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

April 8, 2014 **Refer to NMFS No: SWR-2011-3722**

Lieutenant Colonel John K. Baker
U.S. Department of the Army
San Francisco District, Corps of Engineers
1455 Market Street, 16th Floor
San Francisco, California 94103-1398

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson- Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for Santa Clara Valley Water District Stream Maintenance Program 2014-2023 (Corps File Number 1996-225250)

Dear Colonel Baker:

Thank you for your letter of August 11, 2011, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. § 1531 *et seq.*), and the essential fish habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) regarding the Santa Clara Valley Water District's (SCVWD) proposed 2014-2023 stream maintenance program in Santa Clara County, California (Corps File No. 1996-225250). The U.S. Army Corps of Engineers (Corps) proposes to authorize the SCVWD to conduct these activities under section 404 of the Clean Water Act (33 USC §1344).

The enclosed biological opinion describes NMFS' analysis of the effects of the 2014-2023 stream maintenance program activities on threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*), threatened South-Central California Coast (S-CCC) steelhead (*O. mykiss*), threatened southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostris*), and designated critical habitat for CCC steelhead, S-CCC steelhead, and green sturgeon in accordance with section 7 of the ESA. In the enclosed biological opinion, NMFS concludes that the SCVWD's proposed stream maintenance activities to be conducted from 2014 through 2023 are not likely to jeopardize the continued existence of CCC steelhead, S-CCC steelhead, southern DPS green sturgeon or adversely modify designated critical habitat. However, NMFS anticipates take of listed CCC steelhead and S-CCC steelhead as a result of project implementation. An incidental take statement with non-discretionary terms and conditions is included with the enclosed biological opinion. No incidental take is anticipated for threatened southern DPS green sturgeon.

This letter also transmits NMFS' EFH findings pursuant to section 305(b) of the MSA. NMFS has reviewed the proposed project for potential effects on EFH and determined that the proposed action would adversely affect EFH for various federally managed fish species under the Pacific Salmon, Coastal Pelagic, and Pacific Groundfish Fishery Management Plans (FMPs). However, the project incorporates several conservation and mitigation measures to adequately address adverse effects, and therefore, NMFS has no conservation recommendations to provide.

This biological opinion underwent pre-dissemination review 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 biological opinion will be available through NMFS' Public Consultation Tracking System [https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts].[1] A complete record of this consultation is on file at NMFS' North Central Coast Office in Santa Rosa, California.

Please contact Darren Howe at (707) 575-3152 or Gary Stern at (707) 575-6060 if you have any questions concerning this section 7 consultation, or if you require additional information.

Sincerely,

William W. Stelle, Jr.
Regional Administrator

Enclosure

cc: Kristine O'Kane, SCVWD, San Jose
Lisa Mangione, Corps of Engineers, San Francisco
Tami Shane, California Department of Fish and Wildlife, Yountville
Margaret Beth, San Francisco Bay Regional Water Quality Control Board, Oakland
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[1] On the PCTS homepage, use the following PCTS tracking number within the Quick Search column: SWR-2011-3722

Enclosure

BIOLOGICAL OPINION

ACTION AGENCY: U.S. Army Corps of Engineers, San Francisco District

ACTION: Santa Clara Valley Water District 2014-2023 Stream Maintenance Program in Santa Clara County, California

CONSULTATION CONDUCTED BY: National Marine Fisheries Service, West Coast Region

TRACKING NUMBER: SWR-2011-3722

DATE ISSUED: __April 8, 2014__

I. CONSULTATION HISTORY

The Santa Clara Valley Water District's (SCVWD) Stream Maintenance Program (SMP) was initially developed in 2001 to define and improve the management and maintenance of flood control channels and streams under the SCVWD's authority. In coordination with representatives from the U.S. Army Corps of Engineers (Corps), NOAA's National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife (CDFW), U.S. Fish and Wildlife Service (USFWS), San Francisco Bay and Central Coast Regional Water Quality Control Boards (Regional Boards), and U.S. Environmental Protection Agency (EPA), the SCVWD developed and implemented a 10-year program for routine facility maintenance activities in Santa Clara County streams. The Corps and NMFS completed formal section 7 consultation pursuant to the Endangered Species Act (ESA) on the initial 10-year SMP (*i.e.*, 2002-2012), and NMFS issued a biological opinion to the Corps on July 3, 2002. The biological opinion concluded the Corps' issuance of a 10-year permit to the SCVWD for the 2002-2012 SMP was not likely to jeopardized the continued existence of threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*), threatened South-Central California Coast (S-CCC) steelhead (*O. mykiss*), or adversely modify designated critical habitat.

With permits approaching expiration for the SCVWD's 2002-2012 SMP, SCVWD representatives and their consultant, Horizon Water and Environment (Horizon), initiated discussions in 2011 with NMFS regarding a second 10-year SMP permit. A meeting was held at the Santa Rosa office of NMFS on February 23, 2011, with representatives from the SCVWD to discuss tasks and issues associated with renewal of the Program. A draft biological assessment for the second 10-year SMP was prepared by Horizon and a copy of this document dated July 14, 2011, was provided to NMFS by the SCVWD.

By letter dated August 11, 2011, the Corps requested initiation of formal consultation with NMFS for the proposed issuance of a Regional General Permit (RGP) for the SCVWD's 2012-2022 SMP (Corps File No. 1996-225250). The Corps referenced the July 14, 2011, draft biological assessment as the project description and effects analysis.

A meeting was held on September 15, 2011, with representatives from the Corps, NMFS and SCVWD to discuss the mitigation approach, sediment removal activities, and canal maintenance activities proposed for inclusion in the second 10-year SMP.

By letter dated October 7, 2011, NMFS informed the Corps that not all the information necessary for the initiation of formal consultation had been provided. NMFS requested additional information regarding several SMP activities and the potential effects of these activities. In particular, NMFS requested additional information regarding the location, extent, and frequency of sediment removal projects in streams with anadromous salmonids.

For the purpose of providing coordinated review and permitting of the next 10-year SMP, an SMP Interagency Work Group was convened and comprised of representatives from the Corps, NMFS, CDFW, USFWS, Regional Boards and EPA (Agencies). On December 7, 2011, the SMP Interagency Work Group met at the SCVWD office in San Jose for an overview of the Program and discussion of issues.

A revised biological assessment was provided to NMFS by Horizon on January 6, 2012. Discussions between NMFS, SCVWD, and the Interagency Work Group regarding sediment removal activities and mitigation measures continued from January through August 2012. NMFS provided written comments on the revised biological assessment to SCVWD and the Corps by letter dated August 10, 2012.

A 2-day meeting was held in San Jose on August 23 and 24, 2012, to discuss NMFS' comments on the biological assessment and visit SMP project sites. Following this 2-day meeting, the SCVWD revised the biological assessment and a third draft of the document was provided to NMFS and the Corps on October 11, 2012.

NMFS completed review of the October 11, 2012, revised biological assessment and concluded that there remained a need for additional information to initiate formal consultation. By letter dated December 11, 2012, NMFS informed the Corps that information regarding sediment removal activities in steelhead streams remained deficient and NMFS was unable to assess potential SMP impacts without this information. The enclosure to NMFS' December 11, 2012, letter presented additional information needs, comments, and outstanding issues associated with the October 11, 2012, draft biological assessment

By letter dated January 3, 2013, the Corps responded to NMFS' December 11, 2012, letter and indicated that Corps staff would be resuming a principal role in this formal consultation. The Corps stated their desire to determine the best path forward for resolution of outstanding issues and scheduled an SMP Interagency Work Group meeting for this purpose.

On January 3, 2013, the SMP Interagency Work Group met in Oakland to discuss information needs and outstanding issues. It was decided by the Interagency Work Group that, to facilitate the second SMP permit issuance, the SCVWD's Program Manual should be revised to include detailed descriptions of SMP activities, regulatory mechanisms, notification requirements, maintenance guidelines, conservation measures, mitigation, monitoring and reporting sections.

By letter dated January 16, 2013, the Corps informed NMFS that much of the additional information requested in NMFS' letter of December 11, 2012, would be provided in the revised SMP Manual. To ensure the Corps' understanding of NMFS' information requirements, the Corps' January 16, 2013 letter provided an outline of NMFS' information requirements and information to be provided in the revised SMP Manual.

Between February and September 2013, the SMP Interagency Work Group met nine times to review past SMP activities and develop the next 10-year program. A primary concern of NMFS and the Regional Boards pertained to the necessity and extent of the SCVWD's proposed sediment removal and vegetation management activities for the second 10-year SMP. To address this issue, the SCVWD agreed to utilize "Maintenance Guidelines" for direct sediment removal and vegetation management activities that are based on specific thresholds and criteria. For stream channel reaches where Maintenance Guidelines have not been developed, information regarding channel conditions and flow conveyance needs will be compiled to assess alternatives to sediment and vegetation management activities. The SMP Interagency Work Group also developed measures to avoid, minimize, and mitigate impacts on natural resources, including native species and their habitats for SMP activities. To capture the results of the Interagency Work Group, the SMP Manual was revised, expanded, and draft chapters were provided to the Agencies for review and comment. The goal for the *2014-2023 SMP Manual* was to complete a single document that, in one place, defines the overall 10-year maintenance program and describes the authorized maintenance activities, regulatory framework, annual maintenance planning process, impact avoidance measures, best management practices (BMPs), mitigation activities, and program management actions.

At the February 13, 2013, meeting of the SMP Interagency Work Group, the SCVWD expressed concern regarding delays in the RGP process and the need to perform stream maintenance activities during the 2013 summer/fall period. To address the SCVWD's concerns, the Agencies agreed to develop a process to permit critical 2013 stream maintenance activities while efforts continue on the longer term RGP. NMFS and the Corps agreed to conduct an individual section 7 consultation on the SCVWD's proposed 2013 stream maintenance projects. The SCVWD provided the Interagency Work Group a description of proposed activities for the 2013 work season on April 15, 2013. Proposed 2013 stream maintenance activities consisted of sediment removal, bank stabilization, in-channel vegetation removal and other minor maintenance projects, such as concrete repair and filling holes on levees, in or adjacent to streams in Santa Clara County. By letter dated May 30, 2013, the Corps initiated formal consultation with NMFS regarding the proposed authorization of SCVWD's 2013 stream maintenance activities in Santa Clara County. On June 11, 2013, the NMFS issued a biological opinion to the Corps which concluded the SCVWD's proposed stream maintenance projects for the 2013 work season were not likely to jeopardized the continued existence of CCC steelhead, S-CCC steelhead, threatened

southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostris*), or adversely modify their designated critical habitat.

From September 2013 through January 2014, the SMP Interagency Work Group worked with the SCVWD to complete the *2014-2023 SMP Manual*. Draft chapters were exchanged and conference calls conducted to work through specific issues. Full versions of the draft manual were provided to the SMP Interagency Work Group on October 18, 2013; November 18, 2013; January 7, 2014; and February 7, 2014. By letter dated February 12, 2014, NMFS informed the Corps that the February 7, 2014, draft *2014-2023 SMP Manual* contained all the information necessary to initiate formal consultation and NMFS would strive to complete a biological opinion for the Corps no later than mid-April 2014.

II. DESCRIPTION OF THE PROPOSED ACTION

The Corps proposes to issue a RGP for SCVWD's 2014-2023 SMP activities, under the authority of Clean Water Act Section 404 (33 U.S. Code [USC] Section 1344) and the Rivers and Harbors Act of 1899 Section 10 (33 USC Section 403), in accordance with provisions of "Regulatory Programs of the Corps of Engineers," 33 CFR Section 323.2(h) for activities that are substantially similar in nature and cause only minimal individual and cumulative environmental impacts. The RGP will be valid for 5 years from the date of issuance and may be renewed at Corps' discretion. Because the *2014-2023 SMP Manual* is written for a 10-year period through 2023, pending the SCVWD's compliance during the 5-year permit term, the Corps is expected to renew the RGP for a second 5-year term. For purposes of this consultation, the Corps and NMFS assessed a 10-year SMP extending from 2014 through 2023.

The goals of the SMP are: (1) maintain the flow conveyance capacity of SCVWD channels and facilities; and (2) maintain the structural and functional integrity of SCVWD facilities. Sediment removal and vegetation maintenance are proposed to maintain the flow conveyance capacity of a channel or flood management facility to the designed conveyance capacity of the channel or facility. Bank stabilization is proposed to protect existing infrastructure, maintain public safety, reduce sediment loading, protect water quality, and protect habitat values. Minor maintenance is proposed at stream gages, maintenance roads, bridges, and levees. With the exception of some vegetation management activities, SMP activities within streams supporting threatened CCC steelhead, S-CCC steelhead, and the southern DPS of green sturgeon would be limited to the period between June 15 and October 31 of each year. NMFS has not identified any interrelated or interdependent actions associated with the proposed action.

A. Description of Proposed Work

The SMP consists of five primary maintenance activities: sediment removal; bank stabilization; vegetation management; management of animal conflicts; and minor maintenance. The SMP also includes habitat protection, enhancement, and mitigation elements that consist of invasive plant management, a riparian planting program, an instream habitat complexity program, LWD management, gravel augmentation, and land preservation. Routine maintenance activities would

be performed in channels where the SCVWD has fee title or easements, or where the SCVWD has received specific direction from the SCVWD's Board or a regulatory agency. The project description presented below reflects the five categories of SMP activities that would be performed in or near channels with anadromous salmonids, including non-listed Central Valley fall-run Chinook salmon (*Oncorhynchus tshawytscha*), threatened CCC steelhead, threatened S-CCC steelhead, threatened southern DPS green sturgeon, and their designated critical habitat.

1. Stream Channel Types

To manage SMP activities within the Program area, the SCVWD has classified all channels into three types, based on their form and channel materials: (1) Modified Channel, (2) Modified Channel with Ecological Values, and (3) Unmodified Channel. The following section summarizes the three channel types.

a. Modified Channel

A "Modified Channel" is defined as a channel that has been substantially altered from historical conditions. Some Modified Channels have been modified for flood protection, while others were constructed as a condition of land development approvals or to maximize developable land adjacent to the creek. Many Modified Channels have been engineered to meet an established flood conveyance criteria. Other Modified Channels clearly have been modified over time, but not necessarily to an engineered design with established flood flow conveyance criteria. Modified Channels typically include realigned, straightened, hardened reaches that have been designed to maximize efficient flow of water with minimal erosion. These channels are often concrete lined (bed and/or bank), and may include a high flow channel. Modified Channels may have the potential for some environmental enhancement, but are differentiated from Modified Channels with Ecological Values, which have existing and often diverse ecological values present.

b. Modified Channel with Ecological Values

A "Modified Channel with Ecological Values" is defined as a channel that has been significantly altered from historical conditions, but also has features such as closed canopy riparian woodland, and/or other stream habitat features. Some Modified Channels with Ecological Values have recently completed flood protection projects, while others have had some level of construction that did not eliminate all of the areas with ecological value, or the reconfigured channel was allowed to return to a natural state. Some channels have established flood flow conveyance criteria. Other channels are modified but not necessarily to an engineered design with established flood flow conveyance criteria. Modified Channels with Ecological Values typically include some areas with realigned, straightened, or hardened reaches, designed to convey flood flows with minimal erosion. Creeks classified as Modified Channels with Ecological Values do not have concrete beds and the channel provides habitat which supports native plants, wildlife and fish.

c. Unmodified Channel

An "Unmodified Channel" is defined as a stream channel that generally is unchanged from historic conditions. Unmodified Channels may have small areas of modification, including bridges, outfalls, culverts, gauges, or other appurtenant structures. Unmodified Channels usually are located in areas adjacent to floodplains without other types of flood protection measures and generally occur in the foothills or higher elevations of the SMP area. Creek banks and bed are natural materials and relatively undisturbed by anthropogenic hardscape.

2. Maintenance Guidelines

To ensure that SMP activities are conducted in a manner that protects natural resources to the maximum extent feasible, the SCVWD has adopted an approach with the use of "Maintenance Guidelines" to define the limits of sediment removal and vegetation management. The purpose of Maintenance Guidelines is to provide a quantitative approach to identifying deficiencies in channel conditions that would trigger sediment and vegetation removal activities. Maintenance Guidelines describe maintenance thresholds and criteria developed from field surveys and engineering-based analysis. The SCVWD currently has Maintenance Guidelines developed for some channels in the SMP area and these would be updated during the 10-year term of the SMP. For the remaining channels without existing Maintenance Guidelines, Maintenance Guidelines would be developed for channels subject to sediment removal and vegetation management.

Maintenance Guidelines will establish a channel "maintenance baseline" which is a description of the physical characteristics (*e.g.*, depth, width, length, location, configuration, or design flood capacity, *etc.*) of a channel reach. Over the 10-year SMP Program, the SCVWD will develop Maintenance Guidelines for all channels designated as Modified, Modified with Ecological Value, and frequently maintained (more than 2 times in a 5-year period) Unmodified channels. Draft Maintenance Guidelines will be submitted to the Agencies for review. Through this review process, the Agencies will approve maintenance baselines via the Maintenance Guidelines for channels subject to SMP sediment removal and vegetation management. The Maintenance Guidelines allow for SCVWD decisions regarding the necessity and extent of sediment removal and vegetation management activities to be based on established or calculated channel flow capacities.

3. Sediment Removal

The SMP proposes to mechanically remove sediment from channels for the following purposes: (1) to maintain or restore the design capacity of the channel, per Maintenance Guidelines; (2) to allow appurtenant facilities (*e.g.*, stream gauges) to function as designed; and (3) to facilitate fish passage and access to fish ladders. Determination of sediment removal sites would be performed during annual inspections by SCVWD staff and prioritized based on the risk to public safety (*i.e.*, reduced flow conveyance capacity and potential for flooding) and condition of appurtenant facilities. Initial evaluations of sediment deposition areas for flood flow conveyance will be made visually and each site will be subject to photo documentation, field measurements (length and depth of sediment deposition), and other site specific information. The results of these initial

inspections will be used for additional evaluation by SCVWD technical staff per the Maintenance Guidelines. At appurtenant facilities and for fish passage, sediment removal requirements are typically determined by visual inspections. If sediment deposition poses a threat to proper function or integrity of an appurtenant facility, sediment removal will be conducted. At fish ladders, sediment removal would be conducted if fish passage is impeded within, below, or above the ladder during the migration seasons for anadromous fish. Each facility will be individually assessed based on its functionality.

Sediment removal would occur from channel beds using various equipment including excavators, long-reach excavators, bulldozers, scrapers, and front-end loaders. Sediment would usually be removed from the top-of-bank using one or more excavators. For projects where the use of excavators from the top-of-bank is not possible, or would cause major vegetation impacts, sediment removal equipment may be used within the channel. All removal sites would be seasonally dry, or dewatered through the use of cofferdams. Sediment removal equipment would only be operated on a dry or dewatered channel bed. Excavated sediment would be placed on dump trucks for transport to an approved off-site disposal location. Top-of-bank maintenance roads exist along most SMP-maintained channels and access would primarily occur via these existing roads. In cases where access roads are not available, equipment may be lowered to the channel bed from a nearby road crossing. If selective clearing of vegetation is needed for equipment access, SMP vegetation management requirements and protocols would be applied.

Impact avoidance and sediment removal-specific best management practices (BMPs) are listed in *Section 5.3* of the *2014-2023 SMP Manual*, and would be implemented at all sediment removal sites. All sediment removal projects within anadromous salmonid streams would be limited to the period between June 15 and October 31. Pre- and post-project assessments for impacts to gravel and instream habitat complexity would be performed as described below (see subsection *Mitigation Program* of this Opinion). In Modified Channel types, sediment removal sites may extend up to 5,000 linear feet along the channel bed. In Modified Channels with Ecological Values and Unmodified Channels, sediment removal projects may not exceed 300 linear feet along the channel bed. Additionally, sediment removal projects in Modified Channels with Ecological Values and Unmodified Channels must be associated with a facility or man-made structure (*i.e*., bridge, outfall, gauge, grade control, *etc*.) to be performed by the SMP. "Associated" is defined as one or more portions of the sediment removal project reach must be located 100 feet or less from the man-made structure or facility. All sediment removal projects in all channel types may not exceed the channel's maintenance baseline established by the relevant Maintenance Guidelines. If any proposed sediment removal project exceeds the linear footage limits described above, the SCVWD may invoke a per-project waiver process that requires review by Corps, NMFS, CDFW, FWS, and Regional Boards. Waivers must be obtained from each agency and may only be granted if the project results in minimal adverse effects and includes appropriate compensatory mitigation to offset impacts.[1]

[1] For purposes of this consultation, NMFS has not analyzed sediment removal projects that exceed the SMP linear footage limits. For each waiver request, NMFS would review the individual proposal to determine if the linear footage waiver may affect listed species or critical habitat in a manner or to an extent not previously considered. If the proposed waiver causes an effect to listed species or critical habitat that was not considered in this biological opinion, NMFS and Corps would reinitiate consultation or conduct an individual section 7 consultation.

The number of sediment removal projects undertaken and the quantity of sediment removed in a given year depends on hydrologic conditions during the previous winter and the extent of past maintenance activities. Sediment removal needs following a wet winter are usually higher than the maintenance needs following an average or dry winter, because wet winters typically experience higher than usual runoff events, slope erosion, and higher rates of sediment delivery/transport. Table 1 presents annual sediment removal volumes and channel lengths in SMP streams with anadromous salmonids from 2002 through 2012. Of the 52 sediment removal projects conducted during this 11-year period, over half of the sites were repeat locations during this period.

Sediment volumes removed by the SMP for the period of 2014-2023 are anticipated to be similar or lower than that of SMP 2002-2012. The SMP's development of maintenance baseline information and the associated Maintenance Guidelines would improve the SCVWD's quantitative method to identify deficiencies in channel flow conveyance conditions. With more data obtained during field assessments and engineering analyses of this data, Maintenance Guidelines are expected to provide information that would avoid the removal of sediment volumes in excess of that needed for flood flow conveyance. As a result, sediment removed by SMP 2014-2023 is likely to be reduced from previous years.

4. Bank Stabilization

Bank stabilization involves repairing channel banks when a weakened, unstable, or failing bank causes or threatens to cause: (1) damage to an adjacent property; (2) becomes a flood hazard; (3) becomes a public safety concern; (4) creates problems with roads, transportation, or access; or (5) causes instream sedimentation and/or affects water quality and beneficial uses. In the past, SMP bank stabilization projects have primarily been required in Modified Channels and for the 2014-2023 SMP, it is anticipated Modified Channels would continue to have the greatest need for bank stabilization.

SMP bank stabilization projects would draw upon a palette of bioengineering techniques to address slope stability. These approaches include using engineering back filled soils, erosion control fabric, wood and rock materials, and planting of native riparian vegetation. Bank stabilization techniques would use bioengineering techniques to the maximum extent possible while limiting the use of bank hardening. The specific design of a bank stabilization project would depend on site-specific conditions such as: (1) type of bank failure (sheered slope, undercut bank, rotational slump, *etc*.); (2) hydraulic conditions (bank height, angle, sheer stress); (3) geomorphic setting; and (4) characteristics of the channel adjacent to the site. *Chapter 6* of the *2014-2023 SMP Manual* identifies 12 bank stabilization treatments, generally categorized as hard, hybrid, or soft. "Hard" methods include concrete blocks, sacrete, boulders, or other hardened materials. "Soft" methods usually are biotechnical treatments emphasizing vegetation and earthen banks. "Hybrid" methods are typically earthen banks with vegetation and some type of rock material along the lowermost bank zone to provide additional strengthening. In general, the SMP would provide off-site mitigation for hard treatments and for hybrid projects where the boulder base is not vegetated. *Attachment A* of the *2014-2023 SMP Manual* provides detailed information regarding each of the 12 SMP treatment types, and *Chapter 10* of the *2014-*

2023 SMP Manual identifies the applicable mitigation ratio for each treatment method. All proposed bank stabilization designs for projects on anadromous salmonid streams would be provided to NMFS and the other agencies in advance for review and approval prior to construction (see subsection *Program Management* of this Opinion).

As with sediment removal projects, construction equipment would access SMP bank stabilization sites via existing maintenance roads. If access roads are not available, equipment may be lowered to the channel bed from a nearby road crossing. Equipment used for construction of bank stabilization projects consist of excavators, bulldozers, cranes, front-end loaders, dump trucks, water trucks, pumps, generators, compactors, and hand operated thumpers. Staging typically occurs on adjacent access roads or lands which have been previously disturbed (*e.g.*, service roads and turn-outs). The bank stabilization repair would be completed with final earth compaction and grading to the finished slope design specification and planting and/or other on-site restoration practices as planned for the repair. When repairs are made, banks would be re-contoured to match the adjacent bank slope (*i.e*., returned to pre-failure configuration) to the extent possible. If healthy riparian vegetation exists adjacent to the bank failure site, care would be taken to minimize disturbance of such vegetation, including mature trees.

Impact avoidance and bank stabilization-specific BMPs are listed in *Section 6.4* of the *2014-2023 SMP Manual*, and would be implemented at all bank stabilization sites. Construction of all bank stabilization projects on anadromous salmonid streams would be limited to the period between June 15 and October 31. Pre- and post-project assessments for impacts to gravel and instream habitat complexity would be performed as described in subsection *Mitigation Program* of this Opinion. "Soft" treatment bank stabilization projects may extend up to 500 linear feet. "Hard" and "hybrid" treatments my not exceed 300 linear feet. All bank stabilization projects may not exceed 0.5 acres below ordinary high water for individual projects. If any proposed bank stabilization project exceeds the linear footage limits described above, the SCVWD may invoke a per-project waiver process that requires review by Corps, NMFS, CDFW, USFWS, and Regional Boards. Waivers must be obtained from each agency and may only be granted if the project results in minimal adverse effects and includes appropriate compensatory mitigation to offset impacts.[2] To ensure that SMP bank stabilization projects are unconnected, single and complete actions, and not part of a larger action that will exceed the per-project size limits, each project must demonstrate independent utility and a separation of 500 feet is required between bank stabilization projects.

As with sediment removal projects, a higher number of bank stabilization projects are likely to occur following wet winters. Based on the SMP 2002-2012, the number of annual bank stabilization projects could range from two (2) to 12 individual projects in anadromous salmonid streams and the amount of affected channel can vary greatly. In 2011, bank stabilization occurred along 80 feet of channel while in 2007 approximately 2,623 linear feet of bank

[2] For purposes of this consultation, NMFS has not analyzed bank stabilization projects that exceed the SMP linear footage limits. For each waiver request, NMFS would review the individual proposal to determine if the linear footage waiver may affect listed species or critical habitat in a manner or to an extent not previously considered. If the proposed waiver causes an effect to listed species or critical habitat that was not considered in this biological opinion, NMFS and Corps would reinitiate consultation or conduct an individual section 7 consultation.

stabilization projects were constructed by the SMP (Table 2). It is anticipated that a similar number of bank stabilization projects and linear channel footage affected will occur during SMP 2014-2023.

5. Vegetation Maintenance

Vegetation management activities include pruning, removal, herbicide application, mowing, flaming, and grazing. Vegetation management activities would be conducted to maintain flow conveyance capacity, establish a canopy of native riparian trees and native understory plants, control invasive vegetation, and as a means of fire control. Vegetation management and removal activities are expected to be relatively consistent from year to year, though locations would change depending on recent growth and blockages. Vegetation management in streams with anadromous salmonids would be limited to the period between June 15 and October 31; however, vegetation management activities may continue until December 31 if no significant rainfall event (defined as 0.5 inches of rain within 24-hour period) has occurred in the watershed.

a. Woody Vegetation Management

Management of woody vegetation consists of routine pruning, corrective pruning, coppicing, and hand removal. Routine pruning of trees and shrubs would be conducted along SCVWD maintenance roads, fences, and levee slopes. Routine pruning would involve the partial removal of any individual tree and cutting of tree branches. Pruning would be performed by qualified SCVWD staff according to American National Standards Institute Safety Requirements and would not exceed 25 percent of an individual tree in one season.

Corrective pruning would be performed to promote long-term tree health. Unlike routine pruning, the goal of corrective pruning is to correct an injury, reduce the effects of disease, manage pest damage, or address defects that may eventually result in whole tree failure. As with routine pruning, corrective pruning would be performed by qualified SCVWD staff according to American National Standards Institute Safety Requirements and would not exceed 25 percent of an individual tree in one season.

Coppicing is the cutting of a tree to the ground level, creating annual "sucker" growth that may be used as cutting material for direct installation in mitigation projects. Trees that are chosen for coppicing are trees that would normally be targeted for complete removal. Willow species, mulefat, and coyote brush would typically be chosen for coppicing. After cutting the tree back to the ground, the tree would be left to re-sprout and provide an ongoing cutting source for the individual watershed in which the tree is located. Selected trees within each major watershed may be dedicated to this purpose. Hand-held and small mechanical tools would be used for coppicing; although larger equipment may be used to remove cut vegetation from the site.

Hand removal of vegetation would be performed for flow conveyance in channels, as determined by the relevant Maintenance Guidelines. These conditions usually occur when a tree (or trees) falls from the bank into the channel and the orientation impedes flows or causes debris blockages. If this condition results in an increased flood risk, trees would be removed using

mechanized or non-mechanized hand tools. Hand removal of trees may also be performed for the construction of bank stabilization projects and/or access roads to these work sites. Removals would only be performed when pruning will not suffice to provide clearance for maintenance vehicles and heavy equipment. Hand removal of trees and shrubs may also be performed to improve the health and vigor of vegetation on SCVWD properties. Prior to removal or stand thinning of trees, an assessment of the ecological health of the riparian and/or upland woodland would be conducted and document with appropriate arboricultural and vegetation management techniques.

b. Herbicide Use

Herbicides would be used for control of herbaceous and small woody vegetation in conjunction with mechanical and hand vegetation suppression to support hydraulic, fire safety, and ecosystem functions. All crews would be trained in BMPs relative to herbicide use and daily checklists would be maintained to monitor applications. Herbaceous vegetation includes grasses, broadleaf weeds, cattails, and bulrush. These plants would be controlled to limit weed growth, seeding, and expansion into new areas of special management (*i.e.*, mitigation sites, roads, firebreaks). Herbaceous vegetation may also be controlled with herbicides to improve flow conveyance in channels in conformance with relevant Maintenance Guidelines.

All herbicide applications would be performed using equipment appropriate to the specific application type. In-channel herbicide application would be conducted with a hose and hand gun sprayer, or a backpack unit. In aquatic habitat areas, the SMP proposes to use the following herbicide products: Competitor® (active ingredient is Ethyl Oleate, 98% [modified vegetable oil]); Rodeo® (active ingredient is Glyphosate); and Aquamaster® (active ingredient is Glyphosate). Ethyl Oleate is a non-ionic surfactant designed for aquatic applications and Glyphosate is broad-spectrum herbicide used for control of emerged vegetation.

SMP measures to avoid and minimize impacts associated with herbicide applications are presented in *Section 4.2.1* of the *2014-2023 SMP Manual*. All herbicide applications must be preceded by a Pest Control Recommendation provided by a California licensed Pest Control Advisor. In-channel applications would be limited to work sites that are dry and no rain is forecasted for the next 48 hours. The spray site would include a 20-foot buffer between the treatment area and the wetted creek area if surfactants are used. All applications of herbicides would also comply with BMP GEN-2 (see *Attachment F* of *2014-2023 SMP Manual*) which requires no direct application into water and application shall not occur when wind conditions may result in drift.

c. Mechanical, Flaming and Grazing Vegetation Management

Additional vegetation management methods by the SMP would be mowing, flaming and grazing. Mowing would be the cutting of above-ground plant material by mechanized or hand-held equipment. Flaming would be conducted with a hand-held propane gas-powered flamer to control weed seedlings. Grazing would be used in limited circumstances for herbaceous weed control on upland SCVWD parcels. These vegetation management methods would be used in

upland areas, terraces, and outboard areas outside creek channels. BMPs for mowing, flaming and grazing are presented in *Attachment F* of the *2014-2023 SMP Manual*.

d. Hazard Tree Removals and Large Woody Debris Management

Instream large woody debris (LWD) and leaning trees within channels of the SMP area can increase flood and/or erosion risk. Fallen trees can raise water surface elevations during high stream flow events if the wood traps excessive debris or becomes caught at a bridge or culvert. Large wood in the channel may also focus excessive water velocities on a stream bank and cause erosion damage.

Because large wood provides an important ecological role in Santa Clara County streams, the SMP's LWD management program is designed to retain wood debris where possible. LWD under the SMP is defined as wood having a minimum diameter of 12 inches and a minimum length of 6 feet. In order to effectively manage LWD in streams within the urban landscape of Santa Clara County, the SMP proposes a four tiered, multi-disciplined approach. The four tiers, listed in order of decreasing priority are: (1) retain LWD in the channel; (2) modify (*e.g.*, reorient) LWD instead of removing it; (3) remove LWD and reuse it elsewhere in the watershed; and (4) remove LWD.

To implement this four-tiered approach, SMP maintenance crews would identify sites in which large wood is proposed for removal. Each site would be evaluated by a biologist to determine the ecological and geomorphic integrity the wood is providing to the stream channel. During the biological evaluation the size and position of the wood in relation to the wetted channel would be described. If SMP personnel decide to leave the wood in place, the watershed personnel may place an aluminum tree tag with a unique identifying number on the wood to determine if the wood moves during subsequent storm events. This approach is referred to as Tier 1.

If the LWD cannot be left in its original configuration within the wetted channel due to flooding, debris trapping or erosion potential, the wood may be modified and left in place. Modification can include removal of small, lateral branches, changing position of the LWD to avoid excessive bank scour, or reconfiguration of the LWD to avoid aggradations or channel incision. This approach is referred to as Tier 2.

If SMP personnel determine the LWD feature is an imminent flood risk or infrastructure safety is of great concern, the wood would be removed from its original location and replaced elsewhere within the watershed. Considerations for the new location of wood placement would be the presence of a floodplain, larger width/depth ratio, greater biological value (*i.e.*, natural channel versus modified), or simply improved access. This approach is referred to as Tier 3.

If all other avenues of wood management are exhausted, Tiers 1-3, SMP personnel would completely removal the LWD from the stream channel. Complete removal would most likely occur in highly modified streams with low or zero tolerance for instream vegetation or structures such as LWD. Cutting LWD into smaller pieces and leaving it within the channel would also be considered complete removal. This approach is referred to as Tier 4 and the volume of LWD

removed from the channel must be fully mitigated as described in subsection *Mitigation Program* of this Opinion and in *Chapter 10* of the *2014-2023 SMP Manual*.

6. Management of Animal Conflicts

Management of animal conflicts activities includes animal controls and repair of damage caused by animals. Damage typically occurs with burrowing and foraging animals along levees and other structures within the SMP area. Animals may damage SCVWD facilities by undermining levees, damage mitigation sites by eating vegetation, and interfere with SCVWD work activities.

Management of animal conflicts would include several activities ranging from the maintenance of sanitary conditions to non-lethal trapping and relocation of animals. Physical alterations of facilities would be performed such as placement of bird netting on bridges to prevent swallows or black phoebes from nesting, and surface compaction of levee faces to deter burrowing animals. Lethal control would be implemented only when other animal conflict management activities are inadequate to feasibly address a conflict. Lethal control methods include fumigants in rodent burrows and chemical bait stations. These activities would be conducted in upland area and outside creek channels with anadromous fish. Impact avoidance measures and BMPs for management of animal conflicts are presented in *Section 7.3* of the *2014-2023 SMP Manual*.

7. Minor Maintenance Activities

Minor Maintenance activities consist of routine small-scale activities performed to make repairs and keep SCVWD facilities operational. Minor Maintenance activities may occur in upland areas and along creeks. Minor Maintenance activities would typically completed with one or two days and they do not change the footprint of any existing facility. Minor Maintenance activities include the following: (1) cleaning and removing sediment (limited to 25 cubic yards per project site) at outfalls, culverts, flap gates, tide gates, inlets, and grade control structures; (2) trash and debris removal; (3) repair and installation of fences and gates; (4) grading and repairing existing maintenance roads to restore the original contour; (5) grading small areas without vegetation above channel banks to improve drainage and reduce erosion; (6) repairing structures with substantially similar materials within approximately the same footprint; (7) installing and maintaining mitigation and landscape sites; (8) removing obstructions at structures to maintain functions; and (9) maintaining stream gauges.

The work site of a Minor Maintenance activity must be less than 0.08 acre (3485 sq. ft.) of wetland or riparian vegetation, and any access or staging would be calculated as part of this total. Although there are no specific BMPs for Minor Maintenance activities, BMPs for erosion and sediment control apply if areas of soil are exposed.

B. Avoidance and Minimization Measures

1. Dewatering the Stream and Fish Relocation

If the stream channel is conveying flow or ponding water during a proposed SMP bank stabilization or sediment removal activity, the SCVWD proposes to temporarily dewater sites to facilitate crew and equipment access during work. Dewatering would be achieved with the placement of temporary cofferdams at both the upstream and downstream ends of the construction area. Cofferdams would be constructed with sheet piles, inflatable dams, sand bags, or clean gravel. A bypass system would be installed around the work site to allow for stream flow in the creek to continue downstream. If pumps are used to dewater or bypass stream flow, intakes would be screened to NMFS and CDFW criteria. Water diversions would maintain ambient stream flows below the diversion, and waters discharged below the project site would not be diminished or degraded by the diversion.

Between the two cofferdams, the SCVWD would capture and relocate fish from the work site prior to and during dewatering. Only qualified fisheries biologists would be allowed to capture and relocate fish. Fish collections may be performed by electrofishing, seine nets, and dip nets. Collected fish would be relocated to suitable locations either upstream or downstream of the work sites. Fish would be moved to release sites using live-wells and appropriately equipped transport vehicles. The stream channel at project sites would remain dewatered until work is completed, at which time the cofferdams and flow bypass system would be removed for the re-watering of the site. All SMP activities that require dewatering of areas within anadromous salmonid streams would be restricted to the period between June 15 and October 31.

2. Best Management Practices

The SCVWD has proposed several best management practices for SMP 2014-2023 maintenance activities, including the following for streams with anadromous fish species. The full description of SMP best management practices are presented in *Attachment F* of the *2014-2023 SMP Manual*.

a. Work Window

SMP sediment removal and bank stabilization work would be limited to the period between June 15 and October 31. Vegetation management activities would be limited to the period between June 15 and October 31; however, vegetation management may continue to until December 31 if no significant rainfall (defined as 0.5 inch of rainfall in a 24-hour period) has occurred. No later than October 31, all stream bypass systems would be removed and project sites winterized to prevent erosion. No new instream sediment removal projects and bank protection work would be initiated after October 15. Projects started before October 15 would be at least 50 percent completed by October 15 to continue work until October 31.

b. Wheel and Track Mounted Vehicles

SCVWD personnel would use the appropriate equipment for the job that minimizes disturbance to the stream bottom. Appropriately-tired vehicles, either tracked or wheeled, would be used depending on the situation and heavy equipment will not be operated in the live stream.

c. Spill Prevention

The SCVWD would take measures to prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water into channels. SMP field personnel would be appropriately trained in spill prevention, hazardous material control, and clean-up of accidental spills. No fueling, repair, cleaning, maintenance, or vehicle washing would be performed in the creek channel or in areas at the top of bank that may flow into the creek channel.

d. Minimize Stream Access Impacts

SCVWD personnel would use existing access ramps and roads where possible. If temporary access points are necessary, they would be constructed in a manner that minimizes impacts to streams. Temporary access points would be created as close to the work area as possible to minimize running equipment down channels and would be constructed so as to minimize adverse impacts, such as tree removal. When temporary access is removed, remaining disturbed soil would be stabilized and seeded immediately after construction. Any temporary fill used for access would be removed upon completion of the project. Channel topography and geometry would be restored to pre-project conditions to the extent possible.

e. Erosion and Sediment Control Measures

Erosion control methods would be used as appropriate during all phases of routine maintenance projects to control sediment and minimize water quality impacts. The SCVWD would prevent erosion on steep slopes by using erosion control material according to manufacturer's specifications. Construction-related erosion control methods would be removed at the completion of the project. Appropriate measures include, but are not limited to, the following: silt fences, straw bales, brush or rock filters, storm drain inlet protection, sediment traps, sediment basins, erosion control blankets and mats, and soil stabilization geotextile blankets.

f. Concrete Use Near Waterways

Fresh concrete would be isolated until it no longer poses a threat to water quality by excluding the site from the wetted stream channel for a period 30 days after it has been poured. Commercial sealants may be used on the poured concrete surface where difficulty in excluding water flow for a long period may occur.

3. Fish Ladders and Fish Screens

Section 11.8 of the *2014-2023 SMP Manual* describes a program for annual assessment of sediment accumulation in SCVWD fish ladders. Sediment deposition within the footprint (*i.e.*, below/above/within) of fish ladders would be assessed in order to maintain access during migration seasons for anadromous fish. SCVWD owns and operates 10 fish ladder facilities: Coyote Percolation Ponds/Steel Dam (Coyote Creek); Mabury Diversion (Upper Penitencia Creek); Noble Avenue Diversion (Upper Penitencia Creek); Masson Diversion (Guadalupe Creek); Alamitos Diversion (Guadalupe River); Moffett Boulevard (Stevens Creek); Evelyn Avenue (Stevens Creek); Central Avenue (Stevens Creek); Fremont Avenue (Stevens Creek); and 14 drop structures (Llagas Creek). SCVWD owns and operates six fish screen facilities: Coyote Canal Diversion (Coyote Creek); Mabury Diversion (Upper Penitencia Creek); Noble Avenue Diversion (Upper Penitencia Creek); Masson Diversion (Guadalupe Creek); Alamitos Diversion (Guadalupe River); and Church Avenue Diversion (Llagas Creek). These facilities would be monitored and reported on annually; as to their status and whether or not sediment removal work will be proposed that year. Work activities would be performed consistent with the *2014-2023 SMP Manual*.

C. Mitigation Program

The SMP proposes to mitigate for impacts to LWD, riparian vegetation, instream habitat complexity features, and coarse sediment. The following summarizes these SMP 2014-2023 mitigation programs. The full description of these mitigation programs is presented in *Chapter 10* of the *2014-2023 SMP Manual*.

1. Large Woody Debris

LWD cut and/or removed from stream channels (*i.e.*, Tier 4) would be mitigated by the SMP. Mitigation will be 1:1 replacement of LWD. The method for calculating the volume of LWD removed and the associated mitigation obligation is presented in *Figure 1 of Attachment E* in the *2014-2023 SMP Manual*. The annual Notice of Proposed Work (NPW) would indicate which SMP activities proposed for the upcoming work season are likely to impact LWD and how the SMP would mitigate for that impact. Proposed Tier 4 LWD mitigation projects would be submitted with the NPW for agency review and approval. The proposed design of LWD mitigation projects would be provided and the habitat enhancement objectives specified (*e.g.*, juvenile salmonid instream cover, high flow velocity refuge, structure to retain spawning gravel, *etc*.). Each LWD mitigation proposal would identify a project-specific monitoring/evaluation program and establish success criteria.

2. Riparian Vegetation

To compensate for impacts to riparian trees and shrubs, the SCVWD would mitigate through either riparian plantings or removal of invasive plant species. The annual NPW would indicate which SMP activities proposed for the upcoming work season are likely to impact riparian vegetation and how the SMP will mitigate for that impact.

The SMP riparian planting program would mitigate for vegetation impacts at ratios ranging from 1:1 to 3:1 depending on the location (*i.e.*, Modified, Modified with Ecological Values, or Unmodified channels) and the type of vegetation impacted. *Attachment C* of the *2014-2023 SMP Manual* presents the process for scoring trees (6 to 12" diameter at breast height [dbh]) to be removed by SMP activities. The sum value from the assessment of four (4) attributes specifies the mitigation ratio for 6 to 12" dbh trees/shrubs proposed for removal. The attributes of the assessment are: (1) Vegetation Cover; (2) Local Area Value; (3) Ecosystems Benefits; and (4) Ecosystems Detriments. Vegetation Cover is a measurement of the square footage of canopy created by the tree at the widest drip-line extension of the subject tree. Local Area Value assesses whether the tree is unique to its geographic location based on species, size, structure, absence of adjacent comparable vegetation. Ecosystem Benefits are an assessment the extent of wildlife, fisheries, and stream benefits provided by the tree including bird nesting, seeds, fruits, flowers, and shaded riverine aquatic value. Ecosystem Detriments are an assessment of ecologically undesirable attributes such as a tree failing to thrive with little or no hope of recovery. High scores equate to higher value trees, with greater potential impacts if they are removed; and therefore, will require more mitigation. Low scores equate to lower value trees, having fewer potential impacts if they are removed; and therefore, require lower mitigation. A complete description of the SMP's riparian planting program is described in *Section 10.5.2* of the *2014-2023 SMP Manual* and mitigation ratios presented in Table 10-5.

The primary goal of the riparian planting program would be to compensate for the loss of quality and quantity of riparian habitat from sediment removal, bank stabilization, and vegetation management activities by SMP activities. Riparian planting would establish and/or enhance and habitat for birds, amphibians, and other wildlife using terrestrial riparian areas while providing shade, sources of organic matter and coarse woody debris, improve root and soil structure, and provide other water quality benefits to aquatic species. Restoration, enhancement and establishment would be accomplished primarily via the revegetation of creek banks and terraces within the SMP area where the existing physical conditions (*i.e.*, topography, hydrology, and soils) are suitable to establish native-dominated riparian habitat. The planting palette for the Riparian Planting Program is shown in *Table 10-7* of the *2014-2023 SMP Manual*.

The target species composition, location, and extent of riparian planting and restoration, enhancement and establishment would be directly related to the functions impacted from SMP maintenance activities. Riparian planting may also include site preparation, including minor grading and topsoil preparation, and incorporation of soil amendments. Monitoring would be conducted over a 5-year period with assessments performed in Years 1, 3, and 5 following planting. The data collected during monitoring visits would be used to determine if success criteria are met and to recommend management modifications or the implementation of contingency measures, as necessary, to help meet the final success criteria. *Section 11.3* of the *2014-2023 SMP Manual* describes the quantitative and qualitative monitoring that would be conducted to evaluate site performance and final success. If the final success criteria are not met by Year 5, remedial measures would be implemented and monitoring would continue annually or as otherwise stipulated in writing by the Interagency Work Group until the success criteria are achieved.

In addition to the SMP riparian planting program, impacts to vegetation may be mitigated by removing invasive non-native plant species. The primary goal of the Invasive Plant Management Program (IPMP) element of the SMP's compensatory mitigation package would be to enhance and improve habitat within Santa Clara County streams and riparian corridors by reducing the populations of ecologically impacting invasive plant species. The IPMP would provide compensatory mitigation for temporary SMP impacts to upland, riparian, freshwater and tidal wetlands from vegetation, bank stabilization, and sediment management activities by eliminating or significantly reducing the population of invasive plant species from these affected habitats. Invasive species removal for flow conveyance would be considered impact neutral and no compensation will be required. Invasive removal would be conducted such that it does not significantly reduce the functions and values of the site, and that it provides a net environmental benefit in the short and long term. Success criteria would be developed for each site, and/or for each individual target species. IPMP sites would be assessed annually following re-planting until success criteria are achieved. Annual assessments would be used to determine if additional control work or follow-up control work is necessary at treatment sites. Reporting of IPMP sites would occur for a period of 3 to 5 years depending on the site.

3. Instream Habitat Complexity and Coarse Sediment

Mitigation for impacts to instream anadromous salmonid habitat complexity and coarse sediment is proposed when SMP sediment removal activities or bank stabilization projects would result in the loss of these habitat features. Where feasible, bank stabilization treatments would incorporate habitat complexity features into the project-specific designs. Habitat complexity features incorporated into bank stabilization projects may be used to compensate for impacts to existing instream complexity elements at project sites. For bank stabilization projects which cannot be mitigated on-site, and sediment removal projects that result in the loss of instream habitat complexity and/or coarse sediments, the SMP proposes to mitigate at a 1:1 ratio for these impacts.

Attachment I of the *2014-2023 SMP Manual* describes the pre- and post-project assessment methodology for bank stabilization and sediment removal sites. Pre-project site assessments would be performed by a qualified biologist to quantify, through diagrams and maps, existing coarse sediment and instream habitat features at the SMP work site. Coarse sediment is defined as gravel and cobble ranging from 12.5 to 250 mm in diameter. Habitat complexity features include a range of instream elements that support juvenile and adult salmonid migration, spawning, and rearing (*i.e*., cobble, boulders, LWD, plant roots, undercut banks, *etc*.). Pre-project assessments would be used to identify the location, type, surface area, and value of instream habitat features and coarse sediment that may be impacted by SMP work activities. The annual NPW would present the results of each pre-project instream habitat complexity and coarse sediment assessment. Based on the pre-project assessment, the NPW would propose salmonid habitat enhancement/restoration projects to mitigate for these impacts. Post-project assessments would also be performed in the same manner as the pre-project assessments to confirm the actual extent of loss or retention of habitat features and coarse sediment.

Potential gravel augmentation and salmonid habitat restoration projects would be developed by the SCVWD in advance for use by the SMP mitigation program. In collaboration with the Agencies, designs for enhancement/restoration projects would be developed and a master list of potential projects established that can be used as mitigation for SMP temporary and permanent impacts. Coarse sediment, instream habitat complexity elements and LWD mitigation obligations may be combined and met by the SMP through the construction of the salmonid habitat enhancement/restoration projects.

For each proposed salmonid habitat mitigation project, the SCVWD would develop designs to achieve specific objectives (*i.e*., rearing habitat complexity, spawning gravel augmentation, fish passage, velocity refugia). The NPW would provide the project design plans and a description of specific habitat enhancement/restoration objectives. Additional information provided for each project would include: location (stream, reach), construction methods, dewatering plan (if needed), proposed success criteria, and a monitoring plan. The monitoring plan would establish the type of monitoring to be conducted, the timing of the monitoring to be conducted, the duration of the monitoring to be conducted and adaptive management alternatives if the success criteria are not met. Monitoring of salmonid enhancement/restoration projects may include sampling of juvenile steelhead by electrofishing, seines and/or dip nets.

D. Program Management

The SMP's annual stream maintenance planning, implementation, and reporting process occurs in three phases: 1) annual workplan development and notification; 2) implementation of annual routine stream maintenance work; and 3) annual summary reporting. Maintenance work for the upcoming work season would be presented to the Agencies as part of the Annual Work Plan through the NPW.

1. Notification

The SMP would prepare an Annual Work Plan each year and these activities presented to the Agencies for review through the NPW. The NPWs would describe the channel maintenance activities to be conducted during the upcoming maintenance season and mitigation projects proposed to compensate for any unavoidable adverse impacts. *Section 12.2.2* of the *2014-2023 SMP Manual* identifies the information and contents of the NPW for each type of SMP activity.

The NPW would be submitted to the Agencies by April 15 of each year and the Agencies would have 45 days to respond with comments. The Corps, CDFW, and Regional Boards would respond to the SCVWD with a notice to proceed following their respective reviews. NMFS and the USFWS would provide comments on the NPW to the SCVWD through the Corps. A "Second Submittal" NPW may be provided after April 15, at the discretion of the SCVWD, for additional project authorization. Late season high flow events are a frequent cause for work to be identified later than is feasible to incorporate into the primary NPW. This "second submittal" would be submitted by August 1st and include the same information as the primary NPW, with the same agency review period and process.

2. Reporting

The Annual Summary Report (ASR) would report on the previous work season's SMP activities including bank stabilization, sediment removal and vegetation management. The ASR would include actual impact numbers (*e.g.*, linear footage/acreage) for activities where such numbers were only estimated in the NPW. The SCVWD shall submit the ASR by January 31 of the following year. The ASR would describe maintenance activities completed the previous year and list what projects were proposed in the NPW but not performed. *Section 12.3* of the *2014-2023 SMP Manual* identifies the specific information to be included in the ASR by SMP activity type. Annual mitigation monitoring reports may be submitted separately or as attachments to ASRs. In addition to these reports, the SCVWD and Agencies would meet annually to discuss the performance of the SMP, review lessons learned from the previous maintenance season, and determine the need to improve stream maintenance techniques and BMPs.

E. Description of the Action Area

The action area is defined as all areas affected directly or indirectly by the Federal action (50 CFR 402.02). The action area for the 2014-2023 SMP is located within six watersheds: San Francisquito Creek, Stevens Creek, Guadalupe River, Coyote Creek, Uvas Creek, and Llagas Creek in Santa Clara County, California (Figure 1). In northern Santa Clara County, the action area includes the following streams: San Francisquito Creek, Stevens Creek, Los Gatos Creek, Alamitos Creek, Calero Creek, Guadalupe Creek, Guadalupe River, Coyote Creek, and Upper Penitencia Creek. In southern Santa Clara County, the action area includes Uvas Creek and Llagas Creek. All 2014-2023 SMP projects would occur in the stream areas below the 1000-foot elevation contour, and only in sections of creeks where the SCVWD has fee title or maintenance easements, or where the SCVWD Board has provided specific direction.

For the purpose of this consultation, the action area includes the identified stream reaches and their adjacent riparian corridors in the above named six watersheds and eleven streams (Figure 1 and Table 3). Stream reaches with SMP activities are categorized as Modified, Modified with Ecological Values, or Unmodified channels (see Figures 1-2, 1-3, 1-4, 1-5, and 1-6 in *2014-2023 SMP Manual*). In the watersheds of San Francisquito Creek, Stevens Creek, Guadalupe River and Coyote Creek, the action area consists of SMP project sites on the stream bed, stream banks, upper bank areas adjacent to these sites, and downstream in-channel areas to San Francisco Bay where water quality, gravel/cobble removal, and LWD removal may be affected by SMP work activities. In the watersheds of Uvas Creek and Llagas Creek, the action area includes SMP project sites on the stream bed, stream banks, upper bank areas adjacent to these sites, and downstream in-channel areas to the confluence with the Pajaro River where water quality, gravel/cobble removal, and LWD removal may be affected by SMP work activities.

III. ANALYTICAL FRAMEWORK

A. Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the Status of the Species, which evaluates the CCC steelhead DPS, S-CCC steelhead DPS, and the southern DPS of North American green sturgeon range-wide conditions, the factors responsible for that condition, and the species' likelihood of both survival and recovery; (2) the Environmental Baseline, which evaluates the condition of these listed species in the action area, the factors responsible for that condition, and the relationship of the action area to the likelihood of both survival and recovery of these listed species; (3) the Effects of the Action, which determines the direct and indirect effects of the proposed Federal action and the effects of any interrelated or interdependent activities on these species in the action area; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on these species.

The jeopardy determination is made by adding the effects of the proposed Federal action and any Cumulative Effects to the Environmental Baseline and then determining if the resulting changes in species status in the action area are likely to cause an appreciable reduction in the likelihood of both the survival and recovery of these listed species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on the range-wide likelihood of both survival and recovery of these listed species and the role of the action area in the survival and recovery of these listed species. The significance of the effects of the proposed Federal action is considered in this context, taken together with cumulative effects, for purposes of making the jeopardy determination. We use a hierarchical approach that focuses first on whether or not the effects on salmonids and/or green sturgeon in the action area will impact their respective populations. If the population will be impacted, we assess whether this impact is likely to affect the ability of the population to support the survival and recovery of the DPS or Evolutionary Significant Unit (ESU).

B. Adverse Modification Analysis

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 C.F.R. 402.02, which was invalidated by *Gifford Pinchot Task Force v. USFWS*, 378 F.3d 1059 (9th Cir. 2004), amended by 387 F.3d 968 (9th Cir. 2004). Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

The adverse modification analysis in this biological opinion relies on four components: (1) the Status of Critical Habitat, which evaluates the range-wide and watershed-wide condition of critical habitat for the CCC steelhead DPS, the S-CCC steelhead DPS, and the southern DPS of green sturgeon in terms of primary constituent elements (PCEs – sites for spawning, rearing, and migration), the factors responsible for that condition, and the resulting conservation value of the critical habitat overall; (2) the Environmental Baseline, which evaluates the condition of critical

habitat in the action area, the factors responsible for that condition, and the conservation value of critical habitat in the action area; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs in the action area and how that will influence the conservation value of affected critical habitat units; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the conservation value of affected critical habitat units.

For purposes of the adverse modification determination, we add the effects of the proposed Federal action on CCC steelhead, S-CCC steelhead, and southern DPS of green sturgeon critical habitat in the action area, and any Cumulative Effects, to the Environmental Baseline and then determine if the resulting changes to the conservation value of critical habitat in the action area are likely to cause an appreciable reduction in the conservation value of critical habitat range-wide. If the proposed action will negatively affect PCEs of critical habitat in the action area, we then assess whether or not this reduction will impact the value of the DPS or ESU critical habitat designation as a whole.

C. Use of Best Available Scientific and Commercial Information

To conduct the assessment, NMFS examined an extensive amount of information from a variety of sources. Detailed background information on the biology and status of the listed species and critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, and governmental and non-governmental reports. Additional information regarding the effects of the project's actions on the listed species in question, their anticipated response to these actions, and the environmental consequences of the actions as a whole was formulated from the aforementioned resources, and the following:

1) Information provided by the SCVWD's *2014-2023 SMP Manual* dated February 7, 2014.

2) Information provided to NMFS and the Corps through interagency work group meetings with the SCVWD from December 2011 to January 2014.

A complete administrative record of this consultation is on file in the NMFS Santa Rosa Area Office (Administrative Record Number 151422SWR2011SR00415).

IV. STATUS OF THE SPECIES AND CRITICAL HABITAT

This biological opinion analyzes the effects of the proposed action on the following ESA-listed species and designated critical habitat:

Central California Coast steelhead (*Oncorhynchus mykiss*) DPS
Threatened (71 FR 834; January 5, 2006)
Critical habitat (70 FR 52488; September 2, 2005);

South-Central California Coast steelhead (*Oncorhynchus mykiss*) DPS
Threatened (71 FR 834; January 5, 2006)
Critical habitat (70 FR 52488; September 2, 2005);

North American Green Sturgeon (*Acipenser medirostris*) southern DPS
Threatened (71 FR 17757; April 7, 2006)
Critical habitat (74 FR 52300; September 8, 2008).

A. Species Description, Life History, Status, and Critical Habitat

In this opinion, NMFS assesses four population viability parameters to help us understand the status of CCC steelhead, S-CCC steelhead, and southern DPS green sturgeon and their populations' ability to survive and recover. These population viability parameters are: abundance, population growth rate, spatial structure, and diversity (McElhany *et al*. 2000). NMFS has used existing information to determine the general condition of each population and factors responsible for the current status of each DPS.

We use these population viability parameters as surrogates for numbers, reproduction, and distribution, the criteria found within the regulatory definition of jeopardy (50 CFR 402.02). For example, the first three parameters are used as surrogates for numbers, reproduction, and distribution. We relate the fourth parameter, diversity, to all three regulatory criteria. Numbers, reproduction, and distribution are all affected when genetic or life history variability is lost or constrained. This results in reduced population resilience to environmental variation at local or landscape-level scales.

1. Steelhead

a. General Life History

Steelhead are anadromous forms of *O. mykiss*, spending some time in both freshwater and saltwater. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death (Busby *et al*. 1996). Although one-time spawners are the great majority, Shapovalov and Taft (1954) reported that repeat spawners are relatively numerous (17.2 percent) in California streams. Steelhead young usually rear in freshwater for 1 to 3 years before migrating to the ocean as smolts, but rearing periods of up to 7 years have been reported. Migration to the ocean usually occurs in the spring. Steelhead may remain in the ocean for 1 to 5 years (2 to 3 years is most common) before returning to their natal streams to spawn (Busby *et al*. 1996). The distribution of steelhead in the ocean is not well known. Coded wire tag recoveries indicate that most steelhead tend to migrate north and south along the continental shelf (Barnhart 1986). Adult steelhead typically migrate from the ocean to freshwater between December and April, peaking in January and February (Fukushima and Lesh 1998).

Steelhead fry generally rear in edgewater habitats and move gradually into pools and riffles as they grow larger. Cover is an important habitat component for juvenile steelhead, both as a

velocity refuge and as a means of avoiding predation (Shirvell 1990, Meehan and Bjornn 1991). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. Rearing steelhead juveniles prefer water temperatures of 7.2-14.4 EC and have an upper lethal limit of about 25 EC (Barnhart 1986, Bjornn and Reiser 1991). They can survive in water up to 27 EC with saturated dissolved oxygen conditions and a plentiful food supply. Fluctuating diurnal water temperatures also aid in survivability of salmonids (Busby *et al*. 1996).

Juvenile steelhead emigrate episodically from natal streams during fall, winter, and spring high flow events. Barnhart (1986) reported that steelhead smolts in California range in size from 140 to 210 millimeter (mm) (fork length). The emigration timing of steelhead smolts from streams in Central California typically extends from February through May. Smolts are generally absent from streams during the times of traditional summertime construction windows for projects in steelhead streams.

b. Status of CCC Steelhead DPS

Historically, approximately 70 populations[3] of steelhead existed in the CCC steelhead DPS (Spence *et al*. 2008, Spence *et al*. 2012). Many of these populations (about 37) were independent, or potentially independent, meaning they had a high likelihood of surviving for 100 years absent anthropogenic impacts (Bjorkstedt *et al*. 2005). The remaining populations were dependent upon immigration from nearby CCC steelhead DPS populations to ensure their viability (McElhaney *et al*. 2000, Bjorkstedt *et al*. 2005).

While historical and present data on abundance are limited, CCC steelhead numbers are substantially reduced from historical levels. A total of 94,000 adult steelhead were estimated to spawn in the rivers of this DPS in the mid-1960s, including 50,000 fish in the Russian River - the largest population within the DPS (Busby *et al*. 1996). Recent estimates for the Russian River are on the order of 4,000 fish (NMFS 1997a). Abundance estimates for smaller coastal streams in the DPS indicate low but stable levels with recent estimates for several streams (Lagunitas, Waddell, Scott, San Vincente, Soquel, and Aptos creeks) of individual run sizes of 500 fish or less (62 FR 43937). Some loss of genetic diversity has been documented and attributed to previous among-basin transfers of stock and local hatchery production in interior populations in the Russian River (Bjorkstedt *et al*. 2005). Similar losses in genetic diversity in the Napa River may have resulted from out-of-basin and out-of-DPS releases of steelhead in the Napa basin in the 1970s and 1980s. These transfers included fish from the South Fork Eel River, San Lorenzo River, Mad River, Russian River, and the Sacramento River. In San Francisco Bay streams, reduced population sizes and fragmentation of habitat has likely also led to loss of genetic

[3] Population as defined by Bjorkstedt *et al*. 2005 and McElhaney *et al.* 2000 as, in brief summary, a group of fish of the same species that spawns in a particular locality at a particular season and does not interbreed substantially with fish from any other group. Such fish groups may include more than one stream. These authors use this definition as a starting point from which they define four types of populations (not all of which are mentioned here).

diversity in these populations. For more detailed information on trends in CCC steelhead abundance, see: Busby *et al*. 1996, NMFS 1997a, Good *et al.* 2005, Spence *et al*. 2008. CCC steelhead have experienced serious declines in abundance and long-term population trends suggest a negative growth rate. This indicates the DPS may not be viable in the long term. DPS populations that historically provided enough steelhead immigrants to support dependent populations may no longer be able to do so, placing dependent populations at increased risk of extirpation. However, because CCC steelhead remain present in most streams throughout the DPS, roughly approximating the known historical range, CCC steelhead likely possess a resilience that is likely to slow their decline relative to other salmonid DPSs or ESUs in worse condition. In 2005, a status review concluded that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Good *et al*. 2005). On January 5, 2006, NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834).

A more recent viability assessment of CCC steelhead concluded that populations in watersheds that drain to San Francisco Bay are highly unlikely to be viable, and that the limited information available did not indicate that any other CCC steelhead populations could be demonstrated to be viable[4] (Spence *et al.* 2008). Research monitoring data from 2008/09 and 2009/10 of adult CCC steelhead returns shows a decline in adults across the range of the DPS compared to the last ten years (Jeffrey Jahn, personal communication, 2010). The most recent status update found that the status of the CCC steelhead DPS remains "likely to become endangered in the foreseeable future" (Williams *et al*. 2011), as new and additional information available since Good *et al.* (2005), does not appear to suggest a change in extinction risk. On December 7, 2011, NMFS chose to maintain the threatened status of the CCC steelhead (76 FR 76386).

c. Status of S-CCC Steelhead DPS

Boughton *et al.* (2007) determined the S-CCC steelhead DPS consists of 12 discrete sub-populations which represent localized groups of interbreeding individuals. Steelhead populations are present in most streams in the S-CCC DPS, however, these populations are fragmented and unstable (Good *et al.* 2005; Boughton *et al*. 2007). Severe habitat degradation and compromised genetic integrity of some populations pose a serious risk to the survival and recovery of the S-CCC steelhead DPS (Good *et al.* 2005). None of these sub-populations currently meet the definition of viable and most of can be characterized by low population abundance, variable or negative population growth rates, and reduced spatial structure and diversity. The sub-populations in the Pajaro River and Salinas River watersheds are in particularly poor condition (relative to watershed size) and exhibit a greater lack of viability than many of the coastal subpopulations.

Populations of S-CCC steelhead throughout the DPS have exhibited a long-term negative trend since the mid-1960s. In the mid-1960s, total spawning populations were estimated at 17,750 individuals (Good *et al.* 2005). Available information shows the S-CCC steelhead population continued to decline from the 1970s to the 1990s (Busby *et al.* 1996) and more recent data

[4] Viable populations have a high probability of long-term persistence (> 100 years).

indicate this trend continues (Good *et al.* 2005). Current S-CCC steelhead run-sizes in the five largest systems in the DPS (Pajaro River, Salinas River, Carmel River, Little Sur River, and Big Sur River) are likely reduced from 4,750 adults in 1965 (CDFG 1965) to less than 500 returning adult fish in 1996. More recent estimates for total run-size do not exist for the S-CCC steelhead DPS (Good *et al.* 2005).

In the winters of 2008/09 and 2009/10, adult returns in many streams within the DPS were considerably reduced relative to higher returns at the beginning of the decade. This has been attributed largely to poor ocean conditions along the eastern Pacific Ocean (Lindley *et al.* 2009). During the winter of 2010/11, the number of returning adult steelhead in some populations within the DPS rebounded, including the Carmel River where the total number of returning adults at the San Clemente Dam[5] was similar to recent high returns observed at the beginning of the decade. However, adult returns during the winters of 2012/13 and 2013/2014 were low due to extremely low rainfall (Jon Ambrose, NMFS, personal communication, 2014)

On January 5, 2006, NMFS confirmed the listing of S-CCC steelhead as threatened under the ESA (71 FR 834). In the most recent status update (NMFS 2011, Williams *et al.* 2011) NMFS concluded there was no evidence to suggest the status of the S-CCC steelhead DPS has changed appreciably since the publication of previous status review (Good *et al.* 2005) and therefore S-CCC steelhead remain listed as threatened (76 FR 76386).

c. Status of CCC Steelhead and S-CCC Steelhead Critical Habitat

In designating critical habitat, NMFS considers, among other things, the following requirements of the species: 1) space for individual and population growth, and for normal behavior; 2) food, water, air, light, minerals, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for breeding, reproduction, or rearing offspring; and, generally, 5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species (50 CFR 424.12(b)). In addition to these factors, NMFS also focuses on PCEs and/or essential habitat features within the designated area that are essential to the conservation of the species and that may require special management considerations or protection.

PCEs for CCC steelhead, and S-CCC steelhead critical habitat, and their associated essential features within freshwater include:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;

2. Freshwater rearing sites with:
    a. water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;

[5] http://www.mpwmd.dst.ca.us/fishcounter/fishcounter.htm

b. water quality and forage supporting juvenile development; and

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

3. Freshwater migration corridors free of obstruction and excessive predation 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.

The condition of critical habitat for CCC and S-CCC steelhead, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined the present depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat: logging, agriculture, grazing, and mining activities, urbanization, stream channelization, construction of dams and other migration impediments, wetland loss, and water resource development, including unscreened diversions for irrigation, and recreational harvest. Impacts of concern include alteration of stream bank and channel morphology, alteration of water temperatures, loss of spawning and rearing habitat, fragmentation of habitat, loss of downstream recruitment of spawning gravels and large woody debris, degradation of water quality, water extraction and stream desiccation, fish passage constraints, alteration of riparian vegetation communities, and loss of riparian vegetation resulting in increased stream bank erosion, loss of shade (higher water temperatures) and loss of nutrient inputs, (Busby *et al.* 1996, Good *et al.* 2005, 70 FR 52488).

Water development has drastically altered natural hydrologic cycles in many of the streams in the CCC steelhead and S-CCC steelhead DPSs. Alteration of flows results in migration delays, loss of suitable habitat due to dewatering and blockage; stranding of fish from rapid flow fluctuations; entrainment of juveniles into poorly screened or unscreened diversions, and increased water temperatures harmful to salmonids. Some of these anthropogenic impacts have been reduced or eliminated, and more recently, multiple restoration actions aimed at improving critical habitat quality and access have been implemented that are intended enhance CCC and S-CCC steelhead abundances in the future. These include the modification or removal of numerous other fish passage impediments throughout the CCC and S-CCC steelhead DPSs; installation of a fish passage facility at Los Padres Dam on the Carmel River; continued efforts toward removal of San Clemente Dam on the Carmel River; and revised reservoir release schedules at Uvas Reservoir on Uvas Creek, Crystal Springs Reservoir on San Mateo Creek, Calaveras Reservoir in the Alameda Creek watershed, Lake Sonoma on Dry Creek (Russian River), Lake Mendocino on the Russian River, and at several water diversion intakes in the San Francisquito Creek watershed. Still, the overall current condition of CCC and S-CCC steelhead critical habitat throughout the DPSs remains degraded, and may not provide the full extent of conservation value necessary for the recovery of the species.

2. Green Sturgeon

a. General Life History

Green sturgeon is an anadromous, long-lived, and bottom-oriented fish species in the family Acipenseridae. Sturgeon have skeletons composed mostly of cartilage and lack scales, instead possessing five rows of characteristic bony plates on their body called "scutes." On the underside of their flattened snouts are sensory barbels and a siphon-shaped, protrusible, toothless mouth. Large adults may exceed 2 meters in length and 100 kilograms in weight (Moyle 1976). Based on genetic analyses and spawning site fidelity, NMFS determined that North American green sturgeon are comprised of at least two DPSs: a northern DPS consisting of populations originating from coastal watersheds northward of and including the Eel River ("northern DPS green sturgeon"), with spawning confirmed in the Klamath and Rogue river systems; and a southern DPS consisting of populations originating from coastal watersheds south of the Eel River ("southern DPS green sturgeon"), with spawning confirmed in the Sacramento River system (Adams *et al.* 2002).

Green sturgeon is the most marine-oriented species of sturgeon (Moyle 2002). Along the West Coast of North America, they range in nearshore waters from Mexico to the Bering Sea (Adams *et al*. 2002), with a general tendency to head north after their out-migration from freshwater (Lindley *et al*. 2011). While in the ocean, archival tagging indicates that green sturgeon occur in waters between 0 and 200 meters depth, but spend most of their time in waters between 20–80 meters and temperatures of 9.5–16.0°C (Nelson *et al.* 2010, Huff *et al*. 2011). Subadult and adult green sturgeon move between coastal waters and estuaries (Lindley *et al*. 2008, Lindley *et al.* 2011), but relatively little is known about how green sturgeon use these habitats. Lindley *et al.* (2011) report multiple rivers and estuaries are visited by aggregations of green sturgeon in summer months, and larger estuaries (e.g., San Francisco Bay) appear to be particularly important habitat. During the winter months, green sturgeon generally reside in the coastal ocean. Areas north of Vancouver Island are favored overwintering areas, with Queen Charlotte Sound and Hecate Strait likely destinations based on detections of acoustically-tagged green sturgeon (Lindley *et al.* 2008, Nelson *et al*. 2010).

Based on genetic analysis, Israel *et al*. (2009) reported that almost all green sturgeon collected in the San Francisco Bay system were southern DPS. This is corroborated by tagging and tracking studies which found that no green sturgeon tagged in the Klamath or Rogue rivers (*i.e.*, Northern DPS) have yet been detected in San Francisco Bay (Lindley *et al*. 2011). However, green sturgeon inhabiting coastal waters adjacent to San Francisco Bay include northern DPS green sturgeon.

Adult southern DPS green sturgeon spawn in the Sacramento River watershed during the spring and early summer months (Moyle *et al.* 1995). After hatching larvae migrate downstream and metamorphose into juveniles. Juveniles spend their first few years in the Sacramento-San Joaquin Delta (Delta) and San Francisco estuary before entering the marine environment as

subadults. Juvenile green sturgeon salvaged at the State and Federal water export facilities in the southern Delta are generally between 200 mm and 400 mm total length (TL) (Adams *et al*. 2002) which suggests southern DPS green sturgeon spend several months to a year rearing in freshwater before entering the Delta and San Francisco estuary. Subadult green sturgeon spend several years at sea before reaching reproductive maturity and returning to freshwater to spawn for the first time (Nakamoto *et al*. 1995).

During the summer and fall, an unknown proportion of the population of non-spawning adults and subadults enter the San Francisco estuary from the ocean for periods ranging from a few days to 6 months (Lindley *et al.* 2011). Some fish are detected only near the Golden Gate, while others move as far inland as Rio Vista on the lower Sacramento River in the Delta. The remainder of the population appear to enter bays and estuaries farther north from Humboldt Bay, California to Grays Harbor, Washington (Lindley *et al*. 2011).

Green sturgeon feed on benthic invertebrates and fish (Adams *et al.* 2002). Radtke (1966) analysed stomach contents of juvenile green sturgeon captured in the Sacramento-San Joaquin Delta and found the majority of their diet was benthic invertebrates, such as mysid shrimp and amphipods (*Corophium* spp). Manual tracking of acoustically-tagged green sturgeon in the San Francisco Bay estuary indicates they are generally bottom-oriented, but make occasional forays to surface waters, perhaps to assist their movement (Kelly *et al.* 2007). Dumbauld *et al*. (2008) report green sturgeon utilize soft substrate in estuaries, presumably feeding on benthic invertebrates. Preliminary data from mapping surveys conducted in Willapa Bay, Washington, showed densities of "feeding pits" (depressions in the substrate believed to be formed when green sturgeon feed) were highest over shallow intertidal mud flats, while harder substrates (*e.g.*, gravel) had no pits (M. Moser, unpublished data). Within the San Francisco estuary, green sturgeon are encountered by recreational anglers and during sampling by CDFW in the shallow waters of San Pablo Bay.

b. Status of Southern DPS Green Sturgeon

To date, little population-level data have been collected for green sturgeon. In particular, there are no published abundance estimates for either northern DPS or southern DPS green sturgeon in any of the natal rivers based on survey data. As a result, efforts to estimate green sturgeon population size have had to rely on sub-optimal data with known potential biases. Available abundance information comes mainly from four sources: 1) incidental captures in the CDFW white sturgeon monitoring program; 2) fish monitoring efforts associated with two diversion facilities on the upper Sacramento River; 3) fish salvage operations at the water export facilities on the Sacramento-San Joaquin Delta; and 4) dual frequency sonar identification in spawning areas of the upper Sacramento River. These data are insufficient in a variety ways (short time series, non-target species, *etc*.) and do not support more than a qualitative evaluation of changes in green sturgeon abundance.

CDFW's white sturgeon monitoring program incidentally captures southern DPS green sturgeon. Trammel nets are used to capture white sturgeon and CDFW utilizes a multiple-census or Peterson mark-recapture method to estimate the size of subadult and adult sturgeon population

(CDFG 2002). By comparing ratios of white sturgeon to green sturgeon captures, estimates of southern DPS green sturgeon abundance can be calculated. Estimated abundance of green sturgeon between 1954 and 2001 ranged from 175 fish to more than 8,000 per year and averaged 1,509 fish per year. Unfortunately, there are many biases and errors associated with these data, and CDFW does not consider these estimates reliable. For larval and juvenile green sturgeon in the upper Sacramento River, information is available from salmon monitoring efforts at the Red Bluff Diversion Dam (RBDD) and the Glenn-Colusa Irrigation District (GCID). Incidental capture of larval and juvenile green sturgeon at the RBDD and GCID have ranged between 0 and 2,068 green sturgeon per year (Adams *et al.* 2002). Genetic data collected from these larval green sturgeon suggest that the number of adult green sturgeon spawning in the upper Sacramento River remained roughly constant between 2002 and 2006 in river reaches above Red Bluff (Israel and May 2010). In 2011, rotary screw traps operating in the Upper Sacramento River at RBDD captured 3,700 larval green sturgeon which represents the highest catch on record in 16 years of sampling (Poytress *et al.* 2011).

Juvenile green sturgeon are collected at water export facilities operated by the California Department of Water Resources (DWR) and the Federal Bureau of Reclamation (BOR) in the Sacramento-San Joaquin Delta. Fish collection records have been maintained by DWR from 1968 to present and by BOR from 1980 to present. The average number of southern DPS green sturgeon taken per year at the DWR facility prior to 1986 was 732; from 1986 to 2001, the average per year was 47 (70 FR 17386). For the BOR facility, the average number prior to 1986 was 889; from 1986 to 2001 the average was 32 (70 FR 17386). Direct capture in the salvage operations at these facilities is a small component of the overall effect of water export facilities on southern DPS green sturgeon; entrained juvenile green sturgeon are exposed to potential high levels of predation by non-native predators, disruption in migratory behavior, and poor habitat quality. Delta water exports have increased substantially since the 1970s and it is likely that this has contributed to negative trends in the abundance of migratory fish that utilize the Delta, including the southern DPS green sturgeon.

During the spring and summer spawning period, researchers with University of California Davis have utilized dual-frequency identification sonar to enumerated adult green sturgeon in the upper Sacramento River (*i.e.*, DIDSON). These surveys estimated 175 to 250 sturgeon (±50) in the mainstem Sacramento River during the 2010 and 2011 spawning seasons (E. Mora, personal communication, January 2012). However, it is important to note that this estimate may include some white sturgeon, and movements of individuals in and out of the survey area confound these estimates. Given these uncertainties, caution must be taken in using these estimates to infer the spawning run size for the Sacramento River, until further analyses are completed.

The most recent status review update concluded the southern DPS green sturgeon is likely to become endangered in the foreseeable future due to the substantial loss of spawning habitat, the concentration of a single spawning population in one section of the Sacramento River, and multiple other risks to the species such as stream flow management, degraded water quality, and introduced species (NMFS 2005). Based on this information, the southern DPS green sturgeon was listed as threatened on April 7, 2006 (71 FR 17757).

c. Status of Southern DPS Green Sturgeon Critical Habitat

Critical habitat was designated for the southern DPS of green sturgeon on October 9, 2009 (74 FR 52300) and includes coastal marine waters within 60 fathoms depth from Monterey Bay, California to Cape Flattery, Washington, including the Strait of Juan de Fuca to its United States boundary. Designated critical habitat also includes the Sacramento River, lower Feather River, lower Yuba River, Sacramento-San Joaquin Delta, Suisun Bay, San Pablo Bay, and San Francisco Bay in California. PCEs of designated critical habitat in estuarine areas are food resources, water flow, water quality, mitigation corridor, depth, and sediment quality. In freshwater riverine systems, PCEs of green sturgeon critical habitat are food resources, substrate type or size, water flow, water quality, migratory corridor, depth, and sediment quality. In nearshore coastal marine areas, PCEs are migratory corridor, water quality, and food resources. The current condition of critical habitat for the southern DPS of green sturgeon is degraded over its historical conditions. It does not provide the full extent of conservation values necessary for the recovery of the species, particularly in the upstream riverine habitat of the Sacramento River. In the Sacramento River, migration corridor and water flow PCEs have been impacted by human actions, substantially altering the historical river characteristics in which the southern DPS of green sturgeon evolved. In addition, the alterations to the Sacramento-San Joaquin River Delta may have a particularly strong impact on the survival and recruitment of juvenile green sturgeon due to their protracted rearing time in brackish and estuarine waters.

B. Factors Responsible for Steelhead and Green Sturgeon Stock Declines

NMFS cites many reasons (primarily anthropogenic) for the decline of CCC steelhead (Busby *et al*. 1996), S-CCC steelhead (Busby *et al.* 1996), and southern DPS of green sturgeon (Adams *et al.* 2002, NMFS 2005). The foremost reason for the decline in these anadromous fish populations is the degradation and/or destruction of freshwater and estuarine habitat. Additional factors contributing to the decline of these populations include: commercial and recreational harvest, artificial propagation, natural stochastic events, marine mammal predation, reduced marine-derived nutrient transport, and ocean conditions.

1. Habitat Degradation and Destruction

The best scientific information presently available demonstrates a multitude of factors, past and present, have contributed to the decline of west coast salmonids and green sturgeon by reducing and degrading habitat by adversely affecting essential habitat features. Most of this habitat loss and degradation has resulted from anthropogenic watershed disturbances caused by urban development, agriculture, poor water quality, water resource development, dams, gravel mining, forestry (Busby *et al*. 1996, Adams *et al*. 2002, Good *et al*. 2005), and lagoon management (Smith 1990, Bond 2006).

2. Commercial and Recreational Harvest

Until recently, commercial and recreational harvest of southern DPS green sturgeon was allowed under State and Federal law. The majority of these fisheries have been closed (NMFS 2005). Ocean salmon fisheries off California are managed to meet the conservation objectives for certain stocks of salmon listed in the Pacific Coast Salmon Fishery Management Plan, including any stock that is listed as threatened or endangered under the ESA. Early records did not contain quantitative data by species until the early 1950's. In addition, the confounding effects of habitat deterioration, drought, and poor ocean conditions on salmonids make it difficult to assess the degree to which recreational and commercial harvest have contributed to the overall decline of salmonids and green sturgeon in West Coast rivers.

3. Artificial Propagation

Releasing large numbers of hatchery fish can pose a threat to wild salmon and steelhead stocks through genetic impacts, competition for food and other resources, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production (Waples 1991).

4. Natural Stochastic Events

Natural events such as droughts, landslides, floods, and other catastrophes have adversely affected salmonid and sturgeon populations throughout their evolutionary history. The effects of these events are exacerbated by anthropogenic changes to watersheds such as logging, roads, dams and water diversions. These anthropogenic changes have limited the ability of salmonid and sturgeon to rebound from natural stochastic events and depressed populations to critically low levels.

5. Marine Mammal Predation

Predation is not known to be a major factor contributing to the decline of West Coast salmon and steelhead populations relative to the effects of fishing, habitat degradation, and hatchery practices. Predation may have substantial impacts in localized areas. Harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*) numbers have increased along the Pacific Coast (NMFS 1997b).

In a peer reviewed study of harbor seal predation in the Alsea River Estuary of Oregon, the combined results of multiple methodologies led researchers to infer that seals consumed 21 percent (range = 3–63 percent) of the estimated prespawning population of coho salmon. The majority of the predation occurred upriver, at night, and was done by a relatively small proportion of the local seal population (Wright *et al*. 2007). However, at the mouth of the Russian River, Hanson (1993) reported that the foraging behavior of California sea lions and harbor seals with respect to anadromous salmonids was minimal, and predation on salmonids appeared to be coincidental with the salmonid migrations rather than dependent upon them.

6. Reduced Marine-Derived Nutrient Transport

Marine-derived nutrients from adult salmon carcasses have been shown to be vital for the growth of juvenile salmonids and the surrounding terrestrial and riverine ecosystems (Bilby *et al*. 1996, Bilby *et al.* 1998, Gresh *et al*. 2000). Declining salmon and steelhead populations have resulted in decreased marine-derived nutrient transport to many watersheds. Nutrient loss may be contributing to the further decline of ESA-listed salmonid populations (Gresh *et al*. 2000).

7. Ocean Conditions

Recent evidence suggests poor ocean conditions played a significant role in the low number of returning adult fall-run Chinook salmon to the Sacramento River in 2007 and 2008 (Lindley *et al*. 2009). Changes in ocean conditions likely affect ocean survival of all west coast salmonid populations (Good *et al*. 2005, Spence *et al*. 2008), and may be affecting green sturgeon populations, as well.

C. Global Climate Change

Modeling of climate change impacts in California suggests average summer air temperatures are expected to increase (Lindley *et al.* 2007). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe *et al*. 2004). Total precipitation in California may decline; critically dry years may increase (Lindley et al. 2007, Schneider 2007). The Sierra Nevada snow pack is likely to decrease by as much as 70 to 90 percent by the end of this century under the highest emission scenarios modeled (Luers *et al*. 2006). Wildfires are expected to increase in frequency and magnitude, by as much as 55 percent under the medium emissions scenarios modeled (Luers *et al.* 2006). Vegetative cover may also change, with decreases in evergreen conifer forest and increases in grasslands and mixed evergreen forests. The likely change in amount of rainfall in Northern and Central Coastal California streams under various warming scenarios is less certain, although as noted above, total rainfall across the state is expected to decline.

For the California North Coast, some models show large increases (75 to 200 percent) while other models show decreases of 15 to 30 percent (Hayhoe *et al*. 2004). Many of these changes are likely to further degrade salmonid habitat by, for example, reducing stream flows during the summer and raising summer water temperatures. Estuaries may also experience changes detrimental to salmonids and green sturgeon. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia *et al*. 2002). In marine environments, ecosystems and habitats important to salmonids and green sturgeon are likely to experience changes in temperatures, circulation and chemistry, and food supplies (Feely *et al*. 2004, Brewer 2008, Osgood 2008, Turley 2008). The projections described above are for the mid to late 21st Century. In shorter time frames, climate conditions not caused by the human addition of carbon dioxide to the atmosphere are more likely to predominate (Cox and Stephenson 2007; Smith *et al*. 2007).

V. ENVIRONMENTAL BASELINE

A. Action Area Overview

The action area consists of San Francisquito Creek, Stevens Creek, Los Gatos Creek, Alamitos Creek, Calero Creek, Guadalupe River, Guadalupe Creek, Coyote Creek, Upper Penitencia Creek, Uvas Creek and Llagas Creek in Santa Clara County, California. The action area includes SMP project sites in freshwater areas in these streams, and it also includes tidally-influence areas in the northern Santa Clara County streams where they flow into San Francisco Bay. Northern Santa Clara County streams in the action area consist of San Francisquito Creek, Stevens Creek, Los Gatos Creek, Alamitos Creek, Calero Creek, Guadalupe River, Guadalupe Creek, Coyote Creek, and Upper Penitencia Creek. The southern Santa Clara County streams are Uvas Creek and Llagas Creek which are tributary to the Pajaro River and subsequently to Monterey Bay. All 2014-2023 SMP projects will occur in areas below the 1000-foot elevation contour, and only in sections of creeks where the SCVWD has fee title or maintenance easements, or where the SCVWD's Board has provided specific direction (Figure 1).

The climate in the action area is Mediterranean; most precipitation falls in winter and spring as rain. The freshwater outflow pattern is seasonal; highest outflow occurs in winter and spring. Santa Clara County streams and San Francisco Bay also receive inputs from stormwater runoff, and wastewater from municipal and industrial sources that vary in volume depending on the location and seasonal weather patterns.

B. Status of Listed Species in the Action Area

1. CCC Steelhead

NMFS is not aware of any systematic fish surveys that have been completed for CCC steelhead in Santa Clara County. However, CCC steelhead are known to occur in the following eight streams within the action area: San Francisquito Creek, Stevens Creek, Los Gatos Creek, Alamitos Creek, Calero Creek, Guadalupe River, Guadalupe Creek, Coyote Creek, and Upper Penitencia Creek. The SCVWD operates reservoirs and/or water diversions on these northern Santa Clara County streams, and several of these structures block access to historical upstream habitat for CCC steelhead. On six of the nine CCC steelhead streams in the action area, the following SCVWD dams and diversions are complete barriers to upstream fish passage: Anderson Reservoir on Coyote Creek; Stevens Creek Reservoir on Stevens Creek; Almaden Reservoir on Alamitos Creek, Guadalupe Reservoir on Guadalupe Creek, Calero Dam on Calero Creek, and Page Dam[6] on Los Gatos Creek. The effects of these dams and reservoirs are

[6] On Los Gatos Creek, the first downstream barrier encountered by CCC steelhead is a concrete grade control structure known as the Camden Drop Structure which is approximately 0.75 mile downstream of Page Dam.

discussed in subsection *Factors Affecting Species Environment within the Action Area* of this Opinion.

These nine northern Santa Clara County streams in the action area are used by CCC steelhead for migration, spawning, and juvenile rearing. Adult CCC steelhead migrate from the Pacific Ocean through the San Francisco Bay estuary as they seek upstream spawning grounds in these streams from December through March. Adult spawning typically occurs from January through April. Juvenile (smolt) steelhead migrate from their natal streams through San Francisco Bay estuary to the ocean during the winter and spring. Emigration timing is highly variable, but peak migrations downstream typically occur in February, March, April and May. During the course of their downstream migration, juvenile steelhead can utilize tidal reaches at San Francisco Bay for seasonal rearing.

The highest consistent density of juvenile CCC steelhead in the action area is found in Stevens Creek. Densities of juvenile steelhead as high as 65 steelhead per 100 feet of stream have been recorded in Stevens Creek (unpublished data from Aquatic Systems Research 1999, City of Cupertino 2008, and CDFW 2010). On San Francisquito Creek, the action area includes a portion of the mainstem creek, but steelhead habitat is limited in this area because long reaches of this channel naturally dry out in most years during the summer and early fall period. The mainstem Guadalupe River supports low densities of juvenile steelhead while its tributaries Guadalupe Creek and Alamitos Creek support higher numbers of rearing juveniles. Calero Creek is a tributary to Alamitos Creek and warm water conditions during the summer months limit the stream's ability to support juvenile steelhead rearing. Los Gatos Creek is also a tributary to the Guadalupe River and available information suggests the stream supports low densities of rearing juvenile CCC steelhead. Very few juvenile steelhead occur in the mainstem of Coyote Creek, but the tributary Upper Penitencia Creek supports a small run steelhead and low densities of rearing juveniles.

2. S-CCC Steelhead

Since 2005 juvenile steelhead distribution, abundance, growth rates, and habitat use have been assessed annually in Uvas Creek (Casagrande 2014). Within the action area, S-CCC steelhead are commonly observed in Uvas Creek, and less commonly in Llagas Creek. S-CCC steelhead in Uvas and Llagas creeks have suffered a significant decline from historical levels, due in large part to anthropogenic activities. Uvas Dam on Uvas Creek and Chesbro Dam on Llagas Creek are both complete barriers to upstream migration and historical S-CCC steelhead habitat in the upper watershed is no longer accessible. The effects of these dams and reservoirs are discussed in subsection *Factors Affecting Species Environment within the Action Area* of this Opinion.

Steelhead use Uvas and Llagas creeks for spawning, juvenile rearing, and as a migration corridor. Records of steelhead abundance in Uvas and Llagas Creek prior to the 1970's are very limited. Since the early 1970's, steelhead abundance in Llagas Creek (based on observed juvenile abundance during summer and fall sampling) has been consistently low, and may consist largely of resident trout in some years (Smith 2007). In 2005-2007, 2010, and 2011, fall sampling for juvenile steelhead was conducted at multiple sites in the Llagas Creek downstream of Chesbro

Dam, including a site at or immediately downstream of the action area (Casagrande 2011; Casagrande 2012). In all years, juvenile steelhead/rainbow trout have been extremely scarce with no more than 10 fish captured in over 1,000 feet of sampled stream in a given year. Recent sampling of juveniles in Uvas Creek in 2005, 2006, and 2007, indicates juvenile density has decreased considerably since the early 1970s (J. Smith, personal communication, 2007). Casagrande (2014) reports the overall abundance of young-of-the-year (YOY) steelhead in Uvas Creek in 2013 was similar to most previous years with densities ranging from 0.8 to 14.3 fish per 100 feet.

3. Southern DPS of Green Sturgeon

NMFS is not aware of any fish surveys that have been completed for green sturgeon in the Santa Clara County portion of South San Francisco Bay. However, green sturgeon with acoustic tags have been detected at the Dumbarton Railroad Bridge span in South San Francisco Bay. Green sturgeon are both anadromous and iteroparous, and adults pass through the San Francisco Bay estuary during spawning, and post-spawning migrations. Pre-spawn green sturgeon enter the Bay between late February and early May, as they migrate to spawning grounds in the Sacramento River (Heublein *et al*. 2009). Post-spawning adults may be present in the Bay after spawning in the Sacramento River in the spring and early summer for months prior to emigrating into the ocean. Juvenile green sturgeon move into the Delta and San Francisco estuary early in their juvenile life history, where they may remain for 2-3 years before migrating to the ocean (Allen and Cech, Jr. 2007; Kelly *et al*. 2007). Sub-adult and non-spawning adult green sturgeon utilize both ocean and estuarine environments for rearing and foraging. Due to these life-history characteristics, juvenile, sub-adult and adult green sturgeon may be present in tidal portions of Santa Clara County streams. In the action area of this project, 2014-2023 SMP work sites include tidally-influenced reaches in Guadalupe River, Coyote Creek, and San Francisquito Creek.

C. Status of Critical Habitat in the Action Area

1. CCC Steelhead Critical Habitat

Within the action area, San Francisquito Creek, Stevens Creek, Coyote Creek, and Upper Penitencia Creek are designated as critical habitat for CCC steelhead. In the Guadalupe River watershed, only the lowermost 6 miles of the Guadalupe River is designated as critical habitat. The Guadalupe River tributaries of Alamitos Creek, Los Gatos Creek, Calero Creek, and Guadalupe Creek are not designated as critical habitat for CCC steelhead.

San Francisquito Creek, Stevens Creek, and Coyote Creek in the action area are important to the overall critical habitat designation for CCC steelhead because they represent a unique area within the range of the DPS. These streams represent three of the five streams[7] tributary to South San Francisco Bay with remnant runs of steelhead. Furthermore, South San Francisco Bay represents

[7] San Mateo Creek is the only steelhead stream tributary to South San Francisco Bay not included in the SCVWD's 2014-2023 SMP.

a significant portion of the range of CCC steelhead and its location is relatively isolated from other CCC steelhead streams in the DPS.

PCEs of designated critical habitat for CCC steelhead in the action area include sites for spawning, rearing, and migration (70 FR 52488). Essential features of these sites include spawning gravels, water quality and quantity, natural cover including large substrate and aquatic vegetation, and forage species. Within the action area, the essential features of these PCEs are degraded and limited due to altered stream flows, channelization, bank stabilization, and other activities related to extensive urbanization.

Stream channels designated as CCC steelhead critical habitat in the action area range from well shaded by a dense riparian canopy to open areas along engineered flood control channels. Riparian vegetation typically consists of willow (*Salix sp.*), California sycamore (*Platanus racemosa*), and coast live oak (*Quercus agrifola*), with an understory dominated by non-native Himalayan blackberry (*Rubus discolor*) and isolated patches of giant reed (*Arundo donax*) and cattails (*Typha latifolia*). Due to extensive urban development and current channel conditions, NMFS believes that critical habitat for CCC steelhead within the action area is degraded from properly functioning condition.

2. S-CCC Steelhead

Within the action area, Uvas Creek and Llagas Creek are designated as critical habitat for S-CCC steelhead. Uvas Creek is of particular importance to the critical habitat designation for S-CCC steelhead, because it is one of a few streams in the Pajaro River Watershed that provides effective summer rearing habitat for juveniles. However, both Uvas and Llagas are important to the overall S-CCC steelhead critical habitat designation because they are tributary to the Pajaro River which maintains one of the two deep interior populations in the DPS (Boughton 2007; NMFS 2013).

PCEs of designated critical habitat for S-CCC steelhead include sites for spawning, rearing, and migration (70 FR 52488). Essential features of these sites include spawning gravels, water quality and quantity, natural cover including large substrate and aquatic vegetation, and forage species. Within the action area, the essential features of these PCEs are degraded and limited due to altered stream flows, channelization, bank stabilization, and urbanization.

A portion of Llagas Creek below Chesbro Dam, and Uvas Creek below Uvas Dam are perennial due to stream flow releases from the reservoir. General land use types surrounding the action area and upstream include rural residential development, agriculture (primarily vineyards and orchards), and grazing. Riparian vegetation typically consists of willow (*Salix sp.*), California sycamore (*Platanus racemosa*), and coast live oak (*Quercus agrifola*), with an understory dominated by non-native Himalayan blackberry (*Rubus discolor*) and isolated patches of giant reed (*Arundo donax*) and cattails (*Typha latifolia*). Based on current channel conditions, NMFS believes that critical habitat for S-CCC steelhead within the action area is generally degraded from properly functioning condition.

3. Southern DPS of Green Sturgeon

Within the action area, tidally-influenced stream reaches in San Francisquito Creek, Guadalupe River and Coyote Creek are designated as critical habitat for the southern DPS of green sturgeon. These areas represent a very small portion of the overall critical habitat designation for green sturgeon and the sites are located in areas that this species does not commonly occur. The tidal sloughs of the action area are not within the migratory pathway of green sturgeon.

PCEs for green sturgeon in estuarine areas are: food resources, water flow, water quality, migratory corridor, water depth, and sediment quality. These PCEs for green sturgeon critical habitat in the area are partially degraded. Habitat degradation in the action area is primarily due to altered and diminished freshwater inflow, shoreline development, shoreline stabilization, non-native invasive species, and the discharge and accumulation of contaminants.

D. Factors Affecting Species Environment within the Action Area

Profound alterations to the streams of Santa Clara County began in the early 1900's. Agricultural and urban development in the action area triggered dam construction, water diversion, mining, and the diking and filling of tidal marshes. The SCVWD's operation of Uvas Reservoir (Uvas Creek), Chesbro Reservoir (Llagas Creek), Anderson Reservoir (Coyote Creek), Almaden Reservoir (Alamitos Creek), Guadalupe Reservoir (Guadalupe Creek), Calero Reservoir (Calero Creek), Lexington Reservoir (Los Gatos Creek), and Stevens Creek Reservoir (Stevens Creek) regulate stream flow downstream of their respective dams. In general, winter runoff is stored for release during the dry season to facilitate groundwater recharge. Stream reaches immediately below these dams are typically perennial due to water releases from the reservoirs. General land use types surrounding the action area include urban and residential development, rural development, and agriculture.

Land use practices throughout Santa Clara County are dominated by urban and residential development. Impervious surfaces have affected stream hydrology and development has significantly encroached into riparian areas. Flood control has resulted in engineered channel reaches with hardscape banks and beds. The effects of this development on critical habitat include accelerated erosion rates, hardened stream banks, channel incision, introduction of toxins, reduced riparian vegetation, low stream sinuosity, and reduced instream habitat complexity.

The estuarine portion of the action area lies within San Francisco Baylands. In these areas, flood control, water development, and urban development have resulted in the loss of habitat, changes in vegetation, and changes to prey communities. Tidally-influenced reaches of streams in the action area have been dredged and channelized for navigation and flood control. Tidal marsh areas have been isolated from stream channels by levees. The tidal marshes of San Francisco

Bay historically provided a highly productive estuarine environment for juvenile steelhead and green sturgeon.

E. Previous Section 7 Consultations and Section 10 Permits in the Action Area

Pursuant to section 7 of the ESA, NMFS has completed several interagency consultations with the Corps that affected the action area of this project. Formal consultation pursuant to section 7 of the ESA with the Corps was completed by NMFS in 2002 on the SCVWD's first 10-year permit for stream maintenance (*i.e.*, 2002-2012). In 2013, NMFS and the Corps completed formal consultation and a biological opinion was issued June 11, 2013, for the SCVWD's 2013 SMP projects.

Consultations have been completed with the Corps and Caltrans on new bridge construction, bridge repairs, and bridge replacement projects on San Francisquito Creek, Coyote Creek, Llagas Creek, Uvas Creek, Los Gatos Creek, and Guadalupe River. Consultations between NMFS and the Corps have been completed for bank stabilization and utility line repair projects throughout the action area. Habitat restoration projects have also been the subject of consultations with the Corps on Upper Penitencia Creek and Stevens Creek. For most consultations, NMFS agreed with Federal Action Agencies that the proposed actions were not likely to adversely affect steelhead, green sturgeon, or their critical habitats. However, formal consultations were also completed if there was a need to relocate juvenile steelhead for construction purposes. NMFS determined that these consultations were unlikely to jeopardize listed salmonids and green sturgeon, and were unlikely to adversely modify their critical habitat.

NMFS completed a formal consultation in 2009 with the Corps and the USFWS on the conversion of former salt evaporation ponds to tidal marsh habitat along lower Coyote Creek and lower Guadalupe River associated with the South Bay Salt Pond Restoration Program. Similar to the formal consultations above, NMFS concluded that this project was unlikely to jeopardize listed salmonids, green sturgeon, or their critical habitat. In July 2013, NMFS completed consultation with the Corps and the Natural Resource Conservation Service for the Upper Pajaro River Watershed Partners in Conservation for the Upper Pajaro Basin. This program includes restoration practices designed to minimize sediment input as well as other conservation practices, many of which will directly improve habitat conditions for steelhead.

In addition to the above consultations, NMFS has provided authorization for steelhead research pursuant to Section 10(a)(1)(A) research and enhancement permits, and pursuant to the Section 4(d) limits on streams in action area. Salmonid monitoring approved under these programs includes carcass surveys, smolt outmigration trapping, juvenile density surveys, and non-lethal tissue sampling. In general, these activities are closely monitored and require measures to minimize take during the research activities. The SCVWD currently holds a 5-year permit to conducted downstream migrant trapping for juvenile steelhead in Stevens Creek, Guadalupe River, and Coyote Creek. Biologist, Joel Casagrande has authorization pursuant to the Section 4(d) limits for S-CCC steelhead to collect juveniles in Uvas and Llagas creeks by electrofisher. CDFW has authorization pursuant to the 4(d) limits to collect steelhead by electrofisher in the

following watersheds: Coyote Creek, Guadalupe River, Stevens Creek, Uvas Creek, and Llagas Creek. URS, a consulting firm, is currently authorized to sample steelhead pursuant to the 4(d) limits in the Guadalupe River watershed. Dr. Jerry Smith with San Jose State University is authorized to collect steelhead pursuant to the 4(d) limits in Coyote Creek and Stevens Creek watersheds by electrofisher. The U.S. Environmental Protection Agency is authorized to collect steelhead pursuant to the 4(d) limits in the Coyote Creek watershed. NMFS has analyzed these activities and determined that they are not likely to jeopardize CCC steelhead, S-CCC steelhead, southern DPS green sturgeon nor adversely modify their critical habitat.

VI. EFFECTS OF THE PROPOSED ACTION

The purpose of this section is to identify the direct and indirect effects of the proposed action, and any interrelated or interdependent activities, on threatened CCC steelhead, threatened S-CCC steelhead, threatened southern DPS of green sturgeon, and their critical habitats. Our approach was based on knowledge and review of the ecological literature and other relevant materials. We used this information to gauge the likely effects of the proposed project via an exposure and response framework that focuses on what stressors (physical, chemical, or biotic), directly or indirectly caused by the proposed action, that steelhead, sturgeon, and PCEs of critical habitat are likely to be exposed to. Next, we evaluate the likely response of steelhead and sturgeon to these stressors in terms of changes to survival, growth, and reproduction, and changes to the ability of PCEs to support the value of critical habitat in the action area. Where data to quantitatively determine the effects of the proposed action on CCC steelhead, S-CCC steelhead, southern DPS of green sturgeon and their critical habitat were limited or not available, our assessment of effects focused mostly on qualitative identification of likely stressors and responses.

Construction activities at all 2014-2023 SMP work sites in streams with anadromous salmonids are scheduled to occur between June 15 and October 31. Only juvenile steelhead are expected to be in the action areas during this period; however, there is also a low potential for green sturgeon to be present at work sites within tidally-influenced stream reaches (*i.e.*, San Francisquito Creek, Guadalupe River, and Coyote Creek). At project sites that require dewatering, construction activities may affect CCC and S-CCC steelhead through degraded water quality and fish relocation. Green sturgeon are not likely to be directly affected by 2014-2023 SMP construction activities, because work sites within their habitat areas will frequently be performed from areas outside the wetted channel and, when in-water SMP activities do occur, green sturgeon have a very low probability of being present. Post-construction, some 2014-2023 SMP projects are expected to adversely affect steelhead habitat by removing course substrate (i.e., gravel and cobble) from the stream system, removing riparian vegetation, and removing LWD. Mitigation in the form of riparian plantings and construction of salmonid habitat enhancement/restoration projects are proposed to compensate for the habitat impacts of SMP activities in anadromous salmonid streams.

A. Effects of Construction Activities

The following section describes the effects of SCVWD's SMP construction activities to CCC steelhead, S-CCC steelhead, green sturgeon, and PCEs of their critical habitat.

1. Dewatering and Fish Relocation

If a SMP work site is wetted and the area must be dry to perform the proposed maintenance activity (*e.g*., sediment removal, bank stabilization), SCVWD will relocate steelhead from the project reach and install barriers to exclude fish from the area during channel maintenance work. Before and during project site dewatering, qualified biologists will capture fish and relocate them away from the work area to avoid direct mortality and minimize possible impacts during project construction. Fish in the immediate project area will be captured by seine, dip net and/or electrofisher, and then transported and released to a suitable location upstream or downstream of the work site.

SMP work sites are located within the range of CCC or S-CCC steelhead, but data to precisely quantify the number of CCC and S-CCC steelhead that will be relocated prior to construction activities is limited. Based on the proposed timing of project construction, NMFS can narrow the life stage to which effects are anticipated. Steelhead relocation activities will occur during the summer and early fall low-flow period after emigrating smolts have left and before adults have immigrated to freshwater. Therefore, the CCC and S-CCC steelhead that will be captured during relocation activities will be limited to pre-smolting juveniles.

Using unpublished electrofishing and fish relocation data from streams in the action area, NMFS anticipates juvenile steelhead densities to range widely from site to site. The highest densities of steelhead are expected to occur in Stevens Creek, where densities of up to 65 juvenile steelhead per 100 feet have been observed (unpublished data from Aquatic Systems Research 1999, City of Cupertino 2008, and CDFW 2010). The lowest densities of rearing juvenile steelhead in the action area are reported from Llagas Creek and Coyote Creek where densities range from 0 to 1 fish per 100 feet (SCVWD 2008a; Casagrande 2011; Casagrande 2012). Inter-annual variation in juvenile fish abundance occurs in response to variations in cohort strength, spawning distribution, variations in precipitation and temperature, variations in predator or prey abundance, restoration actions, and other factors.

For the SCVWD's 2003-2013 SMP projects, annual reports were prepared for all sites dewatered in steelhead streams. The number of juvenile steelhead encountered and relocated over a period of 11 years by SMP projects is presented in Table 4. The highest number of CCC steelhead collected in a single year was 207 juveniles (2007) and the highest number of S-CCC steelhead collected in one year was 13 juveniles (2012). In consideration of the potential variation for inter-annual fish productivity, differences in habitat quality between sites, and range in number of SMP projects performed in one season, NMFS will assume that, in some years, up to 50 percent more juvenile steelhead than observed in the past may be present in SMP project sites to be dewatered. Based on this information, it is estimated that up to 310 juvenile CCC steelhead may

be collected and relocated annually by 2014-2023 SMP projects during the dewatering of work sites.

For S-CCC steelhead, there was only one SMP dewatering event during the period between 2003 and 2013 that resulted in collection of juvenile steelhead (*i.e.*, 13 juvenile steelhead in 2012). This single event does not likely provide an adequate representation of the potential to encounter S-CCC steelhead during SMP 2014-2023 activities, because multiple project sites may need to be dewatered during a single SMP work season. The concurrent dewatering of multiple sites in Uvas and Llagas creeks could result in the collection and relocation of juvenile S-CCC steelhead numbers in excess of that encountered in previous years. To address the potential concurrent dewatering of three to four work sites in a single season in the Pajaro Basin, NMFS estimates that up to 80 juvenile S-CCC steelhead may be collected and relocated annually by 2014-2023 SMP project activities.

Fish relocation activities pose a risk of injury or mortality to rearing juvenile steelhead. Any fish collecting gear, whether passive (Hubert 1996) or active (Hayes *et al.* 1996) has some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish capture varies widely depending on the method used, the ambient conditions (*i.e.*, water and air temperature), and the expertise and experience of the field crew. Since fish relocation activities will be conducted by qualified fisheries biologists, direct effects to and mortality of juvenile steelhead during capture are anticipated to be minimized. Data on fish relocation efforts in California since 2004 show most mortality rates are below three percent for steelhead (Collins 2004, CDFG 2005, CDFG 2006, CDFG 2007, CDFG 2008, CDFG 2009, CDFG 2010). Based on SCVWD's annual reports for SMP activities between 2002 and 2013, steelhead mortality rates did not exceed three percent during fish collection and relocation events (SCVWD 2004; SCVWD 2005a; SCVWD 2005b; SCVWD 2007; SCVWD 2008b; SCVWD 2009; SCVWD 2010; SCVWD 2011; SCVWD 2012; SCVWD 2013a). Those fish that avoid capture will be exposed to risks associated with dewatering.

Although sites selected for relocating fish should have similar water temperature as the capture sites and should have ample habitat, in some instances relocated fish may endure short-term stress from crowding at the relocation sites. All of the sites selected as release sites are anticipated to have aquatic habitat that is equivalent to or better than the aquatic habitat found in the dewatered area. Relocated fish may have to compete with other fish causing increased competition for available resources such as food and habitat. Frequent responses to crowding by steelhead include emigration and reduced growth rates (Keeley 2003). Some of the fish released at the relocation sites may choose not to remain in these areas and may move from the release site to areas that have more habitat space and a lower density of fish. As each fish moves, competition remains either localized to a small area or quickly diminishes as fish disperse. NMFS does not believe competition will be large enough to affect the survival chances of individual fish because of the small number of fish encountered and the relocation sites offer similar or better habitat conditions than the dewatered work site. Once work is completed and the construction areas re-watered, juvenile steelhead rearing space will return to the SMP project sites.

NMFS anticipates temporary changes in stream flow within and downstream of project sites during dewatering activities. These fluctuations in flow are anticipated to be small, gradual, and short-term. Stream flow in the vicinity of the project sites should be the same as free-flowing conditions, except during dewatering and in the dewatered reach where stream flow is bypassed. Stream flow diversion and project work area dewatering are expected to cause temporary loss, alteration, and reduction of aquatic habitat. Although dewatered portions of stream channels will be unavailable to steelhead during work activities, the sites are typically located in Modified Channel reaches with fair to poor quality steelhead rearing habitat. Dewatered reaches in Modified Channels with Ecological Values and in Unmodified Channels will be unavailable to steelhead for rearing during SMP activities, but these sites will be limited to reaches that do not exceed 300 linear feet and each site will only be dewatered for a short period (typically ranging from 1-21 days). This represents a small and temporary reduction in rearing and migration habitat, both PCEs for designated critical habitat in many of the channels where dewatering will occur. Since the work period is outside the steelhead migration season, only rearing habitat PCEs will be impacted.

During the installation of the stream bypass and dewatering system, juvenile steelhead could be harmed or killed prior to capture and relocation. Individual fish may be stranded or concentrated in residual wetted areas before they are captured. Individuals could be injured or killed if crushed by equipment and/or field personnel. Juvenile steelhead that avoid capture in the project work areas will likely die during dewatering activities. NMFS expects the number of juvenile steelhead killed as a result of stranding or crushing during dewatering activities will be small and significantly less than the mortality rate associated with fish collection/relocation (*i.e.*, <3 percent), because collection and relocation are expected to effectively remove all fish from work sites.

Benthic (*i.e.*, bottom dwelling) aquatic macroinvertebrates within the project site may be killed or their abundance reduced when creek habitat is dewatered (Cushman 1985). However, effects to aquatic macroinvertebrates resulting from stream flow diversions and dewatering will be temporary because construction activities will be relatively short-lived, and rapid recolonization (about one to two months) of disturbed areas by macroinvertebrates is expected following rewatering (Cushman 1985, Thomas 1985, Harvey 1986). In addition, the effect of macroinvertebrate loss on juvenile steelhead is likely to be negligible because food from upstream sources (via drift) would be available downstream of the dewatered areas since stream flows will be maintained around the project work sites and food sources derived from upstream in the creek will not be affected. Based on the foregoing, the loss of aquatic macroinvertebrates, as a result of dewatering activities, is not expected to impact threatened steelhead.

Although dewatering of project sites will result in temporary adverse effects to CCC and S-CCC steelhead rearing and migration habitat, the effects to steelhead will be short term and minimal as steelhead will be removed from work areas prior to dewatering and relocated to areas that possess adequate habitat. Diminishment of PCEs of critical habitat due to the dewatering of the project sites is anticipated to be temporary and minimal. No impacts to green sturgeon are anticipated from dewatering SMP project sites in tidal sloughs because dewatering would occur during low tide and in areas where this species has a very low likelihood of being present.

2. Instream and Near-stream Construction Effects to Water Quality

a. Dewatered Construction Sites.

As discussed above, several SMP sites will be dewatered each year prior to construction and streamflows will be bypassed around work sites during SMP activities. Once the cofferdams are in place and the work site dewatered, equipment and personnel will not be within the wetted stream and water quality should not be degraded in the stream. The construction impacts presented below are primarily related to the installation of the temporary cofferdams, use of the water diversion system, and effects to water quality after the site is re-watered.

Near-stream demolition and construction activities may cause temporary increases in turbidity (reviewed in Furniss *et al*. 1991, Reeves *et al*. 1991, and Spence *et al*. 1996). NMFS anticipates short-term increases in turbidity will occur during proposed dewatering activities, construction and removal of cofferdams, and placement of the water diversion systems. Sediment exposed or de-stabilized by construction activities may be mobilized post-construction during winter rainfall and high streamflow events, unless remediation measures are taken (*e.g.*, successful planting of appropriate plants in exposed areas).

Sediment may affect salmonids by a variety of mechanisms. High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency, reduce growth rates, and increase plasma cortisol levels. High turbidity concentrations can reduce dissolved oxygen in the water column, result in reduced respiratory functions, reduce tolerance to diseases, and can also cause fish mortality. Even small pulses of turbid water will cause salmonids to disperse from established territories, which can displace fish into less suitable habitat and/or increase competition and predation, decreasing chances of survival. Increased sediment deposition can fill pools and reduce the amount of cover available to fish, decreasing the survival of juvenile steelhead.

Although sediment and turbidity may affect listed salmonids, sedimentation and turbidity levels associated with 2014-2023 SMP projects are not expected to rise to the levels discussed in the previous paragraph, because the SCVWD proposes several best management practices to avoid and minimize the mobilization of sediment during work activities. Post-construction, disturbed soils will be stabilized with geotextile fabrics and replanted with native vegetation. Where appropriate, additional erosion control methods shall be used including silt fences, straw bales, brush or rock filters, storm drain inlet protection, sediment traps, and sediment basins. Based on these measures, NMFS expects elevated levels of turbidity will be minimal and only occur for a short period of time. Some limited behavioral effects to listed steelhead from turbidity, such as temporarily vacating preferred habitat or temporarily reduced feeding efficiency, are the most likely results from implementation of proposed SMP actions. These behavioral changes are not likely to reduce the survival chances of individual steelhead. NMFS expects elevated turbidity levels associated with 2014-2023 SMP projects will be well below levels shown in scientific studies as causing injury or harm (see for example Newcombe and Jensen 1996).

b. Naturally Dry Reaches and Upper Bank Construction Sites.

Many 2014-2023 SMP work sites would be subject to maintenance activities when the stream channel reach is naturally dry or work would be performed along upper creek banks. At these sites, no equipment or personnel will work within the wetted perimeter of the channel. These activities will not directly affect fish or water quality because there would be minimal contact with the live stream. NMFS expects SCVWD's proposed best management practices will effectively prevent the introduction of sediment, construction debris, and contaminants to the stream during SMP work activities.

Post-construction, sediment exposed or de-stabilized by SMP activities may be mobilized during winter rainfall and high streamflow events, unless proper remediation measures are taken. Proposed best management practices include the stabilization of disturbed soils with geotextile fabrics and plantings of native vegetation. When combined with the proposed use of silt fences, straw bales, brush or rock filters, and other erosion control methods, NMFS anticipates these measures will minimize the transport of sediment from banks into streams during subsequent rainfall events.

NMFS expects only minor behavioral changes to steelhead associated with post-construction sedimentation because elevated turbidity levels are expected to be small and only occur for a short period of time. These behavioral changes are not likely to reduce the survival chances of individual steelhead. NMFS anticipates the durations of elevated turbidity levels resulting from these SMP work sites will be well below times shown in scientific studies as causing injury or harm (see for example Newcombe and Jensen 1996).

c. Contaminants.

Equipment refueling, fluid leakage, equipment maintenance, and road grading activities near the stream channel pose some risk of contamination of aquatic habitat and subsequent injury or death to steelhead and green sturgeon. The SMP proposes to maintain any and all fuel storage and refueling site in upland locations well away from the stream channel; that vehicles and construction equipment be in good working condition, showing no signs of fuel or oil leaks, and that any and all servicing of equipment be conducted in an upland location. Additional measures are proposed to contain any accidental spill of toxic materials and restrict the effects of any spills to the immediate area outside of the waterway. With these best management practices, NMFS does not anticipate any localized or appreciable water quality degradation from toxic chemicals or adverse effects to steelhead, green sturgeon, or designated critical habitat associated with implementation of 2014-2023 SMP projects.

B. Effects of Sediment Removal (including Minor Maintenance Activities)

Sediment, including gravel and cobble, plays a critical role in the physical and biological health of an anadromous salmonid stream. Sediment size is important in determining channel form and changes in sediment size distribution may induce channel changes (Kondolf 1997). Coarse sediment (*i.e.*, gravel and cobble) has a tremendous ecological importance as habitat for benthic

macroinvertebrates and as spawning habitat for salmonids. Gravel and cobble create interstitial spaces in the streambed which serve as cover and velocity refugia for small fish. Low sediment storage within incised channels may increase stream temperatures, if the subsurface flow path beneath the streambed is too short. The loss of sediment can reduce or eliminate hyporheic exchange, and the mixing between groundwater and surface water may be too short to significantly affect temperature (Beechie *et al.* 2012). In these and additional ways, sediment influences the physical habitat features and fish productivity of a stream.

Transport of sediment through a watershed and along the length of a stream is continuous, but within the action area dams have disrupted the longitudinal continuity of the river systems' bedload movement. Upstream of the dams, coarse bedload materials are conveyed to and deposited in reservoirs while all, or part, of the suspended load is also deposited in the reservoir. Water released from the dam possess more energy to move sediment, but has a reduced sediment load available to transport. This flow is sometimes referred to as sediment-starved (hungry water) and prone to erode the channel bed and banks, produce channel incision (downcutting), and loss of spawning gravels for salmonids (Kondolf 1997).

With respect to spawning habitat in the streams of the action area, the limited quality and quantity of gravel have adversely affected salmonid reproduction. Not only the dams have disrupted sediment transport and significantly reduced the creation of downstream gravel deposits, removal of natural obstructions such as large woody debris and channel straightening have reduce storage of gravel in stream reaches. Where the area of potential spawning habitat is limited, spawning salmonids may be forced to suboptimal locations, or redd superimposition may occur (Gerstein *et al.* 2005). Redd superimposition and/or suboptimal locations for spawning will reduce egg survival rates.

The 2014-2023 SMP projects include the removal of sediment in streams supporting steelhead migration, spawning and rearing. As presented above, gravel and cobble are important physical building blocks for the channel and habitat features, as well as, important for macroinvertebrate and fish productivity. The anticipated effects of gravel removal at 2014-2023 SMP sites vary widely due to the location within the watershed, site-specific habitat conditions, type of substrate expected to be removed, and quantity of sediment to be removed. The following presents the anticipated effects on habitat conditions for steelhead and green sturgeon, including designated critical habitat, associated with SMP 2014-2023 sediment removal projects. The construction-related effects of channel dewatering associated with SMP sediment removal activities are discussed above (see subsection *Effects of Construction Activities* of this Opinion).

1. Sediment Removal at Bridges

Many of the SMP 2014-2023 sediment removal sites would be located under existing bridges. This loss of material is expected to include an unknown proportion of cobble and gravel that benefits CCC and S-CCC steelhead spawning, rearing, cover, and macroinvertebrate productivity. Although the cobble and gravel may not be contribute all these benefits at road crossings, the sediment is dynamic and would be expected to be transported downstream during high flow events to subsequent downstream locations where it would provide some or all these

benefits in the future. This loss of cobble and gravel contributes to the degradation of rearing and spawning habitat PCEs of designated critical habitat for CCC and S-CCC steelhead. For adult and juvenile steelhead migrations, sediment removal at road crossings may improve migration conditions, as culverts and bridges tend to collect sediment and create fish passage impediments.

The SMP coarse sediment/habitat complexity mitigation program is anticipated to compensate for this loss of gravel and cobble because coarse sediment losses would be quantified by pre-project assessments and gravel augmentation projects implemented as stand-alone mitigation or combined with other SMP mitigation obligations for LWD and instream habitat complexity. Salmonid mitigation projects would be developed in advance with input from the Agencies and selected projects placed on a master list of future SMP enhancement/restoration actions. During the annual review of the NPW, the Agencies would approve the selection of salmonid habitat enhancement/restoration projects from this list as mitigation for an upcoming SMP sediment removal action. Mitigation projects would be designed to target specified steelhead life stages and have defined habitat enhancement objectives. Through an understanding of the limiting factors in stream reaches of the SMP action area, salmonid habitat enhancement/restoration projects would be constructed by the SMP to compensate for coarse sediment impacts and mitigation actions placed in areas that yield the greatest benefits to steelhead spawning and rearing.

2. Sediment Removal at Culverts and Outfalls

SMP 2014-2023 sediment removal sites would include areas within and downstream of existing culverts and outfalls. Based on 2003-2012 SMP actions, the amount of material removed from a single location typically ranges from 0.5 and 100 cubic yards of sediment. Many of these sites have concrete aprons and/or located on the stream bank. Removal amounts are small and excavation would mostly be performed with hand tools. The sediment at these locations is generally contributing little to macroinvertebrate and fish productivity, because habitat conditions have been degraded by the presence of the culvert and operation of the outfall. Sediment removal at these sites is not expected to significantly diminish the amount of beneficial cobble and gravel in the action area because of the small amounts to be removed.

3. Sediment Removal at Sediment Deposition Removal Channels

The majority of SMP sediment removal activities, including the largest amounts and longest channel reaches, would occur in the lower Guadalupe River in an area referred to by the SCVWD as “sediment deposition removal” (SDR) channels. This portion of the Guadalupe River is classified as a Modified Channel and SDR channel areas are located between the inboard levee toe and the natural stream channel. These areas were designed and constructed as part of the Guadalupe River flood control project to capture sediments in high flow events, so as to avoid sediment management activities in the main stream channel. With the location of these sediments outside of the Guadalupe River main channel, these materials are not contributing to macroinvertebrate productivity, fish productivity or instream habitat features for steelhead, sturgeon, or designated critical habitat. Due to the location of SDR channels, sediment at these

locations is not likely to be returned to the main channel of the Guadalupe River. Therefore, sediment removal from SDRs not expected to diminish the amount of beneficial cobble and gravel in the action area, or degrade habitat conditions for listed fish. Additionally, the SDR channels are located in the most downstream reaches of the Guadalupe River where little to no steelhead spawning occurs and juvenile steelhead rearing conditions during the summer/fall are marginal.

4. Sediment Removal at Fish Ladders and Fish Screens

Sediment removal would occur at SCVWD fish ladders and fish screens to restore the functionality of the facility. SCVWD owns and operates 10 fish ladder facilities: Coyote Percolation Ponds/Steel Dam (Coyote Creek); Mabury Diversion (Upper Penitencia Creek); Noble Avenue Diversion (Upper Penitencia Creek); Masson Diversion (Guadalupe Creek); Alamitos Diversion (Guadalupe River); Moffett Boulevard (Stevens Creek); Evelyn Avenue (Stevens Creek); Central Avenue (Stevens Creek); Fremont Avenue (Stevens Creek); and 14 drop structures (Llagas Creek). Sediment removal at these locations would increase water depths, clear passageways in ladders, and generally improve the operation of the ladders for upstream and downstream fish passage.

SCVWD also owns and operates six fish screen facilities: Coyote Canal Diversion (Coyote Creek); Mabury Diversion (Upper Penitencia Creek); Noble Avenue Diversion (Upper Penitencia Creek); Masson Diversion (Guadalupe Creek); Alamitos Diversion (Guadalupe River); and Church Avenue Diversion (Llagas Creek). Sediment removal at fish screens will increase the water/screen surface interface and through screen water velocities will be more uniform. SCVWD fish screens are designed to provide a low approach velocity (*e.g.*, 0.33 cfs or less) which allows the smallest life stages of steelhead to freely swim away from the face of the screen (*i.e.*, avoid impingement). Screens also have a small mesh opening (*e.g.*, 3/32 inch in diameter or less) to prevent steelhead fry from being entrained into the intake. Sediment removal at fish screens would improve the performance of the facility by ensuring the water/screen interface is properly submerged and sweeping flows adjacent to the screen adequately provide for fish to continue to move past the facility under all streamflow conditions. Improved sweeping velocities are also anticipated to transport debris off the screens and prevent the accumulation of debris on the screens.

Fish passage is critical in all creeks throughout the action area, because suitable steelhead spawning and rearing habitat for CCC and S-CCC steelhead is primarily located in the most upstream reaches accessible to anadromy. Adult steelhead must ascend upstream to the most productive habitats available to them in the watersheds of the action area for successful reproduction and to optimize juvenile rearing survival. For example, in 2013 accumulated sediment in the channel of Stevens Creek prevented stream flow from passing downstream through the SCVWD fish ladder at Evelyn Avenue and a large number of adult steelhead spawned in poor habitat in the lower reaches of the creek because they were unable to ascend upstream (NMFS 2013b, SCVWD 2013b). Fish screens prevent the loss of juvenile steelhead and smolts to entrainment at water diversions. Some beneficial gravel and cobble may be removed from the watersheds due to sediment removal at fish ladders and screens, but most

facilities are located low in the watersheds and little to no spawning by steelhead occurs at these downstream locations. Therefore, sediment removal at fish ladders and screens is not expected to diminish CCC and S-CCC steelhead spawning habitat, but these activities may diminish the amount of cobble and gravel downstream for juvenile rearing habitat and macroinvertebrate productivity.

5. Sediment Removal in Modified, Modified with Ecological Value, and Unmodified Channels.

Based on SMP activities performed between 2003 and 2013, from two to eight sediment removal projects are conducted annually within channels classified as Modified and Modified with Ecological Values for the purpose of restoring flood flow conveyance capacities. Sediment removal from Unmodified Channels for flow conveyance is anticipated to be uncommon. Although the amount of sediment to be removed annually will vary widely, the SMP's development and implementation of Maintenance Guidelines for 2014-2023 activities will provide a quantitative approach to identifying deficiencies in channel flow conveyance conditions. With Maintenance Guidelines based on criteria developed from field surveys, SCVWD decisions regarding the necessity and extent of sediment removal will be guided by engineering analysis and avoid the removal of excessive amounts of sediment.

As described above, SMP sediment removal projects for flood flow conveyance are expected to result in the loss of gravel and cobble which provides significant value to steelhead rearing and spawning habitat in the action area. Gravel and cobble are essential substrates for benthic macroinvertebrates and spawning by salmonids. In combination with other types of instream cover (*e.g.*, LWD, undercut banks, surface turbidity), gravel interstitial spaces in the streambed provide cover and velocity refugia for juvenile steelhead. Sediment in stream channels is dynamic and the loss of coarse material by SMP sediment removal projects could significantly influence the physical habitat features and productivity of steelhead in the action area.

Although the above impacts are expected from sediment removal activities by the 2014-2023 SMP, the SCVWD has included measures to limit the magnitude of these potential adverse effects. With the development and adoption of Maintenance Guideline, sediment removal amounts are expected to be less than the 2002-2013 SMP because of the improved quantification methods for determining flow conveyance requirements. Within Modified Channels with Ecological Values and Unmodified Channels, sediment removal projects would not exceed channel lengths of 300 linear feet and project sites would always be associated with a manmade feature such as a bridge, culvert, stream gauge, fish ladder, etc. Therefore, channel reaches with fish habitat undisturbed by manmade structures would not be subjected to SMP sediment removal activities. Review of 2002-2013 SMP sediment removal projects indicates most SMP sediment removal projects would be performed in Modified Channels with poor existing baseline habitat conditions due to engineered earthen and concrete channels. Additionally, over half of the sediment removal projects conducted by the SMP from 2002 through 2012 (27 of 52 sites) were repeat sites from previous years' SMP activities, suggesting that most 2014-2023 SMP sediment removal projects would be performed at sites that are regularly disturbed in Modified Channels.

Mitigation for impacts associated with sediment removal projects would be performed by the SMP's coarse sediment/habitat complexity mitigation program. Gravel augmentation projects by the SMP will be implemented during the 10-year SMP and locations will be selected to enhance suitable areas for steelhead spawning and rearing. This mitigation program is anticipated to benefit CCC and S-CCC steelhead, because the majority of sediment removal activities for flow conveyance will occur in Modified Channels located in downstream reaches while the gravel augmentation/habitat complexity actions can be located in upstream areas where habitat conditions are more suitable for steelhead spawning and rearing. As discussed above in subsection *Sediment Removal at Bridges* in this Opinion, it is anticipated that gravel augmentation projects would be combined with other SMP mitigation obligations for LWD and instream habitat complexity. By combining these mitigation requirements into a well-designed habitat enhancement/restoration project, the instream structure will greatly reduce the likelihood that gravel placed for augmentation would rapidly wash downstream and out of the system.

The BMPs for sediment removal activities include a provision for the maintenance or establishment of low flow channels within non-tidal streams. BMP "SED-3" specifies that low flow channels will be contoured to facilitate fish passage and will emulate the pre-construction conditions as closely as possible, within the finished channel topography. Adult steelhead generally require a minimum depth of about six to seven inches for upstream migration (Thompson 1972), and many streams in the action area have inadequate water depths during winter baseflow conditions between storm events. Sediment removal and the associated channel simplification may exacerbate this problem by expanding the area of shallow water conditions, limiting migration to periods when flows are higher and depth is adequate for passage. Smolt outmigration may also be affected due to decreased water depth leading to emigration delay and potentially increased predation. With the SMP's construction of low flow channels following sediment removal activities, affected channel reaches are expected to provide for fish passage during low flow periods. Low flow channels should also provide for downstream sediment transport.

6. Sediment Removal in Tidal Channel Channels

SMP activities would include the removal of accumulated sediments from a 1.4-mile long tidally-influenced reach of the lower Guadalupe River (*i.e*, Alviso Slough). This reach of channel is the only sediment removal activity projected to occur within tidal waters where threatened green sturgeon may also occur. If work sites in tidal channels are dewatered for sediment removal, fish collection and relocation would be performed.

Adult and juvenile steelhead seasonally migrate through the tidally-influenced reach of the lower Guadalupe River; however, these migrations occur during the winter and spring months (*i.e*., December through May). By limiting channel dewatering and sediment removal activities to the period between June 15 and October 31, the SMP avoids the migration season of adult and juvenile CCC and S-CCC steelhead in these reaches. These tidal channels are not suitable habitat for juvenile steelhead rearing during the summer and fall period. Thus, NMFS anticipates no CCC or S-CCC steelhead would be present in the tidal channel areas during dewatering and sediment removal activities.

Green sturgeon are known to inhabit tidal channels in San Francisco Bay, but their presence in South San Francisco Bay appears to be uncommon. Central San Francisco Bay (*i.e.*, north of the Bay Bridge), San Pablo Bay and Suisun Bay are located within the migratory pathway of green sturgeon traveling between the Sacramento River and the ocean, and green sturgeon are encountered by recreational anglers and during sampling by CDFW in these areas. Additionally, the results of green sturgeon tagging studies indicate they commonly occur between the Golden Gate and Rio Vista in the Delta. However, recreational anglers rarely encounter green sturgeon in South San Francisco Bay and very few reports of tagged green sturgeon have been recorded from locations south of the Bay Bridge. From January 14, 2011, through December 31, 2011, acoustic tag receivers were operated at three locations within South San Francisco Bay: Dumbarton Railroad Bridge; lower Coyote Creek; and lower Guadalupe River (*i.e.*, Alviso Slough). Acoustic tagged green sturgeon were detected at the Dumbarton Bridge, but no detections were recorded at the receivers located in Coyote Creek or the Guadalupe River (unpublished data, T. Keegan, 2011). Although the acoustic receiver arrays were only operated for one year, this information suggests green sturgeon occur infrequently and in very low numbers in the southern most portion of South San Francisco Bay. Based on the very low detection rate of tagged fish and the absence of other records of the species in South San Francisco Bay tidal sloughs, there is a very low potential for green sturgeon to be collected during the SMP's dewatering of channels in tidal sloughs.

If green sturgeon are present during SMP sediment removal activities within tidal channels, individuals could be exposed to degraded water quality. As cofferdams are constructed and sediments removed from the bottom, disturbance of the substrate is likely result in temporary increases in turbidity in the adjacent water column. BMPs (see *Attachment F* of the *2014-2023 SMP Manual*) will be implemented to reduce the extent of disturbance in tidal channels, but these are not expected to fully prevent increased levels of turbidity. High levels of turbidity and suspended sediment can affect listed fish species by disrupting normal feeding behavior, reducing growth rates, increasing stress levels, and reducing respiratory functions. However, increased turbidity levels created by SMP sediment removal activities within tidal channels are expected to be minor, localized and considerably less than the thresholds commonly cited as the cause of the above-referenced possible behavioral and physical impacts (see Cordone and Kelley 1961; Newcombe and Jensen 1996). The minor and localized elevated levels of turbidity associated these activities are expected to disperse from the project area with tidal circulation. As a benthic dwelling species, green sturgeon are adapted to living in estuaries with fine sediment bottoms and inhabit streams with high levels of turbidity (Allen and Cech 2007). Therefore, the effects of short-term elevated levels of turbidity associated with SMP sediment removal within tidal channels are expected to be insignificant to green sturgeon.

C. Effects of Bank Stabilization

The SCVWD proposes to construct bank stabilization structures as part of 2014-2023 SMP. Based on SCVWD's annual reports for bank stabilization projects constructed by the SMP between 2002 and 2013, between five and six bank stabilization projects were constructed on average each year in anadromous salmonid streams. The following presents the anticipated

effects on CCC steelhead, S-CCC steelhead, green sturgeon, and designated critical habitat associated with SMP bank stabilization projects.

All bank stabilization structures will be constructed during the period between June 15 and October 31. During this work window, many channel reaches will be seasonally dry and no dewatering will be required for construction purposes. Some bank stabilization structures will be constructed adjacent to flowing stream reaches, but work activities will be performed on the bank and outside the wetted perimeter of the channel. These bank stabilization projects constructed at dry work sites are anticipated to have no direct constructed-related impacts on CCC and S-CCC steelhead, because proposed BMPs will avoid impacts to the live stream. For work sites that require dewatering for construction of bank stabilization structures, the construction-related effects on water quality and impacts associated with fish relocation are discussed above (see subsection *Effects of Construction Activities* of this Opinion).

1. Bioengineered Treatments in Modified Channels

Half (32 of 64) of the bank stabilization projects constructed by the SMP on anadromous salmonid streams between 2002 and 2013 were located along the Guadalupe River, and many of these sites were in secondary channels off the mainstem and separated from the Guadalupe River by a berm structure. These secondary channels sites are primarily sediment depositional reaches (*i.e.*, SDRs) and designed as trapezoidal channels to collect sediment during high flow events. Based on the past 10 years of SMP actions, it is anticipated that many of the future bank stabilization structures constructed by the 2014-2023 SMP would also be located in SDRs and off the main channel of the Guadalupe River. Construction of bank stabilization structures in these existing trapezoidal channels will not impact any instream habitat features for steelhead in the mainstem of the Guadalupe River or PCEs of designated critical habitat. SDR sites are only subject to inundation during the highest stream flow events and, therefore, they are not typically utilized by steelhead for spawning or rearing.

Although steelhead may be present in Modified Channels, these channel reaches are primarily migration corridors and generally offer poor habitat conditions for juvenile steelhead rearing. Fish relocation efforts by past SMP activities in Modified Channel reaches confirm that most areas do not support juvenile steelhead or support a very small number of juvenile steelhead. These engineered reaches are characterized by hardened banks, low sinuosity, low instream complexity, and limited riparian vegetation. Channelization and bank hardening in Modified Channels has disrupted salmonid habitat forming processes. The proposed construction of new bank stabilization structures by the SMP over the next 10 years provides an opportunity to improve conditions by incorporating instream complexity features in bank stabilization structures. The SMP's proposed approach for using softscape or hybrid[8] bank stabilization designs where feasible has the potential to improve conditions for steelhead migration and rearing in Modified Channel reaches by increasing channel complexity. Improved instream cover, providing areas with low velocity refugia, and increased shading by riparian vegetation

[8] "Hybrid" methods incorporate rock or boulder protection with vegetation.

may occur if softscape or hybrid bank stabilization designs are utilized in Modified Channel reaches.

2. Bioengineered Treatments in Modified Channels with Ecological Values and Unmodified Channels.

Migration, spawning and rearing habitats for steelhead are likely to be minimally impacted by SMP bank stabilization projects that incorporate soft and hybrid treatments in Modified Channels with Ecological Value and Unmodified Channels. Bank stabilization structures are likely to eliminate on-going sources of sediment input at eroding banks. Bioengineered structures will create surfaces for the planting of native riparian vegetation. LWD and boulders incorporated into structures will create areas with instream cover for both juvenile and adult steelhead. LWD and boulders can also provide areas of low velocity refuge for steelhead during winter high flow events. Modified Channels with Ecological Values will generally benefit from bioengineered treatments if features are included to increase habitat complexity and diversity along the shoreline of the creek. In Unmodified Channels bioengineered features are expected to include habitat complexity elements and riparian vegetation that ameliorate the loss of ecological functions like undercut banks and the ability of channels to meander.

3. Hardscape Treatments in All Channels.

If site conditions and hydraulic forces require the use of hardscape elements over softscape treatments, the SMP may select a hardscape bank stabilization treatment such as concrete, rock, gabions, or other permanent hard surfaces. Designs that utilize predominantly hard materials are generally incapable of supporting vegetation and typically offer low instream habitat value. Prior to construction of SMP bank stabilization structures, these locations typically exhibit conditions of unstable earthen erosion, with no vegetation or vegetation of low value (such as early seral invasive vegetation colonizing the destabilized site). With poor baseline habitat conditions at these sites, the use of hardscape treatments often function to maintain existing degraded conditions. Although onsite conditions may not improve, the SCVWD proposes to mitigate for riparian vegetation impacts at hardscape treatment sites with ratios ranging from 1:1 to 3:1. Loss of instream habitat complexity features would also be mitigated through the construction of off-site anadromous salmonid enhancement/restoration projects. This mitigation program is anticipated to compensate for hardscape treatments. Past experience indicates the majority of SMP bank stabilization projects are located in downstream reaches while the anadromous salmonid habitat mitigation projects can be located in upstream areas where habitat enhancements will result in greater benefits to steelhead.

D. Effects of Vegetation Management

Within portions of anadromous salmonid streams, the SCVWD proposes to selectively remove aquatic and riparian vegetation by hand labor and herbicide application in and adjacent to creek corridors. Along both freshwater and tidally-influenced reaches, vegetation management would be performed along portions of stream channels to restore the designed hydraulic capacity of the channel, as determined by the relevant Maintenance Guidelines. In 2013, streamside vegetation

trimming for vegetation management did not exceed five percent of the streamside vegetation. Removal of LWD is also proposed by the SMP to address downed logs and trees that pose an increased risk of flooding or erosion.

Riparian vegetation provides stream shading and provides instream cover for fish. Trees can be a source of large woody debris and contribute to stream complexity when trunks, branches, and roots extend into the wetted perimeter of the channel. Loss of riparian vegetative cover can contribute to increases in stream temperature and the loss of organic matter that contributes to the aquatic food web. This organic matter contributes to the aquatic productivity of the stream, fish prey organisms, and PCEs of steelhead and green sturgeon critical habitat.

1. Effects of Pruning and Herbicide Use

Loss of riparian and aquatic vegetation from streams with steelhead can result in the adverse effects described above. However, the SMP's proposed vegetation management program is not expected to result in significant adverse effects due to careful application of removal methods and selective management techniques. A large portion of the vegetation to be removed consists of herbaceous vegetation which is generally less than three feet tall and rarely exceeds 10 feet in height. This type of vegetation contributes little to LWD and generally does not provide instream cover for steelhead. In some areas, dense willows and box-elders will be removed from engineered channels and along stream banks in heavily urbanized reaches. These instream areas typically support lower habitat values for steelhead rearing and spawning due to poor substrate, warmer water temperatures, and confined channel conditions. In channel reaches with high habitat values for steelhead, removal of plants and pruning are not expected to diminish habitat conditions for steelhead because these areas are likely characterized by overly dense vegetation with slow moving water, accumulations of debris, and thermal warming (see paragraph below regarding benefits of thinning). Pruning activities are expected to result a low level of disturbance of soil and sediment due to the extensive use of hand tools by the SCVWD personnel performing these activities. Additional soil disturbance would occur if the roots of plants are removed.

Proposed vegetation management activities could provide some benefit to steelhead habitat and aquatic productivity in the action area by thinning vegetation in areas that are currently occupied by overly dense stands of vegetation. The presence of dams and subsequent changes to the hydrology of SMP streams in the action area has caused a shift in vegetation type and density along waterways. With reduced heavy flushing flows during winter storms, vegetation has encroached further into the channel which has narrowed channel widths, reduced bed mobility, contributed to channel incision, and contributed to channel armoring. Year-round stable and low water releases from the reservoirs has allowed for the establishment of a dense understory with non-native grasses, willows, box-elders, and cottonwoods. An analysis of understory structure by Gillies (1998) showed annual grasses and other non-native plant species have significantly increased below reservoirs in Alameda and Santa Clara counties. This dense understory has reduced the amount of bare ground and reduced the recruitment of young native sycamore and oak trees in riparian areas. Over time, the riparian zone in many reaches of the action area has shifted from a sycamore-oak dominated community to a willow-cottonwood dominated

community. The SMP's selective removal of annual grasses and dense stands of riparian vegetation adjacent to streams may benefit native sycamore and oak trees. Less shaded sites may also increase invertebrate prey abundance for juvenile steelhead foraging. Casagrande (2010) found that invertebrate biomass was considerably higher at less heavily shaded sites than under a dense forest canopy on Uvas Creek.

Vegetation management with the application of herbicides has the potential to directly affect steelhead and sturgeon from exposure, and affect critical habitat from changes in primary and secondary productivity within the action area. To minimize potential adverse effects due to exposure and changes in aquatic productivity, the SMP proposes to only use herbicide formulations in stream channels that are approved for aquatic environments (*e.g*., Competitor®, Rodeo®, and Aquamaster®) and adhere to all state and federal regulations concerning herbicide use. Herbicides will only be applied in-channel to dry work sites, when no rain is forecasted to occur within 48 hours, and when wind conditions will not result in drift. No surfactants may be added to herbicides used within 20 feet of a wetted channel. Application methods will be limited to a hose, hand gun, or backpack unit.

Glyphosate is highly soluble in water. Studies conducted in a forest ecosystem (Feng *et al.* 1990; Goldsbourough *et al*. 1993; Newton *et al*. 1994) found that glyphosate dissipated from streams within 3-14 days. For all aquatic systems, sediment appears to be the major sink for glyphosate residue. Glyphosate binds to many soil types and clay materials; therefore it is highly immobile in soils and rendered inactive in a period of weeks (Norris *et al.* 1991). Glyphosate can leach from soils into groundwater when soils particles are washed into streams and rivers. The primary mode of actions targets plant cell walls.

The SMP proposes to use glyphosate in the form of *Rodeo*®, and *Aquamaster*® for targeted treatment of in-channel vegetation. Application may occur from June 15 to December 31, but primarily would occur during summer months, with a backpack or hand held sprayer when wind speeds are low. These methods of sprayer application are anticipated to result in low volumes of glyphosate being applied to vegetation and soils. If glyphosate does reach streams, it would rapidly dissipate from the water column into the sediment. For these reasons, steelhead would, if at all, be exposed to glyphosate at very low concentrations for short-durations following applications. Since glyphosate is considered relatively non-toxic to fish and does not bioaccumulate in the tissues of aquatic organisms, NMFS does not expect any steelhead or green sturgeon mortality, changes in growth rates, reduction of reproductive success or detectable effects on designated critical habitat in the action area associated with the application of glyphosate. If the surfactant, Competitor® (active ingredient is Ethyl Oleate) is used, SMP applications would always provide for a minimum buffer of 20 feet from wetted areas in streams. With the presence of a 20-foot buffer and no wind drift, the SMP's proposed hand and backpack application methods for Competitor® are anticipated to reduce the chance of exposure to very low levels and have no detectable effects on steelhead.

Based on the application methods and other BMPs proposed by the SMP for in-channel vegetation management, the risk of herbicides entering the wetted areas of creeks with steelhead and sturgeon is low. Further, exposure levels expected under application by the SMP are

unlikely to be sufficient to cause adverse effects to steelhead, sturgeon, or their designated critical habitat because the herbicide concentrations used are small and directly applied to target invasive vegetation.

2. Effects of Hazard Tree and LWD Removal.

Large wood in the channel is an integral part of freshwater salmonid habitat. LWD provides cover for adult and juvenile salmonids, assists with the formation of pools and other habitat features, provides variability in flow velocity and depth, and it is particularly important as over-wintering habitat for juvenile salmonids (Keller and MacDonald 1983). Within streams of the action area, LWD is generally lacking and its low abundance contributes to the low habitat complexity. The SMP's hazard tree removal program has the potential to further degrade habitat conditions for CCC and S-CCC steelhead by removal of LWD from streams in the action area.

To avoid and minimize the impacts of removing LWD from streams in the action area, SMP has a four-tiered protocol for retaining as much woody debris in the channel as possible (see *Attachment E* of the *2014-2023 SMP Manual*). If a portion or all of the LWD at a project site is cut or removed from the channel, that amount of LWD is quantified and mitigated through the SMP's LWD program. The SCVWD maintains a system of accounting LWD losses and enhancements measured in cubic yards by watershed.

The SMP's LWD program is unlikely to retain existing levels of LWD in the action area and is expected to result in adverse effects to steelhead habitat, including designated critical habitat. Modifications to LWD in the form of relocating or reducing the size of a log or branch would typically result in a piece of wood that is more likely to be transported downstream and lost from the river system. Large pieces of wood tend to become lodged in the stream bed or bank more readily than smaller pieces. Therefore, large pieces of LWD are less likely to be transported downstream in high flow events. Larger pieces of wood are also more effective at retention of coarse sediments, and provide larger habitat complexity features that can be used by both adult and juvenile steelhead. By modifying the LWD in a manner to eliminate hazardous conditions, the SMP likely contributes to a higher rate of loss of LWD from streams in the action area. CCC and S-CCC steelhead critical habitat PCEs for rearing and spawning habitat are expected to be adversely affected by SMP hazard tree removal activities by contributing to an overall loss of LWD in the stream systems. This loss of LWD contributes to the degradation of rearing and spawning habitat PCEs of designated critical habitat for CCC and S-CCC steelhead.

The impact to LWD by the 2014-2023 SMP will be ameliorated by the SMP's four-tiered mitigation program. If LWD removed from one site is placed in an appropriate off-site location within the same watershed (Tier 3), the relocated LWD could enhance areas where existing habitat complexity is low. LWD cut or removed from the system (Tier 4) will be mitigated through the construction of a new LWD structure at an off-site location. LWD mitigation projects may be combined with other SMP gravel augmentation and instream habitat complexity projects to create a complex woody debris feature. Once a LWD mitigation project is constructed, it will provide fish cover immediately. The creation of pools (scour occurring around the wood) will take longer but will likely start during the first winter storm season

following placement. Not all placed wood may create new pools, but not all removed wood is likely to have been creating/maintaining a pool at the site from which it was removed. There may be a minor drop in habitat value in some areas in a watershed followed by a return of that value in other areas. Because wood removal and replacement will only occur at a limited number of sites during one year, the overall impacts in each watershed would likely be small.

In the past 10 years, the SMP has successfully minimized the amount of LWD completely removed from the stream. The total amount of LWD annually removed and lost from steelhead streams in the action area between 2002 and 2012 has ranged from 6 to 18.35 cubic yards. This cubic yard volume equates to two to five pieces of LWD annually and it represents a small portion of the LWD present in these watersheds. For the 2014-2023 SMP, NMFS anticipates that LWD removal (Tier 4) would be within the range of two to 10 pieces of large wood annually and the SMP's LWD mitigation program would install an equal amount of LWD within the same watershed as the removal occurred. As described above, removal, modification and relocation of LWD are anticipated to result in the loss of instream habitat structure from watersheds in the action area. However, NMFS assumes that not all modified LWD will be lost, and relocation and mitigation would successfully create habitat complexity features for steelhead in the same watersheds as the impact. Because LWD removals would be replaced at a ratio of 1:1 through the LWD mitigation program, any loss of habitat value via hazard tree removals by the SMP would likely be small.

E. Effects of Minor Maintenance

Minor Maintenance projects proposed by the SMP include a variety of activities such as levee repairs, maintenance road repairs, concrete repairs, trash removal, fence and gate repairs, small sediment removals (<25 cubic yards), and stream gauge repairs. Many of the SMP's Minor Maintenance activities are limited to SCVWD facilities in upland areas. These projects may be performed at any time of year and typically have no effect on in-channel areas with steelhead, sturgeon and designated critical habitat. Minor Maintenance activities conducted in-channel must comply with the SMP work windows (*i.e*, June 15 to October 31) and all other relevant BMPs described in *Attachment F* of the *SMP Manual*. Minor Maintenance projects are typically completed within one to two days.

Stream gauge maintenance and removal of obstructions from fish ladders are mostly small scale sediment removal projects. The effects of small sediment removal activities from in-channel areas are described in subsection *Effects of Sediment Removal* of this Opinion. In some cases, dewatering may be performed to prepare the work site for a minor maintenance activity and effects would be limited to that of dewatering and fish relocation described in subsection *Dewatering and Fish Relocation* of this Opinion.

Minor grading on SCVWD maintenance roads would involve earth-moving, but these activities would be performed above top of bank and implementation of BMPs are expected to avoid effects to in-channel areas with steelhead, green sturgeon, or designated critical habitat. Levee repairs typically consist of filling holes and stabilizing rills in areas that are only subject to

inundation during the highest stream flow events. Therefore, levee repairs are not expected to impact in-channel habitat features for steelhead, sturgeon, or PCEs of designated critical habitat.

The SCVWD proposes to limit the area of annual minor maintenance activities to less than 0.2 acre of wetland or riparian vegetation impacts per year and this combined total would include sites outside of streams with anadromous fish. Therefore, the extent of minor maintenance activities occurring in channels with steelhead and sturgeon is expected to be very small. For all Minor Maintenance activities, the appropriate BMPs (including applicable work windows) will be implemented to avoid or minimize adverse effects on water quality and aquatic habitat. Due to the short duration of these activities and small areas affected, potential disturbance and effects associated with SMP Minor Maintenance activities are not anticipated to result impacts beyond that described above in subsections *Effects of Sediment Removal* and *Dewatering and Fish Relocation* of this Opinion.

F. Effects of Management of Animal Conflicts.

Management of animal conflicts activities would primarily consist of controlling animals that cause damage by burrowing and foraging along levees and other structures within the SMP area. Proposed SMP activities such as non-lethal trapping and relocation of animals, placement of bird netting on bridges, and surface compaction of levee faces would be conducted in upland area and outside creek channels with anadromous fish. With implementation of the SMP's impact avoidance measures and BMPs for management of animal conflicts, no in-channel vegetation removal or sediment mobilization into streams would be anticipated during such activities. Therefore, activities associated with management of animal conflicts are not likely to adversely affect steelhead, sturgeon, or designated critical habitat.

G. Effects of Mitigation for LWD (Tier 4), Coarse Sediment and Habitat Complexity

As described above under subsections *Effects of Sediment Removal, Effects of Bank Stabilization, Effects of Vegetation Management* of this Opinion, the SMP proposes a mitigation program to account for impacts to coarse sediment, instream habitat complexity, and LWD in anadromous salmonid streams. Salmonid enhancement/restoration projects will be constructed by the SMP over the 10-year duration of the program for the purpose of compensating for impacts to the habitat of anadromous salmonids.

Potential gravel augmentation and salmonid habitat restoration projects would be developed in collaboration with the Agencies. Project designs would incorporate coarse sediment, instream habitat complexity elements, and LWD. Completion of these projects are expected to restore degraded conditions and improve instream habitat features for steelhead in the action area with the placement of clean spawning gravels, creation of instream cover elements, expanded areas of fast water habitats for improved invertebrate productivity, riparian plantings for shading, and other similar salmonid habitat enhancement features.

Construction of these projects will likely require dewatering and the impacts described above for dewatering and fish relocation at SMP project sites would occur (see subsection *Dewatering and*

Fish Relocation of this Opinion). Based on the extent of impacts from SMP activities conducted from 2002 through 2013, the number of salmonid mitigation projects constructed by the SMP over the 10-year program would not likely exceed 20 for northern Santa Clara County and five for southern Santa Clara County. The effects of work site dewatering and fish relocation for the construction of SMP salmonid mitigation projects are not expected to exceed those presented in subsection *Dewatering and Fish Relocation* of this Opinion. However, additional juvenile steelhead collections may occur during the evaluation phase of SMP salmonid habitat mitigation projects.

For each proposed salmonid habitat mitigation project, the SCVWD will develop designs to achieve specific objectives (*i.e.*, rearing habitat complexity, gravel augmentation, fish passage, velocity refugia) and a monitoring plan to assess the success of the project. For example, the SMP proposes to conduct monitoring of LWD that will occur for one year post-construction when wood is replaced within a channel that supports anadromous salmonids. Monitoring of juvenile salmonids at SMP salmonid mitigation sites may include electrofishing, seine or dip net collections. Although the exact locations and number of SMP mitigation projects for salmonid enhancement and restoration are unknown, sampling would be limited to the non-migration season when only juvenile rearing steelhead are present. Based on the habitat conditions within the action area, and providing for the evaluation of up to 20 mitigation projects in northern Santa Clara County and five mitigation projects in southern Santa Clara County, NMFS anticipates up to 500 juvenile CCC steelhead and 100 juvenile S-CCC steelhead may be collected annually by electrofishing during evaluation of SMP mitigation projects between 2014 and 2023. As described in the subsection *Dewatering and Fish Relocation* of this Opinion, NMFS anticipates no more than three percent of the juvenile CCC and S-CCC steelhead collected by electrofishing will be harmed or killed. Thus, it is estimated that up to 15 juvenile CCC steelhead and three (3) juvenile S-CCC steelhead may be harmed or killed by electrofishing during evaluation of SMP salmonid habitat mitigation projects.

VII. CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR § 402.02 as "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". 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. Potential non-federal actions taken in the action area could include State angling regulation changes, voluntary State or private sponsored upslope habitat restoration activities, discharge of stormwater and agricultural runoff, and building of private roads. Due to the productivity and value of private lands in Santa Clara County, urbanization, and agricultural activities are likely to continue in the action area. However, tightened regulation and improved awareness of the effects of urban development and agricultural on streams and water quality are expected to reduce the level of these effects on steelhead, green sturgeon, and their critical habitat in the near future. Other than the impacts of the on-going activities described above in the subsection *Environmental Baseline* of this Opinion, and climate change,

described below, NMFS is unaware of future State tribal, local, or private actions reasonably certain to occur that will affect the action area.

Climate change is a cumulative effect that will occur world-wide, including the action area. Climate change is likely to be expressed in California with warmer air temperatures and changes in precipitation patterns (Kiparsky and Gleick 2003, Cayan *et al*. 2006) and is anticipated to affect aquatic habitat across the landscape through increased water temperatures and reduced streamflows during the dry season, including an increase in drought years. These effects may occur in Santa Clara County streams in the action area.

VIII. INTEGRATION AND SYNTHESIS OF EFFECTS

Proposed 2014-2023 SMP activities associated with sediment removal, bank stabilization, and vegetation management by the SCVWD are anticipated to have significant effects on threatened CCC steelhead, threatened S-CCC steelhead, and their designated critical habitat. Effects to threatened green sturgeon are anticipated to range from insignificant to discountable, because green sturgeon are uncommon in the tidal sloughs of the action area and very few SMP activities are performed in tidal sloughs.

SMP sediment removal activities in anadromous salmonid streams are expected to result in the loss of cobble and gravel that benefits CCC and S-CCC steelhead spawning, rearing, cover, and macroinvertebrate productivity. Although the cobble and gravel removed may not be contributing all these benefits the location of each SMP removal site, sediment is dynamic and would be expected to be transported downstream during high flow events to subsequent locations where it could provide some or all of the above habitat benefits in the future. Therefore, the 2014-2023 sediment removal projects are expected to diminish the amount of beneficial cobble and gravel in the action area, and result in the degradation of habitat conditions for CCC and S-CCC steelhead, including their designated critical habitat. To compensate for this impact, the SMP's coarse sediment/habitat complexity mitigation program would construct salmonid habitat mitigation projects that include gravel augmentation elements and be located within stream reaches that will benefit future steelhead spawning and rearing within the action area. Salmonid mitigation projects would be developed in advance with input from the Agencies and selected projects placed on a master list for future SMP enhancement/restoration actions. In combination with the SMP's mitigation requirements for LWD and instream habitat complexity, well-designed gravel augmentation projects are expected to target specified steelhead life stages, include specific habitat objectives, and result in projects that compensate for coarse sediment impacts associated with sediment removal. By combining these mitigation requirements into well-designed habitat enhancement/restoration projects, the instream structures will greatly reduce the likelihood that gravel placed for augmentation would rapidly wash downstream and out of the system.

Most SMP bank stabilization projects on steelhead streams are not expected to degrade habitat conditions, because the sites are located within engineered sediment deposition removal channels (*i.e*., SDRs) or are located with Modified Channels with poor baseline habitat conditions. In Modified Channels and at other locations, the SMP's proposed approach for using softscape or

hybrid bank stabilization designs, where feasible, has the potential to improve conditions for steelhead migration and rearing by increasing channel complexity. Improved instream cover, providing areas with low velocity refugia, and increased shading by riparian vegetation may occur if softscape or hybrid bank stabilization treatments are applied. For sites where a hardscape treatment is selected, the SMP would mitigate for loss to instream habitat features through construction of off-site salmonid habitat mitigation projects. These mitigation projects would include instream habitat complexity elements and be located within stream reaches that benefit from salmonid enhancement/restoration actions.

Proposed SMP hazard tree and debris removals will be performed in a manner to minimize the amount of LWD removed from streams in the action area. However, the LWD minimization measures are not expected to fully compensate for this impact.; therefore, the SMP's LWD mitigation program is designed to replace LWD lost during hazard tree and in-channel debris removals. Anadromous salmonid streams in the action area currently lack LWD and in many reaches, homogeneous habitat conditions predominate. Although the SCVWD prioritizes cutting or modified the LWD in a manner to eliminate the hazardous condition, smaller pieces of LWD are more likely to wash through the system and smaller pieces generally provide lower habitat values than larger pieces of wood. Overall, the SMP contributes to the loss of LWD and degradation of native fish habitat, including designated critical habitat for CCC steelhead and S-CCC steelhead. Based on SMP activities from 2002-2013, NMFS anticipates that LWD removal (Tier 4) would be within the range of 2 to 10 pieces of large wood annually and the SMP's LWD mitigation program would install an equal amount of LWD within the same watershed as the removal occurred. As described above, the SMP's mitigation program is anticipated to successfully create habitat complexity features for steelhead in the same watersheds as the impact, and the enhancement/restoration projects would be placed in areas to support steelhead spawning and rearing.

In-channel vegetation management by the SCVWD consists of selective removal of aquatic and riparian vegetation by hand and herbicide application. In some portions of the action area, this loss of riparian vegetation may result in subsequent increases in stream temperature, loss of instream cover, and the loss of organic matter that contributes to the aquatic food web. However, the SCVWD's proposed vegetation management program is not expected to result in significant adverse effects due to careful application of removal methods and selective management techniques. Much of the vegetation management occurs in areas that support lower habitat values for steelhead rearing and spawning due to poor substrate, warmer water temperatures, and confined channel conditions. In other areas, vegetation management could provide a benefit to steelhead habitat and aquatic productivity by thinning sites occupied by overly dense stands of vegetation. The application of herbicides has the potential to directly affect steelhead and sturgeon from exposure and indirect effects to critical habitat from changes in primary and secondary production within the action area, but the risk to steelhead and green sturgeon from herbicide use is low and unlikely to produce detectable effects in the form of changes in growth rates, reduction of reproductive success, or mortality.

For construction purposes, the SCVWD proposes to temporarily dewater some SMP work sites including stream areas with juvenile rearing CCC and S-CCC steelhead. Adverse impacts to

juvenile CCC and S-CCC steelhead and designated critical habitat at these sites include fish collection and relocation, and degraded water quality (*i.e.*, water temperature and turbidity). The SMP work window for in-channel maintenance activities and dewatering avoids periods of migrating adult and smolting steelhead. The only life stage of steelhead anticipated in the action area during the SMP dewatering and fish relocation activities are non-smolting juveniles. It is estimated that up to 310 juvenile CCC steelhead and 80 juvenile S-CCC steelhead may be collected and relocated annually during stream dewatering at 2014-2023 SMP project sites. No green sturgeon are anticipated to be collected by SMP dewatering and fish relocation activities.

Mortality rates of steelhead during relocation activities are expected to be below three percent annually (approximately 10 individual CCC steelhead and 3 individual S-CCC steelhead), so the risk of mortality to any encountered steelhead is low. Increased competition for habitat and resources will occur at release sites, however, they are expected to survive in adjacent, similar quality habitat. To reduce impacts of dewatering on juvenile steelhead residing downstream of the construction area, the SCVWD will provide bypass streamflows around the dewatered reach. Impacts from turbidity or toxins related to construction activities are temporary and will be minimized by SMP best management practices.

Salmonid enhancement/restoration projects would be constructed by the SMP over the 10-year duration of the program for the purpose of compensating for SMP impacts to coarse sediment, habitat complexity features, and LWD. Potential gravel augmentation and salmonid habitat restoration projects would be developed in collaboration with the Agencies. Completion of these mitigation projects are expected to restore degraded conditions and improve instream habitat for steelhead in the action area. However, construction of these projects will likely require dewatering and the impacts described above for dewatering and fish relocation at SMP project sites would occur. Based on the extent of impacts from past SMP activities conducted from 2002 through 2013, the number of salmonid mitigation projects constructed by the SMP over the 10-year program is not likely to exceed 20 for northern Santa Clara County and five (5) for southern Santa Clara County. For evaluation of the SMP mitigation projects, NMFS anticipates up to 500 juvenile CCC steelhead and 100 juvenile S-CCC steelhead may be collected annually by electrofishing. As with fish collection for dewatering of a SMP construction site, mortality rates of steelhead associated with electrofishing are expected to be below three percent annually (approximately 15 individual CCC steelhead and 3 individual S-CCC steelhead) for evaluation of mitigation project sites.

Juvenile CCC and S-CCC steelhead present at 2014-2023 SMP project sites during construction activities and those collected during evaluation of SMP mitigation projects likely make up a small proportion from the streams in the action area, and a small proportion from the CCC and S-CCC steelhead DPSs. Although a moderately large number of juvenile steelhead will be affected annually by 2014-2023 SMP projects (up to 810 CCC steelhead and 180 S-CCC steelhead), only a small number of juvenile CCC and S-CCC steelhead are anticipated to perish. It is unlikely that the small potential loss of juveniles during these construction and evaluation activities will impact future adult returns. Due to the relatively large number of juveniles produced by each spawning pair, CCC and S-CCC steelhead spawning in the streams of the action area are likely to

produce enough juveniles in future years to replace the few that may be lost to SMP construction effects and evaluation of mitigation projects.

For the SCVWD's 2014-2023 SMP projects, NMFS expects adverse effects to CCC steelhead, S-CCC steelhead, and southern DPS green sturgeon designated critical habitat associated with construction activities to be temporary and insignificant. Post-construction, SMP projects are anticipated to adversely affect designated critical habitat for CCC steelhead and S-CCC steelhead through the loss of cobble and gravels, construction of hardscape bank stabilization structures, and through the reduced amount of LWD in streams of the action area. However, the SMP mitigation program will compensate for these losses through the construction of gravel augmentation, habitat complexity, and LWD projects. Salmonid mitigation projects developed and selected in coordination with the Agencies are expected to result in the construction of well-designed enhancement/restoration instream structures that support steelhead spawning and rearing in locations that yield the greatest benefits in the action area.

Regarding future climate change effects in the action area, California could be subject to higher average summer air temperatures and lower total precipitation levels in the coming decades. Higher air temperatures would likely warm stream water temperatures. Reductions in the amount of precipitation would reduce stream flow levels in Northern and Central Coastal rivers. For 2014-2023 SMP projects, all maintenance activities will be conducted and completed within the next 10 years, while the benefits of the salmonid enhancement/restoration mitigation projects will continue beyond the 10-year SMP period. The above effects of climate change are expected to minor within the 10-year 2014-2023 SMP time frame. It is expected that the short-term effects of SMP projects will have elapsed prior to the significant onset of the above climate change effects.

IX. CONCLUSION

After reviewing the best available scientific and commercial data, the current status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the proposed activities to be conducted by the SCVWD's 2014-2023 SMP are not likely to jeopardize the continued existence of threatened CCC steelhead, threatened S-CCC steelhead, and threatened green sturgeon.

After reviewing the best available scientific and commercial data, the current status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the proposed 2014-2023 SMP is not likely to result in the adverse modification of CCC steelhead, S-CCC steelhead, or southern DPS green sturgeon critical habitat.

X. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without 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 NMFS as an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by the Corps and its permittee for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps: (1) fails to assume and implement the terms and conditions, or (2) fails to require any permittee to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to any permit, grant document, or contract, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to NMFS as specified in the incidental take statement (50 CFR §402.14(i)(3)).

A. Amount or Extent of Take

The SCVWD's 2014-2023 stream maintenance program in Santa Clara County is expected to result in the incidental take of threatened CCC and S-CCC steelhead. No incidental take is anticipated for threatened southern DPS green sturgeon. As described above in the biological opinion, juvenile steelhead are expected to be captured for relocation efforts at dewatered construction sites. A small number of fish are likely to be harmed or killed during relocation efforts. A few fish may avoid relocation efforts and be killed when the work area is dewatered. Given the habitat conditions of steams within the action area, up to 310 juvenile CCC steelhead and 80 juvenile S-CCC steelhead are likely to be collected and relocated annually from SMP work sites between 2014 and 2023. As described in the biological opinion, NMFS anticipates no more than three percent of the juvenile CCC and S-CCC steelhead present in the areas to be dewatered will be harmed or killed during relocation and dewatering efforts (approximately 10 CCC steelhead and 3 S-CCC steelhead).

Additional CCC and S-CCC juvenile steelhead may be collected annually by electrofishing for evaluation of SMP mitigation projects. Although the location and number of SMP mitigation projects for salmonid enhancement and restoration are unknown, sampling will be limited to the non-migration season when only juvenile rearing steelhead are present. Based on the habitat conditions within the action area, and providing for the evaluation of up to 20 mitigation projects

in northern Santa Clara County and five (5) mitigation projects in southern Santa Clara County, NMFS anticipates up to 500 juvenile CCC steelhead and 100 juvenile S-CCC steelhead may be collected annually by electrofishing during evaluation of SMP mitigation projects between 2014 and 2023. As described in the biological opinion, NMFS anticipates no more than three percent of the juvenile CCC and S-CCC steelhead present in the areas to be evaluated will be harmed or killed during electrofishing activities (approximately 15 CCC steelhead and three (3) S-CCC steelhead).

Based on the combined total of steelhead that may be collected during implementation of SMP maintenance activities and evaluation of SMP salmonid habitat enhancement/restoration projects, incidental take will have been exceeded if more than 810 juvenile CCC steelhead or more than 180 S-CCC steelhead are collected, or if more than 25 individual CCC steelhead or more than 6 individual S-CCC steelhead are harmed or killed annually by SMP activities.

B. Effect of the Take

In the accompanying opinion, NMFS determined that this level of anticipated take is not likely to result in jeopardy to CCC steelhead, S-CCC steelhead, or southern DPS green sturgeon.

C. Reasonable and Prudent Measures

NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of CCC steelhead:

1. Undertake measures to ensure harm and mortality to steelhead resulting from fish relocation and dewatering activities are low.

2. Conduct annual inspections and perform required maintenance at SCVWD fish ladders and fish screens to ensure these facilities are properly functioning for steelhead passage.

3. Ensure SMP impacts to steelhead are adequately determined and impacts fully mitigated per the 2014-2023 SMP Manual.

4. Ensure SMP mitigation actions for LWD (Tier 3 and 4), coarse sediment, and habitat complexity are adequately evaluated and monitored for their benefits to steelhead.

5. Undertake measure to ensure in-channel application of herbicides in streams with anadromous fish minimize the risk of steelhead exposure.

6. Prepare and submit annual reports regarding SMP activities conducted during the previous work season and completed mitigation actions.

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Corps, its permittee, and their contractors or designees must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

1. The following term and condition implements reasonable and prudent measure #1:

    a. The SCVWD must retain qualified biologists[9] with expertise in the area of anadromous salmonid biology, including handling, collecting, and relocating salmonids, for the collection of fish during project site dewaterings. The SCVWD must ensure that all biologists collecting and handling steelhead are qualified to conduct fish collections in a manner which minimizes potential risks.

    b. A qualified biologist must monitor SMP work sites during placement and removal of stream flow diversions and cofferdams to ensure any adverse effects to salmonids are avoid or minimized. The biologist must be on site during all dewatering events to ensure all ESA-listed salmonids are captured, handled, and relocated safely.

    c. Before fish relocation begins, a qualified biologist must identify the most appropriate release location(s). Release locations must have water temperatures within 1° C of the capture location. Release locations must offer ample habitat for released fish, avoid possibility of re-entry to the work area, and avoid areas where individual fish could become impinged on the exclusion net or screen.

    d. Steelhead must be handled with extreme care and kept in water to the maximum extent possible during relocation activities. All captured fish must be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream and fish must not be removed from this water except when released. To avoid predation, the biologist must have at least two containers and segregate young-of-year fish from larger age-classes and other potential aquatic predators. Captured salmonids will be relocated, as soon as possible, to a suitable instream location in which habitat conditions allow for adequate survival of transported fish and fish already present at the release site.

    e. If any steelhead are found dead or injured, the biologist must contact NMFS by phone immediately at the NMFS North Central Coast Office at (707) 575-6050. The purpose of the contact is to review the activities resulting in take and to

[9] A qualified biologist (including those specializing in botany, wildlife, and fisheries) is determined by a combination of academic training and professional experience in biological sciences and related resource management activities. SCVWD may also utilize appropriately experienced and/or trained environmental staff. Resumes of qualified biologists shall be made available to NMFS upon request.

determine if additional protective measures are required. All steelhead mortalities must be retained, placed in an appropriately-sized sealable plastic bag, labeled with the date and location of collection, fork length measured, and be frozen as soon as possible. Frozen samples must be retained by the biologist until specific instructions are provided by NMFS. The biologist may not transfer biological samples to anyone other than the NMFS North Central Coast Office without obtaining prior written approval from the North Central Coast Office, Supervisor. Any such transfer will be subject to such conditions as NMFS deems appropriate.

f. The SCVWD must allow any NMFS employee(s) or any other person(s) designated by NMFS, to accompany field personnel to visit SMP work sites during activities described in this Opinion.

2. The following term and condition implements reasonable and prudent measure #2:

a. The SCVWD must annually inspect fish ladders and fish screens during the period between March 1 and April 30 to determine the condition and required maintenance at the following facilities:

Fish Ladders: Coyote Percolation Ponds/Steel Dam (Coyote Creek); Mabury Diversion (Upper Penitencia Creek); Noble Avenue Diversion (Upper Penitencia Creek); Masson Diversion (Guadalupe Creek); Alamitos Diversion (Guadalupe River); Moffett Boulevard (Stevens Creek); Evelyn Avenue (Stevens Creek); Central Avenue (Stevens Creek); Fremont Avenue (Stevens Creek); and 14 drop structures (Llagas Creek).

Fish Screens: Coyote Canal Diversion (Coyote Creek); Mabury Diversion (Upper Penitencia Creek); Noble Avenue Diversion (Upper Penitencia Creek); Masson Diversion (Guadalupe Creek); Alamitos Diversion (Guadalupe River); and Church Avenue Diversion (Llagas Creek).

b. The following components, where applicable, of each facility must be inspected: (1) upstream access and channels; (2) downstream access and channels; (3) culverts; (4) baffles/pools; (5) pool/chute structures; (6) entry and terminal pools; (7) weirs; (8) bypass channels; (9) gates; (10) debris racks; (11) control systems; (12) screen faces; and (13) screen cleaning systems. Inspections must determine if sediment, debris, or algal growth are impairing the functionality of the facility. Inspections must also determine if any components of the facility are loose, broken, missing, or present sharp edges. For fish screens, inspections must determine if screens are firmly attached and no gaps, tears, rips, or holes are present.

c. The results of inspections at each facility must be presented annually in the SMP Notice of Proposed Work (NPW). Inspection results must include a narrative description of the condition of the facility, photographs, water depth and velocity

measurements (where applicable), and maintenance needs. Maintenance proposed for the upcoming SMP work season must be specified. The inspection reports must also present any other condition that is or could be in the future compromising the functionality of the fish ladder or screen. Maintenance must be performed during the subsequent SMP work window (June 15 to October 31). NMFS shall review the results of the inspections to determine the adequacy of the proposed maintenance and NMFS will respond to the SCVWD through the NPW review procedure.

d. A follow-up inspection of each of the above facilities must be performed between September 1 and October 31 to confirm the completion of maintenance and repairs, if any were performed. If no repairs or maintenance were performed, the follow-up inspection must confirm whether or not the condition of the facility remains as reported in the previous NPW. The follow-up inspection must identify any condition that is or could be in the future compromising the functionality of the fish ladder or screen. The results of the follow-up inspection must be presented in the Annual Summary Report.

e. The SCVWD must develop and maintain an inspection and maintenance log books for each of the above fish ladder and screen facilities.

3. The following term and condition implements reasonable and prudent measure #3:

a. The SCVWD must prepare and submit all pre-project site assessments for sediment removal and bank stabilization projects in anadromous salmonid streams with the annual NPW.

b. Through the annual NPW review procedure, SCVWD must identify all proposed on-site and off-site mitigation actions for potential impacts to LWD (Tier 3 and 4), coarse sediment, and instream habitat complexity to NMFS for review and approval. Each off-site mitigation action must identify: (1) project-specific objectives; (2) project design plans and specifications; (3) monitoring/evaluation program; and (4) project success criteria. NMFS approval of proposed mitigation actions will be based upon the anticipated probability of the project to successfully achieve project-specific objectives, ability of the monitoring program to assess the project's success criteria, and whether the mitigation project adequately compensate for anticipated impacts.

4. The following term and condition implements reasonable and prudent measure #4:

a. Off-site SMP mitigation projects for LWD (Tier 3 and 4), coarse sediment, and habitat complexity must be monitored for a period of at least five (5) years post-construction with assessments performed, at minimum, in Years 1, 3, and 5.

b. Monitoring and evaluation of mitigation sites must be performed by a qualified

biologist to evaluate the condition of the project, utilization by target species, and achievement of the project-specific success criteria.

c. Monitoring and evaluation of mitigation sites must conform with the principals and procedures for project evaluation and monitoring contained in the *California Salmonid Stream Habitat Restoration Manual* (Part VIII Project Evaluation and Monitoring). Methods must include "as-built" design drawings, photographs, and narrative descriptions. Post-construction assessments should include a variety of methods to determine if project-specific objectives have been achieved (*e.g*., fish observations, electrofishing, water depths and velocities, channel cross-section surveys).

5. The following term and condition implements reasonable and prudent measure #5:

a. Herbicides must only be applied to dry work sites, when no rain is forecasted to occur within 48 hours.

b. Herbicides must only be applied when wind conditions will not result in drift.

c. No surfactants may be added to herbicides used within 20 feet of a wetted channel.

d. No direct application of herbicides into water.

e. Herbicide application methods must be limited to a hose, hand gun, or backpack unit.

6. The following term and condition implements reasonable and prudent measure #6:

a. Maintenance and repair work at SCVWD fish ladders and screens completed by the SMP during the previous work season must be presented in the Annual Summary Report (ASR).

b. Evaluation and monitoring performed at SMP mitigation sites for LWD (Tier 3 and 4), coarse sediment, and habitat complexity in anadromous salmonid streams must be presented in the ASR.

c. The Final Water Quality Monitoring Reports prepared by the SMP for water diversions at SMP work sites (as described in *Attachment H* of the *2014-2023 SMP Manual*) must be provided to NMFS no later than January 31 of each year.

d. The SCVWD must provide the ASR to NMFS no later than January 31 of each year. The report must be submitted to the NMFS North Central Coast Office Attention: Supervisor of NMFS North Central Coast Office, 777 Sonoma Avenue, Room 325, Santa Rosa, California, 95404.

XII. REINITIATION NOTICE

This concludes formal consultation on the proposed 2014-2023 SMP projects by the SCVWD in Santa Clara County, California. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately.

XI. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitat, or develop additional information.

NMFS offers the following Conservation Recommendations:

1. The SCVWD and Corps should develop and implement fish habitat restoration projects within steelhead streams in Santa Clara County. Priority should be given to projects that restore spawning gravel, remedy fish barriers, and increase instream habitat complexity. The SCVWD and Corps should identify funding sources and collaborative partners to assist with habitat restoration projects in Santa Clara County.

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Figure 1. 2014-2023 Stream Maintenance Program action area.

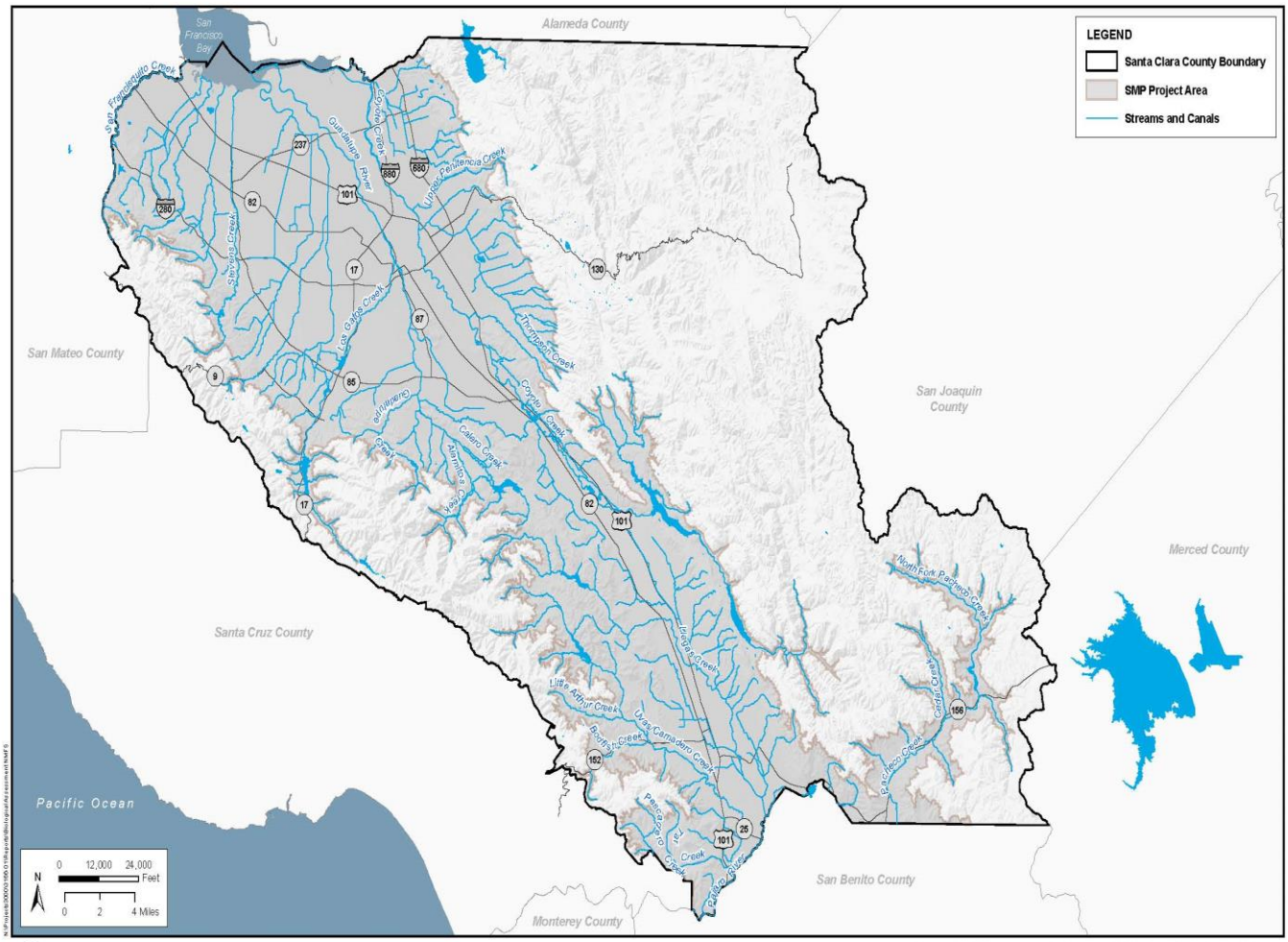

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Figure 2: Streams and Canals within the SMP Project Area
Santa Clara Valley Water District Stream Maintenance Program Biological Assessment – NMFS (3166-01)
July 2011

Table 1. SMP Sediment Removal Summary 2002-2012 in Anadromous Salmonid Streams

	Santa Clara Basin			Pajaro Basin		
Year	Sediment Volume (cy)	Channel Length (ft)	Annual Precipitation (inches)[10]	Sediment Volume (cy)	Channel Length (ft)	Annual Precipitation (inches)[11]
2002	929	199	12.98	0	0	17.36
2003	6173	636	13.62	0	0	15.93
2004	7975	3577	15.10	0	0	19.66
2005	5738	1737	22.80	0	0	24.95
2006	13302	4505	20.42	300	260	18.45
2007	5119	1093	8.38	0	0	5.84
2008	1140	872	10.71	0	0	14.62
2009	2346	1885	13.83	0	0	20.31
2010	4450	7683	17.15	0	0	23.51
2011	2210	7355	12.09	1105	200	n/a
2012	4749	5445	12.55	0	0	20.84
Totals	54,131	34,987	-	1405	460	-

Table 2. SMP Bank Stabilization Summary 2002-2012 in Anadromous Salmonid Streams

Year	Santa Clara Basin Total Length (feet)	Pajaro Basin Total Length (feet)
2002	299	0
2003	1260	0
2004	166	0
2005	479	0
2006	266	130
2007	2623	0
2008	1580	0
2009	845	0
2010	874	0
2011	80	0
2012	2370	0
Total	10,842	130

[10] San Jose rainfall gauge by water year (October 1 to September 30)
[11] Gilroy rainfall gauge by water year (October 1 to September 30)

Table 3. Streams with listed anadromous fish in the SMP area. The following stream indications only apply to stream reaches where SMP activities may occur: MC = Modified Channel; ME = Modified Channel with Ecological Values; UM = Unmodified Channel. Note that all streams contain multiple channels types.

Northern Santa Clara County		**Southern Santa Clara County**	
San Francisquito Ck.	MC, ME	Uvas Creek	MC, ME, UM
Stevens Creek	MC, ME	Llagas Creek	MC, ME, UM
Los Gatos Creek	MC, ME		
Guadalupe Creek	MC, ME		
Alamitos Creek	MC, ME		
Calero Creek	MC, ME		
Guadalupe River	MC, ME		
Coyote Creek	MC, ME, UM		
Upper Penitencia Ck.	MC, ME, UM		

Table 4. Steelhead collected and relocated by SMP project dewatering activities 2003-2013.

Year	CCC Steelhead	S-CCC Steelhead
2003	65	0
2004	33	0
2005	27	0
2006	26	0
2007	207	0
2008	121	0
2009	11	0
2010	7	0
2011	3	0
2012	2	13
2013	0	0
Total	502	13