g., excavators, bulldozers) for grading the two bypass channels (BLBC and SSBC). Both channels will be constructed at elevations above the Ordinary High Water Mark (OHWM) with the BLBC and SSBC expected to activate (start becoming inundated with water) at approximately 1,790 cfs and 440 cfs, respectively. The BLBC will be approximately 800-feet long, 6 to 8-feet deep, 20-feet wide at channel base, channel sides sloped at 2:1, and a 0.5% longitudinal slope. The SSBC will be approximately 600-feet long, 10 to 12-feet deep, 20-feet wide at channel base, channel sides sloped at 2.5:1, and a longitudinal slope of 1.2%. Both channel bottoms will have a horizontal slope of about 2% (the high point on the western edge sloping to the low point on the eastern edge of the channel). A total of approximately 420-linear feet (LF) of vegetated rock-slope protection (VRSP) will be installed along the creekbank at entrance and exit of both bypasses;

- Four floodplain benches will be constructed at pinch points in the creek where the channel is currently narrow, incised, and has vertical banks. All benches will be constructed above the OHWM, 20 to 30-feet wide, and sloped no steeper than 2.5:1. Bench 1 is approximately 150-feet long, bench 2 and 3 are 200-feet long, and bench 4 is 300-feet long. A total of approximately 850-LF of VRSP will be installed along the toe of these floodplain benches;

- Accumulated sediment will be removed from an approximately 0.15-acre area of creek bed, starting from a point approximately 80-feet upstream of the Marsh Street Bridge and extending downstream about 250-LF under and slightly past the bridge. Sediment removal will be limited to elevations a minimum of one foot above the creek low-flow channel to preserve the existing natural contours and dimensions of this channel;

- The existing Bianchi Lane Bridge (accommodating a 6-year storm event) will be replaced with a new two-span bridge that has higher clearance and capacity (accommodating a 23-year storm event). The new bridge installation will involve: removing the existing bridge, grading the bridge approaches and abutment pads on top of both creekbanks; pouring a new bridge abutment on both bank tops (10 to 20-foot wide and 30-foot long); installing a single longitudinal row of three 12-inch diameter Cast-In-Drilled-Hole (CIDH) concrete, center-column supports; and securing the new bridge deck (approximately 30-foot wide and 120-foot long) across the abutments and CIDH columns;

- In total, the applicant estimates up to 150 trees will be removed with the proposed action including 72 native trees (i.e., 41 arroyo willow, 5 black walnut, 1 western sycamore, 14 Fremont cottonwood, 9 coast live oak, 1 California bay, and 1 valley oak). The majority of these trees to be removed are away from the immediate creekbank and dispersed across approximately 3,050-LF of the action area; and

- For the purpose of habitat enhancement, the applicant proposes to install a minimum of three root-wads and four boulder clusters in the creek. Each boulder cluster will consist of three to five large rocks (ranging in dimension from 3x5x3-foot to 3x6x2-foot in size) arranged in close proximity.

Proposed best management practices

Specific BMPs relevant to this biological opinion's effects analysis on steelhead and critical habitat involve the following:

1. Dewatering in-creek work areas involves the following:

    - At least two biologists with experience in steelhead ecology and handling will be onsite during dewatering to oversee work-area isolation and dewatering activities, including relocating steelhead captured from dewatered areas;

    - Prior to installing a diversion, the biologists will identify habitats downstream of the action area to serve as relocation sites for steelhead. Relocation sites will have perennial flow, sufficient water quality (e.g., dissolved oxygen, temperature), and adequate habitat features (e.g., depth, size, instream cover) for supporting steelhead;

    - The biologists will use block nets (minimum 1/8-inch mesh) to enclose the in-creek work areas; steelhead will be captured by hands, seines, dip nets, and electrofishing equipment and relocated from these areas prior to dewatering. Only biologists with over 100 hours of electrofishing experience will engage in this capture method and will strictly adhere to NMFS electrofishing guidelines. To further reduce risk to steelhead, biologists will keep handling and holding times to a minimum (no longer than 20 minutes), avoid overcrowding holding containers, keep water in containers well oxygenated, segregate fish by size into separate holding containers, and remove non-native fish from the creek;

    - Three in-creek work areas will be isolated and dewatered (one at a time) with three separate diversions, each involving construction of two cofferdams (one at the upstream and downstream extent of the work area) across the width of the channel and composed of bags filled with washed gravel and a visqueen lining, if necessary. A pipe culvert will be installed between the cofferdams to direct creek-flow through the work area and sized appropriately to maintain steelhead passage. In total, approximately 2,300-LF of creek will be isolated, dewatered, and remain devoid of water for up to five months (June 1 to October 31);

- Pumps with screened (3/32-inch mesh minimum) intakes will be used to dewater the isolated work areas. This water will be pumped through a filtration system to prevent turbid water returning to surface flow in the creek. As dewatering occurs, biologists will actively monitor the area to capture and relocate remaining steelhead; and

- The biologists will place dead steelhead into a ziplock bag with a label indicating fork length and weight of the specimen along with the location, date, and time of collection. These specimens will be transferred to a freezer and retained until the applicant can coordinate on desired timing and method of transfer to NMFS.

2. Protective measures during construction involve the following:

   - In-creek construction activities will only occur within the dewatered work areas (i.e., outside of flowing water);

   - The biologists will monitor work activities, implement BMPs for erosion control (e.g., silt fencing, straw-rolls), and regularly check to ensure erosion BMPs and the diversion continue to function properly;

   - The biologists will monitor surface flow in the creek and relocate steelhead within the action area, should this reach dry of natural conditions during construction;

   - To minimize risk of pollutants entering the creek, equipment and heavy machinery (e.g., excavators, bulldozers, cranes, backhoes, dump trucks, generators, pumps, etc.) will be staged, cleaned, and refueled, only in confined areas a minimum of 100-feet from aquatic areas. The biologists and workers will inspect vehicles and equipment (at least once per day) to ensure all are free of fuel and lubricant leaks, place drip pans under vehicles or equipment when not in use, and keep 'spill kits' onsite to allow for prompt effective response and remediation of accidental spills;

   - All rock-slope protection (RSP) used in the proposed action will be converted to VRSP. VRSP consists of ungrouted RSP that is backfilled with soil and planted with native trees and vegetation types; and,

   - All components of in-creek diversions (i.e., the cofferdam, gravel bags, pipes, equipment, etc.) and the temporary bridge will be fully removed once in-creek construction activities are complete (not later than October 31); creek contours will be restored to pre-construction conditions.

3. Post-construction measures involve the following:

   - The applicant will implement a HMMP (County 2021) which proposes a minimum 2:1 replacement of any native tree removed and 1:1 replacement for temporary impacts to riverine or riparian vegetation. Based on the HMMP, the applicant proposes to plant a minimum of 192 native trees (82 arroyo willow, 24 black walnut,

2 western sycamore, 46 Fremont cottonwood, 30 coast live oak, 6 California bay, and 2 valley oak) and apply a mix of native plants and grass via hydroseeding on any disturbed ground (e.g., floodplain benches, the bypass channels). Additionally, cuttings of willow, mule fat, and other marsh baccharis will be planted within the backfilled RSP;

- The applicant proposes to hire a qualified botanist to monitor revegetation in the action area for a minimum of five years after construction. The botanist will summarize findings in an annual report for each year of monitoring and include photo documentation of the revegetation, a qualitative and quantitative comparison of mitigation sites through time, an assessment of success criteria, and measures to augment or rectify any problematic issues identified if necessary. Success criteria include 75% survival of planted trees after five years. Monitoring may be extended if site trends indicate success criteria will take longer than five years to achieve; and

- The applicant proposes to monitor the bypass channels for a minimum of 5 years after construction to ensure the design minimizes the risk of steelhead stranding in the bypasses. Surveys of the bypasses will occur following storm events when the bypasses are inundated. Should a steelhead be observed stranded, these individuals will be captured and relocated to the main creek channel. This monitoring will also document whether scour or modification of the bypass channels is occurring to inform whether future maintenance is necessary. No maintenance of the bypass channels is anticipated or proposed with this proposed action.

1.3.1. Other Activities

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

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

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

2.1. Analytical Approach

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

The designation of critical habitat for SCCC steelhead uses 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 this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

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

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

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

The primary documents the Corps submitted for NMFS consideration in the development of this biological opinion are the BA for the project (Rincon 2021) and HMMP (County 2021). The BA provides a detailed description of the proposed action, potential effects of the action on steelhead and critical habitat for this species, and measures to minimize these effects. The HMMP provides details on additional project minimization measures and post-project monitoring and reporting particularly with respect to revegetation of disturbed work sites within the action area. To further inform the assessment of potential effects on threatened steelhead and critical habitat, NMFS relied on relevant ecological literature (referenced in this biological opinion), steelhead observations City staff noted during recent surveys and monitoring of San Luis Obispo Creek over the past several years, and NMFS' own field observations and knowledge of the watershed gained in numerous site visits to this creek over the past decade including a site visit to the action area on November 15, 2022, with representatives from the Corps, City, and County.

2.2. Rangewide Status of the Species and Critical Habitat

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

2.2.1. Status of the Species

Oncorhynchus mykiss is one of six Pacific salmon in the genus *Oncorhynchus* native to the coast of North America. The natural history of this species dictates the terminology fisheries biologists and resource managers use when discussing *O. mykiss*, its habitat, and distribution. If the species remains in freshwater throughout their entire life cycle (and reside upstream of longstanding migration barriers), they are referred to as resident trout (non-anadromous), or rainbow trout. The anadromous or ocean-going form of *O. mykiss* are listed under the ESA (NMFS 2006) and is typically referred to as "steelhead." Globally, steelhead are found in the western Pacific through the Kamchatka Peninsula in Asia, east to Alaska, south to southern California, and even reported in Baja California del Norte (Ruiz-Campos and Pister 1995).

The listed unit of anadromous *O. mykiss* is termed a "distinct population segment" or DPS (NMFS 2006), and the listed unit contains several individual or fish-bearing watersheds. The DPS recognizes only the anadromous *O. mykiss*. In accordance with the listing decision, this biological opinion solely uses the DPS terminology and provides NMFS' conclusion as to the likelihood of jeopardy to the species based only on effects to the listed DPS. This biological opinion analyzes the effects of the proposed action on the following listed DPS and designated critical habitat, which occur in the action area:

Salmonid Species	*ESU/DPS Name*	*Original Listing*	*Revised Listing(s)*	*Critical Habitat Designations*
Steelhead (*O. mykiss*)	South-Central California Coast DPS	FR Notice: 62 FR 43937 Date: 08/18/1997	FR Notice: 71 FR 5248 Date:01/05/2006	FR Notice: 70 FR 52488 Date: 09/02/2005

The threatened SCCC DPS of steelhead occupies rivers from the Pajaro River, Santa Cruz County, south to but not including the Santa Maria River, in Santa Barbara County. The decline of the species prompted listing of the SCCC DPS of steelhead as threatened on August 18, 1997 (62 FR 43937) and a revised listing on January 5, 2006 (71 FR 834). The status of the SCCC steelhead populations was assessed by NMFS' Biological Review Team (BRT) in 1996 (Busby et al.), 2005 (Good et al.), 2011 (Williams et al.), and 2023 (NMFS). Abundance of adult steelhead in the SCCC DPS declined from a historical high abundance of 25,000 returning adults, to an estimate of 4,750 adults in 1965 for five river systems (Pajaro, Salinas, Carmel, Little Sur, and Big Sur), to fewer than 500 adults (Boughton and Fish 2003; Good et al. 2005; Helmbrecht and Boughton 2005; Williams et al. 2011; Williams et al. 2016).

As part of the assessment and listing of SCCC steelhead, NMFS convened the BRT, composed of an expert panel of scientists. The BRT evaluated the viability and extinction risk of naturally spawning populations within each DPS. The BRT found high risks to abundance, productivity, and the diversity of the SCCC DPS and expressed particular concern for the DPS's connectivity and spatial structure. The most recent 5-year status review reaffirms the species is at risk of extinction, with survival and recovery remaining tenuous (NMFS 2023).

2.2.1.1. General Life History of Steelhead

O. mykiss possesses an exceedingly complex life history (Behnke 1992). Distinctly different than other Pacific salmon, steelhead adults can survive their first spawning and return to the ocean until the next year to reproduce again. For returning adults, the specific timing of spawning can vary by a month or more among rivers or streams within a region, occurring in winter and early spring. The spawning time frames depend on physical factors such as the magnitude and duration of instream flows and sand-bar breaching. Once they reach their spawning grounds, females will use their caudal fin to excavate a nest (redd) in streambed gravels where they deposit their eggs. Males will then fertilize the eggs and, afterwards, the females cover the redd with a layer of gravel, where the embryos (alevins) incubate within the gravel. Hatching time can vary from approximately three weeks to two months depending on surrounding water temperature. The young fish (fry) emerge from the redd two to six weeks after hatching. As steelhead begin to mature, juveniles or "parr" will rear in freshwater streams anywhere from 1-3 years. Juvenile steelhead can also rear in seasonal coastal lagoons or estuaries of their natal creek, providing over-summering habitat.

Juvenile steelhead emigrate to the ocean (as smolts) usually in late winter and spring and reach maturity at age 2-4, but steelhead can reside in the ocean for an additional 2-3 years before returning to spawn. The timing of emigration is influenced by a variety of parameters such as photoperiod, temperature, breaching of sandbars at the river's mouth and streamflow. Extended

droughts can cause juveniles to become landlocked, unable to reach the ocean (Boughton et al. 2006).

Through studying the otolith (small ear stone) microchemistry of *O. mykiss*, researchers further understand the complex and intricate life history of steelhead. Specifically, resident rainbow trout can produce steelhead progeny; likewise, steelhead can yield resident rainbow trout progeny (Zimmerman and Reeves 2000). Additionally, evidence indicates that sequestered populations of steelhead (e.g., above introduced migration barriers) can exhibit traits that are the same or similar to anadromous specimens with access to the ocean. Examples include inland resident fish exhibiting smolting characteristics and river systems producing smolts with no regular access for adult steelhead. This evidence suggests the ecological importance of the resident form to the viability of steelhead and the need to reconnect populations upstream and downstream of introduced migration barriers. The loss or reduction in anadromy and migration of juvenile steelhead to the estuary or ocean is expected to reduce gene flow, which strongly influences population diversity (McElhany et al. 2000). Evidence indicates genetic diversity in populations of southern California steelhead is low (Girman and Garza 2006).

2.2.1.2. Steelhead Habitat Requirements

Habitat requirements of steelhead generally depend on the life history stage. Steelhead encounter several distinct habitats during their life cycle. Water discharge, water temperature, and water chemistry must be appropriate for adult and juvenile migration. Suitable water depth and velocity, and substrate composition are the primary requirements for spawning. Furthermore, dissolved oxygen concentration, pH, and water temperature are factors affecting survival of incubating embryos. The presence of interspatial spaces between large substrate particle types is important for maintaining water-flow through the nest as well as dissolved oxygen levels within the nest. These spaces can become filled with fine sediment, sand, and other small particles. Additionally, juveniles need abundant food sources, including insects, crustaceans, and other small fish. Habitat must also provide places to hide from predators, such as under logs, root wads and boulders in the stream, and beneath overhanging vegetation. Steelhead also need places to seek refuge from periodic high-flow events (side channels and off channel areas) and may occasionally benefit from the availability of cold-water springs or seeps and deep pools during summer. Estuarine habitats can be utilized during the seaward migration of steelhead, as these habitats have been shown to be nurseries for steelhead. Estuarine or lagoon habitats can vary significantly in their physical characteristics from one another but remain an important habitat requirement as physiology begins to change while juvenile steelhead become acclimated to a saltwater environment.

2.2.1.3. Influence of a Changing Climate on the Species

One factor affecting the rangewide status of threatened steelhead, and aquatic habitat at large, is climate change (Munsch et al. 2022). For the Southwest region, including California, the average temperature has already increased roughly 1.5 ^{o}F compared to a 1960-1979 baseline period (USGCRP 2009). High temperatures will become more common, indicating that southern California steelhead may experience increased thermal stress even though this species has shown to endure higher than preferable body temperatures (Spina 2007).

Precipitation trends are also important to consider. The Southwest region showed a 16 percent increase in the number of days with heavy precipitation from 1958 to 2007 (USGCRP 2009). Potential impacts to steelhead in freshwater streams include damage to spawning redds and washing away of incubating eggs due to higher winter stream flow (USGCRP 2009), and poor freshwater survival due to longer and warmer periods of drought (Mastrandrea and Luers 2012), which may lead to lower host resistance of steelhead to more virulent parasitic and bacterial diseases (Marcogliese 2001). Snyder and Sloan (2005) projected mean annual precipitation in central western California to decrease by 1.6 cm (2.8% percent) by the end of the 21st century.

Increased wildfire activity over recent decades reflects sub-regional responses to changes in climate, specifically observations of warmer and earlier onset of spring along with longer summer-dry seasons (Westerling and Bryant 2008). These wildfires periodically burn large areas of chaparral and adjacent woodlands in autumn and winter in southern California (Westerling et al. 2004). Wildfires can have long-term benefits for steelhead habitat (such as producing influxes of spawning gravels to the stream), but in the short-term they can be catastrophic due to accumulation of fine sediment that negatively affects spawning, foraging, and depth refugia (Boughton et al. 2007).

Changes in vegetation patterns for this region are forecasted to include substantial increases in the amount of grassland and decreases in most other vegetation communities (e.g., chaparral, coastal scrub, blue oak woodland, and foothill pine). Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia et al. 2002). Additionally, upper ocean temperature is the primary physical factor influencing the distribution of steelhead in the open ocean, and a warming climate may result in a northward shift in steelhead distribution (Myers and Mantua 2013).

2.2.2. Designated Critical Habitat

Critical habitat for the SCCC DPS of steelhead was designated on September 2, 2005, and consists of the stream channels listed in (70 FR 52488). Critical habitat has a lateral extent defined as the width of the channel delineated by the ordinary high-water line as defined by the Corps in 33 CFR 329.11, or by its bankfull elevation, which is the discharge level on the streambank that has a recurrence interval of approximately two years (70 FR 52522). PBFs are components of stream habitat that have been determined to be essential for the conservation of the SCCC DPS of steelhead, and are specific habitat components that support one or more steelhead life stages and in turn contain physical or biological features essential to steelhead survival, growth, reproduction, and conservation. These PBFs include:

1) Freshwater spawning sites with sufficient water quantity and quality and adequate accumulations of substrate (i.e., spawning gravels of appropriate sizes) to support spawning, incubation and larval development.

2) Freshwater rearing sites with sufficient water quantity and floodplain connectivity to form and maintain physical habitat conditions and allow salmonid development and mobility; sufficient water quality and forage to support juvenile development; and

natural cover such as shade, submerged and overhanging large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

3) Freshwater migration corridors free of obstruction with water quantity and quality 9 conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

4) Estuarine areas that provide uncontaminated water and substrates; food and nutrient sources to support steelhead growth and development; and connected shallow water areas and wetlands to cover and shelter juveniles.

5) Marine areas with sufficient water quality to support salmonid growth, development, and mobility; food and nutrient resources such as marine invertebrates and forage fish; and near-shore marine habitats with adequate depth, cover, and marine vegetation to provide cover and shelter.

Designated critical habitat for the SCCC DPS includes 1,249-miles of stream habitat and three-square miles of estuary habitat within Monterey, San Benito, Santa Clara, Santa Cruz, and San Luis Obispo counties from the Pajaro River Hydrologic Sub-area south to the Estero Bay Hydrologic Unit (to but not including the Santa Maria River Hydrologic Unit). There are 30 occupied hydrologic sub-unit watersheds within the freshwater and estuarine range of the DPS. Critical habitat has a lateral extent as defined by the bankfull discharge, also known as a 2-year flood event.

2.2.2.1. Status of Designated Critical Habitat

Streams designated as critical habitat in the SCCC DPS have the above PBF attributes to varying degrees, depending on the stream location and the impacts associated with the watershed. NMFS' most recent status review for SCCC steelhead (NMFS 2023) found habitat conditions (particularly regarding stream flows and fish passage) have improved for this DPS since the last status review. However, an extended drought coupled with extensive wildfires has temporarily curtailed migratory opportunities, degraded rearing habitat, and further depleted anadromous and resident *O. mykiss* populations. Urban development, flood control, water development, and other anthropogenic factors have adversely affected the proper functioning and condition of some spawning, rearing, and migratory habitats in streams designated as critical habitat. Urbanization has resulted in some permanent impacts to steelhead critical habitat due to stream channelization, increased bank erosion, riparian damage, migration barriers, pollution, and increased exposure to highway runoff. Many streams within the DPS have dams and reservoirs that reduce the magnitude and duration of flushing stream flows, withhold or reduce water levels suitable for fish passage and rearing, physically block upstream fish passage, and retain valuable coarse sediments for spawning and rearing. In addition, some stream reaches within the DPS' designated critical habitat may be vulnerable to further perturbation resulting from poor land use and management decisions.

2.3. Action Area

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

The action area encompasses the riparian corridor to the top of bank along approximately 3,400-LF of San Luis Obispo Creek within the City of San Luis Obispo, California. The upper boundary of the action area begins about 150-feet upstream of the Marsh Street Road Bridge and extends about 3400-feet downstream to the Madonna Road Bridge, which is 250-feet downstream from the final diversion where effects of the proposed action such as elevated turbidity are anticipated to terminate.

2.4. Environmental Baseline

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

2.4.1. Status of Aquatic Habitat in the Action Area

The active creek channel in the action area ranges from approximately 25 to 50-feet wide and alternates from shallow riffles to long shallow runs and pools of 6-inches to 1-foot at baseflow. Nine distinct pools were noted in a recent habitat survey (City 2023). The substrate of the creek is a mix of sand, gravels, and cobbles with sporadic larger rocks and boulders. The riparian zone ranges from 50 to 100-feet in width, and includes native (e.g., oak, willow, sycamore) and non-native trees (e.g., blue gum eucalyptus, palm) and plants (e.g., elmleaf blackberry, cape ivy). Immediately adjacent to the riparian zone are many commercial and residential developments with physical structures, paved parking lots, and/or landscaping with a variety of non-native plants. There appears to be perennial flow through the action area during years with above average rainfall with lowest flows (usually less than one or two cubic feet per second) observed during late spring through fall. During years with below average rainfall, all or a portion of the action area may dry naturally (Freddy Otte, Fish Biologist, City of San Luis Obispo, personal communication, November 2022). Overall, the PBFs of critical habitat for juvenile steelhead rearing (i.e., natural cover, shelter, water quality/quantity, and riparian) and spawning (i.e., spawning gravels and substrate of appropriate size and composition) exist throughout the action area. Additionally, the PBFs for migration are also considered suitable through the action area, as there is no obvious barrier to adult or juvenile steelhead migration.

2.4.2. Status of Steelhead in the Action Area

San Luis Obispo Creek is designated as a Core 1 steelhead population in NMFS' recovery plan (NMFS 2013). Core 1 populations are considered vital for the recovery of steelhead in their respective biogeographic population groups and are therefore considered highly important populations for recovering the species.

The population of steelhead in San Luis Obispo Creek, like streams throughout the SCCC DPS, has greatly decreased from historic levels as a result of anthropogenic impacts in the watershed. The current population size of steelhead in San Luis Obispo Creek, including the action area, is unknown. Previous steelhead surveys (Ally 2008) of San Luis Obispo Creek in the vicinity of the action area documented a density of about 22 juvenile steelhead per 100-feet of creek. There have also recently been confirmed observations of juveniles and steelhead spawning (during the winter season) within the action area (Freddy Otte, Fish Biologist, City of San Luis Obispo, personal communication, November 2022).

Overall, based on the above information, a recent City habitat survey (City 2023), and NMFS' observations of available in-creek habitat in the action area and experience with similar construction actions in this watershed, 800 juvenile steelhead may be present in the action area at the time the proposed action is undertaken. Adult steelhead are not expected to be present within the action area due to the timing of construction activities (June 1 to October 31).

2.4.3. Factors Affecting Species Environment in the Action Area and Vicinity

Road Encroachment and Urban Development

The action area is within the City of San Luis Obispo and immediately adjacent to and downstream of lands developed for commercial (e.g., office buildings, businesses, retail stores, etc.) and residential use (e.g., private homes, condominiums, multi-unit apartment buildings, etc.). Within this urban complex exists many paved streets and parking lots as well as several bridges that cross San Luis Obispo Creek. Highway 101 runs adjacent to the west nearly bordering the creek at a couple locations in the action area. Past and present development of lands often results in an increase of impervious surfaces and runoff of pollutants to surface water. The effects on water quality from road-surface runoff are most likely to occur during the wet season. Once in surface water, pollutants of sufficient concentration may impair water quality and alter the characteristics of the channel bed. Runoff from road surfaces contains dirt, oils, automotive fluids, and petro chemicals that are harmful to aquatic life, including steelhead (Tian et al. 2022; Brinkmann et al. 2022). Long-term urbanization effects have been associated with lower fish species diversity and abundance (Wang et al. 2001; Violin et al. 2011). Further, highway, road, and urban development along the creek and within the action area have contributed directly (i.e., through encroachment) or indirectly (i.e., through flood control measures to protect these developments) to confining the stream channel, reducing or eliminating floodplain connectivity, and diminishing riparian vegetation. Consequently, the proliferation of urban areas within the action area and vicinity is of concern.

Agricultural Development

Cultivated fields and open farmlands exist in portions the San Luis Obispo Creek watershed upstream of the action area and can contribute to effects that extend into the action area. There is potential for increased turbidity or nutrient loading due to runoff into the creek from agriculture and/or livestock on these properties. High turbidity concentrations can cause fish mortality, reduce fish feeding efficiency and decrease food availability. Agricultural runoff can transfer nutrients and pesticides to the creek, which can lower dissolved oxygen levels by increasing algae growth in streams and decreasing forage for steelhead (Anzalone et al. 2022).

Surface and Groundwater Diversion

Within the San Luis Obispo Creek watershed there are numerous privately-operated surface and groundwater diversions used to supply water for a variety of uses (e.g., private home, agricultural). Water diversions have the potential to adversely affect the growth and survival of steelhead (Spina et al. 2006) in the action area. Groundwater and surface water pumping lower the water table, decreasing the amount and extent of surface water to support steelhead rearing and may contribute to the curtailment of flows able to sustain steelhead migration (Stillwater and Kear 2012). Further, reduced streamflow or stream drying can mean a significant reduction or loss of habitat and even mortality to steelhead (M. McGoogan, NMFS biologist, personal observation).

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 of the Action on Critical Habitat for SCCC Steelhead

2.5.1.1. Temporary Alteration of Aquatic Habitat

Installing cofferdams to isolate and dewater work areas (a total of 2,300-LF) is expected to temporarily prevent a portion of San Luis Obispo Creek from serving as a freshwater rearing site for threatened steelhead for approximately five months over a single dry season (June 1 through October 31). The temporary loss of habitat is expected to have at least a few effects, described as follows.

The temporary loss of habitat is expected to translate into temporary loss of aquatic macroinvertebrate forage within the action area. Aquatic insects provide a source of food for instream fish populations and may represent a substantial portion of food items consumed by juvenile steelhead. The effect of macroinvertebrate loss as a food source is expected to be negligible because food would be available upstream and downstream of the isolated work areas

via drift through the diversion culverts. Consequently, the temporary loss of access to aquatic macroinvertebrates as a result of isolation activities is not expected to adversely affect forage opportunities within the area over the long term.

The temporary loss of habitat due to dewatering a portion of the creek represents an adverse effect to habitat for steelhead, for at least a few reasons. First, the loss of habitat translates into a loss of a freshwater rearing area, which is essential for the growth and survival of juvenile steelhead (the life stage expected to be present at the time the proposed action is implemented). Without freshwater rearing areas, the habitat cannot fulfill the intended conservation role for the species. Second, the quality and availability of habitat in the action area has already been diminished and reduced due to anthropogenic factors. Therefore, the loss of habitat due to isolation would perpetuate diminished availability. However, the area impacted by the cofferdams and dewatering is relatively small compared to the amount and extent of habitat available elsewhere in San Luis Obispo Creek and, perhaps more importantly, the cofferdams will be removed following completion of the proposed action and the creek bed and banks below the OHWM will be restored to pre-project conditions. Freshwater rearing habitat upstream and downstream of the action area will be unaffected by the proposed action and, therefore, continue providing the intended conservation role for the species. Overall, the loss of aquatic habitat associated with the dewatering will be temporary, and no long-term diminishment is anticipated in the physical capacity of the habitat to serve the intended functional role for steelhead.

2.5.1.2. Alteration of Creekbank and Creek bed

The manipulation and disturbance of the creek bed and creekbank can result in degradation to rearing habitat through loss of habitat complexity or changes to morphology and hydraulic conditions creating impediments to steelhead migration. Further, creating side channels along a stream can increase the potential for a channel avulsion (redirecting a portion or the entire stream into a new channel) or splitting of the stream low-flow channel. However, review of this proposed action indicates substantive adverse changes to channel morphology, channel hydraulics, or habitat complexity, are not expected for at least a few reasons.

First, although in-creek work activities (i.e., placement of the water diversions, falsework for the bridge CIDH columns, in-channel grading and VRSP installation for the floodplain benches and the entrance and exit points of the two bypass channels, installation of root-wads and boulder clusters, sediment removal at Marsh Street Bridge, and installation of the temporary access bridge) will disturbed the creek bed and creekbank, these disturbances are expected to be temporary and minimal. Once construction is complete, all debris and construction materials associated with the bridge installation and diversions will be removed from the creek, the temporary access bridge will be removed, and the creek will be restored to pre-construction contours (aside from the sediment removal area). Sediment removal methods at Marsh Street Bridge will not be excavate below 1-foot above the active low-flow channel to preserve the physical characteristics of the channel. In addition, although the new Bianchi Road Bridge will have a single longitudinal row of three 12-inch diameter CIDH column supports in the creek, the overall conveyance at this site will be greatly expanded, which is expected to reduce water velocity at higher flows and enhance passage conditions through the reach. As a result, no substantive change to the shape or natural substrate composition of the creek bed is expected.

Therefore, these disturbances are not expected to diminish the function value of the habitat for spawning, rearing, or migration.

Second, the installation of the VRSP along a total of 1,270-LF (i.e., 420-LF for the bypass transition points and 850-LF along the floodplain benches) of creekbank is not expected to create velocity increases in flow that would reduce the functional value of migration through the action area for a couple reason. One, the VRSP will be applied in shorter segments (i.e., a total of 8 separate segments ranging from 70 to 300-LF) at discrete locations dispersed across approximately 2,300-LF of creek with 4,600-LF of creekbank. The VRSP will be backfilled and buried along the toe of the creekbank, and expected to maintain the same general geomorphic shape of the channel. Further, planting the VRSP with native trees and other vegetation is expected to increase roughness along the creekbank and thereby, contribute to decreasing water velocity at high flows. Two, in-creek installation of several habitat features (e.g., at least four boulder clusters and three anchored root-wads) along the creekbank and in the creek bed are expected to add additional roughness to the creek channel and create low-velocity refuges for steelhead during high-flow events. Lastly, the floodplain benches and bypass channels will allow elevated stream flows to be dispersed across a wider area which is expected to reduce velocity in the main channel of San Luis Obispo Creek.

Third, although the VRSP will limit lateral-channel migration and associated habitat forming processes, the habitat complexity in the action area is not expected to be appreciably reduced. VRSP will be dispersed and only applied in discrete locations along a fraction of the total creekbank in the construction areas. The planting of VRSP with native vegetation is expected to provide natural-like riparian characteristics, which will provide shade, cover, and habitat complexity. Further, the in-creek installation of the habitat features (i.e., root-wads and boulder clusters) is expected create additional habitat complexity in the action area.

Finally, the risk of channel avulsion is considered low and not expected as a result of constructing the proposed bypass channels. The transitions between the natural creek at the entrance and exit of the bypasses will be fortified with VRSP and root-wads which are expected to keep the channel and associated transition elevations stable. Further, a similar, downstream bypass channel with no added fortification or stabilizing elements, continues to perform as intended for over 30-years, experiencing multiple high-flow events (including the exceptionally large events of this past winter) and maintains position as an elevated high-flow bypass with no channel avulsion.

Overall, based on the foregoing, habitat complexity beneficial for rearing, substrate adequate for spawning, and channel hydraulics conducive for steelhead passage, collectively, are expected to be maintained in the action area. As a result, the proposed action is not expected to appreciably diminish the functional value of the action area for rearing, spawning, or migration.

2.5.1.3. Alteration of Water Quality

Risk of Increased Sedimentation and Turbidity

We expect the adverse effects to water quality resulting from increases in sedimentation and turbidity due to construction activities will be minimal and temporary for several reasons. First, the proposed action includes a number of sediment and erosion-control measures (e.g., installing silt fencing, straw-waddles, etc.) to reduce the likelihood sediment would enter the wetted stream channel. Second, the activities occurring in the wetted creek (i.e., installing the block-nets, seining, installing and removing the coffer diversion dams) are expected to be confined to localized areas and short lived (a few hours or less). Third, water pumped from the work area will be pumped through a filtering system, eliminating the potential of turbid water returning to the creek. Fourth, isolating and dewatering the work area prior to beginning construction activities will allow equipment and crews to work in dry conditions and remove any debris from bridge demolition out of the dry in-creek work area, eliminating the potential for water-quality alterations during construction.

Similarly, post-construction adverse effects to water quality from increased sedimentation are expected to be minimal, if detectable. Construction and associated excavating of material may disturb sediment particles on the bed and banks of the creek making them more susceptible to mobilization. However, loose particles within the channel are expected to be composed of native creek alluvium that will redistribute and settle within the first few hours of elevated creek flow through the channel. Further, the majority of ground disturbance will be in upland areas above the OHWM, which will be extensively planted and seeded prior to the first rainy season, increasing cover and reducing the risk and magnitude for increased sediment runoff. Additionally, the floodplain benches with their sloped banks and VRSP along the toe are anticipated to reduce the overall sediment inputs in these areas which are currently narrow, incised channels with vertical, actively eroding banks.

Risk of Increased Pollutants

Increases in pollutants from newly poured concrete (i.e., for the new bridge abutments and CIDH piles to the new Bianchi Lane Bridge) or leaks from equipment are expected to be unlikely or minimal due to several proposed protective measures. First, newly poured concrete will be contained in place with forms and the isolated, dry work area will prevent wet concrete from entering surface water if a leak occurs. Second, equipment and machinery will be staged, cleaned, and refueled in a contained area, which will be a minimum of 100-feet from aquatic habitat. Third, spill kits will be kept onsite to ensure fast, effective containment and cleanup of a spill should one occur. Finally, construction activities will be conducted during the dry season when streamflow is low and runoff from rainfall is unlikely.

2.5.1.4. Disturbance to Near Channel Vegetation

The construction of the bypasses, floodplain benches, and placement of VRSP has the potential to temporarily cause a discrete loss of shade and cover along San Luis Obispo Creek through the trimming and removal of trees and vegetation. In total, the proposed action is estimated to result

in the removal of up to 150 trees. This loss could degrade water quality through reduced shade and increase water temperatures (Opperman and Merenlender 2004). However, these tree removals will be in discrete locations, widely dispersed across approximately 3,050-LF of the action area with many of the trees to be removed on upland areas away from the immediate creekbank. Further, there are many trees that will remain and retain a dense riparian canopy within and immediately upstream and downstream of the action area providing shade and cover to this reach during and immediately after construction. In addition, with implementation of the HMMP, native riparian vegetation (a minimum of 192 native trees) and seeds will be planted throughout the disturbed portions of the action area including within the VRSP to minimize impacts from construction. Based on NMFS' experience observing the response of riparian vegetation to human-made disturbances, the riparian zone is expected to recover one to two years following the completion of construction. Over, the longer term the plantings from the HMMP and within the VRSP are expected to increase the overall number of trees and amount of riparian vegetation in the action area as well as greatly increase the overall percent of native vegetation versus invasive plant species. In consideration of the foregoing, the proposed action is not expected to diminish the functional value of habitat for steelhead and may result in a benefit over the long term.

Additionally, the applicant proposes monitoring and success criteria as part of the HMMP to ensure the recovery of restoration and replanting areas within the action area for a minimum of five years following completion of construction. However, there is no specification or protocol described for submitting these reports to NMFS. Without these monitoring reports NMFS will be unable to track the recovery of vegetation and habitat within the action area or whether additional measures or further consultation are necessary.

2.5.2. Effects of the Action on SCCC Steelhead

The remaining portion of the effects analysis will focus on consequences to threatened SCCC steelhead in the action area as a result of the proposed action. The following section is organized to explain effects to this species based on the categories of expected effects to designated critical habitat. Because the timing of the in-channel work is outside the steelhead migration season, only juvenile steelhead are expected to be present in the action area and affected by the proposed action. Therefore, the following discussion focuses solely on consequences to juvenile steelhead.

2.5.2.1. Capture and Relocation of Steelhead

Although there is risk of harm and mortality to steelhead inherent with handling and relocation, relocation efforts overall are expected to greatly reduce impacts to juvenile steelhead.

With respect to risk of harm to steelhead, handling can induce stress and temporary disorientation, leading to potential injury and mortality. Direct injury may impair steelhead movement, feeding, and survival. To minimize the risk of injury or mortality the applicant proposes specific BMPs for capturing and relocating individuals. For example, the applicant proposes employing biologists with experience handling steelhead. Further, prior to the start of construction and dewatering activities, the biologist will assess and identify sites for steelhead

relocation that have perennial flow, appropriate water quality (e.g., dissolved oxygen, temperature), and habitat features (e.g., depth, size, instream cover) to support relocated individuals. Based on NMFS' observation, there appears to be ample, sufficient in-creek habitat upstream and downstream of the action area for relocation. Although the applicant will document the capture and relocation of juvenile steelhead within the dewatered area, the proposed action does not include a provision for notifying NMFS in real time if a steelhead mortality occurs, which can be important for identifying whether additional minimization measures are needed to protect steelhead.

Based on NMFS' observations of available habitat in the action area and experience with similar construction projects in this watershed, NMFS expects no more than a total of 800 juvenile steelhead will need to be relocated from the dewatered work areas and wetted creek segments in the action area if natural drying of these segments occurs. NMFS expects up to 30 juvenile steelhead may be injured or killed as a result of relocating steelhead prior to and during construction. This estimated mortality is also based on NMFS' experience and knowledge gained on similar proposed actions in San Luis Obispo County during the last several years. Overall, based on NMFS' general familiarity of steelhead abundance in the SCCC DPS, and San Luis Obispo County streams in particular, the anticipated number of juvenile steelhead that may be injured or killed as a result of the proposed action is likely to represent a small fraction of the overall watershed-specific populations and the entire threatened SCCC DPS of steelhead. Therefore, the effects of the relocation on steelhead are not expected to give rise to population-level effects.

2.5.2.2. Steelhead Stranding

The creation of side channels or off-channel habitat inundated at higher flows can create areas where steelhead are susceptible to becoming stranded as storm waters recede. The long-term risk of steelhead stranding in off-channel areas constructed as part of the proposed action is expected to be low for reasons provided below.

The floodplain benches are not anticipated to strand steelhead. Benches will be sloped at 2.5:1 toward the channel and thereby, expected to naturally and effectively guide steelhead back to the channel as storm waters recede.

The bypass channels are expected to be low-risk for steelhead stranding. The bypasses only activate (start becoming inundated) at higher flows (i.e., at 1,790 cfs and above for the BLBC and 440 cfs and above for the SSBC) and for short (less than 24 hour) durations (Rincon 2021). Further, the bypasses will be grassy channels with no habitat features (e.g., pools, large boulders, etc.) and are intentionally designed and sloped (i.e., longitudinal slope of 0.5% for BLBC and 1.2% slope for SSBC and a 2% horizontal slope for both) such that no areas of pooled water form that might create a holding area for steelhead. Upstream migrating steelhead are not considered likely to use or be attracted to the bypass channels because during large storm events the bypass channel is expected to have higher velocity flows than the main channel (Wallace 2023) and lack velocity refuges. Overall, flows are expected to recede naturally, instep with the declining hydrograph of the creek providing steelhead an opportunity to transition down slope toward the main creek channel. Finally, the existing similar bypass downstream of the action

area has been surveyed on the declining limb of several large storms over the years including a couple events this past winter when this channel was activated for an extended period and no steelhead was observed stranded in this channel during any of these surveys (Freddy Otte, Fish Biologist, City of San Luis Obispo, personal communication, August 2023).

Although the risk is low, there may be potential for a small number of steelhead stranding and mortality in the bypass. To this end, the applicant proposes to monitor the bypass channels for a minimum of five years after construction to determine whether stranding is occurring as a result of the bypass channels. The applicant proposes to relocate steelhead that appear stranded back into the main wetted creek channel. This monitoring is intended to inform with greater confidence whether the design of the bypass channels minimizes the risk of stranding steelhead as expected. With this monitoring, NMFS anticipates no more than 10 juvenile steelhead will be captured and relocated from the bypass channels and 1 juvenile mortality, annually.

Finally, the proposed bypass monitoring is vague, lacking specific criteria to determine the timing for conducting stranding surveys, the magnitude of flow that would trigger a survey, or the number of surveys at a certain magnitude that would be considered 'sufficient' for assessing steelhead stranding risk. Without clear success criteria and monitoring protocols, the proposed bypass monitoring has the potential to be ineffective for observing stranded steelhead in real-time, assessing long-term steelhead stranding risk, and ensuring adverse effects to steelhead are adequately minimized.

2.5.2.3. Temporary Loss of Living Space

The temporary loss of habitat owing to isolation and dewatering of the in-creek work area could translate into an adverse effect on juvenile steelhead primarily through the short-term loss of a freshwater rearing area and displacement of steelhead presuming presence of this species. This could increase densities of steelhead in neighboring reaches of the creek outside the action area. However, based on our observations of the creek upstream and downstream of the action area, and our general familiarity of steelhead abundance, there appears to be ample, comparable habitat adjacent to the action area that can sufficiently support steelhead temporarily displaced from the work areas. Further, the effect of macroinvertebrate loss on juvenile steelhead is expected to be negligible because food from upstream sources would be available downstream of the dewatered area via drift through the diversion culvert. Overall, we anticipate this loss would be temporary, minimal, and affect only a small portion of the overall San Luis Obispo Creek steelhead population for a few months (June 1 to October 31) over a single dry season. Additionally, the proposed habitat enhancements (i.e., the installation of root-wads and boulder clusters) are expected to further minimize the effects of the temporary loss of living space through introducing new features to sustain habitat complexity in the action area.

2.5.2.4. Steelhead Movement and Migration

Steelhead movement is not expected to be substantially restricted through the action area in the short-term during construction. Although steelhead will be temporarily excluded from the dewatered work area, the culvert selected for the diversion will be appropriately sized for passage of steelhead through the work areas. Further, the diversions will only be present during

the summer of a single dry season (removed completely by October 31) when creek-flow is minimal and riffle depth in this reach might naturally preclude or limit movement of steelhead between pool habitats.

Likewise, steelhead movement and migration are not expected to be diminished over the long-term after work activities are complete, for several reasons. First, the post-construction shaping of the channel is expected to retain the basic pre-construction contours. Second, natural habitat characteristics are expected to form following extensive planting of vegetation within the VRSP, floodplain benches, and natural creekbanks. Third, in-creek installation of several anchored habitat features (e.g., at least three root-wads and four boulder clusters) are expected to create low-velocity refuges for steelhead during high-flow events. Finally, steelhead migrating upstream during high flow events may benefit from the benches and bypasses lowering creek velocity in the main channel. As such, characteristics and condition of the action area are expected to support volitional, unimpeded steelhead passage.

2.5.2.5. Altered Water Quality

The anticipated changes in water quality (i.e., increased sediment, turbidity, or pollutants) are not expected to translate into acute or chronic adverse effects on steelhead. Highly turbid water can result in decreased feeding, growth, and survival of juvenile steelhead (Thompson and Beauchamp 2016). Although certain activities associated with work area isolation (i.e., seining, diversion installation and removal) may increase turbidity, the increase is expected to be localized and last only a few hours or less. Further, installing sediment and erosion-control devices (e.g., straw-fiber rolls, silt-fencing) and isolating the work area from surface water is expected to eliminate the likelihood of sediment, debris, or pollutants entering surface water during construction. Therefore, effects of the proposed action on steelhead associated with increases in sedimentation and turbidity are expected to be minimal and temporary.

2.5.2.6. Alteration of Channel Shading

As discussed previously (section 2.5.1.4), short-term effects to steelhead due to loss of shading are expected to be minimal and temporary primarily because vegetation trimming and removal near the creek channel will be widely dispersed across a large area and limited to discrete locations, there will be a high number of trees still remaining in and adjacent to the action area continuing to provide cover and shade, and there will be an extensive revegetation effort with a relatively short (one to two year) recovery time expected. Over the long-term, the native trees and vegetation planted in the VRSP, on the floodplain benches, and on the creekbank are expected to increase native vegetation and overall shading in the action area. As such, alteration of shading due to the proposed action is not expected to impact the fitness of steelhead in the action area.

2.6. Cumulative Effects

"Cumulative effects" are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation [50 CFR 402.02 and 402.17(a)]. Future Federal actions that are unrelated to the

proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

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

NMFS is generally familiar with activities occurring in the action area, and at this time, unaware of such actions that would be reasonably certain to occur. Consequently, no cumulative effect is likely, beyond the continuing effects of present land uses reasonably certain to occur into the future (see Environmental Baseline, Section 2.4).

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step in assessing the risk that the proposed action poses to the 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.

Juvenile steelhead are expected to be present in the action area during the proposed action and, therefore, subject to the effects from the proposed action. The adverse effects to steelhead include potential injury or mortality during the process of capture and relocation from the in-creek work area. However, precautions are proposed that are expected minimize the risk of injury and mortality to steelhead during capture and relocation and the nearby instream habitat in San Luis Obispo Creek is expected to suitably harbor the relocated steelhead. Further, the expected effects associated with the habitat alteration due to the temporary diversion will be brief and localized. The risk of steelhead stranding in the bypasses is considered low, though there may be potential for a small number of steelhead stranding. The applicant proposes post-project monitoring to assess the long-term risk of steelhead stranding in the bypass and proposes to relocate stranded steelhead into the main creek channel.

Based on the steelhead surveys and observations described in the environmental baseline, NMFS concludes non-lethal take of no more than 800 juvenile steelhead may be captured and relocated during the proposed action as a result of dewatering the three in-creek work areas and relocating steelhead within the action area if natural drying of these reaches occurs during construction. A potential for lethal take of no more than 30 juvenile steelhead from these relocations is expected. No more than 10 juvenile steelhead and 1 juvenile mortality are anticipated during stranding monitoring of the bypass. Therefore, the overall risk of mortality as result of the proposed action and associated monitoring is low. Based on NMFS' general familiarity of steelhead abundance in the SCCC DPS, and San Luis Obispo County streams in particular, the anticipated number of

juvenile steelhead that may be injured or killed as a result of the proposed action is likely to represent a small fraction of the overall watershed-specific populations and the entire threatened SCCC DPS of steelhead. Therefore, the effects of the relocation on steelhead or bypass monitoring and their respective anticipated mortality are not expected to give rise to population-level effects.

Overall, the impacts to critical habitat are expected to be temporary and not translate into a reduction in the functional value of the habitat in the long term. Vegetation trimming and removal is expected to be widely distributed across a large action area, only conducted at discrete locations, recover quickly with revegetation efforts, and not expected to decrease the functional value of the riparian zone. The planting of numerous native trees on the floodplain benches and within the VRSP is expected to increase the benefits of the riparian zone (e.g., shading, cover, food production). The proposed bioengineered elements of the design (e.g., backfilling and planting the VRSP and creekbanks with native trees and cuttings) and installing at least seven in-creek habitat features (e.g., three root-wads and four boulder cluster) is expected to minimize the potential effects of VRSP on habitat complexity and fluvial-geomorphic processes as well as assist in maintaining unimpeded conditions for steelhead migration. Therefore, rearing, spawning, and migration conditions are expected to be maintained which support the viability of the threatened SCCC DPS of steelhead.

We also considered the proposed action in the context of anticipated climate trends anticipated for the south-central region inclusive of the action area. The action area could be subject to higher average summer temperatures and lower precipitation levels in the future as a result of climate change, which would lead to higher creek temperatures and longer dry periods. Reduction in the amount of precipitation would reduce the amount and extent of flow. For this proposed action, these noted likely effects of climate change are unlikely to be measurably detected by the time construction is completed. Further, the short-term effects of the proposed action are expected to have completely elapsed prior to these climate-change effects.

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 cumulative effects, NMFS' biological opinion is the proposed action is not likely to jeopardize the continued existence of the threatened SCCC DPS of steelhead or destroy or adversely modify designated critical habitat for this species.

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 taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1. Amount or Extent of Take

In the biological opinion, NMFS determined incidental take is reasonably certain to occur as follows:

For reasons discussed in this biological opinion, NMFS determined the proposed action on San Luis Obispo Creek will result in the incidental take (capture, injury, and mortality) of juvenile steelhead when portions of the action area are dewatered and potentially during post-construction monitoring of the bypass channels. To this end, NMFS anticipates no more than 800 juvenile steelhead will be captured and relocated during construction (i.e., either from the dewatered work areas or the wetted creek segments in the action area if natural drying of these reaches occurs during construction) and no more than 30 of these juvenile steelhead may be injured or killed. NMFS anticipates no more than 10 juvenile steelhead will be captured and relocated annually during post-construction monitoring of the bypass channel and no more than one of these juvenile steelhead killed, annually. With respect to construction, incidental take will have been exceeded if more than 800 juvenile steelhead are captured or more than 30 juvenile steelhead are killed. With respect to post-construction bypass monitoring, incidental take will have been exceeded if more 10 juvenile steelhead are captured or more than 1 juvenile steelhead is killed, annually. The accompanying biological opinion does not anticipate other forms of take incidental to the proposed action.

2.9.2. Effect of the Take

In the biological opinion, NMFS determined 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).

NMFS determined the following reasonable and prudent measures are necessary and appropriate to minimize and monitor incidental take of steelhead. The results of the effect analysis provide the basis for the following reasonable and prudent measure:

1. Avoid and minimize harm and mortality of steelhead during the relocation activities.

2. Implement effective post-construction monitoring and reporting activities to ensure adequate site recovery and minimization of effects on threatened SCCC steelhead and designated critical habitat for this species, including potential stranding in the bypass.

2.9.4. Terms and Conditions

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

1. The following terms and conditions implement reasonable and prudent measure 1:

   A. The applicant's biologist shall contact NMFS (Matt McGoogan, 562-980-4026 or matthew.mcgoogan@noaa.gov) as soon as practicable if one or more steelhead are found dead or injured. The purpose of the contact shall be to review the activities resulting in take and to determine if additional protective measures are required. All steelhead mortalities shall be retained, frozen as soon as practical, and placed in an appropriate-sized sealable bag that is labeled with the date and location of the collection and fork length and weight of the specimen(s). The biologist shall retain frozen samples until transfer of these samples (usually shipping overnight on dry-ice) can be coordinated with NMFS. Subsequent notification must also be made in writing to Matt McGoogan, NMFS, 501 West Ocean Boulevard, Suite 4200, Long Beach, California 90802-4213 and matthew.mcgoogan@noaa.gov within five days of noting dead or injured steelhead. The written notification shall include 1) the date, time, and location of the carcass or injured specimen; 2) a color photograph of the steelhead; 3) cause of injury or death; and 4) name and affiliation of the person whom found the specimen.

   B. The applicant's biologist shall provide a written steelhead-relocation report to NMFS within 30 working days following completion of construction. The report shall include (1) the number and size of all steelhead relocated during the proposed action; (2) the date and time of the collection and relocation; (3) the location and habitat the steelhead were released to; (4) a description of any problem encountered during the project or when implementing terms and conditions; and (5) any effect of the proposed action on steelhead that was not previously considered. The report shall be sent to Matt McGoogan, NMFS, 501 West Ocean Boulevard, Suite 4200, Long Beach, California 90802-4213 and matthew.mcgoogan@noaa.gov.

2. The following term and condition implement reasonable and prudent measure 2:

   A. The applicant shall submit a copy of the annual HMMP monitoring report to NMFS (Matt McGoogan, NMFS, 501 West Ocean Boulevard, Suite 4200, Long Beach, California 90802-4213 and matthew.mcgoogan@noaa.gov) by January 31st following each year of monitoring.

B. The applicant shall develop and implement a detailed Bypass Monitoring (Plan). The applicant shall submit the draft Plan to NMFS (matthew.mcgoogan@noaa.gov) within 60 days after the in-creek construction is complete (i.e., the date the in-creek diversions have been completely removed from the creek) for review and comment. Within 60 days of receiving NMFS' comments on the draft Plan, the City shall revise the draft Plan accordingly to produce and provide the final Plan to NMFS. At a minimum, the content of the Plan shall include: (1) the requirement to submit an annual report by January 31st following each year of monitoring, (2) criteria for determining when a bypass survey will be conducted (e.g., magnitude of flow necessary to trigger a survey, timing of the actual survey in conjunction with the hydrograph, etc.), (3) the number of bypass surveys at a certain magnitude flow that will effectively assess steelhead stranding risk, (4) criteria to determine when a steelhead is determined to be stranded and requiring relocation, and (5) identify the minimum data that will be gathered with each survey event (e.g., the date and time of the survey, flow in creek at the time of the survey, estimated flow in the bypass channel, number of steelhead observed, etc.).

2.10. Conservation Recommendations

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

NMFS has no conservation recommendation related to this proposed action.

2.11. Reinitiation of Consultation

This concludes formal consultation for the Corps' permitting of the applicant's Mid-Higuera Bypass and Habitat Enhancement project on San Luis Obispo Creek.

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

3. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (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.

3.1. 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 Corps. Other interested users could include the City, County, California Department of Fish and Wildlife, and U.S. Fish and Wildlife Service. Individual copies of this opinion were provided to the Corps, City, and County. 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.

3.2. 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.

3.3. Objectivity

Information Product Category: Natural Resource Plan

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

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this 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 reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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