Draft
Environmental Assessment and Initial Study

Lower American River Mile 0.5 Mitigation Site
Sacramento River Bank Protection Project

December 2007

US Army Corps of Engineers ®
Sacramento District

The Reclamation Board

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Environmental Resources Branch

FINDING OF NO SIGNIFICANT IMPACT
Lower American River Mile 0.5 Mitigation Site
Sacramento River Bank Protection Project

I have reviewed and evaluated the information in this Environmental Assessment and Initial Study (EA/IS); other documents; and the views of other agencies, organizations, and individuals concerning the proposed construction of a mitigation area at River Mile 0.5 on the lower American River. The work would provide compensation for unavoidable habitat losses due to past and future levee improvement and bank protection work under the Sacramento River Bank Protection Project.

Construction would involve creating seasonally inundated floodplain habitat for salmonids and delta smelt listed under the Federal Endangered Species Act and Magnuson-Stevens Fishery Conservation and Management Act by excavating and lowering the existing bank at RM 0.5, shaping terraced benches, and incorporating in-stream woody material at the summer-fall water-surface elevations. In addition, a native plant restoration program would be implemented in the newly created habitat to improve the habitat and scenic value of the area.

The possible consequences of the work described in the EA/IS have been studied with consideration given to environmental, social, economic, and engineering feasibility. The potential adverse and beneficial effects have been coordinated with the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), State Historic Preservation Officer, and other Federal and State resource agencies. Potential adverse effects on the valley elderberry longhorn beetle would be compensated fully in accordance with the USFWS's Biological Opinion (BO) dated June 21, 2006. In addition, the requirements in the NMFS's BO dated September 8, 2004, would be implemented to avoid or reduce any adverse effects on listed fish species, critical habitat, and essential fish habitat.

Based on my review, I have determined that construction of the proposed mitigation area will result in no significant adverse effects on the environment, and that the mitigation measures agreed to in the EA/IS are sufficient to reduce any significant effects to less than significant. Based on these considerations, I am convinced that there is no need to prepare an Environmental Impact Statement. The EA/IS and Finding of No Significant Impact provide adequate environmental documentation for the proposed action.

_____ _____

Date

Thomas C. Chapman, P.E.
Colonel, U.S. Army
District Engineer

PROPOSED MITIGATED NEGATIVE DECLARATION

PROJECT: Lower American River Mile 0.5 Mitigation Site, Sacramento River Bank Protection Project

LEAD AGENCY: California Reclamation Board

AVAILABILITY OF DOCUMENTS: The initial study for this proposed mitigated negative declaration is available for review at the Department of Water Resources, Division of Flood Management, Levee Repairs Branch at 2825 Watt Avenue, Sacramento, California 95821 and on the State Reclamation Board website at: http://www.recbd.ca.gov/. Questions or comments regarding this proposed mitigated negative declaration and initial study may be addressed to:

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Division of Flood Management
Levee Repairs Branch
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PROJECT DESCRIPTION: The California Reclamation Board (Reclamation Board) in partnership with the U.S. Army Corps of Engineers under the Sacramento River Bank Protection Project (SRBPP) and with the assistance from the Sacramento Area Flood Control Agency (SAFCA), proposes to construct an offsite mitigation site at river mile (RM) 0.5 on the lower American River. The work would involve creating aquatic and riparian habitat to provide compensation for unavoidable habitat losses due to past and future levee improvement and bank protection work under the SRBPP. This includes compensation for habitat loss at a bank repair site at Sacramento RM 56.7 Left bank repair which is located in Sacramento County, adjacent to the Pocket Area neighborhood. This site is included among the 24 critical levee erosion sites that Governor Schwarzenegger directed to be repaired under his February 24, 2006 Executive Order S-01-06.

This mitigation site project will be located on the right (north) bank of the lower American River approximately 0.5 miles east of the confluence of the American and Sacramento River within the American River Parkway. The project location is on the waterside of a deeply setback levee and is over ¼ of a mile away from the levee of the American River. The project area includes a grading footprint approximately 1,000 feet long and up to 300 feet wide, covering about 3.3 acres and includes an additional approximately 5.0 acres for elderberry transplants and compensation. An approximately 1 acre area would temporarily be disturbed during construction for staging and access to the project site.

The project would be constructed in two phases over two construction seasons. The first phase is scheduled to occur approximately from January through February 2008 and would only involve transplanting elderberry shrubs from the 3 acre grading area footprint to the adjacent 5 acre transplant area followed by reseeding of the area for erosion control. The second phase is scheduled for July through December 2008 and would involve reconstructing the existing bank to create fish and wildlife habitat. The project is designed to increase floodplain depth during spring and winter to provide habitat for delta smelt, juvenile salmon.

The Reclamation Board has directed the preparation of an initial study/proposed mitigated negative declaration (IS/MND) on the proposed project in accordance with the requirements of the California

Environmental Quality Act (CEQA). An IS/MND describes the project and its potential impacts on the environment and concludes that any potentially significant impacts that may result from the proposed project can be avoided, eliminated, or reduced to a level that is less than significant, by the adoption and implementation of specified mitigation measures.

FINDINGS: An initial study has been prepared to assess the proposed project's potential effects on the environment and the significance of those effects. Based on the initial study, the Reclamation Board has determined that the proposed project would not have any significant effects on the environment once mitigation measures are implemented. This conclusion is supported by the following findings:

- The project would result in no impacts to: agricultural resources, geology/soils, land use/planning, population/housing, and energy and mineral resources,

- The project would result in less-than-significant impacts to hydrology, aesthetics, public utilities and service systems.

    - Because the project area is located in a federally and State-designated floodway, a 2-dimenstional hydraulic model analysis of project features was required. The findings of this document - that the project would result in less-than significant impacts to hydrology, were based on this analysis that concluded that effects on velocity and the water-surface elevation are very small if not negligible and localized to the project area.

- Mitigation would be implemented to reduce potentially significant impacts to less-than-significant levels for: biological resources (potential impacts to nesting migratory birds and special-status species), water quality (potential erosion and spills of hazardous substances during construction), air quality (short-term construction-related emissions), noise (short-term construction-related noise), traffic (construction-generated vehicle trips), recreation (potential short-term impacts to parkway access and design-related safety impacts), cultural resources (potential discovery of previously unknown resources or human remains during construction).

Mandatory Findings of Significance:

- The project would not substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, reduce the number or restrict the range of a special-status species, or eliminate important examples of California history or prehistory.

- The project would not achieve short-term environmental goals to the disadvantage of long-term environmental goals.

- The project would not have environmental effects that are individually limited but cumulatively considerable.

- The project would not have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly.

- No substantial evidence exists that the project would have a negative or adverse effect on the environment.

PROPOSED MITIGATION MEASURES:

The following mitigation measures will be implemented by the Reclamation Board to avoid or minimize potential environmental impacts. Implementation of these mitigation measures would reduce the potential environmental impacts of the proposed project to a less-than-significant level.

- **Mitigation Measure 3.2-3 Vegetation and Wildlife**: To the extent feasible, removal of all woody and herbaceous material from construction areas during nonbreeding season (September 1 to February 1) to minimize impacts on nesting activities of migratory birds. Incorporate restoration and an increase in native riparian vegetation.

- **Mitigation Measures 3.3-3 Fisheries**. Since no significant permanent adverse effects on fisheries are anticipated, no mitigation would be required. However, the BMP's listed in Section 3.5-3 would be implemented to protect water quality, and aquatic habitat, from increased suspended sediments, sedimentation, and chemical pollutants during construction.

- **Mitigation Measures 3.4-3 Special Status Species:**

  Valley Elderberry: Transplant all valley elderberry shrubs with stems greater than 1 inch diameter from the area identified for grading within the dormant season for Valley Elderberry longhorn beetle (November 15 to February 15). Erect signs every 50 feet along the edge of the elderberry avoidance areas to keep out human disturbance. Institute post-construction surveys and maintenance and monitoring of the transplanted and newly established elderberry shrubs per USFWS guidelines.

  Swainson's Hawk/Coopers Hawk: Conduct pre-construction surveys for raptor nests and avoid any identified nests during construction.

  Special-Status Fish Species - Delta Smelt, Central Valley Steelhead, Central Valley Spring, Fall and Winter-Run Chinook Salmon, and Green Sturgeon: All in-water work will be scheduled for the period from July 1 to November 30 when special status fish species are less likely to be in the area to avoid or minimize potential effects on these fish species. Construction during this period would occur during lower flow periods to further limit construction incursion into the water.

- **Mitigation Measures 3.5-3 Water Resources and Quality:** Prepare a Storm Water Pollution Prevention Plan (SWPPP) and a Hazardous Materials Management Plan. Limit in-water construction activities to the summer low-flow period to minimize the potential for Stormwater drainage erosion. Prepare a Hazardous Materials Management Plan. Conduct a Water Quality Monitoring Program.

- **Mitigation Measure 3.6-3 Air Quality:** Implement applicable measures to reduce short-term construction-generated emissions and maintain and equip construction equipment with noise control devices. Provide the SMAQMD with an offsite mitigation fee negotiated on an emissions-based calculation.

- **Mitigation Measure 3.7-3 Noise:** Require the contractor to use noise-reducing measures so that equipment would not exceed City of Sacramento noise ordinance limits.

- **Mitigation Measure 3.8-3 Traffic:** Prepare a traffic control plan.

- **Mitigation Measure 3.9-3 Recreation:** Design the placement of Instream Woody Material to insure local approach visibility and at such an angle to reduce "strainer" potential. During construction, provide detours and alternate routes for recreationalists using the parkway features located near the project site. Deter boaters and jet skiers from approaching the site within 100 feet of in-water construction or the construction area.

- **Mitigation Measure 3.11-3 Cultural Resources:** Immediately halt construction activities if any cultural resources are discovered until an evaluation is made by a qualified archaeologist. Immediately halt construction activities if any human remains are discovered and report to the applicable County and other officials.

The project will incorporate all applicable mitigation measures, as listed above and described in the initial study.

Approval of Initial Study/Mitigated Negative Declaration

In accordance with Section 21082.1 of the California Environmental Quality Act, the Reclamation Board has independently reviewed and analyzed the initial study and proposed mitigated negative declaration for the proposed project and finds that the initial study and proposed mitigated negative declaration reflect the independent judgment of the Reclamation Board. The lead agency further finds that the project mitigation measures will be implemented as stated in the mitigated negative declaration.

I hereby approve this project:

_____ _____

Jay Punia Date
General Manager
The Reclamation Board of the State of California

Approved as to Legal Form
And Sufficiency

_____
Nancy Finch
Counsel

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1.0 PURPOSE AND NEED

1.1 Proposed Action

The U.S. Corps of Engineers (Corps) and the California State Reclamation Board (RecBd), with assistance from the Sacramento Area Flood Control Agency (SAFCA), propose to construct an offsite mitigation site at river mile (RM) 0.5 on the lower American River. The work would involve creating aquatic and riparian habitat to provide compensation for unavoidable habitat losses due to past and future levee improvements and bank protection work under the Sacramento River Bank Protection Project (SRBPP). Specific objectives of the project are to:

- Create seasonally inundated floodplain habitat for salmonids and delta smelt listed under the Federal Endangered Species Act and Magnuson-Stevens Fishery Conservation and Management Act (MSA) by excavating and lowering the existing bank at RM 0.5, shaping terraced benches, and incorporating instream woody material at the summer/fall water-surface elevations.
- Implement measures to minimize the potential for adverse environmental effects.
- Implement a native plant restoration program in the project area to complement the bank improvements and improve the habitat and scenic value of the site.
- Create Standard Assessment Methodology (SAM) credits to compensate for adverse effects of past and future SRBPP projects on salmonids and delta smelt.

1.2 Location of Project Area

The project area is located on the right (north) bank of the lower American River approximately 0.5 river mile east of the confluence of the American and Sacramento Rivers (Plate 1). The area is bounded by Interstate 5 (I-5) on the west; developed recreation areas of Discovery Park on the north; American River on the south; and undeveloped, protected habitat areas of Discovery Park to the east (Plate 2). The project area includes a grading footprint approximately 1,000 feet long and from zero to 300 feet wide, covering about 3.3 acres, and approximately 5.0 acres for elderberry transplants and compensation. An approximate additional 1 acre would be temporarily disturbed during construction for staging and access into the project area.

1.3 Need for Proposed Action

In 2003, the Corps evaluated several of the levees protecting Sacramento to determine whether they met minimum criteria for safely containing a flood with a 1 percent annual chance of occurrence (100-year flood) (Tibbits, 2007). The Corps concluded that specific sites along portions of the levees on the lower American River and the Sacramento River had the potential for erosion. In response, the Corps, RecBd, and SAFCA quickly developed an erosion control program for the identified sites. These agencies then moved forward to repair the sites as quickly as possible to reduce the risk of flooding and remove the Sacramento area from the 100-year flood plain.

Among the sites to be repaired was waterside erosion along the left bank levee of the Sacramento River at RM 56.7. This site extended for 1,800 feet along the levee toe and slope just downstream of the confluence of the Sacramento River with the Sacramento Deep Water Ship Channel on the west and the City of Sacramento's Miller Park Marina on the east. The proposed bank protection work included constructing rock benches, planting riparian vegetation, and installing large woody debris. The project was designed to (1) halt erosion, preventing the eventual loss of nearshore aquatic habitat and riparian habitat; (2) minimize the loss of existing riparian vegetation and endangered species habitat from construction activities; and (3) compensate for effects on existing riparian habitat and nearshore aquatic habitat (Corps, 2004). The Corps and the RecBrd completed a joint Environmental Assessment and Initial Study (EA/IS) for the work at RM 56.7 in August 2004. The construction of the project at RM 56.7 was completed in October 2006.

Because of the in-water and nearshore work, the Corps formally consulted with the National Marine Fisheries Service (NMFS) regarding the potential effects of the work at RM 56.7 on Federally listed anadromous species and Essential Fish Habitat (EFH) of Pacific salmon. A SAM analysis for the RM 56.7 project indicated a small, long-term deficit in fall habitat values. As a result, the NMFS issued a Biological Opinion (BO) on September 8, 2004 (151422SWR04SA9167:HLB), for the work at RM 56.7 pursuant to Section 7 of the Endangered Species Act of 1973, as amended. One of the specific requirements in the BO was for the Corps to implement offsite compensation within 30 months of the construction at RM 56.7 (NMFS, 2004) to improve fluvial function and shaded riverine aquatic (SRA) habitat to support growth and survival of Federally listed anadromous fish. Acceptable conservation measures noted in the BO included setback levees, rock removal, riparian revegetation, flood plain restoration, or other actions that are recommended by the SRBPP's Interagency Work Group (IWG) and approved by NMFS (NMFS, 2004). The proposed action is needed to fulfill this compensation requirement in the BO.

The Corps consulted with U.S. Fish and Wildlife Service (USFWS) for possible effects to Federally threatened delta smelt and the valley elderberry longhorn beetle (VELB) for work at RM 56.7. The USFWS issued a BO on August 16, 2004 (1-1-04-F-0237), for work at RM 56.7 in accordance with Section 7 of the Endangered Species Act of 1973, as amended. The USFWS quantified the take of delta smelt incidental to the project as 0.29 acre of shallow water habitat (USFWS, 2004).

In addition to fulfilling the compensation requirement in NMFS's September 2004 BO, the proposed work at RM 0.5 is needed to provide compensation for effects to Federally listed fish species and habitat from implementation of ongoing and future bank protection work. While most of the habitat loss due to the bank protection at erosion sites on the American and Sacramento Rivers has been minimized and mitigated onsite and offsite, some of this bank protection work has resulted in unavoidable losses of fish and wildlife habitat. Additional mitigation sites may be needed to compensate for these losses, depending on the extent of benefits provided by RM 0.5. The mitigation site at RM 0.5 would require the transplanting of elderberry shrubs in order to create appropriate fish habitat. The USFWS in their June 21, 2006, BO (1-1-06-F-0134) specified that up to 5 acres of the project area would be designated for

elderberry shrub transplants and general restoration. Approximately 3.5 acres of elderberry transplant area would be created adjacent to the project site, and approximately 1.5 acres of the project footprint would be used for new elderberry plantings.

1.4 Project Authority

This project is a component of the 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.

1.5 Purpose of the Environmental Assessment/Initial Study

This EA/IS (1) describes the existing environmental resources in the project area; (2) evaluates the effects and significance of the alternatives (including the proposed action) on the resources; (3) proposes measures to avoid, minimize, or mitigate any adverse effects to a less-than-significant level; and (4) discusses SAM credits created by the proposed project. This EA/IS is in compliance with the National Environmental Policy Act (NEPA) and California Environmental Protection Act (CEQA), and provides full public disclosure of the effects of the proposed action.

1.6 Decisions to Be Made

The District Engineer, commander of the Sacramento District, must decide whether or not the proposed mitigation site qualifies for a Finding of No Significant Impact (FONSI) under NEPA or whether an Environmental Impact Statement (EIS) must be prepared. In addition, the RecBd must decide if the proposed action qualifies for a Mitigated Negative Declaration (Neg Dec) under CEQA or whether an Environmental Impact Report (EIR) must be prepared.

2.0 ALTERNATIVES

2.1 Alternatives Not Developed Further

After preparation of the 2004 EA/IS, Jones & Stokes (J&S) and northwest hydraulic consultants (nhc), under contract to the SAFCA, identified and evaluated sites on the lower Sacramento and American Rivers with potential for habitat enhancement that could be developed as compensation for bank protection projects scheduled for construction in and after 2005 (Appendix A). The study included the following three screening phases:

- Review of aerial photography and GIS data to determine geographic locations of potential sites, land ownership, and compatibility with existing land uses.

- Identification of constraints such as infrastructure, environmental regulations, degree of modification needed, and long-term maintenance.

- Conducted more detailed analysis to determine endangered species and/or cultural resources, potential habitat benefits based on the IWG's new SAM, and cost estimates (SAFCA, 2005a).

Initially, 21 potential mitigation sites were identified on the lower Sacramento and American Rivers. Based on the criteria during the first two phases of screening process, the location at RM 0.5 on the American River was determined to provide a significant opportunity to create aquatic and riparian habitat without excessive land costs or other prohibitive restrictions. As a result, none of the other potential mitigation sites was developed further at this time.

A subsequent application of the SAM using a preliminary project design developed by SAFCA indicated that relative to existing conditions, the project would result in substantial short- and long-term gains in winter and spring habitat values for delta smelt, Chinook salmon and steelhead juveniles, smolts, and adults (SAFCA, 2005b).

2.2 No Action

Under the no action alternative, the Corps would not participate in construction of the proposed offsite mitigation site at RM 0.5 on the lower American River. As such, the Corps would not meet the requirements for offsite compensation as described in NMFS's September 2004, BO for the work at Site 56.7 on the Sacramento River, and would need to seek other alternatives or methods to create additional aquatic and riparian habitat as compensation for unavoidable habitat losses due to past and future bank protection activities under the SRBPP to meet the requirements of the BO. Without development of other suitable compensation, the Corps could be in violation of NMFS's September 2004 BO and would be required to reinitiate consultation with NMFS.

2.3 Construct Mitigation Site

The project would be constructed in two phases over two construction seasons. The first phase, scheduled to begin in January 2008 and be completed in February 2008, would involve transplanting existing elderberry shrubs from the grading area footprint to the adjacent transplant areas and reseeding for erosion control. The second phase of the project, scheduled to begin in July 2008 and be completed in December 2008, would involve creating fish and wildlife habitat by degrading the existing bank at RM 0.5, constructing benches at various elevations, installing erosion control structures, and planting native plant species. The project would be designed to increase the frequency of flooded habitat during the spring and winter, providing habitat for delta smelt, juvenile salmonids, and other aquatic and terrestrial species.

2.3.1 Permits and Utilities

Prior to initiation of construction, the contractor would be required to obtain any permits not already obtained by the non-Federal sponsor to perform the work. The Corps' construction office, in coordination with Corps environmental staff, would review the permits and ensure that the contractor is in compliance with the terms and conditions of the permits. To date, the SAFCA has already obtained Encroachment Permit 07-23 required by County of Sacramento

Department of Regional Parks, Recreation and Open Space (Sac County Parks). The contractor would also be required to verify the depths and locations of any existing utilities in the project area. Potentially affected utility companies would be notified and coordinated with directly concerning the timing and degree of the proposed work. These utilities could include electricity, gas, water or sewer, or telecommunications.

2.3.2 Staging and Equipment

The main staging area for the project would be located north of the new mitigation site and south of the American River bike trail. The trapezoidal shaped area would encompass approximately 0.5 acre and is currently covered in nonnative grasses and shrubs and riparian scrub. However, the contractor could use any area that is not within the 20-foot buffer of elderberry shrubs. If necessary, subsequent environmental documentation would be prepared to evaluate the effects of using another area for staging. Short sections of dirt access road would connect staging area with the mitigation site to the south and the Garden Highway to the north across the bike trail. These roads would provide access routes across Discovery Park to and from the staging and work areas.

During mobilization for each phase of the project, equipment and materials would be moved onto the staging area via the Garden Highway and access road. Types of equipment for the project would include truck-mounted tree spade, hydraulic excavators, loaders, bulldozers, and haul trucks. Materials stored at the staging area would include components of the instream woody material (IWM) and brush mattresses, native cuttings and seedlings, soil amendments and irrigation piping, and native seed. The staging area would also provide a parking area for worker and visitor vehicles.

2.3.3 Elderberry Transplanting

The first phase of the project would involve transplanting the elderberry shrubs that would be affected by staging and activities during construction of the second phase of the project. The transplanting is proposed for the time period from January 2008 to February 15, 2008, during the first construction season in accordance with the USFWS's BO (1-1-06-F-0134) issued June 21, 2006, for bank protection at 29 sites along the Sacramento and Bear Rivers, and Steamboat and Cache Sloughs, California (USFWS, 2006).

During elderberry surveys conducted by SAFCA in February/March 2003 and Jones and Stokes in January 2005, an estimated 94 shrubs were identified in the project area. Thirty-one of those shrubs in the grading area footprint would require transplanting (Plate 3). Since the 2003 survey, a significant amount of Himalayan blackberry and poison oak has become established and precludes access to much of the project area. As a result, a complete survey of the project area could not be conducted so the exact number of elderberry shrubs to be transplanted and the total number and locations of elderberry shrubs within 100 feet of project activities are unknown due to the existing dense vegetation. The boundary of the grading footprint would be fenced to avoid encroachment into the adjacent riparian area. Additionally, Zone 4 of the grading footprint is an approximately 40-foot-wide area up to, and along the edge of, the footprint boundary and would have the least amount of grading and soil disturbance. Construction activities could occur

within the 20-foot buffer of elderberry shrubs that are located outside, but near, the boundaries of the grading area footprint. A biological monitor would be present onsite for any work that would encroach into the 20-foot buffer. All elderberry areas to be avoided would be fenced and flagged. When working within 20 feet of an elderberry shrub, measures would be implemented to avoid directly affecting the shrub, such as using the smallest size of equipment and working by hand when within 5 feet of the dripline, if feasible.

Those shrubs with stems 1 inch or greater in diameter (an estimated 272 stems) within the project footprint would be transplanted to a 2.8-acre site adjacent to the eastern side of the project footprint, a 0.7-acre site adjacent to the west side of the project footprint in the American River Parkway (Parkway) (Plate 4). The 3.5 acres of transplant area and Zone 4, the 1.5-acre area within the project footprint, would be used to plant an additional 612 elderberry plants for compensation. Zone 4, with planting elevations of 16 to 24 feet, would be used to plant 269 elderberry plants, and the remaining 343 elderberries would be planted within the transplant areas (Plates 6 and 8). The planting of new elderberries would take place after the completion of the grading and shaping. The 3.5 acres of transplant area and the 1.5-acre Zone 4 planting area total approximately 5.0 acres and are currently covered in nonnative weedy grasses, blackberry vines, and a few native trees. In addition, during the second phase, elderberry seedlings and associated native plant riparian species would be planted at both the mitigation site and transplant area in accordance with the 2006 BO.

Prior to elderberry transplanting, the nonnative vegetation in selected areas at the transplant area would be mowed and removed, while retaining and protecting the surrounding native vegetation and trees. At specific locations in the transplant area, soil preparation activities would include clearing and grubbing the soil surface, as well as applying any necessary soil amendments consistent with the terms and conditions of the 2006 BO.

Subsequent transplanting activities would include locating and flagging those elderberry shrubs to be transplanted, and mowing and removing all surrounding vegetation on the work site. Each shrub would be trimmed according to USFWS's Conservation Guidelines for the Valley Elderberry Longhorn Beetle, 1999, and a tree spade mounted on a truck or other suitable equipment would then be used to remove the entire shrub and root ball. The shrub would be lowered on the back of the truck, transported to its new home in the transplant area, and planted into the prepared ground. These activities would be conducted according to USFWS protocol.

After transplanting is completed, any areas with exposed soil in the mitigation site and transplant area would be reseeded with native grasses to minimize soil erosion until the next construction season and second phase of the project.

2.3.4 Construction and Native Plantings

The second phase of the project would involve creating fish and wildlife habitat by degrading the existing bank at RM 0.5, constructing benches at various elevations, installing erosion control structures, and planting native plant species. Plan and cross-sectional views of the features of the project are shown on Plates 5 through 9. This work would be conducted from July to November 2008 during the second construction season.

Site Preparation. Construction would begin by installing fencing to protect nearby native trees and other sensitive vegetation that could be affected by the work. A 20-foot buffer from the dripline of existing and newly transplanted elderberries in the project area would be established, when possible, and proper fencing would be installed. However, it is possible that construction activities would encroach upon the 20-foot buffer, at which time additional coordination with USFWS would be initiated. Then trees and shrubs within the construction footprint would be transplanted or removed, and the grassy vegetation, organic debris, and top soil would be cleared from the ground surface. Temporary silt fences would be placed just above the shoreline to provide to minimize any sedimentation and erosion into the American River. All large cottonwood snags would be retained onsite unless they are located in the approximate 3.3-acre grading footprint or pose a falling hazard to construction workers. Removed snags would be retained and reused onsite as IWM, when appropriate.

Excavation and Grading. Shaping of the mitigation site would include (1) excavating approximately 60,000 cubic yards of silty sand from the existing bank; (2) lowering the bank along the existing shoreline to an elevation as low as 4 feet, with a typical elevation of 6 to 11 feet, to achieve natural inundation frequencies consistent with the habitat needs of fish and riparian vegetation, (3) creating a variably sloped area extending approximately zero to 120 feet from the existing shoreline (Plate 5), and (4) creating a number of elevated benches in this area capable of supporting natural or planted vegetation adjacent to the water's edge (Plate 6).

The predominant features of the mitigation site would be two areas (total of approximately 0.4 acre) of shallow water habitat surrounded by a large graded area (approximately 1.1 acres) subject to frequent, prolonged inundation with elevation ranges of 6 to 8 feet (Zone 1) and 8 to 11 feet (Zone 2). These elevations would produce shallow inundation at average spring and winter river stages of 8 feet and 9.5 feet, respectively. Grading of the excavated area would include two sloping depressions to facilitate full drainage of the mitigation site and reduce the risk of stranding fish during transition to very low water stages in the river. Grading would produce slopes ranging from nearly level to relatively steep (1.5 horizontal to 1 vertical).

Shallow slopes would be constructed over most of the site below elevation 11 feet to promote plant establishment and provide relatively broad areas of low inundation depth for fish. The area below elevation 6 feet would be very sparsely vegetated due to long duration inundation in the spring and early summer, and would provide more open shallow water habitat. Steeper slopes would be constructed in a few areas to construction of higher benches near the average fall and summer water-surface elevations (approximately elevations 3.5 and 6 feet, respectively). These higher benches would support larger riparian trees with canopies to overhang the water. Relatively level benches at various elevations at approximately 1-foot increments would provide shallow water for diverse salmonid rearing opportunities, as well as backwater habitat for any delta smelt in the project area.

Instream Woody Material. After excavation and grading of the mitigation site are completed, IWM would be installed to reduce erosion due to high flows and boat wakes, and provide additional fish cover along the bank and on the bench. The Corps would use onsite

native vegetation removed from the project site for IWM, as appropriate. The mitigation site would include construction of three alcoves along the bank where IWM (trees 6 to 24 inches in diameter) would be installed, and anchored by wire cable and boulders. The IWM would be configured to reduce any injuries or other risks to Discovery Park users, as well as boaters and swimmers on the American River.

Brush and Tethered Tree Mattresses. In addition to IWM, brush mattress would also be installed to reduce erosion due to wave action, as well as provide fish habitat along the shoreline. The brush mattress would be installed between elevations 3 and 6 feet along most of the mitigation site except at the three IWM alcoves and where the sloping depressions connect with the river. These breaks in the brush mattress would also act as fire breaks. The brush mattress would have rows of small posts installed along the edge of the river flow. Small brush would be placed between the posts up to 3 feet high and would be secured with small diameter wire rope (Plates 6 and 7).

The tethered tree bank protection would be installed at elevation 5.5 feet along a 150-foot-long segment at the upstream end of the mitigation site. Small trees would be secured by the stem to a single small post; this would allow the tip of the tree to float in the river or lie on the river bank, depending on the river stage. The height of the tethered tree mattress would be approximately 3 feet above the ground (Plates 6 and 7).

Plantings and Irrigation System. The planting plan would provide a thick band of vegetation near the river and a less dense and varied vegetation over the rest of the mitigation site. Since elevations below 6 feet would be unlikely to support dense riparian vegetation due to frequent inundation, the sloping depressions would be relatively open areas surrounded by riparian area. There would be four planting zones identified by elevation: (Zone 1) 6 to 8 feet, where inundation would be frequent and long-duration, and significant wave action would be expected along the shoreline; (Zone 2) 8 to 11 feet, where annual inundation would be expected, but typically of shorter duration in the growing season; (Zone 3) 11 to 16 feet, where inundation would occur primarily in high flow events in the winter and early spring; and (Zone 4) 16 to 24 feet, where inundation would occur only during significant high flow events.

Flood-tolerant species such as button bush, cottonwood, willows, mulefat, and box elder would be planted at the lower elevation ranges between 6 and 8 feet. White alder, Santa Barbara sedge, and California rose would be added to this mix in the area between elevation 8 and 11 feet. Larger species, vines, and herbaceous ground cover would be used in the area between elevation 11 and 16 feet. These would include box elder, cottonwood, sycamore, valley oak, Oregon ash California rose, California blackberry, wild grape, mulefat, and creeping wildrye. In the highest area, stinging nettle, coyote brush, and elderberry would be added to this mix, and California rose, California blackberry, and mulefat would be removed. In addition, during the second phase, elderberry seedlings and associated native riparian species would be planted at both the mitigation site and transplant area in accordance with the 2006 BO (Plate 8).

Suitable excavated top soil would be reused to install plantings and to support revegetation of disturbed areas. An irrigation system would be constructed to help ensure establishment and growth of the plantings during the 7- to 10-year establishment period for

elderberries and the 3-year establishment period for the remaining native vegetation. In addition, a beaver exclusion fence would be installed along the shoreline to increase plant survival.

Site Clean Up and Restoration. Once the construction and planting is completed, all equipment and excess materials would be transported offsite. Any disturbed areas outside the planting zones would be reseeded with native grasses to promote revegetation and minimize soil erosion. Finally, all work sites would be cleaned of all rubbish, and the entire work area would be left in a safe and neat condition suitable to the naturalistic and recreation setting of the Parkway.

2.3.5 Borrow, Stockpiling, and Disposal Sites

Borrow. Work at the mitigation site would involve excavation, grading, and leveling of soil material. An estimated 60,000 cubic yards of excess soils would be excavated during the second phase of the project. As a result, no additional soils would be needed for the project. Borrow materials would include components of the IWM and mattresses, native cuttings and seedlings, soil amendments and irrigation piping, and native seed. These materials would be obtained from commercial sources and transported to the mitigation site via truck or barge.

Stockpiling and Disposal. Cleared vegetation, organic debris, unused top soil, and any trash would be removed from the site via truck during the second phase of construction and disposed at the Sacramento County landfill or other approved site. During phase 2, 60,000 cubic yards of excess soil material excavated during grading and shaping of the mitigation site would be removed by barge. The excess soil would be temporarily stockpiled at the staging area or moved directly onto a barge for disposal. (Any stockpiled excess would eventually be moved to the barge for disposal.) Small amounts of vegetation or other materials may be removed by truck.

Disposal of the 60,000 cubic yards of excess soil material would be the responsibility of the contractor. Because of the large volume of material and potential significant adverse effects on recreation in the Parkway, a barge rather than trucks could be used to transport the excess soil material for reuse or disposal. Prior to construction, the contractor would be required to prepare a disposal plan, detailing the proposed transport, reuse, and/or disposal of the material. A Phase 1 Environmental Site Assessment would be completed prior to construction, and the contractor would be required to test the soils to be removed for possible contaminants. This plan would be required to be in compliance with all applicable Federal, State, and local laws, and would be subject to the review and approval of the Corps, RecBd, and other regulatory agencies.

2.3.6 Construction Schedule

Construction of the project would be conducted in two phases over two construction seasons. The first phase of construction would be expected to take place between January 1, 2007, and February 15, 2008, during the transplant window for transplanting elderberry shrubs. The second phase of construction would be expected to take place between July 1, 2008, and December, 31, 2008. The in-water construction work would end no later than November 30, 2008, due to restrictions for listed salmonids and delta smelt. For any in-water construction

projected beyond these dates, the Corps would request and receive authorization form the respective resource agencies for deadline waivers before proceeding with any in-water construction. The tentative construction schedule is shown in Table 1. The equipment would

Table 1. Construction Schedule

Activity	**Start**	**Complete**	**Duration** (approx.)
Transplant elderberry shrubs	Jan 1, 2007	Feb 15, 2008	30 days
Excavate and grade mitigation site	July 1, 2008	Nov 30, 2008	90 days
Install IWM, and brush/tethered tree mattress	July 1, 2008	Nov 30, 2008	30 days
Install plantings	Oct 1, 2008	Dec 31, 2008	90 days

typically operate from 8 a.m. to 5 p.m., five days a week. If necessary, work may occur on some Saturdays. The exact dates within the time periods noted in the table are subject to change depending on availability of funding.

2.3.7 Monitoring and Maintenance

The establishment period for the elderberry seedlings and associated native plant riparian species would be 3 years. Annual monitoring and reporting would occur for 10 years following elderberry transplants. The SAFCA would maintain the mitigation area under an operation and maintenance agreement with the RecBd.

3.0 AFFECTED RESOURCES AND ENVIRONMENTAL EFFECTS

This section describes the resources in the project area, as well as any effects of the alternatives on those resources. When necessary, mitigation measures are also proposed to avoid, reduce, minimize, or compensate for any significant effects.

3.1 Resources Not Considered in Detail

Initial evaluation of the effects of the alternatives indicated that there would likely be little to no direct, indirect, or cumulative effects on several resources. These resources are discussed in Sections 3.1.1 through 3.1.6 to add to the overall understanding of the environmental setting.

3.1.1 Climate

The project area has a Mediterranean, semi-arid climate characterized by warm, dry summers and cool, moist winters. The summers are normally cloudless with warm, dry days and mild, pleasant nights. Summer temperatures average approximately 90 degrees Fahrenheit (F)

during the day and 60 degrees F at night. The winter "rainy season" is from November through February when periodic storms move in from the Pacific Ocean. Winter daytime temperatures average in the upper 50's, and nighttime temperatures average in the lower 40's (Bevan and Cline, 2005). Moist winds are predominantly from the southwest through the Delta region, with occasional dry winds from the north.

3.1.2 Geology and Seismicity

The surface of the Sacramento Valley is composed of unconsolidated Pleistocene (2 to 3 million years ago) and Recent (10,000 year ago) sediments. The valley floor is composed of alluvial fan and channel deposits from the Sacramento, American, and other rivers in the area. Located in seismic zone 3, the Sacramento County area experiences relatively low seismic activity. The nearest active faults are part of the Foothills Fault System east of the project area. Movement along one of these faults (Cleveland Hills Fault) caused the magnitude 6.1 earthquake in Oroville in 1975 (California Department of Conservation, 2003).

3.1.3 Topography and Soil Types

The project area is located on the Sacramento Valley floor, which is nearly level to gently rolling or hilly. Elevations in the valley range from about sea level to about 400 feet mean sea level (msl). The topographic features in the vicinity of the project area include the nearly level flood plain area along the lower American River and the manmade earthen levees that provide flood protection.

According to the Natural Resources Conservation Service (2006), the soil type in the project area is Columbia sandy loam. The Columbia series consists of very deep, moderately well drained soils formed in alluvium from mixed sources. These soils are on flood plains and natural levees, and have slopes of 0 to 8 percent. Elevations are 10 feet below sea level to 155 feet above sea level. Except where drained, these soils are saturated at 20 to 48 inches for several months from November to April. In areas not protected by levees or other flood control structures, these soils are subject to occasional to frequent, brief to long periods of flooding in November to May (NRCS, 2006).

3.1.4 Land Use and Prime/Unique Farmland

The City of Sacramento (2000) designates the project area as part of the Parkway floodway, which includes open space uses. The project area is also identified as a "Protected Area" in the American River Parkway Plan, which recommends that facilities and other improvements are limited to those which are needed for the public enjoyment of the natural environment. The emphasis is on protection and restoration of relatively natural areas (County of Sacramento, 2006).

The project would be consistent with the City of Sacramento's General Plan (City of Sacramento, 1988). The lower American River Corridor Management Plan has recommended management actions that call for the enhancement and protection of existing native vegetation and habitats, and the removal of nonnative plant species (SAFCA, 2002). The project would

involve the improvement of habitat for both aquatic and terrestrial species. There is no land designated as prime or unique farmland in the project area.

3.1.5 Socioeconomics and Environmental Justice

According to the U.S. Census Bureau (2006), the city of Sacramento had a population of 438,000 in 2006. The ethnic composition of the city was about 39 percent white, 24 percent Hispanic, 18 percent Asian, 15 percent African American, and 4 percent others. The leading industries in Sacramento were educational services, health care and social assistance, and public administration. The median income of households in Sacramento was $46,055. There are no minority or low-income populations in the project area.

3.1.6 Hazardous, Toxic, and Radiological Waste

A Phase 1 Environmental Site Assessment (ESA) is being conducted to identify any hazardous, toxic, and radiological waste sites in or near the project area, and determine the potential effects of the project on these sites. Because of the location and undeveloped nature of the project area, no hazardous, toxic, or radiological waste concerns are anticipated at this time. Results of the ESA will be summarized in the final EA/IS, and the EA will be on file at the Corps.

While the project would not require long-term storage or use of hazardous materials, small quantities of fuel, engine oil, and hydraulic line oil would be stored at the staging area and handled during construction. Potential health and safety hazards include possible accidental spills or leaks involving these fuels and lubricants. As a result, the contractor would be required to prepare a hazardous materials control and response plan prior to construction.

3.2 Vegetation and Wildlife

3.2.1 Existing Conditions

Vegetation. The project area is characterized by steep, eroding banks adjacent to the American River. These banks are mostly devoid of vegetation and transition to a relatively flat elevated floodplain that extends north towards the American River bike trail. Prior to a wildfire in 2001, the elevated floodplain area consisted of mature riparian forest dominated by cottonwood and valley oak. Most of the riparian forest was destroyed by the fire and is now composed of young riparian forest, riparian scrub, and ruderal herbaceous species.

Riparian Forest. Remnant stands of riparian forest that were not destroyed by the wildfire in 2001 occur along the perimeter of the project area adjacent to the bike path. Riparian forest is dominated by valley oak and cottonwood. Valley oak, elderberry, Oregon ash, box elder, wild blackberry, Himalaya blackberry, annual grasses, and forbs are also associated with the riparian forest habitat. A row of large fire-killed cottonwood snags in the project area contribute to the habitat value.

Riparian Scrub. Riparian scrub habitat consisting primarily of native and nonnative blackberry, wild rose, elderberry, and wild grape have colonized the areas disturbed by the fire and provide nearly 100 percent vegetative cover. Other species present include arroyo willow and box elder. Riparian scrub habitat also occurs along and on top of the river bank, consisting of willows, white alder, valley oak, and wild blackberry.

Ruderal Herbaceous. Ruderal herbaceous vegetation, annual grasses, and forbs occur in the northeast portion of the project area. There are scattered trees and shrubs within the ruderal herbaceous areas.

Open Water. The adjacent American River provides open water and instream aquatic habitat.

Wildlife. The riparian area adjacent to the American River supports a variety of wildlife. Common mammals found along the river include deer, raccoon, striped skunk, coyote, river otter, squirrels, beavers, and rabbits. Bird species that commonly occur include scrub jay, turkey vulture, mourning dove, American crow, rock dove, killdeer, acorn woodpecker, and yellow-billed magpie. Amphibians and reptiles that have been known to occur along the American River include rattlesnake, garter snake, western tree frog, western pond turtle, pond slider turtle, and western fence lizard (County of Sacramento, 2006).

3.2.2 Environmental Effects

Significance Criteria. Effects on vegetation and wildlife would be considered significant if the alternative would:

- Result in substantial loss, degradation, or fragmentation of any natural vegetation communities or wildlife habitat.
- Permanently interfere with the movement of any resident or migratory wildlife species.

No Action. This alternative would have no effects on existing vegetation and wildlife in the project area. The vegetation communities and associated wildlife would be expected to remain the same.

Construct Mitigation Site. This alternative would have both short-term and long-term effects on vegetation and wildlife in the project area. During the first phase, approximately 6 acres of ruderal and riparian scrub habitat would be mowed and/or trimmed to provide equipment access to transplant elderberry shrubs. This loss of vegetation would be a temporary short-term adverse effect. Any disturbed areas created as a result of phase 1 would be reseeded after completion of the transplanting. Any wildlife in the vicinity of the transplanting would likely be displaced by the noise and activity. However, due to the abundance of suitable wildlife habitat adjacent to the project site, wildlife would have sufficient other habitat and would be expected to return to the area once the work is completed.

During the second phase, approximately 4 acres of vegetation from the project foot print and staging area would be cleared and disposed of offsite. It is anticipated that all riparian forest

vegetation could be avoided although some isolated trees within the ruderal herbaceous habitat may be lost if that area is used for construction staging and storage. Riparian scrub effects include the loss of large areas of riparian scrub vegetation composed primarily of vines, but also including small trees, shrubs, and possibly snags. Since riparian habitat is considered a sensitive natural community, these effects on riparian habitat could be considered significant. However, implementation of the mitigation measures identified in Section 3.2.3 would reduce any effects on riparian habitat to less than significant.

The proposed project would also include native riparian revegetation (including elderberry shrubs) once excavation, shaping, and grading of the project area are completed. The purpose of revegetation is to increase the biological diversity of the project area by increasing the amount and abundance of habitat above the existing baseline condition. This would be accomplished by improving habitat complexity guided by ecological site parameters (moisture regime, soil types, slope, and aspect) and through increased numbers of planted native riparian and riparian scrub species. Wildlife in the project area would be displaced by the noise and construction activity to adjacent areas with an abundance of supportable habitat and would be expected to return once the plantings and new habitats are established. In addition, construction would be scheduled outside the breeding and nesting season for local raptors and migratory birds, when feasible.

The project design includes the construction of variable benches and soil surfaces that would support native riparian vegetation. Onsite mitigation would restore low floodplain surfaces and banks that would be subject to more frequent inundation than occurs under existing conditions. The proposed project would have no significant long-term adverse effects on vegetation or wildlife. The project would result in a temporary decrease in vegetation and wildlife habitat, but would provide a substantial long-term benefit to native vegetation and wildlife habitat. The Planning Aid Letter, dated October 4, 2007, from the USFWS states: ". . . with proper maintenance and monitoring the site should provide higher quality habitat for fish and wildlife species than current habitat" (Appendix B).

3.2.3 Mitigation

The project design incorporates the construction of approximately 3.3 acres of plantable surface that would support native riparian vegetation. Onsite mitigation would restore low floodplain surfaces and banks that would be subject to more frequent inundation than occurs under existing conditions. The onsite mitigation area would result in the construction of planting surfaces that are more conducive to supporting phreatophytic (deep rooted) riparian vegetation and would provide near shore and shallow water habitat values that do not occur under existing conditions. Therefore, this effect is less than significant, and no mitigation beyond what is incorporated into the project description is required.

The project area is located in and adjacent to habitat that supports nesting birds protected under the Migratory Bird Treaty Act including nesting raptors. Protective fencing would be used to protect nesting habitat outside the construction and maintenance areas. Preconstruction surveys would be performed to determine whether nesting birds, including migratory birds,

raptors, and special-status bird species, are present in or immediately adjacent to the proposed project area, borrow sites, mitigation sites, and associated staging and storage areas.

To the extent feasible, all woody and herbaceous vegetation would be removed from the construction areas during the nonbreeding season (September 1 to February 1) to minimize effects on nesting birds. If construction occurs during the breeding season and all affected vegetation has not been removed, a qualified biologist would survey the construction areas for active nests and young migratory birds immediately before construction. If active nests or migratory birds are found within the boundaries of a construction area, appropriate measures would be developed, and the CDFG would be informed of the actions.

3.3 Fisheries

3.3.1 Existing Conditions

The aquatic habitat in the American River near the project area consists of deep water, slow currents, fine sediments, and little or no nearshore cover. Adult salmon and steelhead occur in the project area during their upstream migration and may hold temporarily in the deep portions of the channel adjacent to the project area. The suitability of the site for juvenile rearing is low because of the steep banks and low-quality shaded riverine aquatic (SRA) cover. The SRA cover, defined as the nearshore aquatic area at the interface between a river and adjacent woody riparian habitat, consists of riparian vegetation that overhangs and/or extends into the water, submerged woody debris, natural substrates, and variable water depths and currents (USFWS, 1992).

Fish species found in the lower American River include American shad, striped bass, black bass species (largemouth, smallmouth and spotted bass), channel catfish, white catfish, pikeminnow, sucker, bluegill, and sunfish species. Descriptions of special-status fish species including delta smelt, Central Valley steelhead, Central Valley spring, fall and winter-run Chinook salmon, and green sturgeon can be found in Section 3.4, Special-Status Species.

3.3.2 Environmental Effects

Significance Criteria. Effects on fisheries would be considered significant if an alternative would:

- Substantially diminish habitat for fish or result in displacement of spawning fish such that year-class strength is substantially reduced.
- Substantially interfere with the movement of any resident or migratory fish.
- Involve production and discharge of materials that pose a hazard to fish.

No Action. This alternative would have no effects on existing fisheries in the lower American River. The types of fish, their habitat, and movement patterns would be expected to remain the same.

Construct Mitigation Site. This alternative would have both short-term and long-term effects on fisheries in the American River. During the first phase, all elderberry transplanting activities are expected to be sufficiently distant from the riverbank and waterline that there would be no effects on fisheries or aquatic habitat. If necessary, best management practices (BMP's) would be implemented during the elderberry transplanting to ensure that any loose soils do not enter the river.

During the second phase, approximately 1,000 linear feet of shoreline would be disturbed by excavation, grading, and shaping of the project area. Construction would require one season (July 1 to November 30) and would include creation of up to 2,100 linear feet of shoreline, the addition of instream woody material (IWM), and planting riparian vegetation at various elevations along the bank. Work at the waterline would include excavation of the bank with the removed material placed on a floating barge. Fish could be disturbed and displaced by the activity. In addition, the Corps' contractor would be required to prepare a storm water pollution prevention plan (SWPPP) that identifies BMP's that would be implemented to avoid or minimize movement of soils into the water.

Short-term increases in turbidity and suspended sediment could adversely affect fish and aquatic habitat by disrupting feeding activities of common fish species or result in the temporary displacement from preferred habitats. High concentrations of suspended sediment could also bury stream substrates that provide habitat for aquatic invertebrates; consequently, growth rates of fish could be reduced if suspended sediment and turbidity levels substantially exceeded ambient levels for prolonged periods. However, this increase would not be considered significant once the mitigation measures and BMP's described in Section 3.3.3 are implemented, and the turbidity would return to pre-project conditions once the project is completed.

The use of a barge could have short-term adverse effects on fish due to the noise and vibration generated from barge activities. These effects could temporally disrupt normal fish activities and possibly displace them from the area to adjacent suitable habitats along the river. The effects of barge activities would be limited to the construction window for in-water work after which fish would be expected to return and use the newly created and improved fish habitat.

Over the long-term, the project would have beneficial effects on fisheries and aquatic habitat because of the increase in shallow water habitat for juvenile salmonids due to the creation the various elevations of the vegetated benches that include IWM and greater overall frequency of inundation. These design features would also provide long-term benefits to native fish species that use near shore zones and floodplains for spawning and early rearing in the winter and spring. Construction-related effects could result in significant short-term effects to fish, but with revegetation, placement of IWM, construction timing, and implementation of BMP's associated with protecting water quality, the project would have a long-term benefit to native fish populations, thus reducing any adverse effect of project to less than significant.

3.3.3 Mitigation

Since no significant permanent adverse effects on fisheries are anticipated, no mitigation would be required. However, the BMP's listed in Section 3.5.3 would be implemented to protect water quality, and aquatic habitat, from increased suspended sediments, sedimentation, and chemical pollutants during construction.

The predominant feature of the mitigation site would be the elevated benches that would provide shallow water habitat for aquatic species. The project would include increasing the habitat area, frequency of inundation, and shallow water, submerged vegetation and instream and overhead cover providing nearshore habitat for aquatic species. These design features are also expected to provide long-term benefits to native fish species that use nearshore zones and floodplains for spawning and early rearing in the winter and spring.

3.4 Special-Status Species

This section discusses the special-status species, specifically Federal and State-listed species, candidate species, and species of concern that may be present or have the potential to occur in or near the project area.

3.4.1 Existing Conditions

The special-status species with the potential to occur in the vicinity of the project area were identified by reviewing USFWS species lists dated August 16, 2007, and the California Natural Diversity Database (CNDDB) Rarefind electronic database (CDFG, 2007). A list of Federally threatened and endangered species is included in Appendix C.

Based on recorded observations, availability of suitable habitat, and field visits, nine special-status wildlife species occur or have the potential to occur in the project area. These species include the VELB, Swainson's hawk, Cooper's hawk, delta smelt, Central Valley steelhead, late fall/fall-run Chinook salmon Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and green sturgeon. None of the Federally or State-listed plant species were recorded in the CNDDB or observed during field visits to the project area.

Special-Status Wildlife Species

Valley Elderberry Longhorn Beetle. The VELB (*Desmocerus californicus dimorphus*) is Federally listed as threatened. The USFWS has designated critical habitat for the VELB along the Parkway and an area within the Sacramento metropolitan area (U.S.C. 54; *Federal Register* [FR] 48229). However, the project area does not fall within the two areas designated as critical habitat.

A California endemic species, the VELB, is found in scattered populations throughout its range. The species' range includes most of the California Central Valley (Barr, 1991). The adults feed exclusively on elderberry (*Sambucus mexicanus*) foliage and are active from early

March through early June. The VELB's mate in May, and females lay eggs on living elderberry shrubs. Larvae bore through the stems of the shrubs to create an opening in the stem within which they pupate. After metamorphosing into an adult, the VELB chews a circular exit hole through which it emerges (Barr, 1991).

The locations of elderberry shrubs, which are the host plant of the VELB, were identified and mapped during two surveys. One survey was performed in 2003 by SAFCA as part of a study to record elderberry shrub locations in the Parkway. The second survey was performed by Jones & Stokes in 2005 as part of the planning effort for this project.

The SAFCA survey was performed in February and March 2003. The location of each shrub was surveyed using a GPS unit. Data collection included stem count, stem diameters, shrub or shrub cluster size, vigor, associated species, and location in the landscape, and the presence of adult VELB's or exit holes. The Jones & Stokes valley survey was performed in January 2005 to evaluate site conditions for the VELB and other special-status species. The locations of shrubs not recorded during the 2003 surveys were surveyed using a GPS unit. Between the two surveys, a total of 31 elderberry shrubs were identified in the project footprint. Parts of the area that were inaccessible that contained elderberry shrubs were identified; however, data on these shrubs count could not be collected. Since the last survey, a significant amount of nonnative Himalayan blackberry has become established in the project area. This dense growth has prevented access for surveys and hindered further collection of elderberry shrub data.

Swainson's Hawk. The Swainson's hawk (*Buteo swainsoni*) is State listed as a threatened species. Swainson's hawks migrate long distances, typically returning to nest sites in California from early March to April (later in more northern areas of the state). Migratory flocks begin to form in late August and September, and most birds are on the wintering grounds by November (FOSH, 2007). Nearly all North American populations of Swainson's hawks winter in South America and Mexico; however, a small number of birds regularly winter in southern Florida (Stevenson and Anderson, 1994) and in the Sacramento-San Joaquin Delta of central California (Yee et al., 1991; Herzog, 1996).

The natural foraging habitat of Swainson's hawks throughout the majority of their North American range is relatively open, grass-dominated vegetation and sparse shrublands. Swainson's hawks can forage in many crops, and Schmutz (1987) found that the species is more abundant in areas of moderate cultivation than in either grassland or areas of extensive cultivation.

A survey of nesting birds in California during 1979 revealed that Swainson's hawks nested almost exclusively in large, sparsely vegetated flatlands characterized by valleys, plateaus, broad floodplains, and large expanses of desert (Bloom, 1980). In a study of movements and habitat use, it was found that single trees or riparian areas were used most often for nesting (Estep, 1989). Throughout its range, the Swainson's hawk nests almost exclusively in only a few species of trees (Schlorff and Bloom, 1983). The most commonly used nest trees in the Central Valley are valley oak, Fremont cottonwood, walnut, and large willow ranging from 41 to 82 feet with an average height of about 58 feet (CDFG, 1999).

The CNDDB search results indicate that Swainson's hawks have nested near the confluence of the Sacramento River and American River, and along the Natomas East Main drainage canal. The most recent sighting was approximately 0.3 mile upstream from the project area on May 15, 2005, which is within the ½-mile buffer radius that would require coordination with CDFG.

Cooper's Hawk. The Cooper's hawk (*Accipiter cooperii*) is State listed as a species of concern. The Cooper's hawk breeds throughout most of California in a variety of woodland habitats, including riparian and oak woodlands. Dense stands of live oak, riparian deciduous, or other forest habitats near water are used most frequently, ranging from sea level to above 6,000 feet (CDFG, 2005). The species is seldom found in areas without dense tree stands or patchy woodland habitat. Cooper's hawk is known to be a permanent resident in the project vicinity. This species is also expected as a transient and winter resident in the area.

Although Cooper's hawks have not been recorded at the project area, the project area provides suitable habitat for this species. A CNDDB records search did not identify any occurrences of Cooper's hawk in the project area (CDFG, 2007). The mature riparian vegetation provides suitable nesting; however, riparian habitat in the project area is narrow and subject to human disturbance (pedestrian traffic). Cooper's hawk may use any of the trees in the project area for roosting. Suitable foraging habitat exists in the project area.

Special Status Fish Species. The lower American River supports three special-status species that serve as key evaluation species for the proposed project. These fish species and their designated critical habitats include delta smelt and delta smelt critical habitat, Central Valley steelhead and Central Valley steelhead critical habitat, and Central Valley fall/late fall-run Chinook salmon. The Central Valley winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and green sturgeon are also discussed because juveniles could enter the lower American River during their rearing and downstream migration.

Delta Smelt. Delta smelt (*Hypomesus transpacificus*) was Federally listed as threatened on March 5, 1993 (58 FR 12854), and critical habitat was designated on December 19, 1994 (59 FR 65256). Delta smelt are endemic to the Sacramento-San Joaquin estuary and are found seasonally in Suisun Bay and Suisun Marsh. Delta smelt are typically found in shallow water, have relatively low fecundity, and most live for 1 year (Moyle, 2002).

Delta smelt are semi-anadromous. During their spawning migration, adults move into the freshwater channels and sloughs of the Delta between December and January. Spawning occurs between January and July, with peak spawning from April through mid-May (Moyle, 2002). Spawning has been observed in the Sacramento River up to Garcia Bend during drought conditions as a result of increased saltwater intrusion that moved delta smelt spawning and rearing farther inland (Wang and Brown, 1993). Delta smelt have been documented upstream to the city of Sacramento (RM 60) and may be present in the project area (Moyle, 2002).

Central Valley Steelhead. Central Valley steelhead (*Oncorhynchus mykiss)* was Federally listed as threatened on March 19, 1998 (63 FR 13347), reaffirmed in NMFS final

listing determination on January 5, 2006 (71 FR 834), and critical habitat for Central Valley steelhead was designated on February 16, 2000 (65 FR 7764). Steelhead ranged throughout the tributaries of the Sacramento and San Joaquin Rivers prior to dam construction, water development, and watershed disturbance of the 19th and 20th centuries. Wild stocks are now mostly confined to the upper Sacramento River downstream of Keswick Dam.

Steelhead have one of the most complex life histories of any salmonid species, exhibiting both anadromous and freshwater resident life histories. Freshwater residents typically are referred to as rainbow trout, and those exhibiting an anadromous life history are called steelhead (NMFS, 1998). Steelhead exhibit highly variable life history patterns throughout their range, but are broadly categorized into winter and summer reproductive ecotypes. Winter steelhead are the most widespread reproductive ecotype and the only type currently present in Central Valley streams (McEwan and Jackson, 1996). Spawning occurs primarily from January through March, but may begin as early as late December and may extend through April (Hallock, 1987). Individual steelhead may spawn more than once, returning to the ocean between each spawning migration.

Juvenile steelhead rear a minimum of 1 and typically 2 or more years in fresh water before migrating to the ocean. Juvenile migration to the ocean generally occurs from December through August. The peak months of juvenile migration are January to May (McEwan, 2001). Central Valley steelhead may be present in the project area as adults, migrating upstream to their spawning habitat, and as juveniles and smolts, rearing and migrating toward the ocean.

Central Valley Fall/Late-Fall Chinook Salmon. Central Valley fall-/late fall-run Chinook salmon (*Oncorhynchus tshawytscha*), is not Federally or State listed, but is classified by NMFS as a species of concern (69 FR 19975) and considered a California species of special concern. This species is also covered under the MSA, and the EA/IS constitutes the EFH assessment for Chinook salmon. Adult fall-run Chinook salmon migrate into the Sacramento River, its tributaries including the lower American River from June through December in mature condition, and spawn from late September through December, soon after arriving at their spawning grounds (Yoshiyama et al., 1998). Most spawning occurs in the upper 8 miles of the lower American River between Ancil Hoffman Park and Nimbus Dam. Chinook salmon fry generally emerge from their gravel nests from December through April. Following emergence, fry disperse downstream from spawning areas and begin rearing throughout the lower American River. High winter and spring flows can transport fry beyond the lower American River to the lower Sacramento River and Delta. Smolt outmigration typically occurs from March through July (Yoshiyama et al., 1998).

Late fall-run Chinook salmon migrate upstream before they are sexually mature, and hold near the spawning grounds for 1 to 3 months before spawning. Upstream migration takes place from October through April, and spawning occurs from late January through April, with peak spawning in February and March (Yoshiyama et al., 1998). Fry emerge from their redds from April through June. Juvenile late fall-run Chinook salmon rear in their natal stream during the summer, and in some streams they remain throughout the year. Smolt outmigration can occur from November through May (Yoshiyama et al., 1998).

Central Valley fall-/late fall-run Chinook salmon may be present in the project area, either as adults migrating upstream to their spawning habitat, or as juveniles and smolts, rearing and migrating towards the ocean.

Sacramento Winter-Run Chinook Salmon. Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*) were State listed as endangered on September 22, 1989, and Federally threatened on August 4, 1989 (54 FR 32085). The NMFS subsequently upgraded the Federal listing to endangered on January 4, 1994 (59 FR 440). The NMFS designated critical habitat for Sacramento River winter-run Chinook salmon on June 16, 1993 (58 FR 33213).

Winter-run Chinook salmon spend 1 to 3 years in the ocean. Adult winter-run Chinook salmon leave the ocean and migrate through the Delta into the Sacramento River from December through July with peak migration in March (Moyle, 2002). Adults spawn from mid-April through August (Moyle, 2002). The primary spawning habitat in the Sacramento River is above Red Bluff Diversion Dam at RM 243, although spawning has been observed downstream as far as RM 218 (NMFS, 2001). Spawning success below the Red Bluff Diversion Dam may be limited primarily by warm water temperatures (Hallock and Fisher, 1985; Yoshiyama et al., 1998). Downstream movement of juvenile winter-run Chinook salmon begins in August soon after fry emerge. The abundance of juveniles moving downstream peaks at Red Bluff in September and October (Vogel and Marine, 1991). Winter-run Chinook salmon smolts may migrate through the Delta and bay to the ocean from November through May (Yoshiyama et al., 1998).

Sacramento River winter-run Chinook salmon may be present in the project area, either as adults migrating upstream to their spawning habitat, or as juveniles, rearing and migrating towards the ocean. Winter-run juveniles may temporarily enter the lower American River for additional rearing before continuing their seaward migration. Juvenile Chinook salmon in the winter-run size range have been observed in the lower American River during periods when winter-run juveniles typically occur in the lower Sacramento River (CDFG, 1993). Based on the general timing of rearing and downstream migration in the lower Sacramento River, winter-run juveniles may occur in the project area from October through March, with the greatest potential from January through March.

Central Valley Spring-Run Chinook Salmon. The Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*) ESU was Federally listed as threatened on September 16, 1999 (64 FR 50393). The threatened status of Central Valley spring-run Chinook salmon was reaffirmed in NMFS' final listing determination issued on June 28, 2005 (70 CFR 37160). Critical habitat for Central Valley spring-run Chinook salmon was designated by NMFS on September 2, 2005 (70 FR 52488).

Adult spring-run Chinook salmon enter the mainstem Sacramento River from March through September, with the peak upstream migration occurring from May through June (Yoshiyama et al., 1998). Spring-run Chinook salmon spawn in the upper reaches of the mainstem Sacramento River and tributary streams (USFWS, 1995), with the largest tributary runs occurring in Butte, Deer, and Mill Creeks (Yoshiyama et al., 1998). Spawning typically begins in late August and may continue through October. Juveniles emerge in November and

December in most locations, but may emerge later when water temperature is cooler. Based on observations in Butte Creek and the Sacramento River, young-of-year juveniles typically migrate from November through May. Yearling spring-run Chinook salmon migrate from October to March, with peak migration in November (Cramer and Demko, 1997; Hill and Webber, 1999). Downstream migration of yearlings typically coincides with the onset of the winter storm season, and migration may continue through March (CDFG 1998).

Central Valley spring-run Chinook salmon may be present in the project area, either as adults migrating upstream to their spawning habitat, or as juveniles, rearing and migrating towards the ocean. Juvenile Chinook salmon tend to use bank habitat more frequently than the main channel because it provides increased protection, shade, and food.

Green Sturgeon. On April 7, 2006, NMFS published the final rule to designate the Southern Distinct Population Segment (DPS) of green sturgeon *(Acipenser medirostris)* as threatened effective June 6, 2006 (71 FR 17757). Green sturgeon are long-lived, slow-growing fish and the most marine-oriented of the sturgeon species. Green sturgeon are believed to spend the majority of their lives in nearshore oceanic waters, bays, and estuaries.

Early life history stages reside in fresh water, with adults returning to freshwater to spawn when they are more than 15 years of age and more than 4 feet in size. Spawning is believed to occur every 2 to 5 years (Moyle, 2002). Adults typically migrate into fresh water beginning in late February; spawning occurs from March-July, with peak activity from April-June (Moyle et al., 1995). Juvenile green sturgeon spend 1 to 4 years in fresh and estuarine waters before dispersal to saltwater (Beamsesderfer and Webb, 2002).

The actual historical and current distribution of where this species spawns is unclear because green sturgeon make non-spawning movements into coastal lagoons and bays in the late summer to fall and because their original spawning distribution may have been reduced due to harvest and other human effects. The Sacramento River supports the only known green sturgeon spawning population in the Southern DPS (Adams et al., 2006). Green sturgeon may be present in the project area, either as adults migrating upstream to their spawning habitat, or as juveniles and smolts, rearing and migrating towards the ocean.

3.4.2 Environmental Effects

Standard Assessment Methodology. The SAM analysis for the RM 56.7 project was used to quantify the responses of listed fish species to with-project conditions over a 50-year project period and compare those responses to the species responses under without-project (existing) conditions (SAFCA, 2006). The results of the SAM demonstrated that the project would compensate for short-term reductions in winter and spring values within 2 to 10 years and long-term winter and spring values over the 50-year project period. Long-term benefits to listed species include increases in the amount of shallow water habitat and SRA cover available to juvenile Chinook salmon, steelhead, and delta smelt during typical winter and spring flows. The smaller, long-term deficit in fall habitat values potentially affecting juvenile Chinook salmon could not be fully compensated for onsite. The SAM analysis for the RM 56.7 project is included in Appendix D.

In partial response to the NMFS's September 2004 BO on the RM 56.7 project, the Corps developed and designed the project at RM 0.5, and a SAM analysis was completed for the project to quantify the potential compensation benefits to the listed juvenile Chinook salmon, steelhead, and delta smelt. The results of the two analyses showed the following:

- The maximum deficits in linear feet for Chinook salmon rearing in year 1 are -20.84 feet at RM 56.7 as compared to the creation of 94 feet at RM 0.5, resulting in 73.16 feet of additional compensation remaining at RM 0.5.

- Chinook salmon smolt migration maximum deficits at RM 56.7 in year 1 are -126.39 feet as compared to the creation of 521 feet at RM 0.5, resulting in 394.61 feet of additional compensation remaining at RM 0.5.

- Steelhead juvenile rearing maximum deficits at RM 56.7 in year 1 are -33.83 feet as compared to the creation of 168 feet at RM 0.5, resulting in 134.17 feet of additional compensation remaining at RM 0.5.

- Steelhead smolt migration maximum deficits at RM 56.7 in year 1 are -111.61 feet as compared to the creation of 642 feet at RM 0.5, resulting in 530.39 of additional compensation remaining at RM 0.5.

- Delta smelt spawning and incubation maximum deficits at RM 56.7 in year 1 are -264.29 feet as compared to the creation of 231 feet at RM 0.5, resulting in a first year total deficit of -33.29 feet. In year 2 the deficits at RM 56.7 are -234 feet as compared to the created benefits of 262 feet at RM 0.5, resulting in a second year total benefit of 28 feet.

Therefore, all life stages and species except delta smelt would be compensated at year 1 with the construction of RM 0.5. Although these results of deficits at RM 56.7 and benefits at RM 0.5 are not time integrated, there is remaining compensation that could be applied to other projects such as RM 149, as well as and critical sites constructed by the Corps and DWR in 2006 and 2007. Table 2 summarizes the results of the SAM analysis for RM 0.5.

These results represent the number of credits that could be applied to past and future SRBPP projects. The SAM analysis for the RM 0.5 project is included in Appendix E.

Significance Criteria. Effects on special status species would be considered significant if an alternative would:

- Adversely affect critical habitat.
- Result in an unmitigated take of a special status species.
- Adversely affect a special status species.

No Action. This alternative would have no adverse effects on Federally listed special status species, sensitive species, or their habitat. The types of special status species in or near the project area are expected to remain the same. However, no aquatic and riparian habitat

Table 2. SAM Results Showing Bank-line Weighted Response (feet) at American River RM 0.5R with Increased IWM

Focus Fish Species and Scenario	Fall (September-November)					Winter (December-February)					Spring (March-May)					Summer (June-August)				
	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat
Central Valley spring-run chinook salmon																				
Year 0	0		0	0		0		0	0		0		0	0		0		0	0	
Year 1	392		43	249		256		43	168		967		94	521		911		93	597	
Year 5	392		58	294		260		71	272		981		163	730		911		123	731	
Year 15	416		106	380		270		97	335		1,015		247	860		944		196	848	
Year 25	437		143	438		278		118	370		1,037		295	908		974		255	924	
Year 50	457		173	483		286		140	402		1,059		336	944		1,001		302	982	
Central Valley fall-run chinook salmon																				
Year 0	0		0					0	0		0			0		0				
Year 1	392		43					43	168		967			521		911				
Year 5	392		58					71	272		981			730		911				
Year 15	416		106					97	335		1,015			860		944				
Year 25	437		143					118	370		1,037			908		974				
Year 50	457		173					140	402		1,059			944		1,001				
Central Valley late fall-run chinook salmon																				
Year 0	0			0		0			0		0		0							
Year 1	392			249		256			168		967		94							
Year 5	392			294		260			272		981		163							
Year 15	416			380		270			335		1,015		247							
Year 25	437			438		278			370		1,037		295							
Year 50	457			483		286			402		1,059		336							
Sacramento River winter-run chinook salmon																				
Year 0	0		0	0		0		0	0		0		0	0		0		0		
Year 1	392		43	249		256		43	168		967		94	521		911		93		
Year 5	392		58	294		260		71	272		981		163	730		911		123		
Year 15	416		106	380		270		97	335		1,015		247	860		944		196		
Year 25	437		143	438		278		118	370		1,037		295	908		974		255		
Year 50	457		173	483		286		140	402		1,059		336	944		1,001		302		
Central Valley steelhead																				
Year 0	0		0		0	0		0	0	0	0		0	0	0	0		0		0
Year 1	395		80		395	266		72	200	945	945		168	642	945	890		170		890
Year 5	395		103		395	273		111	276	976	976		261	795	976	890		214		890
Year 15	437		166		437	293		145	319	1,038	1,038		363	891	1,038	948		304		948
Year 25	473		213		473	309		171	344	1,073	1,073		420	932	1,073	999		376		999
Year 50	503		252		503	326		197	369	1,105	1,105		468	964	1,105	1,041		434		1,041
Delta Smelt																				
Year 0	0				0	0	0	0		0	0	0	0		0	0	0	0		0
Year 1	401				401	255	231	231		1,014	1,014	765	765		1,014	956	880	880		956
Year 5	401				401	255	354	354		1,014	1,014	964	964		1,014	956	1,068	1,068		956
Year 15	401				401	255	374	374		1,014	1,014	997	997		1,014	956	1,099	1,099		956
Year 25	401				401	255	378	378		1,014	1,014	1,003	1,003		1,014	956	1,106	1,106		956
Year 50	401				401	255	381	381		1,014	1,014	1,008	1,008		1,014	956	1,110	1,110		956

Notes: 1 Dark shading represents seasons in which various life stages are not found in the modeled reach of the Sacramento River.

2 Results calculated from time-averaged relative responses (with minus without project) to changes in each of six habitat variables used in the SAM (Stillwater Sciences 2006).

would be created or enhanced to benefit fish, including Federally listed anadromous species, or provide compensation for unavoidable habitat loses due to past and future levee work and bank protection in the Sacramento area. In addition, the compensation requirement in the September 8, 2004, BO from NMFS would not be fulfilled.

Construct Mitigation Site. This alternative could have both short-term adverse and long-term beneficial effects on special status species. The first phase of construction could have an effect on the VELB because of transplanting existing elderberry shrubs within the project footprint to the transplant areas. However, the elderberry transplanting would be done within the elderberry transplant window between November 1 and February 15. The Swainson's hawk would not be expected to be present in the project area during phase 1. Cooper's hawks are not expected to be nesting during phase 1; however, Cooper's hawk could be present in the project area. The special status fish species would not be affected by phase 1 construction because the work is expected to be done landside away from the American River. Any loose soils resulting from the transplanting would be minimized using BMP's.

During the second phase, all of the special status species in the project area could be affected by the construction activity. Construction would be conducted in close proximity to elderberry shrubs, and all avoidance measures would be used. Nesting raptors could occur in the project area, and if identified, CDFG would be notified to ensure the minimization of effects. Special status fish would be temporarily disturbed or displaced from the shoreline due to the excavation of the bank and the location of the barge. The movement of soils into the water would be minimized by BMP's and would be a localized short-term effect. The long-term effects would be beneficial with the creation of shallow water habitat and native riparian plantings throughout the project area.

Valley Elderberry Longhorn Beetle. Construction of the mitigation site may affect, but not likely adversely affect, the VELB. Preconstruction and post construction surveys for elderberry shrubs would be conducted, and unavoidable onsite effects to the VELB would be mitigated to less than significant through implementation of appropriate mitigation measures.

Complete avoidance of adult VELB's and elderberry shrubs, as defined in the VELB Conservation Guidelines, is assumed when a 100-foot buffer is established and maintained around elderberry shrubs that have stems of 1-inch or greater in diameter (USFWS, 1999). When work occurs within the 100-foot buffer zone, a minimum setback of 20 feet from the dripline of each shrub is required. Complete avoidance of elderberry shrubs would not be possible based on the density and location of shrubs in the project area. A 20-foot buffer from the dripline of existing and newly transplanted elderberries in the project area would be established, when possible, and proper fencing would be installed. However, it is possible that construction activities would encroach upon the 20-foot buffer, at which time coordination with USFWS would be initiated.

Elderberry shrubs and shrub clusters are distributed throughout the project area (Plate 3). A total of 31 shrub clusters, equating to approximately 272 stems, were mapped within the project footprint and would be directly affected by the project. An additional 63 shrubs occur

within the recommended 100-foot buffer zone. Because of the density of riparian scrub vegetation, a complete census could not be performed. The elderberries in the grading footprint would be transplanted to the adjacent 3.5 acres of transplant area. Upon completion of grading and shaping activities, the 1.5 acres of Zone 4 and the 3.5 acres of transplant area would be used for approximately 612 additional elderberry plantings. During Phase1, additional elderberry shrubs identified during transplant activities would be added to the survey totals, and compensation concerning any additional stems would be coordinated with the USFWS. The project may affect, but not likely adversely affect, the VELB with the incorporation of mitigation measures identified in Section 3.4.3.

During public review of the draft EA/IS, a BA will be prepared and sent to the USFWS, requesting concurrence with the Corps' determination that the proposed project may affect, but not likely adversely affect, the Federally listed valley elderberry longhorn beetle or the delta smelt. The response from the USFWS will be included in the final EA/IS.

Swainson's Hawk. Depending on the time of year when construction or mitigation site implementation occurs, Swainson's hawk may not be present in the region (September to March). Surveys would be scheduled during the spring of 2008, prior to Phase 2 construction, to determine species presence. If nesting or roosting Swainson's hawks are identified, the Corps would coordinate with the CDFG to identify measures to ensure that raptors are not adversely affected. The project may have a significant effect on Swainson's hawk if an active Swainson's hawk nest is located within a ½-mile radius of the project site, which would require coordination with CDFG. Implementation of mitigation measures in Section 3.4.3 would reduce this effect to less than significant.

Cooper's Hawk. Cooper's hawks may nest in or adjacent to the project area. If nesting or roosting raptors are identified, the Corps would coordinate with the CDFG to identify measures to ensure that raptors are not adversely affected.

Delta Smelt, Steelhead, and Fall/Late-Fall Chinook Salmon. The lower American River provides habitat for all or part of the life cycle of these three special-status species. The project area of the lower American River is not suitable spawning habitat for these species; however, adults, juveniles, and smolts may be rearing or migrating through the project site during the construction period between July 1 and November 30. Construction effects would be small to negligible because in-water work would avoid peak juvenile outmigration and adult upstream migration periods.

The short-term effects of construction would be related to increases in turbidity and suspended sediment that could disrupt feeding activities of fish and result in temporary disturbance or displacement from preferred habitats at the project site and downstream. Noise from in-water construction activities could also temporarily disrupt essential behavior patterns (feeding and escape from predators) of delta smelt, and adult and juvenile salmonids at the project site. Removal of riparian vegetation and IWM from the streambank may result in the temporary loss of overhead and instream cover.

Construction activities are not likely to affect adult salmon and steelhead because construction activities would avoid the peak migration period and would be restricted to the channel edge. Adult salmonids are not expected to be injured or killed because they are large enough to avoid in-water construction activity by using deep, mid-channel habitat during their upstream migration and because construction activities would only occur during daytime, which would allow for unimpeded upstream migration during evening hours. The peak migration of juvenile spring-run Chinook salmon and juvenile steelhead occurs during sustained high flow periods from December through February, and from January through March, respectively, avoiding the project in-water construction window. The peak migration of adult delta smelt into fresh water channels and sloughs is between December and January.

In addition, mortality or physiological impairment may be caused by toxic substances (gasoline, lubricants, and oil) entering the water. However, exposure of aquatic species to toxic substances would not be expected as a result of project activities because of implementation of appropriate BMP's. Construction-related effects would also be mitigated by restricting in-water activities to the period from July 1 to November 30, and implementing minimization and avoidance measures. Short-term effects of the project on salmon and steelhead and their habitat are therefore considered to be less than significant.

The long-term effects on habitat for special-status delta smelt, salmon, and steelhead are expected to be beneficial. Implementation of the project would result in temporary losses of aquatic and riparian vegetation and IWM along the affected shorelines. However, these cover losses would occur concurrently with the placement of anchored IWM and planting of riparian vegetation at the site, which would result in a net increase in SRA values at the site. Constructed shallow water benches and backwater habitats are expected to increase the availability of valuable shallow-water rearing habitat for juvenile salmonids. It is possible that the shallow off-channel habitat could provide habitat for predatory fish, primarily nonnatives such as largemouth bass. Salmonids using these areas for rearing and feeding could therefore be subject to predation. However, predation rates would not be expected to exceed predation rates that normally occur in other seasonally flooded off-channel habitats where salmon and steelhead may rear.

The changes in habitat values to salmonids resulting from project construction effects and modeled habitat evolution were evaluated using the SAM (Corps, 2004). Although the analysis may be repeated during or following construction to more accurately reflect as-built conditions, results using the initial site designs indicate positive species responses for all salmonid and delta smelt life stages over the modeled 50-year period. Based on the results of the SAM analysis, the Corps has determined that the RM 0.5 project may affect, but not likely adversely affect, Chinook salmon EFH.

Winter Run Chinook Salmon, Spring Run Chinook Salmon, Green Sturgeon. These three special-status species use the Sacramento River for spawning and rearing, and are not known to depend on the lower American River for any part of their life cycle. However, due to the close proximity of the project site to the confluence with the Sacramento River, these species may temporarily be found in the lower American River as adults migrating upstream the Sacramento to spawn and as rearing and outmigrating juveniles.

Short-term effects of construction could include localized disturbance or displacement of adult and juvenile of these species from noise, suspended sediment, and turbidity generated during in-water construction activities. Adults are not likely to be affected by the construction activity due to their primary use of the deep and mid-water habitat. The potential for adverse effects would be minimized by restricting in-water activities to the period from July 1 to November 30, and implementing minimization and avoidance measures. Construction effects would be small to negligible because in-water work would avoid peak adult upstream migration periods.

Long-term effects of the project on the habitat of listed fish species include alteration of river hydraulics, instream and overhead cover, and substrate conditions along the seasonal low- and high-flow shorelines of the project sites. However, these cover losses would be minimal and would occur concurrently with the placement of anchored IWM and planting of riparian vegetation at the site, which would result in a net increase in SRA values at the site. Over time, the establishment and growth of riparian vegetation on the created benches and graded surfaces would increase habitat values by increasing the extent of instream and overhead cover available to juvenile salmonids under average winter and spring flows. Construction is scheduled during low-flow summer months, which would reduce the likelihood of killing or injuring these fish species. Once construction is complete, the shoreline would return to favorable habitat conditions for aquatic species as a result of the installation of IWM and establishment of riparian vegetation. The overall net effect of this project would make temporary construction effects less than significant.

The changes in habitat values to winter-run and spring-run Chinook salmon from project construction effects and modeled habitat evolution were evaluated using the SAM (Corps, 2004). The green sturgeon was not modeled using the SAM since a comparable tool did not exist at the time. Although the analysis may be repeated during or following construction to more accurately reflect as-built conditions, results using the initial site designs indicate positive species responses for all life stage over the modeled 50-year period (Table 2).

During public review of the draft EA/IS, a BA will be prepared and sent to the NMFS, requesting concurrence with the Corps' determination that the proposed project may affect, but not likely adversely affect, the Federally listed Central Valley spring, fall, and winter-run Chinook salmon; Central Valley steelhead; and green sturgeon. The response from the NMFS will be included in the final EA/IS.

3.4.3 Mitigation

The mitigation measures below, together with the mitigation incorporated into the project description, are adequate to avoid significant effects under both NEPA and CEQA.

Valley Elderberry Longhorn Beetle. During the first phase of construction, two transplant areas would be created adjacent to the project area. One area encompassing 2.8 acres would be located east, and the other area encompassing 0.7 acre would be on the west side, for a total of 3.5 acres. Shrubs with stems greater than 1 inch in diameter would be transplanted to

these areas. Additional elderberry plants, as well as other native vegetation, would be planted in Zone 4 as shown in the landscape design plans (Plates 6 through 9) and the transplant sites.

The Corps would also erect signs every 50 feet along the edge of the avoidance area with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be clearly readable from a distance of 20 feet and must be maintained for the duration of construction.

Prior to construction, a qualified biologist would brief contractors on the status of the VELB and the need to protect and avoid damage to the elderberry plants, as well as the possible penalties for not complying with these requirements. Following completion of construction activities, the Corps would perform a post-construction survey of elderberry shrubs. An exact count would be taken of the number of elderberry stems taken during the transplanting activities, and this number would be provided to the USFWS. The Corps would also determine whether any shrubs were damaged by construction activities. If damage occurs to elderberry shrubs, the Corps would consult with USFWS on appropriate compensation.

The completed mitigation would be intensively maintained for an initial 3-year establishment period and adaptively managed thereafter. Annual VELB monitoring and reporting would occur for 10 years following planting.

Swainson's Hawk. The CDFG generally requires that a ½-mile buffer be maintained around active Swainson's hawk nests between 1 March and 15 August (SHTAC, 2000). Preconstruction surveys for Swainson's hawk would be conducted at and adjacent to all locations to be disturbed by implementation of the proposed project to ensure that this species is not nesting in within one-half mile of the construction site. Preconstruction surveys would consist of surveying all potential nest sites within one-half mile of proposed construction features, borrow sites, and mitigation sites. Surveys would be performed several times during the breeding season to avoid and minimize effects on late-nesting birds. Nest sites would be marked on an aerial photograph, and the position would be recorded using GPS. The Corps would maximize the buffer width around any active nest sites on a site-by-site basis and would consult with CDFG on the buffer widths before commencing construction activities. Unless otherwise approved by CDFG, the Corps would delay construction and maintenance around individual nests until after the young have fledged.

Some of the construction activities may occur in the Swainson's hawk breeding season. To the greatest extent practicable, major construction activities within one-half mile of an active Swainson's hawk nest would be avoided during the breeding season. If practicable, construction activities that would result in the greatest disturbance to an active nest site would be deferred until after or as late in the breeding season as possible (usually August but depends on observed fledging activity in any active nests). The Corps would provide CDFG with the locations of active nest sites identified during the preconstruction surveys and would coordinate with CDFG on appropriate avoidance and minimization measures on a case-by-case basis.

Cooper's Hawk. The Corps would maximize the buffer width around any active nest sites on a site-by-site basis and would consult with CDFG on the buffer widths before commencing construction activities. Unless otherwise approved by CDFG, the Corps would delay construction and maintenance around individual nests until after the young have fledged.

Delta Smelt, Steelhead, Fall/Late-Fall Chinook Salmon, Winter Run Chinook Salmon, Spring Run Chinook Salmon, and *Green Sturgeon*. To avoid or minimize potential effects on these special-status fish species, in-water activities would be scheduled for the period from July 1 to November 30. Adult and juvenile Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, green sturgeon, and adult delta smelt could be present at the time of in-water construction activities. The peak migration periods for these species do not occur within the proposed in-water construction period of July 1 to November 30. The effects of the construction activity would be small to negligible because in-water work would avoid peak juvenile outmigration and adult upstream migration periods of salmonids (NMFS, 2004).

Because green sturgeon are primarily benthic and because the presence of juveniles and adults along the shoreline are not expected to be common, adverse effects including injury or death are not likely (NMFS, 2006). Lower river flows experienced during the in-water work window would allow delta smelt greater access to open water, avoiding the affected shoreline. This measure would avoid effects on the majority of rearing and outmigrating salmon and steelhead juveniles and smolts, as well as adult delta smelt and adult green sturgeon. In addition, although the contractor would prepare a storm water pollution prevention plan (SWPPP) that identifies BMP's that would be implemented to avoid or minimize movement of soils into the water, there would be some increase in turbidity in the river.

The predominant feature of the mitigation site would be the elevated benches that would provide shallow water habitat for diverse salmonid rearing opportunities, as well as backwater habitat for any delta smelt in the project area. The project would include increasing the habitat area, frequency of inundation, and shallow water, submerged vegetation and instream and overhead cover providing nearshore habitat for rearing Chinook salmon, and steelhead during periods when they may occur at the project site. These design features are also expected to provide long-term benefits to other native fish species that use nearshore zones and floodplains for spawning and early rearing in the winter and spring.

3.5 Water Resources and Quality

3.5.1 Existing Conditions

Regulatory Background. The Federal Clean Water Act (CWA) governs pollution control and water quality of the Nation's waterways. The act provides standards and enforcement, regulatory programs, and establishes the baseline that all state and local water quality laws must meet. The State Porter-Cologne Water Quality Control Act, which created the State Water Resources Control Board (SWRCB), regulates the California waterways and establishes pollution prevention plans and penalties.

State Water Quality Certification. Section 401 of the CWA requires certification from the State or interstate water control agencies that a proposed water resources project is in compliance with established effluent limitations and water quality standards. Corps projects, as well as applicants for Federal permits or licenses, are required to obtain this certification.

National Pollution Discharge Elimination System (NPDES). Section 402 of the CWA establishes conditions and permitting for discharges of pollutants by regulating point sources that discharge pollutants into waters of the U.S. under the NPDES. Construction work that disturbs more than 1 acre of land requires a NPDES permit for potential stormwater discharges and construction dewatering.

Dredged or Fill Material. Under Section 404 of the CWA, the Corps retains primary responsibility for permits to discharge dredged or fill material into waters of the U.S. including wetlands. The act also defines the conditions which must be met by Federal projects before they may make discharges into the Nation's waters.

Water Resources Management. The SWRCB is divided into nine Regional Water Quality Control Boards (RWQCB). Each RWQCB is responsible for enforcing the State water quality laws and objectives, establishing beneficial uses for each State waterway, and developing and updating their region's basin plan that protects water quality based on beneficial use. The project area is within the Central Valley RWQCB, which issues water quality certifications and administers the NPDES storm water permit program in Sacramento County.

Surface and Groundwater Resources. The only major surface water body near the project area is the lower American River. This reach of the river is characterized by a very low gradient and low-velocity flow, and is composed almost entirely of deep flatwater with a sand bed. River stage is controlled by flow in the Sacramento and American Rivers and is subject to diurnal tidal fluctuation. Very little sediment is stored in bars, and the bank-building process typical of lowland alluvial rivers no longer occurs. The channel in the project area is approximately 500 feet wide.

Considering that the Folsom Dam was constructed in 1955, the daily flow information from the Fair Oaks gauge on the American River was used from 1955 through 2006. The Fair Oaks gauge is located approximately 22 miles upstream from the project site. The average seasonal flows are presented in Table 3 (USGS, 2007).

Table 3. Average Flows at Fair Oaks Gauge by Season

Season	**Mean Flow at Fair Oaks (cubic feet per second)**
Winter	5,367
Spring	4,257
Summer	2,853
Fall	2,697

The project area overlies the boundary of the North and South American Subbasins of the Sacramento Valley Groundwater Basin. The subbasins are bounded on the east by the Sierra Nevada and on the west by the Sacramento River. The aquifer system of the two subbasins is comprised of continental deposits of Late Tertiary to Quaternary age. Groundwater levels and storage are determined by natural and applied water recharge, permeability and percolation rates, underground flow, and surface use via wells and pumping. Based on information from Olmstead and Davis (1961), the State Department of Water Resources calculated groundwater storage capacity in the South American Subbasin alone at 4,816,000 acre-feet (DWR, 2004).

Surface and Groundwater Quality. Data collected by the Sacramento Coordinated Monitoring Program from July 2005 through June 2006 indicate that the water quality of the lower American River is suitable for all beneficial uses (SRCSD, 2006). Besides mercury, which is a legacy from the gold mining days in the American River watershed, point source discharges that degrade water quality in the project is principally from drainage from urban areas. The river has very low turbidity because of the geologic formations (granite) at the headwaters, high sediment trap efficiency of Folsom Reservoir, absence of fine sediment and lack of intensive agriculture along the river (Corps, 1998). Local turbidity may be increased by the inflow of urban stormwater during the wet season.

The groundwater in the Sacramento Valley Groundwater Basin is typically a calcium magnesium bicarbonate or magnesium calcium bicarbonate. Other minor groundwater types include a magnesium sodium bicarbonate or sodium magnesium bicarbonate at the confluence of the Sacramento and American Rivers near the project area (Bertoldi et al., 1991). Long-term quality of groundwater for Sacramento area residents depends on keeping contaminants out of the aquifer. Regular sampling of subbasin wells by the State indicates some elevated levels of inorganics, nitrates, and volatile and semi-volatile organic compounds (DWR, 2004).

3.5.2 Environmental Effects

Significance Criteria. Effects on water resources or quality would be considered significant if an alternative would:

- Alter the quantity and quality of surface runoff.
- Degrade water quality.
- Violate any water quality standards or waste discharge requirements.
- Substantial alter the existing drainage pattern of the site or area, such that flood risk and/or erosion and siltation potential would increase.
- Place structures that would impede or redirect flood flows within a 100-year flood plain.
- Expose people, structures, or facilities to significant risk from flooding, including flooding as a result of the failure of a levee or dam.
- Create or contribute to runoff that would exceed the capacity of an existing or planned stormwater management system.
- Reduce groundwater quantity or quality.

No Action. This alternative would have no effect on water resources or quality in the project area or the American River. The volume and quality of both surface and groundwater

would continue to be determined by climatic conditions, upstream regulation of flows, local and regional uses, and types of inflow.

Construct Mitigation Site. This alternative could have both short-term and long-term effects on water resources and quality in the American River. During the first phase, all elderberry transplanting activities are expected to be sufficiently distant from the riverbank and waterline that there would be no effects on the river. The clearing of vegetation and use of the tree spade or other equipment would result in ground disturbance and minor alterations to local drainage patterns in the project area. If necessary, BMP's would be implemented by the contractor , including preserving as much existing vegetation as possible, temporary barriers and slope drains, construction scheduling, and revegetation of disturbed areas as appropriate.

During the second phase, approximately 1,000 linear feet of shoreline would be disturbed by excavation, grading, and shaping of the project area. Work on the existing bank would include the removal of trees, shrubs, herbaceous vegetation, and approximately 60,000 cubic yards of silty sand. Phase 2 could increase turbidity from wave action generated during boat and barge operations. Although BMP's such as barriers, silt fencing, slope roughing/terracing, and dust control would be implemented to avoid or minimize movement of soils into the water, there would be some temporary increase in turbidity in the river to levels exceeding the Basin Plan (CVRWQCB, 2007). The Basin Plan identifies a change in turbidity above 10 percent of the ambient turbidity as significant. This could adversely affect aquatic habitat by disrupting feeding activities of fish species or result in temporary displacement from preferred habitats.

High concentrations of suspended sediment can also bury stream substrates that provide habitat for aquatic invertebrates, an important food source for juvenile salmonids. Consequently, growth rates of fish could be reduced if suspended sediment and turbidity levels substantially exceed ambient levels for prolonged periods. However, this increase would not be considered significant because the turbidity and settleable solids would be monitored and construction would be slowed or stopped if turbidity nears regulation thresholds. The turbidity would return to pre-project conditions once the project is completed.

The operation of the barge could have short-term adverse effects on water quality. Anchoring of the barge in the American River would be accomplished by lowering two pilings into the bottom of the river by a hydraulic system. This could disturb some bottom sediments, causing them to move into water column. In addition, inadvertent fuel spills or movement of stockpiled soil onto the barge or into the river during operations could degrade water quality.

However, these potential effects would be limited to excavation and disposal activities. Disturbed bottom soils would be expected to settle once excavation is completed and the barge leaves the area. In addition, the contractor would be required to prepare a disposal plan, including best management practices to avoid or minimize any adverse effects on water quality from the use of the barge for stockpiling and disposal of excess soils.

The contractor would prepare and implement an erosion control plan/SWPPP to control erosion, storm water runoff, sedimentation, and other construction-related pollutants during both phases of construction and until the construction is complete and all disturbed areas are

permanently stabilized throughout the project area. Over the long-term, the project would have beneficial effects on aquatic habitat because the addition of a series of elevated benches would support a tiered riparian habitat of native plants and shallow water fish habitat including a variety of IWM that provide fish cover and reduce erosion.

Small volumes of petroleum products (fuel, engine oil, and hydraulic line oil) would be temporarily used and handled to operate the construction equipment. These materials could be released in accidental spills and harm the environment. The waterside construction could present a direct release of petroleum products through general operation of the construction barges and boats or an accidental spill. The contractor would prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) that would reduce water quality effects to a less than significant.

Because the project area is located in a Federally and State-designated floodway, there is a concern that recontouring and revegetating the project area could affect downstream water surface-elevations and increase the potential for flooding. To evaluate this potential, the SAFCA completed a 2-dimensional hydraulic modeling analysis of the various features of the project. The analysis concluded that the effects on velocity and the water-surface elevation are very small, if not negligible, and localized to the project area. The modeling results are included in Appendix G.

3.5.3 Mitigation

Limiting Phase 2 construction activities to the summer low-flow period would minimize the potential for stormwater drainage erosion. For both construction phases, standard pollution prevention measures including (1) erosion and sediment control measures, (2) proper control of non-stormwater discharges, and (3) hazardous spill prevention and response measures would be implemented as part of the project design specification and standard construction practices. A Section 404(b)(1) evaluation and a water quality certification application for the project are included in Appendix F.

Stormwater Pollution Prevention Plan. The proposed project is expected to result in the disturbance of more than 1 acre. Therefore, the contractor would be required to prepare an NPDES storm water permit. Obtaining coverage under the NPDES permit requires that the project applicant prepare an SWPPP that describes the BMP's that would be implemented to control accelerated erosion, sedimentation, and other pollutants during and after project construction. The specific BMP's that would be incorporated into the erosion and sediment control plan and SWPPP would be determined during the final design phase of the selected alternative, and would be prepared by the construction contractor in accordance with the RWQCB Field Manual.

The specific BMP's that would be incorporated into the SWPPP would be determined during the final stages of project design. However, the SWPPP would likely include one or more of the following BMP's to substantially reduce the potential for erosion and sedimentation as a result of ground and vegetation disturbance.

- Stage construction equipment and materials on the overbank reaches of the project site at Discovery Park. To the extent possible, stage equipment and materials in areas that have already been disturbed in the graded area.
- Minimize ground and vegetation disturbance during project construction by establishing designated equipment staging areas, access routes, stockpile and disposal areas, and equipment exclusion zones prior to grading.
- Stockpile soil on the overbank area, and install sediment barriers (silt fences, fiber rolls, and straw bales) around the base of stockpiles to intercept runoff and sediment during storm events. If necessary, cover stockpiles with geotextile fabric to provide further protection against wind and water erosion.
- Install sediment barriers on graded or other disturbed slopes, as needed, to prevent sediment from leaving the project site and entering nearby surface waters.
- Use and store hazardous materials such as vehicle fuels and lubricants in designated areas located away from surface waters. Implement measures to prevent, control, and clean up hazardous material spills.
- Install plant materials to stabilize cut and fill slopes and other disturbed areas once construction is complete. Plant materials may include an erosion control seed mixture, pole plantings, or shrub and tree container stock.

Hazardous Materials Management Plan. The contractor would be required to develop and implement a hazardous materials management plan prior to initiation of construction. The plan would include BMP's 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 into the lower American River would be cleaned up immediately with notifications provided to the CVRWQCB, NMFS, and USFWS.

Water Quality Monitoring. The contractor would be required to conduct water quality tests specifically for increases in turbidity and sedimentation caused by construction activities. Water samples for determining background levels would be collected in the American River within the general vicinity of the construction site. Testing to establish background levels would be performed at least once a day when construction activity is in progress. The contractor would monitor turbidity and settleable solids at least daily and turbidity at least hourly when a turbidity plume is visible. If turbidity limits are exceeded, the contractor must slow the rate of earthwork or use other means to comply with the requirements, including stopping construction activities until the plume has cleared.

3.6 Air Quality

3.6.1 Existing Conditions

Regulatory Background. Construction of the project would occur within the Sacramento Valley Air Basin (SVAB). Air quality in the air basin is regulated by Federal, State, and regional agencies. At the Federal level, the U.S. Environmental Protection Agency (EPA) is responsible

for overseeing implementation of the 1990 Federal Clean Air Act (42 U.S.C. 7401 et seq.). The Air Resources Board is the State agency that regulates mobile sources and oversees implementation of State air quality laws, including the 1988 California Clean Air Act (Health & Safety §§ 42300 et seq). The Sacramento Metropolitan Air Quality Management District (SMAQMD) is the primary agency that regulates air quality on a regional level over stationary sources in the project area. Regional planning and attainment of air quality goals also involve air quality agencies in neighboring counties.

Pursuant to the Federal Clean Air Act, the U.S. EPA has established national ambient air quality standards for criteria pollutants, including ozone, carbon monoxide (CO), $PM_{10,}$ and particulate matter of respirable size ($PM_{2.5}$). California's ambient air quality standards are generally more stringent than the Federal standards. SMAQMD has permit authority, acts as the primary reviewing agencies for environmental documents, and develops regulations that must be consistent with, or more stringent than, Federal and State air quality policies.

Air Quality Conditions. The SVAB does not consistently meet several applicable State air quality standards (California Air Resources Board, 1996). Between 2004 and 2006, measures of ozone frequently exceeded both Federal and State standards, whereas concentrations of PM_{10} rarely exceeded Federal standards. PM_{10} concentrations did, however, frequently exceed State standards. The SMAQMD attained the Federal standard for PM_{10} and is in the process of addressing the Federal requirements needed for official redesignation to attainment status for PM_{10}. Concentrations of CO did not exceed State or Federal standards during 2004 to 2006, and the SVAB is currently in attainment for CO.

Existing conditions for air quality in the project area can be described with summary statistics for critical air pollutants. Air quality data for the SVAB from 2004 to 2006 are summarized in Table 4.

The Sacramento County portion of the SVAB is classified as serious nonattainment for the Federal and State ozone standards. PM_{10} standards are classified as moderate nonattainment for Federal and nonattainment for State. $PM_{2.5}$ standards are nonattainment for State. For CO, the Sacramento urbanized area was reclassified from nonattainment to attainment of the Federal and State standards in 1998; therefore, the project area is considered to be a maintenance area for CO.

A "nonattainment" designation indicates that a pollutant concentration has exceeded the standard. Two areas that are each designated nonattainment for a pollutant may differ in severity. To identify the severity of the problem and the extent of planning required, nonattainment areas are assigned a classification that is commensurate with the severity of their air quality problem (moderate, serious, severe, or extreme) (SMAQMD, 2004).

Table 4. Summary Statistics for Air Quality Data in the Sacramento Valley Air Basin

Year	Pollutant (averaging time)	Maximum concentration	No. of Days exceeding Federal standards	No. of Days exceeding State standards
2004	Ozone (1h)	0.13 ppm	1	29
2004	Ozone (8h)	0.10 ppm	20	N/A
2004	CO (8h)	4.05 ppm	0	0
2004	PM_{10} (daily)	171 ug/m^3	1	13
2005	Ozone (1h)	0.13 ppm	3	33
2005	Ozone (8h)	0.12 ppm	25	N/A
2005	CO (8h)	4.19 ppm	0	0
2005	PM_{10} (daily)	110 ug/m^3	0	25
2006	Ozone (1h)	0.14 ppm	7	44
2006	Ozone (8h)	0.11 ppm	39	N/A
2006	CO (8h)	4.19 ppm	0	0
2006	PM_{10} (daily)	160 ug/m^3	1	11

N/A=not applicable; state standards for ozone are based on 1h averaging time only.
Source: California Air Resources Board, 2007

Sensitive Receptors. Sensitive receptors include sensitive land uses and those individuals and/or wildlife that could be affected by changes in air quality due to emissions from the alternatives. Sensitive land uses in the project area include Discovery Park and residences, and sensitive receptors include recreationists, residents, visitors, motorists, and wildlife.

Air Quality Management. Pursuant to the Federal Clean Air Act Amendments of 1990 and the California Clean Air Act of 1988, the local air districts are responsible for preparing air quality management plans required for nonattainment areas. These plans set forth strategies for reducing emissions of nonattainment pollutants until the standards are attained. Several plans have been prepared for ozone, but no official plans have been developed for attainment of the Federal or State PM_{10} standards.

In 1994, the Sacramento Area Regional Ozone Attainment Plan was prepared by the five local air districts, the Sacramento Area Council of Governments, and the California Air Resources Board. This plan was submitted to the U.S. EPA on November 15, 1994, as part of California's State Implementation Plan (SIP). The SIP presents control measures, emission inventories, air quality modeling results, contingency measures, and demonstration of emission reductions sufficient for attainment and rate-of-progress milestones.

The Sacramento Area Regional Ozone Attainment Plan 2002 Milestone Report indicates that the Sacramento area has made significant achievements in reduction of ozone precursors since 1994. The Sacramento area has satisfied the 2002 milestone rate-of-progress requirement. When evaluating the overall progress toward attainment, the region has exceeded its planned goals for volatile organic compounds (VOC) emission reductions, and has met its nitrogen oxides (NOx) reduction target in 2002 (SMAQMD 2002).

3.6.2 Environmental Effects

Significance Criteria. Effects on air quality would be considered significant if the alternative would:

- Violate applicable air quality standards.
- Contribute substantially to an existing or projected air quality violation.
- Expose sensitive receptors to substantial pollutant concentrations.

Additionally, significance thresholds developed by the SMAQMD and the U.S. EPA were used in determining the significance of project-related air quality effects. Emissions would be considered significant if emissions exceeded the local thresholds established by the SMAQMD for construction activities. These thresholds are 85 pounds per day of NO_X, 85 pounds per day of reactive organic gases (ROG), and 275 pounds per day of PM_{10}.

Emissions for the project would be considered significant under NEPA if annual emissions exceeded U.S. EPA's general conformity thresholds. Conformity thresholds are based on the *de minimis* thresholds included in the U.S. EPA's general conformity guidelines, as applicable for the Sacramento area. The thresholds are 25 tons per year of NO_X, 25 tons per year of ROG, 100 tons per year of CO, and 100 tons per year of PM_{10}.

No Action. This alternative would have no effect on existing air quality in the project area. Air quality would continue to be influenced by climatic conditions, vehicle emissions, agricultural activities, and industry.

Construct Mitigation Site. This section describes the potential air quality effects of the project, including exhaust emissions from construction equipment, trucks, and worker vehicles, as well as fugitive dust generated by construction activities and vehicle travel over unpaved roads. In order to complete the analysis, information was collected on construction activities, duration, timing, and equipment use. Phase 1 of the construction activity would involve only a few motorized vehicles for a short duration and be conducted during the winter months when fugitive dust emissions are reduced. As a result, the effects to air quality for phase 1 are incorporated into the effects for the second phase of construction and calculated in the emission analysis.

Emissions associated with vehicle exhaust for worker vehicles and trucks were estimated using SMAQMD Road Construction Emission Model Version 5.2, with EMFAC 2002 emission factors, the latest version of this California Air Resources Board model (SMAQMD, 2003) (Appendix H). These emissions were based on a 40-mile round trip for trucks and a 20-mile commute each way for workers. Emissions associated with the operation of construction equipment were estimated using the Sacramento Metropolitan Air Quality Management District's Guide to Air Quality Assessment in Sacramento County (SMAQMD, 2004). Construction equipment data were estimated in the form of equipment descriptions and potential use of all equipment being used simultaneously for 8 hours a day. This information was used to estimate daily and annual exhaust emissions for construction equipment.

Fugitive dust emissions from vehicle travel over unpaved roads and construction activities were estimated using data and emission factors from SMAQMD Road Construction Emission Model Version 5.2, with EMFAC 2002 emission factors, the latest version of this California Air Resources Board model (SMAQMD, 2003).

Table 5 summarizes the input information and assumptions regarding construction activities used to estimate construction emissions. The table lists the anticipated cubic yards of material to be exported by river barge, the anticipated number of employee commute trips, the anticipated number of delivery and haul truck trips, and the construction equipment anticipated to be used.

Thresholds developed by the SMAQMD and the U.S. EPA were used in determining the significance of project air quality effects. Emissions would be considered significant if emissions exceeded the local thresholds established by the SMAQMD for construction activities.

Table 5. Emission Sources and Assumptions Used to Determine Air Emissions

Emission Source	LAR RM 0.5 Mitigation Site
Material placed (onto river barge)	60,000 cubic yards of soil
Employee commute trips	10 employee trips/day, 20 miles each way
Delivery truck trips/ debris haul truck trips	5 truck trips 40 miles average round trip 10 cubic yards average load 20 hauling days
Fuel-fired construction equipment	Crane barge (2) Pick up trucks (2) Tug boats (1) Bulldozer (2) Excavator (2) Loader (2)

Table 6 presents the maximum daily emission estimates in pounds per day (lb/day) for construction of the project, and Table 7 presents the average annual emissions in tons per year (ton/yr).

Table 6. Maximum Daily Construction Emission Estimates

Project Component	July 1 to Nov. 30 (lbs per day)		
	NO_x	ROG	PM_{10}
LAR RM 0.5 Project	156	28	28
Threshold	85	85	275

Table 7. Average Yearly Construction Emission Estimates

Project Component	July 1 to November 30 (tons per year)		
	NO_x	ROG	PM_{10}
LAR RM 0.5 Project	5	1	1
Threshold	25	25	100

Based on this analysis, SMAQMD thresholds would be exceeded for NO_x under the proposed action. This exceedence would occur if all construction equipment operated simultaneously for 12 hours straight per construction day. However, it is anticipated that only the two barge cranes would operate for 12-hour shifts during the project. These barges would be anchored in the water at the project site. The tugboats would only be used to push and pull the barges into position prior to anchoring. Based on the extent and combination of equipment that would be used, it is anticipated that average emissions would not exceed daily thresholds. Emissions from trucks, motor boats, and other construction equipment would only occur when used and never exceed daily thresholds. Federal conformity for NO_x would not be exceeded. Federal conformity for ROG, PM_{10}, and CO would not be exceeded. No sensitive receptors (residences and schools) are located in the project area. Therefore, no sensitive receptors would be affected by short-term increases in dust and other air pollutants.

The proposed mitigation measures identified below would reduce this effect to a less-than-significant level.

3.6.3 Mitigation

Significant air quality effects have been identified, and the Corps would implement the following mitigation measures for NO_x emissions in years where SMAQMD thresholds and Federal thresholds of significance are exceeded.

- The Corps' contractor would provide a plan, for approval by the SMAQMD, demonstrating that the heavy-duty (greater than 50 horsepower) off-road vehicles to be used in the construction project, including owned, leased, and subcontractor vehicles, would achieve a project-wide fleet-average 20 percent NO_x reduction and 45 percent particulate reduction compared to the most recent CARB fleet average at time of construction.
- The Corps and RecBd would pay the SMAQMD an offsite mitigation fee that would be based on the incremental significant emissions at a rate of $14,300/ton (or other negotiated amount) of NO_x, and that the fee would be paid to SMAQMD prior to beginning construction. This mitigation fee would be used as offsite mitigation within the air basin to mitigate NO_x from other ongoing construction projects. The payment is calculated to be $30,459.00 for exceedence of 71 lbs above the 85 lbs/day or 2.1 tons during the construction of the project. This payment may be adjusted prior to

construction once the contractor submits a more detailed emission analysis of equipment proposed for construction along with implemented mitigation measures.

- The Corps' contractor would submit to the SMAQMD a comprehensive inventory of all off-road construction equipment, equal to or greater than 50 horsepower, that would be used a total of 40 or more hours during any portion of the project. The inventory would include the horsepower rating, engine production year, and projected hours of use or fuel throughput for each piece of equipment. The inventory would be updated and submitted monthly throughout the duration of the project, except that an inventory would not be required for any 30-day period in which no construction activity occurs. At least 48 hours prior to the use of subject heavy-duty off-road equipment, the contractor would provide SMAQMD with the anticipated construction timeline including start date, and name and phone number of the project manager and onsite foreman.
- Reducing NO_x emissions from off-road diesel powered equipment
- Require injection timing retard of 2 degree on all diesel vehicles, where applicable.
- Install high pressure injectors on all vehicles, where feasible.
- Encourage the use of reformulated diesel fuel.
- Electrify equipment, where feasible.
- Maintain equipment in tune with manufacturer's specifications.
- Install catalytic converters on gasoline-powered equipment.
- Substitute gasoline-powered for diesel-powered equipment where feasible.
- Use compressed natural gas or onsite propane mobile equipment instead of diesel powered equipment, where feasible.

Standard construction practices would ensure that exhaust emissions from all off-road diesel-powered equipment used on the project site do not exceed 40 percent opacity for more than 3 minutes in any 1 hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) would be repaired immediately, and Corps and SMAQMD would be notified within 48 hours of identification of non-compliant equipment. A visual survey of all in-operation equipment would be made at least weekly, and a monthly summary of the visual survey results would be submitted throughout the duration of the project. The monthly summary would not be required for any 30-day period in which there is no construction activity. The monthly summary would include the quantity and type of vehicles surveyed, as well as the dates of each survey. The SMAQMD and/or other officials may conduct periodic site inspections to determine compliance. Nothing in this section would supersede other SMAQMD or State rules or regulations.

Additional BMP's would be implemented for ozone and PM_{10} to help protect ambient air quality conditions. To reduce ozone and PM_{10} levels, the contractor would perform routine tuning and maintenance of construction equipment to ensure that the equipment is in proper running order. The contractor would monitor dust conditions along access roads and within the construction area to ensure that the generation of fugitive dust is minimized. Water sprays would be periodically applied to disturbed areas and soil stockpiles for dust control, at least two times per day during hot weather. In addition, soil-disturbing activities would be suspended during periods with winds over 25 miles per hour.

With the implementation of these mitigation measures, the project would not exceed SMAQMD thresholds and Federal Thresholds of Significance for the project. As a result, potential emissions due to the project would be below the level of significance for air quality.

3.7 Noise

3.7.1 Existing Conditions

Noise Management. Noise can be defined as unwanted sound and is generally expressed in decibels (dBA). The City of Sacramento has established policies and regulations concerning the generation and control of noise that could adversely affect their residents and noise-sensitive land uses. The Noise Element in the City's General Plan (1988) contains guidelines relating to noise, and the City's Noise Control Ordinance (Chapter 8.68, Noise Control) is the enforcement mechanism for controlling noise in the city.

The City's ordinance states that exterior noise standards for residential areas would not exceed 55 dBA between 7:00 a.m. and 10:00 p.m., and 50 dBA between 10:00 p.m. and 7:00 a.m. However, construction between the hours of 7:00 a.m. and 6:00 p.m., Monday through Saturday, and 9:00 a.m. and 6:00 p.m. on Sunday are exempt from the provisions of the ordinance, provided that internal combustion engines in use on construction sites are equipped with suitable exhaust and intake silencers.

Noise Sources. Noise is generated from vehicles on I-5, Garden Highway, and park roads, as well as boats on the American and Sacramento Rivers. Typical noise levels for heavy traffic such as during commuting hours at 300 feet are 60 dBA (City of Sacramento, 2005). While power boats are limited to 5 miles per hour on the lower American River, power boats are potentially significant noise sources along the Sacramento River. Maximum noise levels of power boat operations on the Sacramento River typically range from 80 to 86 dBA at the riverbank (County of Sacramento, 1993). Park activities also generate noise as people use the recreational facilities and areas offered in the park.

Sensitive Receptors. Noise-sensitive receptors include sensitive land uses and those individuals and/or wildlife that could be affected by changes in noise or noise levels due to the alternatives. The closest noise-sensitive land use to the project area is a residential area about 1,700 feet north of the project area. Sensitive receptors include recreationists, visitors, nearby residents, and wildlife.

3.7.2 Environmental Effects

Significance Criteria. Effects on noise would be considered significant if the alternative would:

- Exceed applicable County of Sacramento noise ordinance limits.

No Action. This alternative would have no effects on existing noise in the project area. Current noise sources and levels would be expected to remain the same.

Construct Mitigation Site. Construction of the project would have short-term effects on noise; however, noise levels would return to pre-project levels once the work is completed. Noise would be generated by equipment and construction activities during the week, and possibly on Saturdays, if necessary. Phase 1 of the construction activity would be expected to create less noise effects due to the limited construction equipment and the time of year when there would be fewer users of the park and American River. Phase 2 of construction is likely to have a greater effect on noise because of the increase in construction equipment, the longer duration of construction, and the increase in recreationists in the vicinity of the construction activity. Mechanized equipment, including bulldozers, heavy trucks, loaders, excavators, backhoes, and barges with associated cranes and equipment can generate peak noise levels ranging from 80 dB to 90 dB at a reference distance of 50 feet.

Construction would be conducted within the times identified in the County General Plan as being exempt from the City noise ordinance. It is not expected that the generation of increased noise due to construction activity in the Parkway above ambient levels would result in effects to recreationists during the week. Should work become necessary on a Saturday, the contractor would coordinate with the Sacramento County Parks and Recreation Department to ensure minimal disturbance to recreationists using the park.

Vibration from construction activity is typically below the threshold of perception when the activity is greater than about 50 feet from sensitive receptors. There are no sensitive receptors within 50 feet of the project site. Because construction activity would not involve high impact activities such as pile driving and is short-term in nature, this effect is considered less than significant.

The increase in noise at the project site would be short term, and noise levels would return to preconstruction ambient levels once construction is completed. Because the noise would not last longer than 120 days, the expected noise levels are not expected to exceed construction noise thresholds, resulting in effects that are less than significant.

3.7.3 Mitigation

The construction contractor would use noise-reducing measures so that equipment noise does not exceed applicable City of Sacramento noise ordinance limits. Measures that can be used to limit noise may include but are not limited to:

- Locating equipment as far as practical from noise sensitive uses.
- Using sound control devices such as mufflers on equipment.
- Using equipment that is quieter than standard equipment.
- Using noise-reducing enclosures around noise-generating equipment.

3.8 Traffic

3.8.1 Existing Conditions

Major and Local Roadways. The major roadways in the vicinity of the project area include Interstate 5 (I-5) (combined with State Route 99) and the Garden Highway. Interstate 5 runs north/south over the American River and Discovery Park to the west of the project area. This multi-lane highway is a major traffic corridor on the West Coast.

The Garden Highway runs east/west along Discovery Park north of the American River and extends west past the convergence with the Sacramento River. The roadway is located on top of the levee on the north side of both the Sacramento and American Rivers. This two-lane roadway provides access to both rivers and the Natomas area.

There are two main entrances into Discovery Park. On the north side of the American River, a local access road, Discovery Park Road, intersects with the Garden Highway and extends south into the park near the project area. South of the American River, access into Discovery Park begins at the intersection of Richards Boulevard and Jibboom Street. North of the Garden Highway, Natomas Park Drive extends into the Natomas area, where it turns into Azevedo Drive, crossing West El Camino Avenue and ending at San Juan Road.

Traffic Types and Volumes. The types of traffic on I-5 and the Garden Highway include cars, sport utility vehicles, semi-trucks, smaller trucks, and motorcycles. The section of I-5 near the project area carries large volumes of traffic, especially during commute hours in the morning and evening. In 2006, the Average Annual Daily Traffic (AADT) for I-5 from Richards Boulevard to Garden Highway was 192,000 (Caltrans, 2006) although traffic continues to increase with ongoing development in Natomas. No traffic volume data for the city street access roads currently exists.

3.8.2 Environmental Effects

Significance Criteria. Effects on traffic would be considered significant if the alternative would

- Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system.
- Exceed either individually or cumulatively, a level of service standard established by the by the county congestion management agency for designated roads and highways.
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.
- Substantially increase hazards due to a design feature or incompatible uses.
- Result in inadequate emergency access.
- Result in inadequate parking capacity.
- Conflict with adopted policies, plans, or programs supporting alternative transportation.

No Action. This alternative would have no effects on existing traffic in or near the project area. The types of traffic would remain the same in the vicinity. However, the volume of traffic is likely to increase as development in the Natomas area continues.

Construct Mitigation Site. This alternative would have short-term effects on traffic in and near the project area during construction. During the first phase of construction, the increase in traffic would last approximately 30 days and would be mostly due to worker round trip commutes to the work site.

The second phase would be expected to have a greater effect on traffic because of the seasonal increase in recreation traffic in the park and construction equipment and personnel at the project site. The second phase of construction occurs during the peak use of the park by recreationists. However, the effects of increased construction traffic within the park would be minimized by working during off-peak traffic hours and the close proximity of the project site to a park exit. Construction equipment such as loaders, excavators, backhoes, and bulldozers would be expected to be delivered to the project site via local roads and left onsite until construction is completed. After completion of the project, the construction equipment would be removed from the site over existing roads.

Construction equipment and worker vehicles would enter Discovery Park from I-5, Garden Highway, Richards Boulevard, and Jibboom Street. In addition, haul trucks could use the major roadways to transport construction materials to and from the work site. Any increase in traffic from the trucks would be less than significant as compared to the current traffic volume. There would be trucks entering the site to deliver construction materials and remove construction debris as necessary. However, soil material excavated from the site would be removed by barge and not transported over roadways.

Worker vehicles would make approximately 10 round trips per day during business hours of 6:00 a.m. to 5:00 p.m. However, most trips would occur during off-peak traffic hours from 9:00 a.m. to 4:00 p.m., and workers would be expected to park in the construction staging area. Overall, this effect is considered less than significant. However, to avoid any potential delays or safety issues on Garden Highway or other haul routes, a traffic control plan would be developed and implemented as discussed below.

3.8.3 Mitigation

The construction contractor would coordinate the City of Sacramento and County Parks to prepare a traffic control plan prior to construction. This traffic control plan would include specific measures to manage traffic in the project area and along haul routes. The plan would be submitted to the City of Sacramento and Sac County Parks for review and approval prior to initiation of the second phase of construction. The purpose of the plan would be to:

- Reduce, to the extent feasible, the number of vehicles (construction and other) on the roadways adjacent to the project area.
- Reduce, to the extent feasible, the interaction between construction equipment and other vehicles.

- Promote public safety through actions aimed at driver and road safety.

The traffic control plan would include the measure listed below. Implementation of these measures would reduce any effects on traffic to less than significant.

- Provide access for emergency vehicles at all times.
- Maintain access for driveways and private roads.
- Provide adequate off-street parking for construction.
- Identify any roadway segments or intersections that are at or approaching a level of service that exceeds local standards. Provide a plan for construction traffic to avoid these locations at the peak periods.
- Include flag persons to direct drivers in traffic controls on major roads.
- Maintain access to, and movement of, public transit.
- Post construction warning signs.
- Provide written notification to contractors regarding access roads, as well as weight and speed limits on those roads.
- Post a sign (minimum size of 1 square yard) at all active construction sites giving contact information for complaints regarding construction traffic.

3.9 Recreation

3.9.1 Existing Conditions

Discovery Park. The project area is located in Discovery Park, located at the confluence of the American and Sacramento Rivers immediately north of downtown Sacramento (Plate 10). The park is part of the Parkway, which extends approximately 29 miles from Folsom Dam to the American River confluence with the Sacramento River. The Parkway provides important wildlife habitat, a high quality water source, a State-designated floodway, and regional recreation. The lower American River is classified as a "recreation river" under the Federal and State Wild and Scenic River Acts.

Discovery Park is a highly used recreation area, providing unique recreational facilities and opportunities. There is a total of 559 acres of the parkland in Discovery Park, of which 130 acres are designated for "Developed Recreation" and 53 acres are designated for "Limited Recreation." The remaining acres are identified as "Protected Area" and "Nature Study Area." In addition to diverse natural resources, Discovery Park area contains several archaeological sites.

The Discovery Park area also includes the Discovery Park East area, which is bounded by Discovery Park on the west and Highway 160 on the north. Privately owned properties in this area include the Riverdale Mobile Home Park, Camp Pollock, a Boy Scouts of America camp, and the Gardenland Sand and Gravel Mine (Urrutia) site. The remaining land is owned by the County. Trails crossing the private land are on established easements.

Discovery Park proper is substantially developed and is one of the most intensively used areas in the Parkway. A six-lane boat access ramp and parking area, information kiosk,

restrooms, and fish cleaning facility occupy the western end of the park. A large turfed picnic area for families and groups, with parking and restrooms, occupies the central portion of the park. A field archery range and target archery range are located toward the east end of the park along with an equestrian staging area. The Jedediah Smith Memorial Bicycle Trail (American River bike trail) and adjacent pedestrian trail, which begins at Discovery Park and continues to Folsom Lake, meanders through the area. The trail system is used for bicycling, walking, hiking, running, and in-line skating. The project area is just south of the bike trail near the archery range and its adjacent parking lot.

Because of the proximity to downtown Sacramento, the area is a popular spot for boating, fishing, swimming, picnicking, and other water-dependent recreational activities. The boat ramp is the only off-channel launch facility in the area and allows boaters' access to both the American and Sacramento Rivers. There are reservable picnic areas with barbeques, picnic tables, and a playground. The archery target range and the archery field range are unique facilities located within riparian vegetation. The equestrian staging area is a large nonpaved area that is connected to a separate equestrian/hiking trail that follows Bannon Slough and extends to Folsom Lake. The park is open year round from sunrise to sunset. Parking fees are collected 365 days a year.

Tiscornia Park. Tiscornia Park is located on the left bank (south side) of the American River at the confluence with the Sacramento River. This small park was donated to the City of Sacramento in memory of Captain Tiscornia, and is maintained and operated by the Sac County Parks. The entire park is designated for Developed Recreation. Tiscornia Park is mostly composed of a sandy beach and is a popular area for sunbathing, picnicking, and fishing. Access into the park is via Jibboom Street, which also provides access to Discovery Park.

Other Bank and Beach Areas. Jibboom Street East is a narrow strip of land extending along the left bank (south side) of the river between the I-5 bridge and the Highway 160 bridge, on the north side of downtown Sacramento. This is a popular area for boaters who escape from the busy Sacramento River to the relative tranquility of the American River. The river bank is popular for fishing and day use. A large sandy beach at the terminus of North 10th Street is a popular area for picnicking, and the bank itself is a maze of informal trails used by anglers and other hikers. The downstream end is easily accessible from parking facilities at Discovery and Tiscornia Parks.

3.9.2 Environmental Effects

Significance Criteria. Effects on recreation would be considered significant if the alternative would:

- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.
- Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.
- Result in a substantial, loss of recreational opportunities.
- Substantially increase the risk of injury to recreationists in or adjacent to the project area.

No Action. This alternative would have no effects on the existing recreation facilities, opportunities, or use in or near the project area. In addition, navigation safety conditions on the lower American River would remain the same.

Construct Mitigation Site. This alternative could have significant short-term effects on recreation during both phases of construction. During the first phase of construction, the project site and adjacent areas would be closed to the public. The bike trail would be intermittently affected by construction equipment and trucks that would cross the trail to access the project area. A flagperson would be present to direct safe passage along the bike trail along with posted warning signs alerting to construction activities in the vicinity. The effects of phase 1 would last for approximately 30 days in the winter months when bike trail use is expected to be light.

Phase 2 would have similar effects on the bike trail and adjacent areas; however, the user activity in the park and on the American River is expected to be higher because the work would occur in the summer months and over a longer period of time. The amount of construction equipment and their need to access the project area would likely cause more numerous interruptions and detours to the bike trail and other nearby park amenities than during phase 1.

Detours and alternate routes would be created, as necessary. Most of the project area is inaccessible due to steep slopes and thick vegetation; therefore, recreation activities would not be affected by construction. Discovery Park and the boat launch facility would continue to operate normally, and signs would be posted at the park and dock area, notifying the public of the construction activities at the project site. It is anticipated that the barge and tugboats would occupy approximately 200 feet of the river channel.

The shaping and grading of soil, placement of 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, with the exception of the temporary closures. The use and anchoring of a barge would obstruct a portion of the river adjacent to the project area. Appropriate signs and lighting in and around the barge would alert boaters to the presence of the barge and in-water activities. The lighting, warning signs, and the 5 mph speed limit for boating on the American River would reduce the risk of boating accidents to less than significant. Existing trees would remain in place to provide shade, nesting, and quality habitat for wildlife. The installation of elevated benches, native riparian vegetation, and IWM would not have a diminished appeal to recreationists as compared to existing conditions. As a result, there would be no substantial loss of recreational values in the project area.

Existing IWM and underwater vegetation pose a threat to recreationists who travel near the river bank. Most boat operators, jet skiers, and swimmers usually avoid sections of river where snags, downed trees, strainers, logs, and concrete debris occur. Implementation of the project adds new highly visible IWM that would be configured to reduce any injuries or other risks to Discovery Park users and recreationists on the American River and Parkway. A more gradual slope and a plantable soil surface would replace the very steep banks of the project site. This modification would reduce the current risk of falling to bank users. In addition, if watercraft becomes trapped at this site or if a swimmer needs to vacate the river, the graduated

elevations would provide an area that could be easily accessed. As a result, there would be no substantial loss of recreational values at the project site. Therefore, this effect is less than significant.

3.9.3 Mitigation

The placement of IWM would incorporate the following design factors to minimize the risk to recreationists:

- The design would ensure local approach visibility and would incorporate the use of natural indicators, such as a partially emergent portion of the IWM, in combination with vegetation on the lower elevated benches to act as a visual warning of the presence of shallowly submerged hardscape so as to reduce the hazard to power boaters and paddlers. This would ensure visual warning so that boaters, swimmers, and other recreationists would have adequate time to avoid the IWM and possible injury or damage to property.
- The IWM would be placed in a manner that reduces its ability to act as a "strainer," thus reducing the risk to recreationists swimming or operating self-propelled watercraft. Specifically, the outboard portions of IWM would be oriented in a downstream direction or would be installed in the form of relatively compact rootwads that would tend to deflect watercraft and reduce the risk for entrapment or straining within the IWM.
- Detours and alternate routes would be imposed as necessary around the project area and within the construction area so recreationists would avoid any hazards and still use the area not affected by project activities.
- Construction personnel would notify boaters and jetskiers if they approach within 100 feet of in-water construction equipment (barges and tugboats) to stay away and avoid driving close to the construction area.

3.10 Esthetics/Visual Resources

3.10.1 Existing Conditions

Esthetic resources are those natural resources, landforms, vegetation, and manmade structures in the regional and local environment that generate one or more sensory reactions and evaluations by the viewers. The city of Sacramento lies within the large flat Central Valley area with the Coast Ranges to the west and the Sierra Nevada to the east. The regional viewshed in Sacramento includes large areas of residential, commercial, and industrial urban development with the lower American River and Parkway area providing a corridor of waterway and natural vegetation. There are no State-designated scenic highways or other visual resources in or near the project area.

The project area is located on relatively flat, elevated flood plain. Before a wildfire in 2001, the project area consisted of mature riparian forest, dominated by cottonwood and valley oak. Most of the riparian forest in the interior portion of the project area was destroyed during the wildfire in 2001. Remnant stands of riparian forest and large snags occur near and along the bike path. In addition, ruderal shrub and herbaceous vegetation occurs in the project area, consisting of Himalayan blackberry and other nonnative vegetation. Riparian scrub habitat,

consisting primarily of, wild rose and elderberry, have colonized the areas disturbed by the fire and along the riverbank. These vegetation types provide nearly 100 percent vegetative cover.

As a result, local views in the project area include scenic undeveloped areas with areas of both dense and scattered vegetation. Nearby areas in Discovery Park offer paved parking areas, open recreational areas, and facilities for picnicking and archery. The American River offers scenic views of open water and associated instream habitat near the project area. In the project area, viewers include recreationists, visitors, and Park staff. Nearby viewers include motorists on nearby roadways, boaters and swimmers on the lower American River, and individuals on the opposite bank of river.

3.10.2 Environmental Effects

Significance Criteria. Effects on esthetics would be considered significant if an alternative would:

- Have a substantial adverse effect on a scenic vista.
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway.
- Substantially degrade the existing visual character or quality of the site and its surroundings.
- Create a new source of light or glare, which would adversely affect day or nighttime views in the area.

No Action. This alternative would have no effects on existing esthetics or visual resources in the project area. The natural landscape and views along this bank of the lower American River would remain the same.

Construct Mitigation Site. This alternative could have short-term adverse effects and long-term benefits on esthetics and visual resources. During the first phase, a spade truck, backhoe, and other elderberry transplant equipment may be visible from Discovery Park and the American River. Phase 1 would occur in the winter months when the park is expected to have fewer visitors and the views of the construction equipment would be expected to be obscured by the heavy vegetation.

Phase 2 of the project would occur in the summer and fall when the recreation facilities are more heavily used and require more equipment that would be visible in the park and along the American River. A crane on top of a barge or on land would be visible at the project area. Boaters, pedestrians, bicyclists using Discovery Park, and motorists traveling on I-5 would see the construction equipment. The presence of construction equipment would temporarily degrade the visual quality of scenic vistas. This disturbance would increase visual contrast and could be considered adverse by some viewers. However, the effects would be limited to the duration of construction. The long-term effects would be considered beneficial because of the removal of nonnative vegetation and the planting of native vegetation on newly created benches, creating a more diverse riparian habitat. These effects are considered to be less than significant.

3.10.3 Mitigation

Revegetation and site restoration as incorporated into the project would add more visual resources to areas that have been degraded and improve viewshed opportunities for users of Discovery Park and the American River and Parkway. Therefore, no mitigation is required.

3.11 Cultural Resources

3.11.1 Existing Conditions

Records Search and Literature Review. On April 6, 2005, Jones & Stokes conducted a records search at the North Central Information Center of the California Historical Resources Information System. The records search area encompassed the area of potential effect (APE) and an approximately 0.43-mile radius from the APE. In addition, Jones & Stokes consulted previous cultural resource studies and maps on file in their office, as well as published syntheses on area prehistory, Native American ethnography, and history.

The records search and literature review indicate that a total of 12 cultural resource studies have been conducted in or adjacent to the APE. One recorded cultural resource, CA-Sac-26, is located near the APE, but no cultural resources have been identified in the APE (SAFCA, 2007). Ground surface visibility in the project area, however, was poor at the time of the two cultural resource inventories that encompassed the entire APE.

Native American Coordination. To determine whether cultural resources of cultural or religious importance to Native Americans have been identified in the APE, Jones & Stokes requested that the Native American Heritage Commission (NAHC) search its sacred-lands file for records of such resources. The NAHC provided a response via facsimile on April 13, 2005, indicating that its files contain no record of sacred sites in the APE. The NAHC also provided a list of Native Americans that may have information about such resources in the APE. On March 8, 2006, Jones & Stokes mailed consultation letters and APE maps to the individuals named on the NAHC's contact list, as well as other persons recommended by SAFCA based on their previous projects in the lower American River corridor.

Jones & Stokes received two responses from the Ione Band of Miwok Indians (Ione Band) in response to the March 8 letters, as well as telephone calls and electronic mail sent by Jones & Stokes. Native American representatives expressed an interest in a field review of the APE, but did not claim specific knowledge of cultural resources in the APE. The initial response received from the Ione Band on May 10, 2006, was that Jones & Stokes should contact the Shingle Springs Rancheria because the APE is in its traditional land. Despite prior attempts to engage the Shingle Springs Rancheria regarding the proposed undertaking, Jones &Stokes received no response.

In response to an April 25, 2006, e-mail from Jones & Stokes, a member of the Ione Band's Cultural Committee e-mailed Jones & Stokes on April 26, 2006, expressing an interest in a field review of the APE. That individual and Jones & Stokes archaeologist conducted a field review of the APE and also visited CA-Sac-26 on September 15, 2006. They examined pedestrian-accessible portions of the APE, where Jones & Stokes explained their 2005 limited

auger-testing program and the proposed project excavation. They also examined the nearby archaeological site to assess the site's proximity to the APE. Pusune maintained its mounded structure, rising approximately 5 to 10 feet above the surrounding ground surface, including the APE. No archaeological materials were observed at the site, although its close proximity to the American River bike trail and the remnants of itinerant camps clearly attest to Pusune's vulnerability to unauthorized artifact collection (SAFCA, 2007).

Subsequent to the field review, the Native American representative indicated that a Native American monitor approved by the Ione Band should participate in the upcoming archaeological excavation and monitor construction of the proposed project. SAFCA agreed to have an Ione Band-approved Native American monitor participate in the presence/absence excavation. The Ione Band assigned an individual to monitor the presence/absence excavation.

Field Survey. Jones & Stokes conducted a field reconnaissance of the APE in May 2005 to assess the feasibility of conducting an archaeological survey. The APE is covered with dense riparian vegetation, most notably poison oak, wild grapevines, and blackberries, all of which obscured the ground surface and constrained passage through the APE.

Because a systematic surface inspection of the APE was not possible under the conditions described above, and a large village site is located in general proximity to the APE, SAFCA authorized Jones & Stokes to conduct presence/absence excavations as an alternative to surface inspection. The presence/absence excavation program consisted of hand-excavated auger tests and mechanically excavated trenches.

Because the APE is directly adjacent to the recorded boundary of CA-Sac-26 and because dense vegetation in the APE prohibited any archaeological survey from being conducted, it was necessary to implement a subsurface presence/absence test excavation program within the APE. In total, 10 auger tests and four backhoe trenches were excavated in order to identify any potential archaeological resources within the project APE. As a result of the testing program, no archaeological materials were found to be located within the APE (SAFCA, 2007).

3.11.2 Environmental Effects

Significance Criteria. Any adverse effects on cultural resources that are listed or eligible for listing on the NRHP are considered to be significant. Effects are considered to be adverse if they:

- Alter, directly or indirectly, any of the characteristics of a cultural resource that qualify that resource for the NRHP so that the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association is diminished.

No Action. This alternative would have no effects on existing cultural resources or historic properties in or near the project area.

Construct Mitigation Site. The Corps has determined that there are no identifiable historic properties within the project's area of potential effect (APE). Since there are no historic properties present, the Corps finds that there would be no historic properties affected by

construction of the project. However, because of access limitations, Jones & Stokes test-excavated a relatively small portion of the APE, warranting caution in generalizing from the test excavations to the rest of the APE. Although a reasonable and good faith effort to identify historic properties has been completed and the proposed undertaking cannot be said to result in effects on historic properties, the Corps would ensure that a qualified archaeologist and representative of the Ione Band of Miwok Indians monitor vegetation removal and excavation in the APE to ensure a timely response to any archaeological discoveries.

3.11.3 Mitigation

The APE lies close to the County of Sacramento's Archaeological Resource Zone within Discovery Park and lies within a geographic area that is considered sensitive for the presence of cultural resources and Native American traditional cultural properties. Due to this sensitivity, the Corps would ensure that a professionally qualified archaeologist be present during any ground-disturbing activities.

If potentially significant cultural resources are discovered during construction, all ground-disturbing activities would cease in the area of the discovery of the find, and the Corps would proceed under Section 106's procedures for post-review discoveries (36 CFR 800.13).

4.0 CUMULATIVE AND GROWTH-INDUCING EFFECTS

4.1 Cumulative Effects

The NEPA and CEQA require the consideration of cumulative effects of the proposed project combined with the effects of other projects. The NEPA defines a cumulative effect as the effect on the environment which results from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (CFR 40 Part 1508.7). The CEQA Guidelines define cumulative effects as "two or more individual effects which, when considered together, compound or increase other environmental impacts" (Section 15355).

4.1.1 Projects

The following projects are in the vicinity of the mitigation project area, upstream on the American River and near the confluence with the Sacramento River:

Long-Term Reoperation of Folsom Reservoir. The current water control manual for Folsom Reservoir requires 400,000 acre-feet of flood storage capacity during the flood season. However, the reservoir is currently operated for additional flood storage capacity through an agreement between the U.S. Bureau of Reclamation and SAFCA. This "interim reoperation" requires a variable flood storage capacity of 400,000 to 670,000 acre-feet, depending on upstream storage conditions. These agencies continue to consider options for long-term reoperation of the Folsom Reservoir, pending other long-term improvements to the American River flood control system.

American River Common Features Project. The Corps, RecBd, and SAFCA are implementing ongoing programs for levee stability along the lower American River, Sacramento River, Natomas Cross Canal, and elsewhere in the Sacramento area. The lower American River levee projects are being implemented pursuant to the 1996 and 1999 Water Resources Development Act authorizations and other programs. Substantial levee improvement work is currently underway.

Folsom Dam Mini Raise. The Corps through the construction of the Folsom Dam Mini Raise plan would strengthen the dam and reduce the annual probability of flooding in Sacramento to approximately 1 in 200 when implementing other authorized components of the American River Watershed Project. The plan also includes environmental restoration features for wildlife habitat along the lower Parkway. In addition, temperature control shutters at Folsom Dam would be mechanized to improve the regulation of water temperature to increase native salmon and steelhead populations.

Folsom Bridge Project. The Corps is constructing a new bridge downstream of Folsom Dam Road. Part of the American River Watershed Project, the new bridge will alleviate traffic congestion in downtown Folsom associated with the closure of Folsom Dam Road. The road formerly accommodated 18,000 vehicles a day. Construction began in March 2007 and is scheduled to open in the winter of 2008-2009.

Folsom Dam Advanced Release. The Corps in coordination with the Department of Interior is in the process of updating the Flood Management Plan for Folsom Dam to increase flood protection through increased release capacity generated by the modification of the outlets at Folsom Dam. Dam releases would be increased based on the Advanced Hydrologic Prediction System of the National Weather Service.

Sacramento River Bank Protection Project. The SRBPP is a long-range program of bank protection authorized by the Flood Control Act of 1960. The SRBPP directs the Corps to provide bank protection along the Sacramento River and its tributaries, including that portion of the lower American River bordered by Federal flood control project levees. Beginning in 1996, erosion control projects at five sites covering almost 2 miles of the south and north banks of the lower American River have been implemented. Additional sites at RM 149 and RM 56.7 on the Sacramento River have been constructed since 2001. This is an ongoing project, and additional sites requiring maintenance will continue to be identified until the remaining authority of approximately 30,000 linear feet is exhausted.

Goethe East Conservation Area. The 35-acre project area, located at RM 14.7 in the American River Parkway, is an ongoing, multi-project, multi-agency effort that provides beneficial cumulative effects by creating contiguous habitat for the VELB, including reestablishing riparian habitat, reducing invasive species, and providing buffers for natural river channel changes. This project establishes VELB habitat and is protected in perpetuity to offset the effects of other projects.

4.1.2 Cumulative Effects

This project in conjunction with the past, present, and future projects in the vicinity could have adverse or beneficial cumulative effects on several of the resources considered in detail in this EA/IS. These resources include vegetation and wildlife, fisheries, special status species, water quality, recreation, and esthetics. There would be no cumulative effects on cultural resources.

Vegetation and Wildlife. This and other projects have removed small portions of the riparian and oak woodland habitats in the Parkway. These projects have resulted in localized removal of vegetation and substantial short-term disturbances of wildlife habitat, but have not substantially reduced the connectivity or extent of natural vegetation and wildlife habitat along the American River. Mitigation, through the establishment of native vegetation on the Parkway for this and other projects, cannot eliminate significant short-term effects on vegetation and wildlife associated with construction activities. However, such mitigation is expected to result in a net, long-term improvement in native vegetation and wildlife habitat values in the Parkway primarily by restoring degraded areas at a ratio higher than what was removed.

Fisheries. Stream bank and other water projects have resulted in short-term disturbance and displacement of fish. Short-term increases in turbidity and suspended sediment could adversely affect fish and aquatic habitat by disrupting feeding activities of common fish species or result in the temporary displacement from preferred habitats. The Corps would prepare a storm water pollution prevention plan (SWPPP) that identifies BMP's that would be implemented to avoid or minimize movement of soils into the water. The improvement to fisheries and aquatic habitat through the increase in shallow water habitat for juvenile salmonids due to the creation of various elevations of the vegetated benches that include IWM for this project and the mitigation requirements of other projects would have long-term beneficial effects. These restoration and mitigation efforts would increase preferred fish habitat resulting in cumulative effects that are less than significant.

Special Status Species. The project would result in direct and indirect effects on elderberry plants, which is the host plant for the Federally listed threatened VELB. Due to the limited spatial extent of elderberry shrub removal, prevalence of existing elderberry shrubs in the project vicinity, transplanting of approximately 30 shrubs from the project footprint to the transplant areas, and the addition of new plantings, the overall extent and connectivity of VELB habitat is not expected to be diminished by the project. While this and other projects have resulted in short-term, localized effects to VELB habitat, the incorporation of habitat mitigation on the Parkway is expected to result in the long-term, cumulative improvement to VELB habitat on the Parkway and ultimately assist in the recovery of the species. As a result, the project would not contribute significantly to cumulative adverse effects on the VELB.

The project could result in effects to Swainson's hawks or Cooper's hawks that may be nesting in the project vicinity. If raptors are found nesting in the project area, CDFG would be notified, and measures would be implemented to ensure there would be no adverse effects. Through the use of appropriate avoidance and minimization measures on this and previous projects, the cumulative effects to special status raptors has been reduced to less than significant.

For special status fish species, the increase in turbidity and suspended sediments would be a short-term effect that would be mitigated with the use of BMP's. The long-term effects of this project would be beneficial with the addition and increased value of shallow water, near shore habitat including elevated benches with aquatic vegetation, IWM, and SRA. The cumulative effect of this and other projects is less than significant since the project and all other project actions affecting special status species are under the jurisdiction of the USFWS and National Marine Fisheries Service, and subject to compensation measures required by the agencies.

Effects to special status species by other projects are expected to be less than significant since they would be regulated under Section 7 or 10 of the Federal Endangered Species Act or by the CDFG. These agencies would work with project proponents to compensate for their actions to a level that would reduce their effects to less than significant.

Water Quality. The project could result in increased turbidity due to soil and sediment disturbance, and accidental spills or leaks that could affect surface and ground water resources. Phase 2 construction would occur during the low-flow period, which would minimize the potential increased turbidity and stormwater erosion. This typically involves the implementation of site-specific stormwater BMP's to avoid and minimize the release of stormwater to offsite receiving waters. Related effects may also occur as a result of other local projects including the lower American River levee improvements and future Sacramento River Bank Protection Projects. The use of site-specific stormwater BMP's would mitigate for soil and sediment disturbance, and as a result, the project would not contribute significantly to cumulative effects on water resources and quality.

Air Quality. All projects involving construction using earthmoving equipment generate criteria pollutants such as NO_x, ROG, PM_{10}, and CO. As such, all construction within the air basin would contribute pollutants, affecting the current air quality. Because of the nonattainment status of the air basin, any additional contributions are considered as potentially significant cumulative effects. However, all projects would be required to reduce or offset their emissions in compliance with Federal, State, and/or local standards. Thus, any cumulative effects would be expected to be less than significant.

Emissions for the RM 0.5 project would not exceed Federal standards, and only emissions of NOx would exceed the SMAQMD thresholds. Mitigation would consist of BMP's and implementation of measures including dust control, requiring the contractor to properly tune and maintain construction equipment, payment for exceeding NO_x emissions above 85 lbs/day from mobile source construction equipment, and the purchase of additional air quality credits, if necessary. Implementation of the BMP's and measures during construction would reduce any project contribution to cumulative effects to less than significant.

Recreation. The loss of recreation opportunities such as the use of the bike trail and access to portions of the American River adjacent to the project area would be intermittent and temporary. Due to mitigation paid in fees to County Parks through the Habitat Restoration Program (HRP) and less-than-significant effects on recreation for this and other projects, the

effects are less than significant. This project and other similar past, present, and reasonably foreseeable future projects are not expected to result in changes to recreation access or opportunities on the Parkway, and therefore are not expected to result in adverse cumulative effects.

Esthetics. The presence of construction equipment clearing and excavating the landscape would have temporary visual effects. These effects would be limited to the construction period, and the revegetation and restoration of the project area to a more natural riparian habitat would improve the esthetics. Other projects have contributed to adverse effects on esthetics with the removal of vegetation and the addition of revetment structures. These effects are mitigated through the establishment of native trees, shrubs, and grasses that are not expected to have long-term significant effects. Due to the mitigation of other projects and the beneficial effects of this project, the cumulative effects on esthetics are considered to be less than significant.

4.2 Growth-Inducing Effects

The project would not directly remove obstacles to growth, result in population increases, or encourage and facilitate other activities that could significantly affect the environment. New development must be consistent with existing City and County general plan policies and zoning ordinances regarding land use, open space, conservation, flood protection, and public health and safety. The project area is currently designated by Sacramento County as Parks-Recreation-Open Space and is identified as a "Protected Area" in the American River Parkway Plan. Therefore, the project is not expected to induce any growth in the area.

5.0 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

5.1 Federal Requirements

Clean Air Act of 1972, as amended, 42 U.S.C. 7401, et seq. *Compliance.* The Corps completed an analysis of air quality effects from the proposed action and determined that the estimated emissions and PM_{10} would not exceed Federal *de minimus* thresholds. The Corps has also determined that the proposed action would have no adverse effect on the future air quality of the project area. Therefore, no conformity determination would be required.

Clean Water Act of 1972, as amended, 33 U.S.C. 1251, et seq. *Full Compliance.* The proposed action includes placement of materials in the waters of the U.S. This may result in the temporary suspension of sediments at and immediately downstream of the work site. A Section 404(b)(1) evaluation and Section 401 water quality certification application for the project are included in Appendix F.

Endangered Species Act of 1973, as amended, 16 U.S.C. 1531, et seq. *Partial Compliance.* A list of threatened and endangered species that may be affected by the project was obtained from the USFWS website on August 28, 2007 (Appendix C). The draft EA/IS will be sent to NMFS, requesting concurrence with the Corps determination of may affect, not likely to adversely affect, the fish species under their jurisdiction. Subsequent consultation with the USFWS and NMFS concerning this project may be required.

Executive Order 11988, Floodplain Management. *Full Compliance.* This order directs all Federal agencies approving or implementing a project to consider the effects that project may have on flood plains and flood risks. To evaluate this potential, a 2-dimensional hydraulic modeling analysis of the various features of the project was conducted. The analysis concluded that the effects on velocity and the water-surface elevation are very small, if not negligible, and localized to the project area. The modeling results are included in Appendix G.

Executive Order 11990, Protection Wetlands. *Full Compliance.* The project would avoid all work in any existing wetlands, as well as create Zones 1, 2, and 3, for a total of 1.8 acres of wetlands and or shallow water habitat.

Executive Order 12989, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. *Full Compliance*. The proposed action would not adversely affect any minority or low-income populations.

Farmland Protection Policy Act, 7 U.S.C. 4201 et seq. *Full Compliance.* There are no designated Prime and Unique Farmlands within the project area. In addition, this area is not used for farming activities.

Fish and Wildlife Coordination Act of 1958, as amended, 16 U.S.C. 661, et seq. *Full Compliance*. The USFWS has participated as an active member of the team in evaluating the existing site and proposed mitigation project. The USFWS provided a Planning Aid Letter dated October 4, 2007 (Appendix B).

Magnuson-Stevens Fishery Conservation and Management Act. *Full Compliance*. The project would have no significant adverse effects on Chinook salmon, nor would it likely destroy or adversely modify the designated critical habitat for these species. This EA serves as the Corps' EFH assessment for Chinook salmon.

Migratory Bird Treaty Act of 1936, as amended, 16 U.S.C. 703 et seq. *Full Compliance*. The project would be scheduled to avoid disturbance of active nests or young of migratory birds that breed in the area. In addition, a biologist would survey the area prior to initiation of construction. If active nests are located, a protective buffer would be delineated, and the area would be avoided until the nests are no longer active.

National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321, et seq. *Partial Compliance*. Comments received during the public review period will be considered and incorporated into the final EA. The final EA and signed FONSI will be in full compliance with this act.

National Historic Preservation Act of 1966, as amended. *Partial Compliance.* The project would have no effect on known historic properties. However, any unforeseen resources discovered during construction would be treated in accordance with the procedures set forth in Section 106 of the NHPA. The Corps sent a letter dated November 28, 2007, requesting the

SHPO's concurrence with a finding of No Effect for the project (Appendix I). The response from the SHPO will be included in the final EA/IS.

Wild and Scenic Rivers Act, 16 U.S.C. 1271 et seq. *Full Compliance*. The lower American River has been designated as a recreational component of the Federal Wild and Scenic Rivers system. The project would neither adversely affect the resources for which the American River was designated nor adversely affect the river's free-flowing status.

5.2 State of California

California Environmental Quality Act. *Partial Compliance*. This joint NEPA/CEQA document will fully comply with CEQA requirements. Adoption of a Mitigated Negative Declaration will provides full compliance by the RecBd.

State Water Resources Control Board, Division of Water Quality, and California Regional Water Quality Control Board, Central Valley Region. This draft EA/IS has been forwarded to the Regional Water Quality Control Board for review. The Section 401 certification under the Clean Water Act will be completed following CEQA documentation. An application for water quality certification is included in Appendix F.

California Department of Fish and Game, Region 2. *Full Compliance*. The CDFG requires a Streambed Alteration Permit for any activity that will change the natural state of any lake, river, or stream in California. Since the Corps is the Federal lead for the project, the DFG considers the project to be a Federal project, exempt from the State requirement for a Streambed Alteration Permit under Section 1602 regulations.

State Lands Commission. *Partial Compliance*. The State Lands Commission has exclusive jurisdiction over all ungranted tidelands and submerged lands owned by the State and the beds of navigable rivers, sloughs, and lakes. A project cannot use these State lands unless a lease is first obtained from the State Lands Commission.

Prior to initiation of Phase 2, the Corps will determine whether the project requires a lease from the State Lands Commission. This requirement will depend on the exact boundary of this agency's jurisdiction at the time of construction. Because of the nature of the project, any use of submerged lands under their jurisdiction would be expected to be limited. If a lease is needed, the Corps would comply with any measures required by the Commission.

State Reclamation Board (California Water Code, Title 23). *Partial Compliance.* The RecBd regulates any encroachments within an adopted plan of flood control and sets permissible work periods for regulated streams, including the excavation, borrow, and vegetation removal activities within the channel. The RecBd is the non-Federal sponsor for the proposed project at RM 0.5. Once the EA/IS is finalized, the RecBd will sign the Mitigated Negative Declaration. At that point, the project will be in full compliance with all RecBd regulations.

5.3 Local Laws, Programs, and Permits

Sacramento County Code, Section 9.36.062. *Partial Compliance*. Pursuant to this code, the SAFCA has obtained Encroachment Permit 06-02 from the Director of the Department of Regional Parks, Recreation and Open Space to transplant and elderberries and construct the mitigation site. As the non-Federal sponsor, the RecBd will also be required to certify that they have the rights needed to construct and maintain the project in perpetuity.

Sacramento County Habitat Restoration Program. *Partial Compliance*. In compliance with this program, a total of $100,000 in fees is required to be paid to Sacramento County to transplant the elderberries and construct the mitigation site in the Parkway. An additional $10,000 is required to fund coordination with County staff.

Sacramento Metropolitan Air Quality Management District. *Partial Compliance.* Since the project is located in a non-attainment area, BMP's for ozone and particulate matter would be implemented to help protect ambient air quality conditions. The SMAQMD will be provided with a copy of the EA/IS for review and comment during the public review period.

6.0 COORDINATION AND REVIEW OF THE DRAFT EA

The draft EA/IS will be circulated for 30 days to agencies, organizations, and individuals known to have an interest in the proposed project. All comments received will be considered and incorporated into the final EA/IS, as appropriate. This project is being coordinated with all relevant government resources agencies including USFWS, NMFS, California SHPO, DWR, CDFG, Sacramento County, and SAFCA.

7.0 FINDINGS

Based on the information in this EA/IS, the Lower American River Mile 0.5 Mitigation project would have no significant adverse effects on the quality of the human environment, and the BMP's and mitigation measures proposed in the EA/IS are sufficient to reduce potential adverse effects to less than significant. Following the public review period, determinations will be made whether a FONSI and Neg Dec are warranted or whether preparation of an EIS and EIR is necessary.

8.0 LIST OF PREPARERS

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U.S. Army Corps of Engineers

Brian Luke, Biologist
U.S. Army Corps of Engineers

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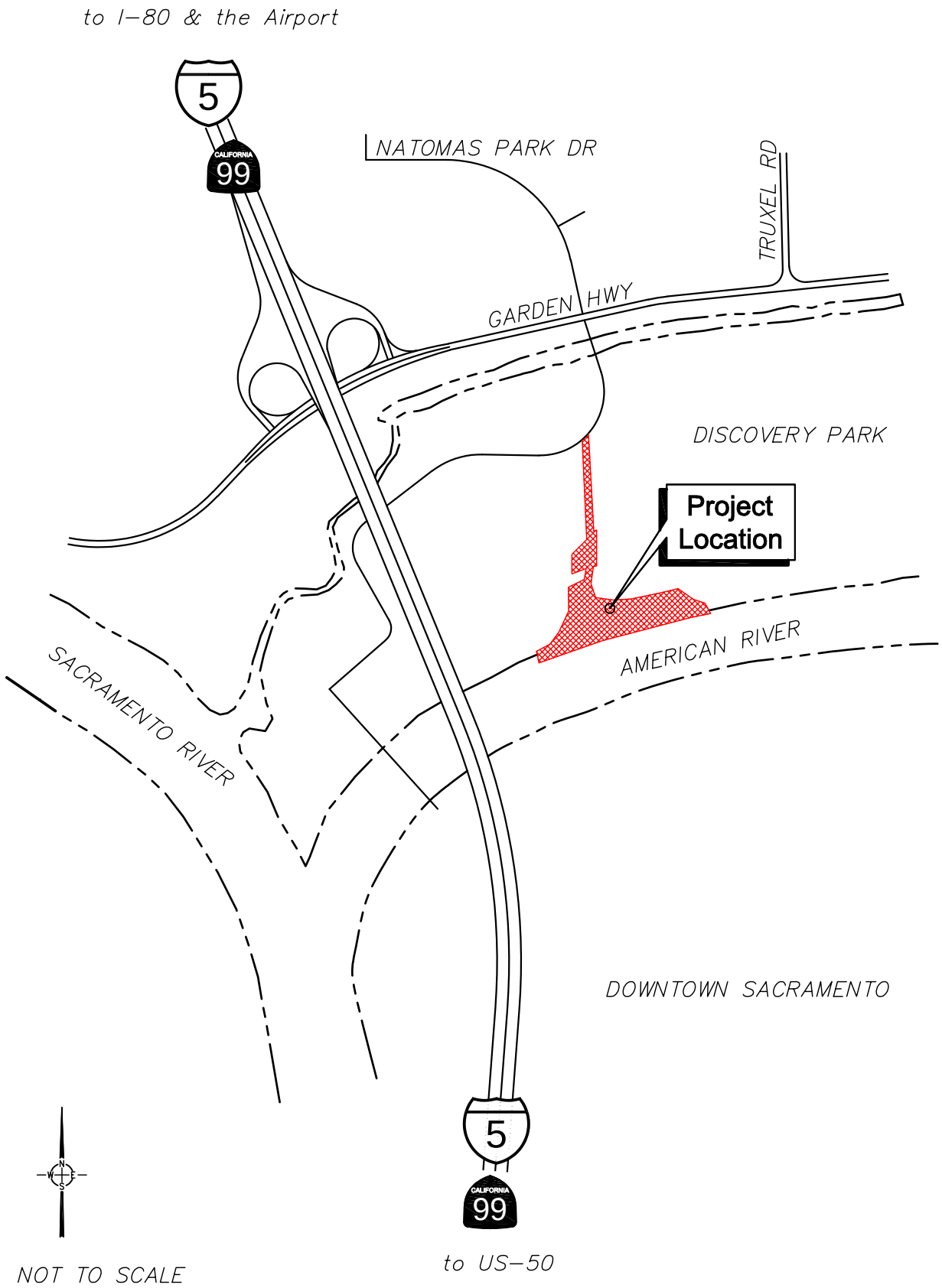
PLATES



Project Vicinity Map

American River RM 0.5

nhc
December 2007

Vicinity Map Plate 1

Project Area **Plate 2**

Locations of Known Elderberry Shrubs

Plate 3

Legend

J&S Elderberries

UCD Elderberries

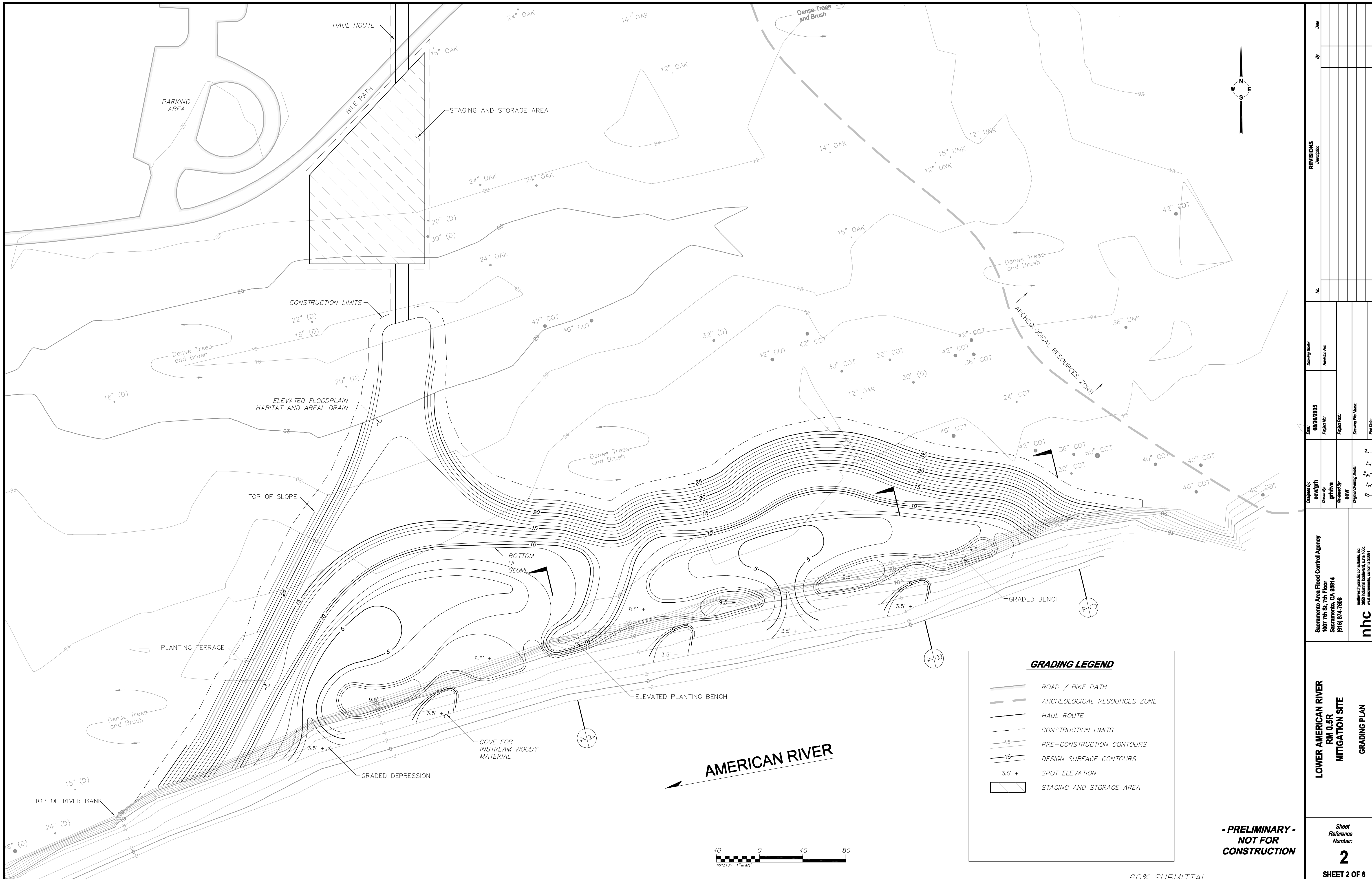
Project Area

N

50 25 0 50 Feet

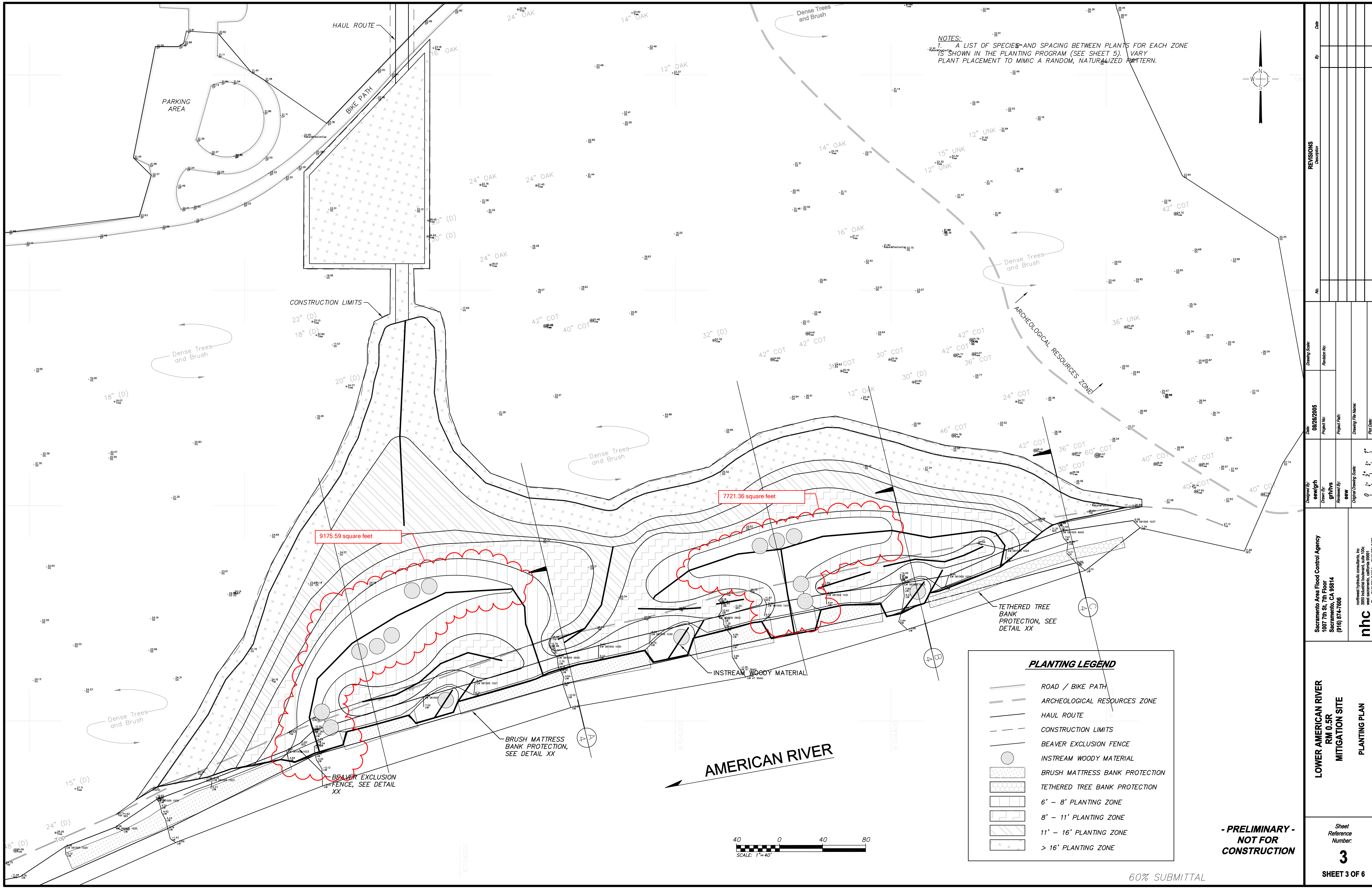
Aerial Photo Source: SAFCA 2003

Transplant Area **Plate 4**



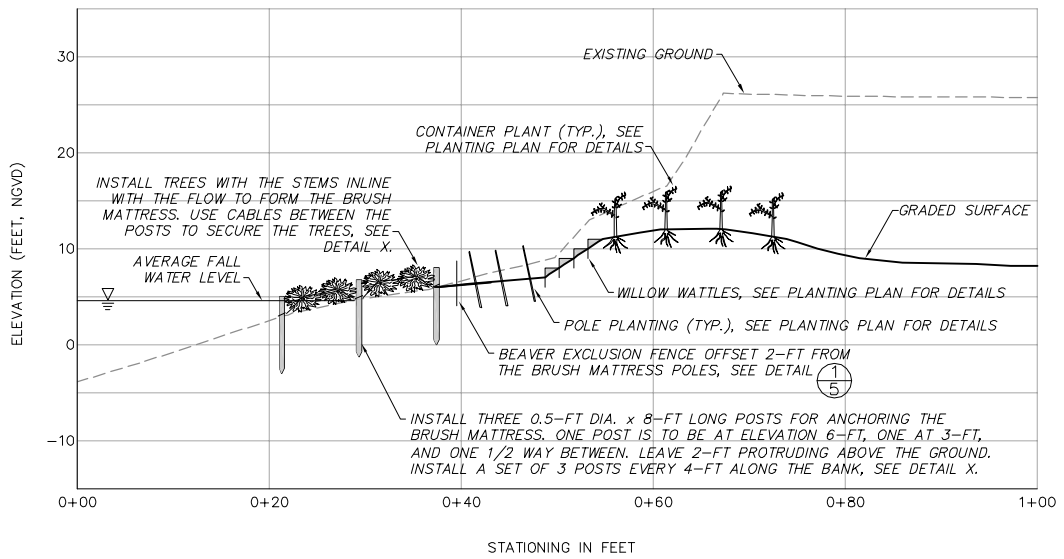
Grading Plan

Plate 5



Planting Plan **Plate 6**

SECTION A



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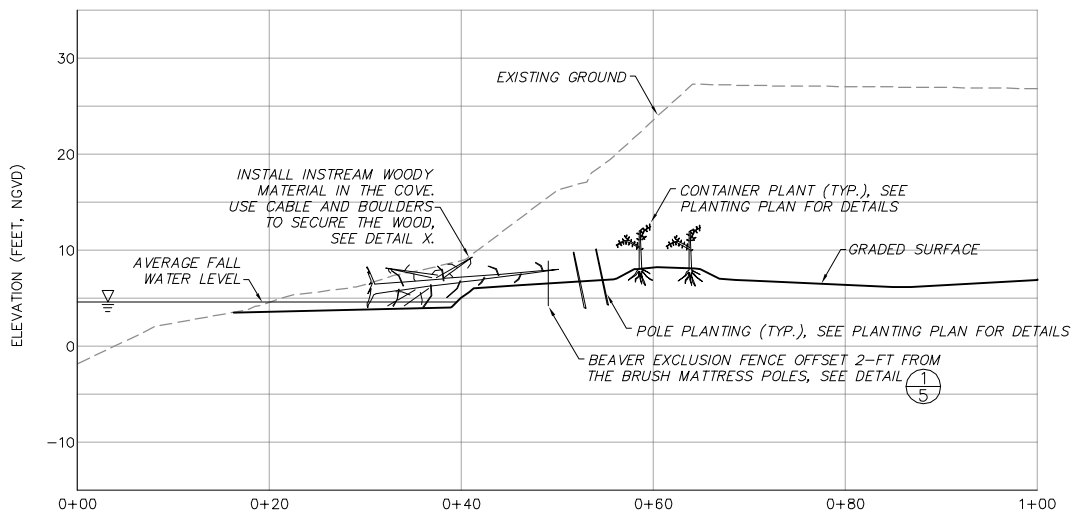

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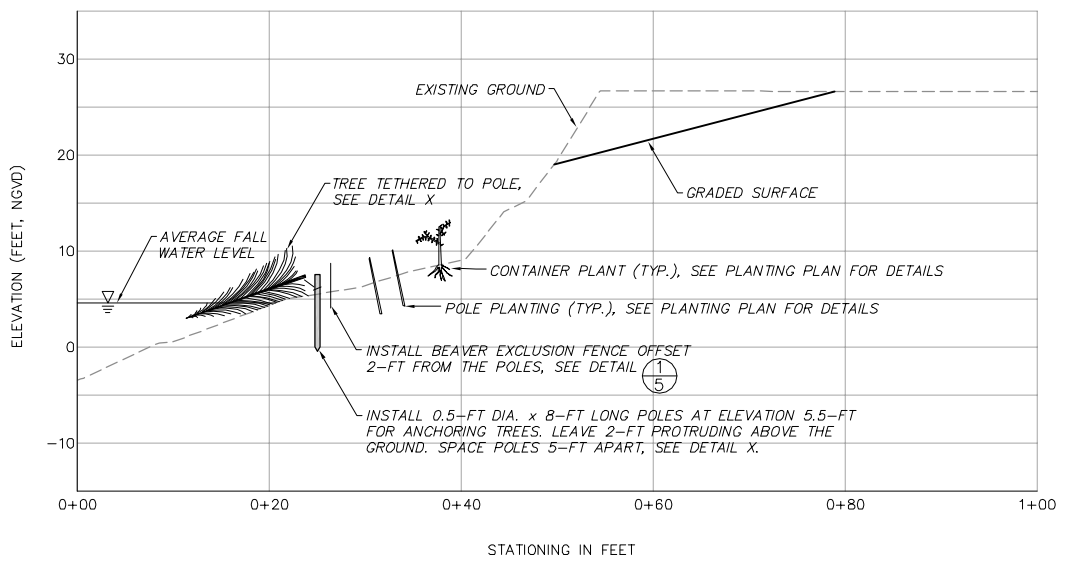

- PRELIMINARY - NOT FOR CONSTRUCTION

60% SUBMITTAL

REVISIONS

No.	Description	By	Date

Date: 08/28/2005
Project No:
Drawing Scale:
Revision No:
Project Path:
Drawing File Name:
Plot Date:
Designed By: ewright
Drawn By: grhtve
Reviewed By: ewr
Original Drawing Scale: 0 1/2" 1" 2"

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nhc

LOWER AMERICAN RIVER
RM 0.5R
MITIGATION SITE

CROSS SECTIONS & DETAILS

Sheet Reference Number:
4
SHEET 4 OF 6

Cross Sections and Details

Plate 7

Planting Zone	Botanical Name	Common Name	Average Zone Plant Spacing (feet on-center)	Plant Distribution	Container Plants		% plant palette	Estimated Area of Planting Zone
					Size	Quantity		
Zone 1 (Elev. 6' – 8') Frequent, prolonged inundation; wake zone	Cephalanthus occidentalis	Button bush	2	Install throughout planting zone	Treepot 4	1209	15%	32,246 sf
	Salix hindsiana	Sandbar willow			Transplant	605	15%	
					Treepot 4	605		
	Salix laevigata	Red willow			Transplant	403	10%	
					Treepot 4	403		
	Salix gooddingii	Goodding's black willow			Transplant	403	10%	
					Treepot 4	403		
	Salix lasiolepis	Arroyo willow			Transplant	403	10%	
					Treepot 4	403		
	Salix lutea	Yellow willow			Transplant	403	10%	
					Treepot 4	403		
	Populus fremontii	Fremont Cottonwood			Transplant	605	15%	
					Treepot 4	605		
	Acer negundo	Box elder			Treepot 4	403	5%	
	Baccharis salicifolia	Mulefat			Treepot 4	806	10%	
Zone 2 (Elev. 8' – 11') Frequent, prolonged inundation; wake zone	Carex barbarae	Santa Barbara sedge	2	2.0 ft o.c. throughout zone	Tree band	2294	50%	18,351 sf
	Juncus effusus var. pacificus	Pacific rush			Tree band	2294	50%	
	Rosa californica	California wild rose		Plant in clusters of 3 around each cottonwood	Treepot 4	230		
	Cephalanthus occidentalis	Button bush	6	Install throughout planting zone	Treepot 4	51	10%	
	Baccharis salicifolia	Mulefat			Treepot 4	51	10%	
	Salix hindsiana	Sandbar willow			Transplant	38	15%	
					Treepot 4	38		
	Salix laevigata	Red willow			Transplant	26	10%	
					Treepot 4	26		
	Salix gooddingii	Goodding's black willow			Transplant	26	10%	
					Treepot 4	26		
	Salix lasiolepis	Arroyo willow			Transplant	26	10%	
					Treepot 4	26		
	Salix lutea	Yellow willow			Transplant	26	10%	
					Treepot 4	26		
	Populus fremontii	Fremont Cottonwood			Transplant	38	15%	
					Treepot 4	38		
	Acer negundo	Box elder			Treepot 4	26	5%	
	Alnus rhombifolia	White alder			Treepot 4	26	5%	
Zone 3 (Elev. 11' – 16') Lower back slopes & mid-slope benches	Leymus triticoides	Creeping wildrye	2	2.0 ft o.c. throughout area	Tree band	4497	60%	29,979 sf
	Artemisia douglasiana	Mugwort			Tree band	2249	30%	
	Vitis californica	Wild grape		Pant in clusters of 3, 2.0 ft o.c. throughout area	Treepot 4	750	10%	
	Rubus ursinus	California blackberry		Plant in clusters of 3 around each cottonwood	Treepot 4	250		
	Rosa californica	California wild rose		Plant in clusters of 3 around each sycamore	Treepot 4	500		
	Baccharis salicifolia	Mulefat	6	Install throughout planting zone	Treepot 4	125	15%	
	Baccharis pilularis	Coyote brush			Treepot 4	83	10%	
	Fraxinus latifolia	Oregon ash			Treepot 4	42	5%	
	Acer negundo	Box elder			Treepot 4	42	5%	
	Platanus racemosa	Sycamore			Treepot 4	167	20%	
	Populus fremontii	Fremont cottonwood			Treepot 4	83	10%	
	Quercus lobata	Valley oak			Treepot 4	292	35%	
Zone 4 (Elev. 16' – 24') Highest zone, low duration/frequent inundation	Leymus triticoides	Creeping wildrye	2	2.0 ft o.c. throughout area	Tree band	9696	60%	64,640 sf
	Artemisia douglasiana	Mugwort			Tree band	4848	30%	
	Vitis californica	Wild grape		Pant in clusters of 3, 2.0 ft o.c. throughout area	Treepot 4	1616	10%	
	Baccharis pilularis	Coyote brush	6	Install throughout planting zone	Treepot 4	180	10%	
	Fraxinus latifolia	Oregon ash			Treepot 4	90	5%	
	Acer negundo	Box elder			Treepot 4	90	5%	
	Platanus racemosa	Sycamore			Treepot 4	359	20%	
	Populus fremontii	Fremont cottonwood			Treepot 4	180	10%	
	Quercus lobata	Valley oak			Treepot 4	629	35%	
	Sambucus melanocarpa	Elderberry		Install in desiginated clusters only	Treepot 4	269	15%	

NOTES:
1. INTENDED 50% ALTERNATIVE PLANTING SOURCES, IF NOT AVAILABLE, CONTRACTOR MAY SUPPLEMENT SUITABLE PLANT MATERIAL.
2. ELDERBERRY CLUSTER LOCATION TO BE DETERMINED IN FIELD BY RESTORATION SPECIALIST.

- PRELIMINARY - NOT FOR CONSTRUCTION

60% SUBMITTAL

REVISIONS
No. | By | Date | Description

Date: 08/28/2005
Project No:
Drawing Scale:
Revision No:
Project Path:
Drawing File Name:
Plot Date:
Designed By:
Drawn By:
Reviewed By:
Original Drawing Scale: 0 1" 2" 4" 1"

Sacramento Area Flood Control Agency
1007 7th St, 7th Floor
Sacramento, CA 95814
(916) 874-7606

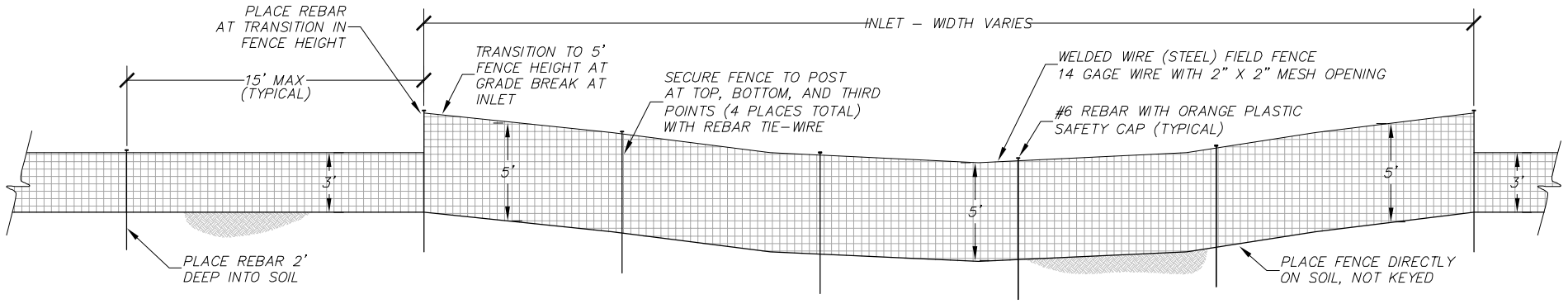
Jones & Stokes
2600 V Street, Sacramento, CA 95818

LOWER AMERICAN RIVER
RM 0.5R
MITIGATION SITE
PLANTING PROGRAM

Sheet Reference Number: 5
SHEET 5 OF 6

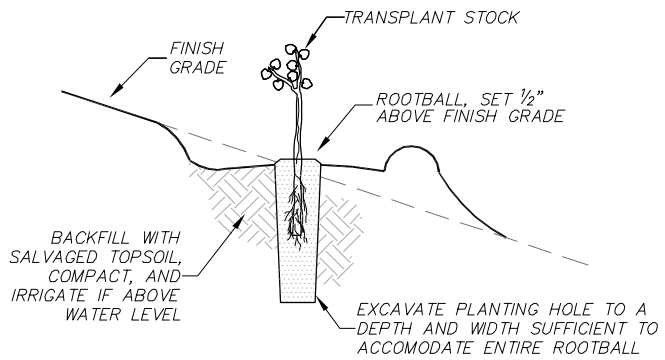
Planting Program

Plate 8



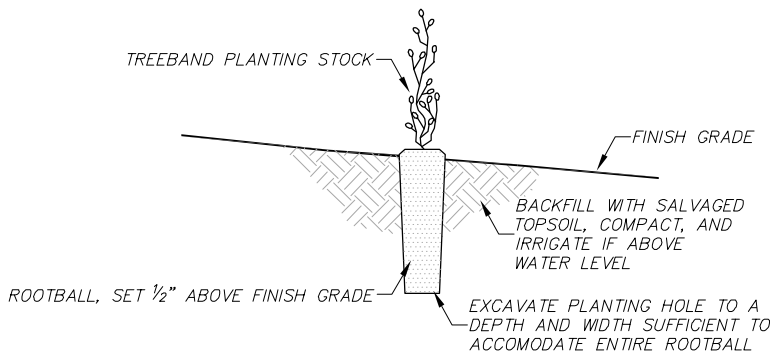
NOTE:
1. BEAVER FENCE SHALL BE INSTALLED ON THE BANK AS SHOWN ON THE PLANTING PLAN – TYPICAL SECTION ABOVE. THE FENCE SHALL BE INSTALLED WITH THE BASE AT ELEVATION 6' AND SHALL EXTEND THE ENTIRE LENGTH OF PROJECT. THE FENCE SHALL BE PLACED TO SPAN THE INLET AND SHALL INCREASE TO 5' HIGH ACROSS THE INLET, FOLLOWING THE GRADE OF THE INLET.

1/5 BEAVER EXCLUSION FENCING
SCALE: 1" = 4'



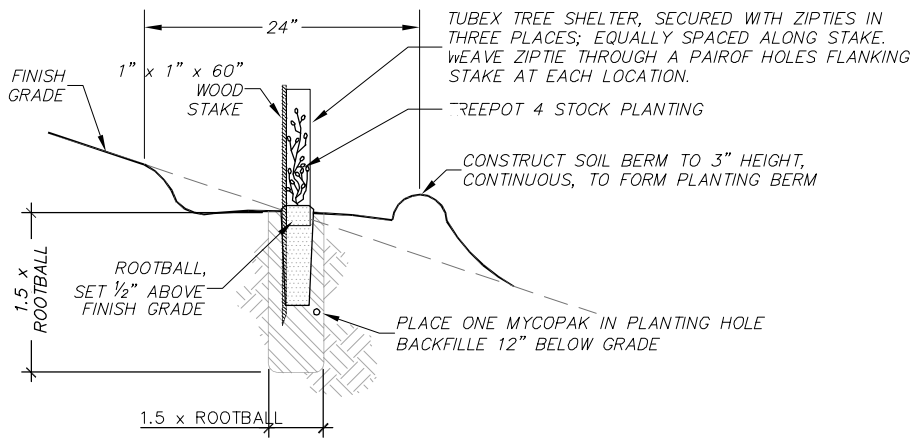
NOTES:
1. PROVIDE 6' WEED–FREE ZONE AROUND PLANTING SITE.
2. FOR PLANTING ON SLOPES, SET PLANT VERTICAL
3. REFER TO PLANTING SPECIFICATIONS FOR ADDITIONAL INFORMATION.

2/5 TRANSPLANT INSTALLATION
NOT TO SCALE



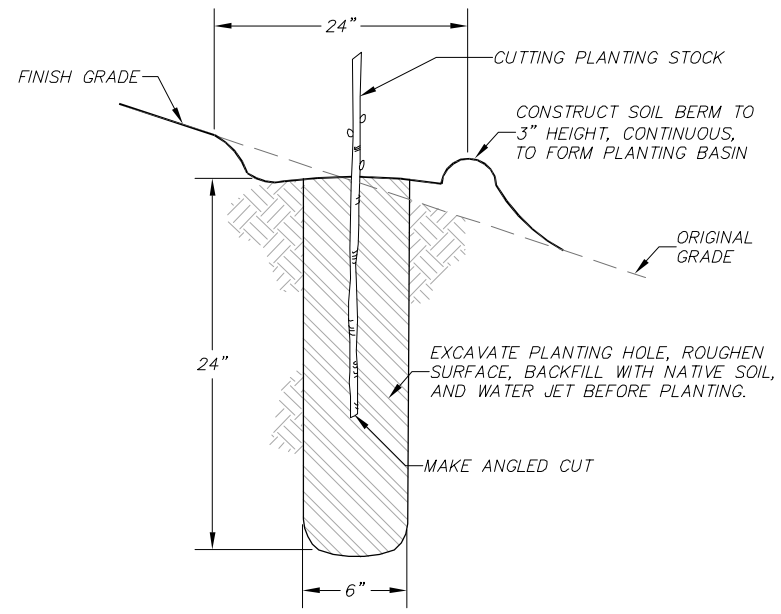
NOTE:
REFER TO PLANTING SPECIFICATIONS FOR ADDITIONAL INFORMATION.

3/5 TREEBAND INSTALLATION
NOT TO SCALE



NOTES:
1. PROVIDE 6' WEED–FREE ZONE AROUND PLANTING SITE.
2. FOR PLANTING ON SLOPES, SET PROTECTION SHELTER AND STAKE VERTICAL.
3. REFER TO PLANTING SPECIFICATIONS FOR ADDITIONAL INFORMATION.

4/5 TREEPOT 4 INSTALLATION
NOT TO SCALE



NOTES:
1. PLACE CUTTING WITH ⅓ OF LENGTH AND 2 TO 5 BUD SCARES ABOVE FINSIHED GRADE.
2. PROVIDE 6' WEED–FREE ZONE AROUND PLANTING SITE.
3. REFER TO PLANTING SPECIFICATIONS FOR ADDITIONAL INFORMATION.

5/5 CUTTING INSTALLATION
NOT TO SCALE

- PRELIMINARY - NOT FOR CONSTRUCTION

60% SUBMITTAL

REVISIONS
No. | Description | By | Date

Date: 08/28/2005
Project No:
Project Path:
Drawing File Name:
Plot Date:
Drawing Scale:
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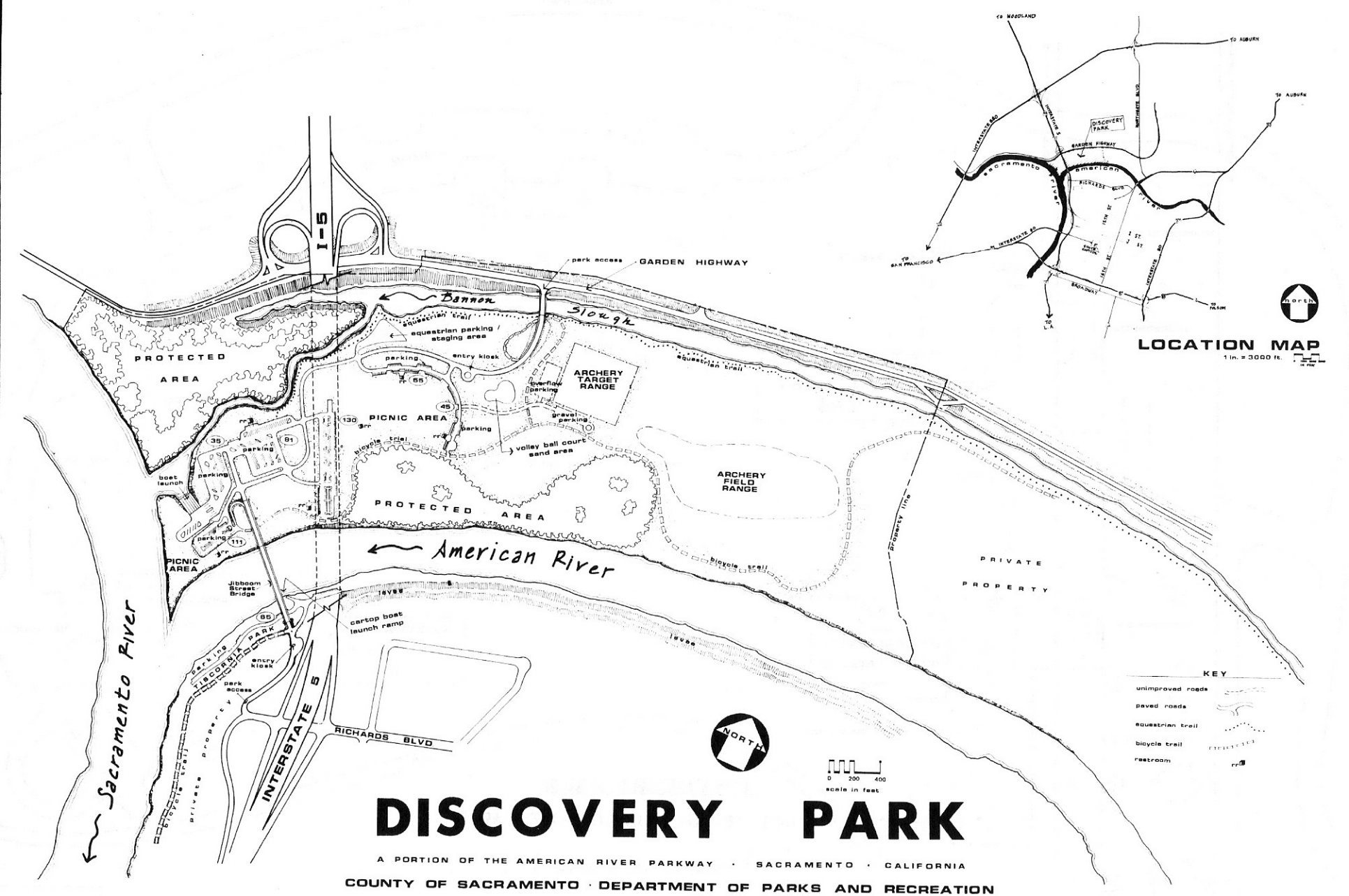
LOWER AMERICAN RIVER
RM 0.5R
MITIGATION SITE

DETAILS - PLANTING

Sheet Reference Number: 6
SHEET 6 OF 6



DISCOVERY PARK

A PORTION OF THE AMERICAN RIVER PARKWAY · SACRAMENTO · CALIFORNIA

COUNTY OF SACRAMENTO · DEPARTMENT OF PARKS AND RECREATION

Discovery Park **Plate 10**

APPENDIX A

Habitat Enhancement Opportunities on the Lower Sacramento & Lower American Rivers
April 2005

Habitat Enhancement Opportunities on the Lower Sacramento & Lower American Rivers

Draft Progress Report, April 2005

Prepared by Jones & Stokes and nhc for SAFCA

Introduction

Current and future channel and levee maintenance work and flood control improvement projects along the Sacramento River and its tributaries (e.g. lower American River) have resulted in habitat mitigation requirements that exceed presently available habitat enhancement sites. Jones & Stokes (J&S) and northwest hydraulic consultants (nhc), under contract to the Sacramento Area Flood Control Agency (SAFCA), have been working together to identify and evaluate sites with potential for habitat enhancement that could be developed as mitigation for bank protection projects scheduled for construction in 2005 and beyond. This progress report describes the steps that J&S and nhc have taken to date to identify and evaluate potential sites on the lower Sacramento River and the results of those efforts.

Background

Consistent with Jones & Stokes' original scope, the approach utilized is based on three screening phases. The first phase includes review of aerial photography and GIS data to determine geographic location of potential sites and associated land ownership and compatibility with existing land uses.

The second screening phase includes identification of constraints such as structure/infrastructure, environmental regulations, constructability, degree of modification required, and other considerations such as continuity with adjacent habitat areas and long-term maintainability.

The third screening phase includes more detailed analysis to determine presence of endangered species and/or cultural resources, applicability of select design templates, potential habitat enhancement value based on the Sacramento River Bank Protection Project (SRBPP) Interagency Working Group's new Standard Assessment Methodology (SAM), and order-of-magnitude cost estimates.

Relationship of SAFCA Survey to Efforts of Federal, State, and Local Agencies

In addition to SAFCA, numerous agencies are interested in or concerned about habitat restoration and mitigation activities along the Sacramento River and its tributaries. All of these agencies have varying levels of interest in improving riverine and riparian habitats and aesthetic values. However, many agencies are also responsible for maintaining an adequate level of flood control. As a result, habitat restoration activities must not increase the risk of flooding by compromising the structural integrity or reliability of the levees flanking the river, reducing the floodway hydraulic capacity, or hindering operation, inspection, and maintenance of the system.

SAFCA has played a substantial role in restoring habitat along the Sacramento River and its tributaries (primarily the lower American River), typically as an element of, or mitigation for bank protection projects. In general, these efforts have been carried out in connection with the federal/state funding under the SRBPP. SAFCA has also provided leadership to the Sacramento River Corridor Planning Forum and the Lower American River Task Force. All of these efforts have included federal, state, and local flood control and natural resource agency representation.

A top priority for SAFCA is to work cooperatively with its federal, state, and local project partners to ensure that suitable habitat enhancement associated with regional flood control projects is implemented in a timely manner. SAFCA has most recently coordinated informally with the SRBPP's Interagency Working Group (IWG) to develop appropriate mitigation for existing and ongoing bank protection work along the Sacramento River, consistent with and complementary to that described in this draft report. The IWG, deliberating over the past several years, consists of federal (Corps, USFWS, NOAA Fisheries) and state (Reclamation Board, DWR, Fish & Game) flood control and natural resource agencies and was formed in response to Biological Opinions issued by NOAA Fisheries and USFWS. However, the IWG has not met in two months due to recent federal funding constraints that eliminated the Corps' budget for future and ongoing projects related to SRBPP. (Until two months ago, the Corps took responsibility for overall coordination of the IWG, and provided all funding for the IWG facilitation and support consultants.) Regardless of the future official status of the IWG, SAFCA will continue to coordinate its ongoing efforts with all the IWG member agencies to allow for their input and review of SAFCA's habitat enhancement strategies and conceptual designs of new habitat enhancement projects.

Since October 2004, SAFCA has kept "the mitigation ball rolling" by assigning staff, biological and engineering consultants, and funding to pursue surveying and technical evaluation of all potential mitigation sites in the lower 84 miles of the Sacramento River. SAFCA has also retained Bill Mitchell, a senior fish biologist at Jones & Stokes, to develop expertise in the understanding and application of the IWG's new SAM mitigation model, and applying it to the most promising habitat enhancement sites identified. Coordination with and reporting to the resource and flood management agencies has been a part of this process, and will continue in the future. All potential habitat enhancement sites given preliminary consideration by the IWG or its member agencies, and relevant to SAFCA's existing and future bank protection projects, are included in this summary and in Table 1. In addition to identifying new enhancement sites, SAFCA also supports drawing of credits from existing or potential compensation banks to meet regional mitigation needs.

Additionally, habitat enhancement sites along the lower five miles of the American River previously evaluated under the SRBPP (Final EIR/SEIS V for the SRBPP, March 1998) and still considered suitable, are included in this summary. Habitat enhancement and mitigation projects at several of these sites have already been implemented by the Corps, Reclamation Board and SAFCA over the past five years. These projects have been quite successful in meeting most or all of the biological expectations and time-increments of mitigation compliance standards following their construction. Several resource agency staff have visited these constructed and planted sites, and are pleased with the overall results and the substantial rates of habitat maturation.

Progress to Date

First Phase Screening

A majority of the first phase screening has been carried out, as described below under "Area Surveyed and Process" and "Land Use Compatibility and Ownership".

Area Surveyed and Process

J&S and nhc were tasked to review and analyze recent aerial photography and existing knowledge of the river to locate potential habitat enhancement opportunities along the Sacramento River between river miles 35 and 84. The analysis was based on the assumption that a broad range of enhancements and opportunities are potentially feasible along the river. Possible enhancements range from setback levees to re-establishing a narrow band of shaded riverine aquatic habitat along the existing shoreline. Intermediate options included lowering existing berms, creating new waterside berms, reducing and lowering the slope of

steep banks (seasonally inundated floodplain), installing large woody debris and/or hybridized brush boxes, and planting varying amounts of vegetation. The Corps' SRBPP GIS database was also referenced to determine the location and extent of existing riprap, and the opportunities and constraints associated with its presence. SAFCA convened a meeting at the start of the process in November 2004 in order that DWR, Corps and SAFCA staff could share knowledge of potential sites within the SAFCA area of interest with SAFCA contractors.

Land Use Compatibility and Ownership

Land use compatibility was also considered in the first screening phase. This analysis was based on aerial photo interpretation and approved city and county general plan and zoning designations. Land use compatibility poses the greatest constraint for habitat enhancement opportunities that require spatial adjustments to the landside of levees, such as setback levees. Several of the other potential design concepts would be constructed on the waterside of the levee or remnant berm, and are generally compatible with most existing land uses.

At this point, land ownership has only been determined for those parcels where data is readily available. Additional research with the appropriate city or county assessor's office has not yet been conducted. Land ownership is particularly relevant to the setback levee design concept, but is also a major factor in potential project costs and the relative ease or timeliness of implementation of a habitat enhancement project.

Second Phase Screening

Second phase screening efforts include evaluation of existing data and site reconnaissance to identify structure/infrastructure and environmental regulatory constraints, constructability, general site modification requirements, site access, and proximity to areas with existing valuable habitats. However, the site reconnaissance survey has been repeatedly postponed due to continuous high stage in the Sacramento River for the past two months. A primary objective of site reconnaissance is to observe and describe existing, site-specific conditions of the bank and berm, and the riparian and aquatic habitat present. Bank erosion potential and baseline SAM value can only be observed during a normal low-flow river stage; therefore this important element of the mitigation site survey has been delayed. However, some level of second stage screening has been carried out, including analysis of available data and consideration of constructability and site modification requirements.

Third Phase Screening

Some aspects of the proposed third phase screening have been conducted to date, including baseline work necessary to estimate habitat/mitigation values relative to the SRBPP IWG SAM model and applicability of select design templates to each site. Work to date on estimates of SAM habitat/mitigation values focuses on the incremental effects of adding various design features, alone or in combination, to a defined bank condition. This information provides a reasonable estimation of compensation values likely to be obtained from the various designs.

Summary

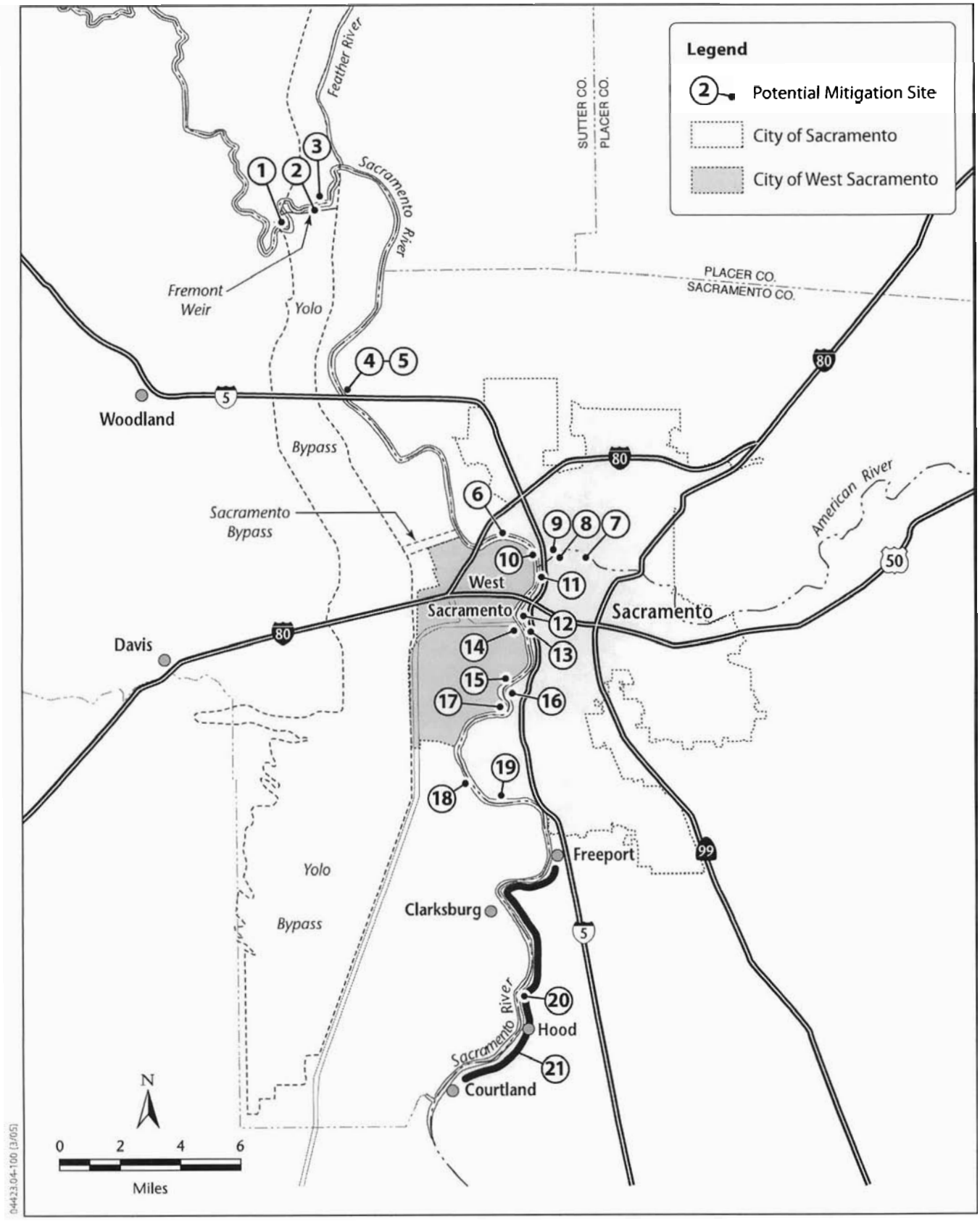
Consistent with the screening process described above, SAFCA has dedicated its effort over the past several weeks to designing and implementing compensation for habitat impacts associated with the bank protection project at RM 56.7 on the Sacramento River.

Two specific initiatives have seen significant progress. Firstly, SAFCA's design team has identified a significant habitat enhancement opportunity at RM 0.5 on the right bank of the lower American River. The analog for this improvement is the RM 0.9 mitigation site, which is characterized by graded banks to create seasonally inundated low floodplain habitat coupled with shaded riverine aquatic vegetation. Preliminary coordination with local USFWS and NOAA Fisheries staff, as well as SAFCA's flood control partners representing the Corps and Reclamation Board, SAFCA's flood control partners that participate in the IWG, occurred in early February 2005 at the proposed project site. Based on this field trip and subsequent discussions, SAFCA has tasked their design team with developing a conceptual level plan that would maximize habitat values for the anadromous fish of concern. Significant habitat value would also be created to benefit upland riparian and semi-aquatic wildlife. SAFCA, subject to review and consideration by the SAFCA Board, has placed this project on a fast track with the objective of constructing this habitat enhancement/mitigation in late summer and early fall of 2005.

Secondly, SAFCA has established a planning design team (PDT) to review the applicability of deploying and constructing hybridized "brush boxes" at non-FEMA critical erosion sites in the Sacramento River. Sites under consideration are characterized by eroding berms and accelerated loss of mature riparian trees and SRA habitat features due to long-term wave wash created by motorized boats. The objective of this initiative is twofold as follows: Firstly to demonstrate that bio-technical engineering methods of erosion control can be successfully constructed in the urban reach of the Sacramento River and, secondly, that the constructed features result in a net gain of habitat value for listed fish species and other river-dependent wildlife. SAFCA's "brush box" PDT has met several times since

January. The PDT is currently focused on a design for the left bank at Sand Cove Park (RM 62.1) where important archeological resources are being lost and continue to be at risk and exposed in the eroding bank. Additional sites have been identified in DWR's Maintenance Area 9 reach of the Sacramento River where brush box demonstration projects may be undertaken in partnership with DWR's flood maintenance staff. Both MA 9 (DWR) and SAFCA are confident that prototype designs can be constructed in summer 2005 as well.

Additional information on the suite of sites under consideration by SAFCA to-date is summarized in Table 1 and Attachment A. Additional sites remain under consideration for enhancement by the Corps and Reclamation Board, but fall outside of SAFCA's member agency geographic area. These include the Cache Slough mitigation area, the State Feeny-Lerch property, Kopta Slough and two sites identified by Wildlands Inc., downstream of the Fremont Weir. The table is intended to provide qualitative, relative rankings of all potential habitat enhancement sites in the survey area for additional, detailed exploration of construction feasibility. Where applicable and feasible, the table includes order-of-magnitude level estimates of mitigation site length and area, as well as potential habitat types. Other relevant comments about unique or important site features are also noted. All the locations listed in Table 1 will be visited as part of the site reconnaissance survey, which will commence when Sacramento River stage at the I-Street Gage has dropped to or below an average of 5 feet mean sea level stage elevation, considering normal tidal fluctuations.



Jones & Stokes

Figure 1
Potential Mitigation Sites along Sacramento River and Tributaries

APPENDIX B

Planning Aid Letter from the U.S. Fish and Wildlife Service

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

In reply refer to:
CESAC-Lower American River RM 0.5 Compensation Site

OCT 4 2007

Francis C. Piccola
Chief, Planning Division
Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814-2922

Dear Mr. Piccola:

The U.S. Army Corps of Engineers (Corps) under the authority of the Sacramento River Bank Protection Project (SRBPP) is proposing to create an off-site compensation site at American River river mile (RM) 0.5. This project is located in the City of Sacramento, Sacramento County, California. This document constitutes the Fish and Wildlife Service's (Service) Planning Aid Letter for the Corps' proposed off-site compensation site at American River RM 0.5. This letter: (1) describes biological resources in the project area, (2) identifies areas and resources of particular ecological sensitivity, and (3) provides recommendations to avoid or minimize any adverse effects the proposed project may have upon these resources.

BACKGROUND

The SRBPP has completed several erosion protection sites along the Sacramento River and to date has not provided off-site compensation for this work (Sacramento River RM 56.7 and RM 149.9). In February 2006, the Corps submitted a biological assessment for additional erosion work on the Sacramento River along the City of Sacramento's Pocket Area. They proposed to use the American River RM 0.5 site for any compensation needed for the work at the Pocket Area sites as well as for Sacramento River RM 56.7. In June 2006, the Service issued a biological opinion for the Pocket Area work, subsequent emergency erosion work, and the construction of American River RM 0.5. This biological opinion described effects and provided incidental take for elderberry shrubs which would be moved as a result of creating this off-site compensation site.

American River RM 0.5 is located on the right bank of the lower American River adjacent to Discovery Park. The site is approximately 1,000 feet long and varies from 0 to 300 feet wide (from the edge of the river). This reach of the lower American River was substantially altered by the massive amounts of sediment deposited as a result of hydraulic mining in the upper watershed. The result is an elevated floodplain that has significantly altered the natural relationship between the river and the surrounding floodplain. The desirable vegetation communities are not reproducing and the floodplain is rarely available to fish. In 2001, the

proposed compensation site was also subject to a high-intensity wildfire that significantly altered the native riparian vegetation community.

American River RM 0.5 would compensate for effects on riparian and aquatic habitat. The objectives of the project are to restore natural habitats that would benefit key special-status species, including fish, valley elderberry longhorn beetle, and several other wildlife species. A primary component is to create juvenile salmonid habitat by constructing a vegetated bench with a range of elevations that would be inundated by typical winter and spring river stages. The range of elevations is designed to provide shallow (1 to 3 feet) inundation in the target seasons and to create several planting zones related to hydrologic characteristics. The planting zones would provide a mixture of vegetation types to protect against erosion and provide cover for salmonids. The grading and planting plan is also designed to minimize predator species habitat and eliminate potential fish stranding in an existing closed depression in the terrace at the site.

PROJECT DESCRIPTION

The Corps has compiled two action alternatives, including a No Action Alternative.

No Action

Under the no action alternative, the Corps would not participate in construction of the proposed off-site compensation site at RM 0.5 on the lower American River. As such, the Corps would not meet the requirements for off-site compensation as described in National Marine Fisheries Service's (NMFS) September 2004, biological opinion for the work at Site 57.6 on the Sacramento River, and there would be no additional creation of aquatic and riparian habitat as compensation for unavoidable habitat losses due to past and future bank protection activities under the SRBPP.

Construct Compensation Site

The project would be constructed in two phases over two construction seasons. The first phase would involve transplanting existing elderberry shrubs and reseeding for erosion control. The second phase of the project would involve creating fish and wildlife habitat by degrading the existing bank at RM 0.5, constructing benches at various elevations, installing erosion control structures, and planting native plant species. The project would be designed to increase the frequency of flooded habitat during the spring and winter.

Staging and Equipment

The staging area for the project would be located north of the new compensation site and south of the American River bike trail. Short sections of road would connect the staging area with the compensation site to the south and the Garden Highway to the north across the bike trail. These roads would provide access routes across Discovery Park to and from the staging and work areas.

During mobilization for each phase of the project, equipment and materials would be moved onto the staging area via the Garden Highway and access road. Types of equipment for the project would include truck-mounted tree spade, hydraulic excavators, loaders, bulldozers, and

haul trucks. Materials stored at the staging area would include components of the instream woody material (IWM) and mattresses, native cuttings and seedlings, soil amendments, irrigation piping, and native seed. The staging area would also provide a parking area for worker and visitor vehicles.

Elderberry Transplanting

The first phase of the project would involve transplanting the elderberry shrubs that would be affected by staging and activities during construction of the second phase of the project. The transplanting would be conducted from November 1, 2007, to February 15, 2008, during the first construction season in accordance with the Service's biological opinion (1-1-06-F-0134) issued June 21, 2006.

In February/March 2003, the Sacramento Area Flood Control Agency (SAFCA) conducted an elderberry survey in the project area and identified a total of 151 shrubs. Since the 2003, survey, a significant amount of riparian scrub vegetation, primarily wild blackberry, has become established and precludes access to much of the project area. As a result, a complete survey of the project area could not be conducted so the exact number of elderberry shrubs to be transplanted are not known.

However, those shrubs with stems 1 inch or greater in diameter would be transplanted to an area in the American River Parkway just east of the staging area and northwest of the compensation site. This transplant area encompasses approximately 3.5 acres and is currently covered in nonnative weedy grasses, blackberry vines, and a few native trees. In addition, during the second phase, elderberry seedlings and associated native riparian plant species would be planted at both the compensation site and transplant area in accordance with the Service's 2006, biological opinion.

Prior to transplanting, the nonnative vegetation, organic debris, and topsoil at the transplant area would be cleared and removed while retaining and protecting the native trees. Subsequent transplanting activities would include locating and flagging those elderberry shrubs to be transplanted, and clearing and removing other surrounding vegetation and debris with a backhoe. Each shrub would be trimmed, and a tree spade mounted on a truck would then be used to remove the entire shrub and root ball. The shrub would be lowered on the back of the truck, transported to the transplant area, and planted into the prepared ground. These activities would be conducted according to Service's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle*.

After transplanting is completed, all cleared and disturbed areas in the compensation site and transplant area would be reseeded with native grasses to minimize soil erosion until the next construction season and second phase of the project.

Construction and Native Plantings

The second phase of the project would involve creating fish and wildlife habitat by degrading the existing bank at RM 0.5, constructing benches at various elevations, installing erosion control

structures, and planting native plant species. This work would be conducted from July to November 2008, during the second construction season.

Site Preparation. Construction would begin by installing fencing to protect nearby native trees and other sensitive vegetation that could be affected by the work. Then trees and shrubs within the construction footprint would be transplanted or removed, and the grassy vegetation, organic debris, and top soil would be cleared from the ground surface. Temporary silt fences would be placed just above the shoreline to minimize any sedimentation and erosion into the American River.

Excavation and Grading. Shaping of the compensation site would include: (1) excavating approximately 60,000 cubic yards of silty sand from the existing bank; (2) lowering the bank along the existing shoreline to an elevation as low as 4 feet, with a typical elevation of 6 to 12 feet, to achieve natural inundation frequencies consistent with the needs of fish and riparian vegetation; (3) creating a variably sloped area extending approximately 0 to 120 feet from the existing shoreline; and (4) creating a number of elevated benches in this area capable of supporting natural or planted vegetation adjacent to the water's edge.

The predominant feature of the compensation site would be a large graded area with an elevation range between 4 and 12 feet, covering approximately a 2-acre area. Most of this area would be between elevations 5 and 9 feet. These elevations would produce shallow inundation at average spring and winter river stages of 8 feet and 9.5 feet, respectively. Grading of the excavated area would include two sloping depressions to facilitate full drainage of the compensation site and reduce the risk of stranding fish during transition to very low water river stages. Grading would produce slopes ranging from nearly level to relatively steep (1.5 horizontal to 1 vertical).

Shallow slopes would be used over most of the site below elevation 12 feet to promote plant establishment and provide relatively broad areas of low inundation depth for fish. The area below elevation 6 feet would be very sparsely vegetated due to long periods of inundation in the spring and early summer, and would provide more open shallow water habitat. Steeper slopes would be used in a few areas to construct higher benches near the average fall and summer water levels (approximately elevations 3.5 and 6 feet, respectively). These higher benches would support larger riparian trees with canopies which overhang the water. Relatively level benches at various elevations at approximately 1-foot increments would provide shallow water for diverse salmonid rearing opportunities.

The compensation site would also have a large sloped area at the northeast corner to connect an existing closed depression near the American River bike trail with the river. This area would provide additional habitat when the river stage is above 15 feet, and the sloped surface would reduce the risk of fish being stranded in the depression. During construction, this sloped area could be used to provide access to the compensation site.

Instream Woody Material. After excavation and grading of the compensation site are completed, IWM would be installed to reduce erosion due to flows and provide additional fish cover along the bank and on the bench. The compensation site would include three alcoves along the bank where IWM (trees 12 to 24 inches in diameter) would be installed and anchored

by wire cable and boulders. The IWM would be configured to reduce any injuries or other risks to Discovery Park users, as well as boaters and swimmers on the American River.

Brush and Tethered Tree Mattresses. In addition to IWM, a brush mattress would be installed to reduce erosion due to wave action, as well as provide fish habitat along the shoreline. The brush mattress would be installed between elevations 3 and 6 feet along most of the compensation site except at the three IWM alcoves and where the sloping depressions connect with the river. These breaks in the brush mattress would also act as fire breaks. The brush mattress would have rows of small posts installed along the edge of the river. Small brush would be placed between the posts up to 3 feet high and would be secured with small diameter wire rope.

The tethered tree mattress would be installed at elevation 5.5 feet along a 150-foot-long segment at the upstream end of the compensation site. Small trees would be secured by the trunk to a single small post; this would allow the tip of the tree to float in the river or lie on the river bank, depending on the river stage. The height of the tethered tree mattress would be approximately 3 feet above the ground.

Plantings and Irrigation System. The planting plan would provide a thick band of vegetation near the river and a less dense and varied vegetation over the rest of the compensation site. Since elevations below 6 feet would be unlikely to support dense riparian vegetation due to frequent inundation, the sloping depressions would be relatively open areas surrounded by riparian habitat. There would be four planting zones identified by elevation: (1) 6 to 8 feet, where inundation would be frequent and long-duration, and significant wave action would be expected along the shoreline; (2) 8 to 11 feet, where annual inundation would be expected, but typically of shorter duration in the growing season; (3) 11 to 16 feet, where inundation would occur primarily in high flow events in the winter and early spring; and (4) 16 to 24 feet, where inundation would occur only during significant high flow events.

Flood-tolerant species such as button bush, cottonwood, willows, mulefat, and box elder would be planted at the lower elevation ranges between 6 and 8 feet. White alder, Santa Barbara sedge, and California rose would be added to this mix in the area between elevation 8 and 11 feet. Larger species, vines, and herbaceous ground cover would be used in the area between elevation 11 and 16 feet. These would include box elder, cottonwood, sycamore, valley oak, Oregon ash California rose, California blackberry, wild grape, mulefat, and creeping wildrye. In the highest area, stinging nettle, coyote bush, and elderberry would be added to this mix, and California rose, California blackberry, and mulefat would be removed.

Suitable excavated top soil would be reused to install plantings and to support revegetation of disturbed areas. An irrigation system would be constructed to help ensure establishment and growth of the plantings. In addition, a beaver exclusion fence would be installed along the shoreline to increase plant survival.

Site Clean Up and Restoration. Once the construction and planting is completed, all equipment and excess materials would be transported off-site. Any disturbed areas outside the planting zones would be reseeded with native grasses to promote revegetation and minimize soil

erosion. Finally, all work sites would be cleaned of all rubbish, and all parts of the work would be left in a safe and neat condition suitable to the naturalistic and recreation setting of the Parkway.

Borrow, Stockpiling, and Disposal Sites

Borrow. Work at the compensation site would involve excavation, grading, and leveling of soil material. An estimated 60,000 cubic yards of excess soils would be excavated during the second phase of the project. As a result, no additional soils would be needed for the project. Borrow materials would include components of the IWM and mattresses, native cuttings and seedlings, soil amendments and irrigation piping, and native seed. These materials would be obtained from commercial sources and transported to the compensation site via truck.

Stockpiling and Disposal. Cleared vegetation, organic debris, unused top soil, and any trash would be removed from the site via truck and disposed at the Sacramento County landfill or other approved site. The 60,000 cubic yards of excess soil material excavated during grading and shaping of the compensation site would either be removed by truck and temporarily stockpiled at the staging area or moved directly onto a barge for disposal. (Any stockpiled excess would eventually be moved to the barge for disposal.)

Disposal of the 60,000 cubic yards of excess soil material would be the responsibility of the contractor. Because of the large volume of material and potential significant adverse effects on recreation in the Parkway, a barge rather than trucks would be used to transport the excess soil material for reuse or disposal. Prior to construction, the contractor would be required to prepare a disposal plan, detailing the proposed transport, reuse, and/or disposal of the material. This plan would be required to be in compliance with all applicable Federal, State, and local laws, and would be subject to the review and approval of the Corps, Reclamation Board, and other regulatory agencies.

Construction Schedule

Construction of the project would be conducted in two phases over two construction seasons. The tentative construction schedule is shown in Table 1. The equipment would typically operate from 8 a.m. to 5 p.m., 5 days a week. If necessary, work may occur on some Saturdays.

Table 1. Construction Schedule

Activity	**Start**	**Complete**	**Duration** (approx.)
Transplant elderberry shrubs	Nov 1, 2007	Feb 15, 2008	30 days
Excavate and grade compensation site	July 1, 2008	Oct 31, 2008	90 days
Install IWM, and brush/tethered tree mattress	July 1, 2008	Oct 31, 2008	30 days
Install plantings	Oct 1, 2008	Dec 31, 2008	90 days

Monitoring and Maintenance

The establishment period for the elderberry seedlings and associated native riparian species would be 3 years. Annual monitoring and reporting would occur for 5 years following plantings and 10 years following elderberry transplants. The SAFCA would maintain the compensation area under agreement with the Reclamation Board.

BIOLOGICAL RESOURCES

Vegetation

American River RM 0.5 consists of riparian vegetation such as cottonwood, elderberry, and blackberry. Much of the site sustained a fire in 2001, consequently most of the large cottonwood trees were either damaged or killed. Subsequent natural recruitment was very limiting, and today the site is highly degraded and largely dominated by invasive forbs, annual grasses, and scattered trees and shrubs. The majority of trees in the area are still young and only 20 to 30 feet tall. Species include mostly box elder, with valley oak and cottonwood trees also scattered across the site. The understory consists of non-native annual grasses, small amounts of starthistle and blackberry.

Fish and Wildlife

Because the floodplain at American River RM 0.5 is elevated, the site provides very little fish habitat during most years. Occasionally, the Discovery Park area does become inundated and the site would provide some habitat for fish including juvenile salmonids. Raptors such as red-tailed hawks have been observed using the snags created by the fire killed trees. With the large abundance of snags it is highly likely that cavity nesting birds such as woodpeckers and flickers may use the site. Mammals present at the site could include raccoon, vole, mice, and opossum.

Endangered Species

Elderberry shrubs, the habitat of the federally threatened valley elderberry longhorn beetle, are present on the site. Incidental take for the valley elderberry longhorn beetle was given for the project in the June 21, 2006, biological opinion (1-1-06-F-0134). Conservation measures include transplanting the shrubs to an upland location and planting an additional 612 elderberry seedlings and 612 associated native plants. Up to 5 acres will have elderberry shrubs transplanted, protected, maintained, and monitored as described in the Service's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle*.

The Corps is still responsible for completing Endangered Species Act Section 7 consultation with NMFS for listed fish species.

ANALYSIS

The overall project should provide a benefit to fish and wildlife species in the area. Fish species, particularly juvenile salmonids, would benefit from lowering the floodplain and providing area that would be inundated yearly. Benefits to vegetation include replacing non-native vegetation

with native species and increasing the diversity and number of species present on the site. The denser riparian habitat, which would be present in a band near the river, would provide habitat for additional wildlife species such as kingfisher, egrets, and herons, as well as migratory songbirds such as sparrows, warblers, and orioles.

There would be some disturbance to wildlife due to the construction activity. Noise and ground disturbance would cause animals to move away from the area. There would be a temporal loss of habitat during the approximate 1 year construction timeframe. Additionally, the newly planted area would provide minimal habitat value to riparian dependent wildlife species for 10 years or more, while newly planted vegetation grows large enough to meet all the habitat needs for wildlife. However, with proper maintenance and monitoring the site should provide higher quality habitat for fish and wildlife species than current habitat.

Due to the proximity of the site to bike trails and other public recreation in Discovery Park, there is a high likelihood of human disturbance. This may have contributed to the fire that occurred in 2001 at the site. The Corps, Department of Water Resources, and SAFCA should create a plan that minimizes human intrusion to the site.

RECOMMENDATIONS

The Service recommends the Corps:

1. Coordinate with NMFS on project effects to listed fish species under the Endangered Species Act and the Magnuson-Stevenson Act.

2. Comply with the Conservation Measures in the Service's biological opinion (1-1-06-F-0134).

3. Develop a maintenance program at the site to control non-native vegetation which may invade the site post-construction.

4. Develop and implement a monitoring program as part of the project. The monitoring plan, at minimum, should include an evaluation of the project features, including seasonally inundated benches, planting of emergent marsh vegetation, planted IWM, planting of riparian vegetation, and other fish habitat protection and enhancement measures, to ensure they are effective, and consistent with the Standard Assessment Methodology assumptions for the life of the project. Additionally, the monitoring should evaluate the success of the riparian plantings including recording tree survival rates, percentage of tree and shrub cover, average height of overstory trees, canopy layering, total woody riparian vegetation, and developing recommendations for alternative methods of riparian restoration should initial efforts fail. The monitoring program should be coordinated with, and approved by, the Service, California Department of Fish and Game, and NMFS.

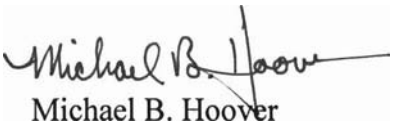
5. Coordinate with the California Department of Fish and Game on project effects to State listed species that may occur in the proposed project area.

6. Insure, through surveys, that any construction activity would not affect nesting migratory bird species.

7. Create a plan to control public access to the site which may include things such as installing signs at the site informing the public of the purpose and function of the site.

If you have any questions, please contact Jennifer Hobbs of my staff at (916) 414-6541.

Sincerely,



Michael B. Hoover
Acting Field Supervisor

cc:
Mike Dietl, COE, San Francisco, CA
Howard Brown, NOAA, Sacramento, CA
Madelyn Martinez, NOAA, Sacramento, CA
Gary Hobgood, CDFG, Rancho Cordova, CA

APPENDIX C

List of Special Status Species from the U.S. Fish and Wildlife Service

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 070828100856

Database Last Updated: August 16, 2007

Quad Lists

SACRAMENTO EAST (512C)

Listed Species

Invertebrates

- Branchinecta lynchi
  - vernal pool fairy shrimp (T)

- Desmocerus californicus dimorphus
  - Critical habitat, valley elderberry longhorn beetle (X)
  - valley elderberry longhorn beetle (T)

- Lepidurus packardi
  - vernal pool tadpole shrimp (E)

Fish

- Acipenser medirostris
  - green sturgeon (T) (NMFS)

- Hypomesus transpacificus
  - Critical habitat, delta smelt (X)
  - delta smelt (T)

- Oncorhynchus mykiss
  - Central Valley steelhead (T) (NMFS)
  - Critical habitat, Central Valley steelhead (X) (NMFS)

- Oncorhynchus tshawytscha
  - Central Valley spring-run chinook salmon (T) (NMFS)
  - Critical Habitat, Central Valley spring-run chinook (X) (NMFS)
  - winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

- Ambystoma californiense
    - California tiger salamander, central population (T)

- Rana aurora draytonii
    - California red-legged frog (T)

Reptiles

- Thamnophis gigas
    - giant garter snake (T)

SACRAMENTO WEST (513D)

Listed Species

Invertebrates

- Branchinecta lynchi
    - vernal pool fairy shrimp (T)

- Desmocerus californicus dimorphus
    - valley elderberry longhorn beetle (T)

- Lepidurus packardi
    - vernal pool tadpole shrimp (E)

Fish

- Acipenser medirostris
    - green sturgeon (T) (NMFS)

- Hypomesus transpacificus
    - Critical habitat, delta smelt (X)
    - delta smelt (T)

- Oncorhynchus mykiss
    - Central Valley steelhead (T) (NMFS)
    - Critical habitat, Central Valley steelhead (X) (NMFS)

- Oncorhynchus tshawytscha
    - Central Valley spring-run chinook salmon (T) (NMFS)
    - Critical Habitat, Central Valley spring-run chinook (X) (NMFS)
    - Critical habitat, winter-run chinook salmon (X) (NMFS)
    - winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

- Ambystoma californiense

    - California tiger salamander, central population (T)

- Rana aurora draytonii
    - California red-legged frog (T)

Reptiles

- Thamnophis gigas
    - giant garter snake (T)

County Lists

No county species lists requested.

Key:

- (E) Endangered - Listed as being in danger of extinction.
- (T) Threatened - Listed as likely to become endangered within the foreseeable future.
- (P) Proposed - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
- Critical Habitat - Area essential to the conservation of a species.
- (PX) Proposed Critical Habitat - The species is already listed. Critical habitat is being proposed for it.
- (C) Candidate - Candidate to become a proposed species.
- (V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
- (X) Critical Habitat designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, or may be affected by projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county

list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.
- During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.
- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.
- Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the

plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our critical habitat page for maps.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be November 26, 2007.

APPENDIX D

Analysis Using Standard Assessment Methodology – RM 56.7
May 2006

Draft
Habitat Evaluation of the Sacramento River Bank Protection Project, River Mile 56.7, Using the Standard Assessment Method

Prepared for:

Sacramento Area Flood Control Agency
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Sacramento, CA 95814
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916/874-7606

Prepared by:

Jones & Stokes
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Sacramento, CA 95818-1914
Contact: Bill Mitchell
916/737-3000

May 2006

Jones & Stokes. 2006. Draft Habitat Evaluation of the Sacramento River Bank Protection Project, River Mile 56.7, Using the Standard Assessment Method. May. (J&S 04423.04.) Sacramento, CA.

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Acronyms and Abbreviations

Corps	U.S. Army Corps of Engineers
D50	median particle diameter of the bank
FEMA	Federal Emergency Management Agency
IWG	Interagency Working Group
IWM	instream woody material
NOAA Fisheries	National Marine Fisheries Service
Q2	2-year flood event
RM	River Mile
SAM	Standard Assessment Methodology
SRA	shaded riverine aquatic
SRBPP	Sacramento River Bank Protection Project
WRI	weighted response index

Habitat Evaluation of the Sacramento River Bank Protection Project, River Mile 56.7, Using the Standard Assessment Method

Introduction

The U.S. Army Corps of Engineers (Corps) and State Reclamation Board propose to implement levee erosion protection under the authority of the Sacramento River Bank Protection Project (SRBPP) at an eroding site on the left bank levee of the Sacramento River at River Mile (RM) 56.7. The purpose of this action is to ensure the reliability of the levees of the Sacramento River Flood Control Project for the life of the project, while protecting environmental values and compensating for and/or mitigating effects on environmental resources to the degree feasible. Detailed descriptions of the proposed project and its potential environmental effects, including effects on listed fish species, were evaluated and disclosed in an environmental assessment/initial study (tiered from an environmental impact report/supplemental environmental impact report) and biological assessment (Jones & Stokes 1987, 2004a, 2004b).

The project is needed because the Sacramento metropolitan area is situated at the confluence of the American and Sacramento Rivers in a low-lying flood basin. Levees along these rivers provide flood control for the Sacramento Valley and help provide conveyance for waters flowing from the Sierra Nevada to the Sacramento–San Joaquin River Delta. Levees and berms stressed by high winter flows weaken and can fail in certain locations. To maintain the integrity of the flood control system, locations with a high potential for failure are identified and remedied.

The RM 56.7 project site extends 1,800 feet along the levee toe and slope just downstream of the confluence of the Sacramento River with the Sacramento Deep Water Ship Channel. The Miller Park and Marina are located just upstream of the site. The RM 56.7 project site was determined to be at risk of failure as a result of erosion on the waterside of the levee. In August 2003, it was determined that the levee could not be certified by the Corps to meet the requirements of the Federal Emergency Management Agency (FEMA) to contain a 100-year flood event until the erosion problems at RM 56.7 were repaired.

The proposed action is intended to meet the project purpose and needs of improving the levees to meet FEMA standards while preserving and enhancing

natural resource values. Key environmental objectives of the proposed project include (1) minimizing losses of existing riparian vegetation and listed species habitat resulting from construction activities; (2) halting erosion and thus preventing the eventual loss of nearshore aquatic habitat and riparian habitat that would likely occur if the project were not constructed; and (3) providing compensation for effects on existing riparian habitat and nearshore aquatic habitat.

The final project design is the result of a collaborative effort of the Interagency Working Group (IWG), whose primary goals are to identify, evaluate, design, and endorse conservation measures that are consistent with the non-jeopardy biological opinions for the SRBPP contracts 42E and 42F (National Marine Fisheries Service 2001; U.S. Fish and Wildlife Service 2001, 2004). The design objectives for the RM 56.7 project (Appendix A) include maximizing on-site mitigation credits concurrent with construction, achieving net gains in habitat values, and, to the extent feasible, restoring key attributes of natural shorelines to address the recovery needs of federally listed fish species. On-site compensation requires an innovative integration of engineering design with ecological and fish habitat objectives at sites constrained by steep, eroding banks abutting urban levees. Although little potential exists to restore natural fluvial processes in this levee-confined portion of the lower Sacramento River, the proposed project design incorporates features designed to maximize the long-term effectiveness of the project in meeting the compensation needs for listed fish species and their critical habitat.

The design objectives would be accomplished by incorporating rock benches that protect the levee from toe scour and shear stress while providing space for planting riparian vegetation, anchoring instream woody material (IWM), and creating shallow-water habitat during key seasons when native fish species are present and dependent on nearshore habitat and floodplains for foraging, spawning, and rearing. This design, which has been successfully employed along the lower American River, would recreate the elements of natural shaded riverine aquatic (SRA) cover that would otherwise be lost as a result of project construction activities and continued erosion. As a result, the off-site mitigation requirements of the project would be substantially less than those associated with the more traditional SRBPP design.

The development of the project design and evaluation of its effectiveness in meeting the design objectives were accomplished by applying the Standard Assessment Methodology (SAM). The SAM was developed by the Corps, in consultation with the IWG, to address the specific habitat assessment and regulatory requirements identified in the biological opinions for the SRBPP and provide a tool to systematically evaluate the impacts and compensation requirements of bank protection projects based on the needs of listed fish species (Stillwater Sciences and Dean Ryan Consultants & Designers 2004).

This report describes the results of the SAM for the RM 56.7 project and conclusions regarding the project's effectiveness in addressing the habitat compensation needs of the primary fish species and life stages of concern.

In summary, the following SAM assessment demonstrates that the RM 56.7 project would compensate for short-term reductions in winter and spring habitat values within 2 to 10 years of project construction and result in long-term increases in winter and spring habitat values for Chinook salmon, steelhead, and delta smelt during the 50-year project period. Long-term benefits to listed species include increases in the amount of shallow-water habitat and SRA cover available to juvenile Chinook salmon, steelhead, and delta smelt during typical winter and spring flows. The smaller, long-term deficit in fall habitat values potentially affecting juvenile Chinook salmon cannot be fully compensated for with the proposed project design and construction schedule. It is estimated that full compensation could be achieved within 10 years of project construction by placing IWM on the outboard slope of the constructed bench in year 3 (similar in quantity to that placed on top of the bench) or restoring IWM along the fall shoreline of a suitable off-site location.

Standard Assessment Method

The SAM quantifies habitat values in terms of bank line– or area-weighted species responses that are calculated by combining habitat quality (fish response indices) with quantity (bank length or wetted area) for each season, target year, and relevant species/life stage. The SAM employs six habitat variables to characterize nearshore and floodplain habitats of listed fish species:

- bank slope—average bank slope along each average seasonal water surface elevation;
- floodplain availability—ratio of wetted channel and floodplain area during the 2-year flood to the wetted channel area during average winter and spring flows;
- bank substrate size—the median particle diameter of the bank (D50) along each average seasonal water surface elevation;
- instream structure—percent of shoreline occupied by IWM along each average seasonal water surface elevation;
- aquatic vegetation—percent of shoreline occupied by aquatic or riparian vegetation along each average seasonal water surface elevation; and
- overhanging shade—percent of shoreline covered by shade along each average seasonal water surface elevation.

The fish response indices are derived from hypothesized relationships between key habitat variables and the responses of individual species and life stages. The response indices vary from 0 to 1, with 0 representing unsuitable conditions and 1 representing optimal conditions for survival, growth, and/or reproduction. For a given site and scenario (e.g., with or without project), the SAM uses the fish response relationships to determine the response of individual species and life stages to changes in the habitat variables for each season and target year. The response indices for each variable are multiplied together to generate an overall species response index, which is then multiplied by the wetted area of the

channel (measured from the center line of the channel) or linear feet of bank to which it applies to generate a weighted species response index (expressed as feet or square feet). The weighted response index (WRI) provides a common metric that can be used to quantify habitat values over time, compare project alternatives, and evaluate the effectiveness of on-site and off-site mitigation actions. For example, the difference in WRIs between with-project and existing conditions in a given year and season provides a measure of the impacts (negative species response) or benefits (positive species response) of the project relative to existing conditions.

Following a recent review and evaluation of the SAM, Jones & Stokes proposed several modifications to improve the resolution and accuracy of the SAM in quantifying the benefits of specific bank protection design features for which detailed topography, design drawings, and hydraulic data are available. Jones & Stokes and MIG (on behalf of the Sacramento Area Flood Control Agency), National Marine Fisheries Service (NOAA Fisheries), and U.S. Fish and Wildlife Service met informally on May 17 and August 1, 2005, to discuss these modifications. A second meeting was held on August 30, 2005, to present the recommendations and seek concurrence from members of the IWG and other agencies and consultants involved in projects of the SRBPP and River Mile 56.7 project design team.

In summary, the proposed modifications include:

- eliminating the response of delta smelt juveniles and adults to changes in nearshore cover based on the pelagic nature of these life stages and their reduced dependence on nearshore cover;
- applying the habitat response curves for delta smelt spawning and incubation life stages to newly hatched larvae based on the importance of nearshore habitat to these life stages;
- characterizing the quality of shallow-water habitat based on the slope of the submerged portion of the bank rather than the slope of the bank at the water's edge;
- quantifying floodplain habitat values based on the actual area of inundated floodplain rather than the ratio of floodplain-to-channel inundation area; and
- quantifying shoreline habitat variables (IWM, aquatic vegetation, shade) based on the actual length of the existing or created shoreline (wetted shoreline contour of bank at different flows).

The meeting participants expressed general support for the proposed modifications to the SAM. Several questions or concerns remained regarding details of the computations used to quantify or weight specific SAM variables. The proposed modifications, along with clarifications to address the comments received on August 30, 2005, were presented in an October 24, 2005, memorandum to NOAA Fisheries and the U.S. Fish and Wildlife Service (Appendix B). The meeting participants agreed to a trial period during which the SAM and the proposed modifications would be used to evaluate the mitigation

requirements for ongoing and proposed bank protection projects in the Pocket Area and other Sacramento River sites.

Methods

The SAM was used to quantify the responses of listed fish species to with-project conditions over a 50-year project period and compare these responses to the species responses under without-project (existing) conditions. The assessment followed the general steps outlined in the SAM Final Review Draft and Users Manual (Stillwater Sciences and Dean Ryan Consultants & Designers 2004, 2006). Computations were performed using the Electronic Calculation Template (Microsoft Access application) provided by Stillwater Sciences.

Stillwater Sciences performed a preliminary SAM assessment of the RM 56.7 project and produced a draft report in 2004. Preproject habitat conditions were estimated from available data sources, including mapping and survey data from the Corps's riprap database. The 2004 draft report served as the primary source of data for describing existing conditions and specific assumptions in the following assessment. However, revisions were required in the following assessment to address subsequent changes in the construction schedule and modifications of the procedures for quantifying specific habitat variables (see below).

The first phase of project construction, completed in fall 2004, included:

- removal of existing concrete rubble, cobble, and riprap;
- installation of fill in erosion holes;
- removal of trees and vegetation below the 25-foot elevation;
- grading and installation of riprap on the levee slope; and
- construction of the riprap bench and soil trench.

The second phase of construction, scheduled for completion in fall 2006, includes:

- installation of large woody material complexes on the riprap bench,
- planting of native vegetation on the riprap bench and levee slope above the bench, and
- removal of existing trees and vegetation and planting of erosion-control grasses above the 25-foot elevation.

A detailed description of the construction techniques can be found in the EA/IS (Jones & Stokes 2004).

Tables 1 and 2 summarize the SAM input data used to characterize existing and with-project conditions at each site. The data collection methods, sources, and modifications to the SAM procedures are summarized below for each variable.

Shoreline Elevations

The Corps estimated average fall, winter, spring, and summer water surface elevations (seasonal shoreline elevations) for the project site from daily flow data measured in the Sacramento River at Freeport for the period 1968–2002 and daily flow and stage data measured in the Sacramento River at I Street for the period 1987–2002.

Wetted Areas

Wetted surface areas of the river (measured from the centerline of the river) were obtained from Tables 1.1 through 1.3 in Stillwater's 1984 draft report.

Shoreline Length

Shoreline lengths for the project site were obtained from Tables 1.1 through 1.3 in the 1984 draft report. Shoreline length is defined as the total length of shoreline (defined by the water's edge or corresponding contour line) corresponding to each average seasonal flow. Variations in average river stage during each season result in differing shoreline lengths at the same site.

Bank Slope

In the SAM, bank slope serves as an indicator of the availability of shallow-water habitat and is obtained from point estimates of bank slope (horizontal change to vertical change) along each seasonal shoreline (i.e., line where the average water surface elevation contacts the bank). As discussed in the attached memorandum (Appendix B), a more accurate method for characterizing shallow-water habitat would be to use the slope of the submerged portion of the bank immediately below (0–3 feet) each seasonal shoreline.

For existing conditions, average bank slopes corresponding to each seasonal shoreline (1.8:1–2.5:1) were obtained from Tables 1.1 through 1.3 in Stillwater's 1984 draft report. Cross sections of the site provided by the Corps indicate that these values are reasonable representations of underwater bank slopes because of the relatively uniform bank slopes along the project site under existing conditions. However, under with-project conditions, the original bank slope estimates for winter and spring flow conditions (2:1) do not capture the shallow-water habitat values associated with the constructed bench. These estimates were

Table 1. RM 56.7L – SAM Input Values (Pre-Project Conditions)

	Seasonal Values			
	Fall	Winter	Spring	Summer
Water Surface Elevation (feet)	4.8	9.8	8.5	5.3
Wetted Area (square feet)	274,944	288,155	286,254	278,986
Shoreline Length (feet)	1,789	1,836	1,768	1,780
Bank Slope (dW:dH)	2.5:1	1.9:1	1.8:1	2:1
Floodplain Inundation Ratio (AQ2:AQavg)	1:1	1:1	1:1	1:1
Bank Substrate Size (D50 in inches)	20	20	20	20
Instream Structure (% shoreline)	23	24	23	23
Vegetation (% shoreline)	0	73	72	0
Shade (% shoreline)	25	7	19	25

Table 2. RM 56.7L – SAM Input Values (With-Project Conditions)

	Seasonal Values			
	Fall	Winter	Spring	Summer
Water Surface Elevation (feet)	4.8	9.8	8.5	5.3
Wetted Area (square feet)	274,944	288,155	286,254	278,986
Shoreline Length (feet)	1,789	1,836	1,768	1,780
Bank Slope (dW:dH)	2:1	10:1	10:1	2:1
Floodplain Inundation Ratio (AQ2:AQavg)	1:1	1:1	1:1	1:1
Bank Substrate Size (D50 in inches)	8	6	6	8
Instream Structure (% shoreline)				
Year 1	0	0	0	0
Year 3	0	50	50	0
Year 15	0	50	50	0
Year 25	0	25	25	0
Year 50	0	25	25	0
Vegetation (% shoreline)				
Year 1	0	0	0	0
Year 3	0	20	20	0
Year 15	0	75	75	0
Year 25	0	75	75	0
Year 50	0	75	75	0
Shade (% shoreline)				
Year 1	0	0	0	0
Year 3	0	0	0	0
Year 15	10	50	50	10
Year 25	30	50	50	30
Year 50	30	50	50	30

modified accordingly (10:1). It was assumed that constructed bank slopes would not change significantly through the 50-year project period.

Floodplain Inundation Ratio

In the SAM, floodplain habitat is defined by areas that are flooded by the 2-year flood event (Q2) and measured by dividing the wetted channel and floodplain area during the 2-year flood event by the wetted channel area during average winter and spring flows. Although modifications have been suggested to improve the way the SAM characterizes floodplain habitat, these modifications were unnecessary for the RM 56.7 project because no changes in floodplain habitat are proposed. This variable was set to 1.0 for both existing and with-project conditions to reflect no project effect.

Bank Substrate Size

Bank substrate size is measured as the median particle size (D_{50} in inches) within the submerged portion of the bank immediately below (0–3 feet) the average seasonal water surface elevation. These values were obtained from the riprap database and reported in Tables 1.1 through 1.3 in Stillwater's 1984 draft report.

A D_{50} of 20 inches was used to characterize the concrete rubble that dominated the lower levee slope of the project site under preproject conditions. With-project substrate conditions were characterized by a D_{50} of 8 inches (riprap) on the lower levee slope, a D_{50} of 6 inches (cobble) on the bench, and D_{50} of 4 inches on the outboard slope of the bench. These conditions were assumed to start in year 1 (corresponding to 2004) and persist through the 50-year project period.

Instream Structure

Instream structure includes IWM (excluding live bank vegetation) that is partially or fully submerged at a given flow. This variable is measured by estimating the percent of shoreline that is occupied by IWM in the inundation zone associated with each average seasonal flow. Estimates of the IWM cover under with- and without-project conditions were obtained from the riprap database and reported in Tables 1.1 through 1.3 in Stillwater's 1984 draft report.

It was assumed that IWM would be placed on the riprap benches in year 3 (corresponding to 2006) and cover approximately 50% of the winter-spring shoreline in years 3 through 15 and 25% of the winter-spring shoreline in years 25 through 50. This assumption reflects the net loss of IWM resulting from the deterioration of the woody material and lack of significant recruitment of large woody material from the adjacent bank.

Aquatic Vegetation

Aquatic vegetation is defined as aquatic or live riparian vegetation that is partially or fully submerged at a given flow. This variable is measured by estimating the percent of shoreline that is occupied by vegetation in the inundation zone associated with each average seasonal flow.

Estimates of the vegetative cover under preproject conditions were obtained from the riprap database and reported in Tables 1.1 through 1.3 in Stillwater's 1984 draft report. Estimates of vegetative cover under with-project conditions were based on the planting plans and observed growth rates and canopy widths of planted trees and shrubs on the constructed banks of previous projects. It was assumed that native vegetation (live pole cuttings and container stock) would be planted on the constructed bench (in the soil trench) in year 3 (corresponding to 2006) and cover approximately 20% of the winter-spring shoreline in year 3 and 75% of the winter-spring in years 15 through 50.

Shade

Shade was measured by estimating the percent of shoreline that is covered by shade at each average seasonal flow. It was assumed that the shade cover along the winter-spring shoreline would increase in response to increasing vegetative cover but that shade cover would be limited to a smaller percentage of the total shoreline length because of expected gaps in the canopy. Expected increases in canopy widths of trees and shrubs on the constructed bench would eventually result in shading of the summer-fall shoreline. Shade cover is expected to result in 50% shading of the winter-spring shoreline in years 15 through 50, 10% shading of the summer-fall shoreline in year 15, and 30% shading of the summer-fall shoreline in years 25 through 50.

Results

Tables 3 and 4 and Figures 1–6 present the results of the SAM assessment for Chinook salmon and steelhead juveniles and smolts and delta smelt spawning adults, eggs, and larvae. The results are presented in terms of bankline-weighted (feet) and area-weighted (feet) fish response indices. The seasons identified reflect the primary periods of occurrence of these species and life stages in the project area:

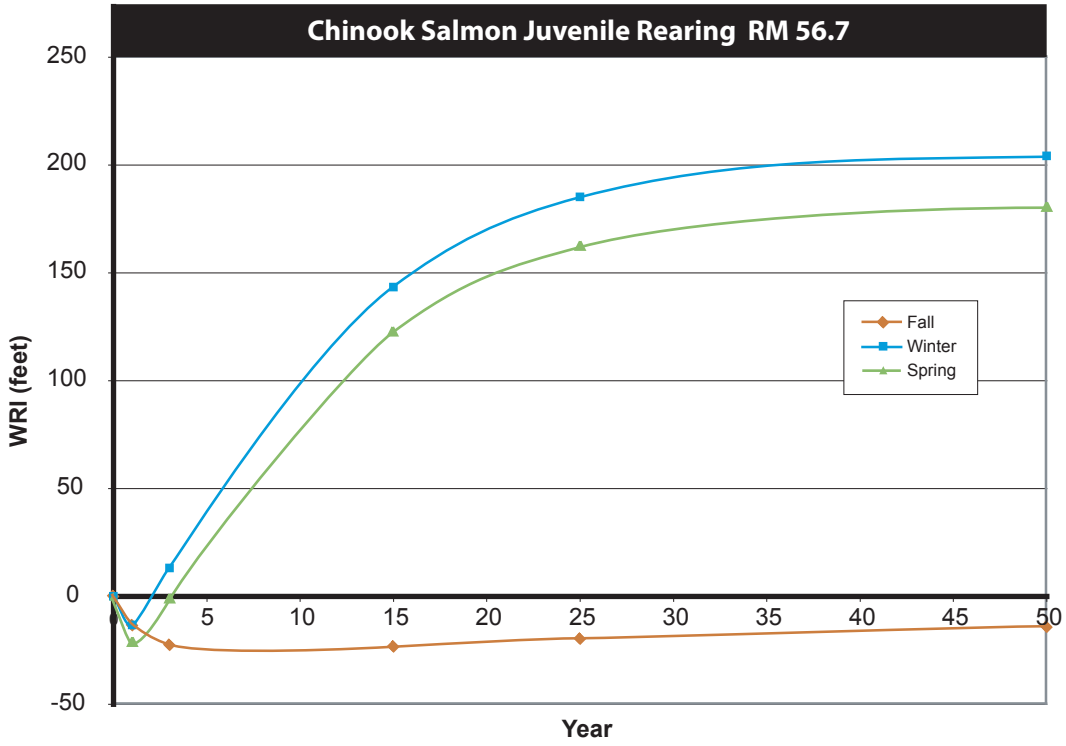
- fall-run Chinook salmon juveniles and smolts (winter, spring);
- late fall–run Chinook salmon juveniles and smolts (fall, winter);
- winter-run Chinook salmon juveniles and smolts (fall, winter, spring);
- spring-run Chinook salmon juveniles and smolts (fall, winter, spring);

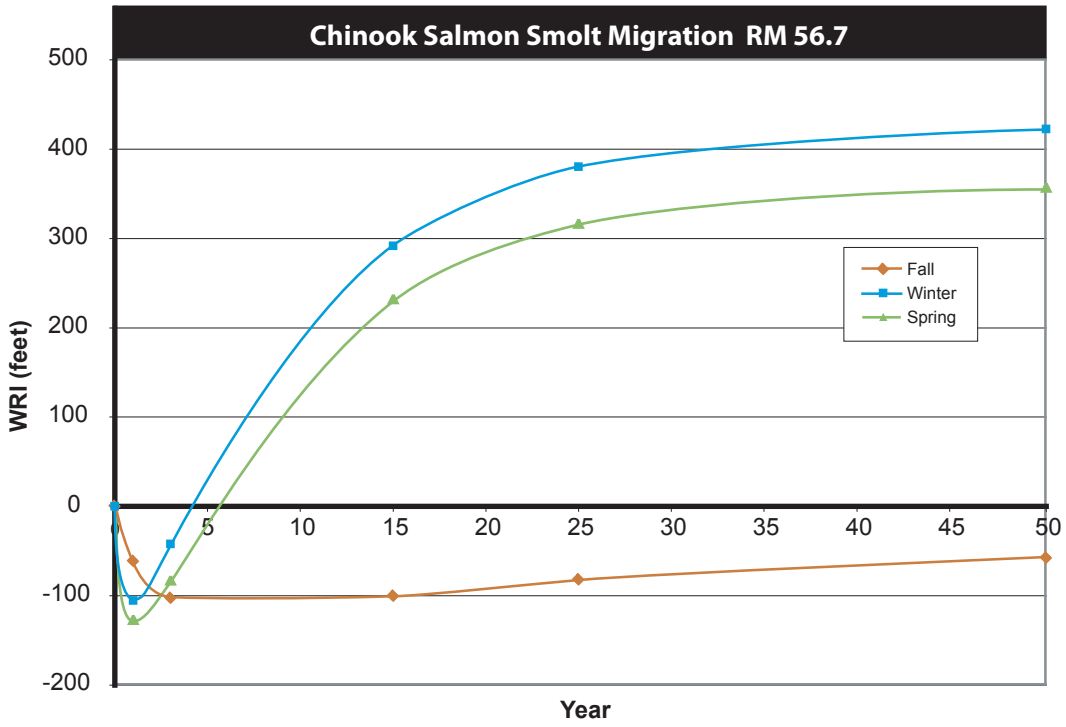
Table 3. Bankline-Weighted Response Indices (feet) for the RM 56.7 Project

	Chinook Salmon Juvenile Rearing			Chinook Salmon Smolt Migration			Steelhead Juvenile Rearing		Steelhead Smolt Migration		Delta Smelt Spawning/Incubation	
Year	Fall	Winter	Spring	Fall	Winter	Spring	Winter	Spring	Winter	Spring	Winter	Spring
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	-13.54	-13.38	-20.84	-61.54	-105.33	-126.39	-22.15	-33.83	-92.24	-111.61	-264.29	-249.28
3	-22.57	13.03	-0.70	-102.57	-42.26	-82.30	20.15	-1.43	-34.32	-71.02	-203.60	-187.35
15	-23.42	143.33	122.66	-100.37	291.55	232.49	200.24	168.66	233.71	181.00	120.59	126.23
25	-19.84	185.14	162.70	-82.17	379.99	316.98	253.38	219.50	303.27	247.38	156.93	161.36
50	-14.29	204.12	180.82	-57.69	422.23	357.16	277.95	242.91	345.41	287.50	179.31	183.01

Table 4. Area-Weighted Response Indices (square feet) for the RM 56.7 Project

	Chinook Salmon Juvenile Rearing			Chinook Salmon Smolt Migration			Steelhead Juvenile Rearing		Steehead Smolt Migration		Delta Smelt Spawning/Incubation	
Year	Fall	Winter	Spring	Fall	Winter	Spring	Winter	Spring	Winter	Spring	Winter	Spring
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	-2081.34	-2100.38	-3373.63	-9457.83	-16530.51	-20463.50	-3476.84	-5477.36	-14476.32	-18069.83	-41479.73	-40360.32
3	-3468.90	2045.28	-113.40	-15763.05	-6632.81	-13325.81	3161.95	-231.35	-5385.97	-11498.79	-31953.98	-30333.56
15	-3600.07	22496.00	19859.17	-15425.07	45757.80	37641.30	31427.63	27308.27	36679.50	29305.44	18926.77	20437.06
25	-3049.33	29056.99	26342.56	-12628.57	59637.79	51321.93	39766.98	35538.65	47596.82	40052.37	24630.22	26125.44
50	-2196.38	32036.79	29276.95	-8865.37	66267.74	57827.30	43623.64	39329.39	54210.88	46549.00	28142.17	29631.14

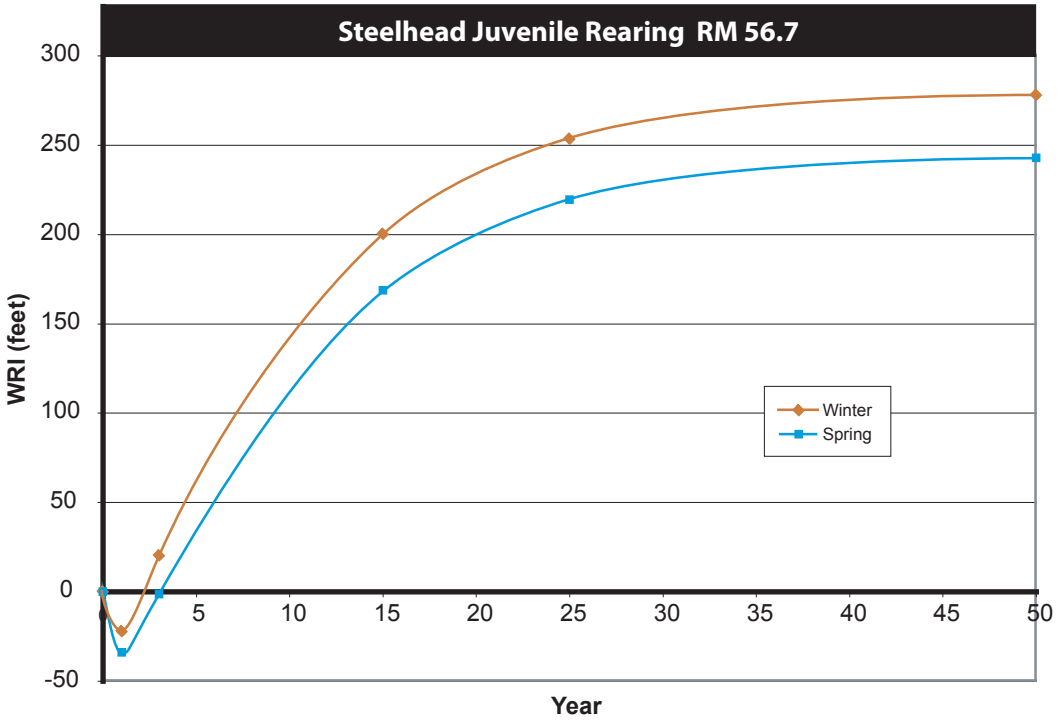




04423.04 703 (04/06)

Jones & Stokes

Figure 1
Chinook Salmon Bankline-Weighted Response Indices for Project RM 56.7



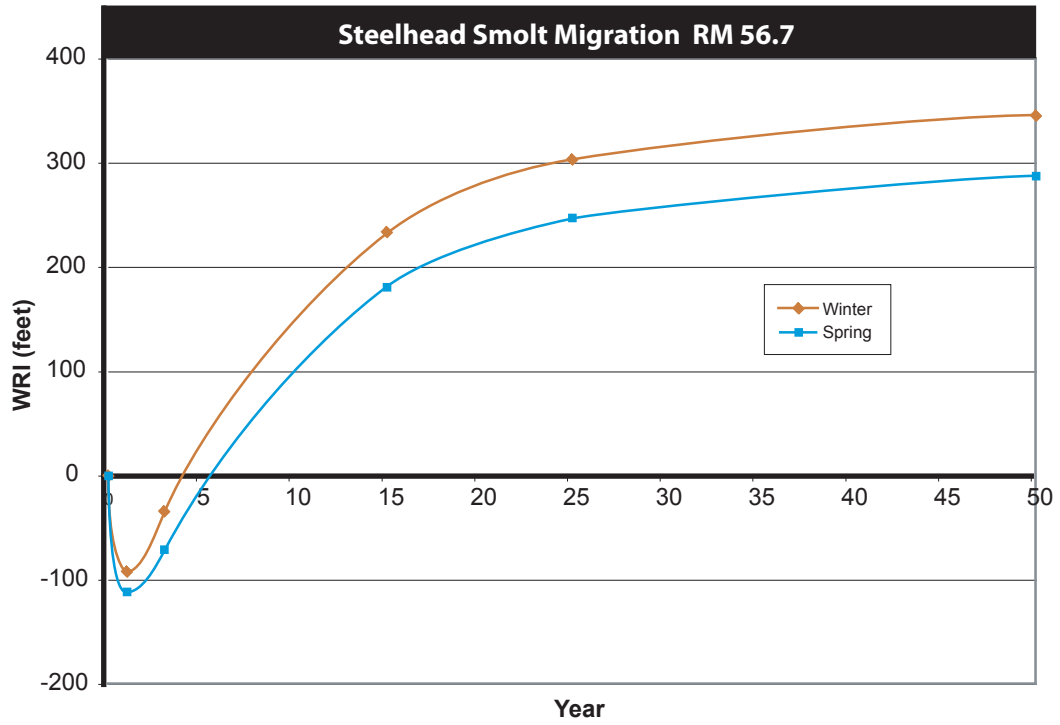


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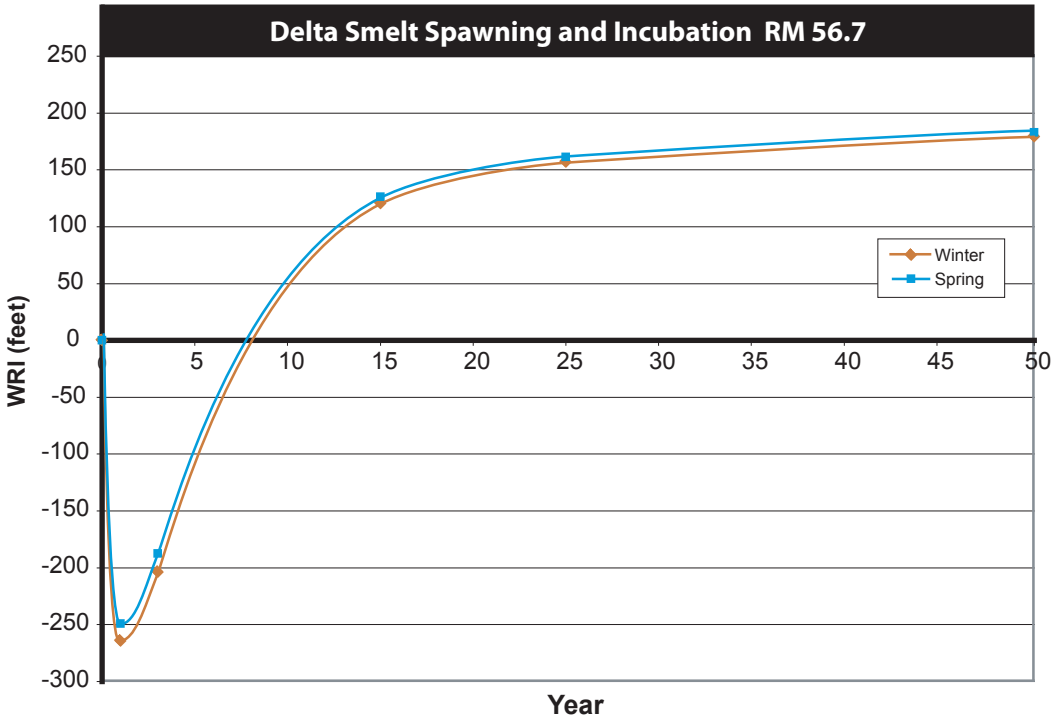
Figure 2
Steelhead Bankline-Weighted Response Indices for Project RM 56.7



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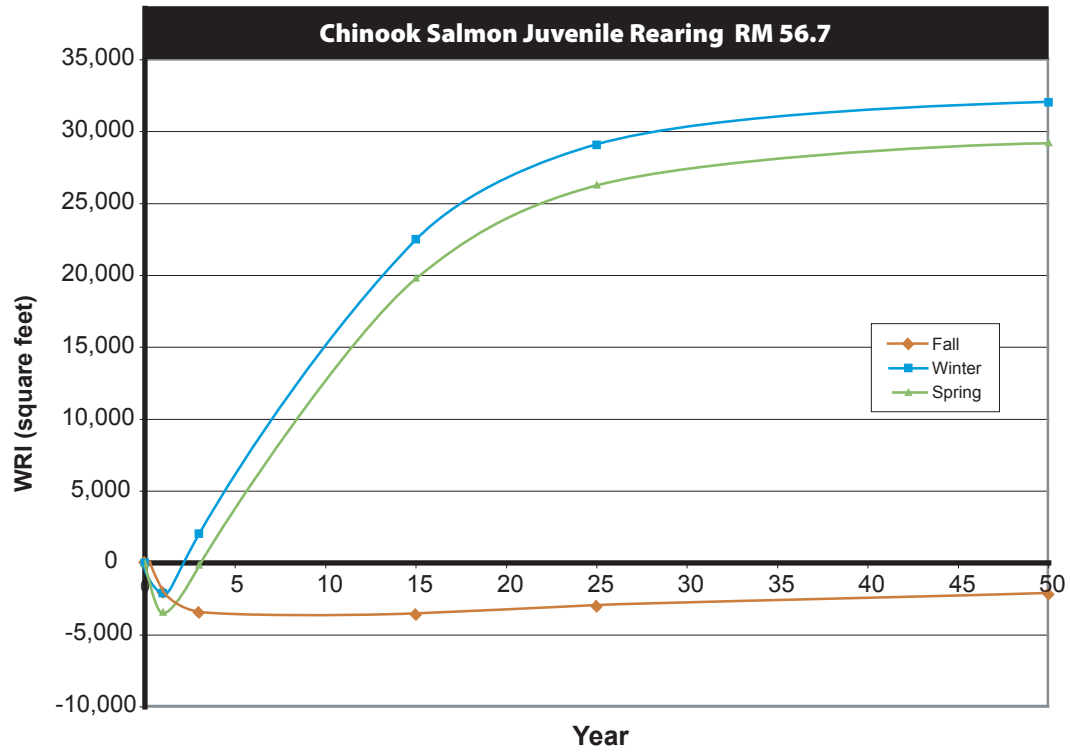
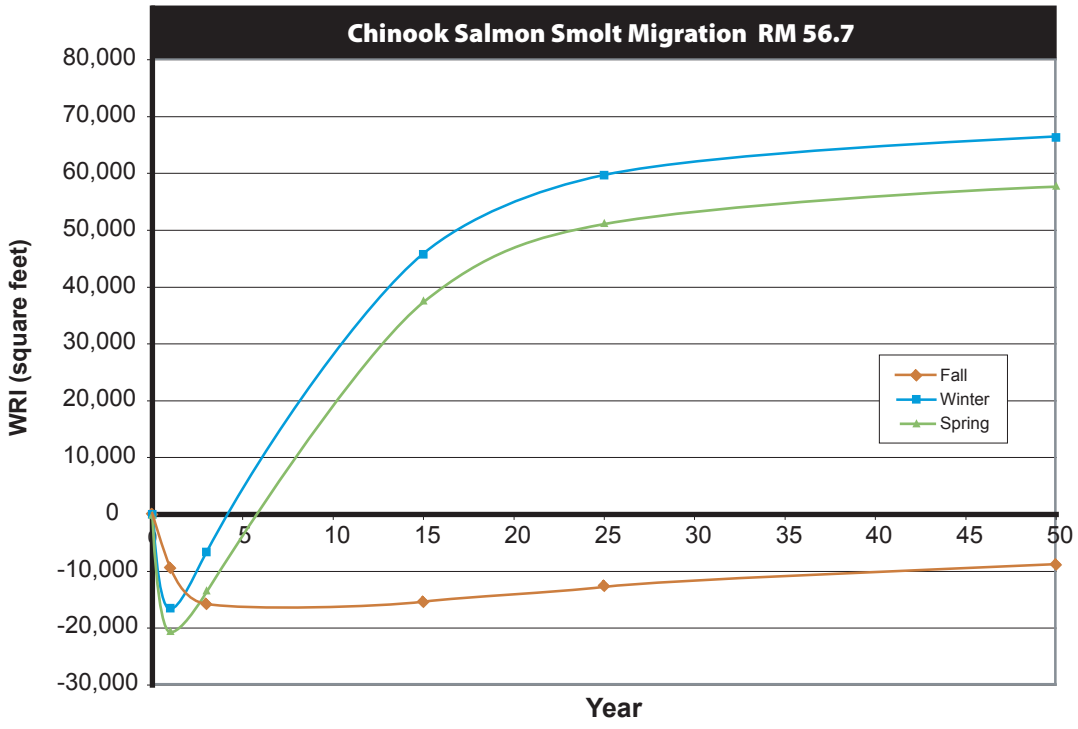
Jones & Stokes

Figure 3
Delta Smelt Bankline-Weighted Response Indices for Project RM 56.7





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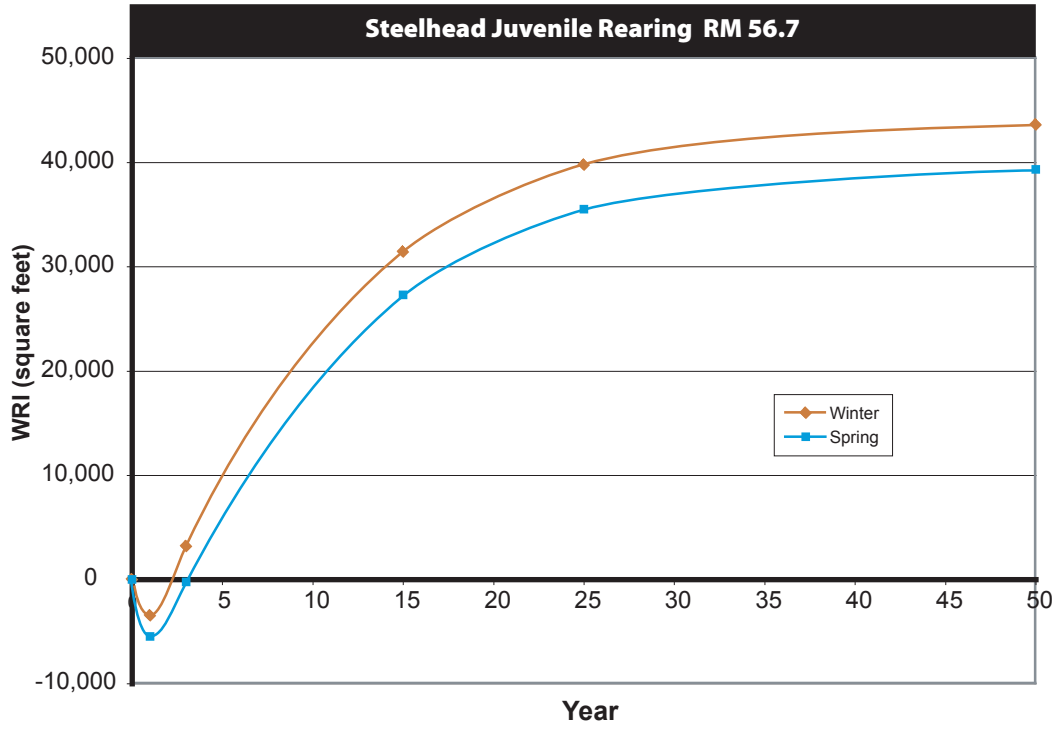
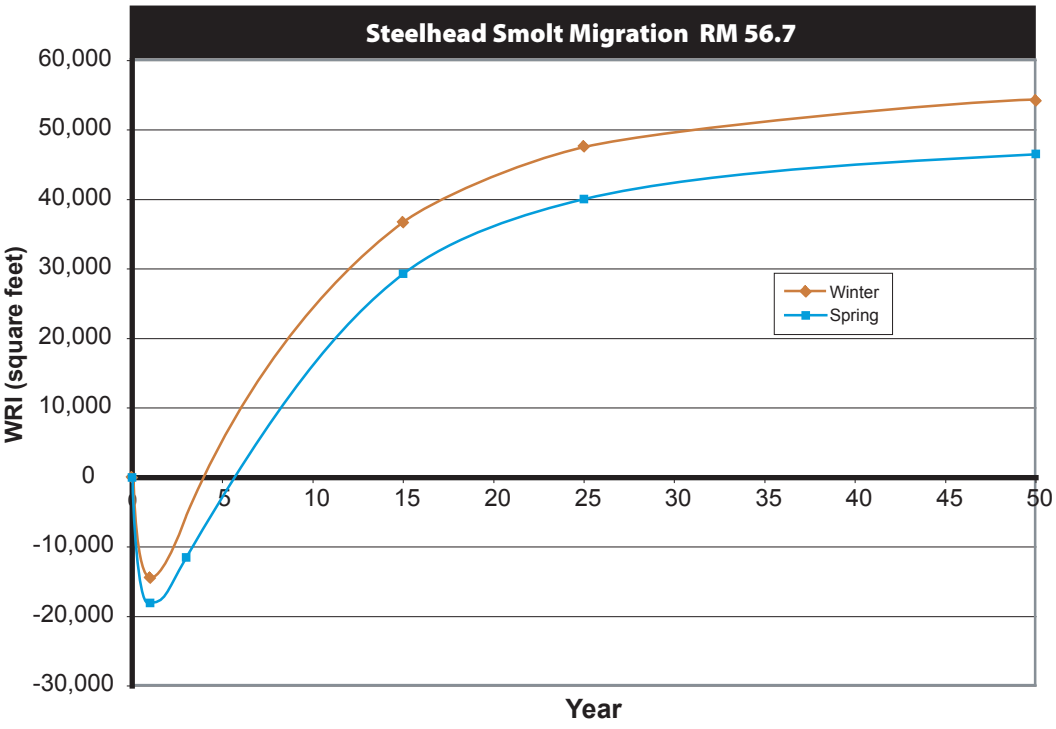
Jones & Stokes

Figure 4
Chinook Salmon Area-Weighted Response Indices for Project RM 56.7





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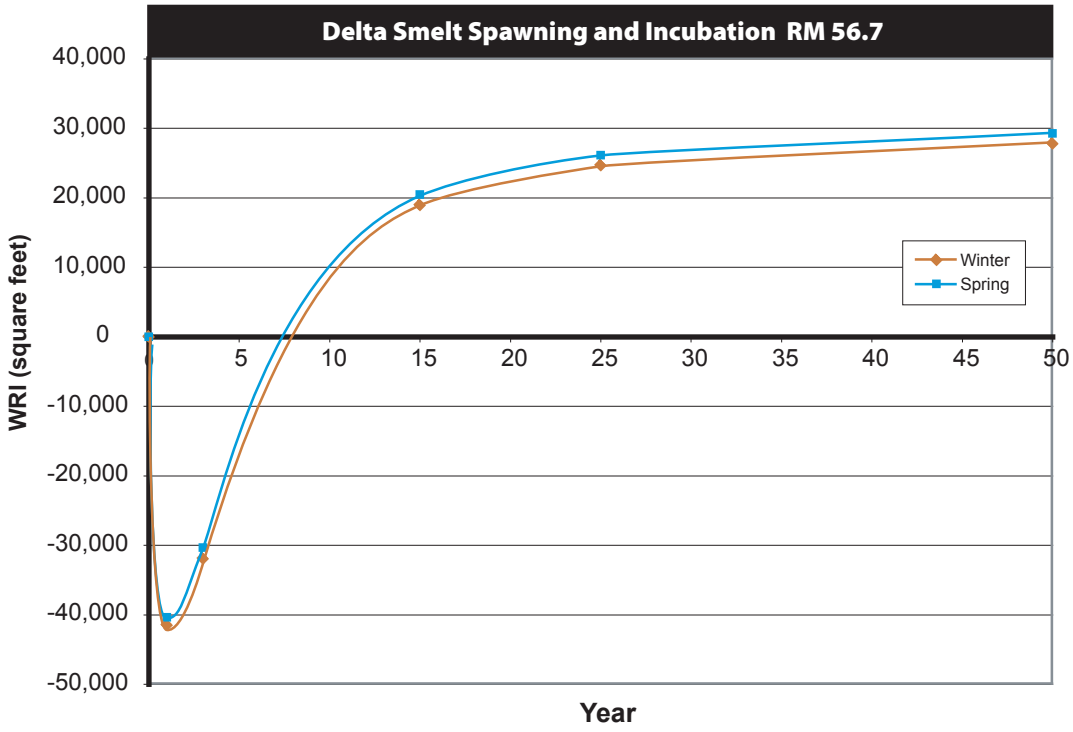
Jones & Stokes

Figure 5
Steelhead Area-Weighted Response Indices for Project RM 56.7



04423.04 703 (04/06)

Jones & Stokes

Figure 6
Delta Smelt Area-Weighted Response Indices for Project RM 56.7

- steelhead juveniles and smolts (winter and spring); and
- delta smelt adults, eggs, and larvae (winter and spring).

The results, expressed in terms of area- and bankline-weighted response indices, represent the seasonal responses of each species and life stage to with-project habitat conditions relative to existing conditions over the 50-year project period. Positive WRIs indicate net gains in habitat values relative to existing conditions and negative WRIs indicate net losses in habitat values relative to existing conditions.

Chinook Salmon

Following construction, juvenile Chinook salmon (rearing juveniles and smolts) would exhibit a short-term negative response to winter-spring habitat conditions followed by a substantially larger positive response over the 50-year project period (Figures 1 and 4). The initial negative response reflects the loss of instream cover and shade resulting from the removal of existing IWM and vegetation in the first year of construction. The juvenile response indices indicate that these losses would be offset within 2 to 6 years by the creation of shallow-water habitat and the addition of IWM and cobble substrate on the constructed bench. Following the planting of the constructed bench and lower levee slope in year 3, long-term increases in the percent cover and shade provided by maturing riparian vegetation would result in continued gains in winter and spring habitat values over the 50-year project period.

Juvenile Chinook salmon would respond similarly to the initial losses of IWM and shade along the average fall shoreline (Figures 1 and 4). Although planted vegetation on the constructed bench is expected to restore shade cover, fall habitat values would not fully recover because of the permanent loss of IWM along the fall shoreline.

Steelhead

As with Chinook salmon, steelhead juveniles would exhibit a short-term negative response to initial losses of instream cover and shade followed by a long-term positive response to increases in shallow-water habitat, IWM, and substrate quality on the constructed bench (Figures 2 and 5). The differences in response indices between Chinook salmon and steelhead reflect minor differences in the species response curves for individual habitat variables.

Delta Smelt

Delta smelt (spawning and incubation life stages) would exhibit a relatively large negative response to winter and spring habitat conditions immediately following construction (Figures 3 and 6). This reflects the loss of potential spawning substrates and instream cover resulting from the removal of existing IWM and vegetation in the first year of construction. The juvenile response indices indicate that these losses would be offset within 5 to 10 years by the creation of shallow-water habitat and addition of IWM on the constructed bench. Following the planting of the constructed bench in year 3, long-term increases in extent of flooded vegetation would result in continued gains in winter and spring habitat values over the 50-year project period.

Conclusions

The results of the SAM assessment demonstrate that the proposed project design will compensate for project impacts and result in long-term increases in winter-spring habitat values for Chinook salmon, steelhead, and delta smelt. This design offers an effective alternative to traditional bank protection designs in the levee-confined reaches of the lower Sacramento River because it effectively addresses levee structural concerns and the critical habitat needs of listed fish species. This design is especially applicable to the project reach where opportunities for reestablishing floodplain habitat and natural channel dynamics (bank erosion, channel migration, and riparian regeneration) have been eliminated or severely restricted by the proximity of the levee and existing human infrastructure.

A key feature of the proposed design is the creation of a seasonally inundated bench that provides high-quality shallow-water and SRA habitat along the length of the project site. Specific benefits include increased habitat availability (area and frequency of inundation), continuity, and complexity that mimic the characteristics of natural shorelines and floodplain habitats used by native fish species for foraging, spawning, and early rearing in the winter and spring. Broader ecological benefits of the project design include restoring habitat diversity and native riparian vegetation and creating structural and hydraulic complexity needed to support other ecological functions characteristic of natural shorelines and floodplains (e.g., primary and secondary production, storage of sediment and organic material).

Initial deficits in spring and winter habitat values for Chinook salmon, steelhead, and delta smelt would result in a 2- to 10-year lag in achieving full on-site compensation with the current project design. This delay is attributable to the:

- loss of existing vegetation and IWM in the first year of construction,
- a 2-year lag in installation of IWM and planted vegetation on the constructed bench, and
- an estimated 15 years for the planted vegetation to mature and achieve pre-project shoreline cover values.

Although not directly quantified by the SAM, specific design elements that would minimize these short-term deficits in habitat values and contribute to long-term gains include the:

- increased area of shallow-water habitat and planted vegetation provided by the bench during winter and spring flows (compared to the relatively narrow strip provided on the existing levee slope),
- use of structurally complex IWM on the bench surface, and
- gently sloping the bench toward the river.

General knowledge of the habitat preferences of juvenile salmonids and other fishes in streams indicate that complex, multi-branched woody complexes (including smaller structural members ranging from 1 to 4 inches in diameter and similar-size spaces between members) provide juvenile fish with important feeding, resting, and escape cover from predators, swift currents, and boat wakes. Gently sloping the bench toward the river minimizes the risk of fish stranding and still promotes sedimentation, natural plant establishment, and fish access to shallow water over a broad range of flows.

Fall habitat values for juvenile Chinook salmon (primarily winter-run, spring-run, and late fall–run Chinook salmon) would not fully recover primarily because of uncompensated-for losses of existing IWM along the fall shoreline. A potential compensation measure would be to extend the woody complexes on top of the bench down the outboard slope of the bench (or anchor woody material directly into the slope) so that a portion of the woody material extends to or below the average fall water surface elevation (approximately 5 feet). It is estimated that approximately 50% IWM cover (resulting in 25% cover in years 25 through 50) is needed along the fall shoreline to minimize this deficit and fully compensate for initial habitat losses within 10 years of project construction. This compensation requirement also could be met by restoring IWM along the fall shoreline of a suitable off-site location.

In conclusion, the RM 56.7 project would compensate for short-term reductions in winter and spring habitat values within 2 to 10 years of project construction and result in long-term increases in winter and spring habitat values for Chinook salmon, steelhead, and delta smelt during the 50-year project period. Long-term benefits to listed species include increases in the amount of shallow-water habitat and SRA cover available to juvenile Chinook salmon, steelhead, and delta smelt during typical winter and spring flows. The smaller, long-term deficits in fall habitat values potentially affecting juvenile Chinook salmon cannot be fully compensated for with the proposed project design and construction schedule. It is estimated that full compensation could be achieved within 10 years of project construction by placing IWM on the outboard slope of the constructed bench in year 3 (similar in quantity to that placed on top of the bench) or restoring IWM along the fall shoreline of a suitable off-site location.

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Appendix A

SAFCA Design Objectives for Bank Protection

SAFCA
Sacramento
Area Flood
Control
Agency

Pocket Erosion Sites and RM 56.7, Sacramento River

Design Objectives for Bank Protection

Draft July 11/05

1. Consistent with ensuring public safety; avoid or minimize loss of aquatic & riparian habitats,

2. Maximize onsite mitigation credits based on IWG's emerging SAM methodology[1], and target net gain in habitat or habitat neutral design. Accomplish optimal onsite habitat values by creating:
    - Seasonally flooded benches and placement of instream wood at varying elevations,
    - Self-sustaining, diverse riparian vegetation in planting benches and on bank slopes, including the lower 1/3 of banks to optimize shaded aquatic and shallow water habitats,
    - Minimal aquatic predator species habitat, to protect out-migrating juvenile salmonids,
    - Shoreline micro-habitats as refugia for native fish, utilizing stable but irregular bench levels and scalloped bank lines. The intent is variable, near-bank hydraulic effects and lower flow velocity;

3. Design for a high level of bank and levee stability, and persistence of bank stabilization under minimal to normal maintenance operations;

4. Limit the use of riprap above summer water surface, or conceal rock with topsoil and dense plantings;

5. Consider innovative uses of engineered materials & products (e.g., turf reinforcement mats, etc) where feasible;

6. Design to effectively attenuate boat wake energy, especially at low summer water (elevation 3'-8'), as well as spring/winter water (elevation 8'-15');

[1] Subject to refinement. Process is underway.

7. Utilize bio-technical engineering methods, including brush boxes (i.e., temporary until vegetation is established) and reliance on vegetation to stabilize soil such as native sedge & grass cover in areas of low velocity and sheer stress;

8. Avoid over-compaction of fill material, or rock layers exceeding 1-foot thickness, so as not to hinder plant growth and root penetration;

9. Accommodate limited recreational use and improved visual conditions, without compromising other, higher priority objectives;

10. Set a design goal of less than $2000 per linear foot for construction.

Appendix B

SAM Modifications and Refinements Memorandum

Jones & Stokes

Date: October 24, 2005

To: Howard Brown, National Marine Fisheries Service
Jennifer Hobbs, U.S. Fish and Wildlife Service

cc: Steve Chainey, MIG

From: Bill Mitchell

Subject: **SAM Modifications and Refinements**

The following memorandum is a revision of the memorandum that we submitted to you on August 17, 2005. This memorandum was revised to address the comments received at the meeting on August 30, 2005 with members of the Interagency Working Group and other agencies and consultants involved in projects of the Sacramento River Bank Protection Project and River Mile 56.7 PDT.

The meeting participants expressed general support for the proposed modifications to the SAM computational and weighting procedures discussed in this memorandum. Several questions or concerns remained regarding details of the computational procedures used to quantify or weight specific SAM variables. These questions and other clarifications and refinements to the SAM model are addressed below. Meeting participants also agreed to a six-month trial period for using the SAM with the proposed modifications to determine the mitigation requirements for ongoing and proposed bank protection projects in the Sacramento Pocket Area and other Sacramento River sites. No additional modifications to the model would be considered until an interagency review occurs following the end of the six-month trial period.

Introduction

The Standard Assessment Methodology (SAM) was developed by the U.S. Army Corps of Engineers, in consultation with the Interagency Working Group, to address specific habitat assessment and regulatory needs for ongoing and future bank protection actions in the Sacramento River Bank Protection Project (SRBPP) planning area (additional background information can be found in the May 2004 SAM final review draft by Stillwater Sciences and Dean Ryan Consultants & Designers). 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. A major advantage of the SAM is that it integrates species life history (life stage occurrence by reach and month) and flow-related variability in habitat quality and availability to generate species responses to project actions over time.

Recent application of the SAM to specific projects has revealed several technical and procedural modifications that improve the accuracy of the results and the quantification of benefits associated with desired mitigation and restoration design features (e.g., graded benches, floodplain habitat). Jones & Stokes and MIG (on behalf of the Sacramento Area Flood Control Agency), NOAA Fisheries, and U.S. Fish and Wildlife Service met informally on May 17 and August 1, 2005 to discuss these modifications. The following memorandum summarizes the proposed modifications. In summary, these modifications include:

- eliminating the assumed negative response of Delta smelt juveniles and adults to nearshore cover (e.g., instream woody material [IWM] and vegetation) based on the pelagic nature of these life stages and their reduced dependence on nearshore cover,

- applying the habitat response curves for Delta smelt spawning and incubation life stages to newly-hatched larvae based on the importance of nearshore habitat to all three life stages,

- characterizing the quality of shallow water habitat based on the slope of the submerged portion of the bank rather than the slope of the bank at the water's edge,

- quantifying floodplain habitat values based on the actual area of inundated floodplain rather than the ratio of floodplain-to-channel inundation area, and

- quantifying shoreline habitat variables (IWM, aquatic vegetation, shade) based on the actual length of the existing or created shoreline (wetted shoreline contour of bank at different flows).

The primary objective of these modifications is to improve the accuracy of the SAM in quantifying differences in habitat values among project sites or alternatives, especially for projects where detailed topography, design drawings, and hydraulic data are available. It was agreed that these modifications should be limited to those that can be implemented using the original mathematical formulations and computational structure of the SAM.

Overview of SAM Computations

In general, the SAM quantifies habitat values in terms of bank line- or area-weighted species responses that are calculated by combining habitat quality (i.e., fish response index) with quantity (bank length or wetted area) for each season, target year, and relevant species/life stage. The fish response indices are derived from hypothesized relationships between key habitat variables and the responses of individual species and life stage (see attached figures from the SAM review draft). The response indices vary from 0 to 1, with 0 representing unsuitable conditions and 1 representing optimal conditions for survival, growth, and/or reproduction. For a given site and scenario (e.g., with or without project), the SAM uses these relationships to determine the response of individual species and life stages to the measured or predicted values

of each variable for each season and target year, and multiplies these values together to generate an overall response index. This index is then multiplied by the area or linear feet of bank to which it applies to generate the weighted species response (expressed as feet or square feet). These values provide a common metric that can be used to quantify habitat values over time, compare project alternatives to baseline conditions, and evaluate the effectiveness of onsite and offsite mitigation actions.

Differences in Species Habitat Relationships (Fish Response Curves)

Problem Statement - In SAM, it is assumed that increasing amounts of nearshore cover correspond to increasing habitat values for juvenile salmonids and decreasing habitat values for Delta smelt larvae, juveniles, and adults. This conflict has raised important questions regarding the assessment of impacts and development of appropriate mitigation and restoration design objectives for bank protection projects.

In SAM, habitat values for juvenile salmon and steelhead are assumed to increase with increasing amounts of structural (e.g., instream woody material) and vegetative cover, with the highest habitat values associated with cover values between 30 and 100% (percent of total shoreline length). In contrast, habitat values for Delta smelt (larvae, juveniles, and adults) are assumed to be decrease as the amount of structural and vegetative cover increases from 50 to 100% of the shoreline length (Figures H5.3 and H6.3).

The proposed cover response of salmonids is supported by the general positive relationship between streamside cover and juvenile abundance, and is based on the hypothesis that structural and vegetative cover provides important feeding areas, shelter, and cover from predators. In contrast, the proposed negative response of Delta smelt to structural and vegetative cover assumes that these types of cover also provide habitat for larger fish that may prey on adults and juveniles. This assumption may apply to areas where structural and vegetative cover occurs in proximity to deep water or where predators have access to such cover. In this situation, however, juvenile salmonids may be equally vulnerable to predation.

The cover response for Delta smelt appears to be based on a single assumption regarding predation rather than the relative importance of specific habitats to various life stages of Delta smelt. Although Delta smelt spawning or eggs have not been documented in the field, spawning areas likely include dead-end sloughs and shallow edge waters with low water velocities and submerged woody and/or herbaceous vegetation (Moyle 2000). These habitats are thought to provide attachment sites for the adhesive eggs and protection for newly hatched larvae, which remain near the bottom until the fins and swim bladder are fully developed. At this stage (16-18 mm TL), Delta smelt become more buoyant and presumably disperse downstream to the open waters of the estuary.

Based on current knowledge of the habitat requirements of Delta smelt, it can be reasonably assumed that shallow edge waters with submerged structural and vegetative cover provide suitable conditions for Delta smelt spawning, incubation, and early larval stages. This is reflected in the SAM's bank slope, instream structure, and aquatic vegetation response curves for the spawning and incubation life stages (Figures H2.2, H5.2, and H6.2). Based on the rationale above, this relationship can also be applied to the early larval rearing period prior to swim bladder formation. Following this stage, it can be reasonably assumed that nearshore cover becomes relatively unimportant to Delta smelt once the larvae disperse into open water. In fact, the SAM assumes that habitat quality for Delta smelt juveniles and adults is unaffected by the presence of shallow water habitat because of their pelagic nature.

Proposed Modification - A simple modification to the SAM would be to use the bank slope, instream structure, and aquatic vegetation response curves for Delta smelt spawning and incubation to also characterize the response of Delta smelt larvae prior to swim bladder formation. The response curves for juvenile and adult life stages could be ignored or assumed to be neutral (i.e., no response) for these habitat variables to reflect the pelagic nature of these life stages.

Bank Slope

Problem Statement – The slope of the bank at the water's edge serves as an indirect measure of shallow water habitat that can be readily measured in the field or derived from topographic data. However, this variable may not accurately characterize the value or extent of natural or constructed features designed to create shallow water or floodplain habitat.

Bank Slope is intended to serve as an indirect measure of shallow water habitat availability, and is derived from point estimates of bank slope (horizontal change divided by vertical change) along each seasonal shoreline (i.e., the line where the water surface intersects the bank at average winter, spring, summer, and fall flows). Application of this approach to specific projects has revealed the potential for underestimating the value of natural or constructed features that provide important shallow water and floodplain habitat for listed species. Although this approach may be appropriate for large river segments where accurate delineation of such features is not feasible or practical, detailed bank protection project descriptions are often available (e.g., detailed survey data and plan drawings), allowing more accurate quantification of the habitat values associated with these features.

Figure 1 illustrates the current SAM procedure for deriving bank slopes for a generalized graded bench design (similar to that currently proposed for RM 0.5 on the Lower American River) (Figure 1). A major objective of this design is to create shallow water habitat by lowering the bank and creating a gently sloped bench (≥10:1) that is frequently inundated and available to juvenile fish during typical winter and spring flows. It is hypothesized that slopes of 10:1 or greater correspond to optimum shallow water habitat for young salmon (Figure H2.3), which

reach peak abundance in the lower Sacramento and American Rivers during the winter and spring.

In SAM, changes in the quality of shallow water habitat resulting from a proposed action are based on projected changes in bank slope along the average seasonal shorelines. As shown in Figure 1, the graded bench design would result in the creation of a 100-foot wide band of high-quality (>10:1 slope) shallow water habitat during average winter and spring flows. However, point estimates of bank slope at the intersection of the bank with the average winter and spring water surface would be 2:1, resulting in no detected change in habitat quality relative to existing conditions.

Proposed Modification - This problem can be partially remedied by using an average bank slope that includes point estimates from the submerged portion of the bank. However, in cases where detailed topography, plan drawings, and/or cross-sections are available, the most accurate and direct method for characterizing the quality of shallow water habitat would be to assign a bank slope equal to the dominant slope of the submerged portion of the bank for each flow (in the case of Figure 1, >10:1 for winter and spring flows). Accordingly, SAM would compute the incremental effect of this variable on overall habitat values by combining the corresponding fish response index (1.0) with the associated increase in wetted area resulting from the graded bench (100 feet multiplied by the length of the site).

Floodplain Habitat

Problem Statement – In SAM, floodplain habitat values are based on the ratio of inundated floodplain width (based on the flood stage that occurs every two years on average) to the inundated channel width (based on the average winter-spring river stage). This ratio provides an indicator of floodplain habitat availability but may not accurately reflect the biological benefits associated with actual floodplain area.

The SAM quantifies the availability of floodplain habitat to listed species based on the ratio of the wetted floodplain width or area at the two-year flood-return flow to the wetted width or area of the river at the average winter-spring flow. For example, according to the response curve for juvenile salmon, the response index ranges from 0.3 for a floodplain inundation ratio of 2:1 to 1.0 for a ratio of 12:1 (Figure H3.3).

Figure 2 illustrates the current SAM procedure for computing floodplain inundation ratios. In this example, the floodplain inundation ratio is 2:1, corresponding to a wetted width of 1,000 feet for the two-year flood-return flow and a wetted width of 500 feet for the average winter-spring flow (measured from the midline of the river channel). If this represents newly created floodplain, approximately 11.5 acres of new floodplain habitat would be created for every 1,000 linear feet of river. However, for juvenile salmon, the only change in habitat values recognized by the SAM would be an increase in the floodplain response index from 0.2 to 0.3,

corresponding to an increase in floodplain inundation from 1:1 to 2:1 (Figure H3.3). Currently, there is no means of weighting the fish response indices by floodplain inundation area or adding the contribution of other variables (e.g., vegetation) to floodplain habitat values.

The use of floodplain to channel ratios to characterize floodplain habitat availability appears to be based on general geomorphic principles that apply to unconfined alluvial streams, and on the assumption that floodplain morphology of the Sacramento River is similar across the region. However, there seems to be no biological rationale for quantifying floodplain values in this manner. A more accurate and direct measure of the habitat values associated with floodplains is the actual area of inundated floodplain surface, which relates directly to the amount of potential living space for fish, site suitability for floodplain vegetation, and overall productive capacity of floodplains.

Proposed Modification - An alternative approach to evaluating floodplain habitat with the current version of the SAM is to use the bank slope variable to quantify floodplain values and run the SAM computational procedure separately for floodplain and in-channel habitat (defined by shallow water, cover, substrate, and shade along each seasonal shoreline). The bank slope variable offers a means of weighting the fish response index by floodplain inundation area and the flexibility to include other habitat variables (e.g., vegetation) in the overall computation of floodplain habitat values. This approach would entail setting the bank slope variable to 10:1 (corresponding to a fish response index of 1.0) and weighting the index by the area of floodplain inundation for the two-year flood-return flow (excluding the wetted area of the river channel).

At the August 30 meeting, a concern was raised about the proposal to generate separate results for floodplain and in-channel habitat. A suggested alternative was to generate one value representing both in-channel and floodplain habitat by weighting bank slope values for each habitat by the area and amount of time that these habitats are available to fish. For example, bank slope values associated with shoreline habitat that is available every year could be multiplied by 1 while bank slope values associated with floodplain habitat that is available every 2 years could be multiplied by 0.5. While this is a logical alternative, the computational structure of the SAM does not allow the bank slope variable to be weighted differently from other variables (i.e., all variables receive the same weighting factor).

Shoreline Length

Problem Statement – In SAM, the extent of IWM, aquatic vegetation, and shade are measured in terms of bank line coverage (percent of total bank length). A simple straight-line measurement of a site's length and the amount of cover or shade intersecting this line may not accurately reflect the increased habitat values associated with variable shoreline lengths at different flows.

As described above, the SAM quantifies habitat values in terms of bank line- or area-weighted species responses that are calculated by combining habitat quality (i.e., fish response index) with quantity (bank length or wetted area). Because instream structure, aquatic vegetation, and shade are measured in terms of bank line coverage (percent of total bank length), weighting by bank length is most appropriate for these variables. A common objective of onsite and offsite mitigation for bank protection projects on the Sacramento and Lower American Rivers is to enhance habitat diversity and complexity of nearshore areas by incorporating variable bank elevations and slopes in the design (e.g., planting berms, embayments). These features also increase the quantity of available habitat by increasing the length of the shoreline and the extent of cover and shade along the water's edge.

Proposed Modification - For projects where detailed survey data and design drawings are available, weighting the fish response indices by the effective shoreline length corresponding to each seasonal water surface elevation provides a means of accurately quantifying the habitat values associated with variable shoreline features. Figure 3 illustrates the measurement of seasonal shoreline lengths for a generalized version of the graded bench design proposed for RM 0.5 on the lower American River. In this example, shoreline lengths for the highlighted segment vary from approximately 400 feet at elevations of 0-2 feet (corresponding roughly to the shoreline length under existing conditions) to approximately 860 feet at average summer flows.

One of the questions raised at the August 30 meeting was whether bank line weighting of shoreline habitat variables could be used in combination with area weighting of shallow-water and floodplain habitat variables to compute overall habitat values at a given site. Unfortunately, as stated above under "Floodplain Habitat", the computational structure of the SAM does not allow different weighting factors to be applied to different variables. Consequently, the only way to apply different weighting factors to different variables is to conduct separate runs of the SAM as proposed above for floodplain and in-channel habitat. Otherwise, it will be necessary to decide which type of weighting (area or bankline) provides the most accurate or meaningful measure of existing or desired habitat values at a given site.

Advantages of SAM Modifications

The modifications and refinements to the SAM recommended above offer three important advantages to successful implementation of the SAM for future SRBPP projects and associated mitigation actions:

- For each successive bank protection project, optimizing the project's SAM mitigation values creates an incentive to incorporate design features (both onsite and offsite) that result in high-value habitats for a range of species throughout the hydrologic year.

- Modifications improve the scientific accuracy and precision of particular response variables, adding to greater credibility and technical defensibility of SAM model assumptions, results, and applications.

- Improving scientific precision and defensibility of the SAM will help promote wider acceptability by local, state, and federal flood management agencies of the habitat mitigation requirements quantified by SAM for bank protection projects.

Figure 1
Generalized Cross Section of Graded Bench Design

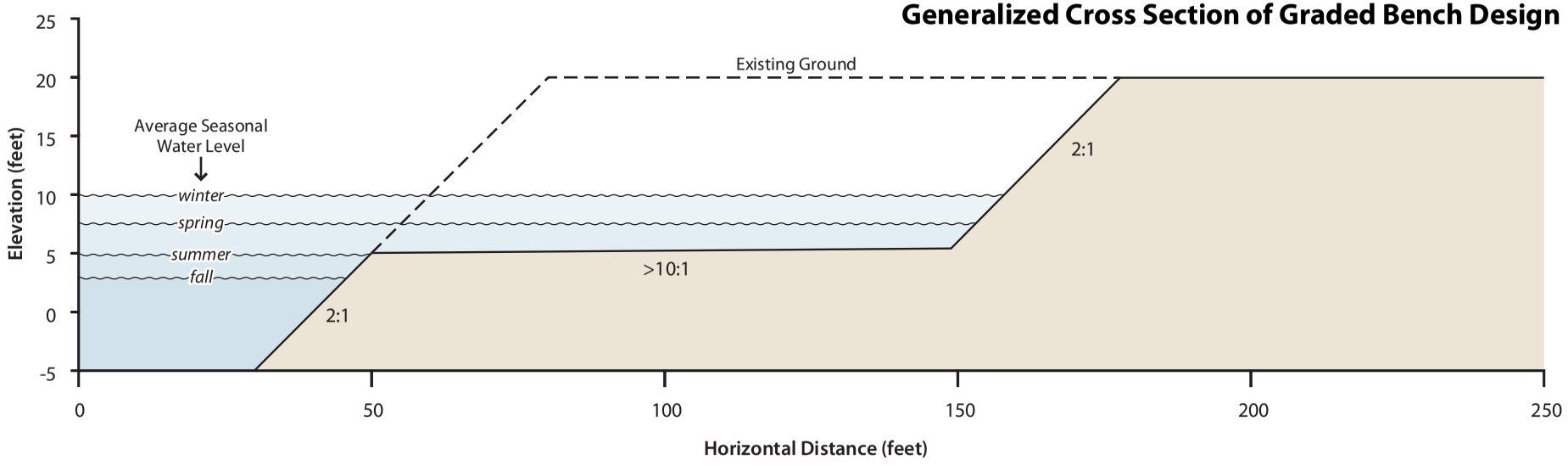
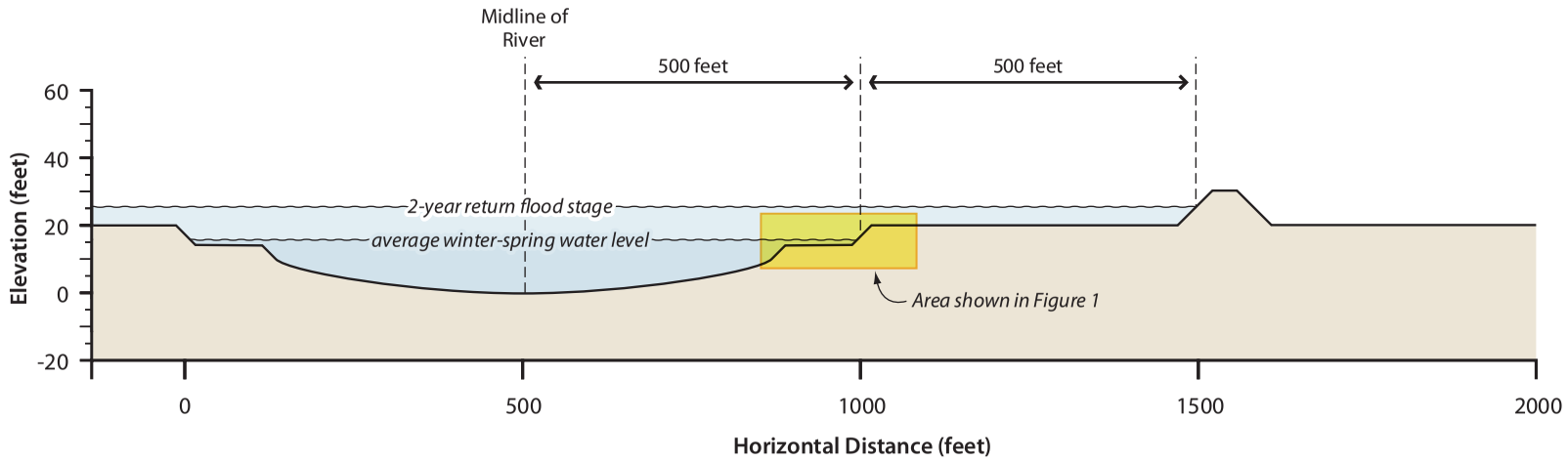


Figure 2
Generalized Cross Section of River and Floodplain



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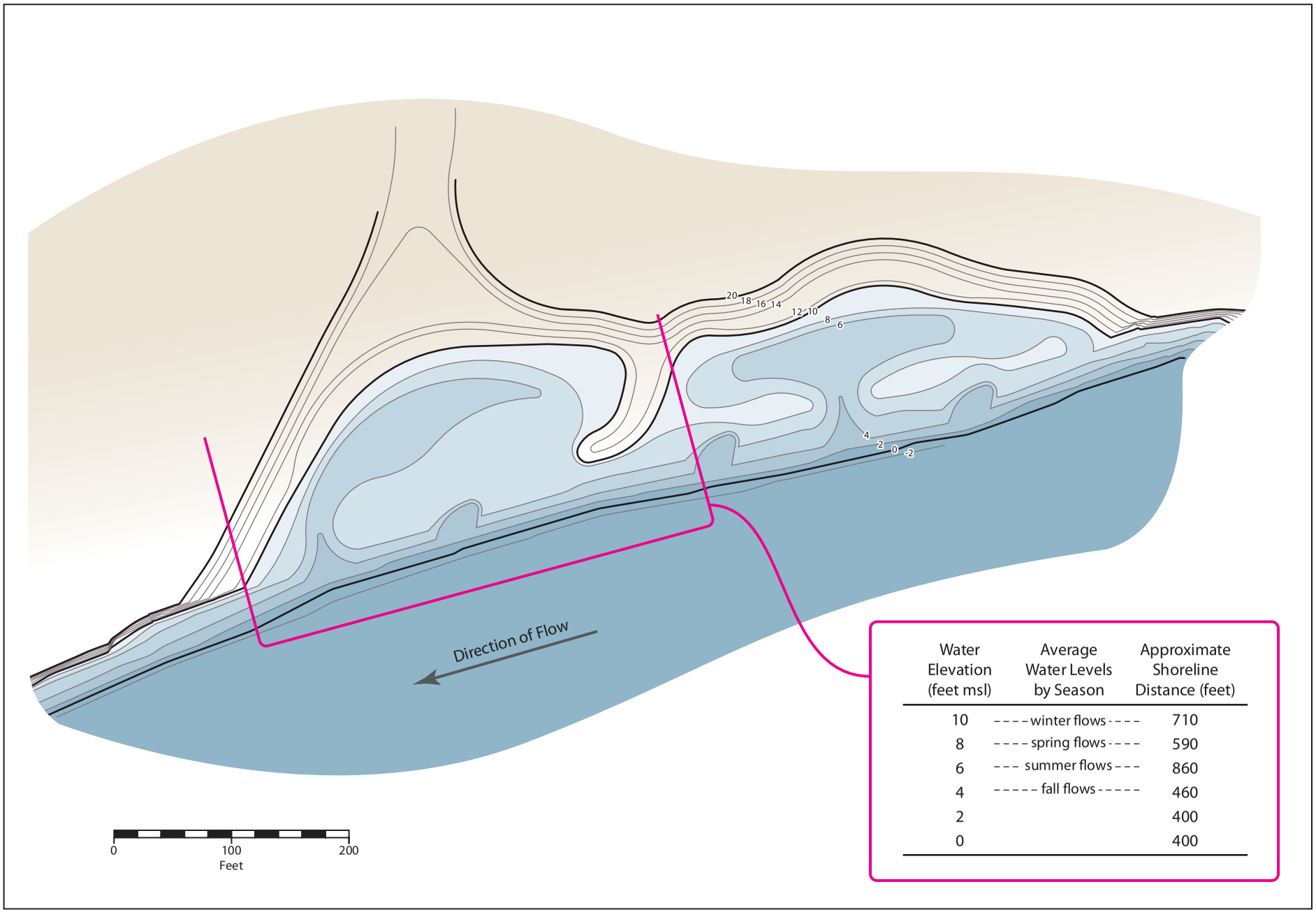
Jones & Stokes



Jones & Stokes

Figure 3
Generalized Plan View of Graded Bench Design

2.2 Spawning and Egg Incubation

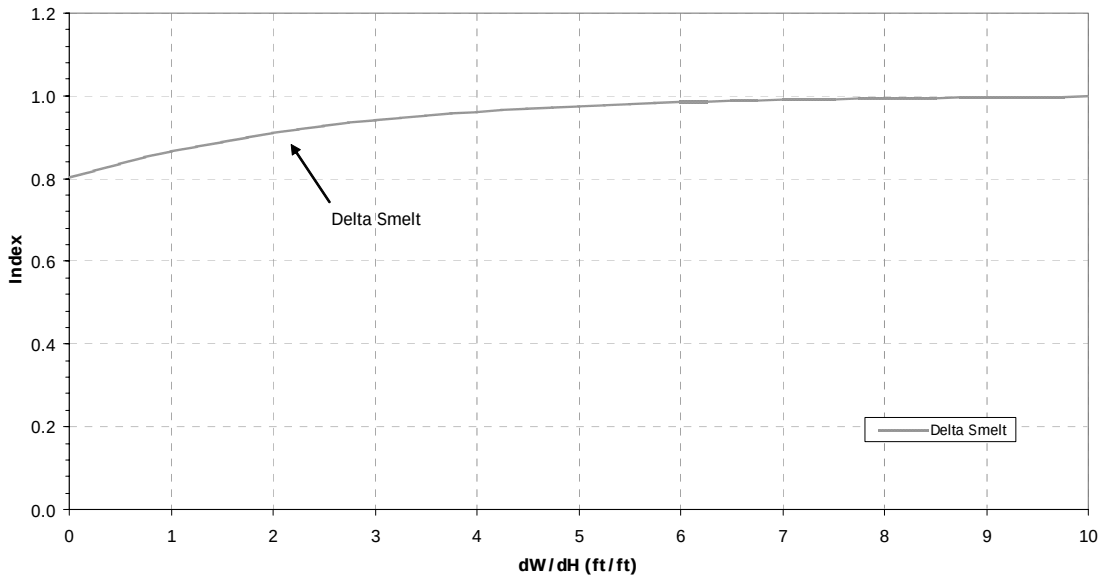


Figure H2.2 Conceptual focus fish response to bank slope during spawning and egg incubation life stages.

Delta smelt spawning has been observed in "dead-end sloughs and shallow edge waters" in the western Delta (USFWS 1993). Therefore, the response index was modeled with a range from 0.8 for areas with steeper banks to 1.0 in shallower backwater habitat. For salmonids, nearly all suitable spawning habitat in the Sacramento River exists upstream of the SRBPP planning area: upstream of the Red Bluff Diversion Dam on the mainstem; upstream of the project area in the American and Feather rivers; and in other Sacramento River tributaries upstream of the project area (Yoshiyama et. al. 1996). For this reason, the response to bank slope was not modeled for the spawning and egg incubation salmonid life stages.

2.3 Larval/Fry/Juvenile Rearing

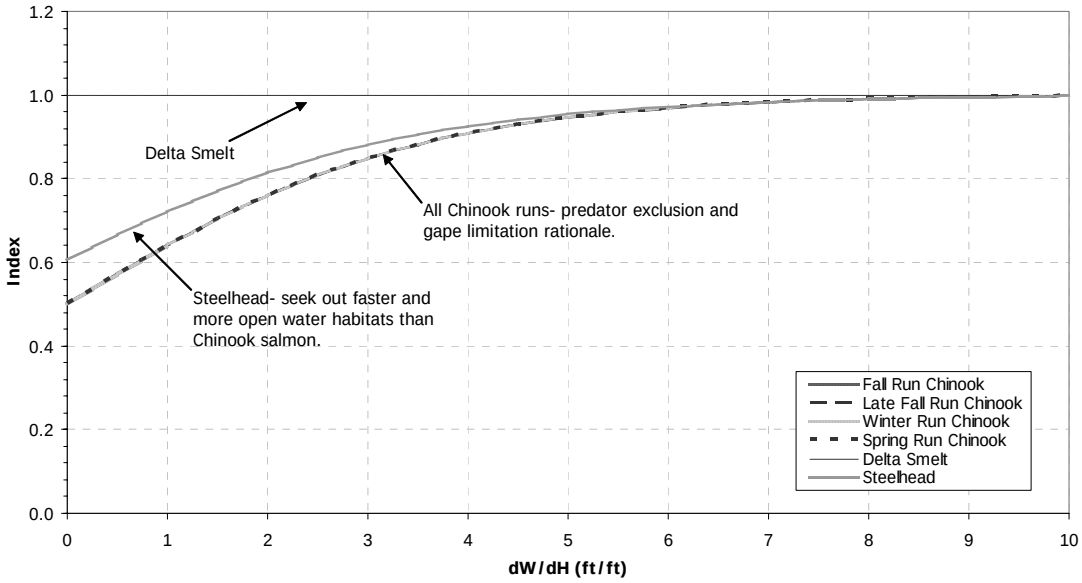


Figure H2.3 Conceptual focus fish response to bank slope during larval, fry, and juvenile rearing life stages.

The juvenile rearing life stages of the salmonid focus fish species are strongly affected by the availability of shallow water. Waite and Barnhart (1992) suggested that steelhead fry occupied a restricted range of depths and low velocities near stream banks. Although older juvenile salmon often use deeper water habitats than do fry, it was assumed that predation risk would be greater in deeper water. The relative response index for Chinook salmon therefore ranges from 0.5 for the steepest bank slope (i.e., deep water near shore) to 1.0 for gradual banks where availability of shallow water is highest. This is based on the predator exclusion and gape limitation rationale described by Power (1987) and Schlosser (1991). A recent snorkel survey in the lower American River that found higher densities of juvenile salmonids at depths less than 3 feet (Cannon and Kennedy 2003). According to a recent DWR report, juvenile steelhead sought out faster and open water habitats than juvenile Chinook salmon (Cavallo et al. 2003), indicating greater swimming ability. The suitability index for steelhead in deeper water is therefore slightly greater (0.6) than for Chinook salmon (0.5). Although no literature has been identified that indicates bank slope preferences for delta smelt at this life stage, juveniles were assumed to be insensitive to this variable due to their generally pelagic nature. The bank slope response index for delta smelt was therefore set at 1.0.

3.3 Larval/Fry/Juvenile Rearing

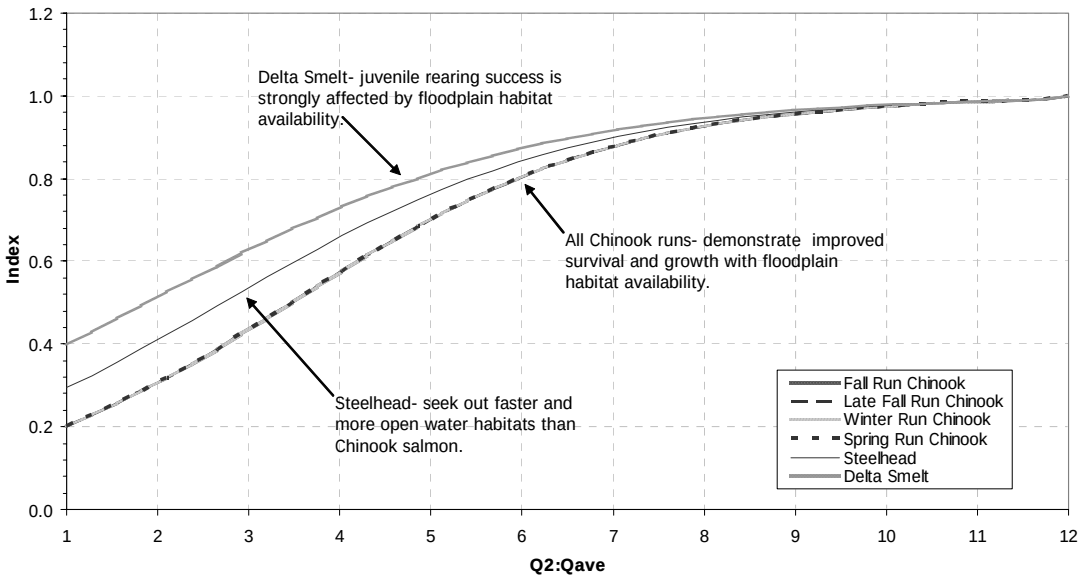


Figure H3.3 Conceptual focus fish response to floodplain availability during larval, fry, and juvenile rearing life stages.

Juvenile salmonid rearing success is strongly affected by floodplain habitat availability. In mark-recapture experiments, Sommer et al. (2001a) demonstrated improved survival and growth of juvenile salmonids on inundated floodplains relative to individuals rearing in adjacent main channel habitats. McCain (1992) noted that vegetated areas flooded during high flows create habitat for rearing juvenile Chinook salmon. The relative response index to floodplain inundation ratio for larval, fry, and juvenile rearing was assumed to range from 0.4 to 1.0 for Chinook salmon. The response index for juvenile steelhead (0.5 to 1.0) indicates slightly less sensitivity to floodplain inundation ratio due to their greater preference for faster open water habitat (Cavallo et al. 2003). Delta smelt are routinely observed in the Sacramento River bypass system (Sommer et al. 2001b), and this species is assumed to benefit from the lower predator density and the high primary and secondary productivity in inundated floodplains. The relative response index for delta smelt larval, fry, and juvenile rearing was therefore modeled to reflect a large positive response (0.4 to 1.0) to floodplain inundation ratio.

5.2 Spawning and Egg Incubation

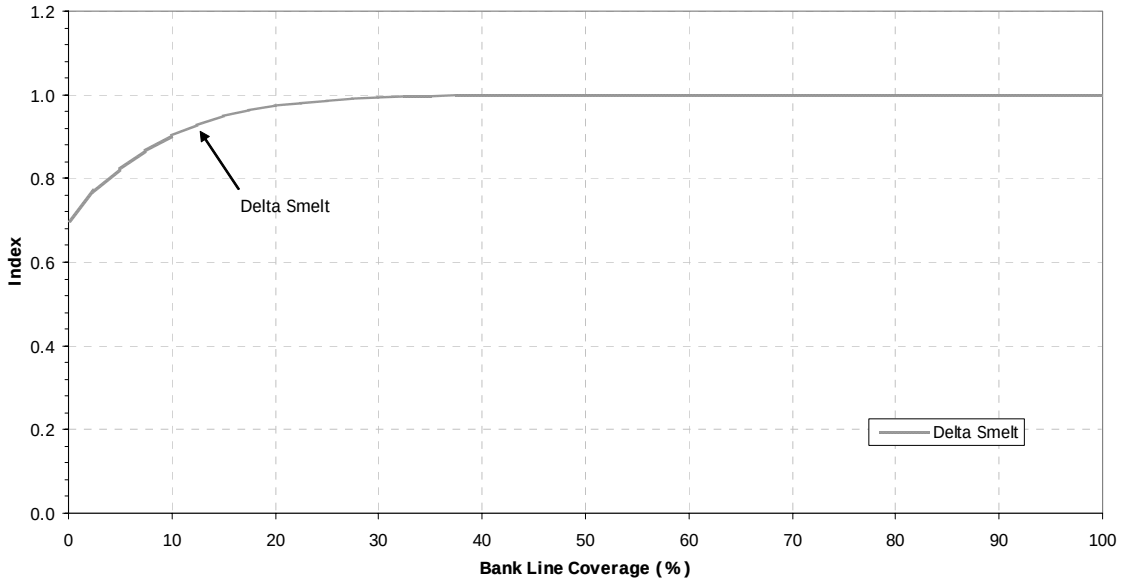


Figure H5.2 Conceptual focus fish response to instream structure availability during spawning and egg incubation life stages.

For salmonids, nearly all suitable spawning habitat in the Sacramento River exists upstream of the SRBPP planning area: upstream of the Red Bluff Diversion Dam on the mainstem; upstream of the project area in the American and Feather rivers; and in other Sacramento River tributaries outside of the project area (Yoshiyama et. al. 1996). For this reason, the response to instream structure was not modeled for the spawning and egg incubation salmonid life stages. Although delta smelt eggs have not been observed in the field, the eggs are thought to attach to substrates such as cattails, tules, tree roots and submerged branches (Moyle et. al. 1992, USFWS 1993). For this reason, spawning and egg incubation response to instream structure was modeled to increase from 0.7 at low structure coverage to 1.0 at the highest levels.

5.3 Larval/Fry/Juvenile Rearing

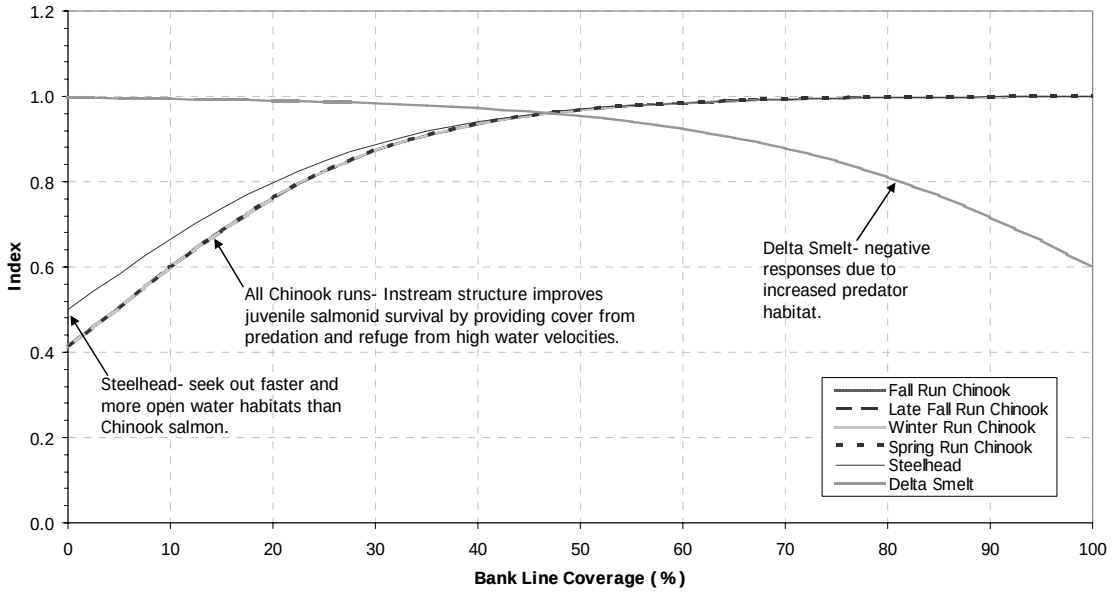


Figure H5.3 Conceptual focus fish response to instream structure availability during larval, fry, and juvenile rearing life stages.

Juvenile rearing success of all focus fish species is assumed to be strongly affected by instream structure. By providing cover from predation and refuge from high water velocities, instream structure can improve survival of juvenile steelhead and Chinook salmon (Bugert 1985, Bugert et al. 1991). For larval, fry, and juvenile salmonids it was therefore assumed that the relative response index would be low for low structural complexity and increase with increasing structural complexity. A lack of instream structure is assumed to be highly detrimental to salmonid rearing success, with responses ranging from 0.4 to 1.0 for Chinook salmon, and from 0.5 to 1.0 for steelhead. Juvenile steelhead are believed to be slightly less sensitive to instream structure due to their greater preference for faster, open water habitat (Cavallo et al. 2003). For delta smelt larvae, fry, and juveniles, low to moderate levels of instream structure were assumed to have little impact on rearing success. However, the relative response declines as instream structure increases due to the increasing potential for higher predator densities, with a response index value of 0.6 at the highest (100%) bank line coverage. Since edge structure may provide benefits in terms of overall productivity (e.g., periphyton and associated fauna) and alternative forage for predators, the modeled response for delta smelt may be reconsidered as new information becomes available.

6.2 Spawning and Egg Incubation

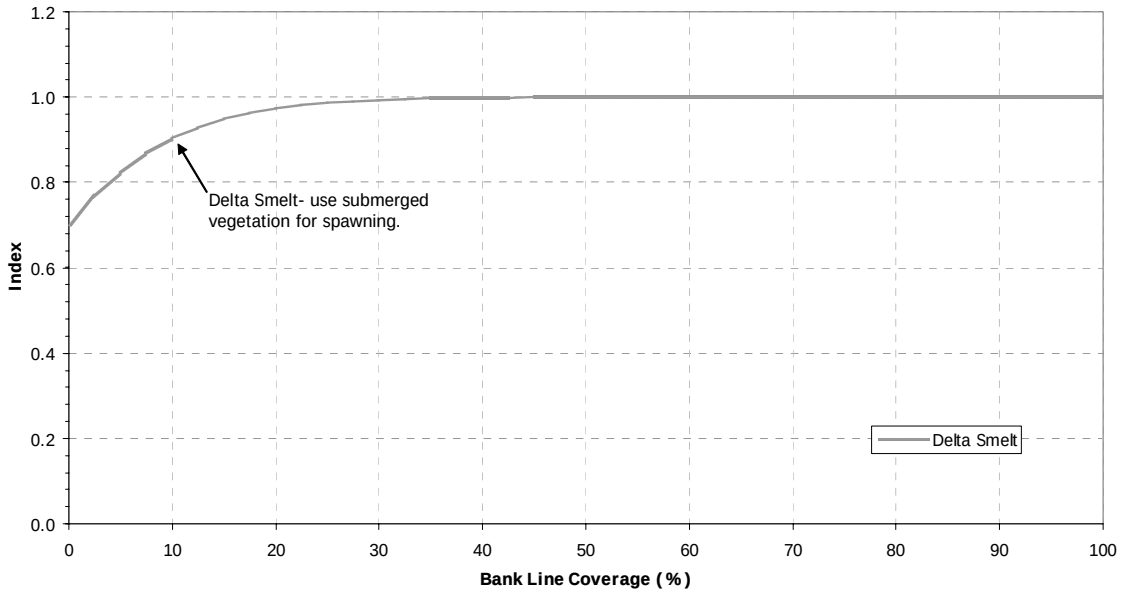


Figure H6.2 Conceptual focus fish response to aquatic vegetation availability during spawning and egg incubation life stages.

Although delta smelt spawning has not been observed in the wild, the eggs are thought to attach to substrates such as cattails, tules, tree roots and submerged branches (Moyle 2002, Moyle et. al. 1992). The aquatic vegetation response index for delta smelt therefore ranges from 0.7 for no vegetation to 1.0 with greater bank line coverage of aquatic vegetation. For salmonids, nearly all suitable spawning habitat in the Sacramento River exists upstream of the SRBPP planning area: upstream of the Red Bluff Diversion Dam on the mainstem; upstream of the project area in the American and Feather rivers; and in other Sacramento River tributaries outside of the project area (Yoshiyama et. al. 1996). For this reason, the response to aquatic vegetation was not modeled for the spawning and egg incubation salmonid life stages.

6.3 Larval/Fry/Juvenile Rearing

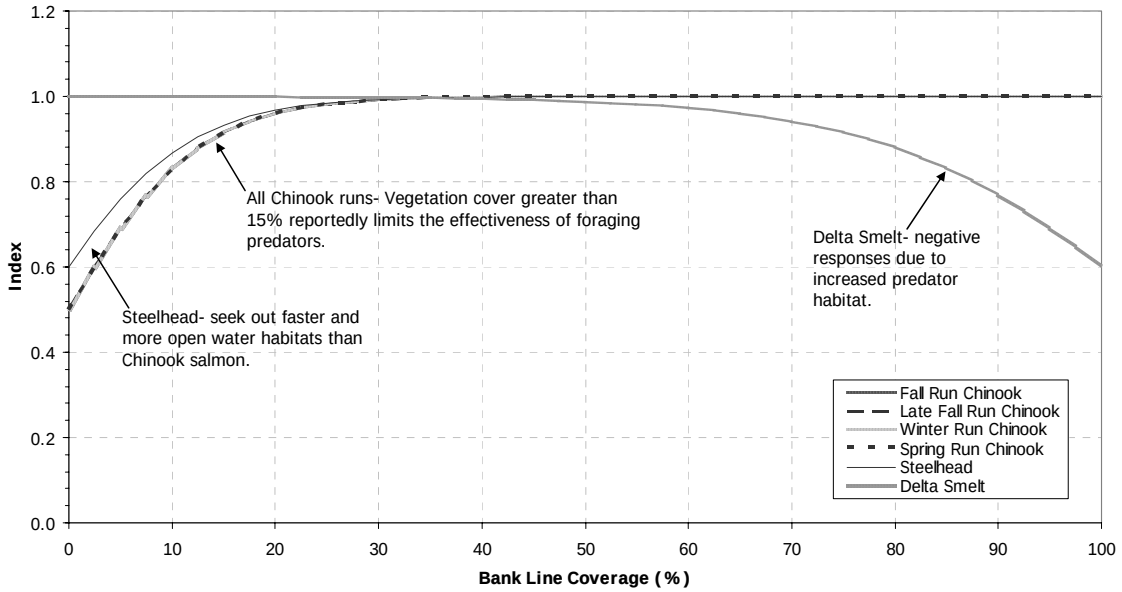


Figure H6.3 Conceptual focus fish response to aquatic vegetation availability during larval, fry, and juvenile rearing life stages.

Rearing success of focus fish larvae, fry, and juveniles is strongly affected by aquatic vegetation. Feeding and growth may be greatest for focus fish of this life stage when vegetation cover is at intermediate levels. Vegetation cover greater than 15% reportedly limits the effectiveness of foraging predators (Savino and Stein 1982, as cited in Bain and Boltz 1992). At greater densities, however, aquatic vegetation may also increase cover for predatory fish. A negative response by focus fish of this life stage to increasing amounts of aquatic vegetation, however, was only modeled for delta smelt due to their weaker swimming (i.e., predator avoidance) ability compared to salmonids. The relative response index for this Chinook salmon life stage ranges from 0.5 with no vegetation to 1.0 at vegetation coverages ≥ 30%. Steelhead, due to their preference for open water habitat (Cavallo et al. 2003) were considered slightly less sensitive to aquatic vegetation than Chinook salmon. Predation risk for larval delta smelt is assumed to increase when aquatic vegetation density exceeds about 40% due to increased suitability for predators such as largemouth bass and inland silversides (Weinstein 1986). Therefore, the response index for larval, fry, and juvenile delta smelt is 1.0 at vegetation coverages up to 40%, and decreases to 0.6 as bank line vegetation coverage reaches 100%.

APPENDIX E

Analysis Using Standard Assessment Methodology – LAR RM 0.5
November 2007

Table 1
SAM data summary for existing conditions at American River RM 0.5R.

Bank Attribute	Seasonal Values			
	Fall	Winter	Spring	Summer
Water Surface Elevation [1] (feet above MSL)	4.8	9.7	8.3	6.3
Wetted Area [2] (square feet)	231,000	231,000	231,000	231,000
Shoreline Length [2] (feet)	1,000	1,000	1,000	1,000
Bank Slope [3] (dW:dH)	1.3	1.3	1.3	1.3
Floodplain Inundation Ratio [2] (AQ2:Aqavg)	1.0	1.0	1.0	1.0
Bank Substrate Size [3] (D50 in inches)	0.25	0.25	0.25	0.25
Instream Structure [4] (% shoreline)	20	20	20	20
Vegetation [3] (% shoreline)	0	88	88	0
Shade [4] (% shoreline)	0	0	0	0

[1] Average seasonal values were estimated by Jones & Stokes and Northwest Hydraulic Consultants, Inc. for the Lower American River, River Mile 0.5R Mitigation Site (SAFCA 2005).

[2] Estimates for the proposed project site obtained from site descriptions prepared by Jones & Stokes and Northwest Hydraulic Consultants, Inc. for the Lower American River, River Mile 0.5R Mitigation Site (SAFCA 2005) and represent the total planform area of the project footprint.

[3] Data from USACE revetment database (USACE 2007).

[4] Data provided by USACE (USACE 2006).

Table 2
SAM data summary of project conditions at American River RM 0.5R.

Bank Attribute	Seasonal Values			
	Fall	Winter	Spring	Summer
Water Surface Elevation [1] (feet above MSL)	4.8	9.7	8.3	6.3
Wetted Area [2] (square feet)	238,731	304,473	287,485	254,351
Shoreline Length [2] (feet)	1,401	1,255	2,014	1,956
Bank Slope [2] (dW:dH)	4	12	10	10
Floodplain Inundation Ratio [2] (AQ2:Aqavg)	1	1.1	1.2	1
Bank Substrate Size [2] (D50 in inches)	0.25	0.25	0.25	0.25
Instream Structure [2] (% shoreline)	10	25	25	25
Vegetation [2] (% shoreline)				
Year 0	0	0	0	0
Year 1	10	50	50	50
Year 5	15	90	90	85
Year 15	25	100	100	90
Year 25	25	100	100	90
Year 50	25	100	100	90
Shade [2] (% shoreline)				
Year 0	0	0	0	0
Year 1	0	0	1	0
Year 5	0	5	14	0
Year 15	61	19	56	61
Year 25	97	28	83	97
Year 50	99	28	84	99

[1] Average seasonal values were estimated by Jones & Stokes and Northwest Hydraulic Consultants, Inc. for the Lower American River, River Mile 0.5R Mitigation Site (SAFCA 2005).

[2] Estimates for the proposed project site obtained from site descriptions prepared by Jones & Stokes and Northwest Hydraulic Consultants, Inc. for the Lower American River, River Mile 0.5R Mitigation Site (SAFCA 2005) and represent the total planform area of the project footprint.

Table 3

SAM data summary of project conditions at American River RM 0.5R with increased IWM coverage.

Bank Attribute	Seasonal Values			
	Fall	Winter	Spring	Summer
Water Surface Elevation [1] (feet above MSL)	4.8	9.7	8.3	6.3
Wetted Area [2] (square feet)	238,731	304,473	287,485	254,351
Shoreline Length [2] (feet)	1,401	1,255	2,014	1,956
Bank Slope [2] (dW:dH)	4	12	10	10
Floodplain Inundation Ratio [2] (AQ2:Aqavg)	1	1.1	1.2	1
Bank Substrate Size [2] (D50 in inches)	0.25	0.25	0.25	0.25
Instream Structure (% shoreline)	40	40	40	40
Vegetation [2] (% shoreline)				
Year 0	0	0	0	0
Year 1	10	50	50	50
Year 5	15	90	90	85
Year 15	25	100	100	90
Year 25	25	100	100	90
Year 50	25	100	100	90
Shade [2] (% shoreline)				
Year 0	0	0	0	0
Year 1	0	0	1	0
Year 5	0	5	14	0
Year 15	61	19	56	61
Year 25	97	28	83	97
Year 50	99	28	84	99

[1] Average seasonal values were estimated by Jones & Stokes and Northwest Hydraulic Consultants, Inc. for the Lower American River, River Mile 0.5R Mitigation Site (SAFCA 2005).

[2] Estimates for the proposed project site obtained from site descriptions prepared by Jones & Stokes and Northwest Hydraulic Consultants, Inc. for the Lower American River, River Mile 0.5R Mitigation Site (SAFCA 2005) and represent the total planform area of the project footprint.

Table 4
SAM results showing bank-line weighted relative response (feet) at American River RM 0.5R.

Focus Fish Species and Scenario	Fall (September–November)					Winter (December–February)					Spring (March–May)					Summer (June–August)				
	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat
Central Valley spring-run chinook salmon																				
Year 0	0		0	0		0		0	0		0		0	0		0		0	0	
Year 1	335		22	159		243		34	135		945		79	467		890		80	546	
Year 5	335		31	196		246		58	233		959		139	663		890		106	672	
Year 15	357		62	267		256		82	292		993		214	786		922		171	783	
Year 25	377		86	315		264		100	325		1,015		256	831		952		222	854	
Year 50	396		105	352		272		119	355		1,036		292	866		978		264	909	
Central Valley fall-run chinook salmon																				
Year 0	0		0					0	0		0			0		0				
Year 1	335		22					34	135		945			467		890				
Year 5	335		31					58	233		959			663		890				
Year 15	357		62					82	292		993			786		922				
Year 25	377		86					100	325		1,015			831		952				
Year 50	396		105					119	355		1,036			866		978				
Central Valley late fall-run chinook salmon																				
Year 0	0			0		0			0		0		0							
Year 1	335			159		243			135		945		79							
Year 5	335			196		246			233		959		139							
Year 15	357			267		256			292		993		214							
Year 25	377			315		264			325		1,015		256							
Year 50	396			352		272			355		1,036		292							
Sacramento River winter-run chinook salmon																				
Year 0	0		0	0		0		0	0		0		0	0		0		0		
Year 1	335		22	159		243		34	135		945		79	467		890		80		
Year 5	335		31	196		246		58	233		959		139	663		890		106		
Year 15	357		62	267		256		82	292		993		214	786		922		171		
Year 25	377		86	315		264		100	325		1,015		256	831		952		222		
Year 50	396		105	352		272		119	355		1,036		292	866		978		264		
Central Valley steelhead																				
Year 0	0		0		0	0		0	0	0	0		0	0	0	0		0		0
Year 1	270		44		270	238		58	183	901	901		144	614	901	847		149		847
Year 5	270		60		270	245		93	257	932	932		228	762	932	847		188		847
Year 15	308		104		308	265		124	299	991	991		320	857	991	904		270		904
Year 25	340		138		340	281		146	323	1,026	1,026		371	896	1,026	953		335		953
Year 50	368		165		368	297		171	347	1,057	1,057		415	928	1,057	995		387		995
Delta Smelt																				
Year 0	0				0	0	0	0		0	0	0	0		0	0	0	0		0
Year 1	401				401	255	220	220		1,014	1,014	748	748		1,014	956	864	864		956
Year 5	401				401	255	342	342		1,014	1,014	944	944		1,014	956	1,050	1,050		956
Year 15	401				401	255	362	362		1,014	1,014	977	977		1,014	956	1,081	1,081		956
Year 25	401				401	255	366	366		1,014	1,014	984	984		1,014	956	1,087	1,087		956
Year 50	401				401	255	369	369		1,014	1,014	989	989		1,014	956	1,092	1,092		956

Notes: 1 Dark shading represents seasons in which various life stages are not found in the modeled reach of the Sacramento River.
2 Results calculated from time-averaged relative responses (with minus without project) to changes in each of six habitat variables used in the SAM (Stillwater Sciences 2006).

Table 5
SAM results showing wetted-area weighted relative response (square feet) at American River RM 0.5R.

Focus Fish Species and Scenario	Fall (September-November)					Winter (December-February)					Spring (March-May)					Summer (June-August)				
	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat
Central Valley spring-run chinook salmon																				
Year 0	0		0	0		0		0	0		0		0	0		0		0	0	
Year 1	1,475		2,706	10,477		69,558		8,667	37,435		53,978		8,367	31,081		23,169		8,777	43,274	
Year 5	1,475		4,331	16,691		70,337		14,483	61,168		56,061		16,957	59,146		23,169		12,131	59,666	
Year 15	5,297		9,599	28,863		72,685		20,187	75,607		60,821		27,594	76,665		27,381		20,547	74,067	
Year 25	8,792		13,659	37,130		74,604		24,577	83,465		63,976		33,639	83,103		31,230		27,253	83,406	
Year 50	11,960		16,929	43,367		76,684		29,333	90,867		67,000		38,746	88,024		34,722		32,673	90,463	
Central Valley fall-run chinook salmon																				
Year 0	0		0					0	0		0			0		0				
Year 1	1,475		2,706					8,667	37,435		53,978			31,081		23,169				
Year 5	1,475		4,331					14,483	61,168		56,061			59,146		23,169				
Year 15	5,297		9,599					20,187	75,607		60,821			76,665		27,381				
Year 25	8,792		13,659					24,577	83,465		63,976			83,103		31,230				
Year 50	11,960		16,929					29,333	90,867		67,000			88,024		34,722				
Central Valley late fall-run chinook salmon																				
Year 0	0			0		0			0		0		0							
Year 1	1,475			10,477		69,558			37,435		53,978		8,367							
Year 5	1,475			16,691		70,337			61,168		56,061		16,957							
Year 15	5,297			28,863		72,685			75,607		60,821		27,594							
Year 25	8,792			37,130		74,604			83,465		63,976		33,639							
Year 50	11,960			43,367		76,684			90,867		67,000		38,746							
Sacramento River winter-run chinook salmon																				
Year 0	0		0	0		0		0	0		0		0	0		0		0		
Year 1	1,475		2,706	10,477		69,558		8,667	37,435		53,978		8,367	31,081		23,169		8,777		
Year 5	1,475		4,331	16,691		70,337		14,483	61,168		56,061		16,957	59,146		23,169		12,131		
Year 15	5,297		9,599	28,863		72,685		20,187	75,607		60,821		27,594	76,665		27,381		20,547		
Year 25	8,792		13,659	37,130		74,604		24,577	83,465		63,976		33,639	83,103		31,230		27,253		
Year 50	11,960		16,929	43,367		76,684		29,333	90,867		67,000		38,746	88,024		34,722		32,673		
Central Valley steelhead																				
Year 0	0		0		0	0		0	0	0	0		0	0	0	0		0		0
Year 1	-5,758		4,738		-5,758	67,739		14,898	50,425	53,183	53,183		13,963	41,460	53,183	23,867		14,883		23,867
Year 5	-5,758		7,480		-5,758	69,431		23,363	68,373	57,524	57,524		25,891	62,632	57,524	23,867		19,936		23,867
Year 15	662		15,016		662	74,248		30,883	78,529	66,071	66,071		39,121	76,131	66,071	31,278		30,578		31,278
Year 25	6,193		20,764		6,193	77,993		36,406	84,490	71,022	71,022		46,405	81,770	71,022	37,664		38,987		37,664
Year 50	10,846		25,406		10,846	81,933		42,285	90,331	75,411	75,411		52,581	86,215	75,411	43,036		45,810		43,036
Delta Smelt																				
Year 0	0				0	0	0	0		0	0	0	0	0		0	0	0	0	0
Year 1	7,731				7,731	73,473	60,847	60,847		56,485	56,485	50,151	50,151		56,485	23,351	67,052	67,052		23,351
Year 5	7,731				7,731	73,473	90,371	90,371		56,485	56,485	78,165	78,165		56,485	23,351	91,172	91,172		23,351
Year 15	7,731				7,731	73,473	95,306	95,306		56,485	56,485	82,847	82,847		56,485	23,351	95,204	95,204		23,351
Year 25	7,731				7,731	73,473	96,293	96,293		56,485	56,485	83,784	83,784		56,485	23,351	96,010	96,010		23,351
Year 50	7,731				7,731	73,473	97,033	97,033		56,485	56,485	84,486	84,486		56,485	23,351	96,615	96,615		23,351

Notes: 1 Dark shading represents seasons in which various life stages are not found in the modeled reach of the Sacramento River.
2 Results calculated from time-averaged relative responses (with minus without project) to changes in each of six habitat variables used in the SAM (Stillwater Sciences 2006).

Table 6
SAM results showing bank-line weighted relative response (feet) at American River RM 0.5R with increased IW

Focus Fish Species and Scenario	Fall (September–November)					Winter (December–February)					Spring (March–May)					Summer (June–August)				
	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat
Central Valley spring-run chinook salmon																				
Year 0	0		0	0		0		0	0		0		0	0		0		0	0	
Year 1	392		43	249		256		43	168		967		94	521		911		93	597	
Year 5	392		58	294		260		71	272		981		163	730		911		123	731	
Year 15	416		106	380		270		97	335		1,015		247	860		944		196	848	
Year 25	437		143	438		278		118	370		1,037		295	908		974		255	924	
Year 50	457		173	483		286		140	402		1,059		336	944		1,001		302	982	
Central Valley fall-run chinook salmon																				
Year 0	0		0					0	0		0			0		0				
Year 1	392		43					43	168		967			521		911				
Year 5	392		58					71	272		981			730		911				
Year 15	416		106					97	335		1,015			860		944				
Year 25	437		143					118	370		1,037			908		974				
Year 50	457		173					140	402		1,059			944		1,001				
Central Valley late fall-run chinook salmon																				
Year 0	0			0		0			0		0		0							
Year 1	392			249		256			168		967		94							
Year 5	392			294		260			272		981		163							
Year 15	416			380		270			335		1,015		247							
Year 25	437			438		278			370		1,037		295							
Year 50	457			483		286			402		1,059		336							
Sacramento River winter-run chinook salmon																				
Year 0	0		0	0		0		0	0		0		0	0		0		0		
Year 1	392		43	249		256		43	168		967		94	521		911		93		
Year 5	392		58	294		260		71	272		981		163	730		911		123		
Year 15	416		106	380		270		97	335		1,015		247	860		944		196		
Year 25	437		143	438		278		118	370		1,037		295	908		974		255		
Year 50	457		173	483		286		140	402		1,059		336	944		1,001		302		
Central Valley steelhead																				
Year 0	0		0		0	0		0	0	0	0		0	0	0	0		0		0
Year 1	395		80		395	266		72	200	945	945		168	642	945	890		170		890
Year 5	395		103		395	273		111	276	976	976		261	795	976	890		214		890
Year 15	437		166		437	293		145	319	1,038	1,038		363	891	1,038	948		304		948
Year 25	473		213		473	309		171	344	1,073	1,073		420	932	1,073	999		376		999
Year 50	503		252		503	326		197	369	1,105	1,105		468	964	1,105	1,041		434		1,041
Delta Smelt																				
Year 0	0				0	0	0	0		0	0	0	0		0	0	0	0		0
Year 1	401				401	255	231	231		1,014	1,014	765	765		1,014	956	880	880		956
Year 5	401				401	255	354	354		1,014	1,014	964	964		1,014	956	1,068	1,068		956
Year 15	401				401	255	374	374		1,014	1,014	997	997		1,014	956	1,099	1,099		956
Year 25	401				401	255	378	378		1,014	1,014	1,003	1,003		1,014	956	1,106	1,106		956
Year 50	401				401	255	381	381		1,014	1,014	1,008	1,008		1,014	956	1,110	1,110		956

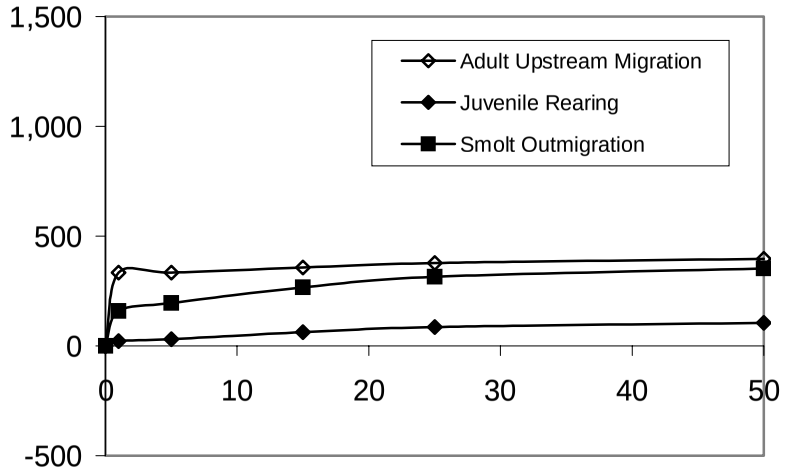
Notes: 1 Dark shading represents seasons in which various life stages are not found in the modeled reach of the Sacramento River.
2 Results calculated from time-averaged relative responses (with minus without project) to changes in each of six habitat variables used in the SAM (Stillwater Sciences 2006).

Table 7
SAM results showing wetted-area weighted relative response (square feet) at American River RM 0.5R with increased IWM.

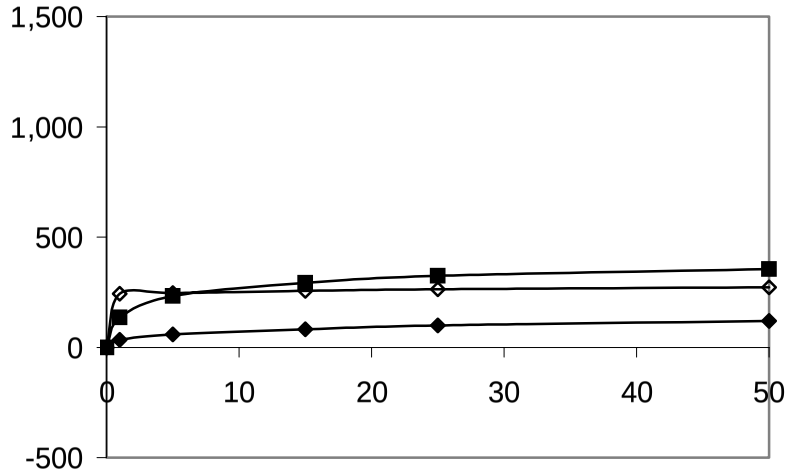
Focus Fish Species and Scenario	Fall (September-November)					Winter (December-February)					Spring (March-May)					Summer (June-August)				
	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat	Adult Upstream Migration	Spawning and Incubation	Juvenile Rearing	Smolt Outmigration	Adult Habitat
Central Valley spring-run chinook salmon																				
Year 0	0		0	0		0		0	0		0		0	0		0		0	0	
Year 1	11,336		6,349	25,882		72,859		10,884	45,529		57,097		10,543	38,780		25,926		10,490	49,889	
Year 5	11,336		8,884	33,392		73,648		17,493	70,733		59,204		20,304	68,586		25,926		14,302	67,297	
Year 15	15,335		17,100	48,103		76,024		23,974	86,068		64,020		32,390	87,191		30,187		23,864	82,591	
Year 25	18,991		23,434	58,094		77,965		28,961	94,413		67,212		39,259	94,029		34,082		31,484	92,510	
Year 50	22,306		28,534	65,632		80,069		34,366	102,274		70,271		45,061	99,255		37,614		37,643	100,004	
Central Valley fall-run chinook salmon																				
Year 0	0		0					0	0		0			0		0				
Year 1	11,336		6,349					10,884	45,529		57,097			38,780		25,926				
Year 5	11,336		8,884					17,493	70,733		59,204			68,586		25,926				
Year 15	15,335		17,100					23,974	86,068		64,020			87,191		30,187				
Year 25	18,991		23,434					28,961	94,413		67,212			94,029		34,082				
Year 50	22,306		28,534					34,366	102,274		70,271			99,255		37,614				
Central Valley late fall-run chinook salmon																				
Year 0	0			0		0			0		0		0							
Year 1	11,336			25,882		72,859			45,529		57,097		10,543							
Year 5	11,336			33,392		73,648			70,733		59,204		20,304							
Year 15	15,335			48,103		76,024			86,068		64,020		32,390							
Year 25	18,991			58,094		77,965			94,413		67,212		39,259							
Year 50	22,306			65,632		80,069			102,274		70,271		45,061							
Sacramento River winter-run chinook salmon																				
Year 0	0		0	0		0		0	0		0		0	0		0		0		
Year 1	11,336		6,349	25,882		72,859		10,884	45,529		57,097		10,543	38,780		25,926		10,490		
Year 5	11,336		8,884	33,392		73,648		17,493	70,733		59,204		20,304	68,586		25,926		14,302		
Year 15	15,335		17,100	48,103		76,024		23,974	86,068		64,020		32,390	87,191		30,187		23,864		
Year 25	18,991		23,434	58,094		77,965		28,961	94,413		67,212		39,259	94,029		34,082		31,484		
Year 50	22,306		28,534	65,632		80,069		34,366	102,274		70,271		45,061	99,255		37,614		37,643		
Central Valley steelhead																				
Year 0	0		0		0	0		0	0	0	0		0	0	0	0		0		0
Year 1	15,457		10,989		15,457	74,358		18,399	54,701	59,439	59,439		17,363	45,512	59,439	29,391		17,630		29,391
Year 5	15,457		14,865		15,457	76,092		27,785	73,097	63,888	63,888		30,588	67,213	63,888	29,391		23,233		29,391
Year 15	22,587		25,516		22,587	81,030		36,123	83,506	72,648	72,648		45,256	81,048	72,648	36,987		35,032		36,987
Year 25	28,731		33,640		28,731	84,868		42,247	89,616	77,723	77,723		53,332	86,828	77,723	43,533		44,355		43,533
Year 50	33,899		40,201		33,899	88,906		48,764	95,603	82,222	82,222		60,180	91,384	82,222	49,039		51,920		49,039
Delta Smelt																				
Year 0	0				0	0	0	0		0	0	0	0	0		0	0	0	0		0
Year 1	7,731				7,731	73,473	63,379	63,379		56,485	56,485	52,553	52,553			56,485	23,351	69,120	69,120		23,351
Year 5	7,731				7,731	73,473	93,260	93,260		56,485	56,485	80,906	80,906			56,485	23,351	93,532	93,532		23,351
Year 15	7,731				7,731	73,473	98,255	98,255		56,485	56,485	85,646	85,646			56,485	23,351	97,613	97,613		23,351
Year 25	7,731				7,731	73,473	99,254	99,254		56,485	56,485	86,594	86,594			56,485	23,351	98,429	98,429		23,351
Year 50	7,731				7,731	73,473	100,003	100,003		56,485	56,485	87,304	87,304			56,485	23,351	99,041	99,041		23,351

Notes: 1 Dark shading represents seasons in which various life stages are not found in the modeled reach of the Sacramento River.
2 Results calculated from time-averaged relative responses (with minus without project) to changes in each of six habitat variables used in the SAM (Stillwater Sciences 2006).

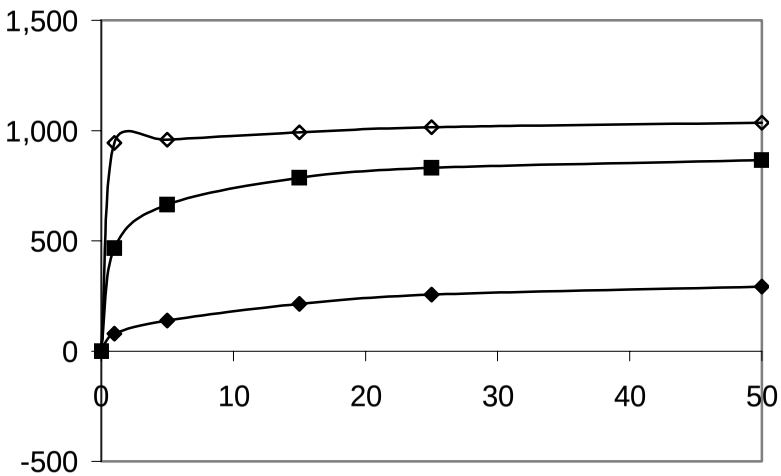
FALL



WINTER



SPRING



SUMMER

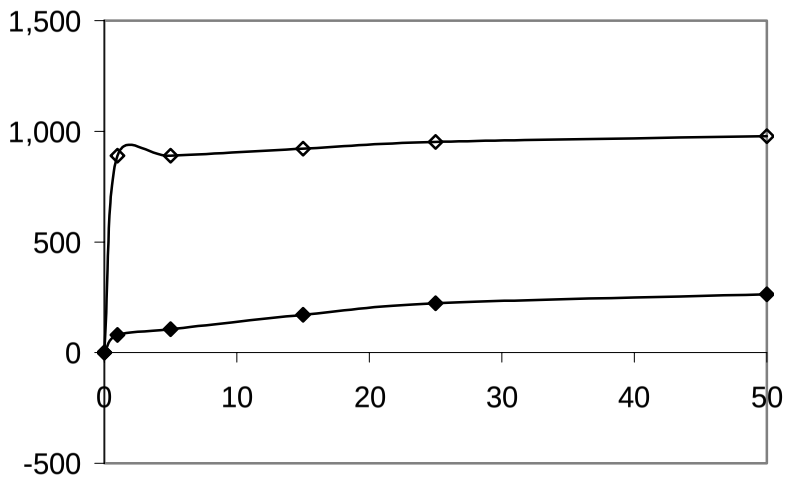
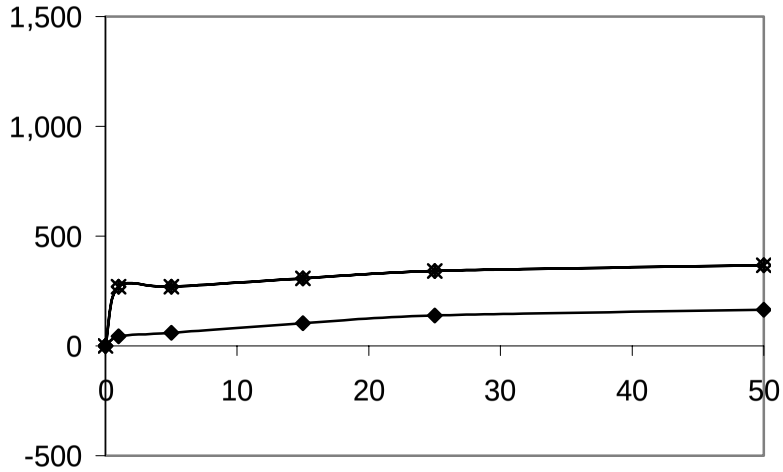
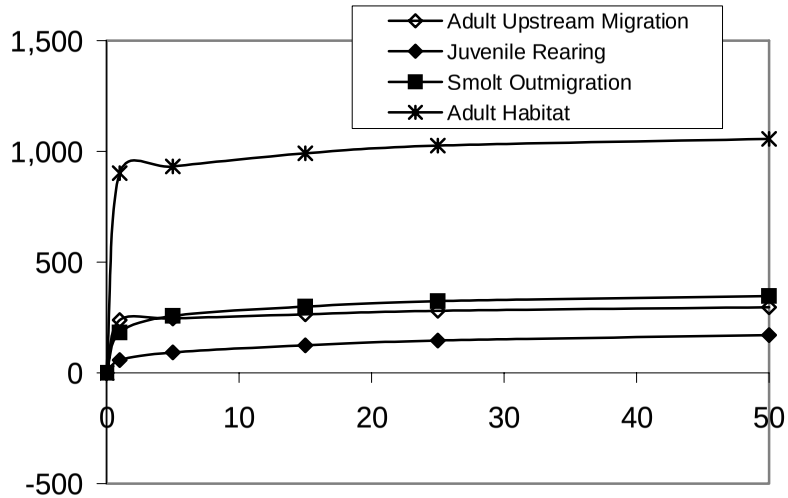


Figure 1. SAM results showing bank-line weighted relative response (feet) for Chinook salmon (Winter-run) at American River RM 0.5R.

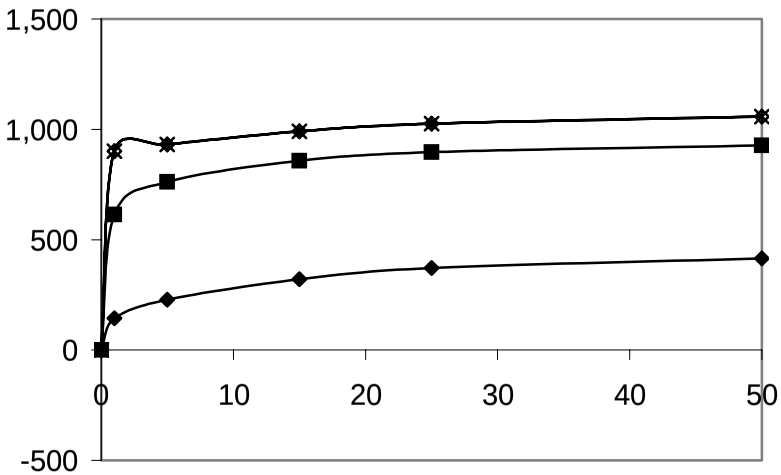
FALL



WINTER



SPRING



SUMMER

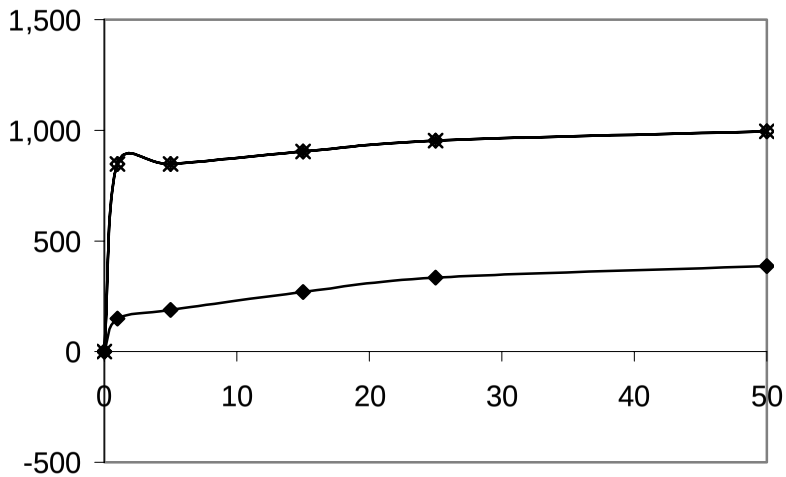


Figure 2. SAM results showing bank-line weighted relative response (feet) for Central Valley steelhead at American River RM 0.5R.

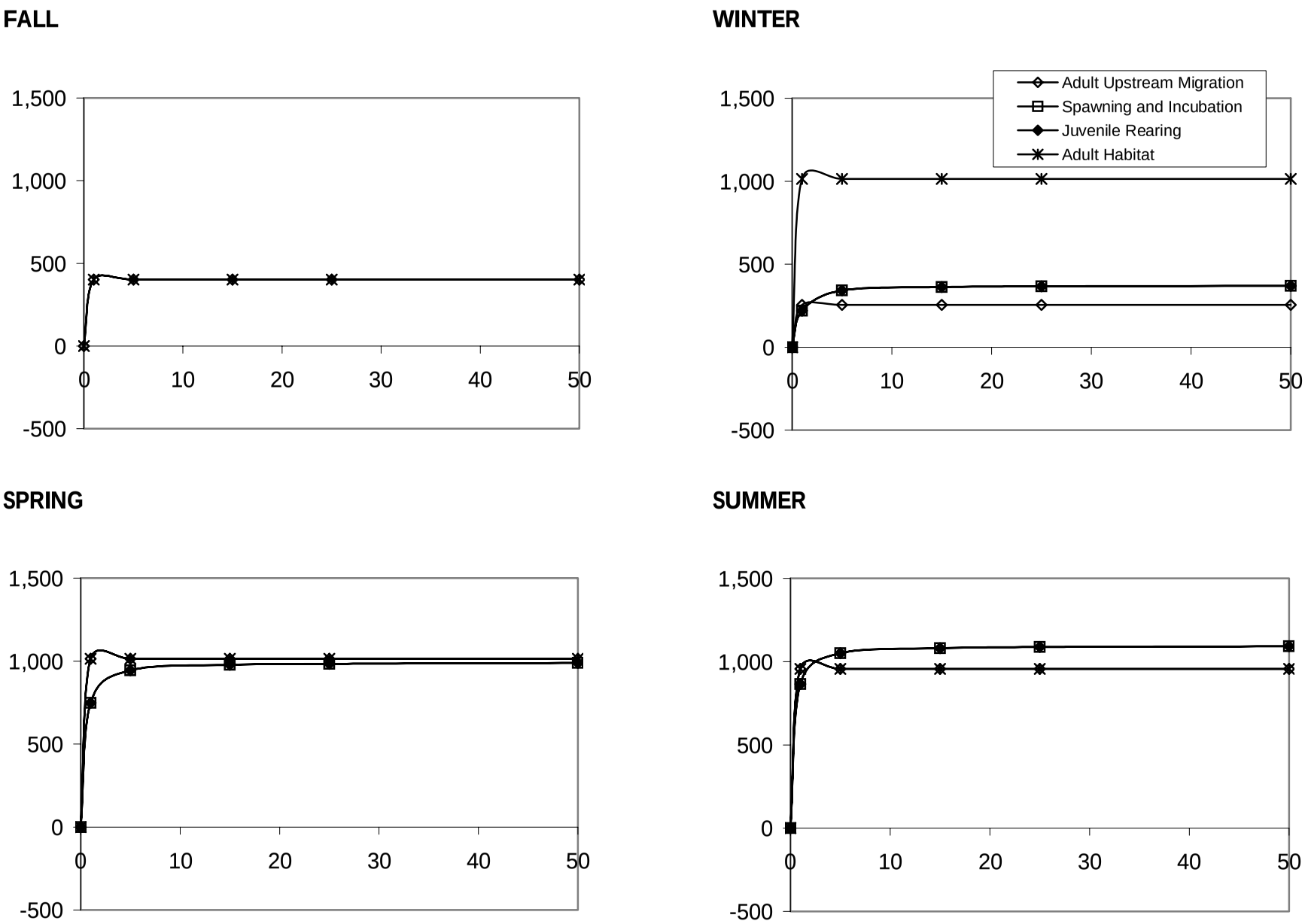
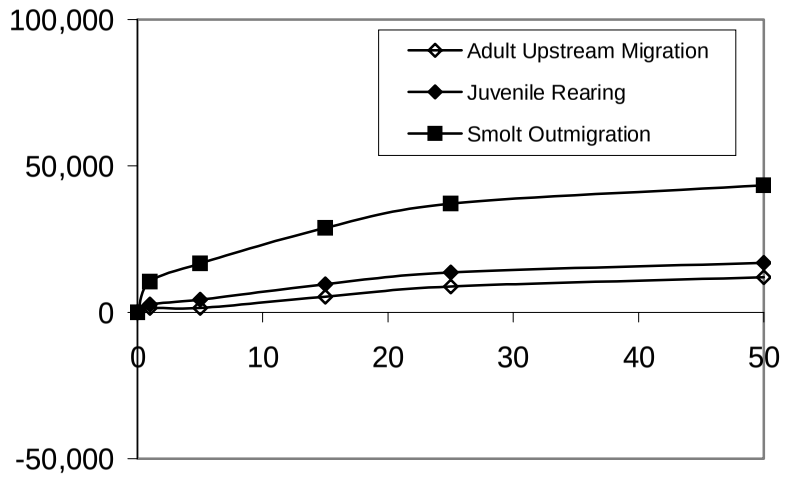
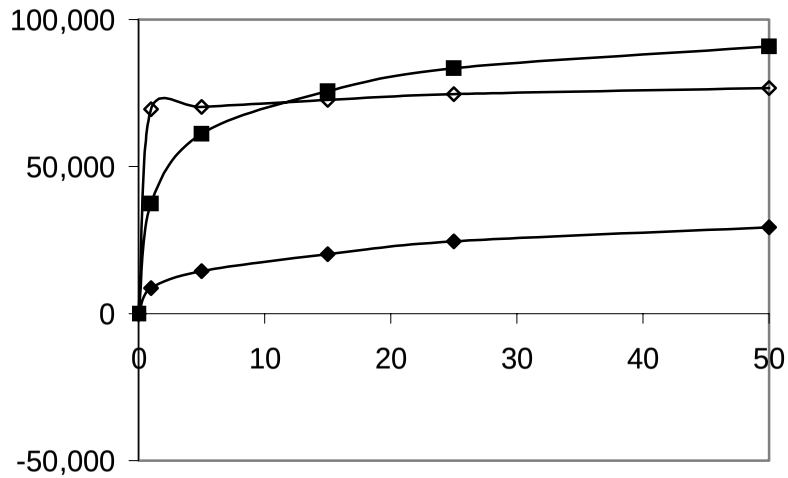


Figure 3. SAM results showing bank-line weighted relative response (feet) for delta smelt at American River RM 0.5R.

FALL



WINTER



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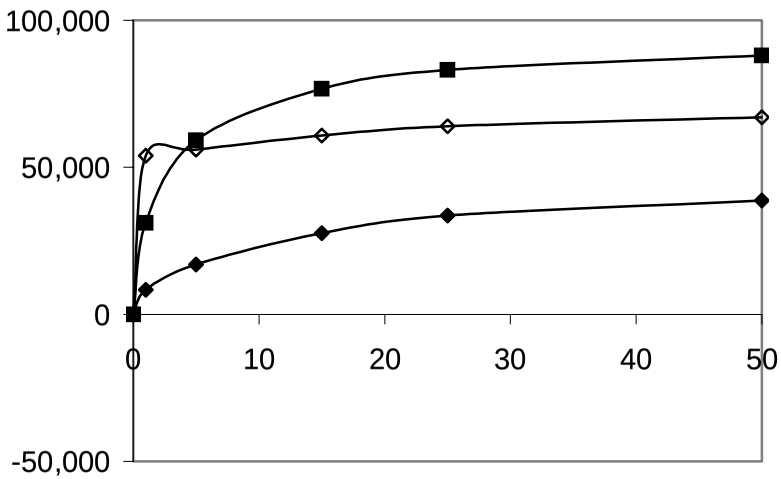


SUMMER

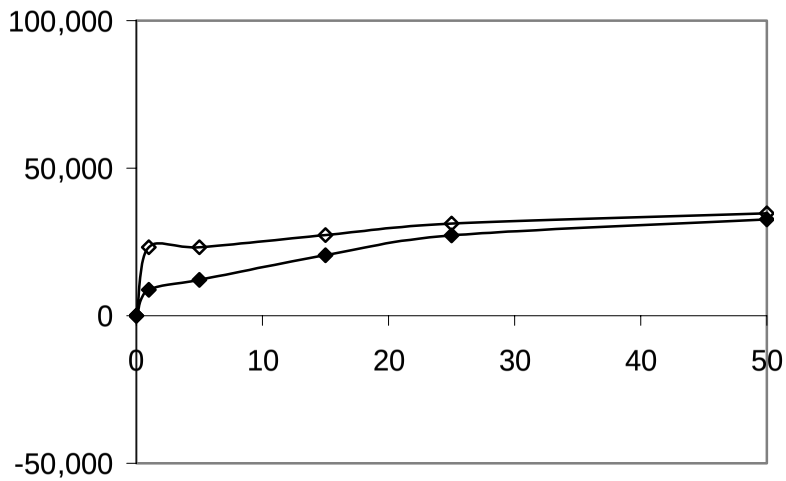
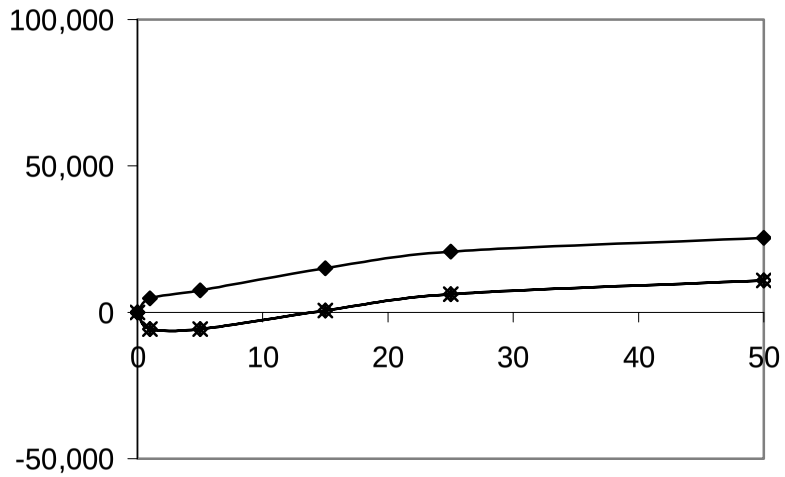
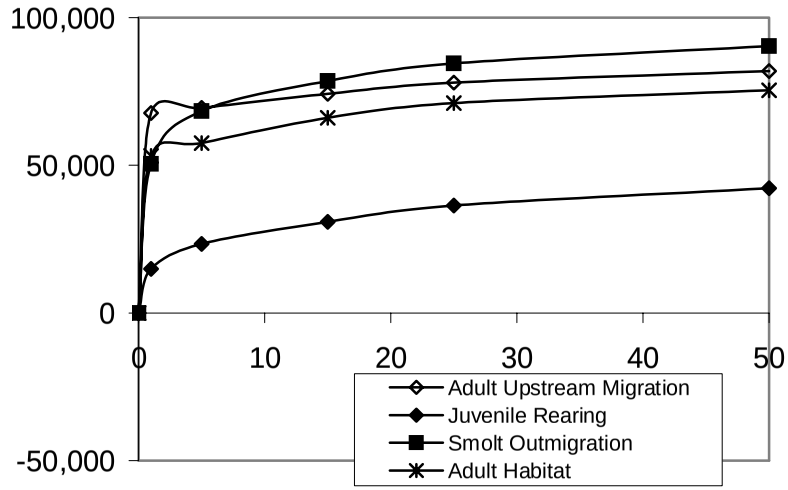


Figure 4. SAM results showing wetted-area weighted relative response (square feet) for Chinook salmon (Winter-run) at American River RM 0.5R.

FALL



WINTER



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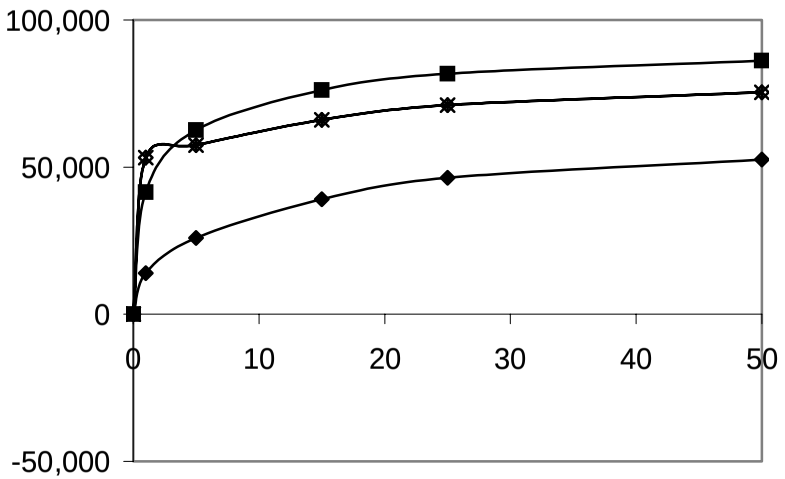


SUMMER

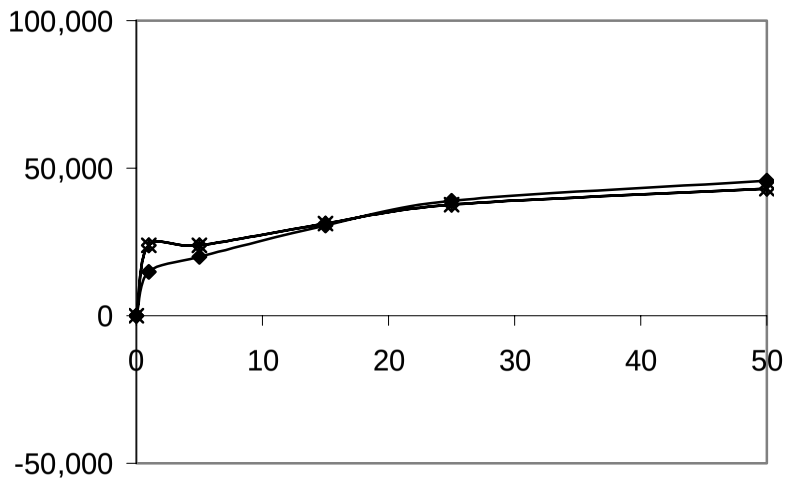
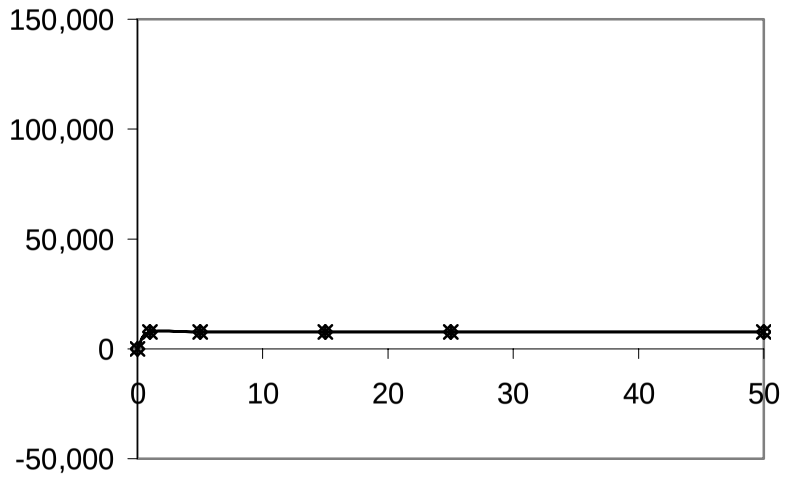


Figure 5. SAM results showing wetted-area weighted relative response (square feet) for Central Valley steelhead at American River RM 0.5R.

FALL



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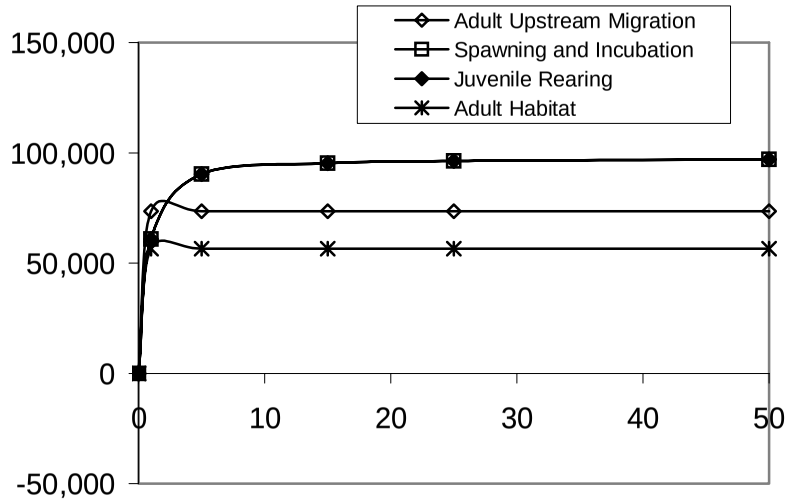

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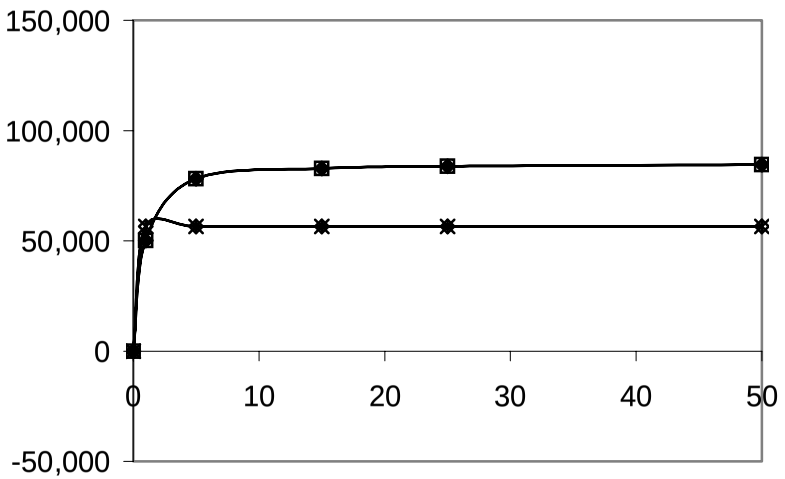

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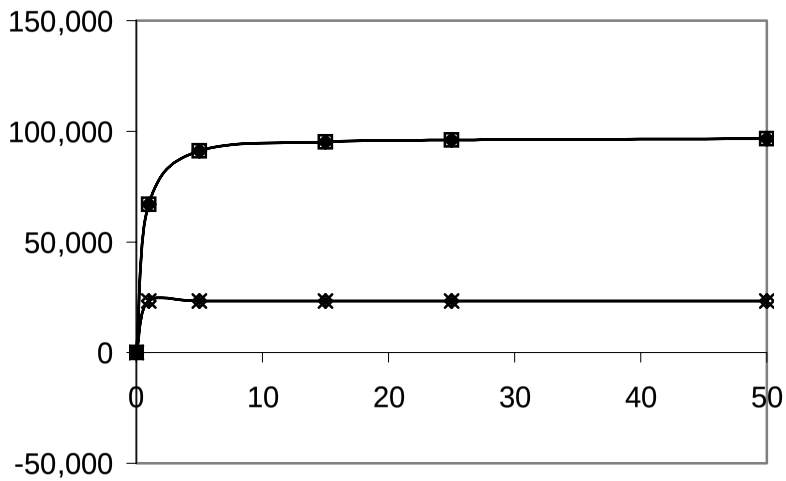
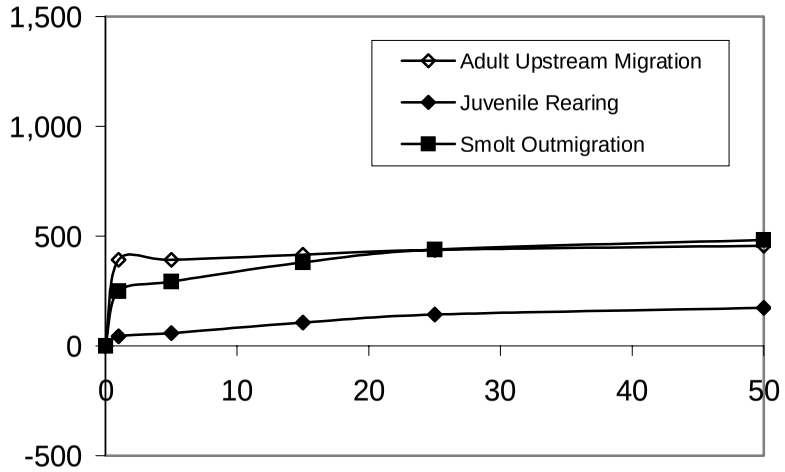


Figure 6. SAM results showing wetted-area weighted relative response (square feet) for delta smelt at American River RM 0.5R.

FALL



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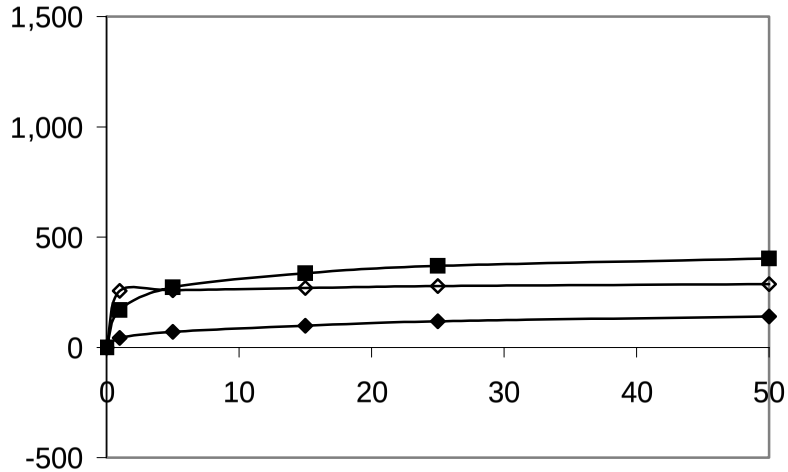

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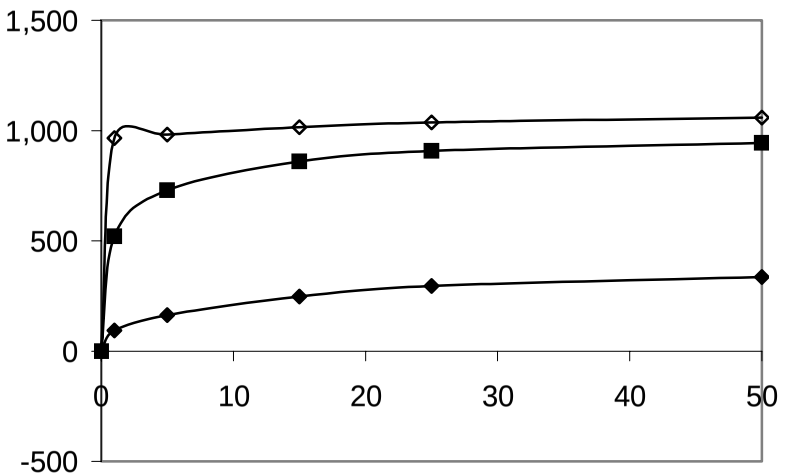


SUMMER

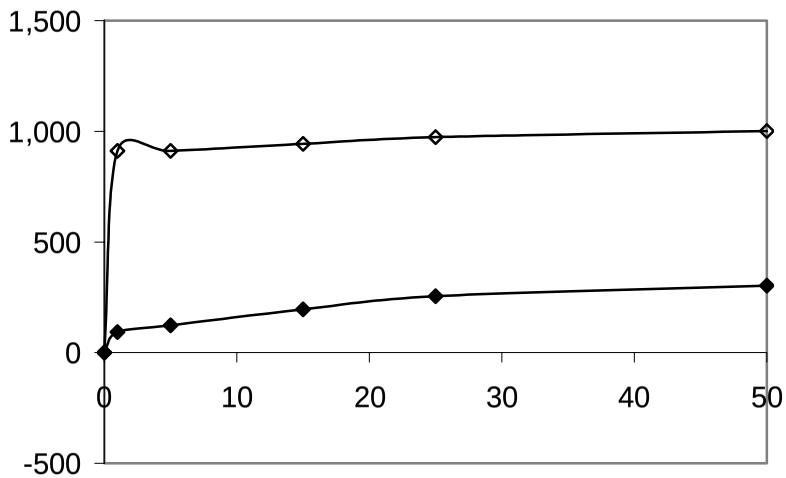
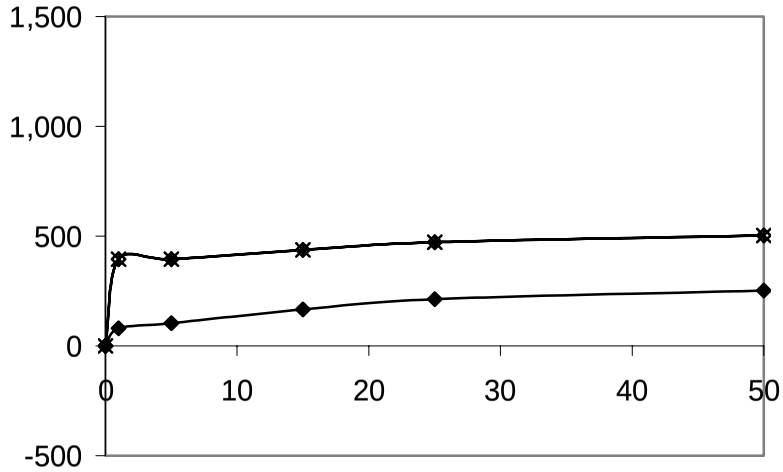


Figure 7. SAM results showing bank-line weighted relative response (feet) for Chinook salmon (Winter-run) at American River RM 0.5R with increased IWM.

FALL



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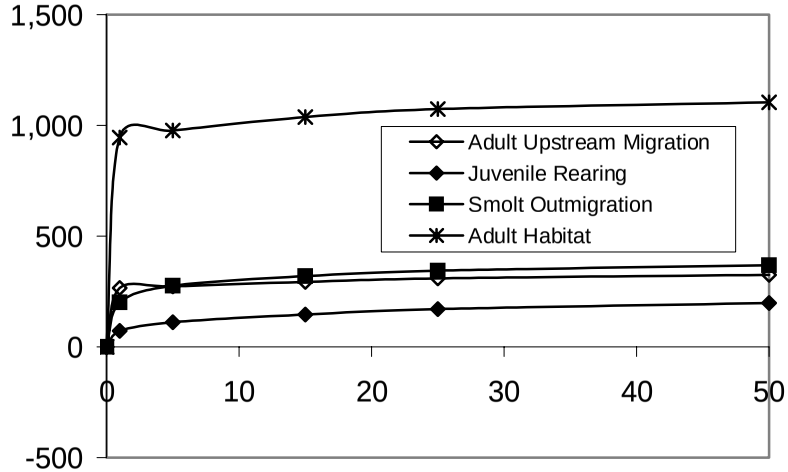

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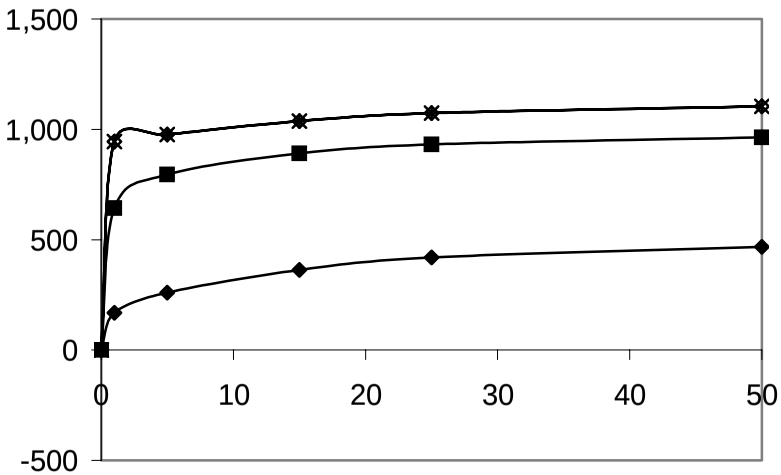


SUMMER

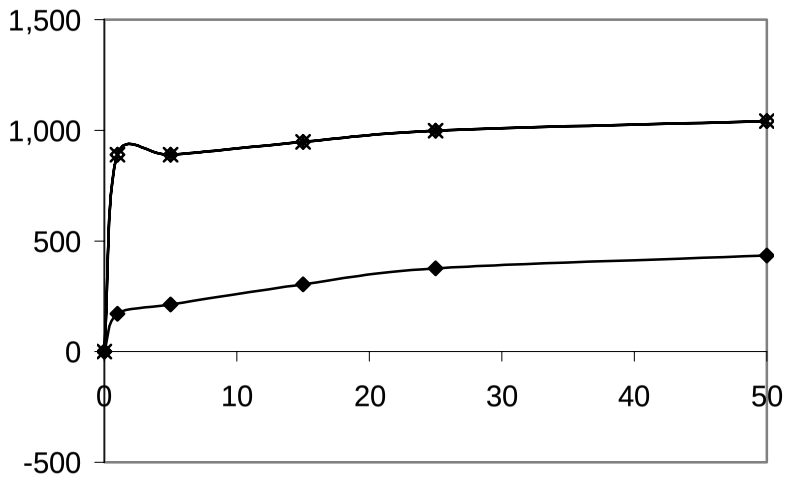
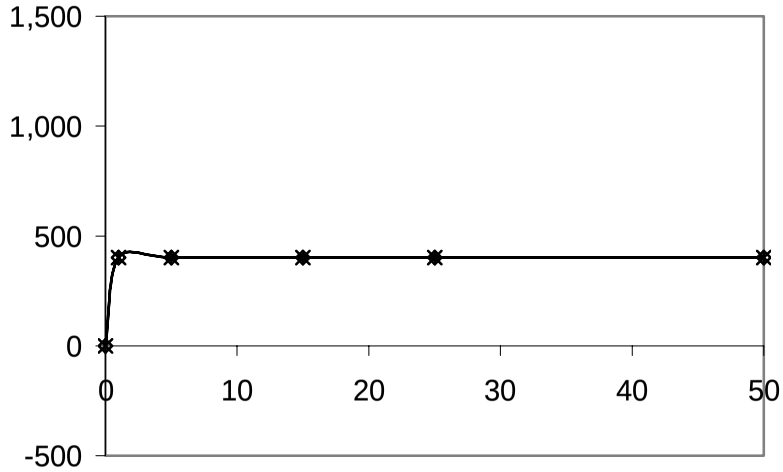
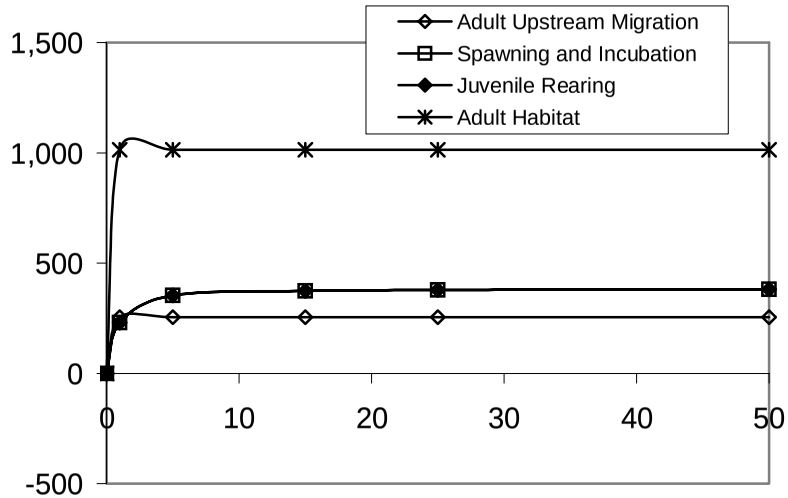


Figure 8. SAM results showing bank-line weighted relative response (feet) for Central Valley steelhead at American River RM 0.5R with increased IWM.

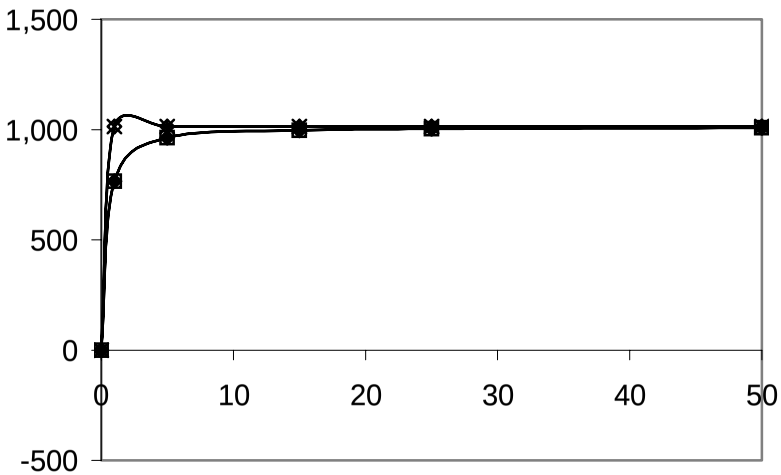
FALL



WINTER



SPRING



SUMMER

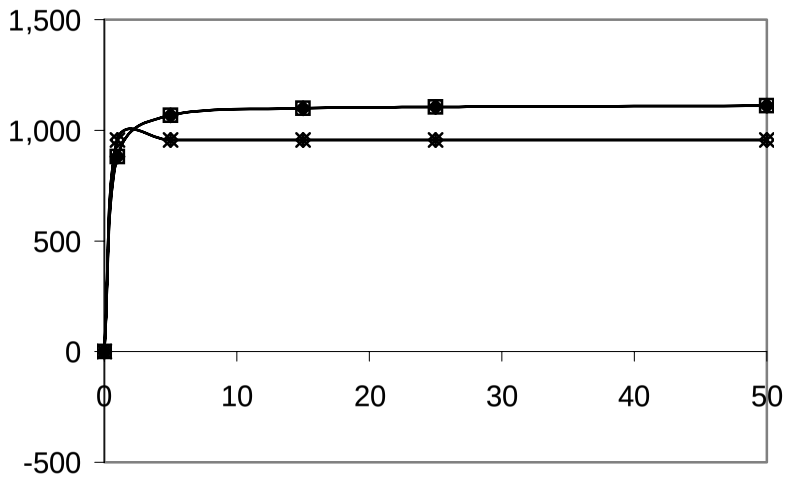
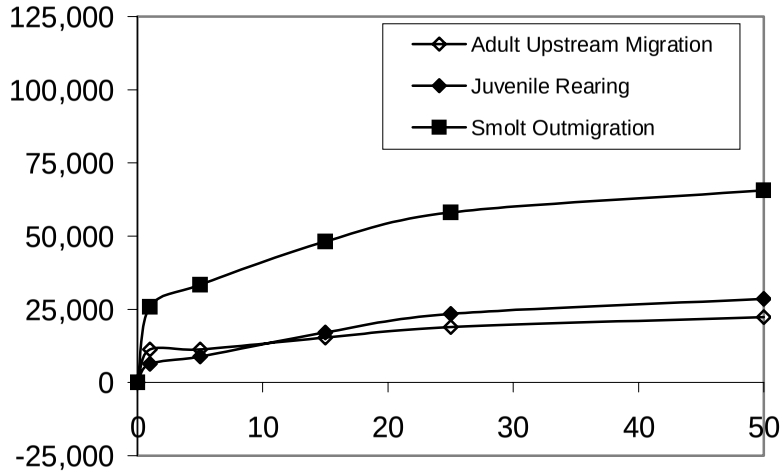


Figure 9. SAM results showing bank-line weighted relative response (feet) for delta smelt at American River RM 0.5R with increased IWM.

FALL



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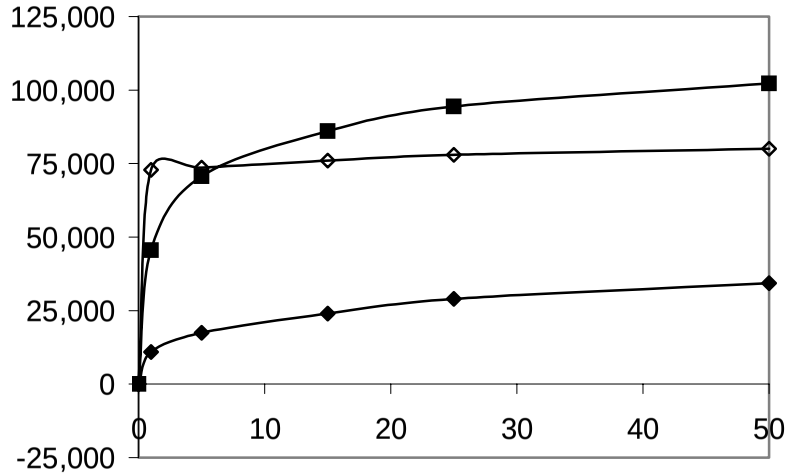

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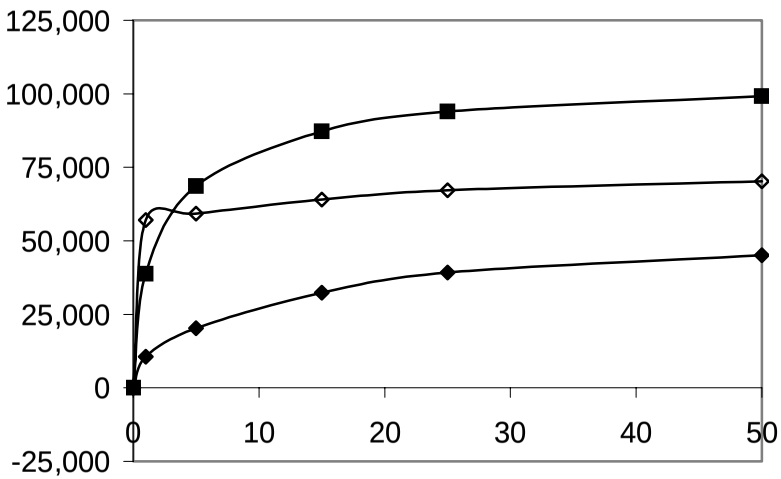


SUMMER

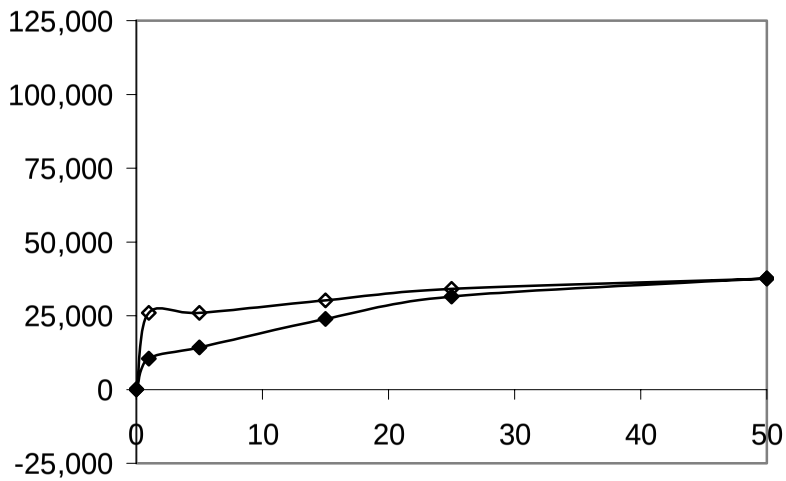
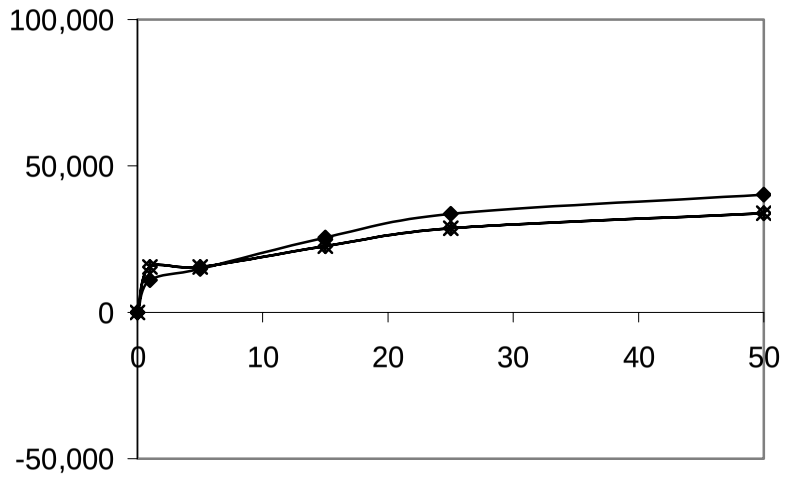


Figure 10. SAM results showing wetted-area weighted relative response (square feet) for Chinook salmon (Winter-run) at American River RM 0.5R with increased IWM.

FALL



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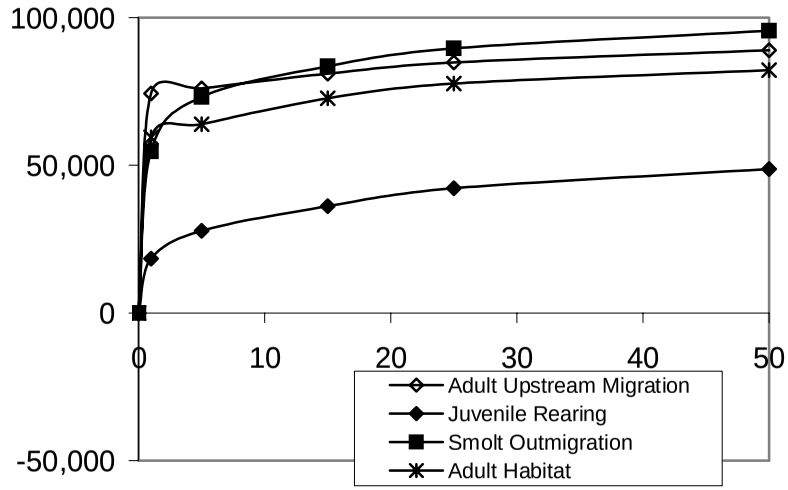

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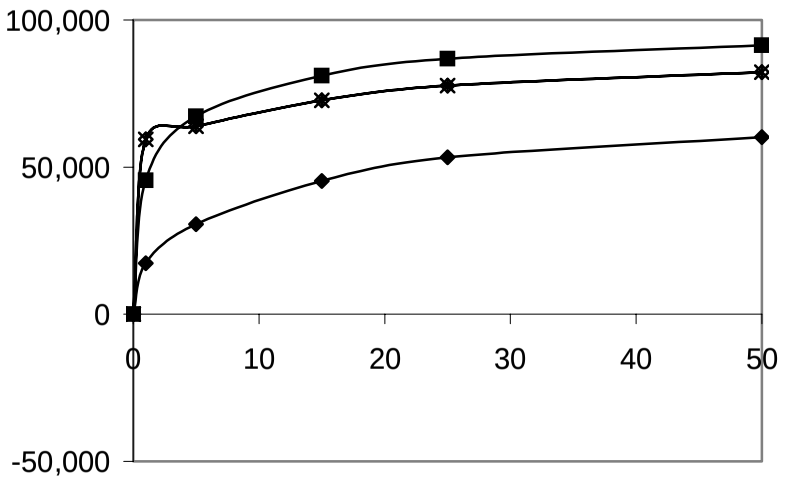


SUMMER

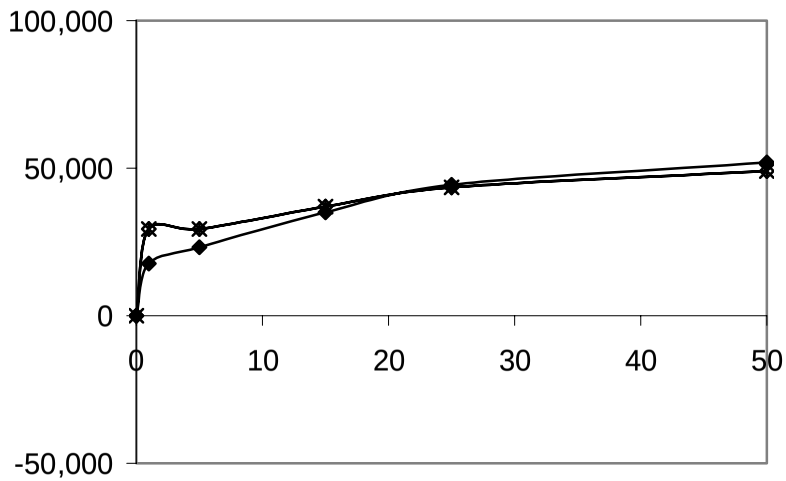
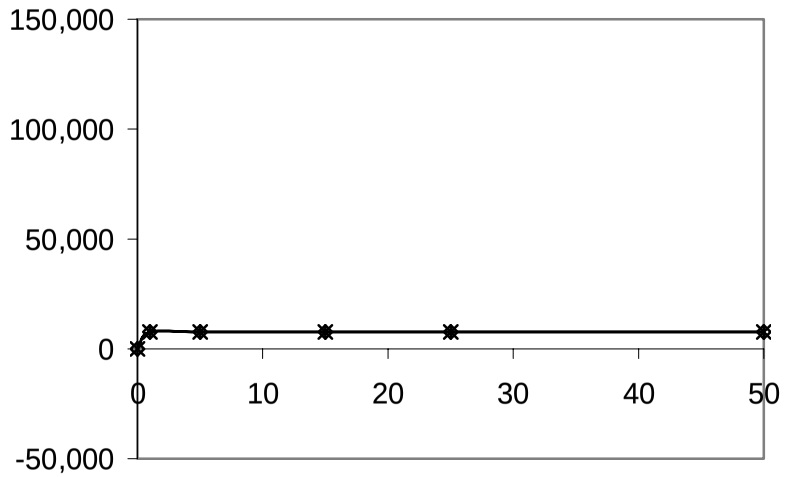
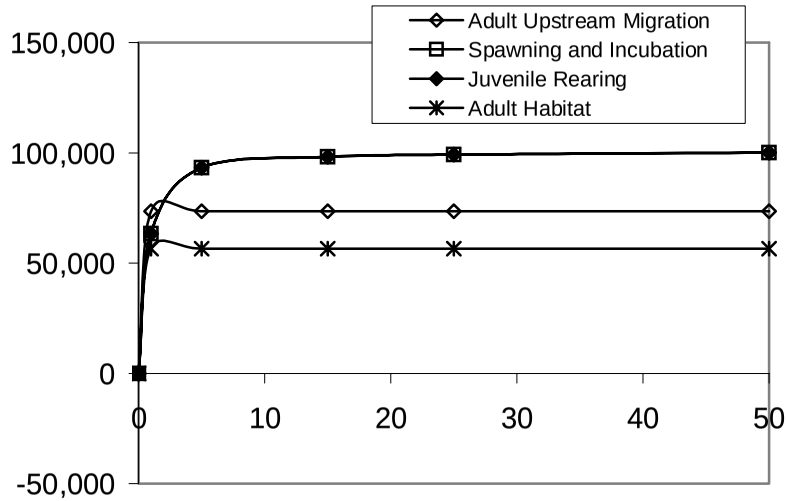


Figure 11. SAM results showing wetted-area weighted relative response (square feet) for Central Valley steelhead at American River RM 0.5R with increased IWM.

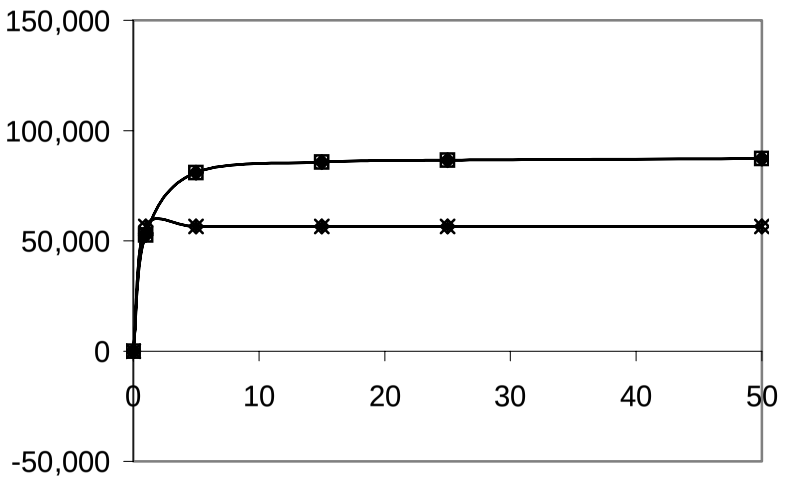
FALL



WINTER



SPRING



SUMMER

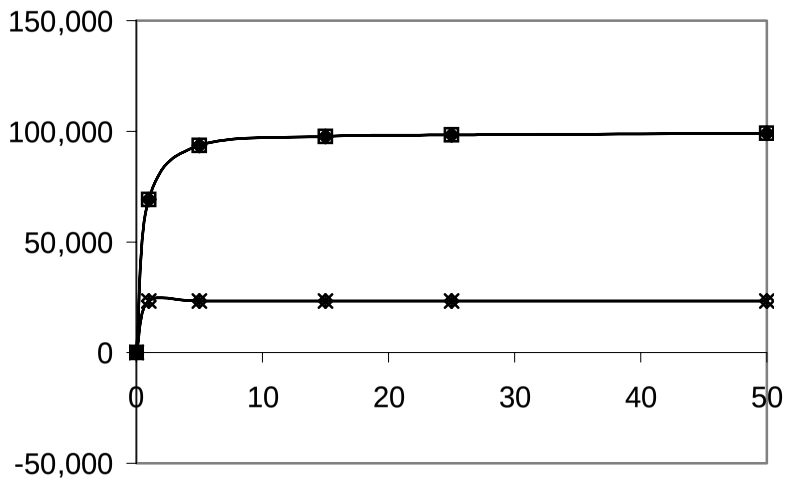


Figure 12. SAM results showing wetted-area weighted relative response (square feet) for delta smelt at American River RM 0.5R with increased IWM.

APPENDIX F

Section 404(b)(1) Evaluation
and
Section 401 Water Quality Certification Application

Section 404(b) (1) Evaluation

Lower American River Mile 0.5 Mitigation Site
Sacramento River Bank Protection Project

I. Project Description

The U.S. Corps of Engineers (Corps) and the California State Reclamation Board (RecBd), with assistance from the Sacramento Area Flood Control Agency (SAFCA), propose to construct an offsite mitigation site at river mile (RM) 0.5 on the lower American River. The work would involve creating aquatic and riparian habitat to provide compensation for unavoidable habitat losses due to past and future levee improvements and bank protection work under the Sacramento River Bank Protection Project (SRBPP).

A complete project description can be found in Chapter 2 of the draft environmental assessment/initial study (EA/IS).

a. Location

The project area is located on the right (north) bank of the lower American River approximately 0.5 river mile east of the confluence of the American and Sacramento Rivers (Plate 1). The area is bounded by Interstate 5 on the west; developed recreation areas of Discovery Park on the north; American River on the south; and undeveloped, protected habitat areas of Discovery Park to the east (Plate 2).

b. General Description

The project would be constructed in two phases over two construction seasons. The first phase, scheduled to begin in January 2008 and be completed in February 2008, would involve transplanting existing elderberry shrubs from the grading area footprint to the adjacent transplant areas and reseeding for erosion control. The second phase of the project, scheduled to begin in July 2008 and be completed in December 2008, would involve creating fish and wildlife habitat by degrading the existing bank at RM 0.5, constructing benches at various elevations, installing erosion control structures, and planting native plant species. The project would be designed to increase the frequency of flooded habitat during the spring and winter, providing habitat for delta smelt, juvenile salmonids, and other aquatic and terrestrial species.

c. Background

In 2003, the Corps evaluated several of the levees protecting Sacramento to determine whether they met minimum criteria for safely containing a flood with a 1 percent annual chance of occurrence (100-year flood). The Corps concluded that specific sites along portions of the levees on the lower American River and the Sacramento River had the potential for erosion. In response, the Corps, RecBd, and SAFCA quickly developed an erosion control program for the

identified sites. These agencies then moved forward to repair the sites as quickly as possible to reduce the risk of flooding and remove the Sacramento area from the 100-year flood plain.

Among the sites to be repaired was waterside erosion along the left bank levee of the Sacramento River at RM 56.7. This site extended for 1,800 feet along the levee toe and slope just downstream of the confluence of the Sacramento River with the Sacramento Deep Water Ship Channel on the west and the City of Sacramento's Miller Park Marina on the east. The proposed bank protection work included constructing rock benches, planting riparian vegetation, and installing large woody debris. The project was designed to (1) halt erosion, preventing the eventual loss of nearshore aquatic habitat and riparian habitat; (2) minimize the loss of existing riparian vegetation and endangered species habitat from construction activities; and (3) compensate for effects on existing riparian habitat and nearshore aquatic habitat (Corps, 2004). The Corps and the RecBd completed a joint Environmental Assessment and Initial Study (EA/IS) for the work at RM 56.7 in August 2004. The construction of the project at RM 56.7 was completed in October 2006.

Because of the in-water and nearshore work, the Corps formally consulted with the National Marine Fisheries Service (NMFS) regarding the potential effects of the work at RM 56.7 on Federally listed anadromous species and Essential Fish Habitat (EFH) of Pacific salmon. A SAM analysis for the RM 56.7 project indicated a small, long-term deficit in fall habitat values. As a result, the NMFS issued a Biological Opinion (BO) on September 8, 2004 (151422SWR04SA9167:HLB), for the work at RM 56.7 pursuant to Section 7 of the Endangered Species Act of 1973, as amended. One of the specific requirements in the BO was for the Corps to implement offsite compensation within 30 months of the construction at RM 56.7 (NMFS, 2004) to improve fluvial function and shaded riverine aquatic (SRA) habitat to support growth and survival of Federally listed anadromous fish. Acceptable conservation measures noted in the BO included setback levees, rock removal, riparian revegetation, flood plain restoration, or other actions that are recommended by the SRBPP's Interagency Work Group (IWG) and approved by NMFS (NMFS, 2004). The proposed action is needed to fulfill this compensation requirement in the BO.

The Corps consulted with U.S. Fish and Wildlife Service (USFWS) for possible effects to Federally threatened delta smelt and the valley elderberry longhorn beetle (VELB) for work at RM 56.7. The USFWS issued a BO on August 16, 2004 (1-1-04-F-0237), for work at RM 56.7 in accordance with Section 7 of the Endangered Species Act of 1973, as amended. The USFWS quantified the take of delta smelt incidental to the project as 0.29 acre of shallow water habitat (USFWS, 2004).

After preparation of the 2004 EA/IS, SAFCA contracted a study to identify and evaluate sites on the lower Sacramento and American Rivers with potential for habitat enhancement that could be developed as mitigation for bank protection projects scheduled for construction in and after 2005. Initially, 21 potential mitigation sites were identified on the lower Sacramento and American Rivers. Based on the criteria during the first two phases of screening process, the location at RM 0.5 on the American River was determined to provide a significant opportunity to create aquatic and riparian habitat without excessive land costs or other prohibitive restrictions. As a result, none of the other potential mitigation sites were developed further at this time.

d. Authority and Purpose

This project is a component of the 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.

The purpose of the project at RM 0.5 is to fulfill the compensation requirement in NMFS's September 2004 BO, and to provide compensation for effects to Federally listed fish species and habitat from implementation of ongoing and future bank protection work. While most of the habitat loss due to the bank protection at erosion sites on the American and Sacramento Rivers has been minimized and mitigated onsite and offsite, some of this bank protection work has resulted in unavoidable losses of fish and wildlife habitat. Additional mitigation sites may be needed to compensate for these losses, depending on the extent of benefits provided by RM 0.5.

e. General Description and Quantity of Dredged or Fill Material

(1) General Characteristics of Material

During the first phase, all elderberry transplanting activities are expected to be sufficiently distant from the riverbank and waterline that there would be no effects on fisheries or aquatic habitat. If necessary, best management practices (BMP's) would be implemented during the elderberry transplanting to ensure that any loose soils do not enter the river.

During the second phase, approximately 1,000 linear feet of shoreline would be disturbed by excavation, grading, and shaping of the project area. Construction would require one season (July 1 to December 31) and would include creation of up to 2,066 linear feet of shoreline, the addition of instream woody material (IWM), and planting riparian vegetation at various elevations along the bank. Work at the waterline would include excavation of the bank with the removed material placed on a floating barge

Shaping of the mitigation site would include (1) excavating approximately 60,000 cubic yards of silty sand from the existing bank; (2) lowering the bank along the existing shoreline to an elevation as low as 4 feet, with a typical elevation of 6 to 11 feet, to achieve natural inundation frequencies consistent with the habitat needs of fish and riparian vegetation, (3) creating a variably sloped area extending approximately zero to 120 feet from the existing shoreline (Plate 5), and (4) creating a number of elevated benches in this area capable of supporting natural or planted vegetation adjacent to the water's edge (Plate 6).

(2) Source of Material

An estimated 60,000 cubic yards of excess soils would be excavated during the second phase of the project. As a result, no additional soils would be needed for the project. Borrow

materials would include components of the IWM and mattresses, native cuttings and seedlings, soil amendments and irrigation piping, and native seed. These materials would be obtained from commercial sources and transported to the mitigation site via truck or barge. Removed snags would be retained and reused onsite as IWM, when appropriate.

f. Description of the Proposed Discharge Site(s)

(1) Location (map)

The location of the discharge site would be the American River at the project site (Plates 1 and 2 of EA/IS).

(2) Size

The total size of the potential fill/impacted area would be approximately 1000 linear feet of shoreline.

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

The borrow materials would include components of the IWM, brush mattresses, and tethered tree bank protection would be along the shore line extending into open water.

(4) Type(s) of Habitat

Generally, the area is riparian forest and scrub/shrub, ruderal grassy and herbaceous vegetation in the elevated river park, a steep bare soil bank, a narrow sandy shoreline and open water. There are several elderberry shrubs in the forested area but all of them with a diameter of 1 inch or greater will be transplanted. Fill in the open water area would occur in shallow water habitat.

(5) Timing and Duration of Discharge

The excavation and grading would take place from July 1, 2008 to November 31, 2008, in approximately 90 days. The installation of the IWM and brush/tethered tree mattress would take place during the same window but is expected to take approximately 30 days.

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

The excavation work would be done from the American River by barges with crane (boom) systems mechanically dumping material from the terraced shore onto the barge. Preparation of the landscaping for plantings would occur from landside along the bank using existing roads and staging areas adjacent to the project site.

II. Factual Determinations (Section 230.11)

a. Physical Substrate Determinations (consider items in Section 230.11(a# and 230.20 Substrate)

(1) Substrate Elevation and Slope

Elevation of the site varies from approximately -2 to 25 feet. Existing bank slope is approximately 3:1 (dW:dH). Approximate bank slope after construction is expected to vary from 4:1 to 12:1 (dW:dH).

(2) Sediment Type

Soils of the site are river deposits which include silts, sands, and gravel and are characterized as Columbia sandy loam.

(3) Dredged/ Fill Material Movement

The borrow materials would include components of the IWM, brush mattresses, and tethered tree bank protection would be appropriately anchored with wire rope and is not expected to move either during construction or after construction is completed. No fill material is needed for access to the construction site since construction personnel would use existing roads.

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

Some of excavation and shaping associated with the construction takes place in areas along the shoreline that is predominantly submerged. It is expected that the benthos of the river bottom areas would be temporarily affected by the construction activity. The project would ultimately create 0.4 acre of additional benthos and shallow water inundation areas.

(5) Other Effects

The installation of additional native plantings and the installed IWM, brush mattresses, and tethered trees would reduce long-term sediment input into the American River.

(6) Actions Taken to Minimize Impacts (Subpart H)

Fill material would only be placed where it is needed for creation of aquatic habitat. During construction, disturbance outside of the project area would be kept to a minimum. Additionally, the following best management practices from the EA/IS are included:

- The staging or storing of construction equipment or materials would be limited to the area designated by the Corps.
- The contractor would prepare an erosion and sediment control plan, incorporating a site drainage plan consistent with Regional Water Quality Control Board policies.
- Construction equipment would be maintained in proper operating condition to prevent leaks of oil or grease.

- A site-specific plan would be developed by the contractor addressing proper disposal of silt, debris, refuse, or other pollutants associated with construction.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water (refer to section 230.11(b), 230.22 Water, and 230.25 Salinity Gradients; test specified in subpart G may be required). Consider effects on:

(a) Salinity

The fill occurring in the American River are areas of permanent water. When they receive water, it is from rain or flood events. All waters affected are freshwater and therefore, filling these areas would not adversely affect salinity.

(b) Water Chemistry (pH, etc.)

The fill areas are in areas of permanent water. Materials would be tested for pH prior to placement as not to affect water chemistry.

(b) Clarity

Fill would occur in areas of permanent waters. The Corps would adhere to turbidity and water chemistry requirements associated with the Corps 401 water quality permit (to be issued).

(c) Color

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

(d) Odor

The proposed project is not expected to affect odor.

(e) Taste

The proposed project is not expected to affect taste.

(f) Dissolved Gas Level

Fill would occur in areas of permanent waters. During filling the Corps would adhere to turbidity and water chemistry requirements associated with the Corps 401 water quality permit (to be issued).

(g) Nutrients

None of the proposed project components would adversely affect nutrients in the water.

(h) Eutrophication

Excavation and IWM fill would occur in areas of permanent waters. During filling the Corps would adhere to turbidity and water chemistry requirements associated with the Corps 401 water quality permit.

(i) Others as Appropriate

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

(2) Current Patterns and Circulation (consider items in Section 230.11(b), and 230.23), Current Flow and Water Circulation

(a) Current Patterns and Flow

The proposed fill areas would not affect general current and flow patterns

(b) Velocity

The velocities of stormwater 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 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.) (consider items in Sections230.11(b) and 230.24)

Normal water fluctuations would not be affected. The project would not effect stage elevations.

(4) Salinity Gradients (consider items in section 230.11(b) and 230.25)

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

(5) Actions That Will Be Taken to Minimize Impacts (refer to Subpart H)

Effects to 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 Subpart H.

e. Suspended Particulate/ Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site (consider items in section 230.11(c) and 230.21)

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 NTU's would increase by 5 NTU's above ambient during construction activities. It is anticipated that an increase of 15 NTU's above ambient levels would be acceptable to the RWQCB based on previous bank protection projects in the area.

The contractor would be required to conduct water quality tests specifically for increases in turbidity and sedimentation caused by construction activities. Water samples for determining background levels would be collected in the American River within the general vicinity of the construction site. Testing to establish background levels would be performed at least once a day when construction activity is in progress. The contractor would monitor turbidity and settleable solids at least daily and turbidity at least hourly when a turbidity plume is visible. If turbidity limits are exceeded, the contractor must slow the rate of earthwork or use other means to comply with the requirements, including stopping construction activities until the plume has cleared.

(2) Effects (degree and duration) on Chemical and Physical Properties of the water Column (consider environmental values in Section 230.21, as appropriate)

(a) Light Penetration

There would not be adverse effects to light penetration.

(b) Dissolved Oxygen

There would be no adverse effects to 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 storm water pollution protection plan (SWPPP), prepared to RWQCB guidelines, and final EA/IS, would minimize the potential for contaminants to be introduced into the fill areas.

(d) Pathogens

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

(e) Esthetics

There would be temporary adverse esthetic effects during construction (construction equipment and general disturbance) but the effects would not be considered significant and the project site would have more native vegetation, shallow water habitat, and IWM than preconstruction conditions.

(f) Others as Appropriate

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

(3) Effects on Biota (consider environmental values in Section 230.21, as appropriate)

(a) Primary Production, Photosynthesis

The project may temporarily affect primary production and photosynthesis in those areas excavated. However, the effects would be temporary and less than significant. The construction of 0.4 acre of shallow water habitat would be a long term benefit.

(b) Suspension/ Filter Feeders

The project may temporarily affect suspension and filter feeders in those areas excavated. However, the effects would be temporary and less than significant for the area. The construction of 0.4 acre of shallow water habitat would be a long term benefit.

(c) Sight Feeders

The project would temporarily affect sight feeders in those areas excavated. However, the effects would be temporary and less than significant for the area. The construction of 0.4 acre of shallow water habitat would be a long term benefit.

(4) Actions Taken to Minimize Impacts (Subpart H)

There are no effects to the aquatic biota. Therefore, no additional measures to minimize effects are needed for fill occurring there.

d. Contaminant Determinations (consider items in Section 230.11(d))

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/IS. The material for the sites would not be the existing material on the site and there is no contamination concern in this natural park setting.

e. Aquatic Ecosystem and Organism Determinations (use evaluation and testing Procedures in Subpart G, as appropriate)

(1) Effects on Plankton

The project would temporarily affect Plankton in those areas excavated. However, the effect would be temporary and less than significant for the area. The construction of 0.4 acre of shallow water habitat would be a long term benefit.

(2) Effects on Benthos

The project would temporarily affect Benthos in those areas excavated. However, the effect would be temporary and less than significant for the area. The construction of 0.4 acre of shallow water habitat would be a long term benefit.

(3) Effects on Nekton

The project would temporarily affect Nektos in those areas excavated. However, the effect would be temporary and less than significant for the area. The construction of 0.4 acre of shallow water habitat would be a long term benefit.

(4) Effects on aquatic Food Web (refer to Section 230.31)

There would be no significant adverse effects to the aquatic food web, or the plankton, benthic and nekton communities with the proposed project. The construction of 0.4 acre of shallow water habitat and an additional 1.1 acres (Zones 1 and 2) of habitat characterized by frequent, prolonged inundation would provide a long term benefit.

(5) Effects on Special Aquatic Sites (discuss only those found in project area or disposal site)

(a) Sanctuaries and Refuges (refer to section 230.40)

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

(b) Wetlands (refer to section 230.41)

No wetlands would be filled.

(c) Mud Flats (refer to Section 230.42)

There would be no adverse effects to mud flats with the proposed project. The construction of 0.4 acre of shallow water habitat would be a long term benefit.

(d) Vegetated Shallows (refer to Section 230.43)

There would be no adverse effects to vegetated shallows with the proposed project. The construction of 0.4 acre of shallow water habitat and an additional 1.1 acres (Zones 1 and 2) of habitat characterized by frequent, prolonged inundation would provide a long term benefit.

(e) Coral Reefs (refer to Section 230.44)

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

(f) Riffle and Pool Complexes (refer to section 230.45)

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

(6) Threatened and Endangered Species (refer to Section 230.30)

This alternative could have both short-term adverse and long-term beneficial effects on special status species. The first phase of construction would have an effect on the VELB because of transplanting existing elderberry shrubs within the project footprint to the transplant areas. However, the elderberry transplanting would be done within the elderberry transplant window between November 1 and February 15. The Swainson's hawk would not be expected to be present in the project area during phase 1. Cooper's hawks are not expected to be nesting during phase 1; however, Cooper's hawk could be present in the project area. The special status fish species would not be affected by phase 1 construction because the work is expected to be done landside away from the American River. Any loose soils resulting from the transplanting would be minimized using BMP's.

During the second phase, all of the special status species in the project area could be affected by the construction activity. Construction would be conducted in close proximity to elderberry shrubs, and all avoidance measures would be used. Nesting raptors could occur in the project area, and if identified, CDFG would be notified to ensure the minimization of effects. Special status fish would be temporarily disturbed or displaced from the shoreline due to the excavation of the bank and the location of the barge. The movement of soils into the water would be minimized by BMP's and would be a localized short-term effect. The long-term effects would be beneficial with the creation of shallow water habitat and native riparian plantings throughout the project area.

(7) Other Wildlife (refer to Section 230.32)

Wildlife effects associated with the construction are expected to be temporary. Generally, wildlife species that use the areas around 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 to wildlife over what was described in the EA/IS.

(8) Actions to Minimize Impacts (refer to Subpart H)

This project is likely to have adverse short-term effects that would be minimized by maintaining buffers around sensitive habitats and conducting construction activities outside of sensitive time frames for special status species fish and migratory raptors. Additionally, the implementation of a storm water pollution prevention plan (SWPPP) and associated BMP's would adequately avoid, minimize, and mitigate adverse effects to special status species.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination (consider factors in section 230.11(f)(2))

Not applicable.

(2) Determination of Compliance with Applicable Water Quality Standards (present the standards and rationale for compliance or non-compliance with each standard)

No water quality or effluent standards would be violated either during or after construction of the shoreline creation or terracing.

(3) Potential Effects on Human Use Characteristics

The proposed project would not have any significant adverse effects to municipal and private water supply, or commercial fisheries. The project area is currently designated by Sacramento County as Parks-Recreation-Open Space and is identified as a "Protected Area" in the American River Parkway Plan. Recreational fisheries, water related recreation, and the bike trail would be temporarily adversely affected during construction.

During construction, the project site and adjacent areas would be closed to the public. The bike trail would be intermittently affected by construction equipment and trucks that would cross the trail to access the project area. A flagperson would be present to direct safe passage along the bike trail along with posted warning signs alerting to construction activities in the vicinity. Fishing, boating, and swimming opportunities in the area would remain substantially the same, with the exception of the temporary closures. The use and anchoring of a barge would obstruct a portion of the river adjacent to the project area. Appropriate signs and lighting in and around the barge would alert boaters to the presence of the barge and in-water activities. The lighting, warning signs, and the 5 mph speed limit for boating on the American River would reduce the risk of boating accidents to less than significant. As a result, there would be no substantial loss of recreational values at the project site.

g. Determination of Cumulative Effects on the Aquatic Ecosystem (consider requirements in Section 230.11(g))

The proposed project would not have any significant cumulative effects on the aquatic ecosystem. The proposed project would result in the creation of approximately 1.5 acres of vegetated shallows including, two areas (total of approximately 0.4 acre) of shallow water habitat surrounded by a large graded area (approximately 1.1 acres) subject to frequent,

prolonged inundation with elevation ranges of 6 to 8 feet (Zone 1) and 8 to 11 feet (Zone 2). An additional 2.2 acres of native riparian habitat, and an increase of shoreline from approximately 250 to 1000 feet, depending on the river flows, would also be created. Cumulative effects on the aquatic ecosystem would be considered beneficial.

h. Determination of Secondary Effects on the Aquatic Ecosystem (consider requirements in Section 230.11(h))

The proposed project would not have any secondary effects on the aquatic ecosystem. An approximately 3.7 acres of shallow water, and riparian habitat would be created or enhanced in the construction of this project. Any secondary effects on the aquatic ecosystem would be considered beneficial.

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

There were no alternatives identified that would have significantly less adverse effects on the aquatic ecosystem than the proposed alternative.

Summary

c. Compliance with Applicable State Water Quality Standards and
d. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act

State water quality standards would not be violated. The proposed action would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

e. Compliance with Endangered Species Act (ESA) of 1973

NMFS issued a Biological Opinion (BO) on September 8, 2004 (151422SWR04SA9167:HLB), for the work at RM 56.7 pursuant to Section 7 of the Endangered Species Act of 1973, as amended. One of the specific requirements in the BO was for the Corps to implement offsite compensation within 30 months of the construction, which resulted in this project. The USFWS in their June 21, 2006, BO (1-1-06-F-0134) specified that up to 5 acres of the project area would be designated for elderberry shrub transplants and general restoration. The draft EA/IS will be sent to NMFS, requesting concurrence with the Corps determination of may affect, not likely to adversely affect, the fish species under their jurisdiction. Subsequent consultation with the USFWS and NMFS concerning this project may be required.

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

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

i. On the Basis of the Guidelines, the Proposed Disposal Site(s) for the discharge of fill material complies with the requirements of these guidelines.

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.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

SECTION 401 WATER QUALITY CERTIFICATION
APPLICATION FORM

A minimum of $500.00 processing fee is required however additional fees in accordance with Title 23 CCR § 2200 (a)(2) may also be required. Please use the fee calculator at http://www.waterboards.ca.gov/cwa401/docs/dredgefillfeecalculator.xls to determine the total fee. Please include a check payable to the **State Water Resources Control Board.** Attach additional sheets as necessary. Submit the complete form to the appropriate Regional Board office.

1. APPLICANT INFORMATION **2. AGENT INFORMATION***

Applicant: U.S. Army Corps of Engineers	Agent*
Contact Name: Mike Dietl	Contact Name:
Address: 1325 J. Street	Address:
Sacramento, CA 95814	
Phone No: 916-557-6742	Phone No:
Fax No: 916-557-7856	Fax No:

*Complete only if applicable

3. PROJECT DESCRIPTION

a) Project Title: Lower American River Mile 0.5 Mitigation Site Sacramento River Bank Protection Project

b) Project Location:
Street location: Discovery Park
County: Sacramento Section: 25 & 26 Township: 9 North Range: 4 East
Latitude: 38.6024 N Longitude: -121.5019 W
*Attach site map with "waters" clearly indicated (e.g. USGS 7 ½ quadrangle map)

c) Project Description: *(include purpose and final goal)*:

The U.S. Corps of Engineers (Corps) and the California State Reclamation Board (RecBd), with assistance from the Sacramento Area Flood Control Agency (SAFCA), propose to construct an offsite mitigation site at river mile (RM) 0.5 on the lower American River. The work would involve creating aquatic and riparian habitat to provide compensation for unavoidable habitat losses due to past and future levee improvements and bank protection work under the Sacramento River Bank Protection Project (SRBPP).

The project would be constructed in two phases over two construction seasons. The first phase, scheduled to begin in January 2008 and be completed in February 2008, would involve transplanting existing elderberry shrubs from the grading area footprint to the adjacent transplant areas and reseeding for erosion control. The second phase of the project, scheduled to begin in July 2008 and be completed in December 2008, would involve creating fish and wildlife habitat by degrading the existing bank at RM 0.5, constructing benches at various elevations, installing erosion control structures, and planting native plant species. The project would be designed to increase the frequency of flooded habitat during the spring and winter, providing habitat for delta smelt, juvenile salmonids,

and other aquatic and terrestrial species.

Shaping of the mitigation site would include (1) excavating approximately 60,000 cubic yards of silty sand from the existing bank. The predominant features of the mitigation site would be two areas (total of approximately 0.4 acre) of shallow water habitat surrounded by a large graded area (approximately 1.1 acres) subject to frequent, prolonged inundation with elevation ranges of 6 to 8 feet (Zone 1) and 8 to 11 feet (Zone 2). These elevations would produce shallow inundation at average spring and winter river stages of 8 feet and 9.5 feet, respectively. Grading of the excavated area would include two sloping depressions to facilitate full drainage of the mitigation site and reduce the risk of stranding fish during transition to very low water stages in the river.

Shallow slopes would be constructed over most of the site below elevation 11 feet to promote plant establishment and provide relatively broad areas of low inundation depth for fish. The area below elevation 6 feet would be very sparsely vegetated due to long duration inundation in the spring and early summer, and would provide more open shallow water habitat. Steeper slopes would be constructed in a few areas to construction of higher benches near the average fall and summer water-surface elevations (approximately elevations 3.5 and 6 feet, respectively). These higher benches would support larger riparian trees with canopies to overhang the water. Relatively level benches at various elevations at approximately 1-foot increments would provide shallow water for diverse salmonid rearing opportunities, as well as backwater habitat for any delta smelt in the project area.

d) Proposed Schedule: *(start-up, duration, and completion dates)*: Phase 1, January 2008 through February 15, 2008. Phase 2, July 1, 2008 through December 31, 2008.

e) Total Project size: *(clearing, grading, other construction activities)*
_7.5_____acres __1000___linear feet *(if appropriate)*

4. IMPACTED WATER BODIES

a) Name*(s)* of Receiving Water Body*(ies)*: American River

b) Anticipated potential stream flow during project activity: During Phase 2 in-water work expected flows would be between 2,700 cfs and 2,900 cfs.

c) Describe potential impacts to water quality: During the first phase, all elderberry transplanting activities are expected to be sufficiently distant from the riverbank and waterline that there would be no effects on the river. During the second phase, approximately 1,000 linear feet of shoreline would be disturbed by excavation, grading, and shaping of the project area. Work on the existing bank would include the removal of trees, shrubs, herbaceous vegetation, and approximately 60,000 cubic yards of silty sand. Phase 2 could increase turbidity from wave action generated during boat and barge operations. Other potential effects include releases of small volumes of petroleum products (fuel, engine oil, and hydraulic line oil) that would be temporarily used and handled to

operate the construction equipment.

d) Indicate in ACRES and LINEAR FEET *(where appropriate)* the proposed **waters of the United States** to be impacted by any discharge other than dredging, and identify the impacts*(s)* as permanent and/or temporary for each water body type listed below:

Water Body Type	**Permanent Impacts**		**Temporary Impacts**	
	(acres)	(linear feet)	(acres)	(linear feet)
Jurisdictional Wetland				
Riparian			3.3	
Streambed unvegetated				1,000
Lake/Reservoir				

c) Indicate the volume of the dredged material (cubic yards) to be discharged to waters of the United States: Small amounts of soil material may be dredged from the shoreline during river bank excavation.

d) Indicate type(s) of material proposed to be discharged to waters of the United States: IWM, brush mattresses, and tethered trees at summer water levels and native plantings on the elevated benches.

5. COMPENSATORY MITIGATION

a) Indicate in ACRES and LINEAR FEET *(where appropriate)* the total quantity of **waters of the United States** proposed to be Created, Restored and/or Enhanced for purposes of providing Compensatory Mitigation:

Water Body Type	**Created**		**Restored**		**Enhanced**	
	(acres)	(linear ft)	(acres)	(linear ft)	(acres)	(linear ft)
Jurisdictional Wetland						
Riparian	1.8				5	
Streambed	0.4					
Lake/Reservoir						

b) If contributing to a Mitigation or Conservation Bank, indicate the agency, dollar amount, acreage, and water body type *(if applicable)*:
Conservation Agency _____
$_____ for_____ acres of _____ *(water body type)*
How many acres of this mitigation area qualify as waters of the United States?_____

c) Other Mitigation *(omit if not applicable)*:

How many acres of this mitigation area qualify as waters of the United States?_____

d) Location of Compensatory Mitigation Site*(s) (attach map of suitable quality and detail)*:

City of Area _____ County_____

Longitude/Latitude _____ Township/Range _____

6. OTHER ACTIONS/BEST MANAGEMENT PRACTICES (BMPs)

Briefly describe other actions/BMPs to be implemented to Avoid and/or Minimize impacts to waters of the United States, including preservations of habitats, erosion control measures, project scheduling, flow diversions, etc. The contractor would be required to develop and implement a hazardous materials management plan prior to initiation of construction. The plan would include BMP's 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.

The specific BMP's that would be incorporated into the SWPPP would be determined during the final stages of project design. However, the SWPPP would likely include one or more of the following BMP's to substantially reduce the potential for erosion and sedimentation as a result of ground and vegetation disturbance.

- Stage construction equipment and materials on the overbank reaches of the project site at Discovery Park. To the extent possible, stage equipment and materials in areas that have already been disturbed in the graded area.
- Minimize ground and vegetation disturbance during project construction by establishing designated equipment staging areas, access routes, stockpile and disposal areas, and equipment exclusion zones prior to grading.
- Stockpile soil on the overbank area, and install sediment barriers (silt fences, fiber rolls, and straw bales) around the base of stockpiles to intercept runoff and sediment during storm events. If necessary, cover stockpiles with geotextile fabric to provide further protection against wind and water erosion.
- Install sediment barriers on graded or other disturbed slopes, as needed, to prevent sediment from leaving the project site and entering nearby surface waters.
- Use and store hazardous materials such as vehicle fuels and lubricants in designated areas located away from surface waters. Implement measures to prevent, control, and clean up hazardous material spills.
- Install plant materials to stabilize cut and fill slopes and other disturbed areas once construction is complete. Plant materials may include an erosion control seed mixture, pole plantings, or shrub and tree container stock.

7. OTHER PERMITS/AGREEMENTS/ETC

a) U.S. Army Corps of Engineers Permit
Indicate the type of ACOE permit *(check one)*
Nationwide Permit No(s)_____ Individual Permit No*(s)*:_____ Regional Permit No*(s)*:_____

Have you notified ACOE of project? _____Corps Project_____

Have you reviewed the General Conditions for your ACOE permit? _____Corps Project ___

Have you attached a copy of the application/notification to ACOE? __See Section 404 (b)(1)

Evaluation in EA/IS_

b) California Department of Fish and Game Lake or Streambed Alteration Agreement: Not applicable.

Federal project.

Date of Application:_____

Have you attached a copy of the application?

Has the Agreement been issued? _____ if so, list Agreement number:_____

8. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

a) Indicate the type of CEQA Document required for project and Lead Agency:

Categorical Exemption ____ Negative Declaration ___yes__ Environmental Impact Report _____

Has the document been certified/approved, or has a Notice of Exemption been filed? ___no_____

If yes date of approval/filing _____ If no, expected approval/filing date:14 January, 2008

Lead Agency ____California Reclamation Board_____
Submit final or draft copy if available*

b) Threatened or Endangered Species impacted by this project *(list potential)*: Based on recorded observations, availability of suitable habitat, and field visits, nine special-status wildlife species occur or have the potential to occur in the project area. These species include the VELB, Swainson's hawk, Cooper's hawk, delta smelt, Central Valley steelhead, late fall/fall-run Chinook salmon Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and green sturgeon. None of the Federally or State-listed plant species were recorded in the CNDDB or observed during field visits to the project area.

9. PAST/FUTURE PROPOSALS BY THE APPLICANT

Briefly list/describe any projects carried out in the last 5 years or planned for implementation in the next 5 years that are in any way related to the proposed activity or may impact the same receiving body of water. Include the estimated adverse impacts from the past or future projects.
Goethe East Conservation Area. The 35-acre project area, located at RM 14.7 in the American River Parkway, is an ongoing, multi-project, multi-agency effort that provides beneficial cumulative effects by creating contiguous habitat for the VELB, including reestablishing riparian habitat, reducing invasive species, and providing buffers for natural river channel changes. This project establishes VELB habitat and is protected in perpetuity to offset the effects of other projects.

American River Common Features Project. The Corps, RecBd, and SAFCA are implementing ongoing programs for levee stability along the lower American River, Sacramento River, Natomas Cross Canal, and elsewhere in the Sacramento area. The lower American River levee projects are being implemented pursuant to the 1996 and 1999 Water Resources Development Act authorizations and other programs. Substantial levee improvement work is currently underway.

Sacramento River Bank Protection Project. The SRBPP is a long-range program of bank protection authorized by the Flood Control Act of 1960. The SRBPP directs the Corps to provide bank

protection along the Sacramento River and its tributaries, including that portion of the lower American River bordered by Federal flood control project levees. Beginning in 1996, erosion control projects at five sites covering almost 2 miles of the south and north banks of the lower American River have been implemented. Additional sites at RM 149 and RM 56.7 on the Sacramento River have been constructed since 2001. This is an ongoing project, and additional sites requiring maintenance will continue to be identified until the remaining authority of approximately 30,000 linear feet is exhausted.

10. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel property gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name:_____ Title:_____

Signature:_____ Date:_____

APPENDIX G
Hydraulic Analysis of Mitigation Project – LAR RM 0.5

MBK ENGINEERS

Water Resources • Flood Control • Water Rights

TECHNICAL MEMORANDUM

DATE: November 20, 2007

TO: LAR Team Members

FROM: Don Trieu

SUBJECT: Hydraulic Analysis of Mitigation Project – LAR RM 0.5

This memorandum documents the hydraulic analysis of the proposed mitigation project at RM 0.5 on the lower American River. The Corps of Engineers and SAFCA are proposing to transplant elderberry shrubs, degrade the existing bank, installing erosion control structures, and planting native plant species. The purpose of the hydraulic analysis is to determine the effects to water surface elevation and velocity for one flood event.

The methodology for the hydraulic analysis will be to simulate the proposed project condition and then compare the results with a baseline condition to determine if there are any effects to water surface elevation and velocity. The baseline condition is the 2005 vegetation condition (Baseline 2) as documented in MBK Engineers memo dated October 13, 2005.

The hydraulic analysis was performed using the RMA-2 hydraulic model of the lower American River. The model was developed and calibrated by Ayers Associates (Ayers, 2003) and further refined by MBK Engineers to update it to 2005 vegetation conditions (MBK October 13, 2005).

The existing condition at the site consists of a heavy stand of non-native grasses & shrubs, mainly wild blackberry, and a few native trees. The project area under existing condition was calibrated and simulated using a Manning's roughness coefficient of 0.11. Figure 1 shows the model mesh and "n" values used under the baseline condition.

The project condition was modeled by changing the Manning's roughness coefficient in the hydraulic model in the project area. The planting plan consists of four planting zones: (1) elev. 6 to 8, button bush, cottonwood, willows, mulefat, and box elders are proposed at 2 feet o.c.; (2) elev. 8 to 11, same plant species as zone 1 but white alder, sedges, and California rose added; (3) elev. 11 to 16, elder, cottonwood, sycamore, valley oak at 6 feet o.c., with mulefat, wildrye and wild grape for ground cover; and (4) elev. 16 to 24, sycamore, cottonwood, valley oak, with wildrye, coyote brush, and elderberry ground cover. A roughness coefficient of 0.07 was assigned for planting zone 1 and 2; and 0.085 for planting zone 3 and 4. For the elderberry transplant area, a roughness coefficient of 0.045 was used. In addition to the plantings, the project consists of minor contouring at the site. The elevations in the hydraulic model were modified to reflect the major contours at the site. Figure 2 shows the model mesh and roughness coefficients used to simulate the project condition.

The project condition was simulated for 115,000 cfs. The boundary condition used for the simulation is as follows:

Table 1: Boundary Conditions

Flow Regime	Flow at LAR RM 14.0 (cfs)	NEMDC flow (cfs)	Flow at Sacramento Weir (cfs)	Stage at I-Street (ft-NGVD)
115,000 cfs	115,000	11,400	18,900	30.4

Results:

The results of the hydraulic modeling were plotted using differential contours between the Project Condition and Baseline 2. Positive values indicate a higher water surface or velocity under the project condition; a negative difference indicates a lower water surface or velocity.

- Figure 3: Base Condition Velocity Map - 115,000 cfs.
- Figure 4: Project Condition Velocity Map - 115,000 cfs.
- Figure 5: Velocity Difference Map - 115,000 cfs.
- Figure 6: Water Surface Difference Map - 115,000 cfs.

Conclusions:

Based on the hydraulic results:

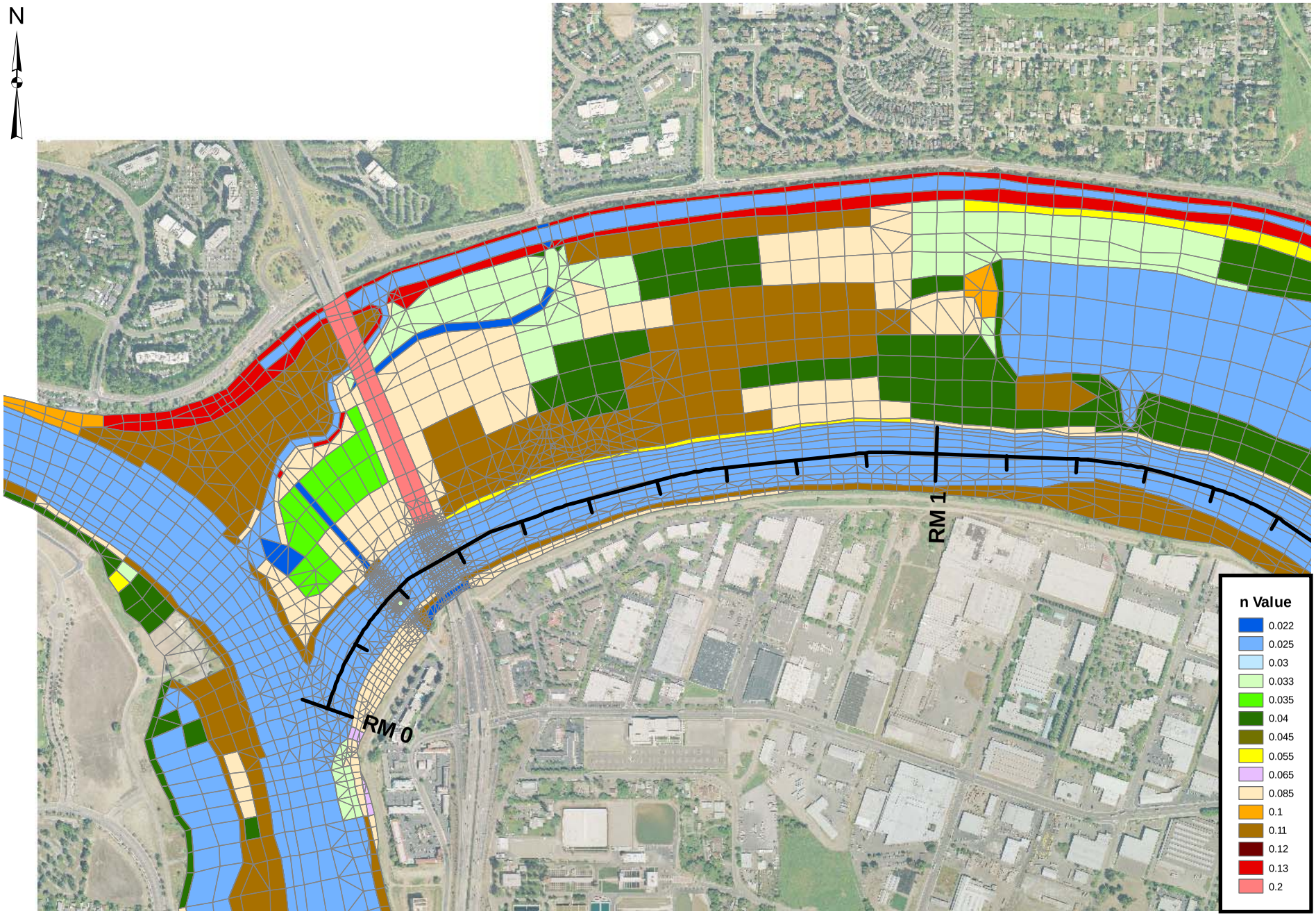
- The project condition increases and decreases velocity in the immediate vicinity of the project. The velocity decrease is on the order of less than 1.5 fps within the project footprint. The velocity increase is along the bank of the river and is between 0.5 to 1.0 fps. The velocity impacts adjacent to the levee are less than significant. See Figure 5.
- Under the project condition, there are no significant increases or decreases in water surface elevation along or near the levees. The project would decrease the water surface on the order of less than 0.1 feet just downstream of the project footprint. See Figure 6.

References:

Ayers, 2003. Lower American River, FEMA Certification, Draft Report, July 2003.

Don Trieu, P.E.

DT/ dt
RM 0.5 H&H Analysis.doc



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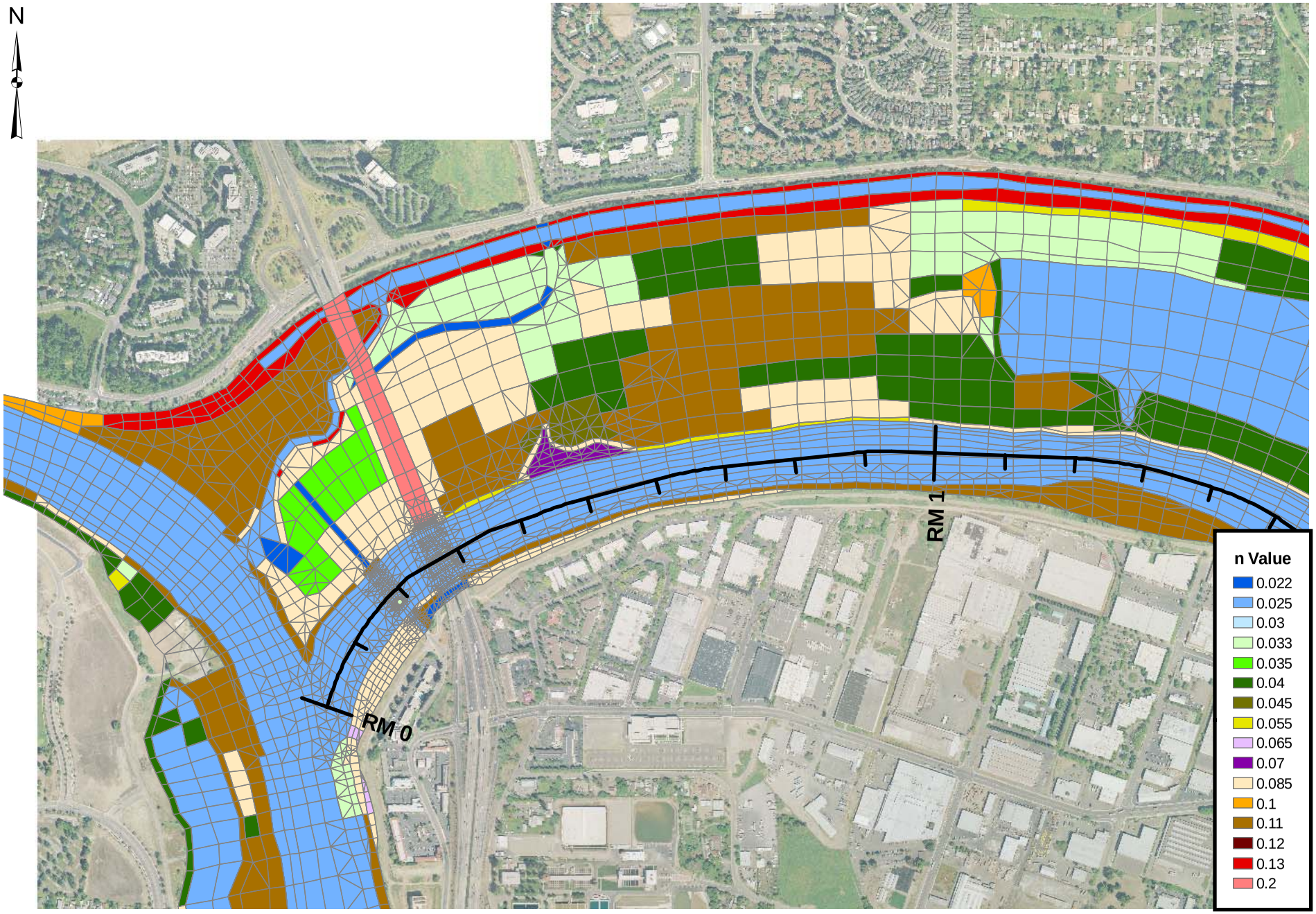
(916) 456-4400

Lower American River - RM 0.5 Mitigation Project
Roughness Coefficient - Base Condition

0 500 1,000
Scale in Feet

Figure 1



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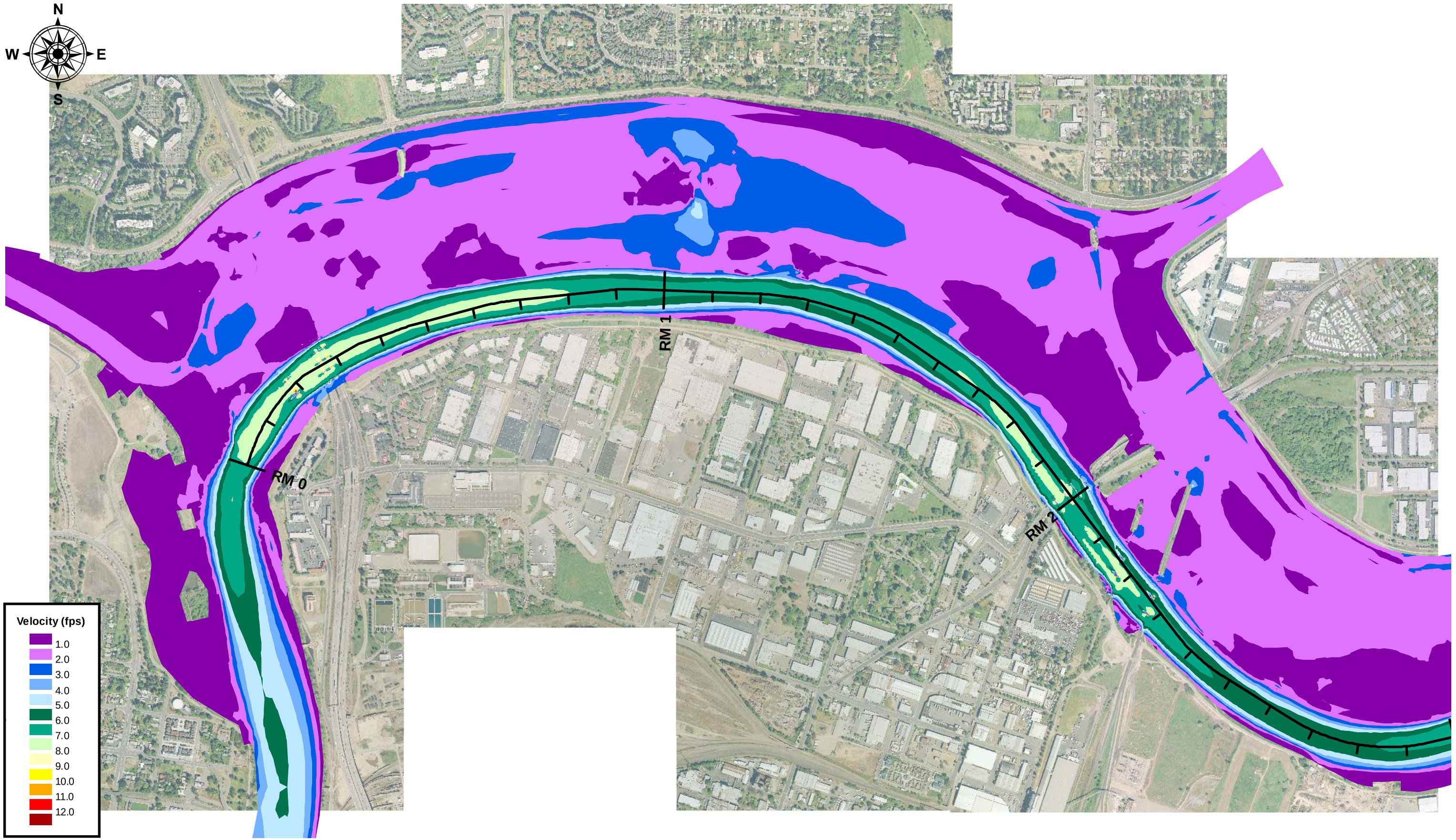
Lower American River - RM 0.5 Mitigation Project
Roughness Coefficient - Project Condition

0 500 1,000
Scale in Feet

Figure 2



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Lower American River - RM 0.5 Mitigation Project
Velocity - Base Condition

0 500 1,000 2,000
Scale in Feet

Figure 3

N
W
E
S

RM 0
RM 1
RM 2

Velocity (fps)
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0

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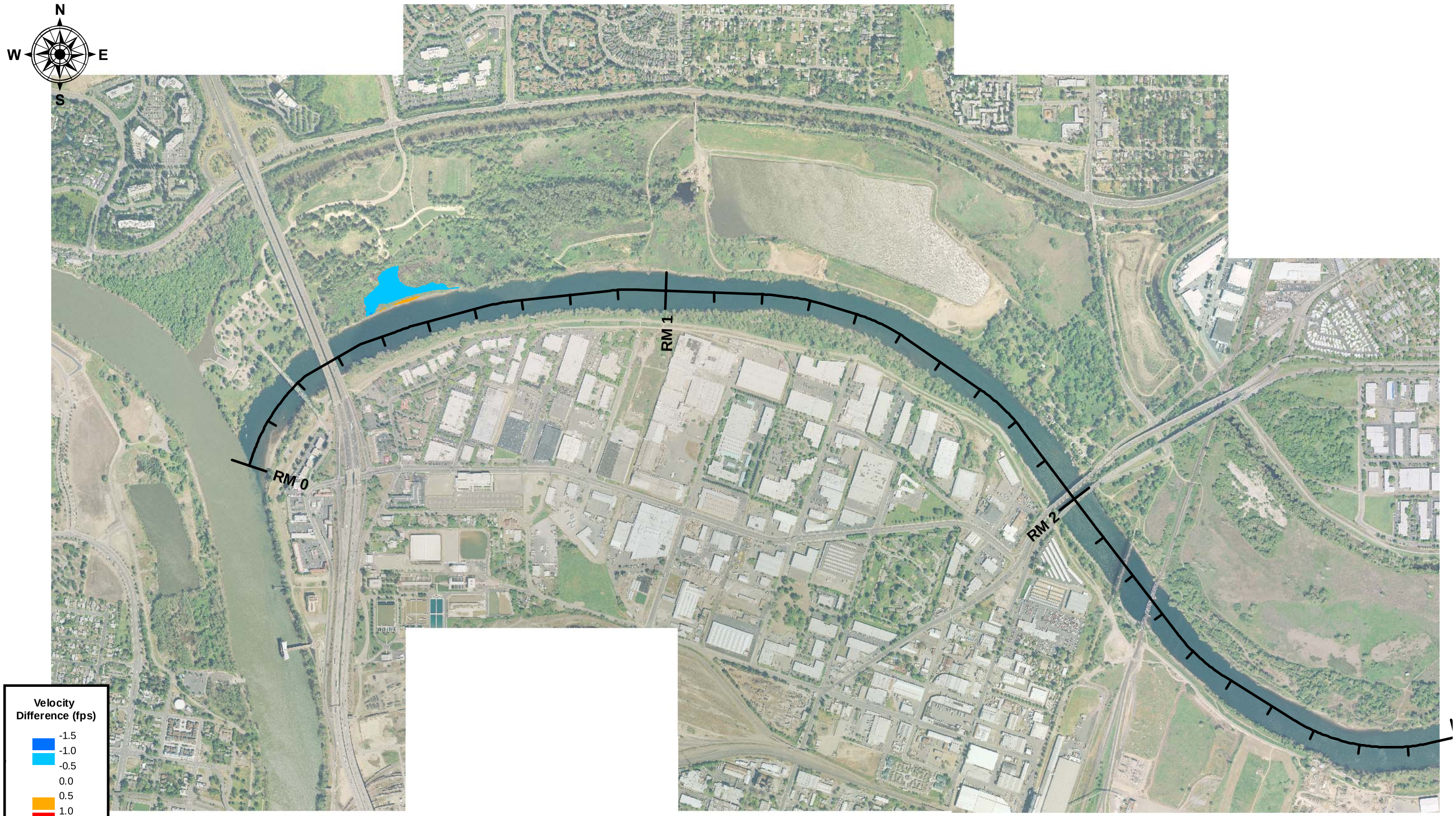
Lower American River - RM 0.5 Mitigation Project
Velocity - Project Condition

0 500 1,000 2,000
Scale in Feet

Figure 4



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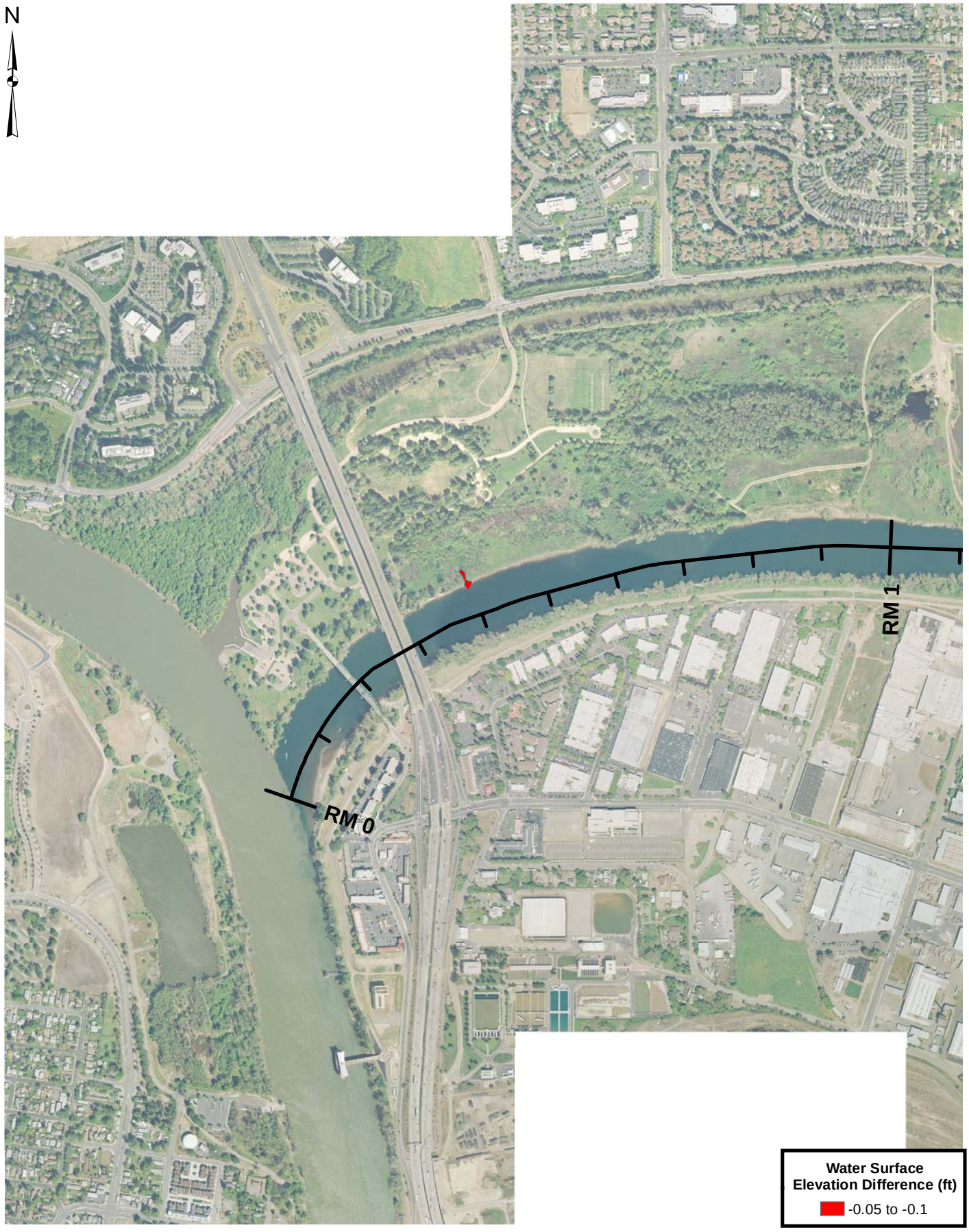
Lower American River - RM 0.5 Mitigation Project
Velocity Difference

0 500 1,000 2,000
Scale in Feet

Figure 5



MBK ENGINEERS

Lower American River - RM 0.5 Mitigation Project
Water Surface Elevation Difference

0 500 1,000
Scale in Feet

Figure 6

APPENDIX H

Air Quality Analysis

Road Construction Emissions Model, Version 5.2

Emission Estimates for -> LAR RM 0.5					Exhaust	Fugitive Dust	
Project Phases (English Units)	**ROG (lbs/day)**	**CO (lbs/day)**	**NOx (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**	
Grubbing/Land Clearing	17	75	90	25	5	20	
Grading/Excavation	28	156	156	28	8	20	
Drainage/Utilities/Sub-Grade	0	0	0	0	0	0	
Paving	0	0	0	0	0	0	
Maximum (pounds/day)	28	156	156	28	8	20	
Total (tons/construction project)	0.81	4.14	4.54	0.90	0.24	0.66	<-tons

Notes:
- Project Start Year -> 2008
- Project Length (months) -> 3
- Total Project Area (acres) -> 4
- Maximum Area Disturbed/Day (acres) -> 4
- Total Soil Imported/Exported (yd^3/day)-> 1000

PM10 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I.

Emission Estimates for -> LAR RM 0.5					Exhaust	Fugitive Dust	
Project Phases (Metric Units)	**ROG (kgs/day)**	**CO (kgs/day)**	**NOx (kgs/day)**	**PM10 (kgs/day)**	**PM10 (kgs/day)**	**PM10 (kgs/day)**	
Grubbing/Land Clearing	8	34	41	11	2	9	
Grading/Excavation	13	71	71	13	4	9	
Drainage/Utilities/Sub-Grade	0	0	0	0	0	0	
Paving	0	0	0	0	0	0	
Maximum (kilograms/day)	13	71	71	13	4	9	
Total (megagrams/construction project)	0.74	3.75	4.12	0.81	0.22	0.60	<- megagrams

Notes:
- Project Start Year -> 2008
- Project Length (months) -> 3
- Total Project Area (hectares) -> 2
- Maximum Area Disturbed/Day (hectares) -> 2
- Total Soil Imported/Exported (meters^3/day)-> 765

PM10 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I.

APPENDIX I

Correspondence with the California State Historic Preservation Officer

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO ATTENTION OF

Environmental Resources Branch

Mr. Milford Wayne Donaldson
State Historic Preservation Officer
Office of Historic Preservation
P.O. Box 942896
Sacramento, California 94296-0001

Dear Mr. Donaldson:

The U.S. Army Corps of Engineers, Sacramento District (Corps), is writing pursuant to 36 CFR 800.3(c)(3) to inform you of an Environmental Assessment (EA) that is being prepared by the Corps for the proposed Lower American River Mile 0.5 Right Habitat Enhancement Project, Sacramento, California (LAR RM 0.5) Project. The U.S. Corps of Engineers and the State of California Reclamation Board, with assistance from the Sacramento Area Flood Control Agency (SAFCA), propose to construct an offsite mitigation site at river mile (RM) 0.5 on the lower American River. The work would involve creating aquatic and riparian habitat to provide mitigation for unavoidable habitat losses due to past and future levee improvements and bank protection activities designed to ensure flood safety of the Sacramento metropolitan area.

In accordance with 36 CFR 800.4 and 800.4(d)(1), respectively, we are notifying you of our determination of the area of potential effects (APE), as well as requesting your concurrence with our finding that the undertaking will have No Effect on historic properties.

The APE for the proposed LAR RM 0.5 Project is located on the north bank of the American River upstream of Interstate 5 (I-5) and consists of the combination of 3 adjacent sites. The APE is bounded by developed portions of Discovery Park on the north, by the American River on the south, and by undeveloped portions of Discovery Park on the east and west. The APE is approximately 0.5 river mile (RM 0.5) east of the confluence of the American and Sacramento rivers. The Phase 2 site is roughly 305 meters (m) in length and varies from 0 to 98 m in width, covering approximately 1.3 hectare (ha) or 3.1 acres (ac) of floodplain surface. Up to an additional 0.4 ha would be temporarily disturbed during construction for use as a staging area and access paths. Adjacent to the Phase 2 site are two smaller areas that will be utilized during Phase 1 for transplanting the elderberry shrubs that would be affected by activities during the construction phase of the project within the Phase 2 site. The transplanting sites are comprised of a 2.8-acre site adjacent to the eastern side of the project footprint and a 0.7-acre site adjacent to the western side of the project footprint in the American River Parkway. This total transplant area encompasses approximately 3.5 acres and is currently covered in nonnative weedy grasses, blackberry vines, and a few native trees. The APE is located in Township 9 North, Range 4 East, Sections 25, and 26 on the Sacramento East 7.5-minute U.S. Geological Survey topographic map. The APE is delineated on Enclosure 1.

The first phase of the project would involve transplanting the elderberry shrubs that would be affected by staging and activities during construction of the second phase of the project. Prior to transplanting, the nonnative vegetation in selected areas at the transplant area would be mowed and removed, while retaining and protecting the surrounding native vegetation and trees. At specific locations in the transplant area, soil preparation activities would include clearing and grubbing the soil surface, as well as applying any necessary soil amendments. Subsequent transplanting activities would include locating and flagging those elderberry shrubs to be transplanted, and mowing and removing all surrounding vegetation on the work site. Each shrub would be trimmed according to USFWS's Conservation Guidelines for the Valley Elderberry Longhorn Beetle, 1999, and a tree spade mounted on a truck would then be used to remove the entire shrub and root ball. The shrub would be lowered on the back of the truck, transported to its new home in the transplant area, and planted into the prepared ground. These activities would be conducted according to USFWS protocol. After transplanting is completed, any areas with exposed soil in the mitigation site and transplant area would be reseeded with native grasses to minimize soil erosion until the next construction season and second phase of the project.

During Phase 2, the proposed undertaking involves: (1) excavating approximately 45,873 cubic meters (m^3) of silty sand from the existing bank; (2) lowering the bank along the existing shoreline to an elevation as low as 1.2 m, with a typical elevation of 1.8–3.7 m to achieve natural inundation frequencies consistent with the needs of fish and riparian vegetation; (3) creating a variable-sloped graded bench extending approximately 0–36.6 m from the existing shoreline; (4) creating a number of elevated benches capable of supporting natural or planted vegetation adjacent to the water's edge; (5) installing in stream woody material and other woody structures to provide erosion control and cover for fish; and (6) revegetating the existing banks in areas of disturbance. Construction equipment and workers would access the APE from the northern end of the APE, which would require at least one crossing over the existing bike and pedestrian trail. More specific details of the undertaking may be found from an extract from the Corps' Draft Environmental Assessment and Initial Study, Lower American River Mile 0.5 Mitigation Site, Sacramento River Bank Protection Project, October 2007 (enclosure 2.)

All cultural resource studies were performed by Jones & Stokes for SAFCA from April 2005 to May 2007. Their investigations are reported in "Cultural Resource Inventory Report for the Proposed Lower American River Mile 0.5 Right Habitat Enhancement Project, Sacramento, California, May 2007" (enclosure 3.) Corps' Archaeologist, Daniel A. Bell reviewed and field-checked all of the Jones & Stokes investigations and concurs with their findings and recommendations. Additionally, Mr. Bell conducted a cursory field check of the Phase 1 transplant areas in October 2007. Due to very heavy vegetation cover, ground surface visibility was extremely limited and no conclusive statements can be made about the presence or absence of historic resources within the transplant sites. The Corps will adopt Jones & Stokes recommendations for construction monitoring to ensure that historic resources are treated in accordance with the procedures for Post-review discoveries (36 CFR 800.13.)

On April 6, 2005, Jones & Stokes archaeologist Gabriel Roark conducted a records search at the North Central Information Center of the California Historical Resources Information System. The records search area encompassed the APE and a 0.4-kilometer (km)

radius from the APE. Sources consulted during the search included: maps of previous cultural resource studies and known cultural resource locations; *California Historical Landmarks*; the National Register of Historic Places (NRHP) (listed properties and determinations of eligibility); the California Register of Historical Resources; the California Points of Historical Interest inventory; *Gold Districts of California*; *California Gold Camps*; *California Place Names*; the California Department of Transportation's Local Bridge Survey (1989) and State Bridge Survey (1987); and the Directory of Properties in the Historical Resources Inventory for Sacramento County. In addition to the records search, Jones & Stokes consulted previous cultural resource studies and maps on file at Jones & Stokes. Jones & Stokes also consulted published syntheses on area prehistory, Native American ethnography, and history; sources examined are cited in the "Environmental and Cultural Context" section of this report.

The records search and literature review indicate that a total of 12 cultural resource studies have been conducted in or adjacent to the APE. One recorded cultural resource, CA-Sac-26, is located near the APE. No cultural resources have been identified in the APE. Ground surface visibility in the project area, however, was poor at the time of the two cultural resource inventories that encompassed the entire APE A 100 meter buffer zone was established around the known boundaries of CA-Sac-26 and Jones & Stokes performed additional sub-surface investigations along the eastern boundary of the APE adjacent to edge of the buffer zone in order to determine the extent of archaeological deposits. No archaeological resources were discovered and it can reliably be concluded that the undertaking will have no effect on this site. Additional details can be found in Enclosure 3.

To determine whether cultural resources of cultural or religious importance to Native Americans have been identified in the APE, Jones & Stokes requested the NAHC to search its sacred-lands file for records of such resources. The NAHC provided a response via facsimile on April 13, 2005, indicating that its files contain no record of sacred sites in the APE. The NAHC also provided a list of Native Americans that may have information about such resources in the APE. On March 8, 2006, Jones & Stokes mailed consultation letters and APE maps to the individuals named on the NAHC's contact list, as well as other persons recommended by SAFCA based on their previous projects in the lower American River corridor. Correspondence is contained in Appendix A of Enclosure 3.

Jones & Stokes received responses from three representatives and followed up with all information and requests from those representatives during their subsequent identification efforts. Native American recommendations have also been incorporated into post-review discovery treatments during the project's implementation. Details of Native American consultation can be found in Enclosure 3.

In accordance with 36 CFR 800.4(d)(1), the Corps finds that this undertaking will have No Effect on historic properties. Although a reasonable and good faith effort to identify historic properties has been completed and the proposed undertaking cannot be said to result in effects on historic properties, the Corps will ensure that a qualified archaeologist and representative of the Ione Band of Miwok Indians monitor vegetation removal and excavation in the APE to ensure a timely, appropriate response to any inadvertent archaeological discoveries that may occur as a result of ground disturbance. If archeological materials are discovered during repair work,

procedures outlined under 36 CFR 800.13 would be followed. If human remains are discovered, State law procedures regarding the discovery would be implemented.

Pursuant to 36 CFR 800.3(c)(4), we request that you review the enclosed information and provide us with any comments within 30 days. Comments or questions may be sent to Mr. Daniel A. Bell, CESPK-PD-RA, U.S. Army Corps of Engineers, 1325 J Street, Sacramento, California 95814; email at daniel.a.bell@usace.army.mil; phone at (916) 557-6818, or fax at (916) 557-7856. Please contact Mr. Dan Tibbits, Project Manager, at (916) 557-7372 with any specific project questions.

Sincerely,

Francis C. Piccola
Chief, Planning Division

Enclosures