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

Highway 225/Las Positas Retaining Wall Project

NMFS Consultation Number: WCR-2016-4330

Action Agency: California Department of Transportation

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Southern California Coast steelhead (*Oncorhynchus mykiss*)	Endangered	Yes	No	No

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

Issued By: for

William W. Stelle, Jr.
Regional Administrator

Date: MAR 23 2016

1. INTRODUCTION

This introduction 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 the biological opinion (opinion) and incidental take statement portions of this document in accordance with Section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 *et seq.*), and implementing regulations at 50 CFR 402.

A pre-dissemination review of this document was completed using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available through NMFS' Public Consultation Tracking System [https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts]. A complete record of this consultation is on file at NMFS' California Coastal Area Office, Southern California Branch in Long Beach, California.

1.2 Consultation History

On December 23, 2015, NMFS received from the California Department of Transportation's (Caltrans) office in San Luis Obispo, California, a written request for formal consultation under Section 7 of the U. S. Endangered Species Act (ESA). Caltrans' request concerned the Highway 225/Las Positas Retaining Wall Project (proposed action) along Arroyo Burro Creek, Santa Barbara County. Caltrans is serving as the lead federal agency for the proposed action in accordance with the provisions of the *Memorandum of Understanding between the Federal Highway Administration and Caltrans Concerning the State of California's Participation in the Surface Transportation Project Delivery Program Pursuant* to 23 USC 327, which became effective October 1, 2012. After reviewing Caltrans' request and biological assessment (BA), NMFS determined the information was insufficient to initiate consultation. By electronic correspondence dated January 11, 2016, NMFS requested additional information regarding the proposed revegetation plan, and recommended that Caltrans incorporate additional avoidance and minimization measures into the proposed action. Upon NMFS' receipt and review of the incorporated avoidance and minimization measures in the proposed action on January 12, 2016, formal consultation was initiated on the same day.

1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR §402.02).

Overview of the Proposed Action: The existing undermined retaining wall along Las Positas Road will be removed to install a 92-foot long vertical soil-nail wall. The proposed action is necessary to alleviate further undermining of the wall and possible failure of the roadway itself. Construction of the proposed action is expected to be completed during one season with all instream work to occur

between June 15 and October 31 of 2018. Best-management practices (BMP) are incorporated into the proposed action and will be implemented when construction activities are undertaken.

Proposed Activities to Prepare the Work Area for Construction: To prepare for construction in dry conditions, the work area will be isolated from surface water and any steelhead within the affected area will be captured by seine and dip nets then relocated. Two coffer dams will be constructed across the channel immediately upstream of the retaining wall and one coffer dam downstream of the wall. The dams will remain in place for the duration of the construction season. Surface water will travel through the work area in a pipe and return to the creek approximately 180-feet downstream. After the immediate project area is dewatered and all steelhead have been removed and relocated, surface flow will be diverted around the work area for the duration of construction.

Prior to the actual diversion of surface water, block nets of one-eighth-inch mesh will be placed about 20-feet upstream and downstream of the proposed diversion to prevent juvenile steelhead from entering the work area from either direction. The entire work area will be surveyed for steelhead, which will be captured with seines and dip nets, then relocated downstream to a pre-determined location with suitable habitat. Upon completion of the proposed action and construction activities, barriers to surface flow shall be removed. The following measures will be undertaken to minimize take of steelhead and adverse effects to aquatic habitat during the dewatering process:

- A Caltrans approved biologist with experience in steelhead biology and ecology, aquatic habitats, biological monitoring (including diversion/dewatering), and capturing, handling, and relocating the species will be present during all construction activities;
- All diversion pump intakes will be screened with 3/32-inch mesh; and
- Caltrans' biologist will note the number of steelhead observed in the affected area, the number of steelhead relocated, size, date, time, and location of the collection and relocation.

Proposed Construction Activities: After the work area is dewatered, Caltrans will remove the undermined section of retaining wall and begin construction of the soil-nail wall. A drill rig will be positioned on a temporary earthen bench at the face of the wall to install the soil nails. The wall will be constructed down to the creek bottom. Following completion of the wall, the stream channel is expected to have a slightly widened configuration throughout much of the action area, relative to existing conditions. The disturbed streambank section will be graded to a 2:1 slope or less and planted with native vegetation and the streambed will be restored to preexisting conditions. Caltrans proposes to implement the following measures to avoid and minimize adverse effects to steelhead and aquatic habitat during construction activities:

- Remove concrete debris from the dewatered work area as necessary;
- Maintain and monitor sediment controls (i.e., fiber-rolls, silt-fencing, hay bales, and settling basin) throughout the demolition and construction periods to minimize erosion and sedimentation of the disturbed sections of the work area. The Caltrans' biologist shall have the authority to halt work activity as necessary and to recommend measures to avoid/minimize adverse effects to steelhead and their habitat; and
- All vehicle and equipment maintenance, staging, and refueling will be located at least 60-feet outside the riparian corridor of the creek.

Proposed Post-Construction Activities: Following construction of the proposed action, Caltrans proposes to implement a revegetation plan that includes native trees and understory species. The revegetation plan provides Caltrans' approach for the restoration, enhancement, and replacement of riparian habitat temporarily or permanently lost as a result of the proposed action. Revegetation will include planting arroyo willow (*Salix lasiolepis*) and southern California black walnut (*Juglans californica*) at a ratio of 1:1. Currently, a monitoring plan has not been proposed by Caltrans to ensure biological resources are restored and enhanced.

"Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02). There is no interrelated or interdependent action associated with the proposed action based on NMFS' review.

1.4 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 about 0.026-acre of land along the eastern bank of Arroyo Burro Creek and includes natural communities and land-use types such as riverine, riparian forest, and existing roads. The length of Arroyo Burro Creek within the action extends about 180-feet upstream of the downstream diversion centerline and 350-feet downstream from the end of the diversion, where temporary construction effects such as elevated turbidity are anticipated to cease. The length of Arroyo Burro Creek within the action area is about 530-feet.

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

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, Federal agencies must ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitat. If incidental take is expected, Section 7(b)(4) requires NMFS to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures 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 "to jeopardize the continued existence of a listed species," which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR §402.02). The

jeopardy analysis considers both survival and recovery of the species.

The adverse modification analysis considers the impacts of the Federal action on the conservation value of designated critical habitat. This biological opinion relies on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. We finalized, as of March 14, 2016, the following regulatory definition: destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features (Final Rule, 81 FR 7214).

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

- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.
- Reach conclusions regarding the jeopardy and adverse modification standards.
- If necessary, define a reasonable and prudent alternative to the proposed action.

Information submitted by Caltrans and reviewed by NMFS included the following documents: (1) the biological assessment (BA) for the proposed action; (2) project plans; (3) conceptual revegetation plan; and (4) electronic correspondence including avoidance and minimization measures. NMFS relied on relevant ecological literature, documented in the official record for the proposed action, to inform the assessment of potential effects on endangered steelhead and designated critical habitat.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of endangered steelhead, as determined by the level of extinction risk that the listed species faces, 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 informs the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR §402.02.

2.2.1 Status of the Species. – *Oncorhynchus mykiss* is one of six Pacific salmon in the genus *Oncorhynchus* that are native to the North American coast. 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 are 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*)	Southern 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 geographic range of this DPS extends from the Santa Maria River, near Santa Maria, to the California–Mexico border (NMFS 1997; NMFS 2002; NMFS 2006), which represents the known southern geographic extent of the anadromous form of *O. mykiss*. NMFS described historical and recent steelhead abundance and distribution for the southern California coast through a population characterization (Boughton *et al.* 2006). Surveys in Boughton *et al.* (2006) indicate between 58 percent and 65 percent of the historical steelhead basins currently harbor *O. mykiss* populations at sites with connectivity to the ocean. Most of the apparent losses of steelhead were noted in the south, including Orange and San Diego counties (Boughton *et al.* 2005). The majority of losses (68 percent) of steelhead were associated with anthropogenic barriers to steelhead migration (*e.g.*, dams, flood-control structures, culverts). Additionally, the investigators found the barrier exclusions were statistically associated with highly-developed watersheds.

Steelhead in southern California are categorized as "winter run" because they can migrate into natal streams between December and April (Fukushima and Lesh 1998), arriving in reproductive condition and spawning shortly thereafter. Adults may migrate several miles, hundreds of miles in some watersheds, to reach their spawning grounds. Steelhead have evolved to migrate deep into the extreme fringes of a watershed to exploit the environmental conditions that favor production of young (Montgomery *et al.* 1999). Steelhead in southern California streams can be tolerant of warm water, remaining active and feeding at temperatures that are higher than the temperature preferences and heat tolerances reported for the species based on individuals from northern latitudes (Spina 2007). While 46 drainages support this DPS (Boughton *et al.* 2005), only 10 population units possess a high biological likelihood of being viable and independent[1] (Boughton *et al.* 2006).

Although the geographic area of the DPS is broad, the individual population units are sparsely distributed throughout the DPS with extensive spatial breadth often existing between nearest-neighbor populations (Boughton *et al.* 2005; NMFS 2005; Boughton *et al.* 2006). Extinction of some population units has been observed as well as contraction of the southern extent of the

[1] Independent population: a collection of one or more local breeding units whose population dynamics or extinction risk over a 100-year time period is not substantially altered by exchanges of individuals with other populations (Boughton *et al.* 2006).

species' geographic range (Boughton *et al.* 2005; Gustafson *et al.* 2007). One reason for the extensive spatial gaps between neighboring population units and the range contraction involves man-made barriers to steelhead migration (Boughton *et al.* 2005).

The small number of extant populations that make up this DPS are vulnerable to extirpation due to loss of accessibility to freshwater spawning and rearing habitat, low abundance, degraded estuarine habitats and watershed processes essential to maintain freshwater habitats (NMFS 2011). There is little new evidence to suggest that the status of the SCC DPS has changed appreciably in either direction since publication of the most recent collections of status reviews (Good *et al.* 2005; NMFS 2011; Williams *et al.* 2011). New information since the last review concerning the status of anadromous runs in the DPS is limited and does not suggest a change in extinction risk.

Population abundance trends can vary based on yearly rainfall within the range of the SCC DPS. A relatively large number of adult steelhead were observed in 2008, two years after an extended wet spring that presumably gave smolts ample opportunity to migrate to the ocean. Low rainfall appears to have caused many spawners to get trapped in freshwater, where they were observed during the summer. In addition, low rainfall probably improved conditions for viewing fish during snorkel surveys and trapping fish in weirs (Williams *et al.* 2011).

2.2.2 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 to reside 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 grow to 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).

2.2.3 Steelhead Habitat Requirements. – Habitat requirements of steelhead 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.

2.2.4 Status of Designated Critical Habitat. – Within the process of designating critical habitat, NMFS developed a list of Primary Constituent Elements (PCEs) (NMFS 2005) for habitat sites essential to support one or more life stages of the DPS, such as sites for spawning, rearing, and migration (Table 1). These sites in turn contain physical or biological features[2] essential to the conservation of the endangered SCC DPS of steelhead.

Habitat for steelhead has suffered destruction and modification, and anthropogenic activities have reduced the amount of habitat available to steelhead (Nehlsen *et al.* 1991; NMFS 1997; Boughton *et al.* 2005; NMFS 2006). In many watersheds throughout the range of the SCC DPS, the damming of streams has precluded steelhead from hundreds of miles of historical spawning and rearing habitats (*e.g.*, Twitchell Reservoir within the Santa Maria River watershed, Bradbury Dam within the Santa Ynez River watershed, Matilija Dam within the Ventura River watershed, Rindge Dam within the Malibu Creek watershed, Pyramid Dam and Santa Felicia Dam on Piru Creek). These dams create physical barriers and hydrological impediments for adult and juvenile steelhead migrating to and from spawning and rearing habitats. Likewise, construction and ongoing impassable presence of

[2] The essential features include water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, single or complex combination of habitat characteristics, and ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity (per proposed rule: Docket No. FWS–HQ–ES–2012–0096; Docket No. 120106025–3256–01; 4500030114 on May 12, 2014; 50 CFR 424 Vol. 79, No. 91. Page 27066-27077).

highway projects have rendered habitats inaccessible to adult steelhead (Boughton *et al.* 2005). Within stream reaches that are accessible to this species (but that may currently contain no fish), urbanization (including effects due to water exploitation) has in many watersheds eliminated or dramatically reduced the quality and amount of living space for juvenile steelhead. The number of streams that historically supported steelhead has been dramatically reduced (Good *et al.* 2005). Groundwater pumping and diversion of surface water contribute to the loss of habitat for steelhead, particularly during the dry season (*e.g.*, Spina *et al.* 2006). The extensive loss and degradation of habitat is one of the leading causes for the decline of steelhead abundance in southern California and listing of the species as endangered (NMFS 1997; NMFS 2006).

A significant amount of estuarine habitat has been lost across the range of the DPS with an average of only 22 percent of the original estuarine habitat remaining (NMFS 2011). The condition of these remaining wetland habitats is largely degraded, with many wetland areas at continued risk of loss or further degradation. Although many historically harmful practices have been halted, much of the historical damage remains to be addressed and will likely require decades to be restored. Many of these threats are associated with the larger river systems such as the Santa Maria, Santa Ynez, Ventura, Santa Clara, Los Angeles, San Gabriel, Santa Ana, San Luis Rey, Santa Margarita, San Dieguito, and San Diego rivers, but they also apply to smaller coastal systems such as Malibu, San Juan, and San Mateo creeks. Overall, these threats have remained essentially unchanged for the DPS as determined by the last status review (Williams *et al.* 2011) though some individual, site specific threats have been reduced or eliminated as a result of conservation actions such as the removal of small fish passage barriers.

Table 1. Physical or biological features critical to the conservation of sites determined essential to support one or more life stages of steelhead (NMFS 2005).

Primary Constituent Elements	Physical Characteristics	Essential to Conservation
Freshwater spawning sites	With water quantity and quality conditions and substrate supporting spawning, incubation and larval development.	Without these features the species cannot successfully spawn and produce offspring.
Freshwater rearing sites	With water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.	Without these features juveniles cannot access and use the areas needed to forage, grow, and develop behaviors (*e.g.,* predator avoidance, competition) that help ensure their survival.
Freshwater migration corridors	Free of obstruction with water quantity and quality 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.	Without these features juveniles cannot use the variety of habitats that allow them to avoid high flows, avoid predators, successfully compete, begin the behavioral and physiological changes needed for life in the ocean, and reach the ocean in a timely manner; allow steelhead adults in a non-feeding condition to successfully swim upstream, avoid predators, and reach spawning areas on limited energy stores.
Estuarine areas	Free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.	Without these features juveniles cannot reach the ocean in a timely manner and use the variety of habitats that allow them to avoid predators, compete successfully, and complete the behavioral and physiological changes needed for life in the ocean; they provide a final source of abundant forage for adult steelhead that will provide the energy stores needed to make the physiological transition to fresh water, migrate upstream, avoid predators, and develop to maturity upon reaching spawning areas.
Near-shore marine areas	Free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.	Without these features juveniles cannot successfully transition from natal streams to offshore marine areas.
Offshore marine areas	With water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.	Without them juveniles cannot forage and grow to adulthood.

2.2.5 Influence of a Changing Climate on the Species. – One factor affecting the rangewide status of endangered steelhead, and aquatic habitat at large, is climate change. For the Southwest region (southern Rocky Mountains to the Pacific Coast), the average temperature has already increased roughly 1.5°F compared to a 1960-1979 baseline period. 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, including California, showed a 16 percent increase in the number of days with heavy precipitation from 1958 to 2007. Potential impacts to southern California 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 (Hanak *et al.* 2011; Mastrandrea and Luers 2012), which may lead to lower host resistance of steelhead to more virulent parasitic and bacterial diseases (McCullough 1999; Marcogliese 2001). Snyder and Sloan (2005) projected mean annual precipitation in southwestern California to decrease by 2.0 cm (four percent) by the end of the 21st century.

Wildfires periodically burn large areas of chaparral and adjacent woodlands in autumn and winter in southern California (Westerling *et al.* 2004). 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 *et al.* 2006; Westerling and Bryant 2008).

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 north-ward shift in steelhead distribution, for example (Myers and Mantua 2013).

In summary, observed and predicted climate-change effects are generally detrimental to the species, given the unprecedented rate of change and uncertainty about the ability to adapt, so unless offset by improvements in other factors, status of the species and critical habitat is likely to decline over time. The climate change projections referenced above cover the time period between the present and approximately 2100. In general, climate change projections cannot be distinguished from annual and decadal climate variability for approximately the first 10 years of the projection period (see Cox and Stephenson 2007). While there is uncertainty associated with projections beyond 10 years, which increases over time, the direction of change is relatively certain (McClure *et al.* 2003).

2.3 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR §402.02).

2.3.1 Status of Aquatic Habitat in the Action Area. – Aquatic habitat within the action area of the Las Positas retaining wall consists of glides and short riffles and the streambed is composed of fine sediment with some gravel and cobble. The average channel width in the action area is 12 to 15-feet and the channel is deeply incised. Water quality during the summer is generally poor due to low streamflow and stagnant conditions. Riparian vegetation along the streambanks is composed of

giant reed (*Arundo donax*), non-native trees (*i.e., Eucalyptus globulus and Washingtonia robusta*), and native trees (*Salix lasiolepsis and Juglans californica)* that provide canopy cover. Overall, the PCEs of critical habitat for juvenile steelhead rearing (*i.e.,* natural cover, shelter, pools, and water quantity/quality) exist within the action area. The PCEs for spawning habitat in the action area are degraded based on the poor substrate conditions within the action area. Finally, the PCEs for migration are considered suitable through action area, as there is no obvious barrier to adult or juvenile steelhead migration.

2.3.2 Status of Steelhead in the Action Area. – Although no estimate of total steelhead abundance in Arroyo Burro Creek is available, there is anecdotal information confirming historical presence of steelhead within the creek (Stoecker 2002; Questa Engineering 2005). The number of juvenile steelhead present in the action area is unknown to NMFS. Inferences of potential steelhead numbers in Arroyo Burro Creek may be drawn by examining juvenile steelhead abundance data from San Ysidro Creek, located about 6 miles to the east. In 2001, juvenile steelhead abundance was qualitatively assessed by direct observation in lower San Ysidro Creek between the upstream end of the lagoon and the Montecito Water District pipeline (Stoecker 2002). A total of 318 juvenile steelhead were observed within about 3.5-miles of habitat (*i.e.,* pools and glides). Based on similar watershed characteristics and habitat characteristics within the action area, the abundance of steelhead observed in lower San Ysidro Creek is an informative index of the potential abundance of steelhead in the lower reach of Arroyo Burro Creek. NMFS estimates that up to 10 juvenile steelhead may be present in the work area to be dewatered. Adult steelhead are not expected to be present within the action area during the time of construction activities (June 15 to October 31).

2.3.3 Factors Affecting Species Environment Including the Action Area

Migration Barrier

An impediment to steelhead migration exists 0.25 mile downstream of the action area under the Cliff Drive Bridge as it traverses Arroyo Burro Creek. A steelhead passage project constructed in 2006 created step-pools within the existing grouted boulder grade control structure and apron below the bridge (Stoecker Ecological 2012). The effectiveness of the fish passage project for passing steelhead without delay into the action area has not been assessed, but we estimate that the project provides some level of passage for steelhead past the bridge. Currently, it is unknown if, and to what extent, steelhead may be delayed at the bridge during their upstream migration. As a result, overall steelhead productivity and rearing capacity has the potential to be reduced in Arroyo Burro Creek including the action area.

Urban Development

Arroyo Burro Creek within the action area flows along a residential development. Urban development of lands often results in an increase of impervious surfaces which can lead to increased runoff of pollutants to surface water. The location of Las Positas Road likely results in road surface runoff during the wet season, which has the potential to reduce the water quality within the action area to an unknown degree. Runoff from road surfaces contains dirt, oils, automotive fluids, and petrochemicals that are harmful to aquatic life, including steelhead (Spence *et. al.* 1996). Increased runoff may not be confined to the wet season, but may extend into the dry season due to the washing of streets, parking lots, vehicles, and other elements of the urban environment. Once in

surface water, pollutants of sufficient concentration may impair water quality and alter the characteristics of the channel bed. Additionally, the placement of the road directly adjacent to the creek has reduced the ability of the stream to meander and diminished the riparian zone on the eastern streambank. Long-term urbanization effects have been associated with lower fish species diversity and abundance (Weaver and Garman 1994). Consequently, the proliferation of urban areas within the Arroyo Burro Creek watershed is of concern.

2.4 Effects of the Action

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

2.4.1 Alteration of Aquatic Habitat. – Dewatering the immediate work area is expected to temporarily disrupt steelhead behavior patterns (*i.e.*, rearing, migrating), cause temporary loss of aquatic habitat, as well as loss of invertebrate forage for steelhead within the dewatered work area. About 180-linear feet of Arroyo Burro Creek will be dewatered for up to six months during the dry season (June 15 through October 31) to allow construction work to proceed in dry conditions.

Dewatering will temporarily preclude the action area from serving as a freshwater rearing site and a freshwater migration corridor for endangered steelhead. The ability of juvenile steelhead to migrate upstream through the action area will be hindered for several months while the diversion is in place. Downstream migration of juvenile steelhead from reaches upstream of the action area is not expected to be significantly affected by the diversion since downstream migrants would be able to migrate from upstream to downstream of the action area through the diversion pipe. Adult steelhead are not expected in the creek and, therefore, are not likely to be affected by construction activities.

Aquatic macroinvertebrate forage will be temporarily reduced or eliminated within the action area as a result of isolating the workspace from flowing water. Aquatic insects provide a source of food for instream fish populations, and may represent a substantial portion of food items consumed by juvenile steelhead. Effects to aquatic macroinvertebrates resulting from stream flow diversions and dewatering will be temporary because construction activities will be temporary, and rapid recolonization (about one to two months) of the restored channel area by macroinvertebrates is expected following re-watering (Cushman 1985; Thomas 1985; Harvey 1986). In addition, 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. Based on the foregoing, the temporary loss of aquatic macroinvertebrates as a result of dewatering activities is not expected to adversely affect steelhead.

Ultimately, the loss of aquatic habitat associated with dewatering will be temporary and is not expected to result in lethal effects, as relocated steelhead will be able to use all aquatic habitat downstream of the dewatered portion of the creek, which appears to be of similar quality as the reach subject to dewatering (Stoecker 2002). Connectivity between the upstream and downstream

stream reaches will be restored after the water diversion is removed and river flows are returned to the dewatered area, and no long-term diminishment will result from the proposed action in the physical capacity of the habitat to serve the intended functional role for steelhead. Overall, effects to steelhead and designated critical habitat for this species from water diversion are expected to be non-lethal and temporary.

2.4.2 Capture and Relocation of Steelhead. – Upon completion of the proposed action and construction activities, barriers to surface flow shall be removed and living space for juvenile will return to the dewatered action area. Ultimately, steelhead relocation efforts are expected to significantly minimize impacts to juvenile steelhead from areas where they would have probably experienced a high rate of injury or mortality.

Capture activities necessitates finding suitable relocation habitat. However, the description of the proposed action does not include Caltrans' criteria for judging suitable habitat. Ideally, sites selected for relocating juvenile steelhead should have ample habitat. Although Caltrans will document the capture and relocation of juvenile steelhead within the dewatered area, the proposed action does not include a provision to notify NMFS of the number of steelhead that may be harmed or injured as a result of the proposed action.

Based on steelhead survey results provided by Stoecker (2002), and habitat conditions in the action area, NMFS expects no more than 10 juvenile steelhead will need to be relocated. NMFS expects that 2 juvenile steelhead may be injured or killed as a result of the proposed action. This estimated mortality is based on NMFS' experience and knowledge gained on similar projects in Santa Barbara County during the last several years. Based on NMFS' general familiarity of steelhead abundance in southern California in general, and Santa Barbara 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 SCC DPS of endangered steelhead. Therefore, the effects of the relocation on steelhead are not expected to give rise to population-level effects.

2.4.3 Disturbance to the Streambed. – Although manipulation and disturbance of the streambed can result in changes to channel morphology that may create impediments to steelhead migration or alter juvenile rearing conditions, review of the proposed action indicates the installation of the soil nail wall is not expected to result in any material change to channel morphology. This conclusion is primarily based on the findings from scour analyses, which indicate the expected degree of localized natural scour would not undermine the proposed retaining wall (Caltrans 2015). The existing rearing and migration conditions are expected to remain the same because the proposed grading of the streambed is expected to retain the existing substrate size, slope and thalweg. Based on these findings, the proposed action is not anticipated to appreciably reduce the functional value of the action areas as sites of freshwater migration or rearing.

2.4.4 Alteration of Water Quality. – NMFS does not expect acute or chronic effects on aquatic habitat or steelhead in Arroyo Burro Creek because increases in sedimentation and turbidity levels resulting from construction activities are expected to be minimal and temporary (*i.e.*, a few hours during dewatering, and a few hours after rewatering to about one day during the first storm). A majority of the research regarding turbidity and sedimentation effects on fish was carried out in a laboratory setting with turbidity levels significantly higher than those expected to result from

project activities. In addition, sediment and erosion control devices (*e.g.*, straw-fiber rolls, silt-fencing, hay bales, settling basins, and filter bag) installed prior to the beginning of construction activities would be expected to minimize the effects of sedimentation and turbidity on water quality. The success of these measures has been documented during other similar projects (M. Larson, CDFG, 2012, personal communication). NMFS expects that the disturbance within the stream channel will not result in any long-term, incremental increases in sedimentation or turbidity within the creek.

2.4.5 Disturbance to Streamside Vegetation. – The proposed action has the potential to temporarily affect riparian vegetation within the action area of Arroyo Burro Creek due to a discrete loss of shade and cover currently present along the active channel. Indirect effects associated with the removal of riparian vegetation can result in increased water temperatures (Mitchell 1999; Opperman and Merenlender 2004) and decreased water quality (Lowrance *et al.* 1985; Welsch 1991) attributable to a loss of shade and cover over the active channel. However, the loss of vegetation as a result of the proposed action will be confined to a small area and expected to be temporary, because native riparian vegetation will be replanted throughout the disturbed area to minimize impacts from project construction. Based on NMFS' experience observing the response of riparian vegetation to human-made disturbances (J. Ogawa, NMFS 2015, pers. obs.), the riparian zone is expected to recover from the project one to two years following the completion of construction. Overall, the amount of riparian vegetation affected by the proposed action is not expected to diminish the overall functional value of the migratory corridor and freshwater rearing sites within the action area. However, Caltrans has not proposed a vegetation monitoring plan to verify the success of the proposed plantings over time.

2.5 Cumulative Effects

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

NMFS is generally familiar with activities occurring in the action area, and at this time is unaware of such actions that would be reasonably certain to occur. Consequently, no cumulative effects are likely, beyond the continuing effects of present land uses that are reasonably certain to occur into the future (see Environmental Baseline, Section 2.3).

2.6 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5), 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) appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species.

Juvenile steelhead are expected to be present in the action area during the time the proposed action will be implemented and, therefore, subject to direct and indirect effects associated with aspects of the proposed action. The main risk to individual steelhead involves effects due to capture and relocation. The adverse effects include potential injury or mortality during the process of capture and relocation during dewatering activities, but precautions are in place to minimize, if not eliminate, the risk of injury and mortality, and adjacent instream habitats are expected to suitably harbor the relocated steelhead. Because the habitat alteration due to the dewatering is short lived and localized, the proposed action is not expected to result in adverse modification to designated critical habitat.

Based on the steelhead surveys described in the environmental baseline section (2.3.2), NMFS concludes non-lethal take of no more than 10 juvenile steelhead that may be captured and relocated as a result of dewatering within the action area during the construction season, with a potential lethal take of no more than 2 out of the 10, thus the risk of mortality is low. Any juvenile steelhead present in the action area likely make up a small proportion of the SCC DPS of steelhead.

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. The replanted areas are expected to create a functional riparian zone that provides cover and shelter for steelhead within the action area of Arroyo Burro Creek. The impacts from disturbing the streambed are not expected to adversely affect the quality or quantity of aquatic habitat; rather the proposed action is expected to maintain steelhead passage and rearing conditions within the localized area. Maintained rearing habitat and steelhead passage conditions within the action area of Arroyo Burro Creek are expected to favor the viability of the endangered SCC DPS of steelhead and not reduce the conservation value of critical habitat for the species.

2.7 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of the endangered SCC DPS of steelhead or destroy or adversely modify its designated critical habitat.

2.8 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). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and Section 7(o)(2) provide that a 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 incidental

take statement.

2.8.1 Amount or Extent of Take

Based on steelhead surveys in a similar watershed and observations in the vicinity of the action area, and the depth, size, and amount of instream cover within the action area, the biological opinion anticipates the following amount of incidental take: All steelhead in the action area, expected to be no more than 10 juveniles that are captured or harassed during project activities. No more than 2 juvenile steelhead are expected to be injured or killed as a result of dewatering the action area and relocating the species. No other incidental take is anticipated as a result of the proposed action. The accompanying biological opinion does not anticipate any form of take that is not incidental to the proposed action.

2.8.2 Effect of the Take

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

2.8.3 Reasonable and Prudent Measures

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

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

2. Minimize the amount and extent of temporary and permanent changes in the quality and quantity of riparian and instream habitat for steelhead.

2.8.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and Caltrans or any applicant must comply with the terms and conditions, which implement the reasonable and prudent measures (50 CFR §402.14). Caltrans 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 incidental take statement (50 CFR §402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action may lapse.

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

    A. Caltrans' biologist shall identify and evaluate the suitability of downstream steelhead relocation habitat(s) prior to undertaking the dewatering activities that are required to isolate the work area from flowing water. The biologist shall evaluate potential relocation sites

based on attributes such as adequate water quality (a minimum dissolved oxygen level of 5 mg/L and suitable water temperature), cover (instream and over-hanging vegetation or woody debris), and living space. Multiple relocation habitats may be necessary to prevent overcrowding of a single habitat depending on the number of steelhead captured, current number of steelhead already occupying the relocation habitat(s), and the size of the receiving habitat(s).

B. Caltrans' biologist shall provide a written steelhead-relocation report to NMFS within 30 working days following completion of construction each season. 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) a description of any problem encountered during the project or when implementing terms and conditions; and 4) any effect of the proposed action on steelhead that was not previously considered. The report shall be sent to Jay Ogawa, NMFS, 501 W. Ocean Blvd., Suite 4200, Long Beach, California 90802-4213.

C. Caltrans' biologist shall contact NMFS (Jay Ogawa, 562-980-4061) immediately 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). Frozen samples shall be retained by the biologist until additional instructions are provided by NMFS. Subsequent notification must also be made in writing to Jay Ogawa, NMFS, 501 W. Ocean Blvd., Suite 4200, Long Beach, California 90802-4213 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.

2. The following terms and conditions implements reasonable and prudent measure 2:

A. Caltrans shall provide a revegetation report that is to include a description of the locations seeded or planted, the area revegetated, proposed methods to monitor and maintain the revegetated area, criteria used to determine the success of the plantings, and pre- and post-planting color photographs of the revegetated area. The revegetation report shall be sent to Jay Ogawa, NMFS, 501 W. Ocean Blvd., Suite 4200, Long Beach, California 90802-4213, within 30 calendar days following completion of the proposed action.

B. Caltrans shall provide the results of the vegetation monitoring within 30 calendar days following completion of each annual site inspection for the five years following completion of the project as described in the BA. The five reports shall include color photographs taken of the project area during each inspection and before implementation of the proposed action. The vegetation monitoring results shall be sent to Jay Ogawa, NMFS, 501 W. Ocean Blvd., Suite 4200, Long Beach, California 90802-4213.

2.9 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 the proposed action considered in this biological opinion.

2.10 Reinitiation of Consultation

This concludes formal consultation for Caltrans. As 50 CFR §402.16 states, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) the amount or extent of incidental taking specified in the incidental take statement is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

5. 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.

5.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended user of this opinion is Caltrans. Other interested users could include the California Department of Fish and Wildlife and U.S. Fish and Wildlife Service. Individual copies of this opinion were provided to Caltrans. This opinion will be posted on the Public Consultation Tracking System web site (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts). The format and naming adheres to conventional standards for style.

5.2 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.

5.3 Objectivity

Information Product Category: Natural Resource Plan

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

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion 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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