

# **Appendix K**

## Section 404(b)(1) Evaluation



**Appendix K**  
**The Erosion Repair of 13 Bank Protection Sites**  
 Section 404(b) (1) Evaluation

**I. Project Description**

The U.S. Army Corps of Engineers (Corps) and the State of California Reclamation Board (Reclamation Board) propose to implement bank protection measures to prevent ongoing streambank erosion at 13 critically eroding sites along the Lower American River, Feather River, Sacramento River, Cache Slough and Steamboat Slough.

a. Location

The project area extends roughly along the Sacramento River from River Mile (RM) 16.8 near the town of Isleton in Sacramento County to RM 177.8 four miles north of the town of Glenn. The RM locations and lengths of the 13 sites are listed (Table 1). Eight of the 13 sites are along the Sacramento River at RM 16.8L, 42.7R, 49.7L, 52.3L, 53.5R, 55.2L, 77.2L, and 177.8L. Two sites are located along the lower American River at RMs 0.3L and 2.8L. One site is located along the lower Feather River at RM 28.5R. Lastly, two of the sites are located near the delta at Steamboat Slough RM 16.6R and Cache Slough RM 21.8R, respectively. A location and vicinity map for the 13 sites is provided in Figure 1 of the EA, and cross-sectional and plan view maps for each site are provided in Figures 2–28 of the EA.

Table 1. Erosion site river mile locations, counties, and lengths.

<b>Erosion site</b>	<b>Water body</b>	<b>County</b>	<b>Length of erosion (feet)</b>
RM 16.6R	Steamboat Slough	Solano	410
RM 21.8R	Cache Slough	Solano	950
RM 49.7L	Sacramento River	Sacramento	250
RM 52.3L	Sacramento River	Sacramento	1,160
RM 0.3L	Lower American River	Sacramento	340
RM 2.8L	Lower American River	Sacramento	320
RM 53.5R	Sacramento River	Yolo	450
RM 177.8R	Sacramento River	Glenn	1,000
RM 16.8L	Sacramento River	Sacramento	650
RM 42.7R	Sacramento River	Yolo	190
RM 55.2L	Sacramento River	Sacramento	690
RM 77.2L	Sacramento River	Sacramento	450
RM 28.5R	Feather River	Sutter	1,180
<b>Total</b>			<b>8,040</b>

b. General Description

The proposed bank protection measures would include: (1) protecting the toe and upper slopes of the bank with riprap; (2) establishing a bench around the mean summer water level (MSWL) to provide aquatic habitat during higher river stages in winter and spring; (3) placing anchored instream wood material (IWM) for aquatic habitat; and (4) planting pole and container plantings to stabilize the bank and provide riparian and shaded riverine aquatic habitat.

c. Background

Over the years, at the 13 sites' river banks, continued erosion into the levee design section has threatened the stability of the levees in these areas. In downstream locations, the erosion appears to be due to wave run-up from tidal and wind action, as well as some recreational boat traffic during the summer months. The Corps, Reclamation Board, and their consultants have made several field assessments of these sites over the last few years. The levee berm has almost completely eroded away along the waterline at most sites, threatening the integrity of the upper banks. Recent bathymetric surveys conducted by Ayres Associates indicate the development of scour holes in the river bed near the toes of the levees in many locations. To fill those scour holes, the project design includes rock fill of the holes with riprap toe protection. Riprap and soil berms will also be placed on the upper banks of the levees to protect these areas from further erosion, while maintaining existing vegetation as much as possible.

d. Authority and Purpose

This project is a component of the Sacramento River Bank Protection Project (SRBPP), which was authorized by Congress under the Flood Control Act of 1960 (Public Law 86-645). Congress authorized the SRBPP in accordance with the recommendations of the Chief of Engineers in Senate Document No. 103, 86th Congress, Second Session, entitled "Sacramento River Flood Control Project, California," dated May 26, 1960. Authorization for environmental features associated with the project was provided in the Water Resources Development Act of 1990. The SRBPP is a State-federal partnership between the Corps and Reclamation Board.

This permit has been prepared in support of and Environmental Assessment (EA) that: (1) describes the existing environmental resources in the project area; (2) evaluates the project alternatives' environmental effects on those resources; and (3) if the effects are significant, determines and describes actions that may be taken to mitigate and reduce environmental effects such that they become not significant. The purpose of the EA is to fulfill the permitting requirements of the state and federal agencies that are implementing the project. In addition, the EA will serve as a biological assessment to be provided to the National Marine Fisheries Service (NMFS) and the US Fish and Wildlife Service (USFWS) for the Section 7 Endangered Species Act consultation, including evaluation of effects of the project on listed and sensitive species, critical habitat, and essential fish

habitat. A programmatic biological assessment has been prepared for the SRBPP and Section 7 consultation requests were made to NMFS and USFWS in October 2007, but consultation will not be completed prior to the need to implement the proposed project.

e. General Description and Quantity of Dredged or Fill Material

(1) General Characteristics of Material

Bank protection measures will be implemented at each of the 13 sites and, in total, the overall project would generally consist of: (1) reinforcement of the bank toe with a total of 8,040 lineal feet (LF) of riprap covering a plan view area of 7.84 acres; (2) placement of a mixture of riprap and soil (mixture of sand and silt suitable for plant growth) on upper banks and tops of the lower banks' riprap, to create riparian benches above the MSWL, covering a total area 10.83 acres; (3) planting the benches and upper banks with vegetation to provide bank stabilization and riparian habitat. Tidal variations range from  $\pm 2$  ft for the sites nearest the Delta. Moving upstream of the confluence of the American and Sacramento Rivers, where daily fluctuations are on the order of  $\pm 1$  ft, tidal variations are assumed to be negligible.

Estimates of project areas (acreages) above and below the median summer water surface elevation affected by project construction (i.e., the construction footprint), and of required material quantities are listed by site (Tables 2 and 3). The total surface area of the construction footprint is estimated to be 18.47 acres, resulting in the conversion of approximately 3.16 acres of existing open water habitat into riparian habitats, with an additional conversion of 1.41 acres of open water habitat into wetland habitat. In total, construction includes approximately 167,625 cubic yards of riprap that would be placed at the levee toe and along the lower banks of the 13 sites. Following bank stabilization, approximately 13,870 cubic yards of soil and sand would be used to establish plantings on the benches and upper banks at the project sites. The quantities of riprap, soil and IWM to be placed may vary slightly from the above estimates due to conditions encountered at the site during construction as well as Fall/Winter 2008/09 flow conditions.

Table 2. Acreages\* for the Project construction footprint at each site.

Site	Water body	Total site area (acres)	Existing area above water (acres)	Existing area below water (acres)	Post-Project area above water (acres)	Post-Project area below water (acres)
RM 16.6R	Steamboat Slough	1.47	0.56	0.92	0.84	0.63
RM 21.8R	Cache Slough	1.26	0.32	0.93	0.62	0.63
RM 49.7L	Sacramento River	1.44	0.60	0.84	0.95	0.49
RM 52.3L	Sacramento River	0.62	0.16	0.46	0.28	0.33
RM 0.3L	Lower American River	0.75	0.19	0.56	0.39	0.36
RM 2.8L	Lower American River	3.00	1.12	1.88	2.26	0.74
RM 53.5R	Sacramento River	1.08	0.45	0.63	0.76	0.32
RM 177.8R	Sacramento River	1.81	0.46	1.35	0.75	1.06
RM 16.8L	Sacramento River	0.98	0.58	0.40	0.84	0.14
RM 42.7R	Sacramento River	1.11	0.41	0.70	0.67	0.44
RM 55.2L	Sacramento River	1.13	0.42	0.71	0.67	0.46
RM 77.2L	Sacramento River	2.22	0.61	1.62	1.15	1.08
RM 28.5R	Feather River	1.61	0.19	1.42	0.44	1.17
<b>Total</b>		<b>18.47</b>	<b>6.06</b>	<b>12.42</b>	<b>10.63</b>	<b>7.84</b>

\* Acreages were estimated as projected in plan view.

Table 3. Material quantities for Project sites.

Site	IWM removed (lineal feet) <sup>1</sup>	IWM Placed above MSWL (lineal feet) <sup>2</sup>	Riprap placed (cubic yards) <sup>3</sup>	Sand fill and soil cover placed (cubic yards) <sup>3</sup>
RM 16.6R	42	46	14,032	1,380
RM 21.8R	218	230	6,829	1,690
RM 49.7L	90	696	6,032	320
RM 52.3L	242	3,045	25,379	2,760
RM 0.3L	12	1,131	6,890	1,110
RM 2.8L	26	81.2	12,242	990
RM 53.5R	0	725	10,276	650
RM 177.8R	--	3,161	11,076	370
RM 16.8L	19	23	12,463	1,090
RM 42.7R	79	696	6,476	250
RM 55.2L	81	1,885	18,745	660
RM 77.2L	2	1,131	11,789	600
RM 28.5R	92	3,538	24,979	2,000
<b>Total</b>	<b>903</b>	<b>16,388</b>	<b>167,625</b>	<b>13,870</b>

<sup>1</sup>. Existing length of IWM estimated during visual bank-line surveys in January and April 2008.

<sup>2</sup>. Length of anchored IWM to be placed estimated from site design quantities and an avg. length of 29 ft.

<sup>3</sup>. Volume of riprap and sand, fill, and soil cover estimated from site design quantities.

For riparian reestablishment, riparian benches will be constructed to flood at river stages corresponding to high tide (where tidally influenced) at average winter/spring flows. Container plants and pole cuttings would be installed along the lower bank, bench and upper bank with the long-term goal of providing riparian and shaded riverine aquatic cover habitat as defined by USFWS (Fris and DeHaven 1993). These areas would be seeded and covered with mulch to prevent soil loss during the first high water which would likely occur before plantings have become established.

In addition to the riparian benches, planted wetland benches will be constructed at five sites; two in the Sacramento River at RM 16.8 and RM 52.7, one in Steamboat Slough at RM 16.6R, one in Cache Slough at RM 21.8R, and one in the Feather River at RM 28.5R. The wetland benches will be constructed to remain inundated at river stages corresponding to low tide at average summer/fall flows.

Each of the 13 sites will have anchored woody material placed at the mean summer WSEL on the constructed benches. Individual pieces will be anchored either parallel to the bank or at an oblique angle to the river flow. Woody materials would: (1) be between 23 and 35 feet long; (2) maintain a crown branch structure that is approximately 6–8 feet wide; and (3) retain limbs and root wads (to the extent feasible) for maximum habitat value. Lower quantities of IWM will be placed at downstream sites nearest to the delta (Sacramento River at RM 16.8, Steamboat Slough at RM 16.6R, and Cache Slough at RM 21.8R) to replace existing IWM materials found during pre-construction surveys. Lastly, to minimize risks of injury all woody materials will be installed in a downstream

orientation and would be installed only on the benches at three sites with the heaviest expected recreational use (American River at RM 0.3L and RM 2.8L; Feather River at RM 28.5R).

(2) Source of Material

Fill materials including rock revetment for four sites nearest the delta (Steamboat Slough RM 16.6R; Cache Slough RM 21.8R; Sacramento River RM 49.7L, 52.3L) will be transported by barge from a quarry in San Rafael, California. Although other sites for rock revetment exist and the source would be determined by the selected contractor, all quarries are within approximately 80–100 miles or less of each of the 13 sites.

f. Description of the Proposed Discharge Site(s)

(1) Location (map)

The location of the discharge sites would be along the channel margins of the Lower American River, Feather River, Sacramento River, Cache Slough and Steamboat Slough at the 13 project sites, as summarized in Table 1. A location and vicinity map for the sites is provided in Figure 1 of the EA, and detailed cross-sectional and plan view maps for each site are provided in Figures 2–28 of the EA.

(2) Size (acres)

The total size of the potential fill/impacted area would be 12.42 acres of open water.

(3) Type of Site (confined, unconfined, open water)

The fill needed for the bank protection construction would take place in open water areas.

(4) Type(s) of Habitat

In total, four land cover types exist at the 13 sites: riparian forest, riparian scrub, ruderal, and emergent (Table 4). Each of these cover types is described in more detail in Section 4.5 of the EA.

Table 4. Land types and associated area (acres and percent) in the Project construction footprint (i.e., spatial extent of Project).

Site	Acreage by land cover type <sup>1</sup> (% of area above water)				Sub total	Total above water	Open water
	Riparian forest	Riparian scrub/shrub	Ruderal	Emergent			
RM 16.6R	0 (0%)	0.16 (28%)	0.32 (57%)	0.04 (7%)	0.52	0.56	0.92
RM 21.8R	0.09 (27%)	0 (0.5%)	0.22 (68%)	0.01 (2%)	0.31	0.32	0.93
RM 49.7L	0.19 (32%)	0 (0%)	0.36 (60%)	0 (0%)	0.55	0.60	0.84
RM 52.3L	0.1 (61%)	0 (0%)	0.06 (37%)	0 (0%)	0.16	0.16	0.46
RM 0.3L	0.08 (44%)	0 (0%)	0.11 (56%)	0 (0%)	0.19	0.19	0.56
RM 2.8L	0.4 (36%)	0 (0%)	0.72 (64%)	0 (0%)	1.12	1.12	1.88
RM 53.5R	0.09 (21%)	0 (0%)	0.18 (40%)	0 (0%)	0.27	0.45	0.63
RM 177.8R	0 (0%)	0.06 (12%)	0.32 (70.5%)	0 (0.5%)	0.38	0.46	1.35
RM 16.8L	0 (0%)	0.38 (66%)	0.13 (22%)	0.02 (4%)	0.53	0.58	0.40
RM 42.7R	0.09 (23%)	0 (0%)	0.18 (45%)	0 (0%)	0.28	0.41	0.70
RM 55.2L	0.29 (68%)	0 (0%)	0.13 (31.5%)	0 (0%)	0.42	0.42	0.71
RM 77.2L	0.31 (51%)	0.03 (5%)	0.21 (34%)	0 (0%)	0.55	0.61	1.62
RM 28.5R	0.04 (22%)	0 (0%)	0.14 (76%)	0 (0%)	0.19	0.19	1.42
<b>Total</b>	<b>1.69 (28%)</b>	<b>0.63 (10%)</b>	<b>3.08 (51%)</b>	<b>0.07 (1%)</b>	<b>5.47</b>	<b>6.06</b>	<b>12.42</b>

<sup>1</sup>This does not include bare ground or revetment on the site.

A total of nineteen elderberry shrubs were located at four sites: RM 53.5R, 0.3L, 77.2L, and 28.5R. The locations of elderberry shrubs are provided in Appendix H of the EA. At site RM 53.5R, one shrub was identified which was located within the construction easement, though not within the construction footprint. At site RM 0.3L, a total of 12 shrubs were identified. Four of these shrubs were located within the construction footprint and eight shrubs were located outside of the construction easement. At site RM 77.2L, one shrub was identified which was located within the construction easement. At site RM 28.5R, a total of five shrubs were identified. One shrub was located within the construction footprint, two shrubs were located within the construction easement, and two shrubs were located outside of the construction easement.



The season to survey VELB and exit holes is March-June, consequently additional surveys will need to be conducted at this time to determine species presence or absence from these sites as well as protective measures discussed below.

During construction activities, nine elderberry shrubs with 137 stems 1.0 inch or greater in diameter could be affected by levee restoration activities at Sites RM 28.5R, 0.3L, 53.5R and 77.2L. Six elderberry shrubs with 96 stems 1.0 inch or greater in diameter occur within the construction footprint while three shrubs with 41 stems 1.0 inch or greater in diameter are located within the construction easement. There are an additional 10 shrubs with 20 elderberry stems 1.0 inch or greater in diameter located outside of the erosion site and the construction easement.

For all shrubs located within the construction easement, it is expected that fencing and other protection measures as outlined in the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999) would be sufficient to prevent any impacts from occurring to any of these shrubs. The shrubs that are located within the construction footprint have the greatest potential to be damaged and will be transplanted to a suitable location in accordance with the above-referenced conservation guidelines (USFWS 1999).

No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used in the buffer areas, or within 100 feet of any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level. Additional mitigation measures for elderberry are discussed in Section 4.6.4 of the EA.

#### (5) Timing and Duration of Discharge

The construction on the sites would occur in three construction contracts. Contract 1 would include four sites (RM 16.6R, 21.8R, 49.7L, and 52.3L), construction would occur during fall/winter 2008/2009, and all work will be from the waterside. Contract 2 will include four sites (RM 0.3L, 2.8L, 53.5R, and 177.8R), construction would occur during fall/winter 2008/2009 and work is expected to be entirely from the landside, though some waterside work may be conducted by the contractor. Contract 3 would include the remaining five sites (RM 16.8L, 42.7R, 55.2L, 77.2L, and 28.5R), construction would occur during fall/winter 2009/2010, and work is expected to be entirely from the landside, though some waterside work may be conducted by the contractor.

Placement of riprap, the rock/soil mixture, and IWM would be completed during one construction season. Vegetation would be installed and maintained during that same construction season and then maintained for an additional 3 years. Maintenance activities may occur year-round in the overbank and dry areas, but would avoid any elderberry shrubs by 100 feet or another distance coordinated with USFWS. In coordination with Federal and State resource agencies, any in-water work needed for maintenance would be conducted during appropriate time periods to avoid adverse effects on fish. The current

acceptable in-water work “window” for listed salmonids is July 1 to October 30 in any year. The construction window for waterside work is August 1<sup>st</sup> through October 30<sup>th</sup> while the landside work could occur year-round. The USFWS has confirmed that the Section 7 consultation will be completed in time for the Fall 2008 construction date. Phase 2 bank revegetation will commence immediately following placement of the revetment and will be completed by 1 June 2009.

h. Description of Disposal Method (hydraulic, drag line, etc.)

At the four erosion sites in Contract 1 (RM 16.6R, 21.8R, 49.7L, and 52.3L), fill work will be conducted from cranes mounted on barges in the Sacramento River, Cache Slough and Steamboat Slough, with the crane (boom) systems mechanically placing the rock along the shore and beneath the water line. Waterside construction will minimize noise and traffic disturbances, and effects on existing vegetation. The contractor may choose to use excavators, loaders, and other construction equipment once the riprap has reached the MSWL.

Construction at the remaining erosion sites in Contracts 2 and 3 (RM 0.3L, 2.8L, 53.5R, 177.8R, 16.8L, 42.7R, 55.2L, 77.2L, and 28.5R) will take place from the landside due to difficulties in accessing the sites from the water. A crane (boom) system located on the levee will mechanically place the rock along the shore and beneath the water line. The contractor may choose to use excavators, loaders, and other construction equipment along the benches on sites that are inappropriate for the crane system and/or once the riprap has reached the means summer WSEL.

As shown in Figures 2–28 of the EA, 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 getting too close to the waterside edge of the existing bank materials and sensitive resources such as elderberry shrubs.

## **II. Factual Determinations**

a. Physical Substrate Determinations

(1) Substrate Elevation and Slope

Elevation of the 13 sites varies from minus 30 ft (NGVD) at RM 42.7R to 112 ft at RM 177.8R (Table 5). The range of existing slopes at each site is summarized in Table 5, and varies across the 13 sites from <1H:1V to 2.5H:1V.

Table 5. Range of existing site elevations (from typical cross-sections) and slopes at each site. Elevations are relative to NGVD 29.

Site	Approximate Min. Elevation (ft)	Summer Median Water Surface Elevation (ft)	Approximate Max. Elevation (ft)	Existing Slope Range (H:V)
RM 16.6R	-18	1.2	20	2:1
RM 16.8L	-13	1.2	20	2:1
RM 21.8R	-5	1.2	18	2.5:1
RM 42.7R	-30	3.5	30	1.5:1
RM 49.7L	-12	3.8	31	1.5:1
RM 52.3L	-3	4.1	33	1.5:1
RM 53.5R	-20	4.3	40	1:1
RM 55.2L	-28	4.5	36	2:1
RM 0.3L	2	5.2	38	1.5:1
RM 2.8L	-15	5.4	43	1:1
RM 77.2L	-8	11.7	43	<1:1
RM 28.5R	20	37.5	82	1:1
RM 177.8R	42	86.0	112	1.5:1

Note: Data based on typical design cross sections developed by Ayres Associates.

## (2) Sediment Type

Natural bank soils at each site are primarily river deposits, which include silts, sands, and gravel. Sites RM 16.6R, 16.8L, 21.8R, 42.7R, 49.7R, 52.3L, 53.5R, and 55.2L also contain some existing, isolated rock revetment material typically 12–20 inches in diameter.

## (3) Dredged/ Fill Material Movement

The fill material needed for the bank protection construction is not expected to move either during construction or after construction is completed. Construction personnel would use existing roads or would access the site by barge from the river. Some fill may be used to access the immediate construction site from the levee road; however, this material would be incorporated into the final site design. For example, the contractor may elect to access the site from constructed berms.

## (4) Physical Effects on Benthos (burial, changes in sediment type, etc.)

All fill associated with the construction takes place in submerged, open water areas. It is expected that the benthos of the river bottom areas within the footprint of bank protection would be completely eliminated by the fill activity.

## (5) Other Effects

The installation of the fill material to complete bank protection activities would, over the long-term, reduce sediment input into the Lower American River, Feather River, Sacramento River, Cache Slough and Steamboat Slough.

## (6) Actions Taken to Minimize Impacts

Fill material would only be placed where it is needed for bank protection. During construction, disturbance outside of the project area would be kept to a minimum. The Corps would implement a Storm Water Pollution Prevention Plan (SWPPP) before and during construction to minimize turbidity generating activities. The Corps will monitor turbidity and settleable solids to avoid violation of basin standards. The contractor would be required to develop and implement a hazardous materials management plan prior to initiation of construction. The plan would include best management practices to (1) reduce the likelihood of spills of toxic chemicals and other hazardous materials during construction, (2) describe a specific protocol for the proper handling and disposal of materials and contingency procedures to follow in the event of an accidental spill, and (3) describe a specific protocol for the proper handling and disposal of materials should materials be encountered during construction.

### b. Water Circulation, Fluctuation, and Salinity Determinations

#### (1) Water:

##### (a) Salinity

The proposed materials and construction activities are not expected to affect salinity.

##### (b) Water Chemistry (pH, etc.)

The proposed materials and construction activities are not expected to affect water chemistry. During filling the Corps would adhere to water chemistry requirements associated with the Corps 401 water quality permit (to be issued).

##### (c) Clarity

The proposed project is expected to affect water clarity only during fill activities.. The Corps would adhere to turbidity requirements associated with the Corps 401 water quality permit (to be issued).

##### (d) Color

The proposed project is expected to affect color only during fill activities.

##### (e) Odor

The proposed materials and construction activities are not expected to affect odor.

##### (f) Taste

The proposed materials and construction activities are not expected to affect taste.

(g) Dissolved Gas Level

The proposed materials and construction activities are not expected to affect dissolved gases

(h) Nutrients

The proposed materials and construction activities are not expected to affect nutrients levels in the water.

(i) Eutrophication

The proposed materials and construction activities are not expected to affect nutrients levels in the water.

(j) Others as Appropriate

The proposed project is not expected to affect other water characteristics.

(2) Current Patterns and Circulation

(a) Current Patterns and Flow

Although some changes to the shoreline contour are anticipated due to the proposed fill, engineering design has been completed to ensure little or no changes in general current and flow patterns.

(b) Velocity

Water velocities during various seasonal river stages and the velocities during flood events are not expected to change with the project.

(c) Stratification

The proposed project is not expected to significantly affect water column stratification.

(d) Hydrologic Regime

The hydrologic regime of the stormwater runoff is not expected to change with the proposed project.

(3) Normal Water level Fluctuations (tides, river stage, etc.)

Although the proposed project may reduce the section width by 5–20 feet in the construction area, normal water fluctuations would not be affected. The project would not affect stage elevations.

#### (4) Salinity Gradients

Since the fill areas receive freshwater stormwater runoff, salinity gradients would not be affected.

#### (5) Actions That Will Be Taken to Minimize Impacts

Effects on pattern or flow of stormwater runoff are not expected to be significant. Therefore, no additional minimization measures are needed that are not already defined in.

#### c. Suspended Particulate/ Turbidity Determinations

##### (1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site

Temporary changes in particulates and turbidity would occur during construction. There would not be significant long-term changes in suspended particulates and turbidity. It is anticipated that turbidity would increase by 5–10 Nephelometric Turbidity Units (NTUs) (approximately 5–10%) above ambient levels during construction activities. It is anticipated that an increase of < 20% above ambient levels would be acceptable to the Regional Water Quality Control Board (RWQCB) based on previous bank protection projects in the area.

For water quality mitigation, and as detailed in the SWPPP, the Corps' contractor would conduct water quality tests specifically for increases in turbidity and sedimentation caused by construction activities as described below:

- Sampling location – Water samples for determining background levels at the time of construction shall be collected in the Lower American River, Feather River, Sacramento River, Cache Slough and Steamboat Slough at upstream locations within the general vicinity of the construction site. Upstream testing to establish background levels shall be performed at least once a day when construction activity is in progress. Water samples for determining down-current turbidity and settleable solid levels shall be collected in the Lower American River, Feather River, Sacramento River, Cache Slough and Steamboat Slough at a point 5 feet out from the shoreline and 300 feet down current of each construction site.
- Turbidity – During working hours, the construction activity shall not cause the turbidity in the Lower American River, Feather River, Sacramento River, Cache Slough and Steamboat Slough down-current from each construction site to exceed:

- where natural turbidity is between 0 and 5 NTUs, increases shall not exceed 1 NTU above ambient levels;
- where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent of ambient levels;
- where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 percent of ambient levels;
- where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent of ambient levels.

These limits would be eased during in-water working periods to allow a turbidity increase of 15 NTUs over background turbidity as measured in surface waters 300 feet downstream from the working area. In determining compliance with the above limits, appropriate averaging periods may be applied provided that beneficial uses would be fully protected.

- **Settleable Solids** – Settleable solids shall be determined by APHA (1998) Method 2540F. During working hours, the construction activity shall not cause the settleable solids in the Lower American River, Feather River, Sacramento River, Cache Slough and Steamboat Slough down-current from each construction site to exceed 0.1 mL/L after one hour settling.

If turbidity or settleable solids measurements exceed the values listed above, the contractor would either slow construction or stop until compliance with the regulation is achieved. Therefore, this impact would be less than significant and no further mitigation is required.

(2) Effects (degree and duration) on Chemical and Physical Properties of the water Column

(a) Light Penetration

There would not be adverse effects on light penetration due to the project.

(b) Dissolved Oxygen

There would be no adverse effects on dissolved oxygen due to the project.

(c) Toxic Metals and Organics

Due to the inertness of the fill materials, there would be no exchange of constituents between the fill and aquatic systems. Measures described in the SWPPP, prepared to RWQCB guidelines, and EA would minimize the potential for contaminants to be introduced into the fill areas.

The contractor would be required to develop and implement a hazardous materials management plan prior to initiation of construction. The plan would include best

management practices to: (1) reduce the likelihood of spills of toxic chemicals and other hazardous materials during construction, (2) describe a specific protocol for the proper handling and disposal of materials and contingency procedures to follow in the event of an accidental spill, and (3) describe a specific protocol for the proper handling and disposal of materials should materials be encountered during construction. Any spills of hazardous materials within the Sacramento River shall be cleaned up immediately with notifications provided to the RWQCB, NMFS, and USFWS.

(d) Pathogens

The proposed project would not introduce pathogens to the aquatic community.

(e) Aesthetics

There would be temporary aesthetic effects during construction (construction equipment and general disturbance), but the effects are not considered significant, and there will be a net long-term increase in native vegetation and IWM compared to the preconstruction condition.

A crane on top of a barge or on top of a levee would be visible to residents and visitors within the surrounding areas. Motorists, boaters, pedestrians, and bicyclists using the levee crown would be able to see the construction equipment. The equipment would be visible for approximately 120 days. The presence of construction equipment would degrade the visual quality of scenic vistas from the levee top and river to that of lower vividness, intactness and unity. However, because these effects are temporary (i.e., only for the duration of construction), they are considered to be less than significant.

Visual effects from the placement of riprap and rock onto the bank would be offset by the installation of IWM, soil fill, and tree plantings. These features would successfully establish and cover the riverbank within a 2-year period.

(f) Others as Appropriate

There would be no other significant adverse effects on the chemical and physical properties of the water column.

(3) Effects on Biota

(a) Primary Production, Photosynthesis

The project may temporarily affect primary production and photosynthesis in those areas filled, and in downstream areas affected by temporary project-related increases in suspended sediment, turbidity, or sediment deposition. However, the effect would be temporary and less than significant.

(b) Suspension/ Filter Feeders



The project may temporarily affect suspension and filter feeders in those areas filled, and in downstream areas affected by temporary project-related increases in suspended sediment or turbidity. However, the effect would be temporary and less than significant for the area.

#### (c) Sight Feeders

The project would temporarily affect sight feeders in those areas filled, and in downstream areas affected by temporary project-related increases in suspended sediment or turbidity. However, the effect would be temporary and less than significant for the area.

#### (4) Actions Taken to Minimize Impacts

Effects to the aquatic biota would be temporary and not significant at the project sites and in the areas downstream. Therefore, no additional measures to minimize effects are needed for fill occurring there.

#### d. Contaminant Determinations

The proposed project would not add contaminants to any nearby body of water. Best management practices to reduce the potential of accidental spills during construction are included in the EA. The rock and soil fill material for the sites would not be contaminated and would be tested for contaminants prior to placement.

#### e. Aquatic Ecosystem and Organism Determinations

##### (1) Effects on Plankton

The project may potentially affect plankton that may be present in those areas filled, and in downstream areas affected by temporary project-related increases in suspended sediment or turbidity. However, the effect would be temporary and the presence of plankton is unlikely in flowing waters. Therefore, the effects on plankton are expected to be less than significant for the area, and no additional measures to minimize effects are needed for fill occurring in the area.

##### (2) Effects on Benthos

The project may temporarily affect benthos in those areas filled, and in downstream areas affected by temporary project-related increases in suspended sediment, turbidity, or sediment deposition. However, the effect would be temporary and less than significant, and no additional measures to minimize effects are needed for fill occurring in the area.

##### (3) Effects on Nekton

The project may temporarily affect nekton in those areas filled, and in downstream areas affected by temporary project-related increases in suspended sediment or turbidity. However, the effect would be temporary and it is expected that nekton may avoid the impacts. Therefore, effects on nekton are expected to be less than significant for the area, and no additional measures to minimize effects are needed for fill occurring in the area.

#### (4) Effects on Aquatic Food Web

Effects on the aquatic food web, or the plankton, benthic, and nekton communities, would be temporary and less than significant.

#### (5) Effects on Special Aquatic Sites

##### (a) Sanctuaries and Refuges

There would be no adverse effects to sanctuaries or refuges with the proposed project.

##### (b) Wetlands

No wetlands would be filled; therefore, there would be no adverse effects on wetlands with the proposed project.

##### (c) Mud Flats

There would be no adverse effects on mud flats with the proposed project.

##### (d) Vegetated Shallows

The project would remove a total of 0.17 acres of vegetated shallows from RM 16.8, 16.6R, 21.8R and 177.8. The project would create 1.4 acres of vegetated shallows at Sites RM 16.8, 16.6R, 21.8R, 28.5 and 52.3.

##### (e) Coral Reefs

There would be no adverse effects on coral reefs with the proposed project.

##### (f) Riffle and Pool Complexes

There would be no adverse effects to riffle and pool complexes.

#### (6) Threatened and Endangered Species

The proposed action at the erosion sites would potentially affect habitat for the following special-status species: green sturgeon (*Acipenser medirostris*), Delta smelt (*Hypomesus transpacificus*), Central Valley spring-run and winter-run Chinook salmon (*Oncorhynchus tshawytscha*), Central Valley steelhead (*O. mykiss*), Sacramento splittail (*Pogonichthys macrolepidotus*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), northwestern pond turtle (*Actinemys marmorata marmorata*), Cooper's hawk (*Accipiter cooperii*), great egret (*Ardea alba*), great blue heron (*A. herodias*), Swainson's hawk (*Buteo swainsoni*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), snowy egret (*Egretta thula*), white-tailed kite (*Elanus leucurus*), black-crowned night heron (*Nycticorax nycticorax*), osprey (*Pandion haliaetus*), double-crested cormorant (*Phalacrocorax auritus*), western red bat (*Lasiurus blossevillii*), hoary bat (*L. cinereus*), California black walnut (*Juglans californica* var. *hindsii*), Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*), Mason's lilaeopsis (*Lilaeopsis masonii*), Delta mudwort (*Limosella subulata*), Sanford's arrowhead (*Sagittaria sanfordii*), marsh skullcap (*Scutellaria galericulata*), and Suisun marsh aster (*Symphyotrichum lentum*).

Short-term construction-related effects may include localized disturbance or displacement of these special-status species due to noise, vibration, suspended sediment, and turbidity generated during in-water construction activities. The potential also exists for injury or mortality to the special-status aquatic species that may not be able to readily move away from channel or nearshore areas directly affected by construction activities.

As described below, long-term impacts due to loss of habitat will be mitigated through the construction of planted wetland and riparian benches and placement of IWM at the mean summer WSEL.

#### (7) Other Wildlife

Wildlife effects associated with the construction are expected to be temporary. Generally, wildlife species that use the areas around the project area are mobile species that would leave the area during construction and return when construction is completed. Therefore, the proposed project would not have any significant adverse effects on wildlife over what was described in the EA.

#### (8) Actions to Minimize Impacts

In consideration of the above information, the proposed action is likely to result in take but is not likely to result in jeopardy to these species as long as the applicable conservation and mitigation measures are adhered to. The conclusion of non-jeopardy is based on the Corps' commitments to: (1) avoid direct impacts by maintaining buffers around sensitive habitat and/or conducting construction activities outside of sensitive timeframes (e.g., during the giant garter snake active window or fledging period of special-status birds); (2) minimize temporary habitat losses through the incorporation of on-site mitigation features (e.g., constructed wetland benches, riparian plantings as discussed in section 4.5.4, and anchored IWM) in the project design; (3) implement a

SWPPP and associated Best Management Practices, as described in section 4.7.4; and (4) offset permanent, incremental adverse effects of riprap on fluvial processes and associated habitat values through the implementation of proven conservation measures (e.g., setback levees, removal of riprap) at an off-site conservation area (see sections 4.6.4 and 2.11). Concurrent implementation of these conservation measures would adequately avoid, minimize, and mitigate adverse effects on the special-status wildlife and fish species discussed in this document. Finally, as of present, only one special-status plant has been documented to occur on the project site (Suisun Marsh aster at sites RM 16.6, 16.8, and 21.8). If further special-status plant species are documented during the planned surveys in spring/summer 2008 the proposed action is not likely to result in jeopardy to these species, as long as the applicable protection and mitigation measures, as detailed in section 4.5.4 of the EA, are adhered to.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination

Not applicable.

(2) Determination of Compliance with Applicable Water Quality

Standards (present the standards and rationale for compliance or non-compliance with each standard)

With the exception of temporary impacts on turbidity (discussed above in Section “c. Suspended Particulate/ Turbidity Determinations”), water quality or effluent standards would not be violated either during or after construction.

(3) Potential Effects on Human Use Characteristics

The proposed project would not have any significant adverse effects on municipal and private water supplies. Any pump structures or pump inlet valves located within the site (RM 16.8L, 42.7R, 52.3L, 55.2L, 77.2L) or immediately upstream or downstream of the site (RM 28.5R, 0.3L, 21.8R, and 177.8R) would be protected in place not adversely affected by the proposed project. There would be no national and historic monuments, parks, seashores, wilderness areas, research sites, or similar preserves affected by the proposed project. The proposed project would not have any significant adverse effects on commercial fisheries. Recreational fisheries and water-related recreation would be temporarily adversely affected during construction, as discussed in more detail below.

During construction on the sites from August through March, the erosion site locations and immediate areas adjacent to the sites would be closed to the public. Detours and alternate routes would be implemented as necessary. Most of the erosion sites are inaccessible due to steep slopes, so river access would not be displaced as a result of construction. It is anticipated that the barge and tugboats would occupy approximately 200 feet of the river channel for the sites in Contract 1 (RM 16.6R, 21.8R,

49.7L, and 52.3L). Access to docks and marinas in the vicinity of the Contract 1 sites may be temporarily halted due to the presence of construction equipment (boats, barges, landside staging, and storage material) working at these locations. Boat access to the docks at Site RM 55.2L may also be prohibited during construction. A private residence located approximately 300 feet downstream of Site RM 77.2L may be temporarily adversely affected by noise during the construction activities, but there would be no long-term or significant effects on the residence from the construction.

The placement of soil, riprap, vegetation, and IWM along the bank would be designed to enhance the natural qualities of the area. Fishing, boating, and swimming opportunities in the area would remain substantially the same as before construction, with the exception of the temporary closures of the construction site areas for public safety purposes.

Most existing trees would remain in place to provide shade, nesting, and quality habitat for wildlife. The installation of rocks, soil and native vegetation, IWM, and their post-construction appeal to the public would not be substantially diminished when compared to existing conditions. As a result, there would be no substantial loss of recreational values at each erosion site.

g. Determination of Cumulative Effects on the Aquatic Ecosystem

The proposed project would not have any significant adverse cumulative effects on the aquatic ecosystem. Though the proposed project would result in the short-term loss of 0.17 acres of vegetated shallows and the removal of 903 LF of IWM currently on the erosion sites, it would result in the creation of approximately 1.41 acres of vegetated shallows and the addition of 16,388 LF of IWM. The temporary loss of existing vegetated shallows habitat would be offset by the restored habitat. The additional IWM represents a substantial increase of the baseline cover habitat for listed salmonids, a key indicator species of river health. In addition, the fill material that would be used for the construction would be chemically stable and non-contaminating material and would result in no detrimental impacts. The cumulative long-term effects of the proposed project on the aquatic ecosystem should be considered beneficial.

h. Determination of Secondary Effects on the Aquatic Ecosystem

The proposed project would not have any secondary effects on the aquatic ecosystem. The potential for secondary effects of induced development as a result of the increased flood protection provided by the proposed project is not probable.

**III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge**

a. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation

No significant adaptations of the guidelines were made relative to this evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Impact on the Aquatic Ecosystem

Because of the potential for emergency bank repair actions at the 13 sites, there were no alternatives identified that would have significantly less adverse effects on the aquatic ecosystem than the proposed alternative.

c. Compliance with Applicable State Water Quality Standards and

The proposed project would not violate State water quality standards identified in the Central Valley Basin Plan (CVRWQCB 1998).

d. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act

The proposed action would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

e. Compliance with Endangered Species Act of 1973

Formal consultation was initiated with NMFS and USFWS on May 8, 2008. It is anticipated that biological opinions will be issued on or prior to August 1, 2008.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972

Not applicable.

g. Evaluation of Extent of Degradation of the Waters of the United States

(1) Significant Adverse Effects on Human Health and Welfare

The proposed project would not cause significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing (other than construction-related effects on recreational fishing access, which would be temporary and less than significant). Construction activities would have temporary effects on benthic communities and plankton. There would be temporary adverse effects to fish, shellfish, wildlife or special aquatic sites. The proposed project would not significantly affect recreation or economic values. Temporary effects on aesthetics would occur during construction only, and would have a net long-term benefit due to establishment of additional riparian vegetation at each site.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem

Appropriate and practicable steps to minimize potential adverse effects of discharge and fill on the aquatic ecosystem include: placing fill material only where it is needed for the proposed project and confining it to the smallest practicable area. The areas disturbed by construction would be returned as close as possible to pre-project conditions where practicable.

On the basis of the guidelines, the proposed project is specified as complying with the inclusion of appropriate and practical conditions to minimize pollution or adverse effect on the aquatic ecosystem

#### **IV. References**

APHA (American Public Health Association). 1998. Standard methods for the examination of water and wastewater. American Public Health Association, Washington, D.C.

CVRWQCB (Central Valley Regional Water Quality Control Board). 1998. The water quality control plan (basin plan) for the California Regional Water Quality Control Board Central Valley region. Sacramento River basin and San Joaquin River basin. Fourth edition. CVRWQCB, Sacramento.

Fris, M. B. and R. W. DeHaven. 1993. A community-based Habitat Suitability Index model for Shaded Riverine Aquatic Cover, selected reaches of the Sacramento River system (draft). USDI, FWS, Sacramento Field Office, CA. 23 pp.

USACE (U.S. Army Corps of Engineers). 2008. Site Characterization Report for Levee Repair of 16 Critical Sites: Sacramento River Bank Protection Project. Prepared for USACE, Sacramento District and The Reclamation Board, Sacramento, California by Parus Consulting, Inc., Roseville, California and Ayres Associates, Inc., Sacramento California.

USFWS (U.S. Fish and Wildlife Service). 1999. Conservation Guidelines for the Valley Elderberry Longhorn Beetle. U.S. Fish and Wildlife Service, Sacramento, CA.