



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL MARINE FISHERIES SERVICE  
Southwest Region  
501 West Ocean Boulevard, Suite 4200  
Long Beach, California 90802-4213

JUL 30 2008 In response refer to:  
2006/07158

Francis C. Piccola  
Chief, Planning Division  
U.S. Army Engineer District, Sacramento  
1325 J Street  
Sacramento, California 95814-2922

Dear Mr. Piccola:

This document transmits NOAA's National Marine Fisheries Service's (NMFS) addendum (Enclosure 1) to the programmatic biological opinion for Phase II of the U.S. Army Corps of Engineer's (Corps) Sacramento River Bank Protection Project (SRBPP), based on our review of a supplemental project description and effects analysis for 13 levee erosion sites within the Sacramento River Flood Control Project. The addendum reviews the effects of the action on Federally listed endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley spring-run Chinook salmon (*O. tshawytscha*), threatened Central Valley steelhead (*O. mykiss*), and their designated critical habitat in accordance with section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). This addendum also includes a section 7(a)(2) analysis of project related effects on the threatened Southern Distinct Population Segment (DPS) of North American green sturgeon (*Acipenser medirostris*).

Your request for formal consultation was received on May 13, 2008. The Corps proposes to construct a total of 13 levee repair projects under the authority of the SRBPP. Eight of the levee repair projects are on the Sacramento River at river miles (RM) 16.8 left (L), 42.7L, 49.7L, 52.3L, 53.5 right (R), 55.2L, 77.2L, and 177.8L; one project is on the Feather River at RM 28.5R; two sites are on the American River at RM 0.3L and 2.8L; one site is on Steamboat Slough at RM 16.6R, and one site is on Cache Slough at RM 21.8R. The work will be conducted in 2008 and 2009 following the construction periods and methodologies described in the 2008 programmatic biological opinion. The bank protection projects will repair bank and levee erosion and will replace and restore the riparian and shaded riverine aquatic habitat. In general, the work will involve placing rock revetment along approximately 8,000 linear feet of river bank. Soil fill suitable for plant growth will be mixed in and placed on top of the rock revetment, and the repair sites will be vegetated with riparian trees and shrubs. Instream woody material will be placed along the sites to provide juvenile fish cover. Existing vegetation will be protected to the maximum extent practicable and will only be removed or trimmed if necessary to construct project features.



This addendum is based on the NMFS 2008 programmatic biological opinion for the remaining 24,000 linear feet of authority under Phase II of the SRBPP, the Corps' October 2007 programmatic biological assessment, the Corps' May 2008 supplemental biological assessment. The addendum also is based on design drawings for all projects, information provided at Interagency Work Group meetings, and site visits and discussions held with representatives of the Corps, NMFS, the U.S. Fish and Wildlife Service, the California Department of Fish and Game, and Ayres and Associates. A complete administrative record of this consultation is on file at the NMFS Sacramento Field Office.

NMFS' 2008 programmatic biological opinion concluded that the implementation of the remaining 24,000 linear feet of authority under Phase II of the SRBPP is not likely to jeopardize the above species or adversely modify designated critical habitat. NMFS anticipated that subsequent projects constructed under the remaining authority would receive separate review and analysis that would append the programmatic biological opinion.

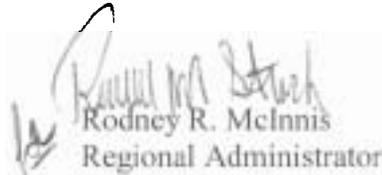
Based on the best available scientific and commercial information, including our review of the programmatic biological opinion, this addendum concludes that implementation of the 13 levee repair projects is not likely to jeopardize the above species or adversely modify designated critical habitat. NMFS has included an incidental take statement with reasonable and prudent measures and non-discretionary terms and conditions that are necessary and appropriate to minimize incidental take associated with project actions. The listing of the Southern DPS of North American green sturgeon became effective on July 7, 2006, and some or all of the ESA section 9(a)(1) prohibitions against take will become effective upon the future issuance of protective regulations under section 4(d). Because there are no section 9(a)(1) prohibitions at this time, the incidental take statement, as it pertains to the Southern DPS of North American green sturgeon does not become effective until the issuance of a final 4(d) regulation, as appropriate.

Also enclosed are draft Essential Fish Habitat (EFH) Conservation Recommendations for Pacific salmon as required by the MSA as amended (16 U.S.C. 1801 *et seq.*; Enclosure 2). This document concludes that the programmatic implementation of the 13 levee repair projects will adversely affect the EFH of Pacific Salmon in the action area and includes recommended measures that, if implemented, will minimize or avoid these adverse effects.

Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act requires that the Corps provide NMFS with a detailed written response within 30 days, and 10 days in advance of any action, to the EFH Conservation Recommendations, including a description of measures adopted by the Corps for avoiding, minimizing, or mitigating the impact of the project on EFH (50 CFR ' 600.920(j)). In the case of a response that is inconsistent with our recommendations, the Corps must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the proposed action and the measures needed to avoid, minimize, or mitigate such effects.

If you have any questions regarding this correspondence please contact Mr. Howard Brown in our Sacramento Area Office, 650 Capitol Mall, Suite 8-300, Sacramento, California 95814. Mr. Brown may be reached by telephone at (916) 930-3608 or by Fax at (916) 930-3629.

Sincerely,



Rodney R. McInnis  
Regional Administrator

Enclosures (2)

cc: Copy to file: 151422SWR2007SA00492:HLB  
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**BIOLOGICAL OPINION**

**ACTION AGENCY:** United States Army Corps of Engineers  
Sacramento District

**ACTIVITY:** Addendum to the Programmatic Consultation for Phase II of the Sacramento River Bank Protection Project for Thirteen Levee Repair Projects in the Sacramento River Flood Control Project

**CONSULTATION CONDUCTED BY:** NOAA's National Marine Fisheries Service,  
Southwest Region

**FILE NUMBER:** 151422SWR2007SA00492

**DATE ISSUED:** July 30, 2008

**I. CONSULTATION HISTORY**

On November 2, 2007, NMFS received the Corps October 24, 2007 request for a programmatic formal consultation for the remainder of Phase II of the SRBPP. The request included the final, October 2007, biological assessment, prepared by Stillwater Sciences.

In July, 2008, NMFS issued the Programmatic Biological Opinion for the remaining 24,000 linear feet of authority under the Sacramento River Bank Protection Project (SRBPP), Phase II (programmatic biological opinion).

On May 7, 2007, NMFS received the Corps' request for formal consultation for 13 levee erosion sites within the Sacramento River Flood Control Project. The request included the draft Environmental Assessment (EA), a biological assessment, and a Standard Assessment Methodology (SAM) analysis for all sites.

This biological opinion is based on information provided in the October, 2007, biological assessment; The May 7, 2007, information packet; discussions held with the Corps, USFWS, and CDFG; field reviews of previous and existing erosion and repair sites; SAM analyses; and engineering designs. A complete administrative record of this consultation is on file at the NMFS Sacramento Area Office.

## **II. DESCRIPTION OF THE PROPOSED ACTION**

The Corps proposes to construct a total of thirteen levee repair projects within the Sacramento River Flood Control Project (SRFCP) under the authority of the SRBPP. The vicinity of the SRBPP project area is shown in Figure 1, and Figure 2 illustrates the locations of each of the repair sites. The work would be conducted in 2008 and 2009 following the construction periods and methodologies described in the 2008 programmatic biological opinion. The bank protection projects will repair bank and levee erosion and will replace and restore the riparian and shaded riverine aquatic habitat. In general, the work will involve placing rock revetment along approximately 9,000 linear feet of river bank. Soil fill suitable for plant growth will be mixed in and placed on top of the rock revetment, and the repair sites will be vegetated with riparian trees and shrubs. Instream woody material will be placed along the sites to provide juvenile fish cover. Existing vegetation will be protected to the maximum extent practicable and will only be removed or trimmed if necessary to construct project features.

The project designs are consistent with the design alternatives that are described and analyzed in the programmatic biological opinion. For reference, these designs are illustrated in Figure 4 through 7. Only one of the design alternatives from the programmatic biological opinion will not be constructed (*i.e.*, design 1, Figure 4). This design was not selected for construction because, in general, it has greater impacts on fish habitat, and because the channel geometry at the erosion sites allows for construction of other designs that integrate more fish habitat measures.

For the purposes of the programmatic biological opinion and this addendum, the SRBPP action area has been divided into four regions, organized south to north. The regions are 1a, 1b, 2, and 3. Project locations, regions, sizes and important fish habitat considerations are summarized in Table 1. The regions are illustrated in Figure 3.

### **A. Site-specific project descriptions**

The repairs are categorized under three different contracts. Contract 1 includes repair sites at river miles (RM) Steamboat Slough 16.6 right (R), Cache Slough 21.8R, and Sacramento RMs 49.7 left (L), and 52.3L. Contract 2 includes repair sites at Lower American RMs 2.8L and 0.3L, and Sacramento RMs 53.5R, and 177.8R. Contract 3 will include Feather RM 28.5, and Sacramento RMs 16.8L, 42.7R, 55.2L, and 77.2L. All levee repair sites were selected based on a comprehensive erosion site evaluation prepared by Ayres and Associates (2005, 2006). The evaluations are made based on field surveys and quantitative ranking of characteristics, such as bank slope, bench width, length and location of erosion, radius of curvature, bank stability, dynamic geomorphology, vegetation cover, tree hazards, soil type, water velocity, wave action, economic factors, human use, seepage potential, and tidal fluctuation.

### **B. Construction staging, sequencing, and equipment**

The project will be constructed following schedules and procedures that are described in the programmatic biological opinion. In general, revetment will be placed from cranes mounted on

barges or from adjacent landside areas. Waterside construction will occur where it minimizes noise and traffic disturbances, and effects on existing vegetation. The contractor will use adjacent landside areas for staging of vehicles, plant materials, and other associated construction equipment, as necessary. Protective fencing will be installed to prevent vehicles from approaching the waterside edge of the existing bank.

For construction at sites downstream of RM 60 on the Sacramento River, including sloughs, all in-water construction will occur between August 1 and November 30 unless approved otherwise by NMFS. For sites within all other parts of the SRBPP action area, in-water construction will occur between July 1 and November 30, of each year unless directed otherwise by NMFS. Conducting in-water construction during these low flow periods will help minimize water quality impacts and will avoid sensitive rearing and spawning periods for salmonid species and delta smelt. Construction or planting activities that do not have potential water quality impacts may be conducted year-round.

#### **D. Operations and Maintenance**

Once repairs are complete, a project site may require limited maintenance. Operations and Maintenance details are described in the programmatic biological opinion.

#### **E. Proposed Minimization and Conservation Measures**

The Corps will implement minimization and conservation measures, including best management practices (BMPs) to reduce construction-related impacts. Additional conservation measures will be taken to offset the temporal and spatial impacts of levee repair sites as described in the programmatic biological opinion. These may include off-site conservation such as setback levees, levee breaching and flooding of delta islands, construction of in-channel and off-channel wetland benches, planting riparian trees, installation of in-stream wood, or the purchase of credits at suitable conservation banks.

#### **F. Monitoring plan**

The Corps has prepared a detailed monitoring plan that includes: (1) monitoring methods, performance standards for SAM variables, and success criteria for riparian vegetation and SRA cover; and (2) a protocol for implementing remedial actions should any success criteria not be met. The monitoring plan shall be incorporated into an Operations and Maintenance (O&M) manual for the project sites. A monitoring report that evaluates how the site meets the conservation success criteria will be submitted to the resource agencies by December of each year. Monitoring will be conducted until the success of conservation actions are either substantially confirmed or discounted.

To ensure that on-site and off-site habitat features are functioning as designed to specifically benefit Federally protected fish species, fishery monitoring efforts will be reported separately

from the monitoring efforts described above. An initial fishery monitoring effort is currently ongoing and will continue through at least 2012 to determine the effects of bank protection installed between 2001 and 2006 on listed species. Yearly adjustments and expansion of the fisheries monitoring plan to include new repair sites will be made through the IWG; the Corps will submit a draft monitoring plan to NMFS by November 30 of each year. A draft monitoring report will be submitted to NMFS by December 30 of each year.

## **J. Action Area**

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR § 402.02). The action area for the overall SRBPP programmatic consultation extends south-to-north along the Sacramento River from the town of Collinsville, at river mile (RM) 0 upstream to Chico at RM 194, and includes reaches of lower Elder and Deer creeks. The SRBPP also includes Cache Creek, the lower reaches of the American River (RM 0–23), Feather River (RM 0–61), Yuba River (RM 0–11), and Bear River (RM 0–17), as well as portions of Threemile, Steamboat, Sutter, Miner, Georgiana, and Cache sloughs.

The action area for the proposed action analyzed in this addendum extends from Sacramento RM 177.8 downstream to Sacramento RM 0, and includes Feather RM 28.5, American RM 2.8, Cache Slough RM 21.8, and Steamboat Slough RM 16.6, downstream to the Sacramento River.

For the purposes of the programmatic biological opinion and this addendum, the SRBPP action area has been divided into four regions, organized south to north by the location of the downstream terminus of each watercourse with the mainstem Sacramento River. These four regions represent biologically similar habitat functions. The regions are 1a, 1b, 2, and 3. The water bodies within these regions are illustrated in Figure 3.

Table 1.- Site-specific project details for each of the thirteen proposed levee repair sites. Regions are shown in Figure 3; design types are illustrated in Figures 4 to 7; IWM will consist of whole trees with diverse branch structure and may be place alone or in clusters depending on site conditions; restricted landscaping includes small trees and brush, unrestricted landscaping may include, but is not limited to, larger trees such as cottonwood, oak, or sycamore.

<b>Site Location</b>	<b>SRBPP Region</b>	<b>Design Type</b>	<b>Site Length (Feet)</b>	<b>Site Area (acres)</b>	<b>IWM Removed (feet)</b>	<b>IWM Replaced (feet)</b>	<b>Landscaping</b>
<b>SS 16.6R</b>	<b>1a</b>	4	700	1.5	42	46	Restricted
<b>CS 21.8R</b>	<b>1a</b>	4	1,040	1.3	218	230	Un-restricted
<b>SAC 49.7L</b>	<b>1b</b>	3	280	1.4	90	696	Un-restricted
<b>SAC 52.3L</b>	<b>1b</b>	2	1,320	0.6	242	3,045	Un-restricted
<b>LAR 0.3</b>	<b>1b</b>	2	520	0.8	12	11,131	Un-restricted
<b>LAR 2.8L</b>	<b>1b</b>	2	470	3.0	26	812	Un-restricted
<b>SAC 53.5R</b>	<b>1b</b>	3	430	1.1	0	725	Restricted
<b>SAC 177.8R</b>	<b>3</b>	3	1,070	1.8	0	3,161	Restricted
<b>SAC 16.8L</b>	<b>1a</b>	4	690	1.0	19	23	Restricted
<b>SAC 42.7R</b>	<b>1b</b>	3	240	1.1	79	696	Restricted
<b>SAC 55.2L</b>	<b>1b</b>	3	730	1.1	81	1,885	Un-restricted
<b>SAC 77.2L</b>	<b>1b</b>	3	600	2.2	2	1,131	Un-restricted
<b>FR 28.5L</b>	<b>2</b>	2	1,260	1.6	92	3,538	Un-restricted
<b>Total</b>			<b>9,350</b>	<b>18.5</b>	<b>903</b>	<b>27,119</b>	

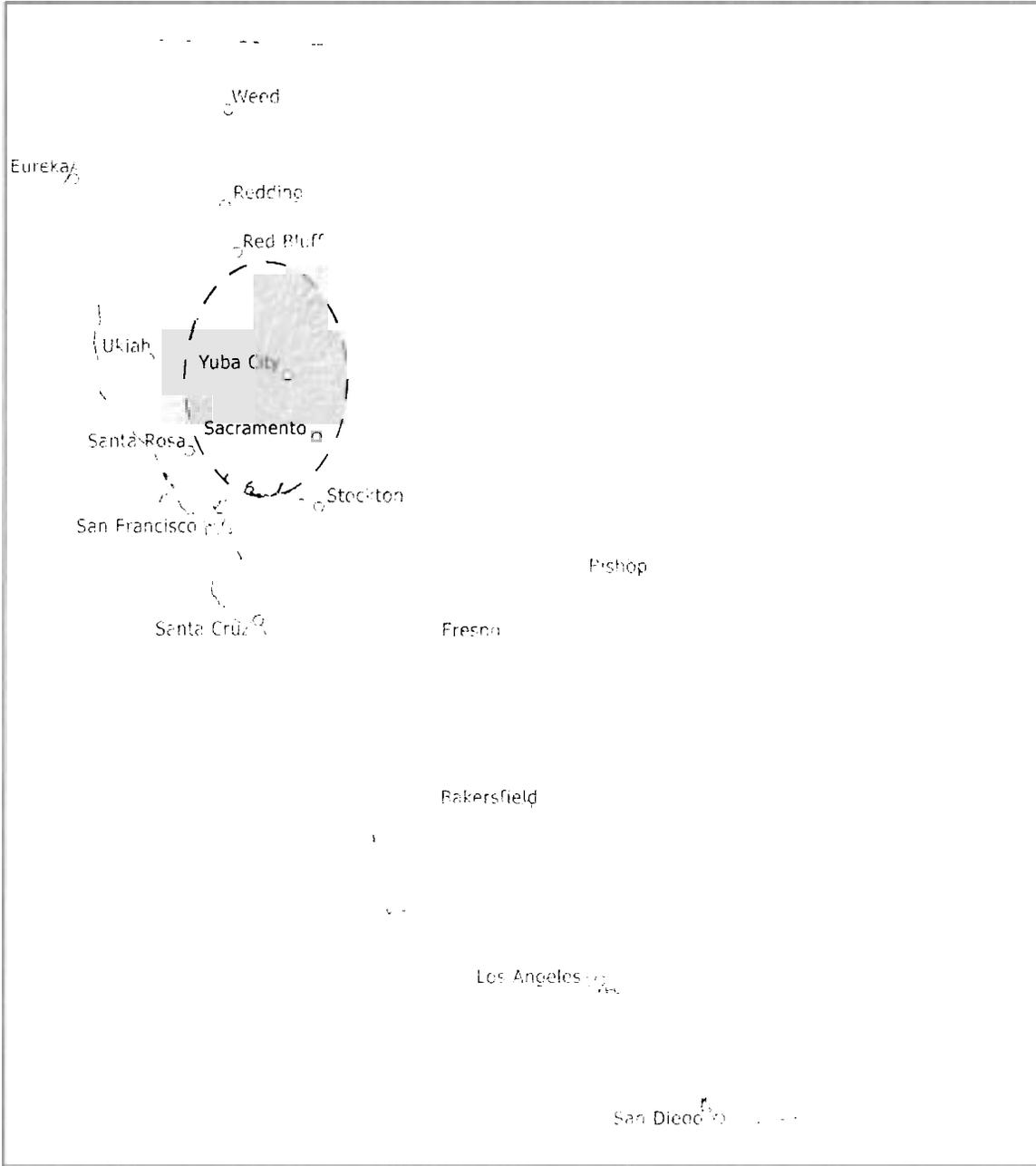
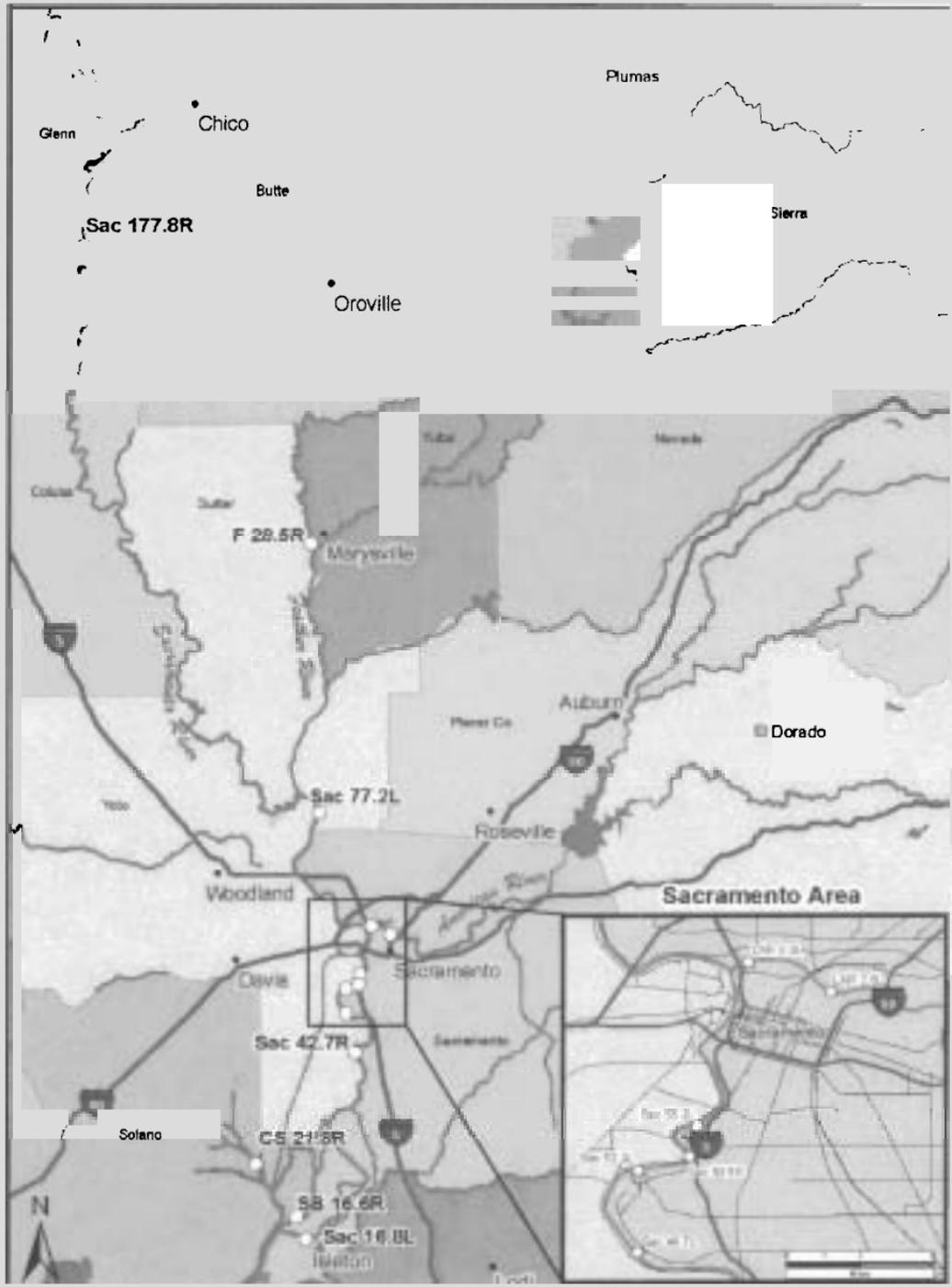


Figure 1. Vicinity map of the SRBPP action area.



Red Bluff

LEGEND

Levees - - -

County Line

Roads (20)

Sacramento River Bank Protection Project Regions

1a:

1b:

2

3

Elder Creek

Deer Creek

Mud Creek

Sutter Creek

Sacramento River

Cherokee Canal

Colusa Bypass

Anteville

Tisdale Bypass

Colusa Main Drain

Knights Landing Ridge Cut

Cache Creek from the Yolo Bypass to the upstream limit of the Project Levees

Willow Slough Bypass

Putah Creek

Yolo Bypass

Hass Slough

Ulatas Creek Bypass

Cache Slough

Lindsey Slough

Orville

Feather River from RM 31 to Western Canal Left Bank

Honcut Creek

Feather River from RM 31 to Honcut Creek Right Bank

Marysville Units 1, 2, and 3

Yuba River from Feather River Upstream to RM 5

Bear River from the Feather River to Upstream end of levees above Hwy 65

Feather River from Sacramento River Upstream to RM 31

Loon Creek Group Interceptor Unit 6

Natomas Cross Canal

Sacramento bypass

American River from Sacramento River to RM 13

Sacramento River

Miner Slough

Sutter Slough

Steamboat Slough

Georgiana Slough

Threemile Slough



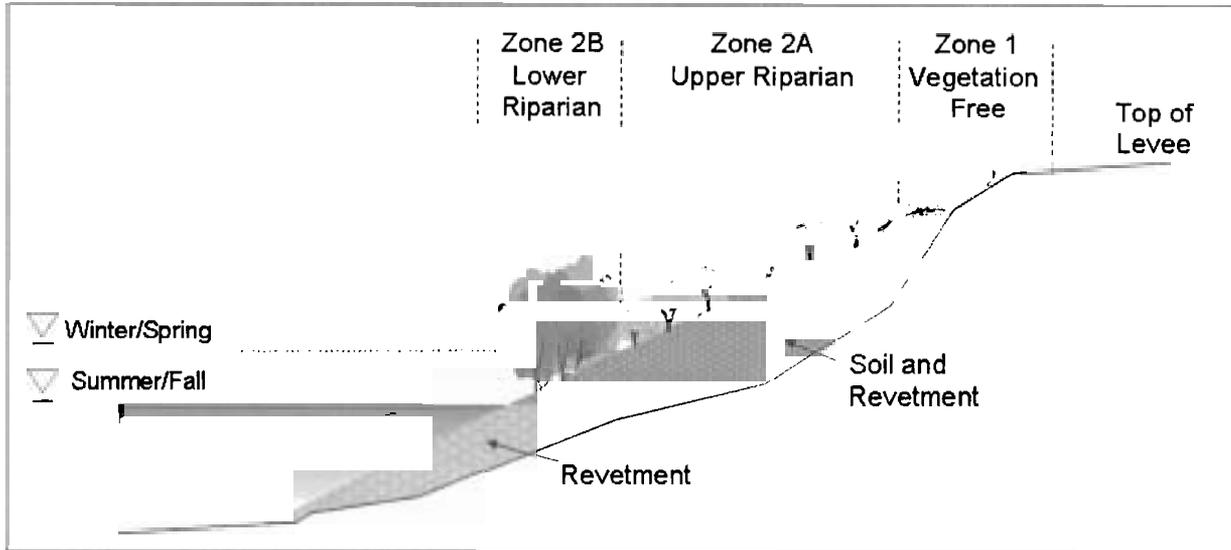


Figure 4. Design 1 – Bank fill rock slope with revegetation.

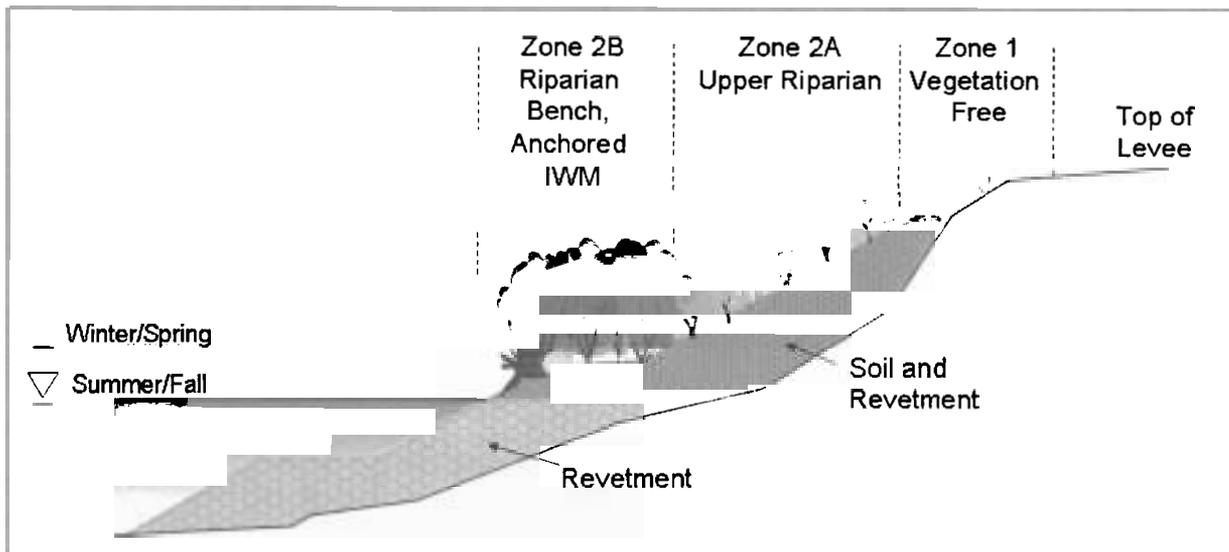


Figure 5. Design 2 – Low riparian bench with revegetation and anchored in-stream woody material enhancements *above* the summer/fall waterline upstream of RM 30.

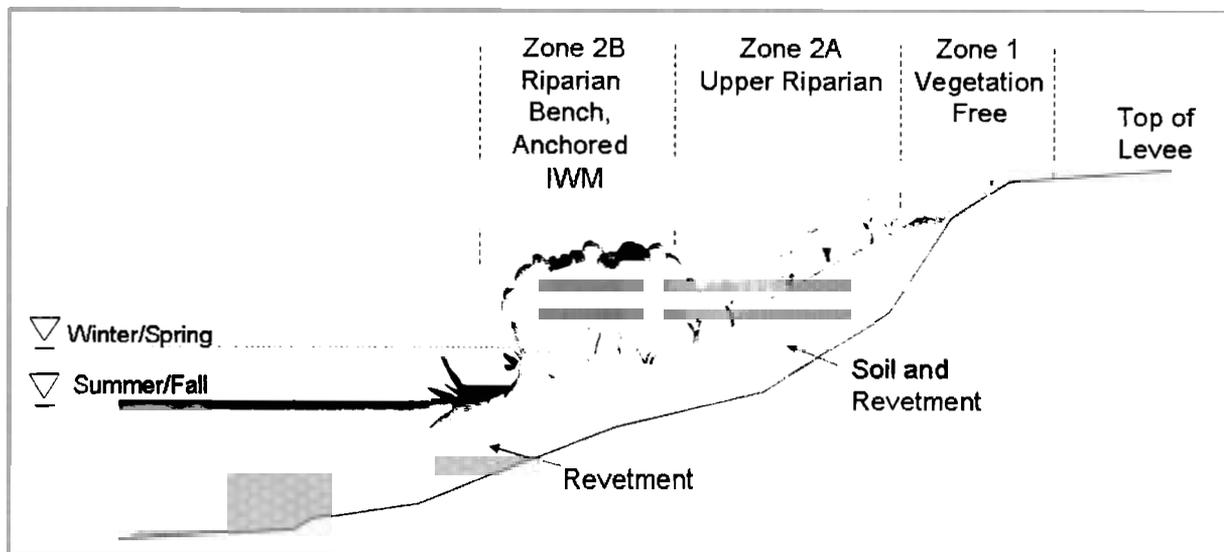


Figure 6. Design 3 – Low riparian bench with revegetation and anchored in-stream woody material enhancements *above and below* the summer/fall waterline upstream of RM 30.

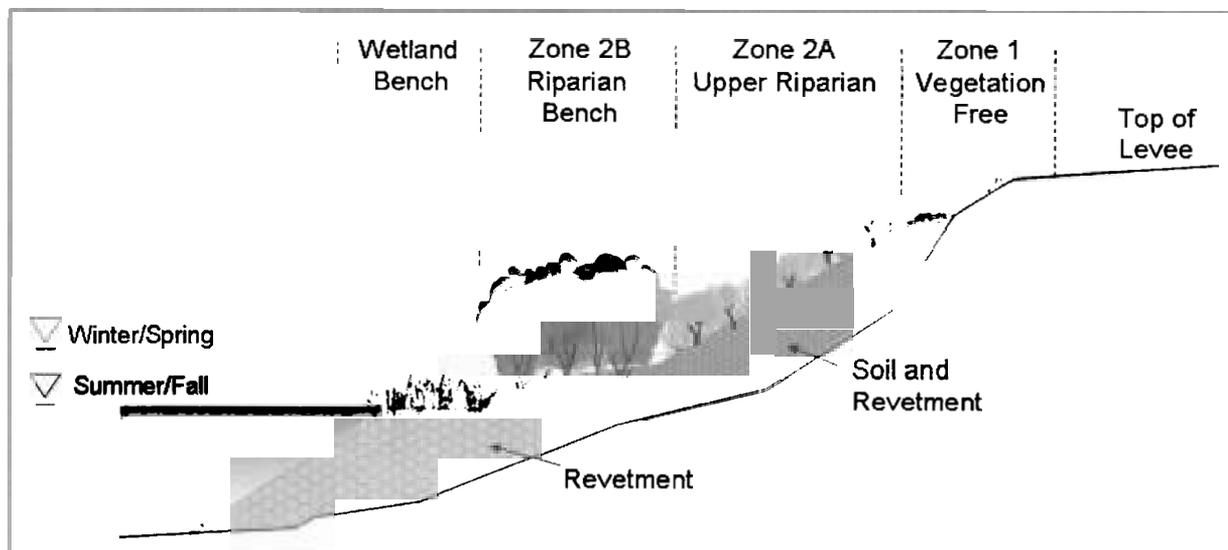


Figure 7. Design 4: Delta smelt design – Low riparian and wetland benches with revegetation downstream of RM 30.

### III. STATUS OF THE SPECIES AND CRITICAL HABITAT

The following Federally listed species evolutionary significant units (ESU) or distinct population segments (DPS) and designated critical habitat occur in the action area and may be affected by the proposed project:

- Sacramento River winter-run Chinook salmon ESU** (*Oncorhynchus tshawytscha*)  
endangered (June 28, 2005, 70 FR 37160)
- Sacramento River winter-run Chinook salmon designated critical habitat**  
(June 16, 1993, 58 FR 33212)
- Central Valley spring-run Chinook salmon ESU** (*Oncorhynchus tshawytscha*)  
threatened (June 28, 2005, 70 FR 37160)
- Central Valley spring-run Chinook salmon designated critical habitat**  
(September 2, 2005, 70 FR 52488)
- Central Valley steelhead DPS** (*Oncorhynchus mykiss*)  
threatened (December 22, 2005)
- Central Valley steelhead designated critical habitat**  
(September 2, 2005, 70 FR 52488)
- Southern DPS of North American green sturgeon** (*Acipenser medirostris*)  
threatened (April 7, 2006, 70 FR 17386)

The programmatic biological opinion includes a detailed *Status of the Species and Critical Habitat* section, describing the life history, population dynamics, migration timing, habitat use, and viability of the species listed above, and the conservation condition of their designated critical habitat. This addendum summarizes the key findings of the biological opinion.

The viability of Central Valley salmonids ESUs, was summarized by Lindley *et al.* (2006) and described that extant populations of Sacramento River winter-run Chinook salmon and CV spring-run Chinook salmon appear to be fairly viable. These populations meet several viability criteria including population size, growth, and risk from hatchery strays. The viability of the overall ESUs to which these populations belong appears low to moderate, because the ESUs remain vulnerable to extirpation due to their small-scale distribution and high likelihood of being affected by a significant catastrophic event. Lindley *et al.* were not able to determine the viability of existing steelhead populations, but believe that the DPS has a moderate to high risk of extirpation since most of the historic habitat is inaccessible due to dams, and because the anadromous life-history strategy is being replaced by residency. McEwan (2001) concluded that the ESU faces a moderate to high risk of extinction due to negative adult population trends and the reduced geographic distribution related to the loss of spawning habitat behind dams (McEwan 2001).

Recent habitat evaluations conducted in the upper Sacramento River for salmonid recovery planning (Lindley *et al.* 2007) suggests that significant potential green sturgeon spawning habitat was made inaccessible or altered by dams (historical habitat characteristics, temperatures, and geology summarized). This spawning habitat may have extended into the three major branches

of the Sacramento River; the Little Sacramento River, the Pit River system, and the McCloud River (NMFS 2005a). Due to substantial habitat loss as well as existing threats to the Southern DPS of North American green sturgeon, it continues to remain at a moderate to high risk of extinction.

The NMFS Critical Habitat Assessment and Review Team (CHART, 2005) reviewed the status of currently occupied habitat and proposed reaches to designate as critical habitat based, in part, on the quality, and conservation value of the habitat to listed salmonids in the Central Valley. The CHART report also considered the need for special management considerations in order to maintain the conservation value of the habitat for listed species. According the CHART report, the current function of existing spawning habitat ranges from moderate to high quality, with the primary threats including changes to water quality, and spawning gravel composition from rural, suburban, and urban development, forestry, and road construction and maintenance. Downstream, river and estuarine migration and rearing corridors range in conservation condition from poor to high quality depending on location. Tributary migratory and rearing corridors tended to rate as moderate quality due to threats to adult and juvenile life stages from irrigation diversion, small dams, and water quality. Delta (*i.e.*, estuarine) and mainstem Sacramento and San Joaquin river reaches tended to range from poor to high quality, depending on location. The alluvial reach of the Sacramento River between Red Bluff and Colusa is in good condition because, despite the influence of upstream dams, this reach retains naturally functioning channel processes that maintain and develop anadromous fish habitat. The river reach downstream from Colusa and including the Delta is in poor condition due to impaired hydrologic conditions from dam operations, water quality from agriculture, degraded nearshore and riparian habitat from levee construction and maintenance, and habitat loss and fragmentation.

#### **IV. ENVIRONMENTAL BASELINE**

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

The programmatic biological opinion includes a detail *Environmental Baseline* section, describing the life history, population dynamics, migration timing, habitat use, and viability of the species listed above, and the conservation condition of their designated critical habitat within the action area. This addendum summarizes the key findings of the programmatic biological opinion.

The action area functions as a migratory corridor for adult Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead, and provides migration and rearing habitat for juveniles of these species. A large proportion of all Federally listed Central Valley salmonids are expected to utilize aquatic habitat within the action area, including the entire

population of winter-run Chinook salmon. The action area also functions as a migratory and holding corridor for adult and rearing and migratory habitat for juvenile Southern DPS of North American green sturgeon.

Based on Lindley *et al.*, 2006 viability assessments, the recent habitat improvements that have been occurring throughout the action area, and the emergence of levee repair designs and approaches that minimize fish habitat loss, and incorporate extensive fish habitat features designed for the purpose of improving the amount and quality of rearing habitat, the programmatic biological opinion and this addendum find that Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, and the southern DPS of North American green sturgeon are likely to continue to survive and recover in the action area.

The action area is within designated critical habitat for Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead. Habitat requirements for these species are similar. The PCEs of salmonid habitat within the action area include: freshwater rearing habitat, freshwater migration corridors, and estuarine areas. The essential features of these PCEs include adequate substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food; riparian vegetation, space, and safe passage conditions. The intended conservation rolls of these habitats are to provide appropriate freshwater rearing and migration conditions for juveniles and unimpeded freshwater migration conditions for adults. The conservation condition and function of this habitat has been severely impaired through several factors discussed in the *Status of the Species and Habitat* section of the programmatic biological opinion. The result has been the reduction in quantity and quality of several essential features of migration and rearing habitat required by juveniles to grow, and survive. In spite of the degraded condition of this habitat, the intrinsic conservation value of the action area is high because the entire length is used for extended periods of time by a large proportion of all Federally listed anadromous fish species in the Central Valley.

## **V. EFFECTS OF THE ACTION**

### **A. Approach to the Assessment**

Pursuant to section 7(a)(2) of the ESA (16 U.S.C. §1536), Federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. This biological opinion does not rely on the regulatory definition of “destruction or adverse modification” of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat. NMFS will evaluate destruction or adverse modification of critical habitat by determining if the action reduces the value of critical habitat for the conservation of the species. This biological opinion assesses the effects of the proposed action on endangered Sacramento River winter-run Chinook salmon, threatened CV spring-run Chinook salmon, threatened CV steelhead, their designated critical habitat, and threatened Southern DPS of North American green sturgeon.

In the *Description of the Proposed Action* section of this biological opinion, NMFS provided an overview of the action. In the *Status of the Species* and *Environmental Baseline* sections of this biological opinion, NMFS provided an overview of the threatened and endangered species and critical habitat that are likely to be adversely affected by the activity under consultation.

Regulations that implement section 7(b)(2) of the ESA require biological opinions to evaluate the direct and indirect effects of Federal actions and actions that are interrelated with or interdependent to the Federal action to determine if it would be reasonable to expect them to appreciably reduce listed species' likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution (16 U.S.C. §1536; 50 CFR 402.02). Section 7 of the ESA and its implementing regulations also require biological opinions to determine if Federal actions would destroy or adversely modify the conservation value of critical habitat (16 U.S.C. §1536).

NMFS generally approaches "jeopardy" analyses in a series of steps. First, we evaluate the available evidence to identify the direct and indirect physical, chemical, and biotic effects of proposed actions on individual members of listed species or aspects of the species' environment (these effects include direct, physical harm or injury to individual members of a species; modifications to something in the species' environment - such as reducing a species' prey base, enhancing populations of predators, altering its spawning substrate, altering its ambient temperature regimes; or adding something novel to a species' environment - such as introducing exotic competitors or a deleterious sound. Once we have identified the effects of an action, we evaluate the available evidence to identify a species' probable response (including behavioral responses) to those effects to determine if those effects could reasonably be expected to reduce a species' reproduction, numbers, or distribution (for example, by changing birth, death, immigration, or emigration rates; increasing the age at which individuals reach sexual maturity; decreasing the age at which individuals stop reproducing; among others). We then use the evidence available to determine if these reductions, if there are any, could reasonably be expected to appreciably reduce a species' likelihood of surviving and recovering in the wild.

The final step in conducting the "jeopardy" analysis is to consider the additive effects of the environmental baseline, the effects of the action and any reasonably foreseeable cumulative effects to determine the potential for the action to affect the survival and recovery of the species, or the conservation value of their designated critical habitat.

To evaluate the effects of the proposed action, NMFS examined proposed construction activities, O&M activities, habitat modification, and conservation measures, to identify likely impacts to listed anadromous salmonids within the action area based on the best available information.

The information used in this assessment includes fishery information previously described in the *Status of the Species* and *Environmental Baseline* sections of this biological opinion; studies and

accounts of the impacts of riprapping and in-river construction activities on anadromous habitat and ecosystem function; and documents prepared by the Corps in support of the proposed action (Corps 2007, 2008); SAM results; project designs; field reviews, and meetings held between the Corps, NMFS, USFWS, and CDFG.

The programmatic biological opinion analyzed the short- and long-term effects of actions, but did not provide details on the project-specific effects that are described in the *Project Description*, section of this addendum. This assessment will summarize the effects analysis from the programmatic biological opinion and review the more specific effects of the 13 proposed levee repairs.

### **A. Summary of Effects Analyzed in the Programmatic Biological Opinion**

NMFS expects that relatively low number of anadromous salmonids will be present in the action area during construction activities because the construction periods do not occur during peak migration periods. Those fish that are exposed to these activities will encounter short-term (*i.e.*, minutes to hours) construction-related noise, physical disturbance, and water quality changes that may cause injury or death by increasing the susceptibility of some individuals to predation by temporarily disrupting normal behaviors, and affecting sheltering abilities. Some juvenile fish may be crushed, and killed or injured during rock placement, especially fry-sized winter-run Chinook salmon that may be present in region 3. Others may be displaced from natural shelter and preyed upon by piscivorous fish. Construction will not occur during peak migration periods; therefore relatively few juvenile fish are expected to be injured or killed by in-river construction activities because most fish are expected to avoid daytime construction activities due to their predominately crepuscular migration behaviors. The implementation of BMPs and other conservation measures also will minimize impacts to the aquatic environment and reduce project-related effects to fish. In addition, and with the exception of the occurrence of winter-run Chinook salmon in region 3, peak migration events correspond with periods of high river flows, when in-river construction activities are likely to be suspended. Furthermore, only one cohort, or emigrating year class, out of perhaps four to five within each salmon and steelhead population will be affected. Therefore, NMFS expects that actual injury and mortality levels will be low relative to the overall population abundance, and not likely to result in any long-term, negative population trends. Adults should not be injured because their size, preference for deep water, and their crepuscular migratory behavior will enable them to avoid most temporary, nearshore disturbance.

NMFS expects that a large, but unknown, number of green sturgeon will be present in the action area during construction because peak migration and spawning periods occur during this time. Green sturgeon are primarily benthic, and their presence along the shoreline is not common. Therefore, adverse effects including injury or death from construction activities are not expected.

The project is expected to result in long-term habitat modifications, including modifications to the designated critical habitat of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead. The modifications will affect fish behavior, growth and

survival, and the PCEs of critical habitat including freshwater and estuarine rearing sites and migration corridors.

The programmatic biological opinion evaluated long-term impacts as modeled by the Corps Standardized Assessment Methodology (SAM). The SAM was developed by the Corps, in consultation with NMFS, USFWS, CDFG and CDWR, to address specific habitat assessment and regulatory needs for ongoing and future bank protection actions in the SRBPP action area. The SAM was designed to address a number of limitations associated with previous habitat assessment approaches and provide a tool to systematically evaluate the impacts and compensation requirements of bank protection projects based on the needs of listed fish species (with the exception of Southern DPS green sturgeon). A major advantage of the SAM is that it integrates species life history and flow-related variability in habitat quality and availability to generate species responses to project actions over time. Species responses represent an index of a species growth and survival based on a 30-day exposure to post project conditions for a variety of seasons and life-history stages, over the life of the project.

In regions 1a and 1b, and during all seasons, SAM results indicate that short- to long-term habitat deficits would potentially occur under the expected proportions of the project designs. Throughout these two regions, the identified erosion sites (Ayres 2005, 2006) were concentrated along bank segments that contain relatively high proportions of in-stream and overhead cover; the erosion sites in regions 2 and 3 were typically situated along banks containing lower proportions of beneficial bank attributes such as shade, IWM, and shallow slope. As a result, when utilizing the expected proportions of the four bank repair designs, the differences between existing and with-project conditions were greater at the representative erosion sites of regions 1a and 1b; these differences in turn resulted in greater habitat deficits compared to those within regions 2 and 3. Based on the SAM results, at the representative project sites in regions 2 and 3, initial short-term habitat deficits recovered to existing conditions by year 5 at the latest in winter and spring, and by year 15 in summer and fall. Despite the deficits modeled throughout all four regions, habitat responses exhibited continuous and long-term improvement over the modeled time-period, due to the on-site mitigating features that are implemented as part of the four project designs, especially designs 3 and 4, which include the most comprehensive elements.

Within regions 1a and 1b during all seasons, small, but long-term habitat deficits would potentially occur from the repair of levee erosion sites under the expected proportions of the project designs assessed in the programmatic biological opinion. Off-site habitat compensation utilizing one of three potential measures (setback levees, IWM installation, and shallow bank slope construction) would be implemented to off-set the project-wide habitat deficits with long-term habitat gains, for all salmonid life stages. The SAM results indicated that habitat responses benefited most with the off-site compensation measure of installing IWM. With the IWM installation measure, all habitat responses exhibited rapid recovery by year 1, with long-term habitat gains through the modeled time period. Compensation from the shallow bank slope measure offered the fewest habitat benefits to the focus species life stages compared with the benefits provided by the other two measures. If implemented 5 years prior to construction of the project designs, compensation from the setback levee measure resulted in habitat response

recovery by year 5 at the latest, followed by substantial habitat gains for the focus species life stages in winter and spring, primarily by seasonal floodplain inundation.

The project, as a whole (*i.e.*, all sites and all regions combined) will cause short-term (*i.e.*, 2 to 12 years) adverse effects to juvenile rearing and migration PCEs, and substantial long-term (*i.e.*, 5 to 50 years) improvements to these PCEs at most seasonal flow elevations. Most deficits result from short-term reductions in vegetation and shade caused by construction and extension of the shoreline away from existing vegetation and shade. Revegetated areas must grow for several years before shade extends over the shoreline. Fall and summer deficits also result from the conversion of shallow-water habitat with fine-textured substrate to large angular rock placed at a 2:1 or 3:1 slope. Despite the modeled summer and fall habitat deficits, they are not expected to reduce the overall conservation condition of rearing and migration PCEs because they will be short-term and the conservation condition will improve to a level above that of the current baseline conditions over the 50 year life of the project.

## **B. Effects of the 13 Proposed Levee Repair Sites**

This section analyzes the site- and regional-scale effects of the 13 proposed levee repairs. Similar to the programmatic analysis, the SAM results indicate mostly short-term (*i.e.*, 1 to 5 years) and some longer-term (*i.e.*, greater than 5 years) deficits, followed by positive increases over the existing baseline condition over the modeled 50-year project period. The initial (*i.e.*, year 0) removal or reduction of several habitat variables during project construction, including the temporary removal of IWM, and aquatic vegetation, drove the short-term deficits. The greatest deficits occur at summer and fall flow elevations at sites having only a riparian bench due to long-term increases in substrate size at these elevations, and because the water level intersects the bank below the elevation of the planted riparian bench.

For the summary of the SAM results, the 13 repair sites have been organized by their associated region within the SRBPP action area. The discussion of effects focuses on the cumulative effects per region, rather than the specific results from each site. However, for reference, the individual site level deficits are shown in Appendix A to this biological opinion, Tables 31 through 56 and Figures 1 through 74. Results per region are shown in Appendix A, Tables 57 through 66 and Figures 75 through 100.

### **1. Region 1a (Sacramento RM 0-20)**

There are three sites and one repair design in region 1a. The design type is a planted wetland bench with placement of IWM to existing bank-line proportions. This design type generally results in relatively small SAM deficits that last short periods, with substantial long-term gains in habitat condition. Habitat values at the summer elevation drop marginally for up to two years, but quickly recovery and exceed baseline conditions. This design has several important habitat-creating features including shallow-water habitat availability at most flows, smaller substrate size, increased instream vegetation, the replacement of IWM cover. Also contributing the positive SAM values are the credited value of the placement of additional IWM at sites repaired

upstream from RM 30. IWM placement at upstream sites is doubled and 40 percent of the shoreline value is applied to sites located in the downstream Delta region as compensation for not placing greater amounts within the spawning habitat of Delta smelt. The credit does affect SAM values at sites in region 1a, but not significantly; the most influential SAM driver is shallow-water habitat availability. The SAM results indicate that all life stages of salmon and steelhead would exhibit immediate positive habitat responses by year 1 during all average seasonal water surface elevations, and would be followed by long-term positive values that exceed baseline conditions.

## 2. Region 1b (Sacramento RM 20-80)

There are eight sites in region 1b. The repair designs planned for the sites in this region are planted riparian benches (seven sites), and planted wetland and riparian benches (one site). Generally, the with-project SAM values for all variables are greater than without-project values at winter and spring water surface elevations, while values at the summer and fall elevations are lower for short periods or remain at baseline. The planted riparian bench will provide high value shallow water habitat with increased bankline cover, fine substrate size, shade, and submerged vegetation at winter- and spring flows. In contrast, increased slope, larger substrate, increases in IWM, with decreases in submerged vegetation, shallow water habitat, and shade will cause temporary declines or maintain baseline conditions at the fall and summer water surface elevations.

## 3. Region 2 (Sacramento RM 2)

Feather River 28.5 is the only repair site located in reach 2. The planned design is a wetland bench with anchored IWM and willow fascine plantings. Despite an initial reduction in shade following construction, the planted wetland bench with IWM will increase shallow water habitat and increase habitat values above baseline at all water surface elevations for the life of the project.

## 4. Region 3 (Sacramento RM 143-194)

Sacramento RM 177.8R is the only repair site in region 3. A planted riparian bench with IWM will be constructed at this site. As described for region 1b, the planted riparian bench with IWM has with-project SAM values that are greater than without-project values at winter and spring water surface elevations, while values at the summer and fall elevations are lower for short periods or remain at baseline. The planted riparian bench will provide high value shallow water habitat with increased bankline cover, fine substrate size, shade, and submerged vegetation at winter- and spring flows. In contrast, increased slope, larger substrate, increases in IWM, with decreases in submerged vegetation, shallow water habitat, and shade will cause temporary declines or maintain baseline conditions the at the fall and summer elevations.

## C. Summary of Effects

### 1. Construction-related Effects

NMFS expects that a relatively small but unknown number of anadromous salmonids will be present in the action area during construction activities due to a small portion of the migration period overlapping with construction activities. Only those fish that are holding adjacent to or migrating past a project site are likely to be exposed or affected. Those fish that are exposed to the effects of construction activities will encounter short-term (*i.e.*, minutes to hours) construction-related noise, physical disturbance, and water quality changes that may cause injury or death by increasing the susceptibility of some individuals to predation by temporarily disrupting normal behaviors, and affecting sheltering abilities. Some juvenile fish may be crushed, and killed or injured during rock placement, especially fry-sized winter-run Chinook salmon that may be present in region 3. Others may be displaced from natural shelter and preyed upon by piscivorous fish. Although some construction activities will occur during migration periods, relatively few juvenile fish are expected to be injured or killed by in-river construction activities because most fish are expected to avoid construction activities due to their predominately crepuscular migration behaviors. The implementation of BMPs and other conservation measures also will minimize impacts to the aquatic environment and reduce project-related effects to fish. In addition, and with the exception of the occurrence of winter-run Chinook salmon in region 3, peak migration events correspond with periods of high river flows, when in-river construction activities are likely to be suspended. Furthermore, only one cohort, or emigrating year class, out of perhaps four to five within each salmon and steelhead population will be affected. Therefore, NMFS expects that actual injury and mortality levels will be low relative to the overall population abundance, and not likely to result in any long-term, negative population trends. Adults should not be injured because their size, preference for deep water, and their crepuscular migratory behavior will enable them to avoid most temporary, nearshore disturbance.

Green sturgeon may be present holding and spawning in region 2 and 3 and their spawning habitat and spawning behavior may be affected if rock is placed into deepwater habitats in the upper regions of the action area. Since there are two projects located in these reaches, and only one of them is being constructed within the known spawning habitat of the species (Sacramento RM 177), the number of fish likely to be affected is low and limited to the project length.

### 2. SAM Modeled Project Effects to the Species and their Designated Critical Habitat

Project-scale SAM responses and region-scale SAM responses, as detailed in Appendix A, Tables 31 through 56 and Figures 1 through 74, and Appendix A, Tables 57 through 66 and Figures 75 through 100, respectively, are consistent with the parameter of effects analyzed in the programmatic biological opinion. In general, NMFS expects that the most significant project-level habitat deficits will occur at summer and fall flows due to the inherent difficulty of successfully establishing riparian vegetation in a zone that is impacted by boat wake erosion, and variable flow conditions typical of a regulated river system. The modeled summer and fall

habitat deficits are expected to affect relatively few fish, since the majority of adult migration and juvenile rearing and emigration within the action area does not occur during average fall flow conditions. Instead, a significant majority of Chinook salmon and steelhead adult migration and juvenile rearing and emigration occurs during periods of higher flow that are more accurately represented by conditions at average winter and spring WSELs. Short-term habitat deficits at winter and spring WSELs are expected to cause injury and death of individuals at all sites from reduced growth conditions and increased predation, for 2 to 12 years. Long-term effects at the winter and spring WSELs will be substantially positive, with conditions improving beyond existing conditions through year 50.

Additionally, the Corps has agreed to pursue offsite habitat improvement projects within each of the affected regions to fully compensate for the temporal and spatial effects of the action as quantified in the SAM model results. Although the project-level deficits will occur as described above, the region-specific habitat improvements will ensure that reach level deficits are fully compensated.

Modeled summer and fall habitat deficits represent impacts to the critical habitat of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon and CV steelhead. Affected PCEs include adult and juvenile freshwater and estuarine rearing and migration habitat. Despite short-term deficits, the impact of the projects are not expected to reduce the overall conservation condition of rearing and migration PCEs because the adverse effects will be reduced through the integration of numerous fish habitat features that will limit any alteration of habitat to only a short time, with overall habitat values increasing above baseline conditions over the 50 year life of the project.

NMFS also expects the action to adversely affect the Federally listed Southern DPS of the North American green sturgeon. Adverse effect to these species is expected to be limited to migrating and rearing larvae, post-larvae, juveniles and holding adults. Juveniles are expected to be affected most significantly because of their small size, reliance on aquatic food supply (allochthonous food production), and vulnerability to factors that affect their feeding success and survival. Construction activities will cause disruptions from increased noise, turbidity, and inwater disturbance that may injure or kill larvae, post-larvae, and juveniles by causing reduced growth and survival as well as increased susceptibility to predation. Adverse affects to adults are primarily limited to the alteration of habitat below the waterline affecting predator prey relationships and feeding success. In the absence of modeled response data for green sturgeon, NMFS expects responses to long-term, project-related habitat conditions to be similar to juvenile salmonids, as described above in *Long-term Effects of SRBPP Actions on Anadromous Salmonids*. However, because green sturgeon are not as near-shore oriented as juvenile Chinook salmon, the relative proportion of the green sturgeon population that will be affected by these conditions should be low.

### 3. Effects of Project Monitoring

The individual monitoring plans for the project sites include physical habitat and fishery monitoring. The physical habitat monitoring will evaluate how sites meet the compensation criteria of the SAM modeling. The monitoring of physical habitat attributes will use passive measurement techniques that are not expected to adversely affect listed fish or critical habitat.

The fishery monitoring program is generally described in the programmatic biological opinion. Implementation of the proposed monitoring program is expected to result in capture, injury and mortality of juvenile salmonids. Up to 10,000 linear feet of the action area may be monitored several times per year and under variable flow conditions. Under the assumptions made in the programmatic biological opinion, NMFS expects a total of 12,000 juvenile salmonids would be captured per year. Assuming that 95 percent of the captured fish are non-listed CV fall-run Chinook salmon, based on juvenile abundance estimates at Red Bluff Diversion Dam (Gaines and Martin 2002) only 600 fish would be listed salmonids. Assuming an injury rate of 10 percent (a conservative estimate that doubles the level observed by McMichael *et al.* (1998)), 60 listed salmonids may be injured. At a mortality rate of 5 percent (common level reported in the Central Valley), an additional 30 juvenile fish would be killed. If the capture, injury, and mortalities are divided equally between Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead (an assumption based on an equal level of effort occurring during the migration period of each species without accounting for fluctuating juvenile population abundance), the monitoring would result in the annual capture of approximately 200 fish, the annual injury of 20 fish, and the annual mortality of 10 fish for each ESU/DPS. These amounts are divided equally. Actual levels should be lower because not all sites will be sampled, and river flows and scheduling complexities are likely to reduce the sampling frequency to fewer than six times per year. Because sampling will be limited to nearshore areas, and will not occur in adult migration corridors, no more than 1 adult of each species is expected to be captured each year with a 95 percent survival rate of captured adults.

Green sturgeon are not expected to be encountered, injured or killed during electrofishing activities. This expectation is based on the fish's preference for deep habitats within the river corridor, and the understanding that electrofishing will be conducted in shallow water habitats along river margins. Additionally, the electrofishing of levee repair sites throughout the action area over the past two years has not yielded any green sturgeon.

The number of fish that will be captured, injured, or killed is expected to be relatively low compared to the overall abundance of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead. The anticipated low levels of capture, injury, and mortality are not expected to result in population level impacts. Monitoring results will be used to validate the effectiveness of project conservation measures for avoiding or minimizing adverse impacts of bank protection projects on Federally listed fish species, and are expected to result in improved methods and strategies to reduce impacts of future bank protection projects on listed salmonids.

#### 4. Effects of Project Operations and Maintenance

O&M activities are expected to occur between July 1 and August 31 for the life of the project (*i.e.*, 50 years) to maintain the flood control and environmental values of the site. Anticipated O&M actions include vegetation management and irrigation for up to three years, periodic rock placement to prevent or repair localized scouring, and periodic replacement or modification of IWM structures. Effects would be limited to the annual placement of up to 600 cubic yards of material at each site. Impacts from O&M actions generally will be similar to the impacts of initial construction, except that they will be smaller and more localized. Effects may include injury or death to salmon and steelhead from predation caused by turbidity changes that temporarily disrupt normal behaviors, and affect sheltering abilities. However, since O&M actions are only expected to repair damaged elements of the project, they are expected to be infrequent (*i.e.*, occurring only once every several years), small (*i.e.*, only affecting small sections of the project area), and will not occur at all sites. Therefore relatively few fish should be affected by O&M actions, and actual injury and mortality levels will be low relative to overall population abundance and not likely to cause any long-term, negative population responses. Any O&M actions that affect habitat conditions will incorporate BMPs, summer in-water construction windows, and other minimization and avoidance measures to reduce the potential for effects to anadromous salmonids, green sturgeon, and their habitat.

#### 5. Interrelated or Interdependent Actions

Regulations that implement section 7(b)(2) of the ESA require biological opinions to evaluate the direct and indirect effects of Federal actions and actions that are interrelated with or interdependent to the Federal action to determine if it would be reasonable to expect them to appreciably reduce listed species' likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution (16 U.S.C. §1536; 50 CFR 402.02). NMFS considered concurrent, ongoing repair of additional PL 84-99 repairs currently being proposed by the Corps as potentially interrelated or interdependent actions to the proposed action. These projects are expected to result in effects to listed salmon, steelhead, and sturgeon that are similar to those previously described in this biological opinion for the proposed action, including short-term adverse effects to these species and their designated critical habitat. NMFS does not consider these actions to be interrelated because there is no single authority or program that binds them together, nor are they interdependent because they would occur regardless of the proposed action.

## **VI. CUMULATIVE EFFECTS**

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this addendum to the programmatic biological opinion. 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. Cumulative effects that are reasonable certain to occur in the action area are summarize in detail in the programmatic biological opinion and include non-Federal riprap projects, continuing

or future non-Federal water diversions, the discharge of point and non-point source chemical contaminant discharges, and climate change. The effects of such actions result in continued fragmentation of existing high-quality habitat, and conversion of complex nearshore aquatic habitat to simplified habitats, entrainment, reduced growth and survival.

## VII. INTEGRATION AND SYNTHESIS

This section considers the *Effects of the Action*, and the *Integration and Synthesis* section of the programmatic biological opinion, which includes analysis of the *Environmental Baseline*, *Cumulative Effects*, and the effects of the programmatic action.

### **A. Impacts of the Proposed Action on the Survival and Recovery of Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, Central Valley Steelhead**

The *Environmental Baseline* section of the programmatic biological opinion and this addendum describe how recent evaluations of the viability of Central Valley salmonids found that extant populations of Sacramento River winter-run Chinook salmon and CV steelhead appear to be fairly viable because they meet several viability criteria including population size, growth, and risk from hatchery strays. The viability of the ESU to which these populations belong appears low to moderate, as the ESU remains vulnerable to extirpation due to their small-scale distribution of independent populations and high likelihood of being affected by a significant catastrophic event. Lindley *et al.* (2007) were not able to determine the viability of existing steelhead populations, but believe that the DPS has a moderate to high risk of extirpation since most of the historic habitat is inaccessible due to dams, and because the anadromous life-history strategy is being replaced by residency. The continued existence of green sturgeon in the Sacramento River and the observation of sturgeon in the Feather and Yuba Rivers indicates that the population is viable and faces a low to moderate risk of extinction. The largest threats to the viability of the ESUs and DPS' are related to loss of access to historic habitats, and the existence of few independent populations, which places the species at risk of extirpation from catastrophic events.

The *Cumulative Effects* section of the programmatic biological opinion and this addendum described how future State, tribal, local, or private actions that are reasonably certain to occur in the action area include non-Federal riprap projects, continuing or future non-Federal water diversions, the discharge of point and non-point source chemical contaminant discharges, and climate change. These actions typically result in habitat fragmentation, and conversion of complex nearshore aquatic habitat to simplified habitats that incrementally reduces the carrying capacity of the rearing and migratory corridors.

The proposed action, as described in the programmatic biological opinion and in detail in this addendum, has specifically been designed to minimize and avoid continued nearshore aquatic and riparian habitat loss from large-scale bank protection projects. The proposed

implementation of the integrated conservation measures and the commitment to implement additional compensation measures and conduct a final post-project SAM assessment will ensure that short- and long-term impacts associated with these bank protection projects will be compensated in a way that prevents incremental habitat fragmentation, and loss throughout the action area. Although some injury or death to individual fish is expected from construction activities, O&M, and short- and long-term habitat modification, successful implementation of all conservation measures is expected to improve migration and rearing conditions, and the growth and survival of juvenile salmon and steelhead during peak rearing and migration periods by protecting, restoring, and in many cases, increasing the amount of flooded shallow water habitat and SRA habitat throughout the action area. Because of this, the proposed action is not expected to reduce the likelihood of survival and recovery of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, or CV steelhead.

The adverse effects to Southern DPS of North American green sturgeon within the action area are not expected to affect the overall survival and recovery of the DPS. This is largely due to the fact that the project will compensate for temporary and permanent habitat losses through implementation of on-site and off-site conservation measures. Construction-related impacts will be temporary and will not impede adult fish from reaching upstream spawning and holding habitat, or larvae, post-larvae, and juvenile fish from rearing or migrating to downstream rearing areas. The number of individuals actually injured or killed is expected to be undetectable and negligible and, population-level impacts are not anticipated. Implementation of the conservation measures will ensure that long-term impacts associated with bank protection projects will be compensated in a way that prevents incremental habitat fragmentation, and reductions of the conservation value of aquatic habitat to anadromous fish within the action area. Because of this, the proposed action is not expected to reduce the likelihood of survival and recovery of the Southern DPS of North American green sturgeon.

## **B. Impacts of the Proposed Action on Critical Habitat**

Impacts to the designated critical habitat of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead include the short- and long-term modification of PCEs at 13 levee repair sites. PCEs include estuarine and riverine areas for juvenile rearing and migration and adult migration. NMFS' CHART (2005) described existing PCEs within the action area as ranging from high quality to degraded, with isolated fragments of high quality habitat. Even with these degraded condition, the CHART report found that the intrinsic conservation value of the entire action area is high because it is used as a rearing and migration corridor for all populations of winter-run Chinook salmon and CV spring-run Chinook salmon, and by the largest populations of CV steelhead.

Impacts to PCEs generally will last for 2 to 12 years and result from loss or modification of riparian vegetation, shallow-water habitat, and the increase in bank substrate size. These losses and modifications affect juvenile rearing and migration PCEs by reducing in-stream cover and food production. The intended conservation roll of the critical habitat in the action area is primarily as a migration corridor. Freshwater migration corridors must function sufficiently to

provide adequate passage; project effects are not expected to reduce passage conditions based on the length of time individual juvenile salmonids will be exposed to the reduced quality and availability of refuge areas as they transit through the action area. Thus, NMFS does not expect the 2 to 12 year reduction in the quality and availability of refuge areas in this reach of the river to impact the current function of the action area or affect its ability to reestablish essential features that have been impacted by past and current actions. From year 12 through 50, the PCEs will improve as vegetation matures and extends over the shoreline. The improved habitat conditions are expected to improve the growth and survival of juvenile fish. Therefore, we do not expect project-related impacts to reduce the conservation condition of designated critical habitat of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead.

## **VIII. CONCLUSION**

After reviewing the best available scientific and commercial information, the current status of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, the Southern DPS of North American green sturgeon, and CV steelhead, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the construction of the proposed 13 levee repair sites and associated operations, maintenance, and monitoring, as proposed, is not likely to jeopardize the continued existence of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, the Southern DPS of North American green sturgeon, or CV steelhead, and is not likely to destroy or adversely modify designated critical habitat for the salmonid species.

## **IX. 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 kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation where it 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 the purpose 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 listing of the Southern DPS of North American green sturgeon became effective on July 7, 2006, and some or all of the ESA section 9(a) prohibitions against take will become effective

upon the future issuance of protective regulations under section 4(d). Because there are no section 9(a) prohibitions at this time, the incidental take statement, as it pertains to the Southern DPS of North American green sturgeon does not become effective until the issuance of a final 4(d) regulation.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit, as appropriate, 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 the contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the contract, permit or grant document, 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 and Extent of Take**

NMFS anticipates incidental take of Sacramento River winter-run Chinook salmon, CV steelhead, CV spring-run Chinook salmon, and the Southern DPS of North American green sturgeon from impacts related to construction, O&M, and through long-term impairment of essential behavior patterns as a result of reductions in the quality or quantity of their habitat. Take is expected to be limited to migrating adults, and migrating, rearing and smolting juveniles.

NMFS cannot, using the best available information, quantify the anticipated incidental take of individual Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, and the Southern DPS of North American green sturgeon because of the variability and uncertainty associated with the population size of each species, annual variations in the timing of migration, and uncertainties regarding individual habitat use of the project area. However, it is possible to describe the general programmatic conditions and ecological surrogates that will lead to the take at both the regional and project-wide scale.

Accordingly, NMFS is quantifying take of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, and the Southern DPS of North American green sturgeon incidental to the action resulting from short-term construction impacts, as well as long-term impacts as indexed by the SAM model, as presented in Appendix A of this biological opinion. The following level of incidental take from program activities is anticipated:

1. Take of juvenile and smolt Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, and the Southern DPS of North American green sturgeon in the form of injury and death from predation caused by constructed-related turbidity that extends up to 100 feet from the shoreline, and 1,000 feet downstream, along all project reaches for construction that occurs from August 1, 2008 to November 30, 2008.

2. Take of juvenile and smolt Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, and the Southern DPS of North American green sturgeon, in the form of harm or injury of fish from O&M actions is expected from habitat-related disturbances from the annual placement of up to 600 cubic yards of material per site for the extent of the project life (*i.e.*, 50 years). Take will be in the form of harm to the species through modification or degradation of juvenile rearing and migration habitat.
3. Take in the form of harm, injury, and death of rearing and smolting Chinook salmon, steelhead, at fall, summer, spring, and winter WSELs from the modification of nearshore habitat that adversely affects the quality and quantity of juvenile Chinook salmon, steelhead, and green sturgeon habitat at Sacramento as represented by the SAM results shown in Appendix A.
4. Take in the form of capture from monitoring activities is not expected to exceed an annual amount 200 juvenile fish for each Federally listed anadromous salmonid ESU or DPS. Take in the form of injury is not expected to exceed an annual amount of 20 juvenile fish for each Federally listed anadromous salmonid ESU or DPS. Take in the form of death from monitoring activities is not expected to exceed an annual amount of 10 juvenile fish for each Federally listed anadromous salmonid ESU or DPS. Take in the form of capture, injury, or death is not expected to exceed one adult fish per year for each Federally listed anadromous salmonid ESU or DPS.

Anticipated incidental take may be exceeded if project activities exceed the criteria described above, if the project is not implemented as described in the biological assessment prepared for this project, or if the project is not implemented in compliance with the terms and conditions of this incidental take statement.

## **B. Effect of the Take**

NMFS has determined that the above level of take is not likely to jeopardize Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, or the Southern DPS of North American green sturgeon. The effect of this action in the proposed project areas will consist of fish behavior modification, temporary loss of habitat value, and potential death or injury of juvenile Sacramento River winter-run Chinook salmon, CV steelhead, and CV spring-run Chinook salmon, and the Southern DPS of North American green sturgeon.

## **C. Reasonable and Prudent Measures**

NMFS has determined that the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize the incidental take of listed anadromous fish.

1. Measures shall be taken to maintain, monitor, and adaptively manage all conservation measures throughout the life of the project to ensure their effectiveness.
2. Measures shall be taken to minimize the impacts of bank protection by implementing integrated onsite and offsite conservation measures that provide beneficial growth and survival conditions for juvenile salmonids, and the Southern DPS of North American green sturgeon.
3. Measures shall be taken to insure that contractors, construction workers, and all other parties involved with these projects implement the projects as proposed in the biological assessment and this biological opinion.

#### **D. Terms and Conditions**

1. Measure shall be taken to maintain, monitor, and adaptively manage all conservation measures throughout the life of the project to ensure their effectiveness.
  - a. The Corps shall continue to coordinate with the IWG agencies and the Technical Team of the Interagency Collaborative Flood Management Program during the implementation and monitoring of these and future repairs.
  - b. The Corps shall provide additional annual reports, as necessary, to describe the implementation of off-site conservation measures, to summarize O&M actions, and summarize monitoring results.
  - c. The Corps shall establish and chair a Project Monitoring Subcommittee to plan monitoring efforts and provide technical support to the Corps for tracking Corps compliance with the biological opinion.
  - d. The Corps shall increase the duration of project-specific monitoring from 5 to 10 years for all SAM-modeled measures. NMFS does not expect that all measures or all sites will require 10 years of monitoring. Instead, through ongoing cooperation with the IWG agencies, and the Project Monitoring Subcommittee, a select, representative group of project sites will be monitored for this period. This requirement is based on the need to help validate that projects with SAM-modeled results are on a positive trajectory and successfully reaching or exceeding baseline values.

Monitoring the effectiveness of the measures installed to meet SAM values may require scientific inquiry that extends beyond in-stream data collection. Tools such as computer modeling and hydraulic models as well as tagging studies should be used as necessary to assess the relative

value of each element of the SAM model. In-stream studies must include sampling procedures to determine species composition and abundance together with physical observations and measurements at selected construction and control sites.

- e. Electrofishing shall be conducted following NMFS Electrofishing Guidelines.
  - f. The Corps shall develop a database for storing site monitoring data. The database shall include fields that track SAM-modeled habitat attributes and fishery data over time. The database shall be developed with the oversight the Project Monitoring Subcommittee.
  - g. The Corps shall ensure that, for the life of the project, future maintenance actions ensure performance of the sites to a level necessary to retain the SAM-modeled habitat values.
2. Measures shall be taken to minimize the impacts of bank protection by implementing integrated onsite and offsite conservation measures that provide beneficial growth and survival conditions for juvenile salmonids.
- a. The Corps shall minimize the removal of existing riparian vegetation and IWM to the maximum extent practicable, and that where appropriate, removed IWM will be anchored back into place. NMFS shall be contacted prior to the removal of any tree greater the 4 inches dbh.
  - b. The landscape plan for all sites shall include planting fascine bundles as close as possible to the mean August WSEL to provide in-stream vegetation and shoreline shading from 1 year to 5 years following repairs.
  - c. The Corps shall ensure that the planting of native vegetation will occur within the same year that construction occurs. All plantings must be provided with the appropriate amount of water to ensure successful establishment.
  - d. The Corps shall prepare an updated SAM assessment of all sites upon completion of Phase II. If this assessment shows additional uncompensated habitat deficits, the Corps must provide a compensation strategy to NMFS within 3 months, and any necessary additional compensation must be completed within 12 months.
  - e. The Corps shall limit the inwater construction period for routine O&M actions to July 1 to August 31.

- f. The Corps shall limit inwater construction in region 3 to between July 1 and August 31.
  - g. The Corps shall develop and implement an advanced compensation strategy and to the extent practicable, implements compensatory actions prior to the construction of bank protection projects.
3. Measures shall be taken to insure that contractors, construction workers, and all other parties involved with these projects implement the projects as proposed in the biological assessment and this biological opinion.
- a. The Corps shall provide a copy of the programmatic biological opinion and the addendum to the programmatic biological opinion to the prime contractor, making the prime contractor responsible for implementing all requirements and obligations included in this biological opinion and to educate and inform all other contractors involved in the project as to the requirements of this biological opinion. A notification that contractors have been supplied this biological opinion will be provided to the reporting address below.
  - b. NMFS-approved Worker Environmental Awareness Training Program for construction personnel shall be conducted by the NMFS-approved biologist for all construction workers prior to the commencement of construction activities. The program shall provide workers with information on their responsibilities with regard to Federally-listed fish, their critical habitat, an overview of the life-history of all the species, information on take prohibitions, protections afforded these animals under the ESA, and an explanation of the relevant terms and conditions of this biological opinion. Written documentation of the training must be submitted to NMFS within 30 days of the completion of training. As needed, training shall be conducted in Spanish for Spanish language speakers and other languages as needed or necessary.

Reports and notifications required by these terms and conditions shall be submitted to:

Sacramento Area Office  
National Marine Fisheries Service  
650 Capitol Mall, Suite 8-300  
Sacramento California 95814-4706  
FAX: (916) 930-3629  
Phone: (916) 930-3600

## **IX. 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 endangered and threatened species. These conservation recommendations include discretionary measures that the Corps can implement to further the conservation of listed species and critical habitat, and further the development of information on the conservation of these species.

1. The Corps, under the authority of section 7(a)(1) of the ESA, should implement recovery and recovery plan-based actions within and outside of traditional flood damage reduction projects. Such actions may include, but are not necessarily limited to restoring natural river function and floodplain development.
2. The Corps should cooperate with local levee maintenance districts, flood control agencies, and State and Federal resource agencies to develop an anticipatory erosion repair program that emphasizes the use of biotechnical techniques, and minimizes the use of rock rip rap to treat small erosion sites before they become critical.
3. The Corps should make set-back levees integral components of the Corp's authorized bank protection or ecosystem restoration efforts.
4. The Corps should evaluate the SRFCP's effectiveness for providing flood damage reduction using regional climate change forecasts and anticipated shifts in precipitation and other related hydrologic regimes.
5. The Corps should make more effective use of ecosystem restoration programs, such as those found in Sections 1135 and 206 of the respective Water Resource Developments Acts of 1986 and 1996. The section 1135 program seems especially applicable as the depressed baselines of the Sacramento River winter-run Chinook salmon, CV steelhead, and CV spring-run Chinook salmon are, to an appreciable extent, the result of the Corps' SRBPP program.
6. The Corps should incorporate the costs of conducting lengthy planning efforts, involved consultations, implementation of proven off-site conservation measures, and maintenance and monitoring requirements associated with riprapping into each project's cost-benefit analysis such that the economic benefits of set-back levees are more accurately expressed to the public and regulatory agencies. This includes a recognition of the economic value of salmonids as a commercial and sport fishing resource.
7. The Corps should conduct or fund studies to identify set-back levee opportunities, at locations where the existing levees are in need of repair or not, where set-back levees could be built now, under the SRBPP, or other appropriate Corps authority. Removal of

the existing riprap from the abandoned levee should be investigated in restored sites and anywhere removal does not compromise flood safety.

8. As recommended in the NMFS Proposed Recovery Plan for the Sacramento River winter-run Chinook Salmon (NMFS 1997), the Corps should preserve and restore riparian habitat and meander belts along the Delta with the following actions: (1) avoid any loss or additional fragmentation of riparian habitat in acreage, lineal coverage, or habitat value, and provide in-kind compensation when such losses are unavoidable (*i.e.*, create meander belts along the Sacramento River by levee set-backs), (2) assess riparian habitat along the Sacramento River from Keswick Dam to Chipps island and along Delta waterways within the rearing and migratory corridor of juvenile winter-run Chinook salmon, (3) develop and implement a Sacramento River and Delta Riparian Habitat Restoration and Management Plan (*i.e.*, restore marshlands within the Delta and Suisun Bay), and (4) amend the Sacramento River Flood Control and SRBPP to recognize and ensure the protection of riparian habitat values for fish and wildlife (*i.e.*, develop and implement alternative levee maintenance practices).
9. Section 404 authorities should be used more effectively to prevent the unauthorized application of riprap by private entities.

To be kept informed of actions minimizing or avoiding adverse effects, or benefiting listed or special status species or their habitats, NMFS requests notification of the implementation of any conservation recommendations.

## **X. REINITIATION OF CONSULTATION**

This concludes formal consultation on the proposed implementation of 13 levee repair actions under the authority of the SRBPP. Reinitiation of formal consultation is required if: (1) 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; (2) the action, including the avoidance, minimization, and compensation measures listed in the *Description of the Proposed Action* section is subsequently modified in a manner that causes an effect to the listed species that was not considered in the biological opinion; or (3) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately.

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U.S. Army Corps of Engineers. 2008. Draft environmental assessment and final SAM assessment for levee repair of 13 critical sites, Sacramento River Bank Protection Project. Prepared by Parus Consulting, Ayres Associates, and Stillwater Sciences, for the U.S. Army Corps of Engineers, Sacramento District, Sacramento, California.

**MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT  
ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS**

**ACTION AGENCY:** United States Army Corps of Engineers  
Sacramento District

**ACTIVITY:** Addendum to the Programmatic Consultation for Phase II of the  
Sacramento River Bank Protection Project for Thirteen Levee  
Repair Projects in the Sacramento River Flood Control Project

**CONSULTATION  
CONDUCTED BY:** NOAA's National Marine Fisheries Service,  
Southwest Region

**FILE NUMBER:** 151422SWR2007SA00492

**DATE ISSUED:** JUL 30 2008

**I. IDENTIFICATION OF ESSENTIAL FISH HABITAT**

This document represents the National Marine Fisheries Service's (NMFS) Essential Fish Habitat (EFH) consultation based on our review of a supplemental project description and effects analysis for the repair of 13 levee erosion sites within the Sacramento River Flood Control Project for the U.S. Army Corps of Engineers (Corps) 24,000 linear feet of authority under Phase II of the Sacramento River Bank Protection Project (SRBPP). The Magnuson-Stevens Fishery Conservation and Management Act (MSA) as amended (U.S.C 180 et seq.) requires that EFH be identified and described in Federal fishery management plans (FMPs). Federal action agencies must consult with NMFS on activities which they fund, permit, or carry out that may adversely affect EFH. NMFS is required to provide EFH conservation and enhancement recommendations to the Federal action agencies. The geographic extent of freshwater EFH for Pacific salmon in the Sacramento River includes waters currently or historically accessible to salmon within the action area described in the programmatic biological opinion for the remaining 24,000 linear feet of authority under Phase II of the SRBPP (NMFS 2008).

EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat, "waters" includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means habitat required to support a sustainable fishery and

a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers all habitat types used by a species throughout its life cycle.

The programmatic biological opinion for the remaining 24,000 linear feet of authority under Phase II of the SRBPP (NMFS 2008), and the addendum to that opinion, which analyzes the specific proposal to construct 13 levee repairs, address Chinook salmon listed under the both the Endangered Species Act (ESA) and the MSA that potentially will be affected by the proposed action. These salmon include Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), and Central Valley spring-run Chinook salmon (CV spring-run Chinook salmon (*O. tshawytscha*)). This EFH consultation will concentrate on Central Valley fall-/late fall-run Chinook salmon (*O. tshawytscha*) because they are covered under the MSA but not listed under the ESA.

Historically, Central Valley fall-run Chinook salmon generally spawned in the Central Valley and lower-foothill reaches up to an elevation of approximately 1,000 feet. Much of the historical fall-run spawning habitat was located below existing dam sites and the run therefore was not as severely affected by water projects as other runs in the Central Valley.

Although fall-run Chinook salmon abundance is relatively high, several factors continue to affect habitat conditions in the Sacramento River, including loss of fish to unscreened agricultural diversions, predation by warm-water fish species, lack of rearing habitat, regulated river flows, high water temperatures, and reversed flows in the Delta that draw juveniles into State and Federal water project pumps.

#### **A. Life History and Habitat Requirements**

Central Valley fall-run Chinook salmon enter the Sacramento River from July through December, and late fall-run enter between October and March. Fall-run Chinook salmon generally spawn from October through December, and late fall-run fish spawn from January to April. The physical characteristics of Chinook salmon spawning beds vary considerably. Chinook salmon will spawn in water that ranges from a few centimeters to several meters deep provided that there is suitable sub-gravel flow (Healey 1991). Spawning typically occurs in gravel beds that are located in marginally swift riffles, runs and pool tails with water depths exceeding one foot and velocities ranging from one to 3.5 feet per second. Preferred spawning substrate is clean loose gravel ranging from one to four inches in diameter with less than 5 percent fines (Reiser and Bjornn 1979).

Fall-run Chinook salmon eggs incubate between October and March, and juvenile rearing and smolt emigration occur from January through June (Reynolds *et al.* 1993). Shortly after emergence, most fry disperse downstream towards the Sacramento-San Joaquin Delta and estuary while finding refuge in shallow waters with bank cover formed by tree roots, logs, and submerged or overhead vegetation (Kjelson *et al.* 1982). These juveniles feed and grow from January through mid-May, and emigrate to the Delta and estuary from mid-March through mid-June (Lister and Genoe 1970). As they grow, the juveniles associate with coarser substrates along the stream margin or farther from shore (Healey 1991). Smolts generally spend a very short time in the Delta and estuary before entry into the ocean.

## II. PROPOSED ACTION.

The Corps proposes to construct 13 levee repair sites in the SRBPP, totaling nearly 10,000 linear feet of shoreline EFH. The SRBPP is a continuing construction project, authorized by the Flood Control Act of 1960, to provide protection for the existing levees and flood control facilities of the SRFCP. The purpose of the action is to ensure the reliability of the levees of the SRFCP for the life of the project, while protecting environmental values and compensating and/or mitigating effects on environmental resources to the degree feasible. The SRFCP consists of approximately 980 miles of levees plus overflow weirs, pumping plants, and bypass channels that protect communities and agricultural lands in the Sacramento Valley and Sacramento-San Joaquin Delta (Delta). A vicinity map illustrates this area in Figure 1.

The action is the future repair of waterside levee-bank erosion sites that occur within the SRBPP project area, which includes the Sacramento River from the town of Collinsville, at river mile (RM) 0 upstream to Chico at RM 194. The SRBPP also includes reaches of lower Elder and Deer creeks, Cache Creek, the lower reaches of the American River (RM 0–23), Feather River (RM 0–61), Yuba River (RM 0–11), and Bear River (RM 0–17), and portions of Threemile, Steamboat, Sutter, Miner, Georgiana, and Cache sloughs. The proposed action is described in the *Description of the Proposed Action* section of the preceding biological opinion (Enclosure 1).

## III. EFFECTS OF THE PROJECT ACTION

The effects of the proposed action on Pacific Coast salmon EFH would be similar to those discussed in the *Effects of the Proposed Action* section of the preceding addendum to the programmatic biological opinion (Enclosure 1, NMFS 2008) for endangered Sacramento River winter-run Chinook salmon, threatened CV spring-run Chinook salmon, and threatened Central Valley steelhead. A summary of the effects of the proposed action on Central Valley fall-/late fall-run Chinook salmon are discussed below.

Adverse effects to Chinook salmon habitat will result from construction related impacts, operations and maintenance impacts, and long-term impacts related to modification of aquatic and riparian habitat throughout the action area. Primary construction related impacts include riprapping approximately up to 10,000 lf of riverbank. Integrated conservation measures to minimize adverse effects of riprapping will be applied to all sites. Conservation measures include construction of seasonally inundated terraces that will be planted with riparian vegetation. IWM will be placed both below and above the mean summer water surface elevation to provide habitat complexity, refugia, and food production of juvenile anadromous fish. Offsite conservation measures, including setback levees, IWM installation, and shallow-bank construction will be implemented to compensate for temporal and spatial effects of individual future actions.

In-channel construction activities such as vegetation removal, grouting, and rock placement will cause increased levels of turbidity. Turbidity will be minimized by implementing the proposed

conservation measures such as implementation of BMPs and adherence to Regional Water Quality Control Board water quality standards. Fuel spills or use of toxic compounds during project construction could release toxic contaminants into the Sacramento River. Adherence to BMPs that dictate the use, containment, and cleanup of contaminants will minimize the risk of introducing such products to the waterway because the prevention and contingency measures will require frequent equipment checks to prevent leaks, will keep stockpiled materials away from the water, and will require that absorbent booms are kept on-site to prevent petroleum products from entering the river in the event of a spill or leak.

The effects of O&M actions will be similar to construction impacts. The Corps expects to place no more than 600 tons of rock annually. Most actions are expected to occur during the summer when anadromous fish are not expected to be present. Additionally, since O&M actions will not occur every year, and actions will be specific and localized in nature, O&M impacts will be smaller and shorter in duration.

At some sites, there will be short and long-term losses of habitat value. Long-term impacts are expected to adversely affect EFH for adult salmon at all seasonal water surface elevations for 2 to 12 years. Impacts at the fall and summer water surface elevation are expected to be the most substantial due to the inherent difficulties of re-establishing riparian vegetation at these zones. Long-term effects of the project (*i.e.*, 5 to 50 years) will be positive as riparian habitat becomes mature. Overall, the action is expected to result in a net improvement in habitat conditions for Chinook salmon that are essential to their survival and growth, especially at winter and spring flows when the majority of Chinook salmon are outmigrating through the action area. These measures are expected to maintain and improve the conservation value of the habitat for Chinook salmon and avoid habitat fragmentation that typically is associated with riprapping.

#### **IV. CONCLUSION**

Upon review of the effects of the proposed action NMFS believes that the project will result in adverse effects to the EFH of Pacific salmon protected under the MSA.

#### **V. EFH CONSERVATION RECOMMENDATIONS**

Considering that the habitat requirements of fall-run Chinook salmon within the action area are similar to the Federally listed species addressed in the preceding addendum to the programmatic biological opinion (Enclosure 1), NMFS recommends that the Terms and Condition, and the Conservation Recommendations in the preceding biological opinion prepared for the Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and Central Valley steelhead be adopted as EFF Conservation Recommendations.

Section 305(b)4(B) of the MSA requires the Corps to provide NMFS with a detailed written response within 30 days, and 10 days in advance of any action, to the EFH conservation recommendations, including a description of measures adopted by the Corps for avoiding, minimizing, or mitigating the impact of the project on EFH (50 CFR ' 600.920(j)). In the case of

a response that is inconsistent with our recommendations, the Corps must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the proposed action and the measures needed to avoid, minimize, or mitigate such effects.

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