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# Hamilton City Flood Damage Reduction and Ecosystem Restoration, California

## *Final Feasibility Report and Environmental Impact Statement/Environmental Impact Report*

July 2004

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**HAMILTON CITY FLOOD DAMAGE REDUCTION AND ECOSYSTEM RESTORATION,  
CALIFORNIA**

**FINAL FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT/  
ENVIRONMENTAL IMPACT REPORT**

**July 2004**

**Type of Statement.** Final Feasibility Report and Environmental Impact Statement/Environmental Impact Report (FR/EIS/EIR).

**Lead Federal Agency:** U.S. Army Engineer District, Sacramento.

**Lead State Agency:** The Reclamation Board of the State of California, State Clearinghouse #2002122048.

**Proposed Action:** The U.S. Army Corps of Engineers and The Reclamation Board propose to increase flood protection and restore the Sacramento River floodplain near Hamilton City, along the west bank of the Sacramento River, in Glenn County, California, about 85 miles north of the city of Sacramento by constructing a setback levee, removing most of the existing "J" levee, and actively restoring about 1,500 acres of native vegetation.

**Abstract:** The final FR/EIS/EIR describes the affected environment in the Hamilton City area; evaluates the direct, indirect, and cumulative environmental effects and the benefits of the recommended plan and three alternative plans; and recommends avoidance, minimization, and mitigation measures. Most potential adverse effects would either be short term and insignificant, or would be avoided or reduced to less-than significance using best management practices. Beneficial effects on vegetation, wildlife, fisheries, other resources, and the historic floodplain from the alternative plans are also discussed.

**Public Review and Comment:** A draft FR/EIS/EIR underwent a 45-day public and agency review April 9 through May 24, 2004. A public meeting was held in Hamilton City on May 6, 2004. All comments received were considered and incorporated as appropriate into the final FR/EIS/EIR. Comments and responses are included as an appendix to the final FR/EIS/EIR. Requests for the final can be directed to the Corps at the following address: U.S. Army Engineer District, Sacramento, Attn: Ms. Alicia Kirchner, 1325 J Street, Sacramento, California, 95814-2922. Ms. Kirchner can also be reached at (916) 557-6767.

## SUMMARY

This report: (1) assesses the risk of flooding to Hamilton City from the Sacramento River and the degradation of the river's ecosystem; (2) describes a range of alternatives to increase flood protection to Hamilton City and to restore the ecosystem; and (3) identifies a recommended plan for implementation. This report constitutes both a Feasibility Report that describes the planning process followed to identify the recommended plan and an Environmental Impact Statement/Environmental Impact Report (EIS/EIR). This final Feasibility Report/EIS/EIR submitted to higher Corps authority for review and approval, then transmitted to Congress for potential project authorization and funding of the Federal share of the project.

## BACKGROUND

Hamilton City is along the west bank of the Sacramento River in Glenn County, California, about 85 miles north of the City of Sacramento. The community has long been at risk of flooding from the Sacramento River. Portions of Hamilton City and the surrounding area flooded in 1974. Extensive flood fighting has been necessary in 1983, 1986, 1995, 1997, and 1998 to avoid failure of the private "J" levee. Residents of the town were evacuated six times in the past 20 years: 1983, 1986, twice in 1995, 1997, and 1998. The community of Hamilton City relies on the existing "J" levee to contain flows in the Sacramento River. The "J" levee does not meet Corps or any other levee construction standards and could fail at river levels well below the top of the levee. Although with flood fighting the "J" levee has historically passed high flood events, statistically it only has about a 66 percent reliability of passing a 10-year event assuming significant flood fighting efforts. This would also equate to a 90 percent reliability of passing an event smaller than a 10-year event. Another way to state this is that on an annual basis, there is a 9 percent chance of flooding in any given year, again assuming flood-fighting efforts. For some perspective, the flood event in 1997 was considered to be an 11-year event.

In the Hamilton City area, native habitat and natural function of the Sacramento River have been altered by construction of the "J" levee and conversion of the floodplain to agricultural and rural development. The Sacramento River, Chico Landing to Red Bluff Project placed bank protection at 29 bank protection sites totaling approximately 86,915 feet (16.5 miles). Sites are situated primarily at outer bends of meanders in the river, which has limited the rivers ability to meander. Native habitat has been reduced to remnant patches along the river and in historic oxbows. These ecosystem alterations greatly diminished the abundance, richness, and complexity of riparian and other floodplain habitat in the study area and the species dependent upon that habitat.

The Corps initiated the feasibility study at the request of The Reclamation Board of the State of California (The Reclamation Board), as part of the Sacramento and San Joaquin River Basins Comprehensive Study (Comprehensive Study) initiated by the Corps and The Reclamation Board in 1998. The Comprehensive Study was authorized in the 1998 Energy and Water Development Appropriations Act, Public Law (PL)105-62 and by the California State Legislature in September 1997. It was recognized that a multipurpose project could be developed in the Hamilton City area to demonstrate how a project could reduce flood damages and restore the ecosystem simultaneously. The Corps and The Reclamation Board

are the lead agencies in the Hamilton City Flood Damage Reduction and Ecosystem Restoration Feasibility Study and shared the cost of the study equally. The Reclamation Board received a State of California grant from the CALFED Bay-Delta Authority to help fund the non-Federal share of the feasibility study cost.

## **CONSIDERATION OF ALTERNATIVE PLANS**

During the feasibility study, the Federal planning process for development of water resource projects was followed to identify a recommended plan for implementation. Following definition of flood and ecosystem-related problems and opportunities, specific planning objectives and planning constraints were identified. Then various management measures were identified to achieve the planning objectives and avoid the planning constraints. Management measures were screened and retained management measures served as the building blocks of alternative plans.

Guidelines to developing multipurpose projects (in this case flood damage reduction and ecosystem restoration) were followed in developing alternative plans. First, a primary project purpose was identified. For this study, it was anticipated that ecosystem restoration would be identified as the primary purpose because there is strong interest by the Sacramento River Conservation Area Forum (SRCAF), The Nature Conservancy (TNC), and the CALFED Bay-Delta Authority in restoring the ecosystem of this area, which indicated that there was high ecosystem restoration potential. Further, based on previous flood damage reduction studies, it was considered unlikely that a flood damage reduction-only project would be cost-effective.

Next, a preliminary and then a final array of single-purpose ecosystem restoration alternative plans were formulated from retained management measures, evaluated and compared to identify a plan that reasonably maximizes the National Ecosystem Restoration (NER) net benefits (outputs minus costs). The preliminary array of ecosystem restoration alternative plans primarily consisted of various setback levee alignments with habitat restoration to the waterside of the new levee. Early on local interests expressed various concerns regarding the potential location of the setback levee. In order to ensure their concerns were addressed, stakeholders actively participated in the alternative formulation process. Community representatives developed two alternative plans (Alternatives 1 and 4). The NER plan was identified, indicating that there is likely Federal interest in implementing an ecosystem restoration-only alternative plan.

Finally, a preliminary and then a final array of multi-purpose (or "combined" alternative plans were formulated, evaluated and compared to identify a plan that reasonably maximizes total net NER and National Economic Development (NED) benefits. This array of alternative plans is identified as combined alternative plans. After evaluation and comparison of these combined alternative plans, a combined plan (NER/NED plan) has been identified as having Federal interest. Table S-1 summarizes the combined alternative plans.

**TABLE S-1: SUMMARY OF FINAL ARRAY COMBINED ALTERNATIVE PLANS**

<b>Consideration</b>	<b>No Action</b>	<b>Combined Alternative 1</b>	<b>Combined Alternative 5</b>	<b>Combined Alternative 6</b>
Total acres restored	Not applicable	1,300	1,600	1,500
Levee length (miles)	Not applicable	6.6	6.4	6.8
Protects agricultural land south of town	Not applicable	Yes	Yes	Yes
Protects waste water treatment facility	Not applicable	Yes	No	Yes
Avoids wetlands	Not applicable	Yes	No	Yes

## RECOMMENDED PLAN

Alternative 6 is determined to be the alternative plan that reasonably maximizes both ecosystem restoration and flood damage reduction benefits compared to costs and therefore has been identified as the recommended plan. Figure S-1 shows the recommended plan. It should be noted that, because Alternative 5 has the greatest habitat benefits, Alternative 5 was identified as both the USFWS Preferred Alternative and the Environmentally Preferred Alternative. However, since the additional output of Alternative 5 is relatively small and the cost is relatively great, Alternative 6 was determined to be the recommended plan.

This plan consists of constructing a setback levee about 6.8 miles long that would have varying heights and consequently, varying levels of performance for flood damage reduction. The entire length of setback levee would have gravel road for patrolling, and would be fenced along the landside. From the northern part of the study area to south of Dunning Slough, a distance of 4.4 miles, the levee would be on average 7.5 feet high (6 feet for the "J" levee replacement levee, and an additional 1.5 feet for the flood damage reduction increment). This portion of the levee would provide a 90 percent confidence of passing a 75-year event thereby providing improved flood protection to the community of Hamilton City. The top-of-levee elevation for this portion of the levee would be set at the 320-year water surface elevation (WSEL). Some agricultural lands north of the community of Hamilton City would have improved protection but would not be removed from the FEMA regulated floodplain.

South of Dunning Slough, the levee height would drop to 6 feet for a distance of about 4,000 feet, providing a 90 percent confidence of passing a 35-year event. The top-of-levee would be set at the 100-year wsel. This change reflects the difference in land use behind the levee at this point, which is largely agricultural. Just north of County Road 23, the setback levee would become a training dike, dropping down to a height of 3 feet for about 1.6 miles. The training dike would perform with a 90 percent confidence of passing the 11-year event and the top-of-levee would be set at the 20-year wsel. The training dike would reduce the frequency of flooding to adjacent agricultural lands and reduce damages from scouring flows. Large flood events would overtop the training dike, spilling into the orchards without the damaging scouring flows and avoid adverse hydraulic effects to downstream property owners. The training dike would also reduce the potential for backwaters flooding Hamilton City.

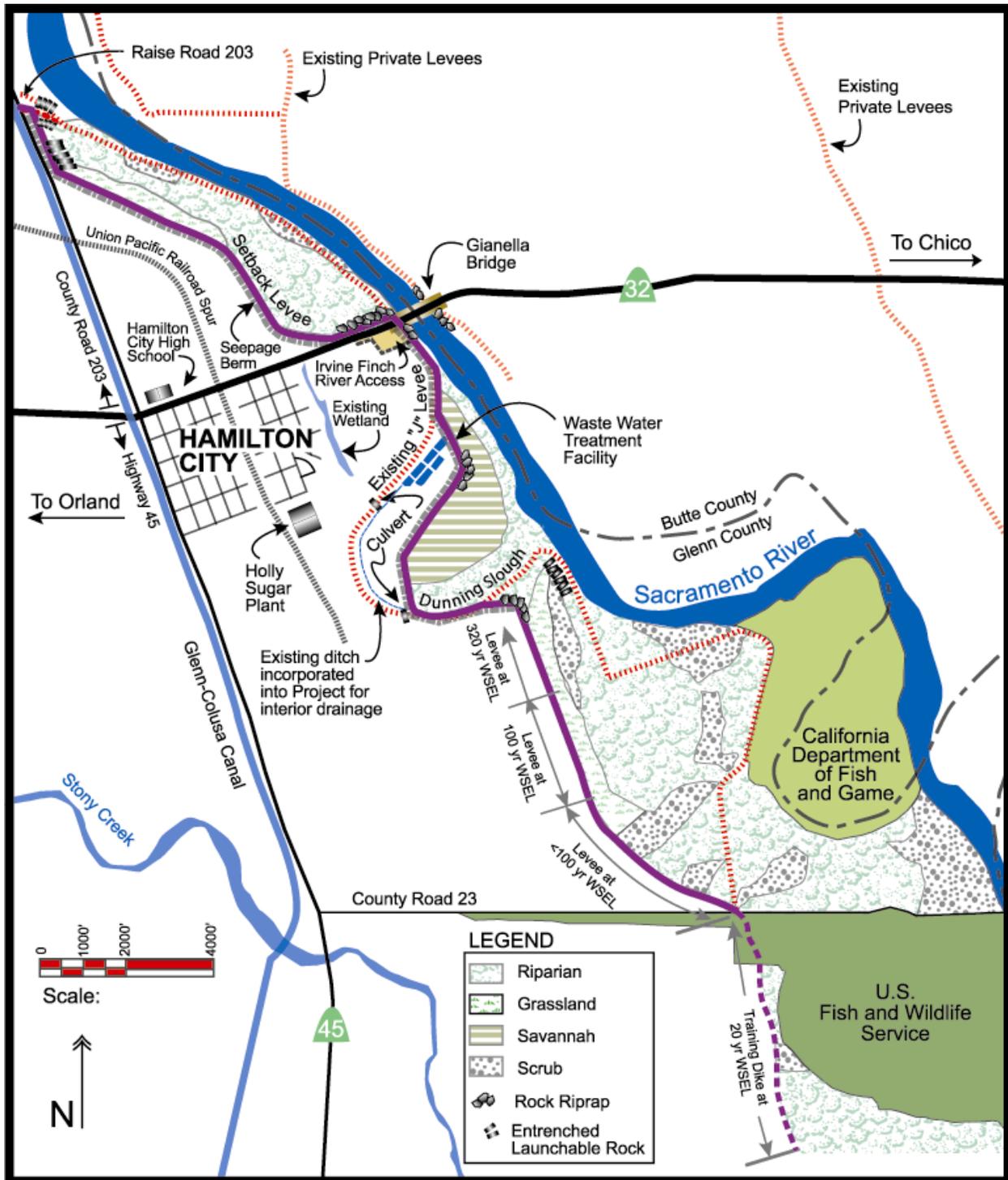


Figure S-1: Recommended Plan

In order to accomplish ecosystem restoration within the project area, most of the existing "J" levee would be removed to reconnect the river to the floodplain, allow overbank flooding and increase capacity in the Sacramento River. Established riparian vegetation waterside of the existing "J" levee would be avoided wherever possible during construction.

The new setback levee would begin about 2 miles north of Hamilton City, tying into high ground near the northern end of the "J" levee. Tying into high ground at this location would prevent flows greater than the 250-year event from wrapping around the setback levee and over County Road 203. The setback levee would be extended to a point just west of County Road 203, which would be ramped approximately 2.5 feet from its current height over the setback levee. As a flood fighting measure, Glenn County constructed a short setback levee near the northern end of the "J" levee in 2003, which would provide additional protection to the new setback levee against potential erosion from the Sacramento River. Entrenched rock would also be placed on the waterside of this training dike as an additional protection for the new setback levee from erosion.

The new setback levee would run southeast along the County Road 203 until turning easterly and running roughly parallel to and about 1,300 feet to the west of the Sacramento River, along higher ground. A seepage berm would be constructed on the landside of the setback levee from the northern end of the levee south to Dunning Slough. The setback levee performance would be 90 percent confidence of passing the 75-year event.

At Highway 32, the setback levee would turn east and run parallel to the highway until tying into the approach to the Gianella Bridge. The highway would not need to be raised, but rock riprap would be placed to protect the levee embankment from induced overland flows. Grouted and/or rock riprap would be placed under the bridge below the surface of the river to protect the bridge from potential increased velocities and potential scouring. South of Highway 32 the alignment would follow the existing "J" levee adjacent to the Irvine Finch River Access (just south of the highway). Some modification to the existing boat ramp would be required. South of Irvine Finch, the setback levee would be aligned away from the river to open up the floodplain.

The alignment would cut across a portion of Dunning Slough and provide protection to the Hamilton City wastewater treatment plant, some abandoned holding ponds for the old Holly Sugar plant, and a lime disposal pile. An existing ditch within Dunning Slough would be used to drain runoff from the agricultural fields and Hamilton City. This drain would be connected to the floodplain via a culvert in the setback levee south of Dunning Slough.

South of Dunning Slough, the alignment would roughly follow along the western edge of the habitat restoration area before turning east and merging with the southern end of the "J" levee at County Road 23. As the levee turns east, the levee height would gradually decrease from 7.5 feet to 6 feet and would continue at this height for approximately 4,000 feet. The setback levee performance would be 90 percent confidence of passing the 35-year event for this area. The setback levee height would then gradually decrease from 6 feet to approximately 3 feet. At this point the new levee would become a "training dike" meant to redirect flows rather than control them. This height reduction reflects a combination of economic justification and avoidance of negative hydraulic effects to downstream property owners.

The training dike's performance would be 90 percent confidence of passing the 11-year event. The training dike would continue for about a mile south of County Road 23, running along the western edge of the U.S. Fish and Wildlife Service (USFWS) property boundary. A small ramp with culverts on either side would be constructed over the training dike at County Road 23 to maintain the river access. This alignment does not tie into high ground and therefore allows some backwater flooding of agricultural lands, as currently happens with the "J" levee. In fact, the training dike would be designed to allow floodwaters to flow over the top and spread out into the agricultural areas while reducing the high velocities that cause extensive damage to the orchards.

Native vegetation would be restored on all project lands waterside of the new setback levee. Restoration would also occur on the land within Dunning Slough and the land south of the USFWS property. Existing USFWS and DFG lands would not be restored as part of the project. Existing orchards in the proposed restoration areas would be removed and native vegetation planted. The native vegetation (total 1,500 acres) would include riparian, scrub, oak savannah, and grassland cover types, based on hydrologic, topographic, and soil conditions. An exception to this is the land in the middle of Dunning Slough. This land is relatively higher in elevation than the rest of the restoration area and oak savannah vegetation is anticipated to be more appropriate for these lands.

Results from hydraulic modeling have shown that by widening the floodway on the western side of the Sacramento River, water surface elevations in Butte County would be reduced. In addition, the water surface elevation near Big Chico Creek would have reduced stages resulting in less overflow to Butte Basin. The reduction in flow has been on the order of magnitude of two thousand cubic feet per second (cfs) when the Sacramento River is conveying roughly 343,000 cfs (320 year flood event).

## **SIGNIFICANT ENVIRONMENTAL IMPACTS**

An evaluation of environmental effects determined that the proposed action could have significant environmental effects on water quality, air quality, transportation, and special status species. With mitigation, effects to these resources were reduced to less than significant levels. Table S-2 summarizes environmental impacts of the final array of combined alternative plans. A description of each effect and corresponding mitigation is included in Chapter 5, Environmental Consequences.

The Corps has determined that this project as recommended is consistent with the Section 404(b)(1) guidelines and in compliance with the Clean Water Act and meets the Section 404(r) exemption criteria. The Corps plans to seek an exemption from the requirement to obtain State water quality certification under section 404(r) of the Clean Water Act.

**TABLE S-2: SUMMARY OF ENVIRONMENTAL IMPACTS OF COMBINED ALTERNATIVE PLANS**

<b>Resource</b>	<b>No Action</b>	<b>Combined Alternative 1</b>	<b>Combined Alternative 5</b>	<b>Combined Alternative 6</b>
<b>Water Quality</b>				
Temporary Effects	Water quality would be similar to existing conditions.	Levee removal may result in temporary degradation of water quality. <b>S</b>	Levee removal may result in temporary degradation of water quality. <b>S</b>	Levee removal may result in temporary degradation of water quality. <b>S</b>
Mitigation	Not applicable.	Use best management practices (BMPs) to prevent sediment runoff from entering the river. <b>LS</b>	Use BMPs to prevent sediment runoff from entering the river. <b>LS</b>	Use BMP's to prevent sediment runoff from entering the river. <b>LS</b>
Permanent Effects	Projects assumed under the future with-out project condition such as CALFED, Central Valley Improvement Act (CVPIA), and the TNC Sacramento River Project seek to maintain high water quality.	Water quality of surface runoff is expected to improve due to increased vegetative cover, reduced tillage, reduced use of well water, and reduced application of agricultural chemicals. Benefits from recharge of groundwater supplies due to temporary storage area created. New levee would be constructed between the wastewater treatment facility and the Sacramento River. Would decrease the risk of sewage spills <b>B</b>	Beneficial effects would be similar to those discussed for Alternative 1, except no benefit due to improved protection of the wastewater treatment plant. The setback levee would be constructed through the existing Hamilton City Irrigation Ditch, considered a seasonal wetland habitat by the USFWS. <b>S</b>	Water quality of surface runoff is expected to improve due to increased vegetative cover, reduced tillage, reduced use of well water, and reduced application of agricultural chemicals. Benefits from recharge of groundwater supplies due to temporary storage area created. New levee would be constructed between the wastewater treatment facility and the Sacramento River. Would decrease the risk of sewage spills due to the new levee. <b>B</b>
Mitigation	Not applicable.	No mitigation required.	In kind wetland of 45 acres would be created. Construction would occur during dry season. <b>B</b>	No mitigation required.
<b>Air Quality</b>				
Temporary Effects	Present trends in degradations to air quality can be expected to continue.	Construction would result in temporary degradation of air quality from dust and emissions from construction equipment. <b>S</b>	Construction would result in temporary degradation of air quality from dust and emissions from construction equipment, though construction time would be less than Alternative 1. <b>S</b>	Construction would result in temporary degradation of air quality from dust and emissions from construction equipment, and construction time would be more than Alternative 1. <b>S</b>
Mitigation	Not applicable.	Use BMP's to reduce fugitive dust and pollutant emissions during construction. <b>LS</b>	Use BMP's to reduce fugitive dust and pollutant emissions during construction. <b>LS</b>	Use BMP's to reduce fugitive dust and pollutant emissions during construction. <b>LS</b>
Permanent Effects	An Air Quality Attainment Plan for the air basin has been developed to regulate air emissions although overall emissions are expected to increase.	Air quality would be improved in the long term with the restoration of habitat and the reduction of the amount of agriculture related emissions. <b>B</b>	Air quality would be improved in the long term with the restoration of habitat (1,600 acres) and the reduction of the amount of agriculture related emissions. <b>B</b>	Air quality would be improved in the long term with the restoration of habitat (1,500 acres) and the reduction of the amount of agriculture related emissions. <b>B</b>
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
<b>Transportation</b>				
Temporary Effects	Not applicable.	Construction activities would generate additional traffic and potential disruptions due to construction-related detours. Increased truck	Construction activities would generate additional traffic and potential disruptions due to construction-related	Construction activities would generate additional traffic and potential disruptions due to construction-related

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<b>Resource</b>	<b>No Action</b>	<b>Combined Alternative 1</b>	<b>Combined Alternative 5</b>	<b>Combined Alternative 6</b>
		traffic may adversely affect safety and roadway conditions. <b>S</b>	detours. Increased truck traffic may adversely affect safety and roadway conditions. <b>S</b>	detours. Increased truck traffic may adversely affect safety and roadway conditions. <b>S</b>
Mitigation	Not applicable.	An access management plan would be prepared and implemented prior to initiation of construction. <b>LS</b>	An access management plan would be prepared and implemented prior to initiation of construction. <b>LS</b>	An access management plan would be prepared and implemented prior to initiation of construction. <b>LS</b>
Permanent Effects	More roads and other transportation infrastructure is expected and traffic is expected to increase.	Transportation on Highway 32 would benefit from increased flood protection. <b>B</b>	Transportation on Highway 32 would benefit from increased flood protection. <b>B</b>	Transportation on Highway 32 would benefit from increased flood protection. <b>B</b>
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
<b>Special Status Species</b>				
Temporary Effects	Conversion of one crop to another or agriculture to urban uses may affect special status species.	1. Yellow-billed cuckoo, bank swallow, and Swainson's hawk may experience temporary disturbance and/or displacement due to construction. <b>S</b> 2. Anadromous fish may be subject to short-term exposure to increased turbidity during construction. <b>S</b>	1. Yellow-billed cuckoo, bank swallow, and Swainson's hawk may experience temporary disturbance and/or displacement due to construction. <b>S</b> 2. Anadromous fish may be subject to short-term exposure to increased turbidity during construction. <b>S</b>	1. Yellow-billed cuckoo, bank swallow, and Swainson's hawk may experience temporary disturbance and/or displacement due to construction. <b>S</b> 2. Anadromous fish may be subject to short-term exposure to increased turbidity during construction. <b>S</b>
Mitigation	Not applicable.	1. Surveys would be conducted prior to construction to determine presence or absence of special status species in the project area and specific avoidance and minimization measures (BMPs) would be implemented, if necessary. <b>LS</b> 2. BMP's to minimize turbidity effects to fish would be implemented. <b>LS</b>	1. Surveys would be conducted prior to construction to determine presence or absence of special status species in the project area and specific avoidance and minimization measures (BMPs) would be implemented, if necessary. <b>LS</b> 2. BMP's to minimize turbidity effects to fish would be implemented. <b>LS</b>	1. Surveys would be conducted prior to construction to determine presence or absence of special status species in the project area and specific avoidance and minimization measures (BMPs) would be implemented, if necessary. <b>LS</b> 2. BMP's to minimize turbidity effects to fish would be implemented. <b>LS</b>
Permanent Effects	Compliance with Federal and State ESA could slow negative impacts of urban development on special status species.	1. Anadromous fish would be adversely affected by placement of rock in bank habitat. Increased access to the floodplain would increase the risk of stranding. <b>S</b> 2. The quantity and variety of special status species, in particular the anadromous fish, valley elderberry longhorn beetle, Swainson's hawk, and western yellow-billed cuckoo, are expected to increase as a result of the restoration. <b>B</b>	1. Anadromous fish would be adversely affected by placement of rock in bank habitat. Increased access to the floodplain would increase the risk of stranding. <b>S</b> 2. The quantity and variety of special status species, in particular the anadromous fish, valley elderberry longhorn beetle, Swainson's hawk, and western yellow-billed cuckoo, are expected to increase as a result of the restoration. <b>B</b>	1. Anadromous fish would be adversely affected by placement of rock in bank habitat. Increased access to the floodplain would increase the risk of stranding. <b>S</b> 2. The quantity and variety of special status species, in particular the anadromous fish, valley elderberry longhorn beetle, Swainson's hawk, and western yellow-billed cuckoo, are expected to increase as a result of the restoration. <b>B</b>

<b>Resource</b>	<b>No Action</b>	<b>Combined Alternative 1</b>	<b>Combined Alternative 5</b>	<b>Combined Alternative 6</b>
Mitigation	Not applicable.	1. Improved access to floodplain habitat and aquatic habitat improvements due to restoration would more than offset any adverse effects. <b>B</b> 2. No mitigation required; but elderberry shrub plantings (3,146 bushes) would be included in the planting plan to benefit the VELB. <b>B</b>	1. Improved access to floodplain habitat and aquatic habitat improvements due to restoration would more than offset any adverse effects. <b>B</b> 2. No mitigation required; but elderberry shrub plantings (3,223 bushes) would be included in the planting plan to benefit the VELB. <b>B</b>	1. Improved access to floodplain habitat and aquatic habitat improvements due to restoration would more than offset any adverse effects. <b>B</b> 2. No mitigation required; but elderberry shrub plantings (3,357 bushes) would be included in the planting plan to benefit the VELB. <b>B</b>

<sup>1</sup>Levels of significance are provided before and after mitigation for each effect.

<sup>2</sup>NE = No effect.

B = Beneficial effect.

LS = Less-than-significant effect.

S = Significant effect.

## **ESTIMATED COST AND COST SHARING**

The estimated total project first cost \$44,876,000. First costs were allocated by project purpose in the preliminary cost allocation process presented in Chapter 3. Alternative Plans, Table S-3 breaks down this cost by primary project element and feature. The total amount allocated to the flood damage reduction project purpose is \$4,266,000. The total amount allocated to the ecosystem restoration project purpose is \$40,440,000. Cultural Resource Preservation costs of \$170,000 will be added as part of the Federal costs. A summary of cost sharing responsibilities is presented in Table S-4.

## **AREAS OF CONTROVERSY OR UNRESOLVED ISSUES**

There is one area of controversy associated with this project. There are no unresolved issues.

### **Agricultural Prime and Unique Farmlands**

An area of potential controversy is associated with effects of the potential project from converting farmland. The California Department of Conservation recommended that the California Agricultural Land Evaluation and Site Assessment (LESA) model be used to evaluate potential effects for the recommended plan. The LESA model is an optional methodology that can be utilized in a CEQA assessment to ensure that significant effects on the environment of agricultural land conversions are quantitatively and consistently considered in the environmental review process (Section 21095, Public Resource Code). This model was applied experimentally for this project. Preliminary application of the model indicated that conversion of the lands would constitute a significant adverse effect. A closer look was then taken at the use of the LESA model as an impact assessment tool for ecosystem restoration projects. The fundamental premise of the LESA model is that a change in the use of important farmland may be a significant effect on the environment. In fact, habitat restoration projects provide a benefit to soils. The model was found to be an inadequate

application for assessing the potential effects of ecosystem restoration projects and was subsequently not used.

**TABLE S-3: ECONOMIC COSTS AND BENEFITS OF RECOMMENDED PLAN<sup>1</sup> (\$1,000)**

Item	FDR		Ecosystem		Total Costs	
	Allocated Costs	Benefits	Allocated Costs	Benefits	Allocated Costs	Benefits
Investment Cost						
First Cost <sup>2</sup>	4,260		40,446		44,706	
Interest During Construction	271 <sup>4</sup>		3,066 <sup>5</sup>		3,337 <sup>5</sup>	
Total	4,531		43,512		48,043	
Annual Cost						
Interest and Amortization	272		2,615		2,887	
OMRR&R <sup>3</sup>	47 <sup>6</sup>		8		55	
Subtotal	319		2,623		2,942	
Annual Benefits						
Monetary (FDR)		577				577
Non-monetary (Ecosystem)				888 AAHU's		888 AAHU's
Net Annual FDR Benefits		258				258
FDR Benefit-Cost Ratio		1.8 to 1				1.8 to 1

<sup>1</sup>Based on October 2003 price levels, 5 5/8 percent rate of interest, and a 50-year period of analysis.

<sup>2</sup>Excludes Cultural Resource Preservation.

<sup>3</sup>Operation, Maintenance, Repair, Replacement, and Rehabilitation

<sup>4</sup>Two year period of construction assumed for J levee removal and construction of setback levee

<sup>5</sup>Three year period construction assumed for overall project

<sup>6</sup>Excludes environmental O&M costs.

**TABLE S-4: SUMMARY OF COST SHARING RESPONSIBILITIES  
RECOMMENDED PLAN<sup>1</sup> (\$1,000)**

Project Purpose	Federal	Non-Federal
Ecosystem Restoration	26,286	14,154
Flood Damage Reduction	2,773	1,493
Cultural Resource Preservation	170	
Total	29,229	15,647
Breakdown of Non-Federal		
LERRDs		13,910
Cash		1,737
Total		15,647

<sup>1</sup>Based on October 2003 price levels, 5 5/8 percent rate of interest, and a 50-year period of analysis and preliminary cost allocation presented in Chapter 3.

The California Departments of Conservation and Food and Agriculture maintain that the LESA model is an appropriate tool for measuring potential effects for the project. The Reclamation Board is the non-Federal sponsor for the project and the State California

Environmental Quality Act lead agency. As such, The Reclamation Board staff has coordinated with the departments of Conservation and Food and Agriculture, as well as with the departments of Fish and Game and Water Resources, the California Bay-Delta Authority, and the State Attorney General’s office to ensure that all aspects of this debate were considered prior to determining the applicability of the LESA model

**Physical Effect**

The Reclamation Board has determined, with input from other State agencies, that the LESA model was not an appropriate tool to measure the potential effects from the conversion of agricultural land for ecosystem restoration projects.

The basis of significance for conversion of prime and unique farmlands was determined to be that an alternative would be considered to have a significant effect if it would result in an irretrievable conversion of a substantial acreage of farmland. An irretrievable conversion was considered to be one that would involve the conversion to land uses that would cause serious degradation of the quality of soils and/or result in expenditures of substantial development costs that would likely preclude the practicality of future conversion back to agriculture. It has been concluded that conversion for ecosystem restoration would not degrade soils but improve them and, acknowledging that the project would be intended to continue in perpetuity, that expenditures would not be of a magnitude that would preclude future conversion back to agriculture if future policies and priorities indicated this would be in the public interest. Table S-5 shows the environmental effect of alternative plans on prime and unique farmlands as considered in Chapter 5. It has been determined that the recommended plan would not result in a significant impact to prime and unique farmlands.

**TABLE S-5: EFFECTS TO AGRICULTURAL/PRIME AND UNIQUE FARMLANDS  
FROM COMBINED ALTERNATIVE PLANS**

<b>Consideration</b>	<b>No Action</b>	<b>Combined Alternative 1</b>	<b>Combined Alternative 5</b>	<b>Combined Alternative 6</b>
Temporary Effects	Not applicable.	Not applicable. LS	Not applicable. LS	Not applicable. LS
Mitigation	Not applicable.	No mitigation required. LS	No mitigation required. LS	No mitigation required. LS
Permanent Effects	Conversion of agricultural land to urban uses will continue.	Conversion of 1300 acres of farmland would not be an irretrievable effect. Some farmlands would benefit from improved flood protection. Acreage in Williamson Act contracts is 283 acres plus 100.7 acres in Farmland Security Zone contracts. LS	Conversion of 1600 acres of farmland would not be an irretrievable effect. Some farmlands would benefit from improved flood protection. Acreage in Williamson Act contracts is 472 acres plus 100.7 acres in Farmland Security Zone contracts. LS	Conversion of 1500 acres of farmland would not be an irretrievable effect. Some farmlands would benefit from improved flood protection. Acreage in Williamson Act contracts is 472 acres plus 100.7 acres in Farmland Security Zone contracts. LS
Mitigation	Not applicable.	The project will be in compliance with the CALFED ROD requirements for conversion of agricultural lands to restoration. LS	The project will be in compliance with the CALFED ROD requirements for conversion of agricultural lands to restoration. LS	The project will be in compliance with the CALFED ROD requirements for conversion of agricultural lands to restoration. LS

### Economic Effects

Another concern related to the conversion of farmlands pertains to the economy. Some farm-related jobs would be lost as a result of this conversion. Conversely, implementation of the recommended plan is expected to increase jobs related to maintenance of the setback levee and native habitat. A requirement of the project is that the non-Federal sponsor assumes responsibility to operate and maintain the project. It is anticipated that the responsibility would be turned over to a local entity. The community of Hamilton City is currently working on developing a new levee maintenance district that could potentially generate jobs. The project would also significantly enhance regional recreation currently being developed by the State Department of Parks and Recreation in coordination with Glenn County. Additionally, the benefits of the recommended plan exceed the costs of constructing it.

### Important Considerations

As part of considering the issue of converting prime and unique farmlands, it is important to understand the effects the Sacramento River has on existing agricultural lands in the study area. The study area is within the Red Bluff to Chico Landing reach of the Sacramento River, which the SRCAF Handbook (SRCAF, 2000 (rev.)) describes as the most erosion and flood prone land along the Sacramento River. Figure S-2 shows recent erosion in the study area. A comparison of land use shows that orchards are planted most closely to the river channel along the more stable reaches and that riparian habitat has developed along the unstable reaches (SRCAF, 2000 (rev.), page 4-8). Specific to the study area, the rate of channel movement is high in the very northern portion of the study area and also south of Dunning Slough. Agricultural lands in those areas are currently subject to seepage, erosion, flooding and scouring flood flows and would continue to be so without a project. Figure S-3 shows recent flooding to lands south of Dunning Slough. The area north of the Gianella Bridge (Highway 32) south to Dunning Slough has had very little channel movement recorded in the last one hundred years and adjacent lands have not been subject to the same forces.



**Figure S-2: Bank Erosion on the Sacramento River in the Study Area**

The SRCAF Handbook also states that this reach has the greatest potential for the re-establishment of a functioning riparian ecosystem. *“Protection of land within the inner river zone guidelines, either through landowner participation in voluntary programs or through purchase of these properties or easements by the proposed nonprofit management entity or cooperating public agencies, should receive top priority.”* (SRCAF, 2000 (rev.), page 4-14). Currently a majority of the land that would be restored as part of the potential project is in conservation ownership. Most of the lands that would be required for the recommended plan are owned and managed by TNC and were purchased from willing sellers. Figure S-4 shows the location of the study area within the SRCAF Inner River Zone and Conservation Area.

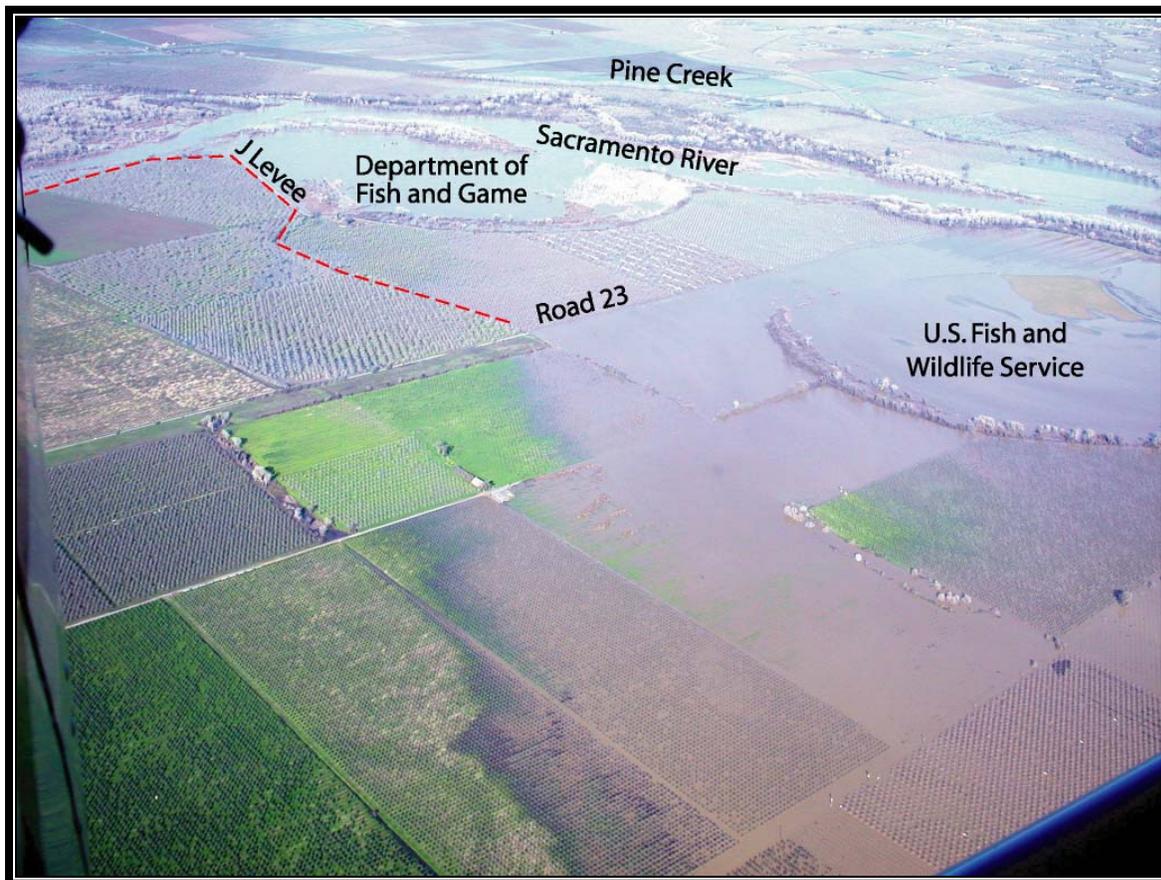


Figure S-3: Flooding in Southern End of Study Area, February 2004.

The recommended plan considers these factors. The recommended plan setback levee alignment would be setback from the river in areas where agricultural lands have been problematic to farm and would be set closer to the river in more stable reaches. Some landowners have already sold lands that have been problematic to farm. They retained ownership of lands located further from the river with the goal of reinvesting in their other farming operations. Construction of the recommended plan would benefit remaining agricultural lands that would be landside of a setback levee. Widening the floodplain would also affect timing and frequency of flooding in the region, benefiting other agricultural lands. South of Dunning Slough, the new setback levee would remove orchards from the floodway of the Sacramento River, which would reduce the amount of agricultural damages sustained during large flood events. The new setback levee would provide a wider floodway and reduce the flood risk of areas on the landside of the new setback levee. The new setback levee would provide improved flood protection for farmland on the landside of the setback levee largely through a reduction in scouring flood flows. These lands would continue to experience backwater flooding as they do currently, but the frequency of this flooding would be reduced.

The recommended plan would contribute to the goal of the CALFED Bay-Delta Authority and the Sacramento River Conservation Area Forum (SRCAF) by restoring

approximately 1,500 acres (up to 10 percent of the SRCAF goal of 15,000 additional acres of riparian habitat from Red Bluff to Colusa).

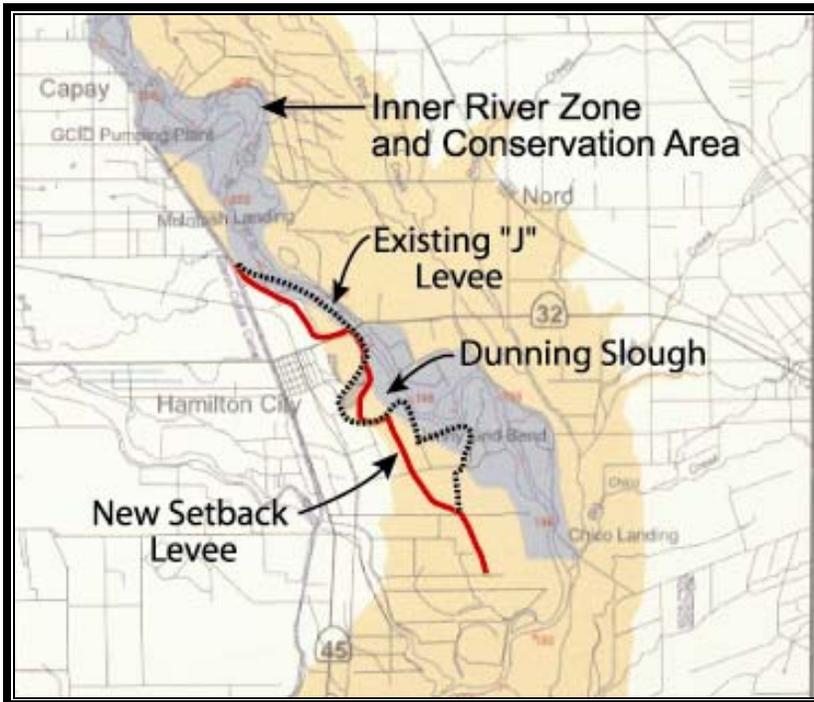


Figure S-4: SRCAF Inner River Zone and Conservation Area near Hamilton City

## MAJOR CONCLUSIONS

The preliminary recommendation of the District Engineer of the Sacramento District, U.S. Army Corps of Engineers is that the recommended plan be authorized for implementation as a Federal project. The estimated first cost of the recommended plan is \$44,876,000 and the estimated annual OMRR&R cost is \$55,000 (October 2003 price levels). The Federal portion of the estimated first cost is \$29,229,000. The estimated fully funded Federal first cost, based on projected inflation rates specified by Corps budget guidance, is \$31,310,000.

The non-Federal sponsor portion of the estimated first cost is \$15,647,000. The non-Federal sponsor shall agree to provide all lands, easements, rights-of-way, relocations, and suitable borrow and disposal areas. The non-Federal sponsor shall also assume responsibility for operating, maintaining, replacing, repairing, and rehabilitating (OMRR&R) the project. The non-Federal sponsor shall publicize floodplain information in the areas concerned and provide this information to zoning and other regulatory agencies for their guidance and leadership in preventing unwise future development in the floodplain and in adopting such regulations as may be necessary to ensure compatibility between future development and protection levels provided by the project.