North Delta Flood Control and Ecosystem Restoration Project

Final Environmental Impact Report

State of California

The Resources Agency

Department of Water Resources

October 2010

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FloodSAFE ENVIRONMENTAL STEWARDSHIP AND STATEWIDE RESOURCES OFFICE

Gail Newton, Chief

DELTA LEVEES AND ENVIRONMENTAL ENGINEERING

Dave Mraz, Principal Engineer

NORTH DELTA FLOOD CONTROL AND ECOSYSTEM RESTORATION PROJECT EIR MANAGER

Matt Reeve, Program Manager

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Prepared by:

California Department of Water Resources

901 P Street, 3rd Floor

P.O. Box 942836

Sacramento, CA 94236-0001

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Acronyms and Abbreviations

CDPH	California Department of Public Health
CNDDB	Natural Diversity Database
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
CORTESE	Cortese Hazardous Waste and Substances Site List
CS	Sacramento County Contaminated Sites
CVP	Central Valley Project
CWA	Clean Water Act
cy	cubic yards
dB	Decibel
dBA	A-Weighted Decibel
DBP	disinfection byproducts
DCC	Delta Cross Channel
DEIR	draft EIR
Delta	The Sacramento–San Joaquin River Delta
DFA	Department of Food and Agriculture
DFG	California Department of Fish and Game
DHI	Danish Hydraulic Institute’s
DPC	Delta Protection Commission
DPR	California Department of Parks and Recreation
DRERIP	Delta Regional Ecosystem Restoration Implementation Plan
DSOD	Division of Safety of Dams
DWR	California Department of Water Resources
EBMUD	East Bay Municipal Utilities District
EDR	Environmental Data Resources Inc.
EIR	environmental impact report
EIS	environmental impact statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERNS	Emergency Response Notification System
ERP	Ecosystem Restoration Program
ERPP	Ecosystem Restoration Program Plan
FEIR	final EIR
FRWP	Freeport Regional Water Project

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Executive Summary

Introduction

The Sacramento–San Joaquin River Delta (Delta) is the focus of complex issues involving water supply, water quality, flood control requirements, and the environment. The Delta provides water for a wide range of beneficial uses, including drinking water for millions of Californians, irrigation water for millions of acres of agricultural lands, and habitat for aquatic and terrestrial organisms. As the outlet point for California's major watersheds—the Sacramento and San Joaquin River systems—peak flows are often greater than the capacity of the levee-defined Delta waterways, resulting in seasonal flooding. The Delta also provides a permanent or seasonal home for a large variety of native plants and wildlife. Over the past several decades, increased demand for the Delta's water and other resources has exacerbated incompatibilities between human needs and efforts to sustain the Delta's fragile, unique ecosystem and recover special-status species.

The northern region of the Delta (North Delta) faces the need to balance the same issues and multi-use objectives as the larger estuary, particularly with regard to flood control and ecosystem restoration. Specifically, runoff from the Sacramento, San Joaquin, Mokelumne, and Cosumnes Rivers during large storm events has caused flooding of homes, infrastructure, farms, and other businesses in the North Delta. Additionally, degradation and the loss of aquatic and terrestrial habitat are primary concerns in the North Delta. The California Department of Water Resources (DWR) proposes to implement the North Delta Flood Control and Ecosystem Restoration Project (Project) to address some of these complex issues.

Document Overview and Approach

This environmental impact report (EIR) was prepared by DWR as the Project proponent and state lead agency under the California Environmental Quality Act (CEQA). As an EIR, this document discloses the program- and Project-level direct, indirect, and cumulative impacts of the Project alternatives, including a no-project alternative. The EIR also identifies mitigation measures to eliminate or reduce the magnitude of significant impacts.

This EIR effort was initiated as a joint document for compliance with both CEQA and the National Environmental Policy Act (NEPA). Therefore, it was intended to be released as a combined EIR and environmental impact statement (EIS) with the U.S. Army Corps of

Engineers (USACE) as the lead agency for NEPA compliance. Under this structure, DWR and USACE conducted joint public scoping for the EIR/EIS.

However, USACE's involvement in the Project was subsequently deferred because of scheduling and budget constraints. Therefore, the current document is being prepared as an EIR only under CEQA, but in such a way as to comply also with NEPA to the extent possible in anticipation that a federal lead will eventually become involved, either as a funding partner with DWR or through its Project permitting authority. To that end, Project alternatives are analyzed on an equal, non-preferential basis and at an equal level of detail (consistent with NEPA standards).

The Department of Water Resources (DWR) has recently re-established their partnership with the US Army Corps of Engineers (USACE), The Nature Conservancy (TNC), and RD 2110 to implement flood protection and restoration actions proposed for McCormack-Williamson Tract and Dead Horse Island. The USACE is currently completing a feasibility report for the project (referred to as the preliminary draft Project Implementation Report (PIR)) as part of the CALFED Levee Stability Program. Once the feasibility report is completed, the Corps will develop a Project Management Plan which will lay out the scope, schedule, and budget to complete the PIR. The Corps will then enter into a cost-share agreement with the local project sponsor, RD 2110 to finalize the PIR. The USACE will also complete either an Environmental Assessment or an Environmental Impact Statement to comply with NEPA requirements for work to be completed on McCormack-Williamson Tract and Dead Horse Island.

Background

Because of ongoing conveyance, flood control, and ecosystem health issues, improvements in the North Delta have been the focus of planning efforts for many years. A brief historical context leading to the current Project is summarized below.

In 1987, DWR launched a planning and environmental documentation process for the North Delta Program, which led to the release of a draft EIR/EIS in 1990. Many of the elements and objectives of the 1990 effort were similar to this EIR; however, one important difference is that the Draft 1990 EIR/EIS included water supply and conveyance benefits from modification of the Delta Cross-Channel (DCC). These elements are now being studied under separate efforts. The current Project improvements under this EIR are focused on flood control and ecosystem restoration benefits. The project will include elements that provide additional benefits, such as improved conveyance and recreational use, to the extent that meeting secondary goals does not interfere with the primary purpose of the project.

Relationship to the CALFED Bay-Delta Program

In 1995, DWR suspended the North Delta planning efforts in deference to the CALFED Bay-Delta Program. The goals of the 1990 North Delta EIR/EIS were substantially absorbed into the CALFED Program and restructured as the North Delta Flood Control and Ecosystem Restoration improvements (subject of this EIR) and the Delta Cross-

Channel Re-operation and Through-Delta Facility studies. While the CALFED Bay-Delta Program was completing the Programmatic Bay-Delta EIR/EIS, CALFED staff convened the North Delta Improvements Group (NDIG) to initiate North Delta flood improvements planning. The group focused early planning efforts on preparation of the "DRAFT White Paper on North Delta Improvements," (White Paper) dated July 2000, to capture the complex history of the area, the then-current related planning efforts, and preliminary planning research. Further alternatives development activities were described in the "Description of Alternatives Evaluation Process" document, which is included in the DEIR as Appendix B.

Acquisition of McCormack-Williamson Tract and Staten Island

In 1999, The Nature Conservancy (TNC) obtained $5.6 million in CALFED Ecosystem Restoration Program (ERP) funds to purchase the approximately 1,600-acre McCormack-Williamson Tract for ecosystem restoration and flood control. Also in 1999, University of California, Davis (UCD) researchers and DWR obtained CALFED ERP funds in complementary proposals. UCD researchers received $556,200 to conduct historical research and baseline studies for restoration planning and a monitoring program, and DWR received $355,000 for restoration planning and design of engineering alternatives. The UCD research included analysis of historical hydrogeomorphic conditions, the modern hydrologic and sedimentologic regime, baseline studies of aquatic resources and riparian resources, and development of data management and monitoring systems.

Staten Island was purchased by TNC in late 2002 with roughly $17.5 million in State Proposition (Prop) 13 funds and roughly $17.5 million in Prop 204 funds under the Flood Protection Corridor Program. Consistent with the funding sources for purchase of Staten Island, DWR committed to carefully balance use of Staten Island for ecosystem restoration and flood control protection and agricultural preservation. A crucial component of this balance is protection of the greater sandhill crane habitat on Staten Island.

Stakeholder Involvement and Public Outreach

The Project planning process has been enriched through the participation of stakeholders beyond DWR and the CALFED agencies as integral voices in Project development. Involvement and outreach efforts have been focused through facilitated meetings and a dedicated website.

DWR met with the CALFED ERP Steering Committee throughout 2001 and 2002 to obtain guidance on ecosystem restoration concepts for the Project. The Steering Committee advised DWR staff to submit ecosystem restoration proposals in the CALFED Ecosystem Restoration Proposal Solicitation Process. In 2003 and 2004, DWR convened a series of ecological coordination meetings with agency and nonprofit scientists to develop ecosystem restoration concepts for the Project and to address comments received in public scoping sessions. The ecological restoration coordination team consisted of representatives from the California Department of Fish and Game (DFG), the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries

Service (NMFS), TNC, and the California Bay-Delta Authority (CBDA) and met regularly throughout 2003 and 2004.

The NDIG was specifically created as a forum for exchanging Project information, establishing goals and objectives, developing alternatives, and discussing analysis results. The NDIG's noticing list has grown considerably from the initial Project planning and scoping meetings and now includes approximately 150 email addresses. Since 2001, the NDIG has been meeting with diverse and spirited involvement as Project needs dictate. The meetings are roughly bimonthly and are open to the public.

The North Delta Agency Team (NDAT) is a subgroup of the NDIG consisting of representatives of state and federal agencies that ultimately will have approval authority for elements of the Project based on various regulatory triggers. The NDAT has been convened roughly four times per year since 2001 and has provided guidance to ensure that regulatory considerations are factored into Project development to facilitate an efficient review and approval process.

Ad hoc subgroups have been convened as needed to address specific Project elements, such as hydraulic modeling.

A Science Panel chaired by Jeff Mount of UCD and consisting of academics from various disciplines was convened four times (November 2003 through January 2005) to review the ecological restoration conceptual ideas for the Project. The Science Panel provided feedback for refinement of the ecological restoration options and recommended modifications to improve the scientific basis of the Project. The results of the Science Panel are included as Appendix C of the DEIR.

Staff have recently held two meetings, one with local, state, and federal regulatory agencies (November 3, 2009) and the other with several Reclamation Districts and other interested local stakeholders (February 11, 2010) to discuss the Project's progress and to present the preferred alternative for the Group 1 actions. Participants at both meetings were very receptive to implementation of the Group 1 actions proposed with Alternative 1-A, and the partnership with TNC, DWR, and USACE.

Consistency with the Delta Reform Act

The Project's goals of flood protection, ecosystem restoration, and enhanced recreation in the North Delta area are consistent with the following goals and policies specified in Sections 29702(a)-(d) and 85020 of the Delta Reform Act:

- Protecting, restoring, and enhancing the Delta ecosystem,
- Protect, maintain, and where possible, enhance and restore the overall quality of the Delta environment, including but not limited to, agriculture, wildlife habitat, and recreational activities,

- Ensure orderly, balanced conservation and development of Delta land resources,

- Improving flood protection by structural and nonstructural means to ensure an increased level of public health and safety

Consistency with the California FloodSafe Program

The North Delta Flood Control and Ecosystem Restoration Project is part of FloodSAFE Functional Area 4 - Flood Protection Projects and Project Grants (within the legal Delta). This functional area is responsible for physical improvements to the flood management system.

The project meets the following FloodSAFE goals:

- Reduction of the chance of flooding,

- Reduction of the consequences of flooding,

- Protection and enhancement of ecosystems and promotion of sustainability.

The Project will also help meet the remaining FloodSAFE goal of sustaining economic growth through the reduction of flood damages. Also, by creating key habitats in the Delta, including aquatic habitat, the project supports efforts to protect the Delta's water supply function by protecting its ecosystem. The Delta's water supply function is critical to California's economy, as concluded by the recently completed Delta Risk Management Strategy Study. Further, the Project has been identified by the processes involved in preparation of the Bay Delta Conservation Plan and the Central Valley Flood Protection Plan as a priority, early implementation project. The coequal goals of flood protection and ecosystem restoration proposed for the North Delta area with the Project are consistent with the visions of both planning efforts.

Project Purpose, Need, and Objectives

Project Purpose

The purpose of the Project is to implement flood control improvements in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. Flood control improvements are needed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem resulting from overflows caused by insufficient channel capacities and catastrophic levee failures in the Project study area.

Project Need

As described above, flood control improvements are needed to reduce damage from overflows caused by insufficient channel capacities and levee failures in the Project study area. The Project would address the need for flood control solutions that are integrated with ecosystem improvements. The existing and historical conditions that warrant flood control and ecosystem quality improvements are described below.

Flood Control

The Mokelumne and Cosumnes Rivers and the Morrison Creek stream group do not currently have sufficient channel capacity to safely convey peak historical flows from Sierra Nevada watersheds, such as occurred during the 1986 and 1997 flood events, through the North Delta to the San Joaquin River. Current channel capacities for the North and South Forks of the Mokelumne River are approximately 40,000 cubic feet per second (cfs). By comparison, the combined channel capacity required to safely convey flows from a 100-year flood event has been estimated at 90,000 cfs. During peak flows, water from the Mokelumne River backs up into a broad floodplain north of New Hope Tract, and the limited capacity further causes water to back up into Snodgrass Slough to the north toward Lambert Road.

Since 1955, several areas have been flooded after levees failed (by breaches or overtopping), including the Point Pleasant area, McCormack-Williamson Tract, Tyler Island, Dead Horse Island, New Hope Tract, Canal Ranch Tract, Glanville Tract, and Franklin Pond area. The potential for flooding also threatens important public facilities and institutions in the North Delta area, including Interstate 5 (I-5), the Union Pacific Railroad line, and the Rio Cosumnes Correctional Center. Aside from these site-specific effects, failure of Delta levees can generally:

- result in flooding of Delta communities, farmland, habitat, and key roads and highways;
- expose adjacent islands to increased wave action, increased seepage, and possible levee erosion;
- degrade water quality through the exposure of contaminants that are otherwise trapped in or behind the levee;
- affect water supply distribution systems; and
- affect flow patterns, potentially resulting in adverse impacts on water quality, if the levee breach is not repaired.

A particular phenomenon associated with levee failure on McCormack-Williamson Tract is the “surge effect” created by the sudden rush of water over the island when the levee breaches or is overtopped. The force of the water from the surge effect rushes across the island from the northeast to the southwest, ultimately reaching the Walnut Grove and

Wimpy's/New Hope marinas. At this point, the surge can displace mobile homes, damage infrastructure, and break boats loose from their moorings. As evidenced in past flood events, flood damage can be considerable when this occurs, as the unmoored boats can become lodged against the New Hope Bridge, compounding the channel constriction with other debris. The channel constriction causes water surface elevation to rise and create a back-up condition upstream and unstable conditions on adjacent areas. The overall result historically has constituted substantial property damage and threat to human safety, both in the immediate area and potentially on adjacent islands.

Ecosystem Restoration

Degradation and the loss of habitats that support various life stages of aquatic and terrestrial species are a primary concern in the North Delta. These habitat changes come from many causes, including sedimentation from hydraulic mining, habitat conversion, water diversions, and the introduction of exotic species.

Many of the seasonally inundated lands in the Bay-Delta system that historically provided habitat to a variety of bird and animal species have been converted to agricultural, industrial, and urban uses. Levees constructed to protect lands in the Delta from inundation and to channelize flow to flush out sediment eliminated fish access to shallow overflow areas. Dredging to construct levees eliminated the tule bed habitat along the river channels. Upstream water development and use, depletion of natural flows by local diverters, and the diversion of water from the Bay-Delta system have altered hydrodynamic processes. This has resulted in changed seasonal patterns of inflow, reduced Delta outflow, and diminished natural variability of flows into and through the Bay-Delta system. Those facilities constructed to support water diversions may result in straying or direct losses of fish and can increase exposure of juvenile fish to predation.

Recreation

The Delta is highly attractive for numerous recreational uses, including motorized and non-motorized boating, fishing, hunting, and wildlife viewing. Much of the North Delta is privately owned, including the levees that contain its hundreds of miles of waterways. Because of these ownership patterns, designated public access points are relatively few. Safe and convenient public recreation access and infrastructure clearly are needed to meet current and future demand.

Project Objectives

Based on the purpose and need stated above, the Project is meant to satisfy the following objectives. Project alternatives are divided into two basic groups (Group I and Group II) for this analysis; objectives are subdivided by Project group, differentiating uniquely group-specific objectives where appropriate. A separate category is used to identify objectives applying to each group.

Flood Control

Both Groups

- Convey floodflows to the San Joaquin River without immitigable stage impacts.
- Reduce the risk of catastrophic levee failures based on the 1997 event for stage and the 1986 event for volume.

Group I

- Control floodwaters coming through McCormack-Williamson Tract in a way that minimizes the surge effect, i.e., avoids the historical occurrence when a large pulse of water from McCormack-Williamson Tract adversely affected adjacent island levees (e.g., Tyler and Staten Islands) and downstream flows and knocked boats loose from local marina moorings in flood events.

Group II

- Provide flood control benefits to I-5 and the Project area by achieving stage reduction, below or as close as possible to a water surface elevation of approximately 16.5 feet at Benson's Ferry and approximately 12.0 feet at New Hope Landing, based on the 1997 event for stage and the 1986 event for volume. These objectives were developed through stakeholder consensus as reasonable stage targets to minimize North Delta area flood damages.

Ecosystem Restoration

Both Groups

- Implement science-driven pilot programs to restore ecologic, hydrologic, geomorphic, and biologic processes and self-sustaining habitats, including freshwater tidal marsh, seasonal floodplain, riparian, and other wetland habitats.
- Support special-status species.
- Limit exotic species establishment.
- Promote foodweb productivity.

Group I

- Promote natural flooding processes and tidal action.
- Promote processes to increase land surface elevations in areas of subsidence.

Group II

- Expand available floodplain area within the leveed channel.
- Minimize potential effects on greater sandhill cranes.

Recreation

Both Groups

- Enhance public recreation opportunities in a manner that does not compromise flood protection infrastructure or operations, compromise habitat integrity, or disturb wildlife.

Project Area

The Project area is approximately 197 square miles and is the area in which DWR is considering alternatives for flood control and restoration actions. Direct (on-the-ground) impacts of constructing the alternatives are evaluated within this area; however, certain impact analyses include evaluation of effects beyond these limits. The following criteria were used to develop Project area boundaries.

- The Project area must include the footprint area of each alternative.
- The Project area should be hydrologically contiguous.
- The Project area should include portions of all waterways where existing flow patterns could be substantially affected by one or more of the alternatives.
- The Project area should be compatible with flood control planning and implementation responsibilities of other flood control agencies.
- To the extent practicable, the Project area should be compatible with CALFED's ERP planning units.

A brief description of the Project area boundaries is presented below.

Northern Boundary	Line running east to west from the Sacramento–San Joaquin Delta Ecological Zone eastern boundary along the south bank of Morrison Creek to the west bank of the Sacramento River.
Western Boundary	Follows the west bank of the Sacramento River from Morrison Creek south to the confluence of Steamboat Slough. From here the boundary follows the east bank of the Sacramento River south to the confluence of Threemile Slough. From here, the boundary follows the north bank of Threemile Slough to its confluence with the San Joaquin River.
Southern Boundary	Follows east along the south bank of the San Joaquin River from Threemile Slough to Potato Slough, along the south bank of Potato Slough to White Slough, along the south bank of White Slough to the Upland Canal, along the south bank of Upland Canal to State Route (SR) 12, then along SR 12 east to the eastern boundary of the Sacramento–San Joaquin Ecological Zone.
Eastern Boundary	Follows the eastern boundary of the Sacramento–San Joaquin Ecological Zone north from State Route (SR) 12 to its intersection with I-5 near Point Pleasant. From here, the boundary follows I-5 north to its intersection with the Sacramento–San Joaquin Ecological Zone near the northeastern shore of Stone Lake. Then the boundary follows the Sacramento–San Joaquin Ecological Zone once again north to Morrison Creek.

Project Description

Alternatives Screening

DWR is pursuing the development of the Project to achieve flood control and ecosystem restoration benefits in the North Delta, as well as additional benefits such as recreation improvements where practicable. In broad terms, the Project is intended to meet equal flood control and ecosystem restoration purposes and objectives by minimizing the surge effect across McCormack-Williamson Tract and providing additional capacity in the Project area to minimize the potential for catastrophic flooding, while substantially increasing opportunities for habitat and ecological processes.

DWR prepared a Description of Alternatives Evaluation Process Report (Appendix B of the DEIR) detailing the process by which a considerable range of Project-level measures have undergone screening as part of the identification of practicable alternatives to the Project, as well as providing a Project-specific evaluation independent of the CALFED documents. Based on the first screen of compatibility with the Project objectives, the alternatives and their components described below have been advanced for environmental analysis in the EIR.

Alternative Groups

Proposed Project actions and alternatives are divided into two basic groups for analysis in this EIR, under the following considerations.

- A grouped approach has been chosen to allow flexibility in implementation depending on determination of incremental Project need, available funding, and Project partnerships. It should be noted that the grouped analysis simply facilitates a phased implementation and would not preclude the implementation of the Project as a single phase.
- The groups are being developed to be independent, such that the proposed component actions are targeted to meet group-specific objectives and that the groups are not inter-reliant for mitigating impacts (i.e., Group II is not required for mitigation of Group I).
- Both groups are analyzed at the level of detail available; however, implementation of some elements may require additional CEQA analysis, depending on specific details discovered through Project development. Such additional analysis may be documented through a tiered negative declaration or technical addendum and may not require a supplemental or subsequent EIR.

Group I

Group I consists of modifications to levees on McCormack-Williamson Tract, downstream levee raising to offset potential hydraulic impacts caused by these modifications, restoration of McCormack-Williamson Tract and the Grizzly Slough property, and dredging of the Mokelumne River.

Flood Control

To achieve flood control objectives, the primary strategy for Group I is degrading portions of the levee system to allow controlled flow across McCormack-Williamson Tract and marina outreach to address boat hazards during floods. Secondarily, downstream levee modifications may be necessary to mitigate hydraulic impacts, and channel dredging may be implemented to increase flood conveyance capacity.

Ecosystem Restoration

Floodplain forests and marshes would be recreated at McCormack-Williamson Tract and the Grizzly Slough property. At McCormack-Williamson Tract, natural hydrologic processes would be restored through one of three pilot program strategies to meet different ecological objectives:

- maximizing fluvial and tidal processes to create a diverse network of riverine, floodplain, and tidal habitats based on natural sedimentation and channel formation;

- maximizing floodplain habitat to benefit fish that spawn and rear on the floodplain by allowing flooding (with some tidal action to maintain water quality) during the wet season; or
- creating floodplain habitat as described above, combined with a demonstration project to reverse subsidence and increase elevations on the tract.

Landside levee slopes would be planted with trees, shrubs, and native grasses to improve habitat for wildlife.

DWR has prepared a more complete description of the ecosystem restoration for McCormack-Williamson Tract as envisioned and articulated as a conceptual model for each of the three pilot program strategies. These conceptual models were developed with input from the science panel, resource agency representatives, and other stakeholders. The conceptual models are detailed in Appendix D.

Additional benefits to wildlife, fish, and healthy ecosystem functions would be achieved by recreating floodplain forests at the Grizzly Slough property. The Grizzly Slough restoration would maximize floodplain habitat to benefit fish that spawn and rear on the floodplain and reconnect the floodplain with adjacent sloughs.

Recreation

Opportunities for recreation would be developed to be compatible with flood control and ecosystem restoration through the development of public access for fishing, wildlife viewing, and boat use. Recreation could be enhanced by:

- opening up the southern portion of McCormack-Williamson Tract to boating and/or
- improving Delta Meadows property.

Group II

Group II consists of proposed Project actions on Staten Island and levee modifications, and dredging along the Mokelumne River.

Flood Control

To achieve flood control objectives, the strategy for Group II is to create an off-channel detention basin on Staten Island in one of three optional locations on the north, east, or west part of the island, or dredging in combination with levee modifications. Dredging may also be an optional component combined with detention to improve channel capacity. However, dredging combined with levee modifications is also being evaluated as a stand-alone action in lieu of off-channel detention.

Ecosystem Restoration

Benefits to ecosystem function in Group II would consist of expanded floodplain area within the leveed channel through the construction of a setback levee. By creating a setback levee on Staten Island to expand the flood conveyance capacity of the Mokelumne River to the detention basin and lowering and breaching the existing levee, additional floodplain habitats would be created, including shallow-water, shaded riverine aquatic, and riparian.

It is anticipated that broadening the floodplain to allow natural geomorphic processes would improve river-floodplain connectivity, promote sedimentation, allow channel migration, and promote foodweb productivity.

Recreation

Opportunities for recreation would be developed to be compatible with flood control and ecosystem restoration through the development of public access for wildlife viewing. Recreation would be enhanced by:

- access and interpretive kiosks for wildlife viewing and
- restroom, circulation, parking, and signage infrastructure to support such uses.

Project Alternatives

Various actions and measures to meet the Project objectives were developed and refined through technical brainstorming sessions, public and agency scoping input, hydraulic modeling, and stakeholder participation. These actions, termed *components* herein, were packaged as alternatives, described below, and summarized in Table ES-1. To assist in distinguishing components from alternatives, each component title begins with an action word, such as *install* or *excavate*. Alternative titles are nouns and represent broader strategies or approaches, typically composed of numerous component actions.

Table ES-1. Summary of Project Alternatives by Group

Group	Alternative Code	Alternative Description
–	NP	No Project
1	1-A	Fluvial Process Optimization
1	1-B	Seasonal Floodplain Optimization
1	1-C	Seasonal Floodplain Enhancement and Subsidence Reversal
2	2-A	North Staten Detention
2	2-B	West Staten Detention
2	2-C	East Staten Detention
2	2-D	Dredging and Levee Modifications

The selection of one preferred alternative from each group was determined based on analyses in the administrative draft and public EIRs, and comments received during the public comment period and public hearing. Alternative 1-A (Group 1) and the No Action Alternative (Group 2) have been identified as the preferred alternatives. Optional components for each of the preferred alternatives were also analyzed for inclusion in the project.

Table ES-3 presents a summary of the impacts and their significance for Preferred Alternatives 1-A (Group I actions) and the No Action Alternative (Group II actions).

Alternative NP: No Project

Consideration of a no-project or no-action alternative is required for CEQA and NEPA. Herein called the No-Project Alternative, this alternative compares existing baseline conditions and the likely future conditions in the Project area without the implementation of the Project. Under the No-Project Alternative, the existing conditions are compared with projected future conditions at a planning horizon of 2025. If the Project were not implemented, the components described below for improvements to flood control, ecosystem restoration, and recreation would not be implemented. It is not definitively known whether farming would continue because of the presently marginal profitability; however, it is assumed for the future no-project condition that agriculture would continue and cropland would be the dominant cover type, consistent with the existing condition.

Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. See Figure 2-1 for a plan of this alternative.

Alternative 1-B: Seasonal Floodplain Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with actions to maximize floodplain habitat to benefit fish species that spawn or rear on the floodplain. This would be accomplished by allowing controlled flooding (with some tidal action to maintain water quality) during the wet season. See Figure 2-2 for a plan of this alternative.

Alternative 1-C: Seasonal Floodplain Enhancement and Subsidence Reversal

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with scientific pilot actions to create floodplain habitat (similar to but less than Alternative 1-B), combined with a subsidence reversal demonstration project in the lowest area of the tract. This would be accomplished by allowing controlled flooding (with some tidal action to maintain water quality) during the wet season, as well as sediment import. See Figure 2-3 for a plan of this alternative.

Alternative 2-A: North Staten Detention

This alternative provides additional capacity in the local system through construction of an off-channel detention basin on the northern portion of Staten Island. High stage in the river would enter the detention basin upon cresting a weir in the levee. Other components are combined to protect infrastructure. Similar to all the detention alternatives, this alternative is designed to capture flows no more frequently than the 10-year event while having no measurable effect on the 100-year floodplain. The interior of the basin would continue to be farmed, consistent with current practices. See Figure 2-5 for a plan of this alternative.

Alternative 2-B: West Staten Detention

This alternative provides additional capacity in the local system through construction of an off-channel detention basin on the western portion of Staten Island, along the North Fork Mokelumne River. High stage in the river would enter the detention basin upon cresting a weir in the levee. Habitat restoration is integrated with the construction of a setback levee. Other components are combined to protect infrastructure. Similar to all the detention alternatives, this alternative is designed to capture flows no more frequently than the 10-year event while having no measurable effect on the 100-year floodplain. The interior of the basin would continue to be farmed, consistent with current practices. See Figure 2-6 for a plan of this alternative.

Alternative 2-C: East Staten Detention

This alternative provides additional capacity in the local system through construction of an off-channel detention basin on the eastern portion of Staten Island, along the South Fork Mokelumne River. High stage in the river would enter the detention basin upon cresting a weir in the levee. Habitat restoration is integrated with the construction of a setback levee. Other components are combined to protect infrastructure. Similar to all the detention alternatives, this alternative is designed to capture flows no more frequently than the 10-year event while having no measurable effect on the 100-year floodplain. The interior of the basin would continue to be farmed, consistent with current practices. See Figure 2-7 for a plan of this alternative.

Alternative 2-D: Dredging and Levee Modifications

This alternative provides additional channel capacity by dredging the river bottom and modifying levees. See Figure 2-8 for a plan of this alternative.

Alternative Components

The components composing each alternative are summarized below in Table ES-2a (Group I) and Table ES-2b (Group II), wherein *X* denotes that the component is included in the alternative and *OP* denotes the component is an optional within the alternative.

Table ES-2a. Summary of Group I Alternatives and Components

	1-A	1-B	1-C
	Fluvial Process Optimization	Seasonal Floodplain Optimization	Seasonal Floodplain Enhancement and Subsidence Reversal
Degrade McCormack-Williamson Tract East Levee to Function as a Weir	X	X	X
Completely Degrade McCormack-Williamson Tract Southwest Levee to Match the Elevation of the Island Floor	X		
Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir		X	X
Reinforce Dead Horse Island East Levee	X	X	X
Modify Downstream Levees to Accommodate Potentially Increased Flows	X	X	X
Construct Transmission Tower Protective Levee and Access Road	X	X	X
Demolish Farm Residence and Infrastructure	X	X	X
Enhance Landside Levee Slope and Habitat	X	X	X
Modify Landform and Restore Agricultural Land to Habitat	X	X	X
Modify Pump and Siphon Operations	X	X	X
Breach Mokelumne River Levee	X		
Allow Boating on Southeastern McCormack-Williamson Tract	X		
Construct Box Culvert Drains and Self-Regulating Tide Gates		X	X
Construct Cross-Levee to Create Subsidence-Reversal Demonstration Area			X
Import Soil for Subsidence Reversal			X
Implement Local Marina and Recreation Outreach Program	X	X	X
Excavate Dixon and New Hope Borrow Sites	X	X	X
Excavate and Restore Grizzly Slough Property	X	X	X
Dredge South Fork Mokelumne River	OP	OP	OP
Enhance Delta Meadows Property	OP	OP	OP

Table ES-2b. Summary of Group II Alternatives and Components

	2-A	2-B	2-C	2-D
	North Staten Detention	West Staten Detention	East Staten Detention	Dredging and Levee Modifications
Construct Inlet Weir	X	X	X	
Construct Interior Detention Levee	X	X	X	
Construct Outlet Weir	X	X	X	
Install Detention Basin Drainage Pump Station	X	X	X	
Reinforce Existing Levees	X	X	X	
Construct Setback Levee		X	X	
Degrade Existing Levee	X	X	X	
Relocate Existing Structures	X	X	X	
Modify Walnut Grove–Thornton Road and Staten Island Road	X			
Retrofit or Replace Millers Ferry Bridge	OP	X	OP	OP
Retrofit or Replace New Hope Bridge	OP	OP	X	OP
Construct Wildlife Viewing Area	X	X	X	
Excavate Dixon and New Hope Borrow Sites	X	X	X	
Dredge South Fork Mokelumne River				X
Modify Levees to Increase Channel Capacity				X
Raise Downstream Levees to Accommodate Increased Flows				X

The Preferred Alternatives and Proposed Project

Alternatives 1-A and The No Action Alternative for the Group 2 actions are identified as the preferred alternatives based on the analysis in the Draft EIR, and comments received during the public comment period and public hearing. The Proposed Project is consistent with the actions detailed in Preferred Alternative 1-A; specifically flood control and ecosystem restoration actions on McCormack-Williamson Tract and Grizzly Slough. The justification for this selection is presented in the Chapter 2 Identification of Preferred Alternatives discussion (page 2-65).

Terminology used in the EIR

The EIR uses the following terminology consistent with CEQA Guidelines to denote the significance of potential environmental impacts:

- A “less than significant” impact or an impact that is “not significant” would cause no substantial adverse changes in the environment; no mitigation is needed.
- A “significant” impact could or would cause substantial physical changes in the environment. Mitigation is recommended to reduce the impact to a less-than significant level.
- A “significant and unavoidable” impact is one that could or would cause a substantial adverse change in the environment that cannot be avoided if the project is implemented. Mitigation may be recommended, but would not reduce the impact to a less-than-significant level

Impacts and Mitigation Measures

This document along with the DEIR constitutes the final EIR and will be certified by the Department of Water Resources prior to consideration of project approval. DWR may require the mitigation measures identified in this FEIR (Table ES-3) as conditions of project approval. In order to approve any discretionary applications for the proposed project, DWR must adopt a separate document, prepared pursuant to State CEQA Guidelines Section 15091 and 15093, containing a set of required CEQA “Findings” (Exhibit B) with respect to each significant environmental effect, and a “Statement of Overriding Considerations” (Exhibit C) for any effects that are unavoidable or infeasible to mitigate. Also included in the Findings document is a Mitigation Monitoring and Reporting Program (Exhibit D) that must be adopted in accordance with Public Resources Code Section 21081.6.

Table ES-3. Summary of Impacts and Mitigation Measures for the North Delta Flood Control and Ecosystem Restoration Project

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
HYDROLOGY AND HYDRAULICS				
Impacts and mitigation discussed in other sections				
FLOOD CONTROL AND LEVEE STABILITY				
FC-1: Raise Flood Elevations and Increase the Frequency of Flooding	1-A–C	Less than significant	None required.	–
FC-1: Raise Flood Elevations and Increase the Frequency of Flooding	1-A-C	Less than significant	None required as long as the alternative retains the features that minimizes impacts through implementation.	–
FC-1: Raise Flood Elevations and Increase the Frequency of Flooding	2-A–C	No impact	None required.	–
FC-2: Increase the Degree or Quantity of Seepage	1-A–C, 2-A–D	Significant	FC-1: Develop a Seepage-Monitoring Program.	Less than significant
FC-3: Increase the Degree or Quantity of Levee Settlement	1-A–C, 2-A–D	Less than significant	None required.	–
FC-4: Increase the Degree or Quantity of Wind Erosion	1-A–C, 2-A–C	Less than significant	None required.	–
FC-5: Increase the Degree or Quantity of Scour	1-A–C,	Less than significant	None required.	–
FC-5: Increase the Degree or Quantity of Scour	2-A–C	–	The discussion and evaluation of potential scour impacts are presented again in Section 3.3, Geomorphology.	–
FC-6: Increase the Degree or Quantity of Subsidence Adjacent to Levees	1-A–C, 2-A–D	Less than significant	None required.	–
FC-7: Decrease Levee Inspection and Maintenance	1-A–C, 2-A–C	No impact	None required.	–

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
FC-8: Decrease in Levee Stability from Proposed Construction Activities	1-A–C, 2-A–D	Less than significant	None required.	–
FC-9: Decrease in Levee Stability from Non-Motorized Boating Activities	1-A	Less than significant	None required.	–
FC-10: Temporary Decrease in Flood Control or Levee Stability during Channel Dredging	1-OP2*, 2D	Less than significant	None required.	–
GEOMORPHOLOGY AND SEDIMENT TRANSPORT				
GEOMORPH-1: Temporary Increase in Sediment Accumulation and Scouring during Levee Modifications	1-A–C, 2-A–C	Less than significant	None required.	–
GEOMORPH-2: Increase in Sediment Accumulation in Channels as a Result of Levee Modifications	1-A–C, 2-A–C	Less than significant	None required.	–
GEOMORPH-3: Increase in Sediment Accumulation on Land as a Result of Levee Modifications	1-A–C	Beneficial	None required.	–
GEOMORPH-3: Increase in Sediment Accumulation on Land as a Result of Detention Basin Construction	2-A–C	Less than significant	None required.	–
GEOMORPH-4: Increase in Scouring on Levees and in Channels as a Result of Levee Modifications	1-A–C, 2-A–C	Less than significant	None required.	–
GEOMORPH-5a: Increase in Scouring on Land as a Result of Levee Modifications (McCormack-Williamson Tract East Levee)	1-A–C	Less than significant	None required.	–
GEOMORPH-5b: Increase in Scouring on Land as a Result of Levee Modifications (Mokelumne River Levee)	1-A	Beneficial	None required.	–

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
GEOMORPH-5c: Increase in Scouring on Land as a Result of Levee Modifications (Dead Horse Island)	1-A–C	Less than significant	None required.	–
GEOMORPH-5d: Increase in Scouring on Land as a Result of Detention Basin Construction (North Staten Island Inlet Weir)	2-A	Less than significant	None required.	–
GEOMORPH-5e: Increase in Scouring on Land as a Result of Detention Basin Construction (North Staten Island Interior Detention Levee)	2-A	Less than significant	None required.	–
GEOMORPH-5f: Increase in Scouring on Land as a Result of Detention Basin Construction (West Staten Island Inlet Weir)	2-B	Less than significant	None required.	–
GEOMORPH-5g: Increase in Scouring on Land as a Result of Detention Basin Construction (West Staten Island Interior Detention Levee)	2-B	Less than significant	None required.	–
GEOMORPH-5h: Increase in Scouring on Land as a Result of Detention Basin Construction (East Staten Island Inlet Weir)	2-C	Less than significant	None required.	–
GEOMORPH-5i: Increase in Scouring on Land as a Result of Detention Basin Construction (East Staten Island Interior Detention Levee)	2-C	Less than significant	None required.	–
GEOMORPH-6: Increase in Debris Accumulation Resulting in an Increase in Sediment Accumulation and Scouring	1-A–C	Beneficial	None required.	–
GEOMORPH-6: Increase in Debris Accumulation Resulting in an Increase in Sediment Accumulation and Scouring	2-A–C	Significant and unavoidable	None available.	–

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
GEOMORPH-7: Scour and Deposition Associated with Excavation and Restoration of the Grizzly Slough Property	1-A–C	Beneficial	None required.	–
GEOMORPH-8: Increase in Scouring on South Fork Mokelumne River and Associated Increase in Deposition Downstream	1-A–C, 2-D	Less than significant	None required.	–
WATER QUALITY				
WQ-1: Release of Pollutants during Construction and Dredging	1-A–C, 2-A–D	Less than significant	None required.	–
WQ-2: Release of Organic Carbon	1-A–C	Less than significant	None required.	–
WQ-3: Release of Methylmercury	1-A–C	Significant	WQ-1: Participate in an Offset Program to Ensure No Net Increase in Methylmercury Loading.	Less than significant
WATER SUPPLY AND MANAGEMENT				
WSM-1: Changes in Water Uses as a Result of the Project	1-A–C, 2-A–D	Less than significant	None required.	–
GROUNDWATER				
GW-1. Potential Increase in Groundwater Levels as a Result of Conversion of Farmland to Ecosystem Restoration	1-A–C	Beneficial	None required.	–
GW-2. Potential Groundwater Seepage to Adjacent Islands/Tracts as a Result of Frequent Inundation of McCormack-Williamson Tract	1-A–C	Significant	GW-1: Control Seepage.	Less than significant
GW-3. Potentially Increased Groundwater Seepage to Adjacent Lands	1-C	Significant	GW-1: Control Seepage.	Less than significant
GW-4. Potentially Increased Groundwater Recharge	1-C	Beneficial	None required.	–

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
GW-5. Potential Increased Groundwater Seepage from Exposing High Permeability Sand Lenses	1-OP2, 2-D	Less than significant	None required.	–
GW-6. Potential Groundwater Contamination from Dredge Spoils	1-OP2, 2-D	Less than significant	None required.	–
GW-7. Potential Increase in Seepage of Groundwater to Adjacent Islands/Tracts from Flood Storage	2-A–C	Significant	GW-1: Control Seepage.	Less than significant
GEOLOGY, SEISMICITY, SOILS, AND MINERAL RESOURCES				
GEO-1: Increase the Potential for Structural Damage and Injury Caused by Fault Rupture	1-A–C, 2-A–D	Less than significant	None required.	–
GEO-2: Increase the Potential for Structural Damage and Injury Caused by Ground Shaking	1-A–C, 2-A–D	Less than significant	None required.	–
GEO-3: Increase the Potential for Structural Damage and Injury as a Result of Development on Materials Subject to Liquefaction	1-A–C, 2-A–D	Significant	GEO-1: Conduct Geotechnical Evaluation for Sediments Susceptible to Liquefaction, and Design Project to Accommodate Effects of Liquefaction.	Less than significant
GEO-4: Increase the Potential for Accelerated Runoff, Erosion, and Sedimentation as a Result of Grading, Excavation, and Levee Construction Activities	1-A–C, 2-A–D	Less than significant	None required.	–
GEO-5: Increase the Potential for Structural Damage and Injury as a Result of Development on Expansive Soils	1-A–C, 2-A–D	Significant	GEO-2: Conduct Geotechnical Evaluation for Expansive Soils, and Design Project to Accommodate Effects of Expansive Soils.	Less than significant
GEO-6: Increase Potential for Land Subsidence as a Result of Placement of Degraded Levee Material or Additional Soil for Levee Construction on Peat Soils	1-A–C, 2-A–C	Less than significant	None required.	–

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
GEO-7: Decrease Rate of Land Subsidence as a Result of Abandonment of Farming Activities	1-A–C	Beneficial	None required.	–
GEO-8: Loss of Availability of a Known Mineral Resource or of a Locally Important Mineral Resource	1-A–C, 2-A–C	No impact	None required.	–
TRANSPORTATION AND NAVIGATION				
TN-1: Temporary Increase in Traffic Delays, Increase in Road Hazards, and Changes in Circulation Patterns	1-A–C, 2-A–D	Less than significant	None required.	–
TN-2: Deterioration of the Roadway Surface	1-A–C, 2-A–D	Less than significant	None required.	–
TN-3: Construction of New or Improvement of Existing Roads	1-A–C, 2-A–D	Beneficial	None required.	–
TN-4: Changes in Circulation and Access	1-A–C, 2-A–D	Less than significant	None required.	–
TN-5: Changes in Navigation	1-A–C, 2-A–D	Less than significant	None required.	–
AIR QUALITY				
AIR-1: Generation of Pollutant Emissions in Excess of SMAQMD and SJVAPCD Threshold Levels	1-A–C, 2-A–D	Significant and unavoidable	AIR-1: Implement all Mitigation Measures from the CALFED Bay-Delta Program Final Programmatic EIS/EIR. AIR-2: Implement SMAQMD Requirement to Reduce NO_X Emissions from Off-Road Diesel Powered Equipment. AIR-3: Implement SMAQMD Requirement to Control Visible Emissions from Off-Road Diesel Powered Equipment. AIR-4: Implement SMAQMD Requirement to Pay	Significant and unavoidable

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
			an Off-Site Mitigation Fee. AIR-5: Consult with SMAQMD and SJVAPCD and Implement Approved Emissions Reduction Programs or Offsets to Reduce Operational Emissions. AIR-6: Require Construction and Dredging Contractors to Use Equipment with Valid Statewide Portable Equipment Registrations or to Obtain an Operating Permit from the SMAQMD and SJVAPCD.	
AIR-2: Exposure of Sensitive Receptors to Elevated Levels of Diesel Exhaust and an Increased Health Risk	1-A–C, 2-A–D	Less than significant	AIR-2: Implement SMAQMD Requirement to Reduce NO_X Emissions from Off-Road Diesel Powered Equipment.	Less than significant
AIR-3: Generation of Pollutant Emissions in Excess of *de minimis* Threshold Levels	1-A–C, 2-A–D	Significant and unavoidable	AIR-1: Implement all Mitigation Measures from the CALFED Bay-Delta Program Final Programmatic EIS/EIR. AIR-2: Implement SMAQMD Requirement to Reduce NO_X Emissions from Off-Road Diesel Powered Equipment. AIR-3: Implement SMAQMD Requirement to Control Visible Emissions from Off-Road Diesel Powered Equipment. AIR-4: Implement SMAQMD Requirement to Pay an Off-Site Mitigation Fee. AIR-6: Require Construction and Dredging Contractors to Use Equipment with Valid Statewide Portable Equipment Registrations or to Obtain an Operating Permit from the SMAQMD and SJVAPCD. AIR-7: Consult with the SMAQMD and SJVAPCD to Conduct a Conformity Determination.	Significant and unavoidable

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
NOISE				
NZ-1: Exposure of Noise-Sensitive Land Uses to Noise from General Construction Activities	1-A–C, 1-OP2, 2-A–D	Significant	NZ-1: Limit Noise-Generating Construction Activity and Heavy Trucking to Daytime Hours.	Less than significant
NZ-2: Exposure of Noise-Sensitive Land Uses to Noise from Material Hauling Operations	1-A–C, 1-OP2, 2-A–C	Significant	NZ-1: Limit Noise-Generating Construction Activity and Heavy Trucking to Daytime Hours.	Less than significant
NZ-3: Exposure of Noise-Sensitive Land Uses to Noise from Modified Pump Operations	1-A–C, 2-B, C	Less than significant	None required.	–
NZ-4: Exposure of Sensitive Land Uses to Groundborne Vibration from Construction Activity	1-A–C, 1-OP2, 2-A–D	Less than significant	None required.	–
NZ-5: Exposure of Noise-Sensitive Land Uses to Noise from Hydraulic Dredging Activities	1-OP2, 2-D	Significant	NZ-1: Limit Noise-Generating Construction Activity and Heavy Trucking to Daytime Hours.	Less than significant
NZ-6: Exposure of Noise-Sensitive Land Uses to Noise from Clamshell Dredging Activities	1-OP2, 2-D	Significant	NZ-1: Limit Noise-Generating Construction Activity and Heavy Trucking to Daytime Hours.	Less than significant
NZ-7: Exposure of Noise-Sensitive Land Uses to Noise from Dragline Dredging Activities	1-OP2, 2-D	Significant	NZ-1: Limit Noise-Generating Construction Activity and Heavy Trucking to Daytime Hours.	Less than significant
NZ-8: Exposure of Noise-Sensitive Land Uses to Noise from Additional Pump Operations	2-A	Less than significant	None required.	–

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
VEGETATION AND WETLANDS				
VEG-1: Loss or Disturbance of Valley/Foothill Riparian Land Cover Types	1-A–C, 2-A–D	Significant	VEG-1: Replace Valley/Foothill Riparian Cover Types VEG-2: Avoid and Minimize Impacts on Sensitive Biological Resources.	Less than significant
VEG-2: Loss or Disturbance of Nontidal Freshwater Emergent Wetland Land Cover Types	1-A–C, 2-A–D	Significant	VEG-2: Avoid and Minimize Impacts on Sensitive Biological Resources. VEG-3: Replace Nontidal Freshwater Emergent Wetland Cover.	Less than significant
VEG-3: Loss or Disturbance of Tidal Perennial Aquatic Land Cover Types	1-A–C, 2-A–D	Significant	VEG-2: Avoid and Minimize Impacts on Sensitive Biological Resources. VEG-4: Replace Tidal Perennial Aquatic Land Cover Types.	Less than significant
VEG-4: Loss or Disturbance of Tidal Freshwater Emergent Wetland Land Cover Type	1-A–C, 2-A–D	Significant	VEG-2: Avoid and Minimize Impacts on Sensitive Biological Resources. VEG-5: Replace Tidal Freshwater Emergent Wetland Cover Types.	Less than significant
VEG-5: Establishment of Invasive Nonnative Plants	1-A–C, 2-A–D	Significant	VEG-6: Avoid Introduction and Spread of New Noxious Weeds during Project Construction and Dredging.	Less than significant
VEG-6: Loss or Disturbance of Special-Status Species	1-A–C, 2-A–D	Significant	VEG-2: Avoid and Minimize Impacts on Sensitive Biological Resources. VEG-7: Conduct Preconstruction Surveys for Special-Status Plants. VEG-8: Avoid and Minimize Impacts on Special-Status Species and Compensate for Special-Status Species Loss.	Less than significant

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
VEG-7: Loss or Disturbance of Perennial Grassland	1-A–C, 2-A–D	Significant	VEG-2: Avoid and Minimize Impacts on Sensitive Biological Resources. VEG-9: Replace Perennial Grassland.	Less than significant
FISHERIES AND AQUATICS				
Fish-1: Temporary Disturbance and Possible Mortality of Fish, including Special-Status Species, as a Result of Construction Activities	1-A–C, 2-A–C, 2-OP1, 2-OP2*	Less than significant	None required.	–
Fish-2: Temporary Disturbance and Possible Mortality of Fish, including Special-Status Species, as a Result of Accidental Spills of Construction Materials	1-A–C, 2-A–C, 2-OP1, 2-OP2	Less than significant	None required.	–
Fish-3: Loss of Fish, including Special-Status Species, from Direct Injury as a Result of Construction	1-A–C, 2-A–C	Less than significant	None required.	–
Fish-3: Loss of Fish, including Special-Status Species, from Direct Injury as a Result of Construction	2-OP1, 2-OP2	Significant	Fish-13: Limit Pile-Driving Activities to Daytime Hours and from June 1 to August 31.	Less than significant
Fish-4: Loss of Shaded Riverine Aquatic Cover as a Result of Construction	1-A–C, 2-A–C	Significant	Fish-1: Incorporate Instream Woody Material into Rock Slope Protection at Degraded Levee Sites. Fish-2: Replace Affected Shaded Riverine Aquatic Cover.	Less than significant
Fish-4: Loss of Shaded Riverine Aquatic Cover as a Result of Construction	2-OP1, 2-OP2	Significant	Fish-2: Replace Affected Shaded Riverine Aquatic Cover.	Less than significant
Fish-5: Increased Availability and Quality of Spawning Habitat for Splittail, Delta Smelt, and Other Floodplain-Spawning Species, as a Result of Project Operation	1-A–C, 2-A–C	Beneficial	None required.	–

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Fish-6: Increased Availability and Quality of Rearing Habitat for Juvenile Chinook Salmon, Splittail, and Delta Smelt, as a Result of Project Operation	1-A–C, 2-A–C	Beneficial	None required.	–
Fish-7: Loss of Fish from Stranding as a Result of Project Operation	1-A	Significant	Fish-3: Monitor for and Fill Any Scour Pools Formed following Large Flood Events That Result in Significant Flooding of McCormack-Williamson Tract.	Less than significant
Fish-7: Loss of Fish from Stranding as a Result of Project Operation	1-B, C	Significant	Fish-5: Replace Existing Drainage Pumps on McCormack-Williamson Tract with Fish-Friendly Pumps. Fish-6: Conduct More Detailed Analysis of Box Culvert Design and Installation to Ensure Minimal Ponding Of Water On the Southern Portion of McCormack-Williamson Tract. Fish-7: Operate McCormack-Williamson Tract to Minimize Long-Term Storage of Floodwaters.	Less than significant
Fish-7: Loss of Fish from Stranding as a Result of Project Operation	2-A–C	Significant	Fish-9: Design and Operate Detention Basin Drainage Facility to Safely Pass and Return Fish to South Fork Mokelumne River. Fish-10: Fill or Grade Low-lying Areas in North Staten Detention Basin to Reduce Fish-Stranding Risks. Fish-11: Monitor for and Fill Any Scour Pools Formed following Operation of North Staten Island Detention Basin. Fish-12: Conduct More Detailed Analysis of Slot Channel Design, Fish-Friendly Pump Design, and Outlet Weir Design to Minimize Stranding of Fish.	Less than significant
Fish-8: Potential for Loss of Native Fish from Predation as a Result of Project Operation	1-A, 2-A–C	Significant	Fish-4: Develop and Implement a Floodplain and Shallow Water Tidal Marsh Habitat Restoration and Monitoring Plan.	Less than significant
Fish-8: Potential for Loss of Native Fish from	1-B, C	Less than significant	None required.	–

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Predation as a Result of Project Operation				
Fish-9: Reduced Pumping and Agricultural Discharges	1-A–C	Beneficial	None required.	–
Fish-10: Temporary Disturbance and Possible Mortality of Fish, Including Special-Status Species, from Increases in Sedimentation and Turbidity as a Result of Dredging Activities	1-OP2, 2-D	Less than significant	None required.	–
Fish-11: Temporary Disturbance and Possible Mortality of Fish, including Special-Status Species, from Release of Pollutants during Dredging	1-OP2, 2-D	Less than significant	None required.	–
Fish-12: Temporary Disturbance and Possible Mortality of Fish, Including Special-Status Species, from Entrainment during Dredging	1-OP2, 2-D	Significant	Fish-8: Incorporate BMPs and Other Minimization Measures into the Dredging Sampling and Analysis Plan.	Less than significant
Fish-13: Changes in Habitat Availability and Quality for Fish as a Result of Disturbance and Water Surface Elevation Changes from Dredging	1-OP2, 2-D	Less than significant	None required.	–
Fish-14: Changes in Prey Availability for Fish as a Result of Disturbance to Channel Bed and Removal of Sediments during Dredging	1-OP2, 2-D	Less than significant	None required.	–
Fish-15: Changes in Prey Availability for Fish as a Result of Disturbance to Channel Bed and Removal of Sediments during Dredging	2-D	Less than significant	None required.	–

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
WILDLIFE				
WILD-1: Loss of Riparian-Associated Wildlife Habitat	1-A–C, 2-A–D	Significant	WILD-1: Replace Riparian Land Cover Types. WILD-2: Avoid and Minimize Effects on Nesting Birds during Construction and Maintenance. WILD-3: Minimize Impacts on Sensitive Biological Resources.	Less than significant
WILD-2: Loss of Tidal Freshwater Emergent Wetland–Associated Wildlife Habitat	1-A–C, 2-A–D	Significant	WILD-2: Avoid and Minimize Effects on Nesting Birds during Construction and Maintenance. WILD-3: Minimize Impacts on Sensitive Biological Resources. WILD-4: Replace Wetland Land Cover Types.	Less than significant
WILD-3: Loss or Disturbance of Tidal Perennial Aquatic–Associated Wildlife Habitat	1-A–C, 2-A–D	Significant	WILD-3: Minimize Impacts on Sensitive Biological Resources. WILD-5: Compensate for Loss of Tidal Perennial Aquatic Habitat.	Less than significant
WILD-4: Loss or Disturbance of Nontidal Freshwater Emergent Wetland–Associated Wildlife Habitat	1-A–C, 2-A–D	Significant	WILD-2: Avoid and Minimize Effects on Nesting Birds during Construction and Maintenance. WILD-3: Minimize Impacts on Sensitive Biological Resources. WILD-6: Replace Nontidal Wetland Land Cover Types.	Less than significant
WILD-5: Loss of Agricultural Land and Ruderal-Associated Wildlife Habitat	1-A–C, 2-A–D	Less than significant	WILD-2: Avoid and Minimize Effects on Nesting Birds during Construction and Maintenance. WILD-3: Minimize Impacts on Sensitive Biological Resources.	Less than significant
WILD-6: Temporary Disturbance and Possible Mortality of Common Wildlife Species as a Result of Construction Activities	1-A–C, 2-A–D	Less than significant	None required.	–

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
WILD-7: Potential Effects on Greater Sandhill Crane as a Result of Loss of Agricultural Lands	1-A–C, 2-A–D	Significant	WILD-2: Avoid and Minimize Effects on Nesting Birds during Construction and Maintenance. WILD-3: Minimize Impacts on Sensitive Biological Resources. WILD-7: Compensate for the Loss of Greater Sandhill Crane Foraging Habitat.	Less than significant
WILD-8: Potential Effects on Valley Elderberry Longhorn Beetle	1-A–C, 2-A–D	Significant	WILD-8: Perform Preconstruction and Postconstruction Surveys for Elderberry Shrubs. WILD-9: Avoid and Minimize Impacts on Elderberry Shrubs. WILD-10: Compensate for Unavoidable Impacts on Elderberry Shrubs.	Less than significant
WILD-9: Potential Effects on Giant Garter Snake	1-A–C, 2-A–D	Significant	WILD-4: Replace Wetland Land Cover Types. WILD-6: Replace Nontidal Wetland Land Cover Types. WILD-11: Conduct Preconstruction Surveys for Giant Garter Snake. WILD-12: Minimize Construction-Related Disturbances in the Vicinity of Occupied Habitat.	Less than significant
WILD-10: Loss or Disturbance of Swainson's Hawk Nests or Foraging Habitat	1-A–C, 2-A–D	Significant	WILD-1: Replace Riparian Land Cover Types. WILD-3: Minimize Impacts on Sensitive Biological Resources. WILD-13: Perform Preconstruction Surveys for Nesting Swainson's Hawks before Construction and Maintenance. WILD-14: Avoid and Minimize Construction-Related Disturbances within ½ Mile of Active Swainson's Hawk Nest Sites. WILD-15: Replace or Compensate for the Loss of Swainson's Hawk Foraging Habitat. WILD-16: Avoid Removal of Occupied Nest Sites.	Less than significant
WILD-11: Loss or Disturbance of Nesting or	1-A–C,	Significant	WILD-2: Avoid and Minimize Effects on Nesting	Less than significant

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Wintering Western Burrowing Owls	2-A–D		Birds during Construction and Maintenance. WILD-3: Minimize Impacts on Sensitive Biological Resources. WILD-17: Conduct Preconstruction Surveys for Burrowing Owls. WILD-18: Minimize Construction-Related Disturbances near Occupied Nest Sites. WILD-19: Avoid or Minimize Disturbance to Active Nest and Roost Sites. WILD-20: Create New or Enhance Existing Suitable Burrows. WILD-21: Replace Lost Burrowing Owl Foraging Habitat.	
WILD-12: Loss or Disturbance of Raptor Nest Sites	1-A–C, 2-A–D	Significant	WILD-1: Replace Riparian Land Cover Types. WILD-2: Avoid and Minimize Effects on Nesting Birds during Construction and Maintenance. WILD-3: Minimize Impacts on Sensitive Biological Resources. WILD-4: Replace Wetland Land Cover Types. WILD-6: Replace Nontidal Wetland Land Cover Types.	Less than significant
WILD-13: Loss of Western Pond Turtle or Suitable Habitat	1-A–C, 2-A–D	Significant	WILD-4: Replace Wetland Land Cover Types. WILD-5: Compensate for Loss of Tidal Perennial Aquatic Habitat. WILD-6: Replace Nontidal Wetland Land Cover Types. WILD-22: Avoid and Minimize Construction-Related Disturbances in the Vicinity of Occupied Habitat.	Less than significant
WILD-14: Loss of Tricolored Blackbird Nesting Habitat	1-A–C, 2-A–D	Significant	WILD-1: Replace Riparian Land Cover Types. WILD-2: Avoid and Minimize Effects on Nesting Birds during Construction and Maintenance.	Less than significant

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
			WILD-3: Minimize Impacts on Sensitive Biological Resources. WILD-4: Replace Wetland Land Cover Types. WILD-6: Replace Nontidal Wetland Land Cover Types. WILD-23: Conduct Preconstruction Surveys for Tricolored Blackbird. WILD-24: Minimize Construction-Related Disturbances in the Vicinity of Active Tricolored Blackbird Colonies.	
WILD-15: Loss or Disturbance of California Black Rail or Suitable Nesting Habitat	1-A–C, 2-A–D	Significant	WILD-2: Avoid and Minimize Effects on Nesting Birds during Construction and Maintenance. WILD-3: Minimize Impacts on Sensitive Biological Resources. WILD-4: Replace Wetland Land Cover Types. WILD-6: Replace Nontidal Wetland Land Cover Types. WILD-25: Conduct Preconstruction Surveys for California Black Rail. WILD-26: Minimize Construction-Related Disturbances in the Vicinity of Active California Black Rail Nest Sites.	Less than significant

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
WILD-16: Loss or Disturbance of Colonial Waterbird Rookeries	1-A–C, 2-A–D	Significant	WILD-1: Replace Riparian Land Cover Types. WILD-2: Avoid and Minimize Effects on Nesting Birds during Construction and Maintenance. WILD-3: Minimize Impacts on Sensitive Biological Resources. WILD-27: Conduct Preconstruction Surveys to Locate Rookeries. WILD-28: Minimize Construction-Related Disturbances within ¼ Mile of Active Rookeries. WILD-29: Avoid Removal of Occupied Rookeries. WILD-30: Replace Lost Breeding Habitat.	Less than significant
WILD-17: Loss or Disturbance of Aleutian Canada Goose	1-A–C, 2-A–D	Less than significant	None required.	–
WILD-18: Loss or Disturbance of Wintering Bald Eagle	1-A–C, 2-A–D	Less than significant	None required.	–
WILD-19: Loss or Disturbance of Migratory Birds	1-A–C, 2-A–D	Significant	WILD-2: Avoid and Minimize Effects on Nesting Birds during Construction and Maintenance. WILD-3: Minimize Impacts on Sensitive Biological Resources.	Less than significant
WILD-20: Loss or Disturbance of Bats and Bat Habitat as a Result of Construction Activities	1-A–C, 2-A–C	Significant	WILD-2: Avoid and Minimize Effects on Nesting Birds during Construction and Maintenance. WILD-3: Minimize Impacts on Sensitive Biological Resources. WILD-23: Conduct Preconstruction Surveys for Bats.	Less than significant

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
LAND USE, RECREATION, AND ECONOMICS				
LU-1: Permanent Loss of Farmland	1-A–C 2-A-D	Potentially significant	Optional project features.	Less than significant
LU-2: Operations-Related Effects on Agricultural Production	1-A–C, 2-A–C	Less than significant	None required.	–
LU-3: Inconsistency with Agricultural Objectives of Local, Regional, and State Plans	1-A–C	Less than significant	None required.	
LU-4: Conflict with General Plan Designations or Zoning	1-A–C	Less than significant	None required.	
REC-1: Temporary Disruption of Recreational Boating Activities during Construction	1-A–C	Less than significant	None required.	–
REC-1: Temporary Disruption of Recreational Boating Activities during Construction	2-A–D	Significant	REC-1: Implement a Bridge Construction Phasing Schedule.	Less than significant
REC-2: Temporary Disruption of Recreational Boating Activities during Dredging Operations	1-A–C, 2-D	Less than significant	None required.	–
REC-3: Long-Term Increase in Recreational Boating Opportunities	1-A	Beneficial	None required.	–
REC-4: Upgrade of Recreational Facilities at the Delta Meadows Property	1-A–C	Beneficial	None required.	–
REC-5: Increased Public Awareness of Recreational Facilities and Public Access Points	1-A–C	Beneficial	None required.	–
REC-6: Occasional Temporary Loss of Wildlife-Viewing Opportunities	2-A–C	Less than significant	None required.	–
REC-7: Long-Term Improvements in Wildlife-Viewing Opportunities	2-A–C	Beneficial	None required.	–

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
POPULATION, HOUSING, AND ENVIRONMENTAL JUSTICE				
POP-1: Displacement of Housing	1-A–C, 2-A–C	Less than significant	None required.	–
POP-2: Displacement of People	1-A–C, 2-A–C	Less than significant	None required.	–
POP-3: Disproportionate Impacts on Low-Income or Minority Populations	1-A–C, 2-A–C	Less than significant	None required.	–
UTILITIES AND PUBLIC SERVICES				
PUB-1: Increase in Use of Energy	1-A–C, 2-A–D	Less than significant	None required.	–
PUB-2: Reduction in the Capacity of Local Solid Waste Landfills	1-A–C, 2-A–D	Less than significant	None required.	–
PUB-3: Disruption of Utility Services	1-A–C, 2-A–C	Less than significant	None required.	–
PUB-3: Disruption of Utility Services	2-D	No impact	None required.	–
PUB-4: Increase in Emergency Service Response Times	1-A–C, 2-A–D	Less than significant	None required.	–
POWER PRODUCTION AND ENERGY				
PPE-1: Change in Power Consumption	1-A–C, 2-A–D	Less than significant	None required.	–
VISUAL RESOURCES				
VIS-1: Temporary Visual Change as a Result of Construction Activities	1-A–C, 2-A–D	Less than significant	None required.	–
VIS-2: Permanent Changes in Viewshed	1-A–C, 2-A–D	Less than significant	None required.	–

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
PUBLIC HEALTH AND ENVIRONMENTAL HAZARDS				
PH-1: Releases of Hazardous Materials during Construction	1-A–C, 2-D	Less than significant	None required.	–
PH-1: Releases of Hazardous Materials during Construction	2-A–C	Significant	PH-3: Contain and Properly Dispose of Lead-Based Paint.	Less than significant
PH-2: Potential Exposure to Currently Unidentified Contaminated Waters or Soils during Construction	1-A–C, 2-A–D	Significant	PH-1: Properly Dispose of Contaminated Materials	Less than significant
PH-3: Increased Occurrence of Wildland Fires and Increased Emergency Response/Evacuation Times	1-A–C, 2-A–D	Less than significant	None required.	–
PH-4: Exposure of People to Mosquitoes	1-A–C, 2-A–C	Significant	PH-2: Design and Operate Project to Minimize Mosquito Breeding Habitat.	Less than significant
PH-4: Exposure of People to Mosquitoes	2-D	Significant	PH-2a: Design and Operate Dredged Material Drying Areas to Minimize Mosquito Breeding Habitat.	Less than significant
CULTURAL RESOURCES				
CR-1: Destruction of Archaeological Sites P-39-324, P-39-4419, and P-39-4420 as a Result of Ground Disturbance	1-A–C	Significant	Several mitigation strategies listed in the August 2000 CALFED Programmatic ROD are feasible mitigation measures for impacts incurred on P-39-324, P-39-4419, and P-39-4420, namely mitigation strategies 3–5 and 7–8. Prior to approval and final design of the downstream levee modifications, DWR will authorize qualified archaeologists to map the sites (mitigation strategy 3), conduct surface collections and perform test excavations at the sites (mitigation strategies 4 and 5), and prepare a report to document the results of mitigation strategies 3–5 above (mitigation strategy 7). Based on the findings of these mitigation strategies, DWR will determine whether the sites are historical resources or unique archaeological resources for the purposes of CEQA,	Less than significant to significant, depending

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
			or are not significant cultural resources. If DWR determines the sites to be non-significant, no additional mitigation is required, and this impact will be reduced to a less-than-significant level. Conversely, if DWR determines that the any or all of the sites qualify as historical resources or unique archaeological resources, DWR will authorize qualified archaeologists to conduct full-scale excavations of the site(s) deemed significant (mitigation strategy 8), prepare public interpretive documents (mitigation strategy 9), and prepare a report to document mitigation work (mitigation strategy 7), as appropriate to the qualities of the sites.	
CR-2: Destruction of Unevaluated Isolated Finds	1-A–C	Significant	Mitigation strategies 1 and 3, listed in the August 2000 CALFED Programmatic ROD, are feasible mitigation measures for impacts incurred on P-39-4421, P-39-4427, P-39-4428, P-39-4429, and P-39-4438. Prior to approval and final design of the downstream levee modifications, DWR will authorize qualified archaeologists to survey the isolate vicinities and map all archaeological materials identified to determine whether additional archaeological materials are present. If no additional archaeological materials are present, isolates P-39-4421, P-39-4427, P-39-4428, P-39-4429, and P-39-4438 would not qualify as historical resources or unique archaeological resources for the purposes of CEQA, and implementation of mitigation measures 1 and 3 would reduce this impact to a no-impact level. If additional archaeological materials are identified at any or all of the isolated finds, they will be considered archaeological sites and DWR will authorize qualified archaeologists to conduct surface collections and perform test excavations at the sites (mitigation strategies 4 and 5), and prepare a report to document the results of mitigation strategies 3–5	Less than significant to significant, depending

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
			above (mitigation strategy 7). Based on the findings of these mitigation strategies, DWR will determine whether the sites are historical resources or unique archaeological resources for the purposes of CEQA, or are not significant cultural resources. If DWR determines the sites to be non-significant, no additional mitigation is required and this impact will be reduced to a less-than-significant level. Conversely, if DWR determines that the any or all of the sites qualify as historical resources or unique archaeological resources, DWR will authorize qualified archaeologists to conduct full-scale excavations of the site(s) deemed significant (mitigation strategy 8), prepare public interpretive documents (mitigation strategy 9), and prepare a report to document mitigation work (mitigation strategy 7), as appropriate to the qualities of the sites.	
CR-3: Destruction of Cultural Resources along Unexamined Portions of the Downstream Levees	1-A–C	Significant	Because the progress in defining this project action is provisional, mitigation strategies 1 and 7 listed in the August 2000 CALFED Programmatic ROD, are feasible mitigation measures for this impact, provided no cultural resources are identified as a result. Prior to approval and final design of the downstream levee modifications, DWR will authorize qualified cultural resource specialists to survey the areas slated for improvements (mitigation strategy 1). If no cultural resources are identified in the improvement areas, implementation of mitigation strategies 1 and 7 (report preparation) will reduce this impact to a no-impact level. If archaeological resources are identified as a result of survey work, DWR will authorize qualified archaeologists to conduct surface collections and perform test excavations at the sites (mitigation strategies 4 and 5) and prepare a report to document the results of mitigation strategies 3–5 above	No impact, or less than significant to significant, depending

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
			(mitigation strategy 7). Based on the findings of these mitigation strategies, DWR will determine whether the sites are historical resources or unique archaeological resources for the purposes of CEQA, or are not significant cultural resources. If DWR determines the sites to be non-significant, no additional mitigation is required and this impact will be reduced to a less-than-significant level. Conversely, if DWR determines that the any or all of the sites qualify as historical resources or unique archaeological resources, DWR will authorize qualified archaeologists to conduct full-scale excavations of the site(s) deemed significant (mitigation strategy 8), prepare public interpretive documents (mitigation strategy 9), and prepare a report to document mitigation work (mitigation strategy 7), as appropriate to the qualities of the sites. If historic architectural resources are identified as a result of survey work, DWR will authorize qualified architectural historians to conduct an oral history research to determine, in consultation with DWR, whether the resources constitute historical resources for the purposes of CEQA. The results will be documented in an evaluation report (mitigation strategy 7). If DWR determines the historic architectural resources to be historical resources for the purposes of CEQA, DWR will authorize qualified architectural historians to document historic structures by preparing Historic American Engineering Records of Historic American Building Surveys (mitigation strategy 10), prepare public interpretive documents (mitigation strategy 9), and prepare mitigation reports (mitigation strategy 7). Options for avoidance through project design should be contemplated as well (mitigation strategy 2).	

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
CR-4: Damage to or Destruction of Site P-34-39 as a Result of Soil Removal	1-A–C, 2-A–C, Dixon	Significant	[See Impact CR-1]	No impact, or less than significant to significant, depending
CR-5: Damage to or Destruction of Cultural Resources in the Dixon Borrow Site	1-A–C, 2-A–C, Dixon	Significant	[See Impact CR-3]	No impact, or less than significant to significant, depending
CR-6: Damage to or Destruction of Architectural Resources in the New Hope Borrow Site	1-A–C, 2-A–C, New Hope	Significant	[See Impact CR-3]	No impact, or less than significant to significant, depending
CR-7: Damage to or Destruction of Archaeological Site P-34-36 as a Result of Soil Removal and Other Ground-Disturbing Activities	1-A-C	Significant	DWR archaeologists did not identify archaeological materials at the mapped location of P-34-36 as a result of the April 2005 survey. The lack of materials may represent agricultural disturbances and looting of artifacts or insufficient mapping at the time of original recordation (1929). Both scenarios leave open the possibility that buried archaeological materials are present at the mapped location of P-34-36. The lack of specificity in the original mapping suggests that presence-absence excavation to locate P-34-36 is unwarranted. Instead, DWR will map the vicinity of P-34-36 as an environmentally sensitive area on construction and design drawings. DWR will ensure that a qualified archaeologist with full stop-work authority monitors all construction activities in the vicinity of P-34-36.	Less than significant
CR-8: Damage to or Destruction of Archaeological Site P-34-37 as a Result of Grading	1-A-C	Significant	Two mitigation strategies listed in the August 2000 CALFED Programmatic ROD are feasible mitigation measures for impacts incurred on P-34-37, namely mitigation strategies 2 and 3. Prior to approval and final design of the grading of the proposed borrow site, DWR will authorize qualified archaeologists to map the site (mitigation strategy 3) and fence the site boundaries for avoidance during construction (mitigation strategy 2). DWR should task a qualified	No impact

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
			archaeologist with periodic examinations of the fencing to ensure that the barrier is not crossed and clearly delimits the site boundaries throughout the duration of grading.	
CR-9: Destruction of Architectural Resources along Unexamined Portions of the Grizzly and Bear Slough Levees	1-A-C	Significant	[See Impact CR-3]	No impact, or less than significant to significant, depending
CR-10: Destruction of Submerged Cultural Resources as a Result of Channel Dredging	1-OP2, 2-D	Significant	[See Impact CR-3]	No impact, or less than significant to significant, depending
CR-11: Destruction of Cultural Resources as a Result of Dredge Spoil Disposal	1-OP2, 2-D	Significant	[See Impact CR-3]	No impact, or less than significant to significant, depending
CR-12: Damage to or Destruction of Archaeological Site CA-Sac-76/H at the Delta Meadows Property	1-OP4	Significant	The full range of CALFED programmatic mitigation strategies discussed under Impact CR-5 are appropriate for the mitigation of impacts on CA-Sac-76/H. Mitigation will be developed by California Department of Parks and Recreation during preparation of the Delta Meadows specific plan document.	No impact, or less than significant to significant, depending
CR-13: Damage to or Destruction of Archaeological Sites CA-Sac-47 and P-34-102	1-OP4	Significant	The full range of CALFED programmatic mitigation strategies discussed under Impact CR-8 are appropriate for the mitigation of impacts on CA-Sac-47 and P-34-102. Mitigation will be developed by California Department of Parks and Recreation during preparation of the Delta Meadows specific plan document.	No impact, or less than significant to significant, depending
CR-14: Damage to or Destruction of Architectural Resources in the Delta Meadows Property Area	1-OP4	Significant	[See Impact CR-3]	No impact, or less than significant to significant, depending

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
CR-15: Damage to or Destruction of P-39-4423 as a Result of Detention Levee Construction (North Staten Island Detention)	2-A	Significant	Several mitigation strategies listed in the August 2000 CALFED Programmatic ROD are feasible mitigation measures for impacts incurred on P-39-4423, namely mitigation strategies 2–5 and 7–8. Prior to approval and final design of the North Staten Island Detention, DWR will authorize qualified archaeologists to map the site (mitigation strategy 3), conduct surface collections and perform test excavations at the site (mitigation strategies 4 and 5), and prepare a report to document the results of 3–5 above (mitigation strategy 7). Based on the findings of these mitigation strategies, DWR will determine whether P-39-4423 is a historical resource or unique archaeological resource for the purposes of CEQA, or is not a significant cultural resource. If DWR determines the site to be non-significant, no additional mitigation is required. Conversely, if DWR determines that the site qualifies as a historical resource or a unique archaeological resource, DWR will cause the final design of the North Staten Island Detention to avoid the boundaries of P-39-4423 (mitigation strategy 2) or, in the event that avoidance is not feasible, authorize qualified archaeologists to conduct full-scale excavations of P-39-4423 (mitigation strategy 8), prepare public interpretive documents (mitigation strategy 9), and prepare a report to document mitigation work (mitigation strategy 7), as appropriate to the qualities of P-39-4423.	No impact, or less than significant to significant, depending
CR-16: Damage to or Destruction of P-39-356, P-39-4423, and P-39-4424 as a Result of Inundation	2-B	Significant	Several mitigation strategies listed in the August 2000 CALFED Programmatic ROD are feasible mitigation measures for impacts incurred on P-39-356, P-39-4423, and P-39-4424, namely mitigation strategies 3–5 and 7–8. Prior to approval and final design of the North Staten Island Detention, DWR will authorize qualified archaeologists to map the sites (mitigation strategy 3), conduct surface	No impact, or less than significant to significant, depending

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
			collections and perform test excavations at the sites (mitigation strategies 4 and 5), and prepare a report to document the results of mitigation strategies 3–5 above (mitigation strategy 7). Based on the findings of these mitigation strategies, DWR will determine whether P-39-356, P-39-4423, and P-39-4424 are historical resources or unique archaeological resources for the purposes of CEQA, or are not significant cultural resources. If DWR determines the sites to be non-significant, no additional mitigation is required. Conversely, if DWR determines that the sites qualify as historical resources or unique archaeological resources, DWR will authorize qualified archaeologists to conduct full-scale excavations of P-39-356, P-39-4423, and P-39-4424 (mitigation strategy 8), prepare public interpretive documents (mitigation strategy 9), and prepare a report to document mitigation work (mitigation strategy 7), as appropriate to the qualities of the sites.	

* Optional Alternatives:

1-OP2 = Mokelumne River Dredging.

1-OP4 = Enhance Delta Meadows Property.

2-OP1 = Retrofit or Replace Millers Ferry Bridge.

2-OP2 = Retrofit or Replace New Hope Bridge.

Chapter 1
Introduction

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Introduction

This Final Environmental Impact Report (EIR) consists of a discussion of the selection of Preferred Alternatives for the project, the Draft EIR for the North Delta Flood Control and Ecosystem Restoration Project (NDFCERP) as revised (see edits in Chapter 3of this volume), the comments on the Draft EIR, and lead agency responses to those comments. The public comment period for the Draft EIR was from January 28, 2008 to March 28, 2008. Comments on the Draft EIR were received by mail, fax, e-mail, and at the public hearing.

Public Review Process

The Draft EIR was preceded by an Administrative Draft EIR (ADEIR) which was distributed among the CALFED implementing agencies for comment. These agencies include DWR, USACE, California Bay Delta Authority (CBDA), U.S. Department of the Interior, Bureau of Reclamation (Reclamation), the California Department of Fish and Game (DFG), the U.S. Fish and Wildlife Service (USFWS), and National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS), Delta Protection Commission (DPC), and California Department of Food and Agriculture (DFA). The ADEIR was then revised based on the input provided by the participating agencies resulting in the public Draft EIR

The public comment period for the NDFCERP Draft EIR began January 28, 2008 with an announcement of the availability of the Draft EIR. The formal public comment period closed March 28, 2008. A public meeting was held on February 20, 2008, in Walnut Grove at the Jean Harvie Community Center. Both written and oral comments were received during these hearings.

The Draft EIR along with a Notice of Completion (NOC) was provided to the State Clearinghouse for distribution to interested state agencies and an NOC was filed with the county clerks' offices of San Joaquin and Sacramento counties. The NOC was also published in the Sacramento Bee. Several e-mail announcements announcing the release of the Draft EIR were sent on the North Delta e-mail reflector which contains the e-mail addresses over 150 stakeholders.

The Draft EIR was made available online at DWR's North Delta website, and copies were delivered to the Sacramento, Thornton, Walnut Grove, and Elk Grove public libraries. Approximately 100 copies were distributed, including CDs and paper copies. Approximately 150 comments were received during the public comment period. Public comments received during the public comment period and the public hearing for the Draft EIR were considered and responded to during preparation of this Final EIR. Responses to these comments are presented in this Final EIR.

CEQA Compliance Steps

To certify the Final EIR, DWR must find that:

- The Final EIR has been completed in compliance with CEQA, and
- The Final EIR was presented to the decision-making body of the lead agency, and the decision-making body reviewed and considered the information within the FEIR prior to approving the project (Public Resources Code Section 21082.1 and CEQA Guidelines Section 15025).

The lead agency decision makers (DWR) are able to approve the proposed project after they have certified the FEIR. DWR's Director will make the final decision regarding which of the project alternatives are selected for implementation and adopt findings of fact regarding the significant effects identified in the FEIR. DWR's finding that "changes or alterations" have been incorporated into the project to mitigate the significant environmental effects identified in the certified FEIR will require the development of a monitoring program to ensure compliance during project implementation (Public Resources Code Section 21081.6). DWR will file a Notice of Determination (NOD) with the State Clearinghouse once it has approved the selected alternative. The filing of the NOD starts the 30 day statute of limitations on court challenges to the approval under CEQA.

Responses to Comments

According to CEQA Guidelines Section 15088, subd. (a), "The Lead Agency shall evaluate comments and shall prepare a written response". The detail provided in the response is reflective of the level of detail submitted by the commenter; in other words, a specific comment will warrant a specific response. The range of responses may include such topics as hydraulic modeling, revising DEIR text, additional mitigation measures, and supplementing analyses. Public agencies have been provided a minimum 10-day opportunity to review responses prepared to their comments, as provided under CEQA. Upon completion of the FEIR, DWR may act to certify the document and adopt a project.

Related Actions, Programs, Legislation, and Planning Efforts

Bay Delta Conservation Plan

Planning Process

The Bay Delta Conservation Plan (BDCP) was created to identify a set of water flow and habitat restoration actions to contribute to the recovery of endangered and sensitive species and their habitats in California's Sacramento-San Joaquin Delta. The goal of the BDCP is to provide for both species/habitat protection and improved reliability of water supplies. The BDCP is being prepared through a collaboration of state, federal, and local water agencies, state and federal fish agencies, environmental organizations, and other interested parties known as the BDCP Steering Committee.

The Steering Committee for the BDCP is developing a comprehensive conservation plan for the Sacramento and San Joaquin Delta pursuant to a planning agreement that was executed on October 6, 2006. The BDCP planning area is the legal Delta. In first half of 2007, the Steering Committee developed a list of ten conceptual conservation strategies, evaluated those strategies, and shortened that list to four Conservation Strategy Options.

The Steering Committee is intent on further narrowing the remaining Options to a single Option (derived from one or more of the evaluated Options) that will be carried forward into a detailed conservation planning process over the course of the next year. The chosen Option will serve as the nucleus for the larger conservation plan and other major elements of the strategy will be formulated around it. This larger, more comprehensive conservation plan will then be evaluated through a formal, public environmental review process under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

The BDCP is being developed under the Federal Endangered Species Act (ESA) and the California Natural Community Conservation Planning Act (NCCPA) and will undergo extensive environmental analysis that will include opportunities for public review and comment. When complete, the BDCP will provide the basis for the issuance of endangered species permits for the operation of the state and federal water projects. The plan would be implemented over the next 50 years. The heart of the BDCP is a long-term conservation strategy that sets forth actions needed for a healthy Delta.

Environmental Review Process

Agencies developing the Environmental Impact Report (EIR)/Environmental Impact Statement (EIS) will evaluate ecosystem restoration, water conveyance, and other stressors alternatives identified by the Bay Delta Conservation Plan (BDCP) and through the environmental review process under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). In addition, the California Department of Water Resources (DWR) formed the Delta Habitat Conservation and Conveyance Program (DHCCP) to provide engineering and real estate services in support of the environmental review process.

A joint EIR/EIS for BDCP is currently being prepared by the DWR, the Bureau of Reclamation, the U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service, in cooperation with the California Department of Fish and Game, the U.S. Environmental Protection Agency, and the U.S. Army Corps of Engineers.

Under CEQA, the EIR will describe the proposed project, identify its significant environmental impacts, and develop reasonable mitigation measures and alternatives to eliminate or reduce such impacts. Under NEPA, the EIS will describe a reasonable range of alternatives that would avoid, minimize, and mitigate adverse impacts.

The EIR/EIS will:

- Fulfill the requirements of:
  - CEQA
  - NEPA
- Describe the proposed action
  - For CEQA compliance: Describe the proposed project, identify its significant environmental impacts, and develop reasonable mitigation measures and alternatives to eliminate or reduce such impacts.
  - For NEPA compliance: Describe reasonable range of alternatives that would avoid, minimize, and mitigate adverse impacts.
- Analyze the environmental effects of the proposed action and the alternatives
- Support future regulatory actions or approval
- Serve as a decision document as well as a disclosure document

The draft EIR/EIS is expected to be ready for public review and comment by 2011.

2009 Comprehensive Water Package

Governor Schwarzenegger and state lawmakers crafted a plan to meet California's growing water challenges. The plan is comprised of four policy bills and an $11.14 billion bond. The package establishes a Delta Stewardship Council, sets ambitious water conservation policy, ensures better groundwater monitoring, and provides funds for the State Water Resources Control Board for increased enforcement of illegal water diversions. The bond will fund, with local cost-sharing, drought relief, water supply reliability, Delta sustainability, statewide water system operational improvements, conservation and watershed protection, groundwater protection, and water recycling and water conservation programs.

Senate Bill No. 1
Delta Governance / Delta Plan

SB 1 establishes the framework to achieve the co-equal goals of providing a more reliable water supply to California and restoring and enhancing the Delta ecosystem. The co-equal goals will be achieved in a manner that protects the unique cultural, recreational, natural resource, and agricultural values of the Delta. Specifically, this bill:

- Creates the Delta Stewardship Council, consisting of seven members with diverse expertise providing a broad statewide perspective. The Chairperson of the Delta Protection Commission is a permanent member of the Council. The Council is also tasked with:
    - Developing a Delta Plan to guide state and local actions in the Delta in a manner that furthers the co-equal goals of Delta restoration and water supply reliability;
    - Developing performance measures for the assessment and tracking of progress and changes to the health of the Delta ecosystem, fisheries, and water supply reliability;
    - Determining if a state or local agency's project in the Delta is consistent with the Delta Plan and the co-equal goals, and acting as the appellate body in the event of a claim that such a project is inconsistent with the goals; and
    - Determining the consistency of the Bay-Delta Conservation Plan (BDCP) with the co-equal goals.
- Ensures that the Department of Fish and Game and the State Water Resources Control Board identify the water supply needs of the Delta estuary for use in determining the appropriate water diversion amounts associated with BDCP
- Establishes the Sacramento-San Joaquin Delta Conservancy to implement ecosystem restoration activities within the Delta. In addition to the restoration duties the Conservancy is required to:
    - Adopt a strategic plan for implementation of the Conservancy goals;
    - Promote economic vitality in the Delta through increased tourism and the promotion of Delta legacy communities;
    - Promote environmental education about, and the public use of, public lands in the Delta; and
    - Assist in the preservation, conservation, and restoration of the region's agricultural, cultural, historic, and living resources.
- Restructures the current Delta Protection Commission (DPC), reducing the membership from 23 to 15 members, and tasks DPC with the duties of:
    - Adopting an economic sustainability plan for the Delta, which is to include flood protection recommendations to state and local agencies;
    - Submitting the economic sustainability plan to the Delta Stewardship Council for inclusion in the Delta Plan.
- Appropriates funding from Proposition 84 to fund the Two-Gates Fish Protection Demonstration Program, a project in the central Delta which will utilize operable gates for protection of sensitive species and management of water supply.

Senate Bill No. 6
Groundwater Monitoring

SB 6 requires, for the first time in California's history, that local agencies monitor the elevation of their groundwater basins to help better manage the resource during both normal water years and drought conditions. Specifically, this bill:

- Requires the Department of Water Resources (DWR) to establish a priority schedule for the monitoring of groundwater basins and the review of groundwater elevation reports, and to make recommendations to local entities to improve the monitoring programs.
- Requires DWR to assist local monitoring entities with compliance with this statute.
- Allows local entities to determine regionally how best to set up their groundwater monitoring program, crafting the program to meet their local circumstances.
- Provides landowners with protections from trespass by state or local entities.
- Provides that if the local agencies fail to implement a monitoring program and/or fail to provide the required reports, DWR may implement the groundwater monitoring program for that region.
- Provides that failure to implement a monitoring program will result in the loss of eligibility for state grant funds by the county and the agencies responsible for performing the monitoring duties.

Senate Bill No. 7
Statewide Water Conservation

SB 7 creates a framework for future planning and actions by urban and agricultural water suppliers to reduce California's water use. For the first time in California's history, this bill requires the development of agricultural water management plans and requires urban water agencies to reduce statewide per capita water consumption 20 percent by 2020. Specifically, this bill:

- Establishes multiple pathways for urban water suppliers to achieve the statewide goal of a 20 percent reduction in urban water use. Specifically, urban water suppliers may:
  - Set a conservation target of 80 percent of their baseline daily per capita water use;
  - Utilize performance standards for water use that are specific to indoor, landscape, and commercial, industrial and institutional uses;
  - Meet the per capita water use goal for their specific hydrologic region as identified by DWR and other state agencies in the 20 percent by 2020 Water Conservation Plan; or
  - Use an alternate method that is to be developed by DWR before December 31, 2010.
- Requires urban water suppliers to set an interim urban water use target and meet that target by December 31, 2015 and meet the overall target by December 31, 2020.
- Requires DWR to cooperatively work with the California Urban Water Conservation Council to establish a task force that shall identify best management practices to assist the commercial, industrial and institutional sector in meeting the water conservation goal.

- Requires agricultural water suppliers to measure water deliveries and adopt a pricing structure for water customers based at least in part on quantity delivered, and, where technically and economically feasible, implement additional measures to improve efficiency.
- Requires agricultural water suppliers to submit Agricultural Water Management Plans beginning December 31, 2012 and include in those plans information relating to the water efficiency measures they have undertaken and are planning to undertake.
- Makes ineligible for state grant funding any urban or agricultural water supplier who is not in compliance with the requirements of this bill relating to water conservation and efficient water management.
- Requires DWR to, in 2013, 2016 and 2021, report to the Legislature on agricultural efficient water management practices being undertaken and reported in agricultural water management plans.
- Requires DWR, the State Water Resources Control Board, and other state agencies to develop a standardized water information reporting system to streamline water reporting required under the law.

Senate Bill No. 8
Water Diversion and Use / Funding

SB 8 improves accounting of the location and amounts of water being diverted by recasting and revising exemptions from the water diversion reporting requirements under current law. Additionally, this bill appropriates existing bond funds for various activities to benefit the Delta ecosystem and secure the reliability of the state’s water supply, and to increase staffing at the State Water Resources Control Board to manage the duties of this statute. Specifically, this bill:

- Provides a stronger accounting of water diversion and use in the Delta by removing an exemption from reporting water use by in-Delta water users.
- Redefines the types of diversions that are exempt from the reporting requirement.
- Assesses civil liability and monetary penalties on diverters who fail to submit the required reports, and for willful misstatements, and/or tampering with monitoring equipment.
- Appropriates $546 million from Propositions 1E and 84, in the following manner:
    - $250 million (Proposition 84) for integrated regional water management grants and expenditures for projects to reduce dependence on the Delta;
    - $202 million ($32 million Proposition 84 and $170 million Proposition 1E) for flood protection projects in the Delta to reduce the risk of levee failures that would jeopardize water conveyance;
    - $70 million (Proposition 1E) for stormwater management grants; and
    - $24 million (Proposition 84) for grants to local agencies to develop or implement Natural Community Conservation plans.
- Appropriates $3.75 million from the Water Rights Fund to the State Water Resources Control Board for staff positions to manage the duties in this bill relating to water diversion reporting, monitoring and enforcement.

The Safe, Clean, and Reliable Drinking Water Supply Act (SCRDWSA) of 2010

The SCRDWSA is an $11.14 billion general obligation bond proposal that would provide funding for California's aging water infrastructure and for projects and programs to address the ecosystem and water supply issues in California. The bond is comprised of seven categories, including drought relief, water supply reliability, Delta sustainability, statewide water system operational improvement, conservation and watershed protection, groundwater protection and water quality, and water recycling and water conservation.

Governor Schwarzenegger issued a statement calling for the removal of the water bond from the November, 2010 ballot. The bond is now scheduled to appear on the June 2012 ballot.

California Water Plan Update 2009

The ***California Water Plan*** provides a framework for water managers, legislators, and the public to consider options and make decisions regarding California's water future. The Plan, which is updated every five years, presents basic data and information on California's water resources including water supply evaluations and assessments of agricultural, urban, and environmental water uses to quantify the gap between water supplies and uses. The Plan also identifies and evaluates existing and proposed statewide demand management and water supply augmentation programs and projects to address the State's water needs.

The five-volume report was published on March 30, 2010.

Delta Blue Ribbon Task Force

Background

On September 2006 Governor Schwarzenegger signed Executive Order S-17-06. This Executive Order built on the Legislature's SB 1574, AB 1200 and AB 1803. The Executive Order launched the Delta Vision process by establishing a Blue Ribbon Task Force, a Cabinet-level Delta Vision Committee, Delta Science Advisors, and a Stakeholder Coordination Group. The independent Blue Ribbon Task Force was charged with developing both a long-term vision for the Delta and a plan to implement that vision. That same Executive Order charged a Committee of the Governor's Cabinet Secretaries, the Delta Vision Committee, to review the completed work of the Task Force and to make their own implementation recommendations to both the Governor and Legislature by December 31, 2008. This report sets forth those recommendations.

Summary Recommendation to the Governor

In its October 2008 *Delta Vision Strategic Plan*, the Governor's Blue Ribbon Task Force drew a fundamental and significant conclusion that California's Delta must be managed according to two coequal goals:

"Restore the Delta ecosystem and create a more reliable water supply for California."

The Delta Vision Committee agrees and recommends that this concept, as further defined herein, be incorporated into state law.

In addition to the commendable accomplishment of achieving consensus on this level, the Task Force was able to take a highly politicized topic and distill rhetoric and diverse opinions and recommendations into a list of recommended actions. The Delta Vision Blue Ribbon Task Force's Strategic Plan is a robust document, developed through public input under the leadership of an accomplished team, that will serve as an important guide and reference as California moves forward to make improvements in the Delta.
The priorities that form the foundation for a sustainable Delta include the following "fundamental actions":

- A new system of dual water conveyance through and around the Delta to protect municipal, agricultural, environmental, and the other beneficial uses of water;

- An investment commitment and strategy to restore and sustain a vibrant and diverse Delta ecosystem including the protection and enhancement of agricultural lands that are compatible with Plan goals;

- Additional storage to allow greater system operational flexibility that will benefit water supplies for both humans and the environment and adapt to a changing climate;

- An investment plan to protect and enhance unique and important characteristics of the Delta region;

- A comprehensive Delta emergency preparedness strategy and a fully integrated Delta emergency response plan;

- A plan to significantly improve and provide incentives for water conservation – through both wise use and reuse – in both urban and agricultural sectors throughout the state;

- Strong incentives for local and regional efforts to make better use of new sources of water such as brackish water cleanup and seawater desalination; and

- An improved governance system that has reliable funding, clear authority to determine priorities and strong performance measures to ensure accountability to the new governing doctrine of the Delta: operation for the coequal goals.

Delta Vision

The initiative resulting from legislation and Governor Schwarzenegger's Executive Order S-17-06 to integrate the many but separate Delta planning efforts, using a collaborative and inclusive public process, to develop and articulate findings and recommendations for durable and sustainable management of the Delta. The Delta Vision process concluded at the end of 2008, a little more than two years after it began, with a suite of strategic recommendations for long-term, sustainable management of the Sacramento-San Joaquin Delta.

Delta Risk Management Strategy

Background

Many of the local levees in the Delta started out as 3 to 5-foot-high dikes of peat over a century ago. Modern engineering analyses and techniques were not available during the initial construction of the levees which generally rest on the original marsh soils. Over time, the weight of the levees compressed and displaced the soft, organic soils beneath them. In addition, the organic soils within the island interiors oxidized and were removed by wind over time, resulting in the land surface significantly subsiding. As a result, the levees have to be continually raised and broadened, which commonly initiates further settlement, embankment cracking, and loss of freeboard. This process will continue until the levees and their foundations stabilize, and many reaches have not yet stabilized to date. Delta levees today are now commonly 15 to 20 feet high, and often protect island interiors that are 15 to 20 feet below sea level. Permeable lenses in the levee and foundation, together with historic relics, such as abandoned pipes, and constant burrowing by various mammals also commonly result in seepage distress and internal erosion.

During the last century, there have been 162 Delta levee failures leading to island inundations. In many cases, the flooding of the islands has been extremely costly to both local residents and farmers, and to the State as a whole. Levee failures in the Suisun Marsh have also occurred with significant impacts to local and statewide interests. In February 1998, 11 exterior levee breaches in the Suisun Marsh resulted in the inundation of over 22,000 acres and threatened both the State Water Project and Central Valley Project facilities.

California has an immense interest in maintaining many of the Delta and Suisun Marsh levees, in part because the Delta is a source of drinking water for about two out of every three Californians. In addition, there are important critical environmental, agricultural,and recreational benefits in the region. There are also extensive infrastructure and capitol investments in the Delta, ranging from houses, businesses, and towns to State highways, rail lines, natural gas fields, gas and fuel pipelines, and drinking water pipelines (e.g. Mokelumne Aqueduct) and two deepwater ports.

Phase 1

Phase 1 evaluated the risk and consequences to the State (e.g., water export disruption and economic impact) and the Delta (e.g., levees, infrastructure, and ecosystem) associated with the failure of Delta levees and other assets considering their exposure to all hazards (seismic, flood, subsidence, seepage and sea level rise, etc.) under present as well as foreseeable future conditions. The evaluation assessed the total risk as well as a deaggregation of the risk for individual islands.

Phase 2

The second phase is a risk analysis assessing alternative risk-reduction strategies and propose risk management options for consideration by DWR and other local, state, and federal agencies.

Timeline and Milestones

Below is the schedule for accomplishing the Delta Risk Management Strategy (DRMS) program's milestones.

Submittal of Current Uses-Trends Report	*November 2006*
Submittal of Risk Analysis (Phase 1 Report)	*April 2007*
Public Review of Draft Phase 1 Report	*September 2007*
CALFED Independent Review Panel review	*June - August 2007*
Final Phase 1 Report	*June 2008*
Submittal of Draft Phase 2 Report	*July 2008*
Receive Comments on Draft Final Report	*June - July 2008*
Submit Final DRMS Report	*December 2010*

FloodSAFE California

FloodSAFE California is a multi-faceted, strategic program to improve public safety through integrated flood management. The FloodSAFE vision is a sustainable, integrated flood management and emergency response system throughout California that improves public safety, protects and enhances environmental and cultural resources, and supports economic growth by reducing the probability of destructive floods, promoting beneficial floodplain processes, and lowering the damages caused by flooding. The program builds upon the State's ongoing flood management work, especially progress made since Governor Arnold Schwarzenegger called for improved maintenance, system rehabilitation, effective emergency response, and sustainable funding.

Central Valley Flood Management Planning Program

The purpose of the Central Valley Flood Management Planning (CVFMP) Program is to develop a sustainable, integrated flood management plan for areas protected by facilities of the State-Federal flood protection system in the Central Valley. The program is one of several the Department of Water Resources (DWR) is implementing within FloodSAFE

California to accomplish the goals of Propositions 1E and 84. The CVFMP Program consists of two primary projects: the State Plan of Flood Control and the Central Valley Flood Protection Plan.

State Plan of Flood Control

The State Plan of Flood Control will produce both a Descriptive Document to inventory the facilities and operations associated with State and Federal flood control works, and a Flood Control System Status Report to assess the status of that inventory.

Central Valley Flood Protection Plan

DWR intends to develop a Central Valley Flood Protection Plan that has broad agreement on a long-term vision for improving flood management in the Central Valley. This document will describe current flood risk; define goals, objectives, and constraints important in the planning process; identify potential plan elements; and make recommendations for improvement of the State-Federal flood management system aimed at reducing the risk of flooding in the Central Valley.

Current Work

The second and final series of management actions workshops to contribute to Phase 2 development of the 2012 Central Valley Flood Protection Plan began on August 24. Hosted by the California Department of Water Resources' Central Valley Flood Planning Office, the Round 2 Management Actions Workshops follow the completion of 11 category-based workshops held in July. Round 2 sessions include one integration-based workshop and three community application-based workshops.

The Great California Delta Trail System

Recognizing the unique natural resources of the Sacramento-San Joaquin Delta, the growing demands for public access to these resources, and the increasing recognition of the importance of outdoor recreation in addressing childhood obesity, the California Legislature passed, and the Governor signed, Senate Bill 1556 (Senator Torlakson) supporting the creation of a Delta trail network. The vision is for the trail to link the San Francisco Bay Trail system and planned Sacramento River trails in Yolo and Sacramento counties to present and future trail ways around and in the Delta, including Delta shorelines in Contra Costa, San Joaquin, Solano, Sacramento, and Yolo counties. The Delta Protection Commission will facilitate the feasibility and planning process, which will include a Stakeholder Advisory Group and Technical Advisory Group. A consulting team, consisting of Valley Vision and Alta Planning and Design, has been selected through an RFP process to assist the Commission. A large grant proposal has been submitted to Caltrans for Delta trail planning.

Recently, the Draft Great California Delta Trail Blueprint Report for Contra Costa and Solano Counties was published on August 27th, 2010.

Lower Yolo Bypass Planning Forum

The Lower Yolo Bypass is the most downstream portion of the Yolo Bypass (Bypass), a massive levied floodway located west of the Sacramento River and within Yolo and Solano counties. The Bypass provides flood conveyance for the cumulative high flows from several northern California waterways to the Sacramento-San Joaquin River Delta (Delta). In addition to flood conveyance, the Bypass provides critical habitat to a variety of species including numerous bird species and threatened and endangered fish such as the Delta Smelt and Sacramento Splittail. The Bypass also provides recreation opportunities, including widespread hunting and fishing use.

To address these issues (and with generous funding support from the California Department of Fish and Game), the Delta Protection Commission and the Yolo Basin Foundation are co-sponsoring The Lower Yolo Bypass Planning Forum. The Forum will seek to achieve what no single affected stakeholder and associated agency / organization has achieved to date; the collaborative creation of a mutually beneficial, mutually agreed on, long- range management strategy for the Lower Bypass. The Forum Group will be comprised of representatives from national, state, and local government agencies, as well as private land owners and recreation enthusiasts. Participation is completely voluntary and based on the assumption that all interest groups will be given equal weight in the decision/recommendation making process.

The Preliminary Draft Lower Yolo Bypass Planning Forum Management Recommendation Planning Goals were completed on June 10, 2010.

Operation Criteria and Plan Consultation (OCAP)

The Operations Criteria and Plan (OCAP) ESA consultation addresses ongoing Central Valley and State Water Project operations and future changes. The U.S. Bureau of Reclamation formally consulted on several new actions, such as Freeport diversion Project, municipal and industrial shortage policy, the Trinity ROD flows, the DMC/California Aqueduct Intertie. There was also early consultation (on actions that are not anticipated to be implemented in the immediate future) on the operation of South Delta Improvement Project (SDIP) with assumptions for a long-term Environmental Water Account (EWA). Additional consultation under ESA will be required prior to implementing any actions addressed in the early consultation. The OCAP consultation is not a decision making process, but rather analyzes the effects of proposed operation on listed species. It involves issuing a Biological Assessment (BA) followed by the U.S. National Marine Fisheries Service and U.S. Fish and Wildlife Service issuing (or revising) Biological Opinions (BO) on Delta smelt, salmon, and steelhead. Decisions on implementing new actions are made in separate project specific planning/environmental compliance processes.

The U.S. Fish and Wildlife Service (Service) delivered its Biological Opinion (BO) to the Bureau of Reclamation on Monday, December 15, 2008, on the effects of the continued operation of the Federal Central Valley Project and the California State Water Project on the delta smelt and its designated critical habitat.

The Service has determined that the continued operation of these two water projects as described in the Biological Assessment (BA) is likely to jeopardize the continued existence of the delta smelt and adversely modify its critical habitat. The BO is accompanied by a Reasonable and Prudent Alternative (RPA) intended to protect each life-stage and critical habitat of this federally protected species.

Reclamation initiated the formal phase of consultation in May 2008 and transmitted a revised BA in August of this year. Reclamation and the Service cooperated closely throughout the development of the BO and coordinated regularly with the California Departments of Water Resources and Fish and Game.

Reclamation is currently reviewing the BO, including the RPA, to determine if the BO can be implemented in a manner that is consistent with the intended purpose of the action, is within the agency's legal authority and jurisdiction, and is economically and technologically feasible.

Sacramento County General Plan Update

This project consists of the adoption of an updated General Plan for the County of Sacramento (Control Number 02-0105). This Plan is intended to guide the growth and development of the County through the year 2030, and supports the Sacramento Area Council of Governments' Blueprint Vision for regional land use and transportation. The County's existing General Plan was adopted by the Board of Supervisors in 1993 and is approaching its time horizon of 2010.
After conducting extensive public outreach and coordinating with various agencies, organizations and jurisdictions at the federal, state, and local level, the County unveiled the Public Review Draft of the General Plan on November 8, 2006. The Board of Supervisors then held additional public workshops to review the key themes of the General Plan, to receive and consider additional input from the public and other stakeholders, and to make changes to the draft General Plan. On May 30, 2007, the Board adopted a Resolution (No. 2007-0698) to transmit the Draft General Plan to the Department of Environmental Review and Assessment (DERA) to begin the environmental analysis of the Draft Plan.

With the conclusion of hearings before the Sacramento County Planning Commission on February 17, 2010, preparation of the Final EIR began. The FEIR was published on April 19th, 2010.

San Joaquin County General Plan Update

San Joaquin County is just beginning the comprehensive update of the General Plan for the unincorporated areas of the County. It is anticipated that the process will take three to five years. The current General Plan was adopted in 1992 and is effective through 2010. The General Plan expresses the long-range public policy to guide the use of private and public lands in regards to development and resource management. The Housing Element will be updated in 2009 and will be incorporated into the updated General Plan. The General Plan will include required elements addressing land use, circulation, safety, noise, open space, and conservation, and will, also, address agriculture and climate change.

The General Plan Update is scheduled to take 36 months, starting in June 2008 and concluding in June 2011. The update is being conducted as follows:

- Phase 1 - Project Start-up
- Phase 2 - Baseline Information Gathering (Background Report)
- Phase 3 - Housing Element Update
- Phase 4 - Issues and Opportunities Identification
- Phase 5 - Alternatives Evaluation
- Phase 6 - Draft General Plan
- Phase 7 - Environmental Review
- Phase 8 - Public Review
- Phase 9 - General Plan Adoption

During the General Plan Update, the Zoning Code will be evaluated for consistency with the new General Plan goals and policies. After adoption of the General Plan, the Zoning Code will be updated.

State Water Resources Control Board (SWRCB) Bay-Delta Strategic Workplan

On December 4, 2007, the State Water Board adopted Resolution 2007-0079 outlining regulatory actions the State Water Board, Central Valley Regional Water Board, and San Francisco Bay Regional Water Board will take, or will consider taking, to address Bay-Delta issues related to water supply, species protection, and water quality improvements. The resolution directs Water Board staff to develop a strategic workplan that prioritizes and describes the scope of Bay-Delta activities. Staff will present a workplan to the Water Board for its adoption in July 2008.

The Strategic Workplan for Activities in the San Francisco Bay/Sacramento - San Joaquin Delta Estuary was adopted by the State Water Board on July 16, 2008.

US Army Corps of Engineers (USACE) Delta Dredged Sediment Long-Term Management Strategy (LTMS)

Project Purpose

The Delta Long-Term Management Strategy (LTMS) is a cooperative planning effort to coordinate, plan, and implement beneficial reuse of sediments in the Sacramento and San Joaquin River Delta (Delta). Five agencies (USACE, USEPA, DWR, CBDA, and CVRWQCB) have begun to examine Delta dredging, reuse, and disposal needs. The Delta LTMS will explore ways to coordinate and manage dredging, planning, regulatory approval, and implementation to protect and enhance Delta functions, ecosystem, and water quality. The goals of the LTMS are to manage dredging activities to:

- Support and maintain Delta channel functions for navigation, flood control, water conveyance, and recreation.
- Maintain and stabilize Delta levees that protect land-based activities, water conveyance, and terrestrial ecosystems.
- Protect and enhance water quality for Delta water supply and ecosystem function.

Milestones

- Interagency Working Group (IWG) March 25, 2010 – teleconference
- Technical Working Groups (TWG) April 15, 2010—Sacramento
- Formulate Management Alternatives: July, 2010
- Programmatic EIS/EIR for Alternatives: FY11
- Adopt Sediment Management Plan: FY12

Current Work

- A Delta LTMS Technical Work Group meeting (TWG) was held on July 20 and was attended by representatives from USACE San Francisco and Sacramento Districts, USEPA, Central Valley Regional Water Quality Control (CVRWQCB), USFWS, Port of West Sacramento, Port of Stockton Contra Costa County, Solano County, Bay Planning Coalition and other stakeholders.
- The group discussed the various meetings attended and lessons learned. Updates were given on the progress of the Sacramento and Stockton Deep Water Ship Channels, CALFED Levee Stability Program, Delta Islands Feasibility Study, and the Bethel Island Project. For Sacramento DWSC there were updates given on the status of the draft SEIS, sediment testing report, hydrodynamic modeling and placement sites/beneficial use report. The RWQCB gave an update on the status of the general order.
- USACE, dredgers, and RWQCB staff had met within the past few months to discuss methyl Hg and have been conducting a monitoring study since last year. USACE has also drafted a list of practical field methods to reduce methylation. The use of credits and total Hg vs. methyl Hg are still issues to be determined.
- Additional updates, including past agendas and meeting minutes, can be found on the project website, http://www.deltaltms.com.

USACE Delta Islands and Levees Feasibility Study

Project Purpose

This feasibility study is the Corps' mechanism to participate in a cost-shared solution to a variety of water resources needs for which we have the authority. Results of state planning efforts will be used to help define problems, opportunities, and specific planning objectives. The feasibility study will address ecosystem restoration and flood risk management, and may also investigate related issues such as water quality and water supply. A feasibility cost-sharing agreement (FCSA) was executed May 26, 2006 with the DWR, our non-Federal sponsor.

Current Work

The Corps team members are meeting regularly with study partners from the California Department of Water Resources (DWR). Draft problem and opportunity statements focus the team on the authorized study purposes of Ecosystem Restoration, Flood Risk Management, and other related water resources purposes. Meetings were held in June 2010 to capture goals, constraints, and objectives that will lay the groundwork to identify data and information gaps.

On July 26th, 2010, the Project Delivery Team (PDT) conducted an inter-agency meeting with other Federal, State, and local agencies in order to get additional input on draft problems, opportunities, objectives, goals, and constraints. This agency coordination meeting is now planned to be held quarterly, with the next meeting in October. These and other planning components will guide revisions to the existing PMP, signed in 2006 with DWR, the non-Federal project sponsor.

USACE CALFED Levee Stability Program

Project Purpose

The CALFED Act (PL 108-361) directed the U.S. Army Corps of Engineers (USACE) to deliver a report that identified and prioritized potential levee stability projects in the Delta that could be carried out with the authorized $90 million in Federal funds. An additional $106 million was authorized to be appropriated by Section 3015 of WRDA 2007. To quickly identify critically needed projects with active non-Federal support, the USACE invited Delta stakeholders to submit project proposals with letters stating their willingness to participate as cost-sharing sponsors. In response, Delta area Reclamation Districts and flood management agencies submitted 68 project proposals totaling more than $1 billion in estimated costs. USACE evaluated proposals and prioritized potential projects according to how well they met USACE environmental, economic, and other implementation criteria. The USACE short-term strategy is to move quickly to construction on high priority levee reconstruction projects identified in that report. The authorized $196 million of Federal funds, plus the required non-Federal funds, would be an important first step to address Delta-wide levee system needs. The long-term strategy will be developed through the Delta Islands and Levees Feasibility Study process. The project delivery process includes: PMP/FCSA development; Project Implementation Report (PIR); SPD approval; Project Partnership Agreement (PPA) execution; design & construct; and operate & maintain.

Current Work

- The Corps team has completed draft PMPs for four LSP projects, including **McCormack-Williamson Tract, Bacon Island, Walnut Grove, and River Junction.** Final review and certification of PMPs and discussion of FCSAs with non-Federal sponsors is ongoing. The Corps team is preparing a draft PMP for the **Brannan-Andrus Levee Maintenance District** project for review in August. The team will begin preparing draft PMPs for the next group of projects in the program in September, 2010.

- The Draft Program Management Plan (PgMP) is currently being revised based on comments and additional information from the Corps team. The Draft PgMP will include templates for Project Management Plans (PMPs) and Feasibility Cost Sharing Agreements (FCSAs) developed for projects in the LSP.
- To date, the Kleinfelder-Geomatrix Joint Venture (K-G JV) contractors have submitted 30 Preliminary Draft Project Implementation Reports (PDPIRs) that will provide information for future PMPs.
- **Bethel Island Project** On July 13th, 2010, the **FCSA for Bethel Island – Horse-shoe Bend was signed** by the Bethel Island Municipal Improvement District (BIMID) and the Corps. With the FCSA and PMP signed, BIMID and the Corps have begun hydraulic and hydrologic (H&H) modeling of alternatives to determine the feasibility of the crosscut channel. Due to the limited summer in-water work window, BIMID has begun in-water and landside geotechnical borings concurrently with the H&H modeling. Information from these efforts will be used by the PDT to determine the viability of the crosscut channel in future alternatives analyses. The approved FCSA and PMP will be templates for future projects under CALFED LSP. With this approved template, the Corps will move forward with the FCSAs and PMPs for the next group of LSP projects.
- **Emergency Response Planning**
  A Memorandum of Agreement (MOA) was signed between USACE and DWR, allowing the Corps-DWR to initiate GIS Flood Contingency Mapping and Phase 1 of an Emergency Response Plan for the Delta region. The team has begun meeting with Delta counties to get input on the GIS products, response plan, and related data. The Corps/DWR team is also investigating next steps toward Phase 2 of the response plan.

Chapter 2
Identification of Project Preferred Alternatives

Chapter 2
Identification of Project Preferred Alternatives

Alternatives Screening

The project was analyzed at the program level as part of the preferred alternative in the CALFED Programmatic EIS/EIR, as described in Chapter 1. The CALFED programmatic documents (i.e., the certified Final EIS/EIR, its findings, and the ROD) provide information developed at the programmatic level for environmental review purposes and to be used as background and context for the screening of alternatives. The programmatic documents include the review and screening of broader alternatives such that this document may be focused at the project level, consistent with and in the context of the CALFED program. As part of the DEIR, DWR prepared a Description of Alternatives Evaluation Process Report (Appendix B) detailing the process by which a considerable range of project level measures have undergone screening as part of the identification of practicable alternatives to the project, as well as providing a project-specific evaluation independent of the CALFED documents. Based on the first screen of compatibility with the project objectives, the alternatives and their components described below were advanced for environmental analysis in the EIR.

Alternatives Descriptions

Various actions and measures to meet the project objectives were developed and refined through technical brainstorming sessions, public and agency scoping input, hydraulic modeling, and stakeholder participation. These actions, termed *components* herein, were packaged as alternatives, described below, and summarized in Table 2-1. To assist in distinguishing components from alternatives, each component title begins with an action word, such as *install* or *excavate*. Alternative titles are nouns and represent broader strategies or approaches, typically composed of numerous component actions. A more detailed discussion of each of the proposed alternatives is provided in Chapter 2 of the Draft EIR for the North Delta Flood Control and Ecosystem Restoration Project.

Table 2-1. Summary of Project Alternatives by Group

Group	Alternative Code	Alternative Description
–	NP	No Project
1	1-A	Fluvial Process Optimization
1	1-B	Seasonal Floodplain Optimization
1	1-C	Seasonal Floodplain Enhancement and Subsidence Reversal
2	2-A	North Staten Detention
2	2-B	West Staten Detention
2	2-C	East Staten Detention
2	2-D	Dredging and Levee Modifications

One alternative from each group ultimately was selected to advance as the preferred alternative. Comments received on the administrative draft and public EIRs were considered in determining the Preferred Alternatives 1-A (Group 1), and the No Action Alternative (Group 2). The preferred alternatives did include optional components, which were analyzed for inclusion in the project.

The alternatives are described in this chapter by component. As many components are common among alternatives, each component is described only at its first occurrence and is referred to by title thereafter unless there are distinctions about the component specific to that alternative. The alternatives and components are summarized in Table 2-2-A (Group I) and Table 2-2-B (Group II), wherein *X* denotes that the component is included in the alternative and *OP* denotes the component is optional to the alternative.

Table 2-2-A. Summary of Group I Alternatives and Components

	1-A	1-B	1-C
	Fluvial Process Optimization	Seasonal Floodplain Optimization	Seasonal Floodplain Enhancement and Subsidence Reversal
Degrade McCormack-Williamson Tract East Levee to Function as a Weir	X	X	X
Completely degrade McCormack-Williamson Tract Southwest Levee to match elevation of Island floor	X	X	X
Reinforce Dead Horse Island East Levee	X	X	X
Modify Downstream Levees to Accommodate Potentially Increased Flows	X	X	X
Construct Transmission Tower Protective Levee and Access Road	X	X	X
Demolish Farm Residence and Infrastructure	X	X	X
Enhance Landside Levee Slope and Habitat	X	X	X
Modify Landform and Restore Agricultural Land to Habitat	X	X	X
Modify Pump and Siphon Operations	X	X	X
Breach Mokelumne River Levee	X		
Allow Boating on Southeastern McCormack-Williamson Tract	X		
Construct Box Culvert Drains and Self-Regulating Tide Gates		X	X
Construct Cross-Levee to Create Subsidence-Reversal Demonstration Area			X
Import Soil for Subsidence Reversal			X
Implement Local Marina and Recreation Outreach Program	X	X	X
Excavate Dixon and New Hope Borrow Sites	X	X	X
Excavate and Restore Grizzly Slough Property	X	X	X
Dredge South Fork Mokelumne River	OP	OP	OP
Enhance Delta Meadows Property	OP	OP	OP

Table 2-2-B. Summary of Group II Alternatives and Components

	2-A	2-B	2-C	2-D
	North Staten Detention	West Staten Detention	East Staten Detention	Dredging and Levee Modifications
Construct Inlet Weir	X	X	X	
Construct Interior Detention Levee	X	X	X	
Construct Outlet Weir	X	X	X	
Install Detention Basin Drainage Pump Station	X	X	X	
Reinforce Existing Levees	X	X	X	
Construct Setback Levee		X	X	
Degrade Existing Levee	X	X	X	
Relocate Existing Structures	X	X	X	
Modify Walnut Grove–Thornton Road and Staten Island Road	X			
Retrofit or Replace Millers Ferry Bridge	OP	X	OP	OP
Retrofit or Replace New Hope Bridge	OP	OP	X	OP
Construct Wildlife Viewing Area	X	X	X	
Excavate Dixon and New Hope Borrow Sites	X	X	X	
Dredge South Fork Mokelumne River				X
Modify Levees to Increase Channel Capacity				X
Raise Downstream Levees to Accommodate Increased Flows				X

Alternative NP: No Project

Consideration of a no-project or no-action alternative is required for CEQA and NEPA. Herein called the no-project alternative, this alternative compares existing baseline conditions and the likely future conditions in the project area without the implementation of the entire project or one of the project groups. Under the no-project alternative, the existing conditions are compared with projected future conditions at a planning horizon of 2025. If the project were not implemented, the components described below for improvements to flood control, ecosystem restoration, and recreation would not be implemented. It is not definitively known whether farming would continue because of the presently marginal profitability; however, it is assumed for the future no-project condition that agriculture would continue and cropland would be the dominant cover type, consistent with the existing condition.

Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely Degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

Degrade McCormack-Williamson Tract East Levee to Function as a Weir

Objective

Extensive hydraulic modeling shows that it is necessary to degrade a portion of the east and southwest levees on McCormack-Williamson Tract to achieve desired flood control benefits in the upper portion of the project area measured as stage reductions at Benson's Ferry. Because the North Delta study area is limited by channel capacity, and McCormack-Williamson Tract levees are legally restricted in height, water may overtop the east levee on McCormack-Williamson Tract during large storm events. When the east levee is overtopped, McCormack-Williamson Tract fills and causes the southwest levee to breach catastrophically, causing a surge effect downstream that displaces boats and precipitates further levee failures. Lowering the elevation of the McCormack-Williamson Tract levees would allow flow to move through the tract in a controlled manner, eliminating this surge effect. To convey high river stages into McCormack-Williamson Tract, the degraded east levee would be reinforced as a hardened weir to direct flow and minimize erosion.

Location

This project component would affect the east levee of McCormack-Williamson Tract, about 1,000 feet west of I-5 (see Figure 2-1). The affected portion of the levee is approximately 3,700 feet long.

Design and Construction

The east levee of McCormack-Williamson Tract would be lowered to allow flood flows onto the tract (see Figure 2-1). Three thousand feet of the east levee would be degraded to an elevation of 8.5 feet (from an existing elevation of 17 feet to 18.5 feet). This elevation has been established to maintain the current level of access to the transmission tower via the east levee, including a 30-inch layer of rock slope protection (RSP) consisting of 24-inch angular rock placed along the entire face and crest of the degraded levee as prescribed by the USACE (USACE 1991). The levee crest would also include a paved access road with 1-foot concrete retaining walls to serve as a pavement-containment edge and to prevent undercutting.

The riverside levee slope would be over-excavated an additional 30 inches from the crest to 10 feet down the slope, in which RSP of the size specified above would be placed to protect against erosion caused by turbulence in the approaching flow.

On the landside toe of the levee, a 3-foot-deep sill would be excavated to dissipate the energy of overtopping water cascading down the landside levee face. RSP would be placed from the crest of the levee down the landside face, in the toe sill, and onto the floor of the island for an additional 6 feet beyond the toe sill. RSP placed on the landside face of the levee and on the floor of the island would be placed directly on the existing land surface to avoid unnecessary excavation. One or more filter layers would be placed under all RSP areas to prevent scour of the underlying soil. Grading and excavation of exit channels would ensure that fish are not entrapped in the toe sill as floodwaters recede from the island.

Operations and Maintenance

Vegetation management (by herbicide application, mowing, or removal with hand tools) may be required periodically.

Completely Degrade McCormack-Williamson Tract Southwest Levee to Match the Elevation of the Island Floor

Objective

The southwest levee of McCormack-Williamson Tract would be lowered to allow floodflows to pass out of the tract without causing a surge effect, as described above. To convey high river stages out of McCormack-Williamson Tract, the degraded southwest levee would be reinforced as a hardened weir to direct flow and minimize erosion. During low-flow seasons, the lowered southwest levee would allow tidal exchange on the island from the south.

Location

The southwest levee of McCormack-Williamson Tract is located on the southwest side of the island adjacent to Dead Horse Cut. The affected portion of the levee is approximately 3,500 feet long.

Design & Construction

The McCormack-Williamson Tract southwest levee would be degraded along the entire length of Dead Horse Cut to match the elevation of the island floor (between –1 foot and –2.5 feet) from an existing elevation of 15 feet . This would allow floodflows to pass out of the tract without causing a surge effect. This would also allow tidal water onto the tract from the southern end, facilitating the formation of dendritic intertidal channels at elevations near sea level and keeping the southernmost portion of the tract as shallow open water.

The potential for scour along the embankment between the untouched levee and the breach requires the placement of 24-inch angular RSP (USACE 1991) to a depth of 30 inches along the 3:1 grade-matching slope as well as the adjacent levee faces. A 60-inch launchable RSP toe should be placed along the base of the 3:1 grade and in the river channel along the levee toe. *(Note: Launchable RSP refers to an approach of placing rock in piles or rows in anticipation of erosion, such that it seeks its own resting place where needed by gravity or hydraulic force.)* The area of protection required will vary with levee geometry, the invert of the Mokelumne River, and landform elevation within the tract. One or more filter layers would be placed under all RSP to prevent scour of the underlying soil.

Operations & Maintenance

This feature will be adaptively managed to avoid inducing growth of nonnative invasive species. Vegetation management (by herbicide application, mowing, or removal with hand tools) may be required periodically.

Reinforce Dead Horse Island East Levee

Objective

Because of increased lateral flows and higher velocities from water flowing through McCormack-Williamson Tract, the riverside face of the eastern levee on Dead Horse Island may require additional erosion protection.

Location

This levee is located along the eastern edge of Dead Horse Island, directly across Dead Horse Cut from the southwestern end of McCormack-Williamson Tract.

Design and Construction

The entire Dead Horse Island east levee (approximately 3,000 feet) is currently protected with RSP. To withstand the increased lateral flows and velocities associated with water flowing through McCormack-Williamson Tract, the Dead Horse east levee would be reinforced with the placement of 18-inch RSP to a depth of 24 inches. A 48-inch launchable toe would be placed in the river channel to prevent scour of the waterside toe of the levee. One or more filter layers would be placed under all RSP to prevent scour of the underlying soil.

Operations and Maintenance

Vegetation management (by herbicide application, mowing, or removal with hand tools) is currently required to maintain the Dead Horse levee. After reinforcement of the Dead Horse east levee, similar vegetation management may be required periodically.

Objective

Because of increased lateral flows and higher velocities from water flowing through McCormack-Williamson Tract, the riverside face of the eastern levee on Dead Horse Island may require additional erosion protection.

Location

This levee is located along the eastern edge of Dead Horse Island, directly across Dead Horse Cut from the southwestern end of McCormack-Williamson Tract.

Design and Construction

The entire Dead Horse Island east levee (approximately 3,000 feet) is currently protected with RSP. To withstand the increased lateral flows and velocities associated with water flowing through McCormack-Williamson Tract, the Dead Horse east levee would be reinforced with the placement of 18-inch RSP to a depth of 24 inches. A 48-inch launchable toe would be placed in the river channel to prevent scour of the waterside toe

of the levee. One or more filter layers would be placed under all RSP to prevent scour of the underlying soil.

Operations and Maintenance

Vegetation management (by herbicide application, mowing, or removal with hand tools) is currently required to maintain the Dead Horse levee. After reinforcement of the Dead Horse east levee, similar vegetation management may be required periodically.

Modify Downstream Levees to Accommodate Potentially Increased Flows

Objective

To address the hydraulic effects of opening McCormack-Williamson Tract to more frequent inundation and flow, downstream levees would be raised as needed on the North Fork Mokelumne River to maintain freeboard.

Location

Levees are proposed to be raised as needed along portions of the North Fork Mokelumne River. Levees on opposite sides of the waterway are proposed to be raised in parallel (i.e., matching in profile).

Design and Construction

Hydraulic modeling results indicate that the implementation of Alternative 1-A would require minor levee raises along portions of the North Fork Mokelumne River on the order of 1 to 2 inches (see Appendix E for more information on hydraulic modeling for the project). These modest increases could be accomplished by adding stabilized and compacted aggregate base to the levee crown and would not affect the footprint or sideslopes of the levee.

Operations and Maintenance

The levees affected by this component would continue to be managed as they are under existing conditions. These activities include vegetation management (by herbicide application, mowing, or removal with hand tools), placement of RSP to address waterside erosion, and restoration of the aggregate base patrol road with new material placed and graded to maintain a drivable surface.

Construct Transmission Tower Protective Levee and Access Road

Objective

Construction of a protective levee would be needed to maintain the current level of flood protection for the property being leased by KCRA-3. All alternatives are required to maintain the current level of flood protection and road access with no additional flood risk for the property being leased. The levee would protect the transmission tower and associated control building. Degrading the McCormack-Williamson east levee would necessitate constructing a new access road to the transmission tower.

Location

The transmission tower protective levee would be constructed in the northwest corner of McCormack-Williamson Tract. The access road would be constructed along the degraded portion of the east levee on McCormack-Williamson Tract.

Design and Construction

The length of the levee would be 4,000 feet. The elevation of the levee is to be set to maintain the current level of protection and would key into the existing north and south levees. Borrow from the Grizzly Slough property and the Dixon and New Hope borrow sites, both described below, would provide the extra soils needed to build this levee. The access road would be integrated with the hardened weir structure constructed on the degraded portion of the east levee. The road surface would provide all-weather access, proposed to be concrete at the weir and compacted aggregate base on the levee crown.

Operations and Maintenance

The levee would be maintained according to current levee standards for vegetation control, erosion protection, slope stability, and patrol access, in a similar condition to existing levees. The access road would be managed for vegetation, either by mowing or herbicide application at the shoulders and side-slopes. The aggregate base surface would be periodically refreshed with new material and graded to maintain a drivable surface. In the event that the transmission tower lease were not continued, maintenance may be terminated or the levee may be removed.

Demolish Farm Residence and Infrastructure

Objective

A multi-family farmworker residence (the two-story, wood-frame type commonly used for housing migrant farmworkers) and associated farm outbuildings (sheds) would be removed to allow water to flow unimpeded through the tract, to prevent the structures from being dislodged during high flows, and to complement restoration of the tract to habitat.

Location

The structures are located in two concentrations on the southeast levee in the upper half of McCormack-Williamson Tract (see Figure 2-1).

Design and Construction

The structures would be demolished with bulldozers, and the material would be hauled away by dump trucks to an appropriate permitted disposal site. Select material, such as doors, windows, siding, lumber, timbers, and steel, may be salvaged. It should be noted that fuel tanks are present and it is likely that agricultural chemicals have also been stored on site; therefore, these locations would need to be evaluated for the potential to contribute hazardous materials into the aquatic environment from inundation. These fuel tanks would be removed, and any legacy contamination would be safely removed before flooding is allowed to occur.

Operations and Maintenance

No operations or maintenance would be required for this component.

Enhance Landside Levee Slope and Habitat

Objective

"Wildlife-friendly" levees are proposed to provide a diversity of vegetative cover for wildlife habitat and to provide additional levee stability and interior erosion protection from periodic inundation.

Location

This component is proposed on the landside levee slopes around McCormack-Williamson Tract .

Design and Construction

The landside of all McCormack-Williamson Tract levees (where there are no other treatments proposed) would be reconfigured with a varying slope, ranging from 3:1 to 6:1 and undulate in planform and profile to create a more naturalistic land surface. Borrow from the Grizzly Slough property and the Dixon and New Hope borrow sites, both described below, would provide the extra soil material needed to achieve a more gentle slope on the landside of the McCormack-Williamson Tract levees. Approximately 21,600 linear feet of levee would be modified in this manner. In total, approximately 70 acres would be planted with native trees, shrubs, and grasses. The levee habitat is intended in part to be dedicated and managed as mitigation of project impacts. The plantings may be irrigated for an establishment period of approximately 3 years.

The exterior slopes of the levees would not be affected.

Operation and Maintenance

A Standard Operating Procedure (SOP) would be developed as part of the AMP to preferentially remove nonnative invasive species and retain native vegetation on the slopes of the levees. Vegetation management (by herbicide application, mowing, or removal with hand tools) may be required periodically.

Modify Landform and Restore Agricultural Land to Habitat

Objective

The cultivation of agricultural crops on McCormack-Williamson Tract would be discontinued, and the land would be restored to native vegetation types for wildlife habitat. Restoration activities would include modifying the landform to ensure positive drainage and minimize the potential for fish-stranding.

Location

The interior of McCormack-Williamson Tract would be affected by this action, except for levee slopes and the area included by the transmission tower protective levee.

Design and Construction

Under the fluvial process optimization scenario, hydrologic and hydraulic forces as allowed by degrading and breaching the levees are envisioned to reform the interior of McCormack-Williamson Tract and facilitate conditions for natural revegetation.

To assist these processes and facilitate habitat benefit, minor grading would occur to ensure positive drainage and provide more diverse geomorphic surfaces. At the upper end of the tract on the landside of the east levee, large depressions resulting from scour caused by previous levee failure events would be filled with material from the degraded east levee to reduce the risk of fish-stranding when high flows recede. Smaller depressions along the west side of the tract would be treated similarly.

At the lower end of the tract, starter channels would be graded at intertidal elevations to encourage formation of natural dendritic tidal channels and to ensure positive drainage to minimize the potential for fish-stranding. It is intended that a dendritic channel network would provide a maximum amount of edge habitat for native fish as well as provide positive draining of the tract after high-flow events to avoid fish-stranding. The channels would be located within the intertidal zone, which would be inundated at mean high high water (MHHW) levels but dry at mean low low water (MLLW) levels. This range is approximately 0.23 feet to 3.31 feet National Geodetic Vertical Datum (NGVD). The channels therefore would dry out on a daily basis, preventing the establishment of exotic submerged aquatic vegetation. The channel system would be designed to mimic natural dendritic systems, in which surface drainage streams branch randomly at various angles. Excess material would be used to fill depressions described above.

To facilitate conversion to native vegetative cover types, a combination of passive and active approaches likely would be used. It is acknowledged that risk inevitably is associated with natural revegetation. Many factors contribute to this risk, such as proliferation of weed species in Central Valley wetland systems that are adapted to more aggressive colonization than native species, an altered hydrologic regime that is unpredictable relative to native seed dispersal, and uncertainty of the actual hydrologic and hydraulic patterns caused by the project. These and other details will be evaluated during engineering design with the goal of ensuring establishment of desirable native vegetation; however, it should be noted that sites in the project watershed are successfully recolonizing with native species, such as those at the upstream Cosumnes River Preserve.

To reduce risk and minimize potential for colonization by exotic vegetation species, native and non-invasive starter vegetation would be planted, such as tule in the wetter southern portion of the island and grasses in the drier northern part. Over time, flooding events would import propagules such as willows, cottonwoods, and perennial herbs that would naturally colonize on higher areas and tules and other water plants at intertidal and subtidal elevations. Planting of other woody and herbaceous species may be proposed in the final project design, if further study shows they are warranted to ensure native vegetative cover and preclude nonnative invasive species. A supplemental irrigation system may also be implemented to facilitate vegetation establishment. These active approaches to revegetation would likely focus on compensatory habitat required for mitigation of project impacts.

Operations and Maintenance

The overall approach to land management would be relatively "hands off," similar to practices at TNC's upstream Cosumnes River Preserve. Vegetation management (by herbicide application, mowing, or removal with hand tools) may be required periodically. Prescribed burning and strategic grazing will be evaluated as elements of the project's adaptive management plan.

Herbivore protection shelters and fencing may also be needed to prevent plant predation from beavers, although beavers may provide a benefit by thinning forested areas to maintain diverse cover. These actions will be elements of the project's adaptive management plan.

Irrigation, if needed, would use existing agricultural siphons with a pressurized closed delivery system (i.e., pipes and nozzles).

Modify Pump and Siphon Operations

Objective

McCormack-Williamson Tract contains water management infrastructure to facilitate agricultural practices, including approximately five irrigation pumps and siphons that draw water out of adjacent waterways and two drainage pumps that return excess water to the surrounding waterways, in addition to portable pumps and a domestic well pump. These devices would be selectively decommissioned or reused to facilitate habitat development. The remaining pumps and siphons would be screened to reduce impacts on fish.

Location

The irrigation and drainage pumps are located around the perimeter of McCormack-Williamson Tract.

Table 2-3. Existing Pumps at McCormack-Williamson Tract

Station Number or Item Code	Water Body	Purpose	Rating
15+00	Mokelumne River	Direct pumping for irrigation	25 HP (electric)
30+00	Mokelumne River	Direct pumping for irrigation	10 HP (electric)
80+00	Mokelumne River	Direct pumping for irrigation	20 HP (electric)
145+00	Mokelumne River	Drainage	60 HP (electric)
260+00	Snodgrass Slough	Siphon priming for irrigation	5 HP (gasoline)
305+00	Snodgrass Slough	Drainage	50 HP (electric)
360+00	Lost Slough	Siphon priming for irrigation	5 HP (gasoline)
PD	Interior ditches	Two portable pumps of this type for irrigation distribution	2 each 105 HP (diesel)
PP	Interior ditches	Two portable pumps of this type for irrigation distribution	2 each 60 HP (propane)
DW	Underground well	Domestic use	1 HP (electric)

Design and Construction

Under Alternative 1-A, the change in use for each pump is described in Table 2-4.

Table 2-4. Change in Pump Use under Alternative 1-A

Station Number or Item Code	Baseline Use	Proposed Use
15+00	75% during June, July, and August for crop irrigation	25% during June, July, August, September, and October to establish native vegetation
30+00	back-up only for crop irrigation	Decommission
80+00	20% during April and May; 75% during June, July, and August; and 10% during September for crop irrigation	25% during June, July, August, September, and October to establish native vegetation
145+00	1 hour per day throughout year, continuous during high-water events for drainage	Decommission
260+00	20 minutes per week during June, July, and August to prime crop irrigation siphon	Same as baseline to establish native vegetation
305+00	1 hour per week throughout year, continuous during high-water events for drainage	Decommission
360+00	20 minutes per week during June, July, and August to prime crop irrigation siphon	Same as baseline to establish native vegetation
PD	10 hours per day, 6 days per week during June, July, and August for crop irrigation	Decommission
PP	10 hours per day, 6 days per week during June, July, and August for crop irrigation	Decommission
DW	2 hours per day throughout year for domestic use	Decommission

Decommissioned pumps would be removed from the site and salvaged for reuse. The network of distribution ditches for irrigation and collection ditches for drainage would be filled, concurrent with activities described above to modify the landform to facilitate positive drainage. Pipes through the levee would be filled with concrete or soil, capped at the ends, and abandoned in place. The electrical distribution system to decommissioned pumps would be demolished and removed from the tract.

Irrigation pumps proposed for reuse would be screened and fitted with a pressurized delivery system to irrigate the revegetation areas (primarily on the enhanced levee slopes) through a 3-year establishment period; the delivery system would be left in place for potential future use to be determined through adaptive management. The screens would be designed to meet DFG and NOAA fish screen criteria. It should be noted that the pumps on the southeast levee of the tract (between the proposed levee breach and degraded southwest levee) would become isolated and may be accessible only by boat (under Alternative 1-A only).

Operations and Maintenance

Pumps proposed for reuse would be operated as described above and would be maintained consistent with existing operations, including semiannual inspection for operability. Any abandoned facilities would be inspected annually to ensure their anchoring is sound and that they do not pose a threat to safety.

Breach Mokelumne River Levee

Objective

The Mokelumne River levee of McCormack-Williamson Tract would be breached to allow a secondary channel of the Mokelumne River to meander through the tract and establish hydraulic connectivity between the breach and the southwestern end of McCormack-Williamson Tract. A starter channel would be excavated to facilitate channel-forming processes in the interior of the tract. Riparian forest should colonize the channel banks.

Location

The 300-foot breach would be cut into the southern levee on McCormack-Williamson Tract at approximately Station 15+00 on the Mokelumne River .

Design and Construction

The breach would be broken down into two side tiers at elevation 3.5 feet and one central tier at 0 feet NGVD . The lower tier would remain unprotected so that it could scour and eventually form into a natural channel inlet. The side tiers would be planted to protect against erosion and to precipitate colonization of the area by appropriate species.

To protect the interface between the breach and the existing levee, 24-inch RSP would be placed to a depth of 30 inches along the exposed 3:1 slope that matches the different grades. A 60-inch launchable RSP toe would be placed in the river channel to prevent undercutting of the RSP. One or more filter layers would be placed under all RSP to prevent scour of the underlying soil.

A starter channel also would be excavated on the floor of the tract for approximately 3,000 feet to encourage flow through the inlet. The starter channel would be graded to integrate with the topography on the floor of the tract to minimize potential for fish-stranding and would drain toward the bottom of the tract.

Operations and Maintenance

This feature will be adaptively managed to avoid inducing growth of nonnative invasive species. Vegetation management (by herbicide application, mowing, or removal with hand tools) may be required periodically.

Allow Boating on Southeastern McCormack-Williamson Tract (Optional)

Objective

The degradation of the southwest levee to below sea level would open up the southern portion of the island to tidal influence. Boating would be allowed on the southern half of the island to enhance recreation opportunities in the North Delta.

Location

The southern portion of McCormack-Williamson Tract subject to hydrology sufficient to float small recreational craft would be open to recreational use.

Design and Construction

No construction would be required to facilitate boat use. No new facilities for parking or launching would be developed, as it is assumed that users would come from facilities existing nearby (however, a separate optional component is proposed to enhance the Delta Meadows property, including the existing boat launch facility). Signage would be placed on the levee ends, or buoys may be anchored in the water to limit speeds to less than 5 miles per hour, consistent with the surrounding Delta Meadows property.

Operations and Maintenance

No active operations or maintenance would be required. Periodic monitoring (inspections) may be conducted to ensure habitat features are not being adversely affected by boating.

Implement Local Marina and Recreation Outreach Program

Objective

Anecdotal information from prior flood events indicates that one of the key factors influencing increasing water surface elevation and exacerbating flood damage has been boats that have come adrift from local marinas during floods and consequently become lodged upon the structures of the Millers Ferry Bridge and New Hope Bridge. This phenomenon results in the trapping of additional debris and the constricting of conveyance capacity, thereby raising upstream water surface elevation as well as putting increased pressure on the bridges themselves.

The project would include a DWR-sponsored local marina outreach program in coordination with the Delta Protection Commission (DPC) to educate marina operators and boat owners on precautions to minimize flood damage risks and to coordinate high-flow forecasting with marina operators to give warning about pending floods, with the intent that boats could be adequately secured or relocated.

Early discussions in formulating project components included consideration of closing or relocating one or both of the marinas in the project area. Marina relocation or closure is no longer under consideration as an action of the project for the following reasons.

- Marina closure or relocation does not directly address the purpose and objectives of the project, as it more closely treats a symptom of the surge effect rather than the cause (uncontrolled flow) and does not directly lower stage or increase capacity in a substantial way.
- Because of local business interests and North Delta recreational use represented by the marinas, closure is not considered to be a sound political or economic option at this time.
- No readily identifiable site opportunities for relocation have emerged as viable or suitable while still meeting local needs and demands.

Therefore, marina closure or relocation will not be carried forward as a component of the project in the scope of this document; however, it is recommended that actions to address the marinas be evaluated further for potential to incrementally reduce flood risk. Specifically, a special study to evaluate boating facility needs in terms of type, capacity, location, amenities, and recommended alternatives for the Walnut Grove area should be commissioned to further relative studies including the Delta Recreation Master Strategy: Aquatic Resources Focus prepared by the DPC in 2005.An additional element of outreach would be highlighting existing recreational opportunities and facilities available to the public, such as fishing access, wildlife viewing, and boat launches to promote lawful public use.

Design and Construction

No facility construction would be required.

Operations and Maintenance

This component approaches the marinas' role in flooding in two ways: coordinated operations with local flood control officials and marina operators, and evaluation of a relocation study. Consideration will be given to developing conditions for inclusion in marina leases to mitigate potential marina-related flood issues. Provisions could include requirements such as a bond to cover the costs of damages if required precautions are not taken or the marina facilities are not maintained to standard.

Coordinated Operations

Each fall, DWR will coordinate with local flood control officials to visit the marinas to warn of the hazard created when boats break free from their moorings during floods. Marina operators will be asked to:

- remind tenants of the hazard created when boats break free from their moorings during floods through signage, notices, or mailings to tenants;
- temporarily relocate boats moored in locations where they are prone to break free during floods into vacant berths where they will be safer during floods or into upland storage areas; and
- inspect moored boats when local rivers reach flood stages to ensure that they are safely moored.

When floods are forecast, DWR will coordinate with local flood control officials and marina operators to warn of pending high flows. To facilitate this program, DWR will develop and maintain a communication directory and protocol, including flow standards that would trigger response. After floods, DWR will coordinate with local flood control officials to meet with marina operators to review any hazards created by their moorings or boats during the flood and, if necessary, to suggest additional measures to mitigate flood hazards related to the boats or moorings.

DWR will further coordinate with local flood control officials to report incidents of boats breaking loose from moorings during floods and any recommendations about improving the marinas' flood safety to the Department of Boating and Waterways, county building department, the sheriff, the State Lands Commission, or other agencies with regulatory responsibility or other duties regarding the marinas. This authority is provided in the Harbors and Navigation Code Section 523(a), stipulating, in part, that a peace officer, an appropriately designated employee of the State Lands Commission, or a county or city marine safety officer may remove and, if necessary, store a vessel under the following circumstances: (1) when the vessel is left unattended and is moored or docked in a condition that creates a hazard to … public safety or to the property of another; (5) when the vessel … poses a danger to navigation or to the public health, safety, or welfare; or (6) when the vessel poses a threat to adjacent … levees.

Relocation Study

DWR will work with the DPC and other state and local entities to determine need and interest in a study of relocation of the area marinas. The scope of the study may include background information on the marina use (including identifying user groups, activities, and trends), analysis of economic feasibility, comparison to other marinas in the project area, evaluation of operating constraints, identification of alternative sites, and recommendations (including measures to improve the marinas in their current location).

Outreach

DWR will coordinate with the California Department of Parks and Recreation (DPR), DPC, Boating and Waterways, and the California Coastal Commission Clean Boating Network to define key locations available to the public that have recreational benefit. Emphasis would be on promoting recreational opportunities where there is a lack of public awareness. Public outreach would be achieved by communicating with the public through focus discussion meetings and workshops, the Internet, mailings, signage, and providing willing public and private entities (e.g., post offices, marinas, and bait shops) with flyers/pamphlets to make available to the public.

Excavate Dixon and New Hope Borrow Sites

Objective

Levee construction proposed under the project necessitates more borrow than is available on site. Thus, additional borrow would be excavated and transported from two parcels owned by DWR in the project area.

Location

Figure 2-10 of the Draft EIR shows the location of the two proposed borrow sites owned by DWR and the routes that would be used to haul the borrow to the project sites (Note: This figure also shows the Grizzly Slough property and associated haul routes, as described under the next component). The Dixon site is located immediately east of the McCormack-Williamson Tract east levee, and the New Hope site is located on New Hope Tract, south of McCormack-Williamson Tract and east of Staten Island.

Design and Construction

The first step in borrow operations would be clearing and grubbing the land surface to remove any woody vegetation. The top 2 feet of the soil profile would then be stockpiled on site for replacement at the conclusion of borrow excavation to allow recolonization by the on-site seedbank.

Earthmoving between the Dixon site and McCormack-Williamson Tract is a short distance over private unpaved roads; therefore, it is assumed that material would be excavated, transported, and placed with scrapers. Earthmoving between the Dixon site and Staten Island is a greater relative distance over public paved roads; therefore, it is assumed that material would be excavated by excavators, transported by truck, and placed with dozers.

Earthmoving between the New Hope site and McCormack-Williamson Tract or Staten Island is a greater relative distance over public paved roads; therefore, it is assumed that material would be excavated by excavators, transported by truck, and placed with dozers.

Following excavation, sideslopes at the borrow sites would be graded to a maximum steepness of 3:1 (horizontal to vertical), and the stockpiled topsoil would be replaced to allow natural revegetation.

Operations and Maintenance

The sites would be monitored to ensure erosion is not contributing to sedimentation of local waterways and to ensure that revegetation is occurring.

Excavate and Restore Grizzly Slough Property

Objective

The objectives for breaching the Grizzly Slough property (see Figure 2-11) levees and regrading the land surface are:

- recreating a frequently flooded riparian woodland to provide habitat for birds and fish,
- improving local ecosystem health by reconnecting Grizzly and Bear Sloughs to the floodplain,
- mitigating impacts on riparian woodland associated with other project components, and

- generating borrow material for use on McCormack-Williamson Tract to construct wildlife-friendly levees and/or the transmission tower protective levee.

Breaching or degrading portions of levees along the Grizzly Slough property adjacent to Bear and Grizzly Sloughs would increase flood frequency and provide annual connection to the adjacent sloughs. These actions would maximize floodplain habitat to benefit fish species that spawn on the floodplain and to reestablish natural floodplain processes. Potential additional work to encourage floodplain processes and maximize floodplain habitat includes excavating and regrading the floodplain terrace in Grizzly Slough to encourage formation of a secondary channel system. Over time, riparian habitat is expected to establish itself on the Grizzly Slough property (see Figure 2-12). Material from Grizzly Slough levee breaches, degradation, or regrading would provide a source of material for construction of other project elements.

Location

The levee breaching or degradation would be performed on the DWR-owned Grizzly Slough property along the northeast and northwest levees adjacent to Bear and Grizzly Sloughs, respectively. The Grizzly Slough breach would be in the vicinity of the DFG mitigation wetlands near the northernmost tip of the Grizzly Slough property. The Bear Slough breach would be located on the western bank of the Bear Slough levee just north of the New Hope Bridge on the eastern edge of the property. Excavation and regrading would occur on the interior of the Grizzly Slough property.

Design and Construction

The northeast and northwest Grizzly Slough property levees, adjacent to Bear and Grizzly Sloughs, respectively, would be breached or degraded at the locations described above to allow more frequent floodflows onto the property (see Figure 2-4). Each breach would be approximately 60 feet wide. The Grizzly Slough property currently floods during all flood events greater than roughly 2- to 3-year frequency, so the breaches and regrading would not affect the property's function in high-flow events.

In addition, a shallow starter channel would be excavated across the southeast portion of the site from Bear Slough toward Grizzly Slough. Additional grading may lower a more extensive portion of the site by up to 1 foot. The most open scenario would entail complete removal of both the Grizzly and Bear levees, making approximately 220,000 cubic yards of fill available for other project elements and providing the greatest hydraulic connectivity . The least open scenario would include a 60-foot breach on each of the Grizzly and Bear Slough levees, making 1,900 cubic yards of fill available.

The most extensive excavation scenario would include excavation of an approximately 200- to 900-foot varied-width swale to increase the inundated area and provide 286,000 cubic yards of borrow as well as a uniform 1-foot excavation across the property to provide an additional 648,000 cubic yards of borrow.

A low levee paralleling New Hope Road may be proposed in final design if needed to mitigate flooding of the roadway. However, one-way or manually operated gate or culvert structures would be constructed in this levee to maintain the natural hydrology of the area and ensure that floodflows from the south are able to flow onto the Grizzly Slough property, as thought to occur under the existing conditions, so as not to increase flooding potential south of New Hope Road. This levee would be constructed to the north of the ditch paralleling New Hope Road in order to preserve habitat currently in the ditch.

An outlet would be excavated for the toe drain running parallel to the Grizzly Slough levee in order to decrease the risk of fish-stranding on the property. The outlet would be excavated on the north end of the channel, in the direction of flow.

Provisions to maintain access to a privately owned parcel landlocked within the property will be included in final design.

Flooding events would import propagules such as willows, cottonwoods, and perennial herbs that would naturally colonize frequently flooded portions of the site. Once established, young willows and cottonwoods should be able to access the relatively shallow groundwater in these areas. On higher areas, planting oaks, elderberries, native grasses, or other species may be proposed in the final project design, if further study shows they are warranted; however, other sites in the area have exhibited successful native colonization (such as the “Accidental Forest” at TNC’s adjacent Cosumnes River Preserve).

Operations and Maintenance

The overall approach to land management would be relatively “hands off,” similar to practices at the adjacent Cosumnes River Preserve. Vegetation management (by herbicide application, mowing, or removal with hand tools) may be required periodically. Prescribed burning and strategic grazing will be evaluated as elements of the project’s adaptive management plan. Herbivore protection shelters and fencing may also be needed to prevent plant predation from beavers, although beavers may provide a benefit by thinning forested areas to maintain diverse cover. These actions will be elements of the project’s adaptive management plan.

Dredge South Fork Mokelumne River (Optional)

Objective

This component is optional in Group I and provides additional channel capacity through dredging the river bottom to remove accumulated sediment. The cross-sectional area of the channel would be increased to improve conveyance without change to the levees.

Although occurring within the same geographic limits and using the same methods as Alternative 2-D (discussed later in this chapter), this component is distinguished from that alternative in that the volume and area limits would be established during detailed engineering so that dredging under this component would be limited and not require downstream levee raises or modifications based on increased upstream conveyance capacity caused by dredging; Alternative 2-D combines dredging and levee modifications to increase overall conveyance capacity.

Location

Dredging is proposed along portions of the Mokelumne River, Snodgrass Slough, and Dead Horse Cut, as shown in Figure 2-8. The specific volume and area limits would be established during detailed engineering to ensure no measurable increases in downstream water surface elevation.

Design and Construction

Dredging would increase channel capacity in locations where sedimentation has occurred. The cross-sectional limits would be determined during detailed engineering to minimize potential effects on shallow aquatic habitat and levee stability but would generally follow the channel centerline with side slopes of 2:1 (horizontal:vertical) or steeper and dredged to a depth of approximately 2–3 feet.

The dredged material would be sidecast over adjacent levees into landside drying basins to be effectively dried for beneficial reuse, such as constructing project features, providing stability berms on the landside of levees, or similar uses on the island or tract. It is assumed that up to 10% of the dredge spoils would be transported to McCormack-Williamson Tract after drying to be used for levee construction and subsidence reversal, or would be piped directly to that location. Drying operations are described below after the dredging methods.

The project may use one or more dredging methods determined through a balance of regulatory constraints, effectiveness, and efficiency. The methods are described below.

Hydraulic Dredging

The hydraulic dredging method would siphon a water-sediment mix (roughly four parts water for every one part sediment) from the channel bottom and deposit it into a drying basin. The operation is staged from a barge floating in the channel with a mobile pipe that can be lowered into the sediment. The pipe siphons the water-sediment mix into a flexible delivery pipe that may be extended up to 1,000 feet up or down the channel from the barge to deposit the siphoned sediment.

The delivery pipe may be weighted down to avoid interfering with boat navigation. The delivery pipe is attached to a semi-permanent, stationary pipe that is braced to the waterside of the levee, extends across the top and down the landside of the levee into the primary basin of a drying basin. The stationary pipe would range from 8 to 18 inches in diameter and would require that gravel be placed on either side to create a ramp over the pipe to maintain vehicular access on the levee crown. The direct deposition of the material into drying basins on adjacent lands allows uninterrupted dredging up to the capacity of the drying basin. Barges may also be used to transport the dredged sediment, up to 5,000 cubic yards per barge.

Hydraulic dredging is used in situations where there are large areas to be dredged, the concern for induced turbidity and harm to benthic vegetation is great, and there is ample area available for drying basins, as this method entrains more water in the sediment and requires greater drying capacity. This dredging method does not cause excessive turbidity in the channel and causes only minimal disruption to vegetation and other benthic organisms. It also allows flexibility in disposal sites, as flexible piping may be extended to allow dredging to occur some distance from the drying basins. Therefore, land-based or water-based transport and other operations are minimized.

Clamshell Dredging

The clamshell dredging method would excavate a water-sediment mix (roughly equal parts water and sediment) from the channel bottom with a clamshell bucket and deposit it either into a drying basin or onto a barge to be transported to a drying basin. A hydraulic long-reach excavator arm controls the clamshell bucket, which can hold up to 5 cubic yards of material per scoop. The use of the clamshell method requires sufficient height and swing clearance for the excavator arm.

The operation may be staged from a barge floating in the channel or from the top of the levee, depending on restrictions in habitat and channel width. Barges are not self-propelling and therefore would need tugboats to maneuver within the channel.

The clamshell dredging method can cause greater disruption to channel vegetation than hydraulic dredging when the bucket scrapes layers of sediments from the channel bottom. This method would likely be used in situations where there is limited space for drying basins, the likelihood of major disruption to vegetation and other organisms in the channel bottom is minimal, the area to be dredged is small, there are channel islands, or when there are no issues concerning temporary turbidity and sedimentation in the water. It is possible, however, to reduce turbidity generated by this method through careful bucket management.

Dragline Dredging

The dragline dredging method would excavate a water-sediment mix (roughly equal parts water and sediment) from the channel bottom with a bucket and deposit it either into a drying basin or onto a barge to be transported to a drying basin. A crane controls the bucket with cables. The boom swings to position the bucket, which is then lowered and dragged horizontally across the bottom of the channel to collect sediments until the bucket is full. The cables are used to maneuver the bucket as it moves horizontally and to open it so that spoils may be deposited in the desired location. The use of the dragline method requires sufficient height and swing clearance for the crane.

The operation may be staged from a barge floating in the channel or from the top of the levee, depending on restrictions in habitat and channel width. Barges are not self-propelling and would therefore need tugboats to maneuver within the channel.

The dragline method is effective in shaping the channel bottom with relative control. Other considerations are substantially similar to the clamshell dredging method.

Drying Operations

Drying basins would be constructed on the landside of the levees, typically adjacent to the channel or suitable interior low areas, and would be used for the decanting and drying process, effectively separating the sediment from the water and allowing dried material to be put to beneficial use. The basins would be constructed of on-site soil and compacted to minimize basin slope erosion.

For hydraulic dredging, drying basins typically are composed of three parts: primary, secondary, and return basins. The primary and secondary basins serve to settle sediments out of the dredged mix. When water reaches the return basin, most suspended sediment has settled out of it and the water is then pumped back into the channel from which it was taken. The sediment would take between 24 and 36 days to settle out of the water.

A single drying basin, 3,600 feet long, 1,600 feet wide, and up to 6 feet deep, can hold up to 285,000 cubic yards of the water-sediment mix if the basin is filled up to 4 feet with dredged material. As water moves from the primary to the secondary basins, more area becomes available for additional dredged material. The absolute capacity of a single basin will be determined by the rate at which the sediments settle, the rate at which the water is pumped from the return basin, and the rate of dredging. The basin is then reused or left to dry.

For clamshell and dragline dredging, a single-purpose basin may be used. The water-sediment mixture would reach 25% moisture content (half of its original rate) in 2 to 6 weeks for re-use depending on weather and the thickness at which it is placed.

Operations and Maintenance

Recurring dredging needs will be assessed and a maintenance dredging trigger will be developed as part of the adaptive management plan. This effort will take into account any new requirements of the forthcoming Delta Mercury TMDL. It is currently estimated that dredging is expected to be repeated on a roughly 15-year interval, with approximately 20% of the channel area dredged per episode.

Enhance Delta Meadows Property (Optional)

Objective

This component would help improve recreation in the North Delta area by upgrading existing recreation facilities and amenities, including boat launch facilities, parking areas, signage, and public restrooms.

Location

This plan envisions that eventually upgrades to recreation facilities would occur at Delta Meadows, an unclassified State Park property north of the DCC and west of McCormack-Williamson Tract . Delta Meadows is considered one of the last remaining areas of the northern Delta that exhibit remnants of the natural conditions that existed prior to settlement. DPR has managed the area since 1985. DPR acquired the park property primarily to protect and preserve the natural resources on the property, including riparian habitat and wildlife, sloughs, and other wetlands. The property contains Native American occupancy sites and remnants of early farming and ranching activities. The property provides public access to boating, fishing, and hiking along levee trails, and DPR offers guided canoe tours during the summer season.

Planning, Design, and Construction

Prior to the development of any permanent improvements at Delta Meadows, a General Plan for the property must be prepared by DPR. DPR has not yet identified funding for the preparation of a General Plan for the Delta Meadows property. As an optional component of the project, DWR commits to working cooperatively with DPR to assist in preparation of the General Plan, development of a funding strategy, and implementation. DPR anticipates that passive recreation activities would be developed. These types of recreation activities are hiking, nature viewing, non-motorized boating, and fishing. Physical improvement may include upgrading boat launch facilities, parking improvements, trails, interpretive signage, and public restrooms.

Operations and Maintenance

In addition to the canoe tours, current operations and maintenance activities at Delta Meadows include patrol by state park rangers, survey and inventory of natural and cultural resources, and some natural resource management activities. Protection and management of natural and cultural resources, such as the control of invasive exotic weeds, would be ongoing operation activities. Future operation and maintenance activities might include cleaning restrooms and replacing supplies, picking up litter, periodically re-sealing and re-striping any paved surfaces, and maintaining boat launch facilities trails, and signs.

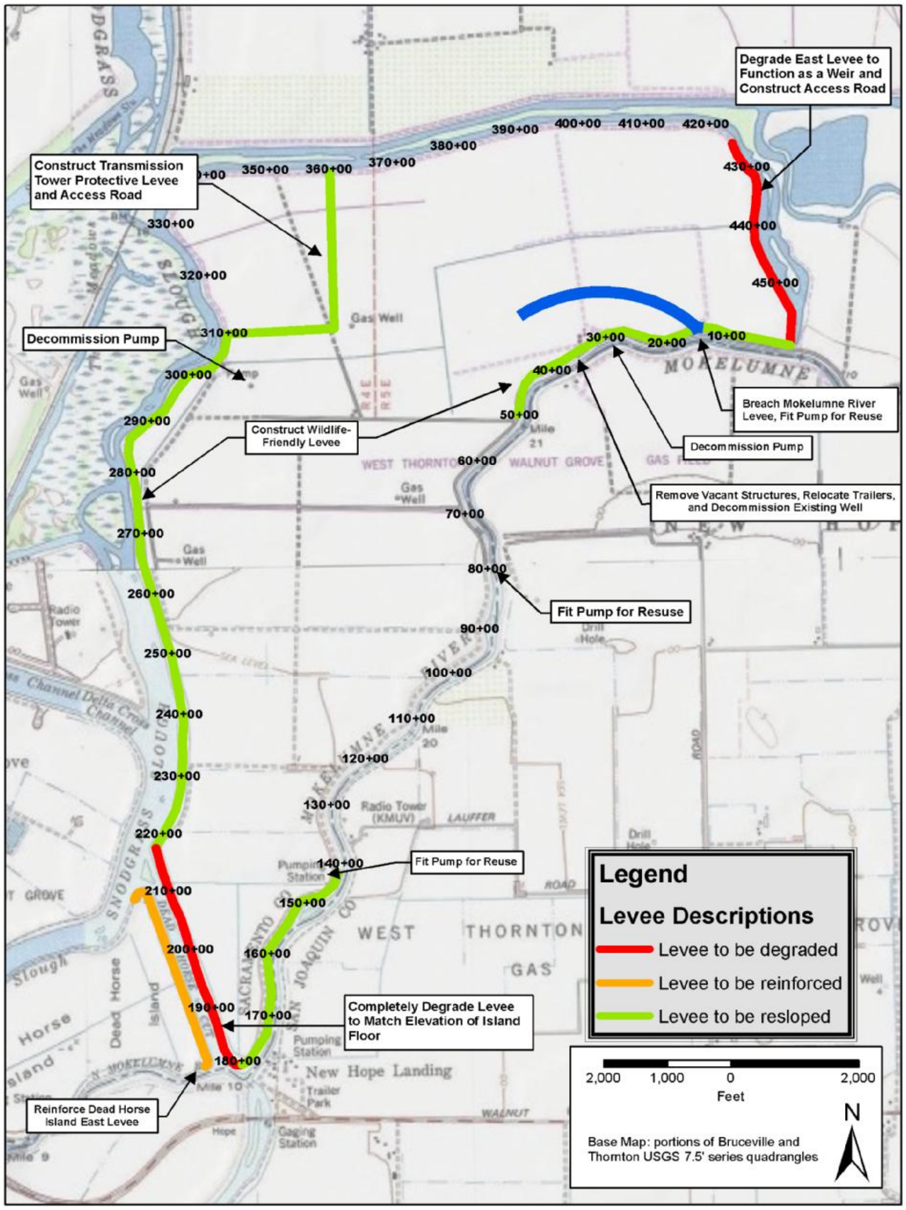


Figure 2-1. Alternative 1-A: Fluvial Process Optimization

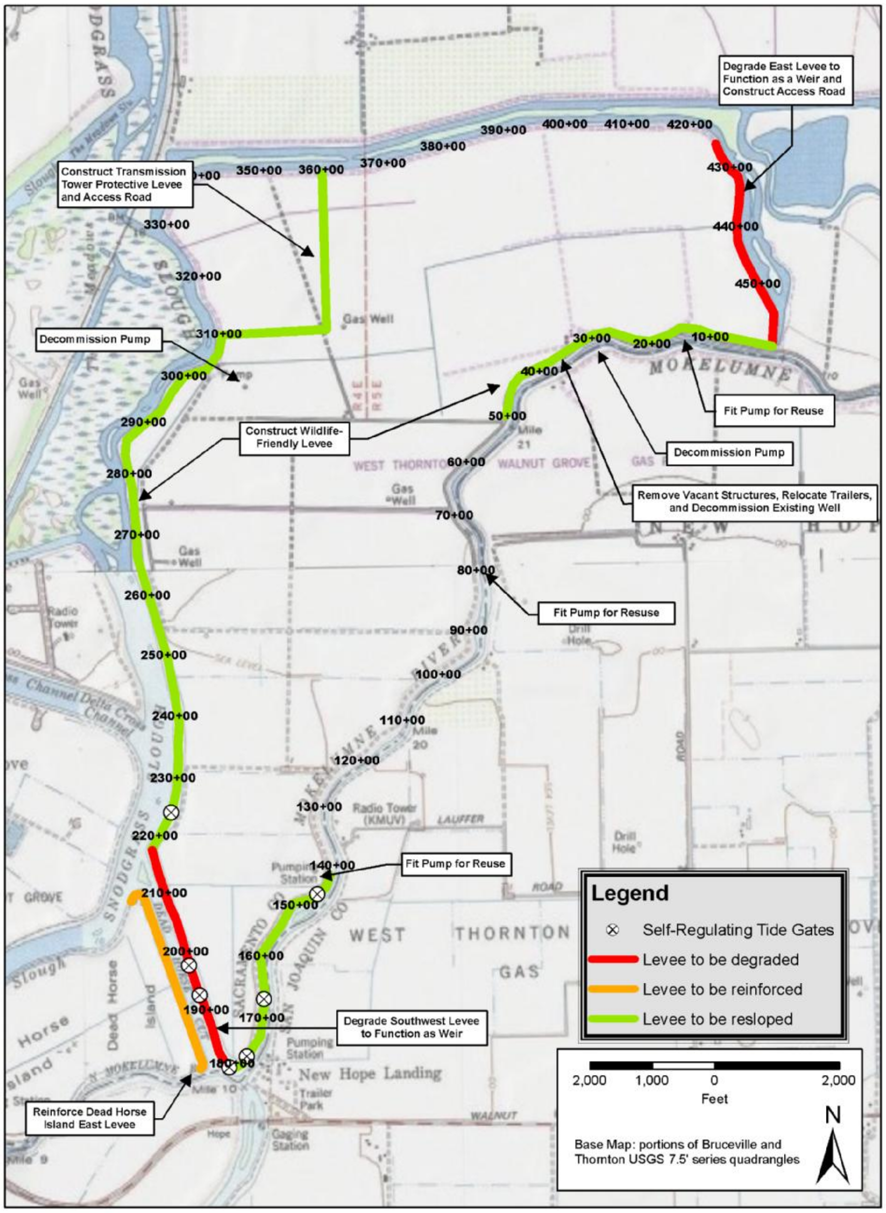


Figure 2-2. Alternative 1-B: Seasonal Floodplain Optimization

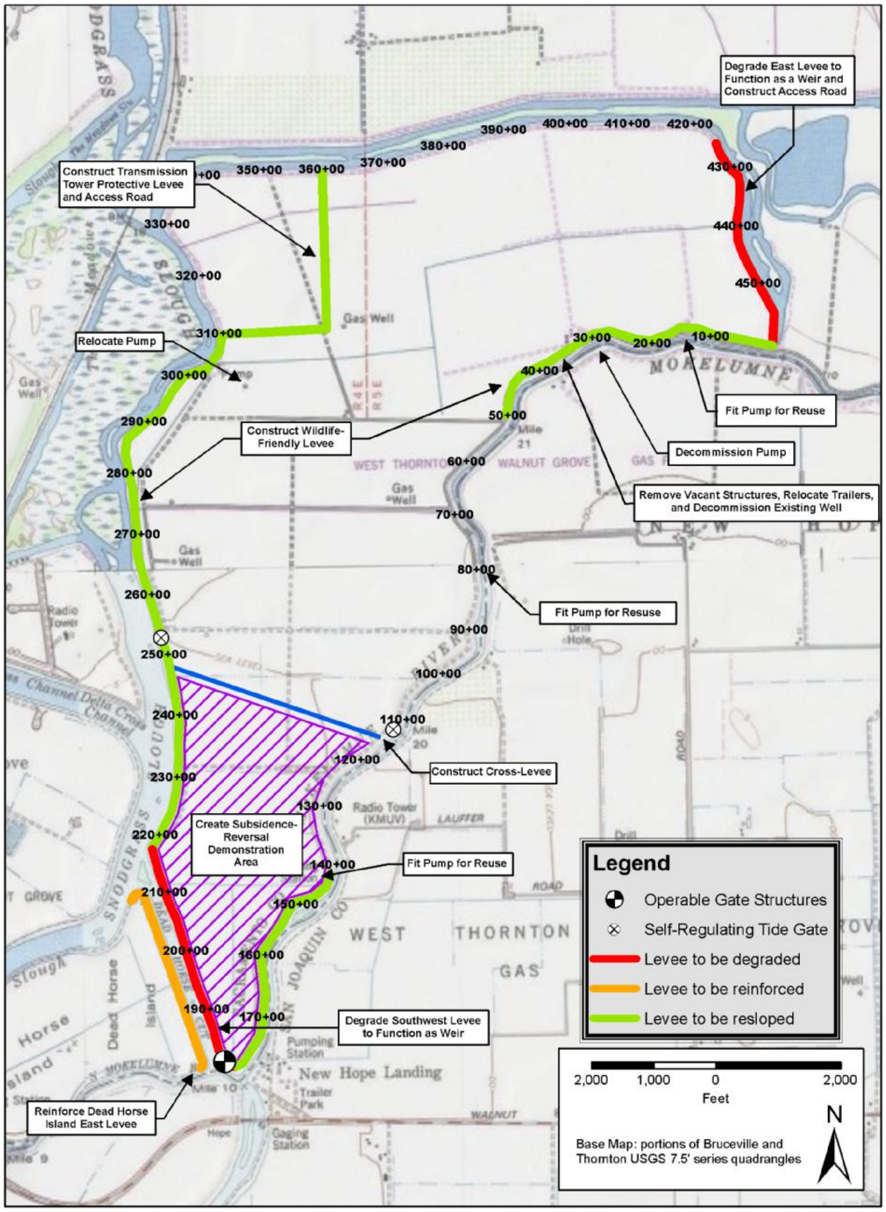


Figure 2-3. Alternative 1-C: Seasonal Floodplain Enhancement and Subsidence Reversal

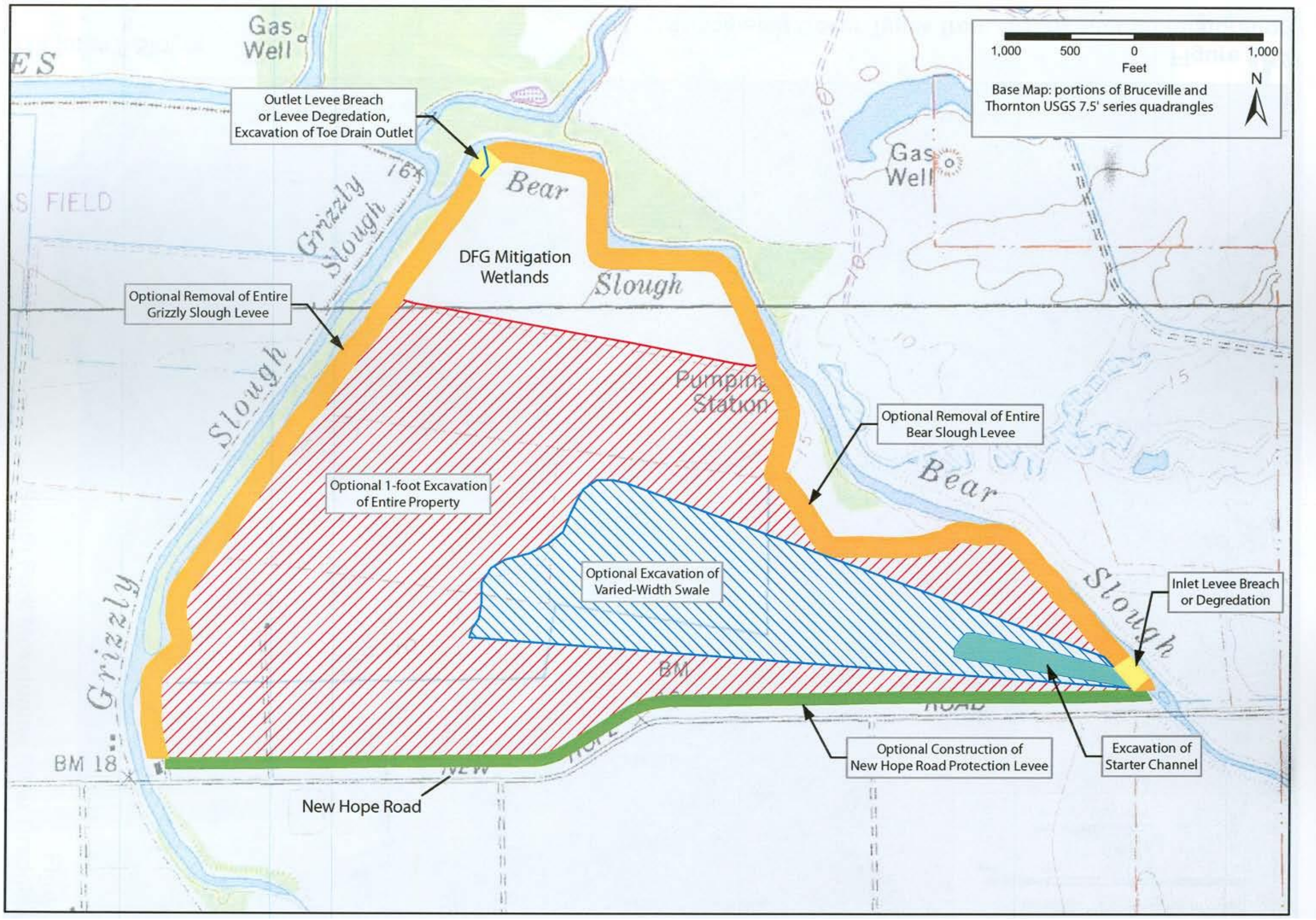


Figure 2-4. Grizzly Slough property and proposed actions

Alternative 1-B: Seasonal Floodplain Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with actions to maximize floodplain habitat to benefit fish species that spawn or rear on the floodplain. This would be accomplished by allowing controlled flooding (with some tidal action to maintain water quality) during the wet season. As shown in Figure 2-2, Alternative 1-B includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows

- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Construct Box Culvert Drains and Self-Regulating Tide Gates
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

Degrade McCormack-Williamson Tract East Levee to Function as a Weir

This component would be the same as described under Alternative 1-A.

Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir

Objective

The southwest levee on McCormack-Williamson Tract would be lowered to 5.5 feet NGVD to allow floodflows to pass out of the tract without causing a surge effect, yet remain high enough to prevent tidal flooding of the island during low-flow seasons. To convey high river stages out of McCormack-Williamson Tract, the degraded southwest levee would be reinforced as a hardened weir to direct flow and minimize erosion. Tidal action and water levels would be controlled using self-regulating tide gates and existing drainage pump stations (described separately below).

Location

The southwest levee on McCormack-Williamson Tract is located on the southwest side of the island adjacent to Dead Horse Cut. The affected portion of the levee is approximately 3,500 feet long.

Design and Construction

The levee would be built to withstand bi-directional flows, with RSP placed accordingly, as the levee would be regularly overtopped from Dead Horse Cut during minor flood events. During flood events large enough to overtop the east levee on McCormack-Williamson Tract, the flow over the southwest levee would reverse, and water within the tract would discharge back into Dead Horse Cut. Although the structure would be submerged under these conditions, turbulence on the waterside face of the levee would likely initiate local scour.

The levee would be degraded and reshaped, followed by installation of 24-inch angular rock placed to a depth of 30 inches along the entire face and crest of the degraded levee. The RSP would be placed directly on the existing levee face both on the landside and on the waterside to avoid unnecessary excavation. Additional erosion protection (a 60-inch launchable toe) would be placed on the riverside toe of the levee. An integrated end sill would be constructed at the landside toe of the levee to help dissipate energy and protect against scour. One or more filter layers would be placed under all RSP to prevent scour of the underlying soil.

A 10-foot-wide access road may be integrated into the crest design and would include 30-inch-deep cut-off walls to prevent scour at the interface of the RSP and road.

Operations and Maintenance

Vegetation management (by herbicide application, mowing, or removal with hand tools) may be required periodically.

Reinforce Dead Horse Island East Levee

This component would be the same as described under Alternative 1-A.

Modify Downstream Levees to Accommodate Potentially Increased Flows

This component would be the same as described under Alternative 1-A.

Construct Transmission Tower Protective Levee and Access Road

This component would be the same as described under Alternative 1-A.

Demolish Farm Residence and Infrastructure

This component would be the same as described under Alternative 1-A.

Enhance Landside Levee Slope and Habitat

This component would be the same as described under Alternative 1-A.

Modify Landform and Restore Agricultural Land to Habitat

This component would be similar to Alternative 1-A except for design and construction, which would not include subtidal components, and intertidal action is anticipated only during seasonal high water in the winter. The overall species composition would be less aquatic and more mesic.

Modify Pump and Siphon Operations

This component would be the same as described under Alternative 1-A, except that pumping would be required to facilitate drainage of the tract during warm weather. Under Alternative 1-B, the change in use for each pump is described in Table 2-5.

Table 2-5. Change in Pump Use under Alternative 1-B

Station Number or Item Code	Baseline Use	Proposed Use
15+00	75% during June, July, and August for crop irrigation	25% during June, July, August, September, and October to establish native vegetation
30+00	Back-up only for crop irrigation	Decommission
80+00	20% during April and May; 75% during June, July, and August; and 10% during September for crop irrigation	25% during June, July, August, September, and October to establish native vegetation
145+00	1 hour per day throughout year, continuous during high-water events for drainage	Continuously for 5 days for up to three episodes per year during April and May, and as needed throughout year for drainage
260+00	20 minutes per week during June, July, and August to prime crop irrigation siphon	Same as baseline to establish native vegetation
305+00	1 hour per week throughout year, continuous during high-water events for drainage	Continuously for 5 days for up to three episodes per year during April and May, and as needed throughout year for drainage
360+00	20 minutes per week during June, July, and August to prime crop irrigation siphon	Same as baseline to establish native vegetation
PD	10 hours per day, 6 days per week during June, July, and August for crop irrigation	Decommission
PP	10 hours per day, 6 days per week during June, July, and August for crop irrigation	Decommission
DW	2 hours per day throughout year for domestic use	Decommission

Construct Box Culvert Drains and Self-Regulating Tide Gates

Objective

Self-regulating tide gates at the south end of McCormack-Williamson Tract would allow tidal action during winter through spring. These gates would allow the tract to partially fill during incoming tide and fully drain during outgoing tide. In combination with pumping stations, the self-regulating tide gates would be used to drain the tract of floodwaters by June to avoid fish-stranding, address aquatic weed and or mosquito concerns, and allow other adaptive management actions as needed.

Location

Up to seven self-regulating tide gates would be placed in box culvert drains in the levees on the southern portion of McCormack-Williamson Tract.

Design and Construction

To prevent backflow into the island during high tides, two 3.5-by-4-foot horizontal tide gates would be installed at the outlets of each of the seven 4- by 8-foot box culvert drains. The invert of the culverts would be placed at 0 feet NGVD or lower to take advantage of low tides. The inlet and outlet boxes of the culverts would be constructed to match the grade of the existing levee in which they are installed to avoid unnecessary local scour. The levee faces on both the outlet and inlet sides would be protected with 18-inch angular rock placed to 24 inches deep.

Operations and Maintenance

The tide gates would be operated to drain the island of floodwaters by June, taking advantage of low tides to let the island drain by gravity, and to help facilitate conditions for desired vegetation on the tract. The tide gates would not allow water to enter the island during high tide when they are being operated to drain the island. At other times during the year, the tide gates may be used to provide muted tidal action to McCormack-Williamson Tract. The gates would require periodic inspection to ensure appropriate operation, as a component of a comprehensive adaptive management plan.

Implement Local Marina and Recreation Outreach Program

This component would be the same as described under Alternative 1-A.

Excavate Dixon and New Hope Borrow Sites

This component would be the same as described under Alternative 1-A.

Excavate and Restore Grizzly Slough Property

This component would be the same as described under Alternative 1-A.

Dredge South Fork Mokelumne River (Optional)

This component would be the same as described under Alternative 1-A.

Enhance Delta Meadows Property (Optional)

This component would be the same as described under Alternative 1-A.

Alternative 1-C: Seasonal Floodplain Enhancement and Subsidence Reversal

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with scientific pilot actions to create floodplain habitat(similar to but less than Alternative 1-B), combined with a subsidence reversal demonstration project in the lowest area of the tract. This would be accomplished by allowing controlled flooding (with some tidal action to maintain water quality) during the wet season, as well as sediment import. As shown in figure 2-3, Alternative 1-C includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Construct Box Culvert Drains and Self-Regulating Tide Gates
- Construct Cross-Levee to Create Subsidence-Reversal Demonstration Area
- Import Soil for Subsidence Reversal
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

Degrade McCormack-Williamson Tract East Levee to Function as a Weir

This component would be the same as described under Alternative 1-A.

Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir

This component would be the same as described under Alternative 1-B.

Reinforce Dead Horse Island East Levee

This component would be the same as described under Alternative 1-A.

Modify Downstream Levees to Accommodate Potentially Increased Flows

This component would be the same as described under Alternative 1-A.

Construct Transmission Tower Protective Levee and Access Road

This component would be the same as described under Alternative 1-A.

Demolish Farm Residence and Infrastructure

This component would be the same as described under Alternative 1-A.

Enhance Landside Levee Slope and Habitat

This component would be the same as described under Alternative 1-A.

Modify Landform and Restore Agricultural Land to Habitat

This component would be similar to Alternative 1-B.

Modify Pump and Siphon Operations

This component would be the same as described under Alternative 1-B, except that the drainage pump station would be relocated from Station 305+00 to facilitate drainage of the tract during warm weather, because the tract is proposed to be separated by a cross-levee and operated as two distinct hydrologic cells at low flow. Under Alternative 1-C, the change in use for each pump is described in Table 2-6.

Table 2-6. Change in Pump Use under Alternative 1-C

Station Number or Item Code	Baseline Use	Proposed Use
15+00	75% during June, July, and August for crop irrigation	25% during June, July, August, September, and October to establish native vegetation
30+00	Back-up only for crop irrigation	Decommission
80+00	20% during April and May; 75% during June, July, and August; and 10% during September for crop irrigation	25% during June, July, August, September, and October to establish native vegetation
145+00	1 hour per day throughout year, continuous during high-water events for drainage	Operated continuously for 3 days for up to three episodes per year during April and May, and as needed throughout year for drainage
260+00	20 minutes per week during June, July, and August to prime crop irrigation siphon	Same as baseline to establish native vegetation
305+00	1 hour per week throughout year, continuous during high-water events for drainage	Relocated downstream to location just north of subsidence-reversal area cross-levee on Snodgrass Slough; operated continuously for 3 days for up to three episodes per year during April and May, and as needed throughout year for drainage
360+00	20 minutes per week during June, July, and August to prime crop irrigation siphon	Same as baseline to establish native vegetation
PD	10 hours per day, 6 days per week during June, July, and August for crop irrigation	Decommission
PP	10 hours per day, 6 days per week during June, July, and August for crop irrigation	Decommission
DW	2 hours per day throughout year for domestic use	Decommission

Construct Box Culvert Drains and Self-Regulating Tide Gates

This component would be the same as described under Alternative 1-B, with the possible addition of two box culvert drains with self-regulating tide gates to facilitate drainage of the northern portion of the island and an operable gate structure near the downstream tip of the island to drain the subsidence reversal area. An adjustable structure at this location would allow flexibility to optimize the water level for vegetative growth and provide movement of the water to reduce the potential for mosquito growth. The adjustable structure may include flashboards to regulate the water level and an operable gate to regulate outflow.

Construct Cross-Levee to Create Subsidence-Reversal Demonstration Area

Objective

A cross-levee would be constructed across McCormack-Williamson Tract to isolate the bottom third of the island for a subsidence-reversal demonstration project. This levee would allow bi-directional flow during small to large flood events in the winter months but would prevent any tidal action on the upper two-thirds of the island during the dry months. Thus, during low flow, the tract could be drained and operated as two distinct hydrologic cells.

Location

The cross-levee would run west to east across McCormack-Williamson Tract, from just north of the DCC on the west side of the island to roughly Station 116+15 of the Mokelumne River on the east side of the island. The resulting cross-levee would be approximately 3,000 feet long.

Design and Construction

The cross-levee would be constructed across McCormack-Williamson Tract at an elevation of 5.5 feet NGVD with a crest of 10 feet and side slopes at 3:1. The levee footprint would vary according to the local elevation of the island on which it is constructed. Similar to the conditions of the southwest levee as described under Alternative 1-B, flow over the cross-levee would be bi-directional depending on hydraulic conditions, so erosion protection would be provided on both faces. The entire structure would be protected with 18-inch angular rock placed to a depth of 24 inches. One or more filter layers would be placed under all RSP to prevent scour of the underlying soil. Because discharge over the levee would likely occur from the southern side first, an end sill would be constructed on the north toe for energy dissipation. Grading and excavation of exit channels would ensure that fish are not entrapped in the toe sill as floodwaters are removed from the island. The footprint width of the cross-levee would be approximately 70 feet. Borrow from the Grizzly Slough property and the Dixon and New Hope borrow sites would provide the extra material needed to build this levee.

Operations and Maintenance

The box culverts with self-regulating tide gates would drain the upper two-thirds of the island of floodwaters before June to prevent fish-stranding. No water would be allowed in through the tide gates during the dry months.

Import Soil for Subsidence Reversal

Objective

Imported soil would increase land-surface elevation on the lower portion of McCormack-Williamson Tract to accelerate accretion.

Location

Fill soil would be placed in roughly the lower third of McCormack-Williamson Tract, in the area delineated by the cross-levee described above.

Design and Construction

Soil may be imported by a number of methods, including pumping of dredged sediments through a pipe system, waterborne placement by barge and bucket, or landborne placement by truck and tractor. Soil would be placed in lifts and cells for incremental accretion. The desired finished elevation is sea level; roughly 300 af are below this level. The approximate volume of material imported could be up to 160,000 cubic yards. Depending on method (pumped or dredged), the soil may be placed in a slurry, resulting in use of drying basins and runoff management basins as described under the dredging component.

Operations and Maintenance

The soil profile would be monitored for elevation change. Placement of soil would recur as material is available and further accretion is desired, as determined through comprehensive project adaptive management.

Implement Local Marina and Recreation Outreach Program

This component would be the same as described under Alternative 1-A.

Excavate Dixon and New Hope Borrow Sites

This component would be the same as described under Alternative 1-A.

Excavate and Restore Grizzly Slough Property

This component would be the same as described under Alternative 1-A.

Dredge South Fork Mokelumne River (Optional)

This component would be the same as described under Alternative 1-A; however, dredged material may be pumped or dried and transported to provide fill material for the subsidence reversal component.

Enhance Delta Meadows Property (Optional)

This component would be the same as described under Alternative 1-A.

Alternative 2-A: North Staten Detention

This alternative provides additional capacity in the local system through construction of an off-channel detention basin on the northern portion of Staten Island. High stage in the river would enter the detention basin upon cresting a weir in the levee. Other components are combined to protect infrastructure. Similar to all detention alternatives, this alternative is designed to capture flows no more frequently than the 10-year event while having no measurable effect on the 100-year floodplain. The interior of the basin would continue to be farmed, consistent with current practices. As shown in figure 2-5, Alternative 2-A includes the following components:

- Construct North Staten Inlet Weir
- Construct North Staten Interior Detention Levee
- Construct North Staten Outlet Weir
- Install Detention Basin Drainage Pump Station
- Reinforce Existing Levees
- Degrade Existing Staten Island North Levee
- Relocate Existing Structures
- Modify Walnut Grove–Thornton Road and Staten Island Road
- Retrofit or Replace Millers Ferry Bridge *(optional)*
- Retrofit or Replace New Hope Bridge *(optional)*
- Construct Wildlife Viewing Area
- Excavate Dixon and New Hope Borrow Sites

Table 2-8d summarizes the construction operations anticipated to implement Alternative 2-A, including work sequence and schedule, equipment, material volume, and duration.

Construct North Staten Inlet Weir

Objective

To convey high river stages into the detention basin on the northern tip of Staten Island, the degraded levee would be reinforced as a hardened weir to direct flow and minimize erosion. It would also serve as an elevated platform for a relocated Walnut Grove–Thornton Road.

Location

A weir would be constructed adjacent to the existing alignment of Walnut Grove–Thornton Road to direct flows from the Mokelumne River into the Staten Island detention basin, across the river from Dead Horse Island . The resulting weir would be approximately 4,600 feet long.

Design and Construction

The weir would have a crest elevation set to 10 feet NGVD, approximately 12 feet above the surrounding land surface. The crest would be approximately 74 feet wide (to accommodate the realigned roadway of Walnut Grove–Thornton Road atop the weir with 22-foot-wide pavement and 8-foot-wide shoulders on either side), and the slopes of the weir would be 3:1 on either side. See description later in this chapter regarding modifications to Walnut Grove–Thornton Road and Staten Island Road.

On the southern toe of the weir, a 3-foot-deep sill would be excavated to help dissipate the energy of overtopping water cascading down the landside levee face. Grading and excavation of exit channels would ensure that fish are not entrapped in the toe sill as floodwaters are removed from the detention basin. Twenty-four-inch angular RSP would be placed to a depth of 30 inches from the southern edge of the road to the crest of the weir, down the landside face, in the toe sill, and onto the floor of the island for an additional 6 feet beyond the toe sill. Additional RSP of the size specified above would be placed from the northern edge of the road to the crest of the weir and 10 feet down the north face of the weir to protect against erosion caused by turbulence in the approaching flow. One or more filter layers would be placed under all RSP areas to prevent scour of the underlying soil. A concrete retaining wall would be constructed at the road-RSP interface to protect against undercutting of the pavement when the structure is overtopped. The approximate total width of the footprint would be 180 feet.

Operations and Maintenance

The weir itself has no operable devices. The weir would be maintained in a manner similar to current levee management practices in the area for vegetation control. As a component of the AMP, DWR will develop a Flood Recovery Plan to ensure the land in the detention basin is restored for farming as quickly as possible after flood events. The roadway would be maintained consistent with current county practices for the existing Walnut Grove–Thornton Road.

Construct North Staten Interior Detention Levee

Objective

A detention basin is proposed on Staten Island to contain flows greater than the 10-year event but less than the 100-year event.

Location

The detention levee would key into and connect the Staten Island east and west levees approximately 16,000 feet south of Walnut Grove–Thornton Road . It would key into the levee on the South Fork Mokelumne River near the inlet of Beaver Slough, and into the levee on the North Fork Mokelumne River near Station 1251+65. The resulting detention levee would be approximately 16,000 feet long.

Design and Construction

The capacity of the detention basin would be designed based on the 1997 flood event. Hydraulic modeling during project design would assist in sizing the basin relative to the 1997 event while minimizing required acreage and frequency of inundation. A levee patrol road would be constructed on the crown of the levee. The road surface would provide all-weather access, proposed to be compacted aggregate base.

The detention levee may be classified as a dam per the definition and jurisdiction of the DWR Division of Safety of Dams (DSOD). A conceptual design report has been prepared for the detention levee and has been submitted to DSOD staff for a final determination.

The detention levee would be constructed with low-permeability materials (lean clay or clayey sand to sandy clay), and would use the existing levees along the North Fork Mokelumne River and South Fork Mokelumne River as abutments.

An outlet weir (spillway) would be constructed on the existing South Fork Mokelumne River levee near the pump station, although the exact location has yet to be determined. The outlet weir height would be the same as the inlet weir height. To meet DSOD criteria for dams, the crest of the levees should be at least 1.5 feet above the maximum water level that develops when water flows over the outlet weir. To achieve this, the interior detention basin levees would be at least 2 feet above the height of the outlet weir, accounting for a water depth of 0.5 feet flowing over the outlet weir.

Two cross sections for the detention levee are being evaluated. It is known that Staten Island contains peat soils, which would easily compress under the weight of a detention levee. However, it is unknown at this time how deep the peat soils are on the island. Case 1 assumes that the peat is shallow enough to fully excavate under the footprint of the detention levee, and Case 2 assumes the peat is too deep to fully excavate. For the purposes of this EIR, it is assumed that Case 2 would be used, as it has the greatest potential for impacts and is therefore the most conservative approach for analysis. A description of Case 1 is offered as an information item only.

Case 1

This cross section assumes that the peat is shallow enough (about 5 feet thick or less) to fully remove it below the footprint of the detention levee. It is assumed that the peat would be replaced with the same fill material used for the embankment materials. It is also assumed that the peat would be removed to a distance of 20 feet beyond either toe of the detention levee. The detention levee would then be constructed on the underlying stiffer sands and clay. The height of the constructed detention levee would be 26 feet, with a 3:1 slope on the detention basin side, a 2.5:1 slope on the dry side, and a 16-foot-wide crest. The detention basin side of the detention levee would be protected from erosion by placement of conventional RSP or by placement of soil treated with cement or lime as facing material. The dry side of the detention levee would be covered with vegetation to provide erosion protection and allow ready examination of the slope. The width of the construction footprint, including excavation of peat, would be approximately 200 feet.

To prevent the effects of liquefaction in the case of seismic activity, potentially liquefiable sands could be densified with conventional earthwork equipment or other techniques such as deep dynamic compaction. The liquefaction hazard could be reduced to a level that would keep deformation sufficiently small to maintain the integrity of the detention levee under operating conditions. During final design, a thorough seismic analysis of the detention levee would be needed.

Case 2

This cross section assumes that the peat is too thick to effectively remove. The island is well below sea level, and dewatering to remove the peat may not be practical. For conceptual design of Case 2, it has been assumed that the detention levee would be constructed on 10 feet of peat. It is assumed that the material below the peat is potentially liquefiable, but there is no cost-effective method to densify the underlying sand and eliminate the liquefaction hazard. Case 2 therefore features an oversized detention levee. During final design, a thorough seismic analysis of the detention levees would be needed.

The height of the constructed detention levee would be 26 feet, with a 30-foot wide crest to allow for additional building up of the levee crown if the levee foundation were to settle. It is assumed that the peat would compress about 4 to 5 feet under the crest of the detention levee. The settlement of the detention levee may introduce tensile stresses within the fill, which may cause cracking. Plastic geogrids would be placed within the core of the detention levee to stiffen the embankment and reduce differential settlement and cracking in the core area.

The detention levee would be built with a 3:1 slope on the detention basin side and a 2.5:1 slope on the dry side, both buttressed by toe berms inclined at 10:1 starting at one-half the height of the detention levee to reduce to a safe level the risk of liquefaction-induced slope failure. The detention basin side of the detention levee would be protected from erosion by placement of RSP. The dry side of the detention levee would be covered with vegetation to provide erosion protection and allow ready examination of the slope. The width of the construction footprint, including the toe berms, would be approximately 370 feet.

Placement of soil to construct the levee would occur in lifts to facilitate compaction.

Abutments

As mentioned above, the detention levee would abut the existing levees along the North Fork Mokelumne River and South Fork Mokelumne River. The existing levees consist of fill over peat, and options to improve the existing levees are limited because the levee foundations are below the river water surface. The peat would be removed to near the toe of the existing levees for construction of the detention levee, but any peat beneath the existing levees would remain below the abutment.

Seepage through the abutment is a concern, as placing the detention levee against the existing levees may cause the levees to settle and may cause differential settlement with adjacent sections of the levee. To provide protection against settlement-induced cracking and seepage, a soil-bentonite slurry cut-off wall would be constructed through the existing levee and foundation . The soil-bentonite slurry is a low-permeability material to reduce seepage, yet it is sufficiently flexible to resist cracking from differential settlement.

The cut-off wall would extend along the axis of the existing levee to at least 20 feet beyond the toes of the detention levee. The cut-off wall would also extend through the axis of the detention levee approximately 20 feet beyond the toes of the existing levees. The total length of cut-off wall at each abutment under Case 1 would be approximately 340 feet, and under Case 2 approximately 480 feet.

Soil from the Dixon and New Hope borrow sites would provide the extra material needed to build the detention levee.

Operations and Maintenance

Vegetation management (by herbicide application, mowing, or removal with hand tools) may be required periodically. Soil periodically may be replaced and regraded to maintain the levee cross section. RSP may be placed on the levee slope to control erosion. The access road would be managed for vegetation, which is anticipated to be mowed or treated with herbicide at the shoulders and side-slopes. The aggregate base surface periodically would be refreshed with new material and graded to maintain a drivable surface.

Construct North Staten Outlet Weir

Objective

In order to control the water level in the detention basin during flood events, an outlet weir would be constructed to pass excess water through the basin once it has filled to capacity.

Location

The outlet weir would be constructed on approximately 3,000 feet of the existing levee along the South Fork Mokelumne River near the drainage pump station, lowered to 10 feet NGVD.

Design and Construction

A concrete-armored outlet weir would be constructed on the lowered portion of the levee to convey flows out of the detention basin when it has filled to capacity. Engineering design of this feature per DSOD criteria has not been completed; however, it is envisioned that the outlet weir would be an operable weir structure. To facilitate the operable weir, the levee profile may be lowered 2 feet and replaced with an outlet works of flashboards that could be removed in the event the detention basin reaches capacity, or a similar design. The outlet works would be located toward the channel side of the levee section to accommodate the levee patrol road on the basin side.

Operations and Maintenance

The weir is currently envisioned as a manually operated structure. When it is anticipated that the basin would fill to an internal water surface elevation that would spill over the weir back to the river channel, crews would remove the flashboards by truck from the levee patrol road, using mobile hoists if necessary. The structure would be inspected annually for functionality. The flashboards may require painting or other treatment to protect against weathering, anticipated at a 5-year interval.

Install Detention Basin Drainage Pump Station

Objective

Because the floor of Staten Island is well below the water levels in surrounding channels, the detention basin would not be able to drain by gravity. Permanent or portable pumps would lift the water out of the detention basin after flood events and discharge it back to the river.

Location

The drainage pump station would be located at the southeast end of the detention basin, on the South Fork Mokelumne River levee across from the inlet of Beaver Slough.

Design and Construction

Engineering design of this feature is not complete; however, portable pumps are proposed for use on a permanent concrete pad integrated with the outlet weir structure. Under Alternative 2-A, the detention basin area would be approximately 2,350 acres, and capacity would be approximately 48,350 af, requiring seven 42-inch-diameter pumps, each rated at 350 to 400 horsepower running continuously to drain the basin within 30 days. Each diesel-powered pump would consume 15 to 18 gallons of fuel per hour and would generate 95 to 105 decibels of sound. The permanent pump facility (integrated with the outlet weir) would have intake pipes leading to an elevated pump pad on the landside of the levee, without flow pipes over the crown of the levee to discharge to the channel side. The outfall would likely be reinforced with a rock dissipation apron.

To avoid fish entrainment and mortality at the pumps, at least one of the pumps would be a fish-friendly design, such as a centrifugal type. This determination will be made as a part of the detailed project design process. A slot channel would be excavated in the basin to direct fish toward the fish-friendly pump at extreme low flow to avoid stranding. The slot channel would be vegetated to provide wildlife cover at times when the basin is not inundated. The other pumps would be screened and barricaded to prevent fish attraction and entrainment. DWR is continuing to research pumping facilities and evaluate new technologies to ensure a fish-friendly design is incorporated during detailed project engineering.

Operations and Maintenance

After flood events during which the detention basin is filled, the pumps would be used to lower the water level as soon as possible to at least 3 feet below the crests of the existing levees. This action would protect the existing levees and the detention levee from excessive erosion and overtopping from wind-generated waves. The water in the basin would be fully removed before saturation of the levees occurs and to allow farming to resume in the spring.

Reinforce Existing Levees

Objective

Alternative 2-A proposes using the existing levees along the North Fork Mokelumne River and South Fork Mokelumne River as the eastern and western walls of the detention basin. Approximately 37,000 feet of these levees would be reinforced to safely contain floodwaters in the detention basin.

Location

The levees on the eastern and western sides of Staten Island (along the North Fork Mokelumne River and South Fork Mokelumne River) would be reinforced from the new weir in the north to the detention levee in the south.

Design and Construction

Interior slopes surrounding detention areas are vulnerable to erosion from drawdown of the detained waters, especially where steepened slopes are susceptible to vertical sloughing. Wind and wave wash are an additional threat to these slopes. Designs under consideration for the project are placement of additional material to reinforce and layback the slopes, planting of vegetation to dissipate energy and consolidate the soil structure, use of plastic geogrid or natural fiber geotextile fabric, and placement of RSP to protect the soil surface. These options may be used in combination, such as geotextile fabric planted with wild rose. Engineering design of this component is not complete; however, for the purposes of this analysis, RSP reinforcement is assumed to provide the most conservative approach in terms of environmental impact and least habitat benefit. Therefore, it should be assumed that RSP would be placed from the toe of slope up to the crown, ranging in size from 12 to 24 inches at an average depth of 18 inches.

Operations and Maintenance

Detention basin slopes would be monitored for erosion. Soil and RSP may be placed to address any areas of evident erosion.

Degrade Existing Staten Island North Levee

Objective

Flows would be conveyed from McCormack-Williamson Tract to Staten Island by degrading the northern levee on Staten Island from an existing elevation of 15 feet to a lower elevation (to be determined in project design through hydraulic modeling).

Location

This action would affect the north levee of Staten Island in the segment bounded by Walnut Grove–Thornton Road.

Design and Construction

The levee would be degraded primarily with scrapers. Dozers would be used to reshape the levee to final grade, followed by an imprinter to compact the soil. The area between the degraded levee and the detention levee would be left to reform and revegetate by natural processes. The removed levee material would be used to construct other project features.

Operations and Maintenance

Vegetation management (by herbicide application, mowing, or removal with hand tools) may be required periodically. Soil periodically may be replaced and regraded to maintain the levee cross section. RSP may be placed on the levee slope to control erosion.

Relocate Existing Structures

Objective

Opening up the northern part of Staten Island to detain flows in high-stage events would affect a number of important structures. These structures would be removed and relocated to maintain their use.

Location

The affected structures include a grain dryer facility, a residential complex, and other residential structures accessed via Staten Island Road on the northern part of the island (south of Walnut Grove–Thornton Road).

Design and Construction

Complete demolition of the grain dryer, a predominantly concrete and steel facility, is likely too costly; it may be selectively deconstructed and salvaged to minimize flood damage and safety concerns. A new grain dryer would be constructed on Staten Island, outside of the proposed detention area. Residential structures and associated buildings would be completely demolished. Their function would be replaced with new structures built on Staten Island near the headquarters complex on the west side of the island, outside of the proposed detention area.

Operations and Maintenance

These facilities would be operated and maintained consistent with current practices, although it is anticipated that the grain dryer would be of a different, more contemporary type and would be operated accordingly.

Modify Walnut Grove–Thornton Road and Staten Island Road

Objective

Under Alternative 2-A, Walnut Grove–Thornton Road would be realigned and elevated atop the new weir. Staten Island Road would be partially elevated on an earthen ramp to provide an at-grade intersection with the elevated Walnut Grove–Thornton Road. Realignment of Staten Island Road to the Staten Island west levee is also under consideration, but is not included in the scope of this environmental analysis as a permanent action. It is anticipated that the existing roadways and access connections would be maintained during construction to the greatest extent feasible.

Location

Walnut Grove–Thornton Road (also known as San Joaquin County Road J-11) crosses Staten Island at the extreme northern end. Staten Island Road begins at a "T"-intersection with Walnut Grove–Thornton Road and proceeds southward, bisecting the island into east and west halves.

Design and Construction

As described under the inlet weir component, Walnut Grove–Thornton Road would be permanently realigned atop the new weir, adjacent to its existing alignment. The existing Walnut Grove–Thornton Road is expected to remain open for use during construction; therefore, there should be no disruption or minimal disruption in traffic patterns.

Staten Island Road would require a new earthen ramp to intersect Walnut Grove–Thornton Road at grade. The ramp grade would be approximately 5% to maintain site distance and provide a gentle slope for truck operations. To construct the ramp on the current Staten Island Road alignment, traffic would need to be temporarily diverted. As most of the structures and circulation needs are concentrated in the northwest corner of the island, the west levee of Staten Island would be developed to provide a temporary access route. While temporary, this route may receive a considerable amount of traffic and therefore would be paved, striped, and signed. It is anticipated that the temporary access route may be in use for up to 45 days.

Operations and Maintenance

As Walnut Grove–Thornton Road would be integrated with the inlet weir as part of Alternative 2-A, the roadway would need to be closed to all traffic when the weir is in operation (as water would be spilling over the roadway). The roadway would be barricaded on the east side of the New Hope Bridge, so that westbound traffic could not cross the South Fork Mokelumne River from New Hope Tract. The roadway would be barricaded on the east side of the Millers Ferry Bridge, so that eastbound traffic could cross the North Fork Mokelumne River from Tyler Island to access Dead Horse Island and Staten Island. During detention basin operation only (which is designed to be less frequent than the 10-year event), the west levee of Staten Island, improved for temporary access during construction, would be used for temporary access during flood events. Through-traffic between SR 160 (via River Road) and Interstate 5 would likely be diverted northward to Twin Cities Road.

Maintenance after flood events would include inspection of pavement integrity and street sweeping. Ordinary maintenance during non-flooding periods would be consistent with existing practices.

Retrofit or Replace Millers Ferry Bridge (Optional)

Objective

Alteration or replacement of Millers Ferry Bridge may be necessary to allow for construction of a weir and to accommodate a potential realignment of Walnut Grove–Thornton Road. This bridge (along with the New Hope Bridge) historically has been a constriction point in the system during flood events. Bridge replacement should help provide relief at this point of constriction in future flood events.

Location

Millers Ferry Bridge is at the crossing of Walnut Grove–Thornton Road and the North Fork Mokelumne River.

Design and Construction

Options for Millers Ferry Bridge are opening one or more new bays to extend the bridge along its length and widen the channel area, or completely replace of the bridge. Either option is likely to require closing Walnut Grove–Thornton Road on Staten Island and detouring traffic, mostly to Twin Cities Road to the north to maintain access for Walnut Grove, Locke, and surrounding residences and businesses between SR 160 (via River Road) and I-5. The road may be closed up to 60 days.

Either of these options is also likely to reuse the steel bridge structure and require temporary removal of the bridge. It is anticipated that the bridge would be lifted by crane to an adjacent staging area while the abutments and supporting structure are under construction, or the bridge could be relocated to new abutments and supporting structure built near the existing alignment. Because of the need for vegetation clearing to convey floodflows, this footprint is considered a permanent impact.

Operations and Maintenance

Operations and maintenance would include clearing vegetation in the channel under the bridge and at the bridge approaches as part of other floodway and levee management activities. Operations and maintenance of the bridge would be similar to the existing condition, including on-demand articulation of the bridge for boat passage and maintenance of the roadway and bridge structure (such as periodic painting to resist weathering).

Retrofit or Replace New Hope Bridge (Optional)

Objective

Alteration or replacement of New Hope Bridge may be necessary to allow for construction of a weir and to accommodate a potential realignment of Walnut Grove–Thornton Road. This bridge (along with Millers Ferry Bridge) historically has been a constriction point in the system during flood events. Bridge replacement should help provide relief at this point of constriction in future flood events.

Location

New Hope Bridge is at the crossing of Walnut Grove–Thornton Road and the South Fork Mokelumne River.

Design and Construction

Options for New Hope Bridge are opening one or more new bays to extend the bridge along its length and widen the channel area, or completely replacing the bridge. Either option is likely to require closing Walnut Grove–Thornton Road on Staten Island and detouring traffic, mostly to Twin Cities Road to the north to maintain access for Walnut Grove, Locke, and surrounding residences and businesses between SR 160 (via River Road) and I-5. The road may be closed up to 60 days. An anticipated maximum footprint of disturbance is shown on Figure 2-28. Because of the need for vegetation clearing to convey floodflows, this footprint is considered a permanent impact.

Operations and Maintenance

Operations and maintenance would include clearing vegetation in the channel under the bridge and at the bridge approaches as part of other floodway and levee management activities. Operations and maintenance of the bridge would be similar to the existing condition, including maintenance of the roadway and bridge structure (such as periodic painting to resist weathering).

Construct Wildlife Viewing Area

Objective

The objective of this optional component would be to enhance recreation opportunities in the North Delta, specifically focused on public facilities for viewing sandhill cranes.

Location

Access to the new wildlife viewing area would be via Staten Island Road, with a new parking facility and restroom located to the east of the road just south of the new detention levee.

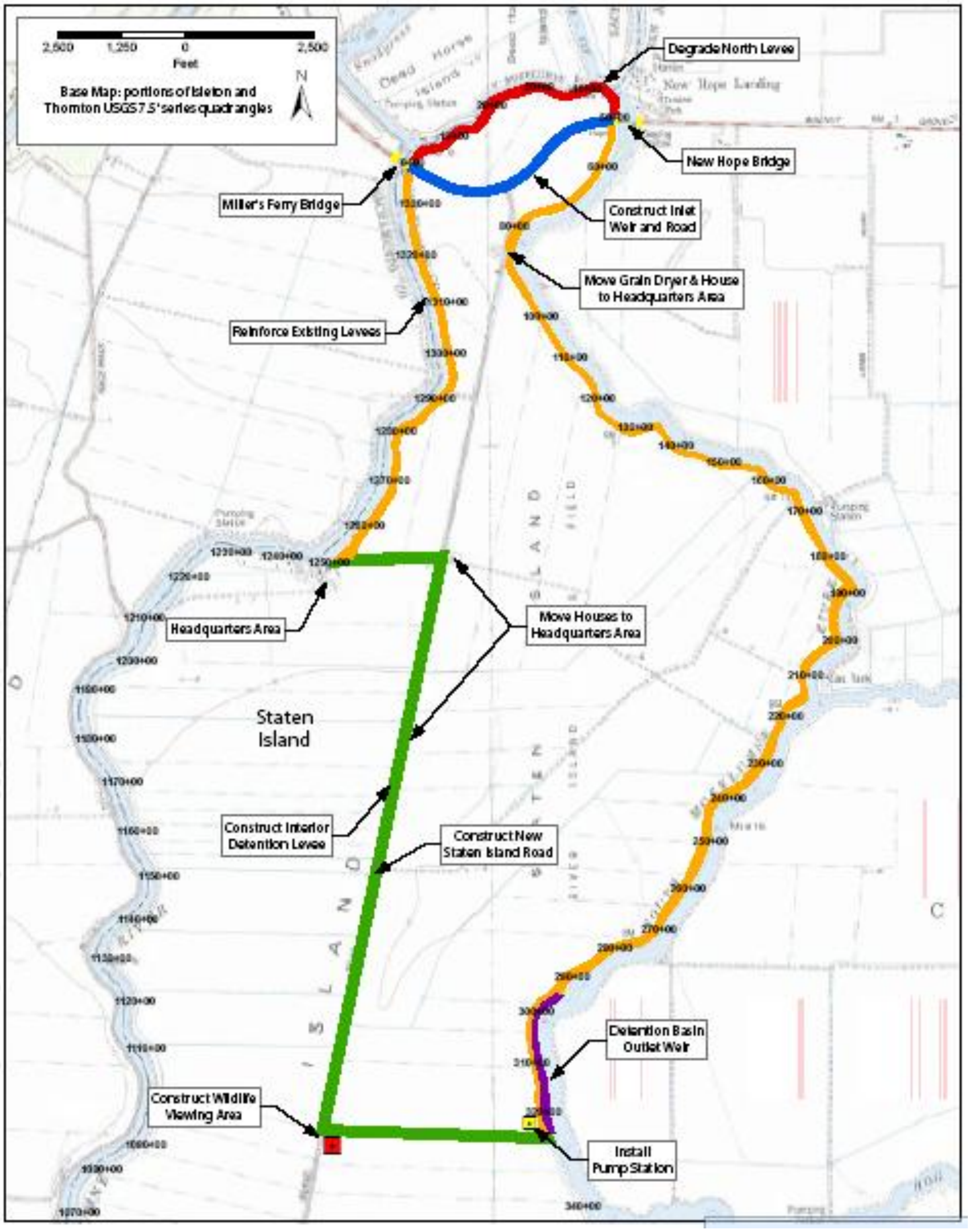


Figure 2-5. Alternative 2-A: North Staten Detention Plan

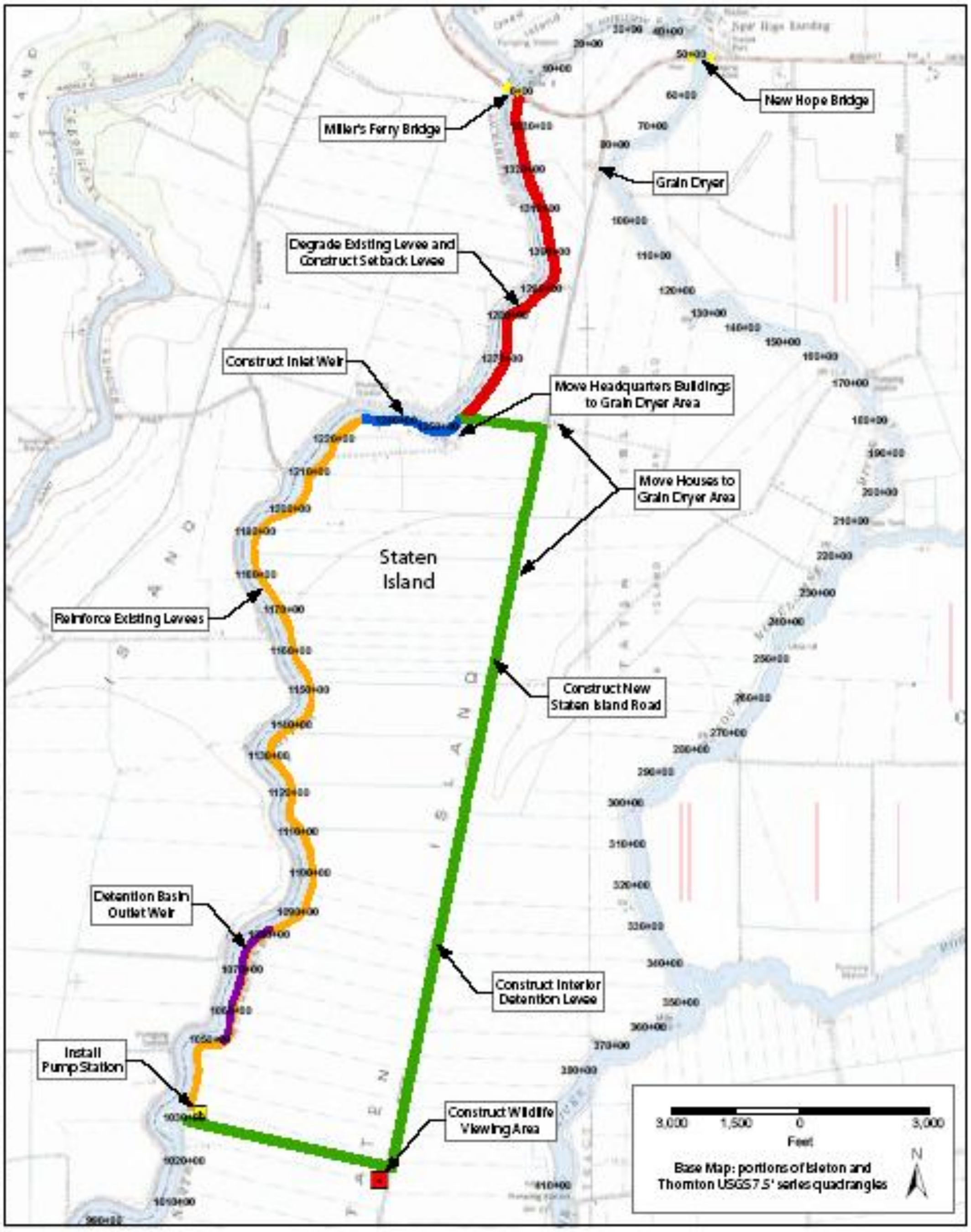


Figure 2-6. Alternative 2-B: West Staten Detention Plan

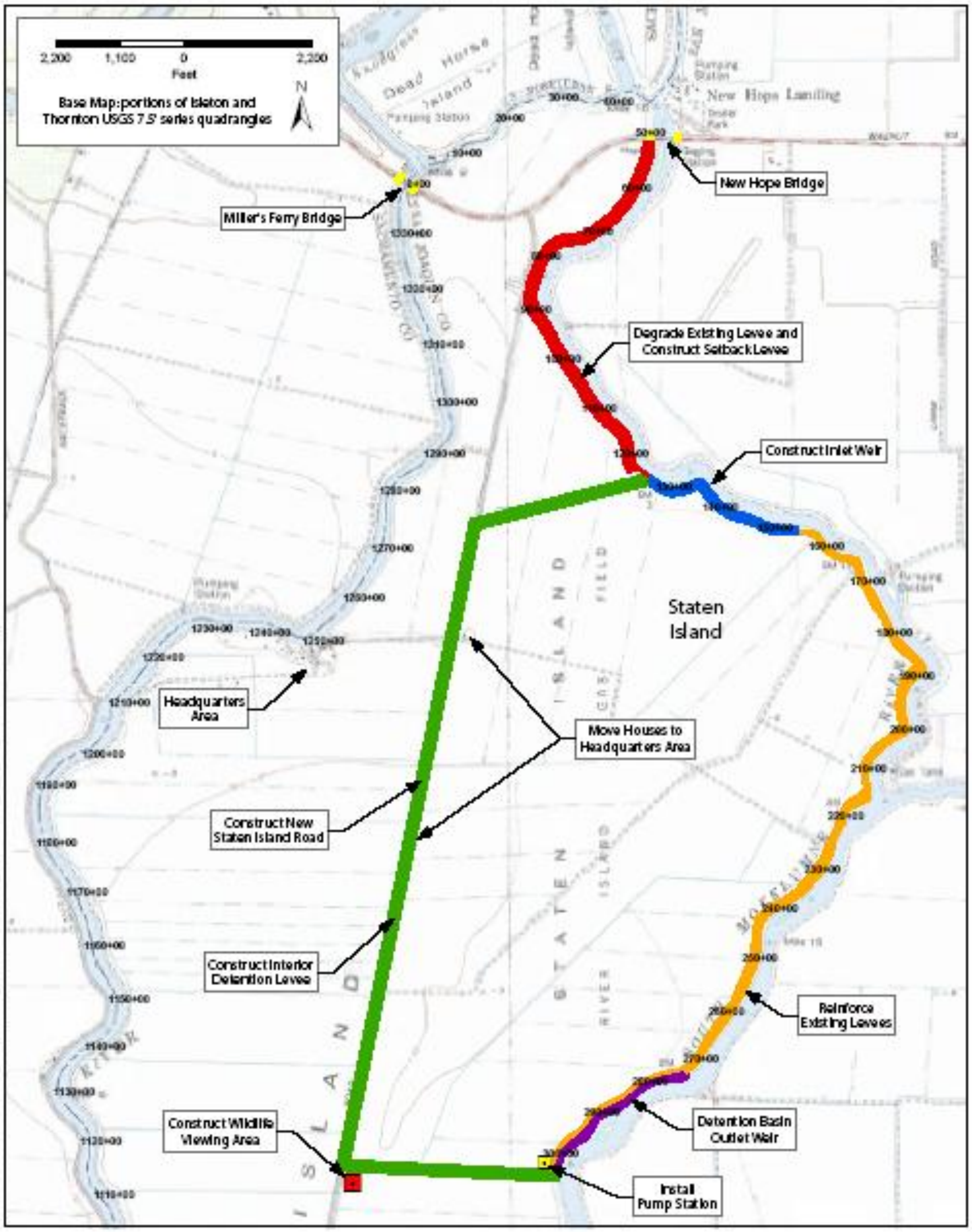


Figure 2-7. Alternative 2-C: East Staten Detention Plan

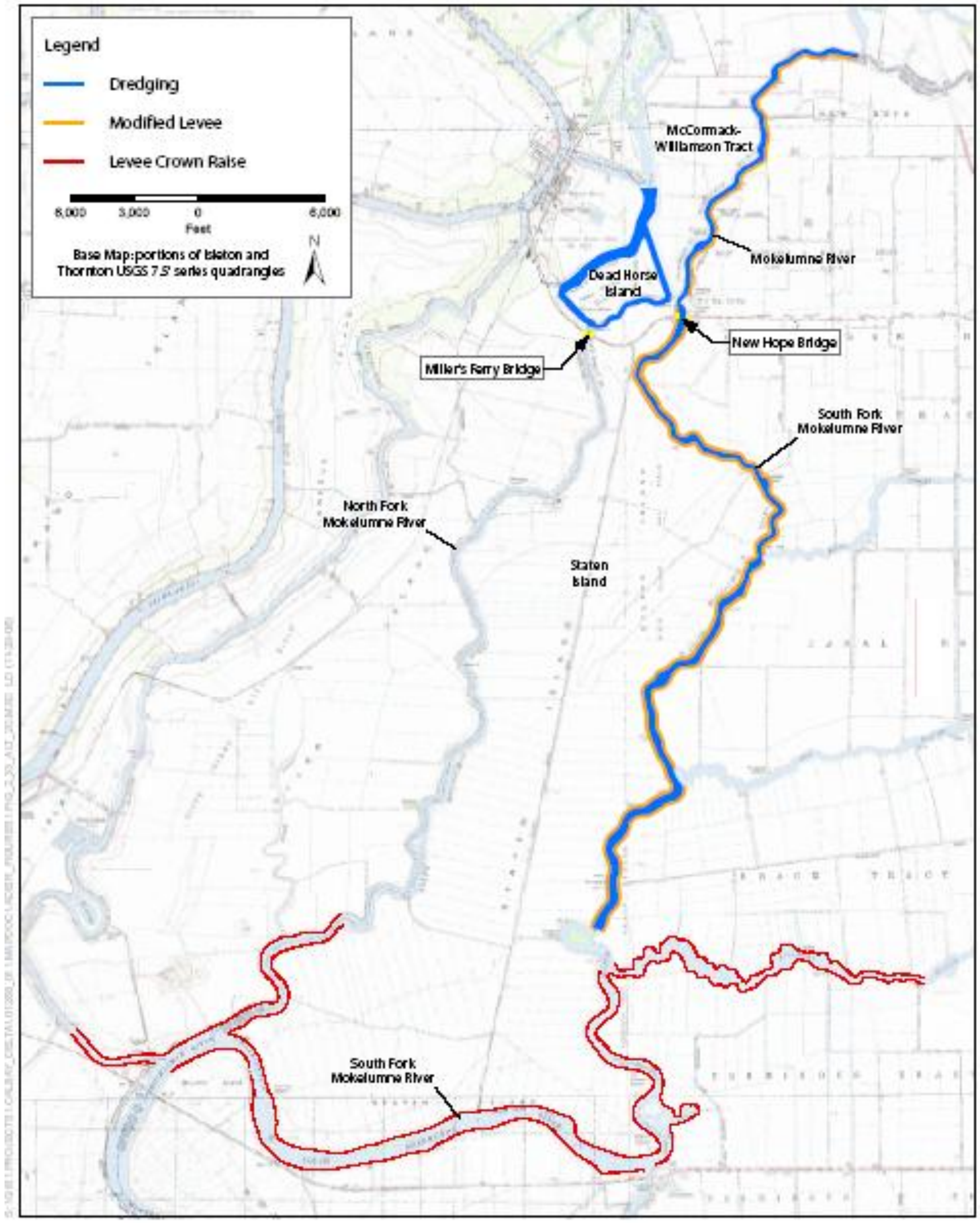


Figure 2-8. Alternative 2-D: Dredging and Levee Modification Plan

Design and Construction

Enhancements would be achieved through construction of a wildlife viewing area on the new detention levee with supporting infrastructure located near the base of the levee (parking lot and restrooms). An all –weather–surfaced ramp would be constructed along the levee to allow circulation between the parking area and the viewing area, meeting state and federal accessibility requirements. The viewing area would include an open blind-type structure, designed with a low profile and low visibility to blend in with the levee. The blind may include interpretive signage, benches, and permanently mounted spotting scopes. These enhancements would be constructed concurrently with the flood control improvements on Staten Island.

Supporting infrastructure would include an allweather–surfaced parking area, picnic benches, self-contained vault-type restrooms, and an interpretive trail loop.

Operations and Maintenance

Coordination with TNC's wildlife-friendly farming operation would occur so that recreation would not interfere with farming operations. No public access would be permitted to the viewing area during times when the detention basin is inundated. The restroom would require periodic inspection and maintenance.

Excavate Dixon and New Hope Borrow Sites

The inlet weir, roadway ramps, and new detention levee require select fill material, assumed to be available from the Dixon and New Hope borrow sites. This component would be the same as described under Alternative 1-A.

Alternative 2-B: West Staten Detention

This alternative provides additional capacity in the local system through construction of an off-channel detention basin on the western portion of Staten Island, along the North Fork Mokelumne River. High stage in the river would enter the detention basin upon cresting a weir in the levee. Habitat restoration is integrated with the construction of a setback levee. Other components are combined to protect infrastructure. Similar to all detention alternatives, this alternative is designed to capture flows no more frequently than the 10-year event while having no measurable effect on the 100-year floodplain. The interior of the basin would continue to be farmed, consistent with current practices. As shown in figure 2-6, Alternative 2-B includes the following components:

- Construct West Staten Inlet Weir
- Construct West Staten Interior Detention Levee
- Construct West Staten Outlet Weir
- Install Detention Basin Drainage Pump Station
- Reinforce Existing Levee

- Construct Staten Island West Setback Levee
- Degrade Existing Staten Island West Levee
- Relocate Existing Structures
- Retrofit or Replace Millers Ferry Bridge
- Retrofit or Replace New Hope Bridge *(optional)*
- Construct Wildlife Viewing Area
- Excavate Dixon and New Hope Borrow Sites

Construct West Staten Inlet Weir

Objective

To convey high river stages into the detention basin on the western side of Staten Island, the degraded levee would be reinforced as a hardened weir to direct flow and minimize erosion.

Location

A weir would be constructed to direct flows on the North Fork Mokelumne River into the Staten Island detention basin, across the river from Tyler Island. The resulting weir would be approximately 3,000 feet long.

Design and Construction

The weir would have a crest elevation set to 9 feet NGVD, approximately 16 feet above the surrounding land base. The crest would be approximately 44 feet wide, and the slopes of the weir would be 3:1 on either side. RSP on the northern side of the weir would extend 10 feet down the weir face flush to grade to protect against turbulence in the approaching flow. The protection would continue across the crest and down the southern face of the structure. At the southern toe, an end sill would be constructed to dissipate the energy of the overtopping flow. All RSP would consist of 24-inch angular rock placed to a depth of 30 inches. One or more filter layers would be placed under all RSP areas to prevent scour of the underlying soil. The approximate total width of the footprint would be 160 feet.

Operations and Maintenance

The weir itself has no operable devices. The weir would be maintained in a manner similar to current levee management practices in the area for vegetation control. As a component of the AMP, DWR will develop a Flood Recovery Plan to ensure the land in the detention basin is restored for farming as quickly as possible after flood events.

Construct West Staten Interior Detention Levee

This component would be the same as described under Alternative 2-A, except for the location. The detention levee would key into the existing Staten Island west levee at the southern end of the detention basin near Station 1030+00, and into the new setback levee where it meets the new inlet weir near Station 1252+90. The resulting detention levee would be approximately 22,000 feet long.

Construct West Staten Outlet Weir

This component would be the same as described under Alternative 2-A, except for the location. The outlet weir would be constructed on approximately 3,000 feet of the existing levee along the North Fork Mokelumne River near the drainage pump station.

Install Detention Basin Drainage Pump Station

This component would the same as described under Alternative 2-A, except for the location and pump specifications. The drainage pump station would be located at the southwest end of the detention basin, on the North Fork Mokelumne River levee at approximately Station 1031+85. Under Alternative 2-B, the detention basin area would be approximately 1,600 acres and capacity would be approximately 35,600 af, requiring nine 30-inch-diameter pumps, each rated at 200 to 250 horsepower running continuously to drain the basin within 30 days. Each diesel-powered pump would consume 10 to 14 gallons of fuel per hour and would generate 95 to 105 decibels of sound.

Reinforce Existing Levee

This component would be the same as described under Alternative 2-A except for the location. Alternative 2-B proposes using the existing levee along the North Fork Mokelumne River as the western wall of the detention basin. Approximately 19,000 feet of this levee would be reinforced to safely contain floodwaters in the detention basin.

Construct Staten Island West Setback Levee

Objective

As a companion action with a degraded levee (described below), additional channel capacity during flood events would be created by providing setback levees. The increased channel capacity afforded by a setback levee is important for function of the inlet weir of the new detention basin.

Location

This component would affect the west levee of Staten Island on the North Fork Mokelumne River, landside and paralleling the existing levee alignment (see Figure 2-29).

Design and Construction

The setback levee would be set between 125 and 500 feet back from the Mokelumne River. The setback distance would be refined through hydraulic modeling. The setback levee crown height would be approximately 15 feet, or the greater of the existing levee height or DWR's PL84-99 standard. The crown width would be 16 feet, and the side slopes would be 2.5:1 on the landside and 3:1 on the waterside. The levee section would also include a 20-foot-wide bench at about 4 feet NGVD on the riverside and earthwork to facilitate development of a floodplain meander channel and positive drainage returning to the main channel of the river. The channel will be of a sufficient elevation to drain at low tide to discourage nonnative invasive species from establishing themselves in the channel. Soil from the Dixon and New Hope borrow sites would provide the extra material needed to build the setback levee.

A levee patrol road would be reconstructed on the crown of the levee. The road surface, proposed to be compacted aggregate base, would provide all-weather access.

Operations and Maintenance

Vegetation management (by herbicide application, mowing, or removal with hand tools) may be required periodically. Soil periodically may be replaced and regraded to maintain the levee cross section. RSP may be placed on the levee slope to control erosion. The access road would be managed for vegetation, anticipated to be mowed or treated with herbicide at the shoulders and side-slopes. The aggregate base surface would be refreshed periodically with new material and graded to maintain a drivable surface.

Degrade Existing Staten Island West Levee

Objective

Historically, the Delta was characterized by meandering channels and complexes of wetland, shallow aquatic, and riparian habitat. The present-day Delta is characterized by rip-rapped channels with steepened banks. As a companion action with a setback levee (described above), additional channel capacity during flood events would be created by degrading the existing Staten Island west levee. This would also serve to increase habitat values in the area by expanding the floodplain and creating diverse geomorphic surfaces for various aquatic habitat types. The increased channel capacity afforded by the setback levee is also important for function of the inlet weir of the new detention basin.

Location

This component would affect the west levee of Staten Island on the North Fork Mokelumne River.

Design and Construction

The Mokelumne River levee would be degraded to a height of 6 feet and function solely as habitat. Riparian and emergent vegetation would be planted or allowed to colonize the levee, depending on elevation. The levee crown would be approximately 16 feet wide, with a 5:1 slope on the landside. The waterside of the levee would not be reconfigured so as to minimize disturbance to any existing habitat.

Between the degraded existing levee and the new setback levee, a meander channel approximately 20 feet wide would be constructed at about 0 feet NGVD. Breaches in the existing levee would allow the Mokelumne River to flow through this area during low flow and high tide. In higher flows, the meander channel area would be more fully inundated. In very high floodflows, the Mokelumne River channel would expand to the setback levee, adding from 125 to 500 feet to the existing channel cross section.

Operations and Maintenance

Vegetation management (by herbicide application, mowing, or removal with hand tools) may be required periodically, targeted at controlling invasive exotic vegetation.

Relocate Existing Structures

This component would be the same as described under Alternative 2-A, except different structures would be affected and the relocation area is different. Opening up the western part of Staten Island to detain flows in high-stage events would affect the headquarters complex for operating the island, located just south of the proposed inlet weir. These structures would be removed and relocated.

Retrofit or Replace Millers Ferry Bridge

This component would be the same as described under Alternative 2-A. The distance by which the bridge would be lengthened would be consistent with the channel width created by the new setback levee (ranging from 125 to 500 feet).

Retrofit or Replace New Hope Bridge (Optional)

This component would be the same as described under Alternative 2-A. The distance by which the bridge would be lengthened would be consistent with the channel width created by the new setback levee (ranging from 125 to 500 feet).

Construct Wildlife Viewing Area

This component would be the same as described under Alternative 2-A, except that the facilities would be shifted slightly based on the different detention basin and levee alignment.

Excavate Dixon and New Hope Borrow Sites

The new detention levee and setback levee require select fill material, assumed to be available from the Dixon and New Hope borrow sites. This component would be the same as described under Alternative 1-A.

Alternative 2-C: East Staten Detention

This alternative provides additional capacity in the local system through construction of an off-channel detention basin on the eastern portion of Staten Island, along the South Fork Mokelumne River. High stage in the river would enter the detention basin upon cresting a weir in the levee. Habitat restoration is integrated with the construction of a setback levee. Other components are combined to protect infrastructure. Similar to all detention alternatives, this alternative is designed to capture flows no more frequently

than the 10-year event while having no measurable effect on the 100-year floodplain. The interior of the basin would continue to be farmed, consistent with current practices. As shown in Figure 2-7, Alternative 2-C includes the following components:

- Construct East Staten Inlet Weir
- Construct East Staten Interior Detention Levee
- Construct East Staten Outlet Weir
- Install Detention Basin Drainage Pump Station
- Reinforce Existing Levee
- Construct Staten Island East Setback Levee
- Degrade Existing Staten Island East Levee
- Relocate Existing Structures
- Retrofit or Replace New Hope Bridge
- Retrofit or Replace Millers Ferry Bridge *(optional)*
- Construct Wildlife Viewing Area
- Excavate Dixon and New Hope Borrow Sites

Construct East Staten Inlet Weir

This component would be the same as described under Alternative 2-B except for the location. The weir would be constructed to direct flows on the South Fork Mokelumne River into the Staten Island detention basin, across the river from Canal Ranch and New Hope Tract. The resulting weir would be approximately 3,000 feet long.

Construct East Staten Interior Detention Levee

This component would be the same as described under Alternative 2-A except for the location. The detention levee would key into the Staten Island east levee at the southern end of the detention basin near Station 304+10, and into the new setback levee where it meets the new South Fork Weir. The resulting detention levee would be approximately 17,000 feet long.

Construct East Staten Outlet Weir

This component would be the same as described under Alternative 2-A except for the location. The outlet weir would be constructed on approximately 3,000 feet of the existing levee along the South Fork Mokelumne River near the drainage pump station.

Install Detention Basin Drainage Pump Station

This component would be the same as described under Alternative 2-A except for the location and specifications. The drainage pump station would be located at the southeast end of the detention basin, on the South Fork Mokelumne River levee at approximatelyStation 301+40. Under Alternative 2-C, the detention basin area would be approximately 1,600 acres, and the capacity would be approximately 32,400 af, requiring eight 30-inch-diameter pumps, each rated at 200 to 250 horsepower, running continuously to drain the basin within 30 days. Each diesel-powered pump would consume 10 to 14 gallons of fuel per hour and would generate 95 to 105 decibels of sound.

Reinforce Existing Levee

This component would be the same as described under Alternative 2-A except for the location. Alternative 2-C proposes using the existing levee on the eastern side of Staten Island along the South Fork Mokelumne River as the western wall of the detention basin. Approximately 16,000 feet of this levee would be reinforced to safely contain floodwaters in the detention basin.

Construct Staten Island East Setback Levee

This component would be the same as described under Alternative 2-B except for the location, which is the east levee of Staten Island on the South Fork Mokelumne River, landside and paralleling the existing levee alignment.

Degrade Existing Staten Island East Levee

This component would be the same as described under Alternative 2-B except for the location, which is the east levee of Staten Island on the South Fork Mokelumne River.

Relocate Existing Structures

This component would be the same as described under Alternative 2-A, except different structures would be affected. Opening up the eastern part of Staten Island to detain flows in high-stage events would affect the two residences along Staten Island Road near the new detention levee. These structures would be removed and relocated.

Retrofit or Replace New Hope Bridge

This component would be the same as described under Alternative 2-A.

Retrofit or Replace Millers Ferry Bridge (Optional)

This component would be the same as described under Alternative 2-A.

Construct Wildlife Viewing Area

This component would be the same as described under Alternative 2-A, except that the facilities would be shifted slightly based on the different detention basin and levee alignment.

Excavate Dixon and New Hope Borrow Sites

The new detention levee and setback levee require select fill material, assumed to be available from the Dixon and New Hope borrow sites. This component would be the same as described under Alternative 1-A.

Alternative 2-D: Dredging and Levee Modifications

This alternative provides additional channel capacity by dredging the river bottom and modifying levees. As shown if figure 2-8, Alternative 2-D includes the following components:

- Dredge South Fork Mokelumne River
- Modify Levees to Increase Channel Capacity
- Raise Downstream Levees to Accommodate Increased Flows
- Retrofit or Replace Millers Ferry Bridge (*optional*)
- Retrofit or Replace New Hope Bridge (*optional*)

Dredge South Fork Mokelumne River

This component would be similar to the component described under Alternative 1-A. Although occurring within the same geographic limits and using the same methods as described under Alternative 1-A, this component is distinguished from that alternative in that the volume removed is not constrained by the objective to result in no effect on downstream conveyance capacity. In other words, downstream levees would be modified in combination with increased dredging to remove a larger volume of in-channel sediments to provide greater channel conveyance capacity within and downstream of the dredging area. The cross-sectional limits would be determined during detailed engineering to minimize effects on shallow aquatic habitat.

Unlike the similar optional component under Group I, this component under Alternative 2-D would include removal of accumulated sediments and associated vegetation from around the New Hope Bridge. The sediment is presently creating a constriction at the bridge by reducing the cross-sectional area of the channel at the bridge and its approaches.

Modify Levees to Increase Channel Capacity

Objective

Substantially increasing conveyance capacity of the South Fork Mokelumne River involves channel dredging in combination with modification of the levee system. Further, higher degrees of dredging necessitate raising the profile of downstream levees to accommodate the resulting greater flows, as demonstrated through hydraulic modeling.

The premise of a modified setback levee is that the levee slopes are laid back, such that the channel cross section is progressively wider and channel capacity is considerably increased, corresponding with higher water surface elevation. A modified setback levee approach has been implemented on the east side of Tyler Island, across the North Fork Mokelumne River from Staten Island, and is proposed to be further expanded upstream (under a separate project). This component proposes to adopt a similar approach on the South Fork Mokelumne River to increase channel capacity when needed at higher flows.

Location

This component would potentially be applied to the same geographic limits as the dredging component. These activities are linked in part because dredge spoils would provide some of the material needed to construct the levee modifications. Both sides of the channel are proposed to be modified, except where structures or other infrastructure that cannot be easily relocated would preclude implementation.

Design and Construction

The modified setback levee entails laying back the waterside slope from the toe of the levee at a 5:1 (horizontal to vertical) angle, providing a 16-foot wide patrol road on the levee crown, and a 3:1 landside slope down to the land surface. A key feature of the modified setback is a splash berm at the waterside hinge point of the levee, projecting 1 foot above the crown and 2 feet wide at the top to provide additional wave and wake protection at high flows. The waterside slope would be treated with RSP and planted with riparian vegetation along the slope face and emergent vegetation at the toe. The patrol road would be treated with compacted aggregate base.

Operations and Maintenance

Levees would be operated and maintained consistent with current practices; however, vegetation would be selectively permitted to grow on the waterside slope to dissipate wind and wave energy and protect the levee embankment.

Raise Downstream Levees to Accommodate Increased Flows

Objective

To address the hydraulic effects of increasing conveyance capacity on the South Fork Mokelumne River (through dredging and levee modifications), downstream levees would be raised as needed to maintain freeboard (please see Figure 2-5, Volume II-Figures of the DEIR).

Location

Levees are proposed to be raised as needed along portions of the South Fork Mokelumne River, North Fork Mokelumne River, Sycamore Slough, Georgiana Slough, and the mainstem Mokelumne River. Levees on opposite sides of the waterways are proposed to be raised in parallel (i.e., matching in profile).

Design and Construction

Hydraulic modeling results indicate that the implementation of dredging and levee modifications under Alternative 2-D would require levee raises along portions of the aforementioned waterways of approximately 1.2 inches (0.1 foot) (see Appendix E for more information on hydraulic modeling for the project). These levee raises would require adding stabilized and compacted aggregate base to the levee crown and landside surface of the levee in order to maintain levee crown width and landside levee slope.

Operations and Maintenance

The levees affected by this component would continue to be managed as they are under existing conditions. These activities include vegetation management (by herbicide application, mowing, or removal with hand tools), placement of RSP to address waterside erosion, and restoration of the aggregate base patrol road with new material placed and graded to maintain a drivable surface.

Retrofit or Replace New Hope Bridge (Optional)

This component would be the same as described under Alternative 2-A.

Retrofit or Replace Millers Ferry Bridge (Optional)

This component would be the same as described under Alternative 2-A.

CEQA Environmentally Superior Alternatives

According to CEQA Guidelines Section 15126(e)(2), the lead agency should identify the environmentally superior alternative(s). Alternatives 1-A and the No Action Alternative for the Group 2 actions are currently identified as the Environmentally Superior Alternatives, based on the analysis in the Draft EIR, and comments received during the public comment period and public hearing. These alternatives include the lowest levels of environmental impacts associated with construction and flood control improvements.

The Preferred Alternatives and Proposed Project

Alternatives 1-A and The No Action Alternative for the Group 2 actions are identified as the Preferred Alternatives based on the analysis in the Draft EIR, and comments received during the public comment period and public hearing. The Proposed Project is consistent with the actions detailed in Preferred Alternative 1-A; specifically flood control and ecosystem restoration actions on McCormack-Williamson Tract and Grizzly Slough. The justification for this selection is presented in the discussion below; organized by the actions proposed with each of the Group 1 and Group 2 Alternatives.

Group 1

Alternative 1-A is the only Group 1 action designed to promote natural flooding processes and improve river floodplain connectivity; benefiting floodplain spawning fish, such as the Sacramento splittail, and floodplain rearing habitat fish species, such as the Chinook salmon. The degraded southwest levee on McCormack-Williamson Tract will create a tidal wetland habitat on the southern end of the Tract and will minimize the potential to strand juvenile fish. The system will be open to riverine, flooding, and tidal processes, creating channel and floodplain habitat, dendritic intertidal channels, and emergent marsh habitat. The enhanced flooding and tidal processes will increase the sediment accretion rate and over time, raise lower land surface elevations on the Tract. Alternative 1-A actions are consistent with UC Davis paleogeomorphic research study findings that McCormack-Williamson Tract was historically dominated by fluvial processes (page 10, Appendix B of DEIR). Alternatives 1-B and 1-C in contrast, have a higher potential for stranding salmonids, steelhead, and Sacramento splittail due to the absence of a permanent water connection between the southern end of the Tract and the adjacent Delta channels.

The greenhouse gas emissions emitted with the construction of Alternative 1-A will be lower in comparison (1179 versus 1212 metric tons of CO_2 equivalents) to Alternatives 1-B and 1-C because more of the borrow material needed for the completion of the wildlife friendly levees will be provided onsite (see Greenhouse Gas Analysis on page 4-31). The breaching of the Mokelumne River to allow a secondary channel to meander through the tract, followed by excavation of the starter channel to facilitate channel-forming processes will provide additional borrow material to complete the levee construction. In contrast, construction of Alternatives 1-B and 1-C will require more offsite borrow material; necessitating additional excavation and transport of levee material from the Dixon borrow site and Grizzly Slough parcel, both owned by DWR.

The frequency at which the McCormack-Williamson Tract floods will increase with the implementation of any of the three Group 1 actions; however the partially degraded southwest levee (5.5 feet msl) of the McCormack-Williamson Tract for Alternatives 1-B and 1-C may extend the detention of floodwaters on the island, exposing the fish to declining water quality conditions and delaying their migration.

Alternative 1-C proposes an additional benefit with the partially degraded southwest levee as the southern border of a subsidence reversal demonstration study site (bordered on the north with landside cross levee). However, recent land elevation analyses comparing DWR LiDAR (2007) data with USGS quadrangle (1974 survey) indicate that subsidence has not occurred over three decades on the Tract. Subsidence reversal is therefore not a high priority for McCormack-Williamson Tract which comprises mostly mineral soils. The lower elevations of the southern end of the Tract (approximately -2.5 ft. msl) are expected to accrete sediment in any event, with the opening of the Tract to tidally influenced sediment deposition as proposed with Alternative 1-A.

Alternative 1-A is the least expensive of three Group 1 Alternatives based on construction cost estimates developed by Jones and Stokes in 2006 (see Table 2-7). Alternative 1-A costs are approximately $3 million lower than Alternative 1-B and $6 million lower than Alternative 1-C. Please see Volume II, Appendix B of the FEIR for the Jones and Stokes construction cost estimates for the North Delta Project.

According to the findings of the Preliminary North Delta Flood Control and Ecosystem Restoration Project Benefits Analysis (Appendix A), Alternative 1-A was calculated to provide the highest Benefit/Cost ratio of all of the Group 1 and Group 2 Alternatives with a value of 3.2 (Table 2.8). Typically, a B/C ratio of 1.0 is the minimum value (benefits equal costs) needed to justify the economic costs of implementing large scale projects. This economic analysis was developed by DWR specifically for the North Delta Flood Control and Ecosystem Restoration Project.

The flood protection benefits provided by each of the three of the Group 1 Alternatives are comparable based on the MIKE 11 modeling results. Please refer to Chapter 3.1 of the North Delta Draft EIR for additional information.

Optional Group 1 Actions

There are two actions designated as optional under Alternative 1-A:

- Dredge the South Fork Mokelumne River and,
- Enhance Delta Meadows Property

Dredging the South Fork of the Mokelumne River has not been selected as a component of Preferred Alternative 1-A because of the limited flood protection benefits provided with this component. This dredging action would occur within the same geographic limits as proposed with Alternative 2-D; however, the volume of sediment dredged would be limited to the extent that downstream levee modifications/raises would not be required. Any increase in upstream conveyance capacity would need to be balanced with downstream levee modifications. The action proposed with this dredging component does not necessitate downstream modifications, implying minimal increases in river channel conveyance capacity, and limited flood protection benefits. A more detailed discussion of the efficacy of dredging actions in the North Delta project area is provided in the Group 2 Alternatives discussion.

The enhancement of the Delta Meadows Property has been selected as a component of the Preferred Group 1 Alternative. The goal of this action is to improve recreation by upgrading the recreational facilities of the property including boat launch facilities, parking areas, signage and public restrooms. This is consistent with one of the recommendations of the Delta Vision Blue Ribbon Task Force to, "create a statewide public identity for the Delta and encourage expanded tourism and recreational investment." Enhancement of the Delta Meadows Property is also consistent with the goals of the North Delta EIR to increase opportunities for recreation that are compatible with flood control and ecosystem restoration by improving public access for fishing, wildlife viewing, and boat use. The opening of the southern portion of McCormack-Williamson Tract proposed with Alternative 1-A will also create more recreational opportunities for boating and fishing.

A General Plan for the Delta Meadows property must be prepared by the Department of Parks and Recreation (DPR) prior to any permanent recreation improvements. DPR has not yet identified funding for the preparation of a General Plan for the Delta Meadows property, though the completion of the Plan and upgrading the facilities is estimated to cost $250,000. DWR commits to working cooperatively with DPR to assist in preparation of the General Plan, development of a funding strategy, and implementation. DPR anticipates that passive recreation activities would be developed. These types of recreation activities are hiking, nature viewing, non-motorized boating, and fishing. Physical improvement may include upgrading boat launch facilities, parking improvements, trails, interpretive signage, and public restrooms.

Table 2-7. Cost estimates for Implementation of Group 1 and Group 2 Alternatives

Alternative	Costs in millions of dollars
Alternative 1-A	$44,320,498
Alternative 1-B	$47,555,174
Alternative 1-C	$50,907,456
Alternative 2-A	$209,617,368
Alternative 2-B	$327,474,925
Alternative 2-C	$247,689,584
Alternative 2-D	$102,897,468

Table 2.8 North Delta Alternatives
Comparison of Net Benefits and B/C Ratios

Alternative	PV Net Benefits (1)	B/C Ratio
Alternate 1-A	$102 M	3.2
Alternate 1B	$99 M	3.0
Alternate 1C	$96 M	2.8
Alternate 2-A	-$60 M	0.7
Alternate 2-B	-$178 M	0.5
Alternate 2-C	-$98 M	0.6
Alternate 2-D	$42 M	1.4

(1) 50 year analysis period; 6% discount rate

Group 2

The No Action Alternative is selected as the Preferred Alternative for the Group 2 Actions. The justification for this selection is presented in the discussion below; organized by the actions proposed with each of the Group 2 Alternatives.

Group 2-A, 2-B, and 2-C – Detention Basin Alternatives

Group 2-A, 2-B, and 2-C consist of the proposed detention basins on Staten Island. Alternative 2-A has the greatest potential for achieving flood control and ecosystem restoration benefits (creating approximately 78 acres of floodplain habitat) compared to Group 2-B, 2-C, and 2-D Alternatives. The weir located on the northern end of the detention basin is wider than the two other proposed detention basin alternatives allowing for a higher rate of flow into the basin. Alternative 2-A is strategically located to catch floodflows directly from both the North and South forks of the Mokelumne River versus Alternatives 2-B and 2-C which are located further south; requiring the floodwaters to follow a longer and more indirect route into the detention basins. Alternative 2-A is designed to hold up to 48,350 acre feet (af), considerably more volume than the west Staten detention alternative (designed for 35,600 af), and the eastern Staten detention alternative (designed to detain 32,400 af).

According to the MIKE 11 model results described in Volume 1, Chapter 3 and Volume 3, Appendices of the North Delta Flood Control and Ecosystem Restoration Project DEIR; the stage elevation decreases at most of the index points were highest with the combined implementation of Group 1B (there are no appreciable differences modeling results for all of the Group 1 Alternatives) with Alternative 2-A. This would correlate with a higher level of flood protection with the implementation of Alternative 2-A in comparison to the all of the other Group 2 Actions, including Alternative 2-D.

All of the detention basins are designed to pump out within 30 days of the flood event which will most likely occur during the winter months of December, January, and February. The quick pump-out of the basin and the timing of the flood event (colder winter months) will significantly reduce the chance for mosquito breeding to occur at the site. The quick turnaround time to pump out the basin will also help mitigate for anecdotal evidence that supports the idea that flooded islands will produce more seepage into neighboring islands. In any case, the neighboring islands that may experience seepage from infrequent flooding of detention basins are the islands that will benefit most from reduced flood risk due to the stage reductions produced by the detention basin.

Alternatives 2-A, 2-B, and 2-C would not impact agricultural operations because the areas within the detention basins will continue to be farmed; the basins' fixed weirs are designed to overflow during a greater than a one in ten year event which means the basins will be dry and available for farming (corn and other crops typically grown on Staten are not planted during the winter months when flooding is most likely to occur) most years. In addition, the basin will continue to provide important roosting habitat for the Greater Sandhill Cranes.

The potential for fish entrainment with the implementation of Alternative 2-A, 2-B, and 2-C is uncertain due to insufficient information; however the infrequency of basin flooding (>10 year event) and the timing of the flood event during the winter months December, January, and February should lessen the likelihood of special status species entrainment. Any adverse effects from entrapment would be offset with the creation of approximately 78 acres of floodplain habitat as a result of degrading the northern levee on Staten Island. Alternatives 2-B and 2-C do not propose the creation of floodplain habitat on the northern end of Staten Island.

Alternative 2-A is the least expensive of the three detention basin alternatives yet is more costly than Alternative 2-D, the dredging and levee modifications proposal. This is misleading, however because the estimate does not include the additional costs associated with maintenance dredging that will inevitably occur anywhere from 10 to 15 years after the initial dredging project. According to Jones and Stokes annual flood operations estimates, Alternative 2-D would cost approximately $310,000 assuming dredging would be required on a 15 year cycle (average annual cost divided by 15). Annual costs will be higher if dredging is needed on a more frequent basis, such as 10 years. In contrast, the estimated annual flood operations cost for Alternative 2-A is $1,120 based on the average annual cost divided by 10 assuming the island would be flooded once every ten years (Jones and Stokes, 2006).

Alternative 2-A would provide the highest level of flood protection in comparison to all of the Group 2 actions and create approximately 78 acres of floodplain habitat on the northern end of the island. Unfortunately, the level of flood protection provided with Group 2-A and the other detention basin proposals is not commensurate with the estimated costs (210 to 328 million dollars) to implement these alternatives. According to a Preliminary North Delta Flood Control and Ecosystem Restoration Project Benefits Analysis (Table 2.8), Benefit/Cost (B/C) ratios for Alternatives 2-A, 2-B, and 2-C range from 0.5 to 0.7, well below the minimum threshold value of 1.0 to justify implementation of this phase of the project.

There is little public support for the detention basin alternatives (2-A, 2-B, and 2-C) based upon written and verbal comments (public hearing) received during and after the 60 day public comment period. A critical factor in moving a project forward is the support of stakeholders and for these alternatives, stakeholder support is clearly lacking.

Alternative 2-D – Dredging and Setback Levees on the North Fork of the Mokelumne River Alternative

Dredging Component of Alternative 2-D

The remaining alternative among the Group 2 actions is 2-D, or the dredging and levee modifications alternative. 2-D is the most cost effective to implement, with a calculated B/C ration of 1.4. However, the annual maintenance costs are significantly higher ($310,000 vs. $1,120) than those of Alternatives 2-A, 2-B, and 2-C. In addition, the benefits analysis used in the development of the B/C ratio did not include a discussion of the costs associated with environmental compliance.

Dredging and placement of dredged material must comply with the California Environmental Quality Act and National Environmental Policy Act and meet the requirements of the US Army Corps of Engineers (e.g., section 10 permit, section 404 permit), the Regional Water Quality Control Board (e.g., section 401 water quality certification, waste discharge requirements), the California Department of Fish and Game (e.g., streambed alteration agreement), and any other applicable agency (**see list on page 2-71**). All agencies should be contacted to ensure the project meets all applicable requirements.

Background information to be collected for the permitting process include the location to be dredged, the depth, quantity, and distribution of sediment to be dredged, dredging operation plan (e.g., the proposed dredging schedule, type of dredging method), the characteristics of the placement site (e.g., location, capacity, return water if any, soil characteristics, groundwater information), and a characterization of the dredged material. The dredged material is characterized by a pre-dredge sampling analysis which typically includes a whole sediment analysis, a standard elutriate test (SET), a waste extraction test (WET) or de-ionized waste extraction test (DIWET)[1] if the dredged material will be placed to land, and a modified elutriate test (MET) if effluent will be returned to surface waters.

It is advisable to consult with the Regional Board prior to pre-dredge sampling to ensure the sampling plan meets the Regional Board's requirements and to prevent the need for potentially expensive re-sampling. Roughly one boring for every 5,000 cubic yards of dredged material has been used to characterize dredged material, although this varies based on the variability of the soil and the size of the project. Constituents to be analyzed include total Title 22 metals, PCBs, PAHs, pesticides, ammonia, total organic carbon,

[1] The acid generation potential (AGP) and neutralization potential (NP) should be determined and if the ratio of NP:AGP is 3 or greater, a DIWET test should be performed, otherwise a WET test should be performed.

methylmercury, and salinity constituents/parameters (e.g., electrical conductivity, TDS, chloride).

Federal

1. US Army Corps of Engineers (Clean Water Act Section 404 dredging permit) may also require a Section 10 permit and/or nationwide permits or special permitting by the USACE to actually do the dredging, 404. Section 10 if navigable waters.
2. US Environmental Protection Agency (Provides oversight for Corps' regulatory program)
3. National Marine Fisheries Service (Endangered Species Act, Section 7 Consultation)
4. US Fish and Wildlife (Endangered Species Act, Section 7 Consultation)
5. United States Coast Guard to ensure signs and buoys comply with the California Uniform State Waterway Marking System. Also the USCG publishes notices with local papers to notify mariners of dredging operations and channel obstructions.

State

1. State Lands Commission (Dredging activities are subject to the California Environmental Act (CEQA) and CEQA review must identify lands found to contain "Significant Environmental Values" (PRC Section 6370) and determine if proposed use (dredging) is consistent with identified values. The project cannot be presented at the SLC hearing until CEQA process is complete.
2. Department of Fish and Game (Department of Fish and Game Code Section 1601, Streambed Alteration Permit)
3. State Historic Preservation Office (Section 106 of National Historic Preservation Act) Consultation with State Historic Preservation Officer and the Advisory Council for Historic Preservation to determine mitigation requirements
4. Department of Food and Agriculture (Consult with CDFA if dredge material is disposed of on agricultural land)
5. Delta Protection Commission (DPC) – DPC would like the proposed project to be reviewed at a public meeting to allow for public and Commission input relative to the DPC's adopted Land Use Plan for the Primary Zone of the Delta.

Local

1. County and/or Municipality – Local Permits may be required for various activities such as grading, etc.
2. Local Reclamation Districts, State Reclamation Board **-** Encroachment Permit needed if dredging activity involved placement, construction, reconstruction, removal, or abandonment of any landscaping, culvert, bridge, conduit, fence, projection, fill, embankment, building, structure
3. Native American Tribes – Must consult with them in accordance with US Army Corps of Engineers if dredging operation impacts their lands.

Laws and Regulations related to dredging projects

1. Clean Water Act Section 401
2. Clean Water Act Section 404
3. Endangered Species Act, Section 7
4. National Historic Preservation Act Section 106
5. Porter Cologne Water Quality Control Act Sections 13260-13274
6. California Fish and Game Code Section 1601
7. California Resources Public Code Sections 6005, 6105, 6108, 6216, 6301, 6309, 6321, 6501, 6501.1, and 6501.2

The rationale for moving ahead with the large scale dredging/ levee modification actions proposed with Alternative 2-D must be substantive in lieu of the implementation costs and environmental regulatory requirements. There must be evidence to support that sedimentation of the waterway has significantly reduced the cross sectional area and conveyance capacity of the stretch of the Mokelumne River identified in the alternative (see Figure 2-8). According to the bathymetry data results collected for the North Delta Scour Monitoring Program, that is not the case. DWR's North Delta Scour Monitoring Program was initiated in 1993 to evaluate changes in channel cross sections at 38 sites in the North Delta; including 7 sites located on the North Fork of the Mokelumne River. The stretch of the Mokelumne River proposed for dredging in the North Delta Project (UM-15, UM-25, UM-30, SN-25, SN-30, NM-10, DH-10, SM-10, SM-20, SM-35, SM-45, and SM-55) has either increased in cross sectional area or remained stable at nearly all of the 12 monitoring sites over a 14 year (1994-2008) period of the ongoing study. There are additional monitoring sites located upstream (UM-10), downstream (SM-65, SM-70), and in the sloughs intersecting the South Fork Mokelumne River (BS-45, BS-50, HS-45, HS-50, SY-45, and SY-50); all of these locations follow a similar pattern of erosion instead of sediment accumulation. Figure 2-9 displays a map of the site locations on the North and South Forks of the Mokelumne River; figures 2-10 through 2-31 display changes in cross sectional area for each of the monitored sites upstream, downstream, and within the boundaries of the river stretch proposed for dredging in Alternative 2-D. The BASE AREA referred to in graphs is the cross sectional area of the site in 1994, the first year of bathymetry data collection (bathymetry measurements were taken in both April and October of 1994).

The North Delta Scour Monitoring results are supported by the findings of the North Delta Sedimentation Study (November, 2006) prepared by Northwest Hydraulics Consultants (NHC) for the Department of Water Resources (Volume 3, Appendix F of DEIR, pages 12-14). NHC evaluated bathymetric data from 1934 in combination with the North Delta Scouring Monitoring Program's detailed annual cross section data from 1994-2001. "At most locations, the 1934-2001 and 1994-2001 cross-section data show declines in channel invert elevation as well as increases in cross-section for the 1994-2000 period. Due to the lack of density of data points, estimates of the 1934 channel invert could be made at only 13 of the 32 cross section locations; however almost all of the data (11 of 13) show an apparent decline in invert elevation from 1934 to 2001. Only two sites indicate a possible channel invert rise, NM-30 (+1) and SM-20 (+5)." Bathymetry data collected for both of these sites from 2001-2008 reflect an increase in cross sectional area for site NM-30, and a slight decrease in cross-sectional area for SM-20 since 2001. SM-20's 2008 cross-sectional area of 1609 sq. ft. however, is approximately 217 sq. ft. greater than the 1994 BASE AREA measurement of 1309 sq. ft. for the site (see Figures 2-16 and 5-3).

The NHC sediment model predicts general deposition at a system-wide level in the North Delta based upon the limited bathymetry database available at the time (1934, 1994-2001). However, more recent data collected from 2001-2008 for the North Delta Scour Monitoring Study indicate a consistency with the study's historical cross-section findings "that the majority of waterways in the project area have experienced some channel incision over the several decades and may be experiencing a net sediment loss over time".

The NHC study does include dredging as a possible explanation for the decline in invert elevation for certain locations in the North Delta; however the dredging operations completed in the past 22 years were limited to Snodgrass, Beaver, and Hog Sloughs, Dead Horse cut, and short sections of the South Fork and North Fork of the Mokelumne River. These dredging operations were mostly small to moderate in scale (0 to 60,000 cubic yards of material) yet more importantly, were conducted by the Reclamation Districts in order to provide an inexpensive source of borrow material for levee maintenance; not to increase the conveyance capacity of the channel (see Figure 2-29). The Hog Slough/South Fork dredging project for example, was conducted in the early 90's for material to improve levees. Since Hog Slough was a dead end slough, it was doubtful there was much of a hydraulic improvement. No soundings were taken after the project was completed though the area dredged was not very wide or deep, and didn't take up much of the channel cross section (Darcy, 2008).

The largest recent dredging project in the North Delta area was completed in 1999-2000, outside of the location proposed for dredging in Alternative 2-D. The dredging was conducted on the North Fork of the Mokelume River by RD 563, and removed approximately 95,000 cubic yards of material to be used for levee maintenance/improvement (Chima pers.com.). The North Delta Scour monitoring sites in the vicinity of the dredging project are NM-70, NM-75, and NM-80 (see Figure 2-9). A review of the cross sectional areas for these sites (Figures 5-6, 5-7, and 5-8) show a slight increase in cross sectional area for NM-70 and NM-75, and a larger increase in cross sectional area for NM-80. However, cross sectional areas for these sites in subsequent years continue to increase even though there was no associated dredging activity; especially in 2006 for NM-80. This would reflect more of a steady state sedimentation pattern with sedimentation occurring one year followed by the flushing of sediment from the sites the following year.

Sedimentation and Turbidity

The large scale dredging project proposed with Alternative 2-D has the potential to increase sedimentation and turbidity in nearby areas as a result of disturbance to bottom sediments. Increases in sedimentation and turbidity can adversely affect aquatic plants by: causing abrasion to plant surfaces and attached biota; uprooting or smothering rooted plants; and reducing light penetration in aquatic habitats, thereby adversely affecting the availability of light that is necessary for photosynthesis. Potential effects of increased suspended and deposited sediments on macroinvertebrates, an important fish food item, range from impairing respiration function to smothering organisms inhabiting the substrate.

High concentrations of suspended sediment can have both direct and indirect effects on fish. Chronic exposure to high turbidity and suspended sediment may affect growth and survival by impairing respiratory function, reducing tolerance to disease and contaminants, and causing physiological stress (Waters 1995). In general, larger fish tend to be more tolerant than smaller fish, while eggs and fry are the least tolerant. Chinook salmon and steelhead spawning habitat (and, therefore, eggs and yolk-sac fry) will not be affected because the project site is located downstream of all spawning areas in the Sacramento and Mokelumne Rivers and their tributaries.

In-water construction activities are not likely to cause direct mortality of fish because the expected increases in turbidity and suspended sediment would be of short duration, limited in extent, and monitored for compliance with regulatory standards. In addition, any localized increases in suspended sediment and turbidity likely would be diluted quickly as a result of the mixing potential associated with the strong channel currents. Potential impacts on fish species will likely be limited to indirect effects resulting from the behavioral response of fish to turbid water and suspended sediment in the affected portion of the river.

Potential behavior effects associated with elevated levels of suspended sediment and turbidity include avoidance of high turbidity, changes in foraging ability, increased predation risk, and reduced territoriality. For example, salmonid rearing habitat quality and quantity may be reduced by fine sediment (Bash et al. 2001; Meehan 1991). Deposition of excessive fine sediment on the stream bottom could eliminate habitat for aquatic insects; reduce density, biomass, number, and diversity of aquatic insects and vegetation; and reduce the suitability of spawning habitat for estuarine species that spawn in the North Delta (e.g., delta smelt, splittail). Substantial sediment input could adversely affect the migration of migratory species.

The diets of many species, especially juvenile salmonids, consist mostly of macroinvertebrates living in aquatic environments. Large amounts of fine sediments reduce or eliminate much of the suitable substrate necessary for macroinvertebrate production, essentially limiting the food available to juvenile salmonids (Meehan 1991) and other species.

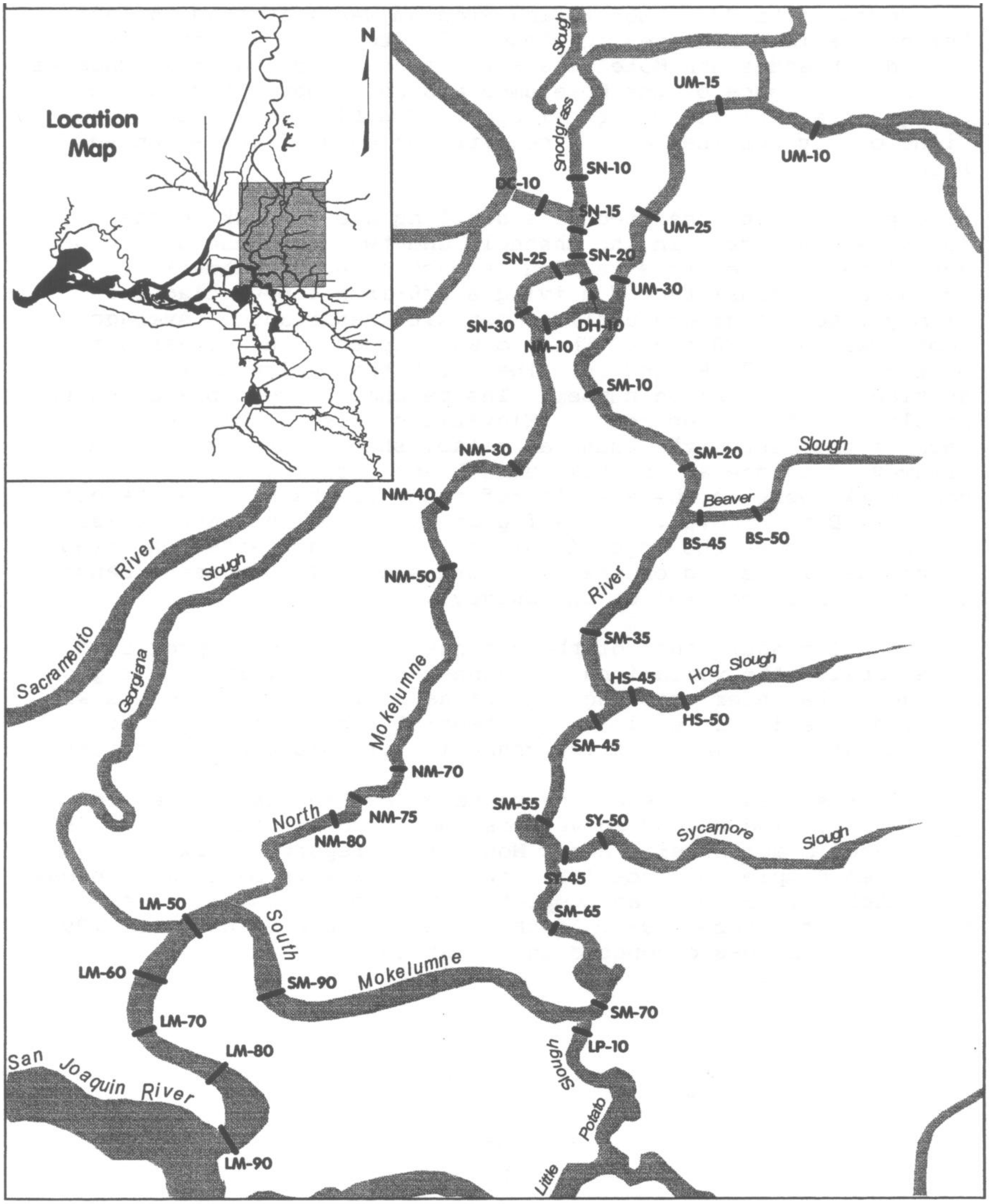
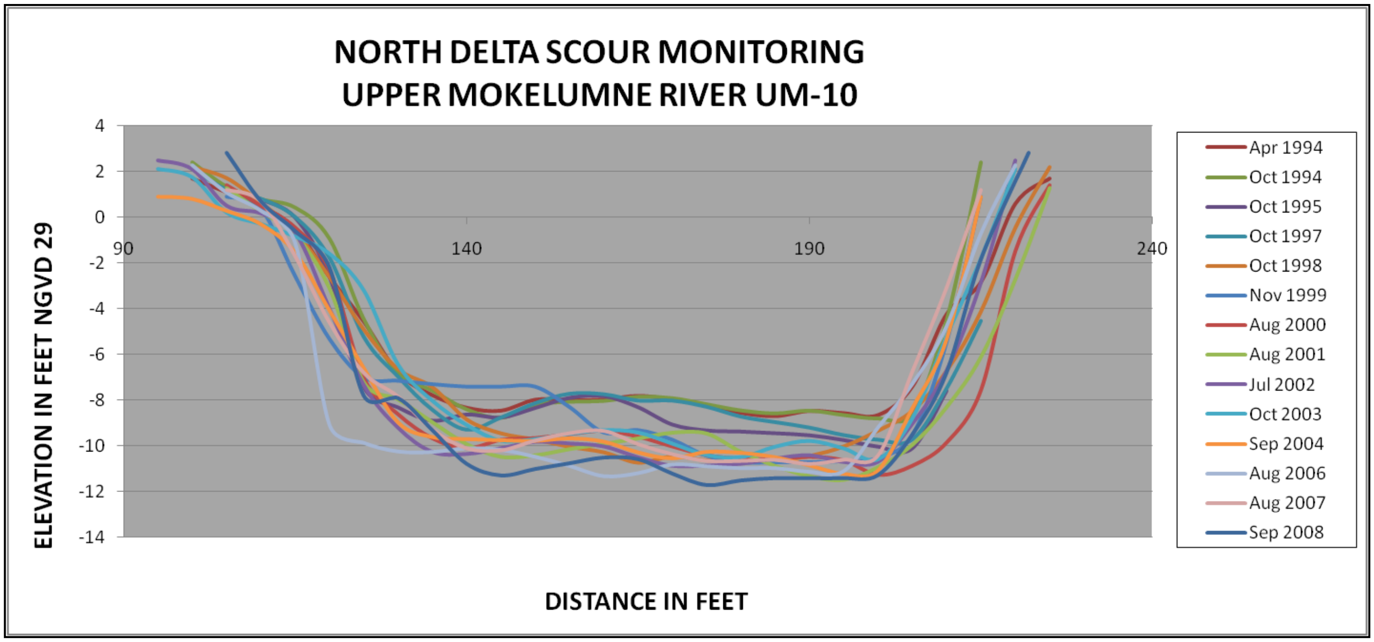
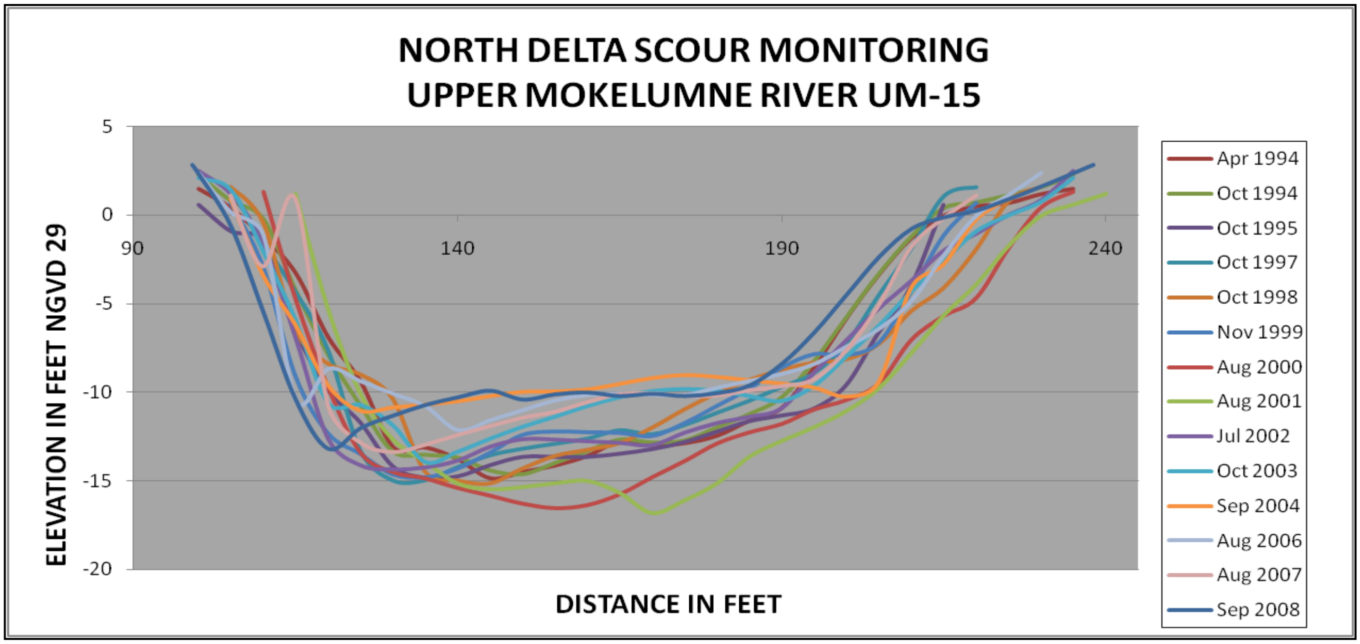


Figure 2-9. Map of the North Delta Scour Monitoring Program Sites.



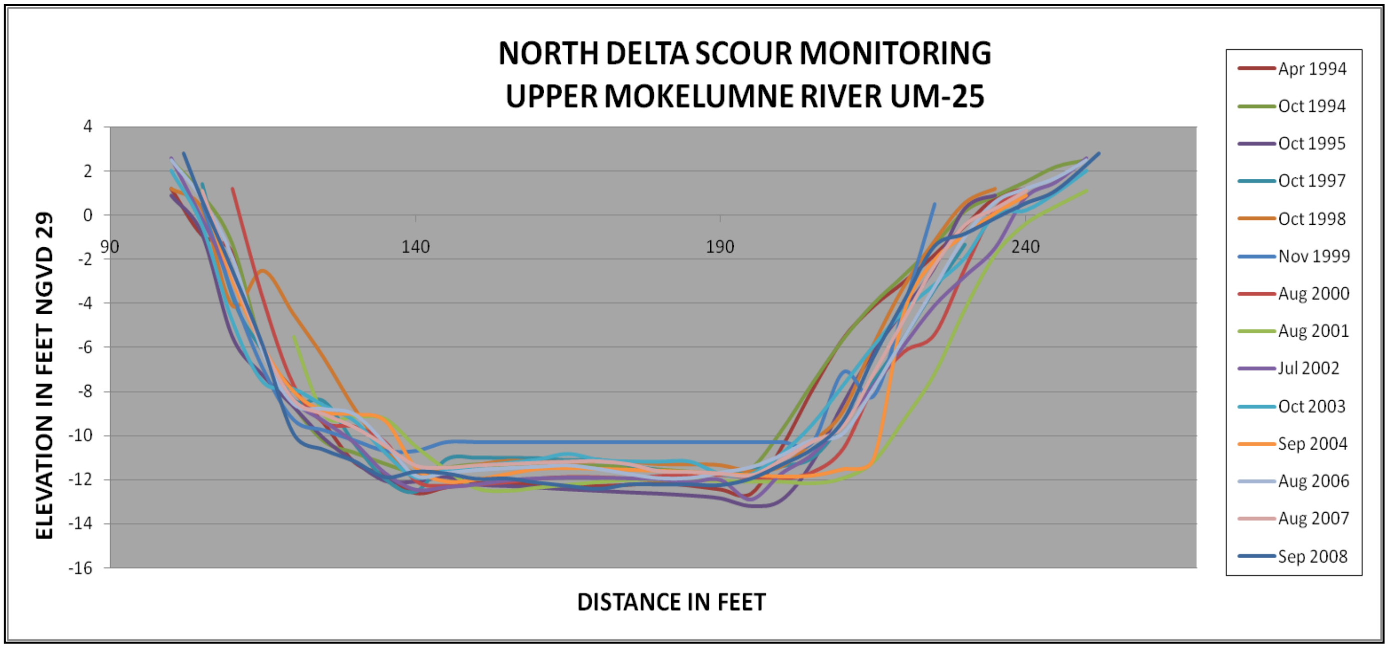
BASE AREA	725.15	sq ft	Oct 05, 1998	865.85	sq ft	Sep 25, 2003	821.07	sq ft
Oct 25, 1994	712.51	sq ft	Nov 03, 1999	843.84	sq ft	Aug 24, 2004	900.24	sq ft
May 23, 1995	835.27	sq ft	Aug 09, 2000	950.12	sq ft	Aug 29, 2006	975.04	sq ft
Oct 24, 1995	830.38	sq ft	Aug 01, 2001	940.93	sq ft	Aug 21, 2007	867.09	sq ft
Oct 29, 1997	790.07	sq ft	Jul 30, 2002	931.21	sq ft	Sep 03,2008	952.96	sq ft

Figure 2-10. Upper Mokelumne River: Site UM-10 Channel Cross sectional area measurements from 1994 to 2008.



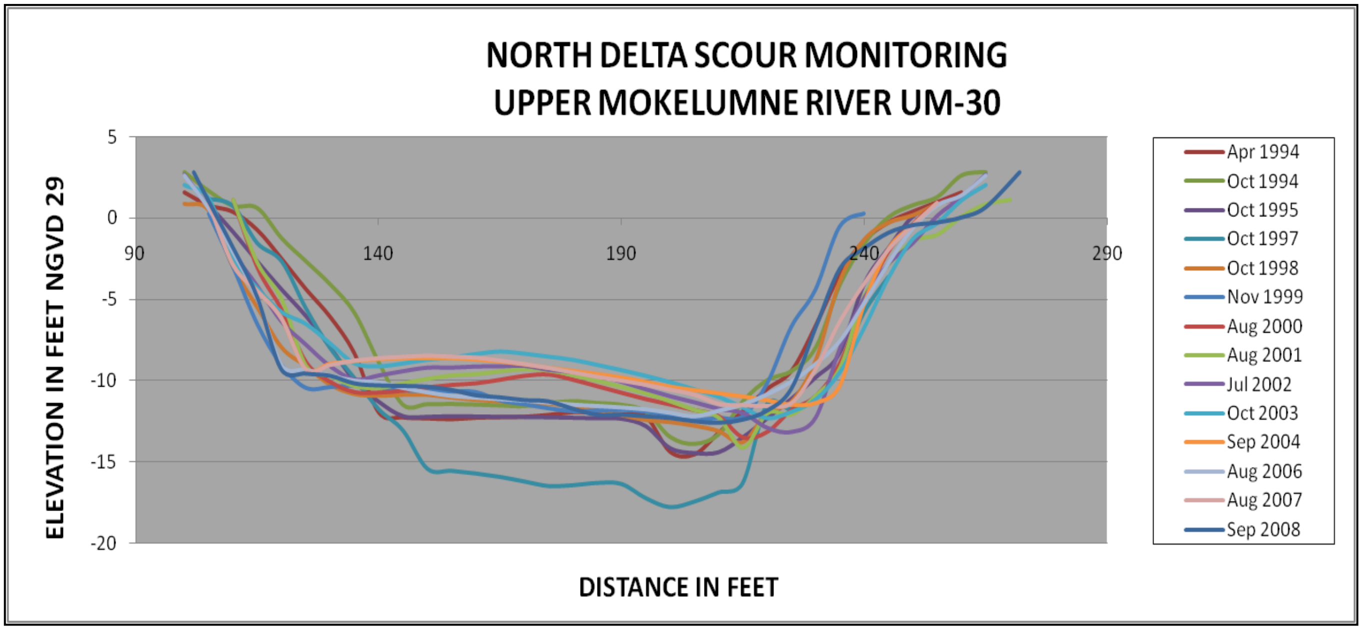
BASE AREA	1056.7	sq ft	Oct 05, 1998	1091.0	sq ft	Sep 25, 2003	1037.80	sq ft
Oct 25, 1994	1049.6	sq ft	Nov 03, 1999	1127.4	sq ft	Aug 24, 2004	973.12	sq ft
May 23, 1995	1116.5	sq ft	Aug 09, 2000	1346.9	sq ft	Aug 29, 2006	989.80	sq ft
Oct 24, 1995	1179.3	sq ft	Aug 01, 2001	1301.0	sq ft	Aug 21, 2007	962.74	sq ft
Oct 29, 1997	1059.9	sq ft	Jul 30, 2002	1142.6	sq ft	Sep 03, 2008	937.12	sq ft

Figure 2-11. Upper Mokelumne River: Site UM-15 Channel Cross sectional area measurements from 1994 to 2008.



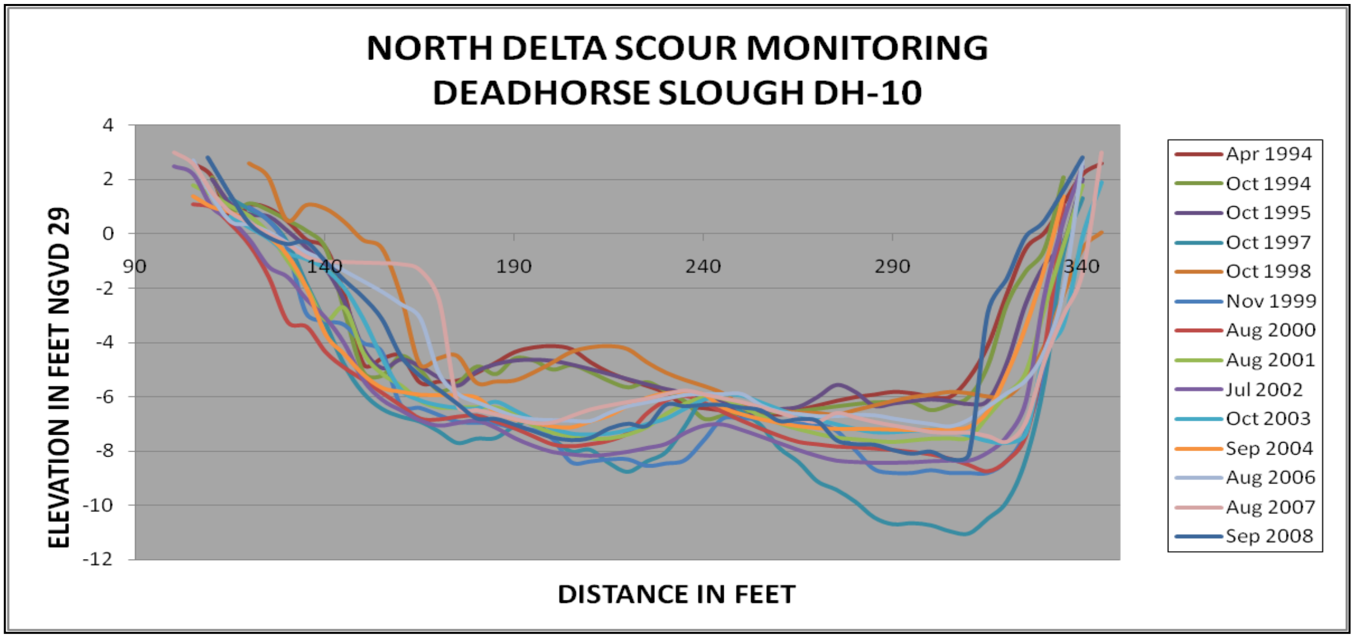
BASE AREA	1149.8	sq ft	Oct 05, 1998	1087.1	sq ft	Sep 25, 2003	1148.30	sq ft
Oct 25, 1994	1088.8	sq ft	Nov 03, 1999	1083.4	sq ft	Aug 24, 2004	1189.20	sq ft
May 23, 1995	1131.4	sq ft	Aug 09, 2000	1199.6	sq ft	Aug 29, 2006	1164.80	sq ft
Oct 24, 1995	1250.9	sq ft	Aug 01, 2001	1249.2	sq ft	Aug 21, 2007	1143.20	sq ft
Oct 29, 1997	1177.4	sq ft	Jul 30, 2002	1241.9	sq ft	Sep 03, 2008	1203.87	sq ft

Figure 2-12. Upper Mokelumne River: Site UM-25 Channel Cross sectional area measurements from 1994 to 2008.



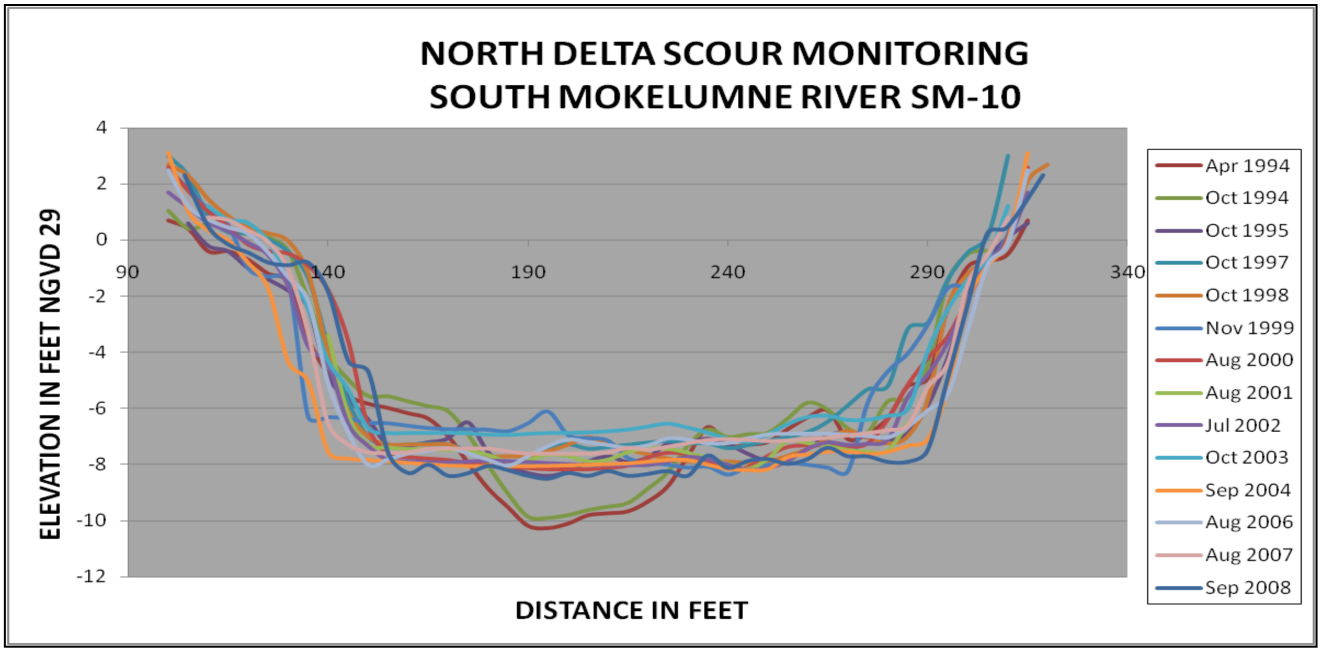
BASE AREA	1267.2 sq ft	Oct 05, 1998	1363.3 sq ft	Sep 25, 2003	1207.50 sq ft
Oct 25, 1994	1172.9 sq ft	Nov 03, 1999	1281.0 sq ft	Aug 24, 2004	1219.20 sq ft
May 23, 1995	1357.6 sq ft	Aug 09, 2000	1317.1 sq ft	Aug 29, 2006	1361.30 sq ft
Oct 24, 1995	1411.5 sq ft	Aug 01, 2001	1300.4 sq ft	Aug 21, 2007	1190.20 sq ft
Oct 29, 1997	1683.8 sq ft	Jul 30, 2002	1274.6 sq ft	Sep 03, 2008	1322.01 sq ft

Figure 2-13. Upper Mokelumne River: Site UM-30 Channel Cross sectional area measurements from 1994 to 2008.



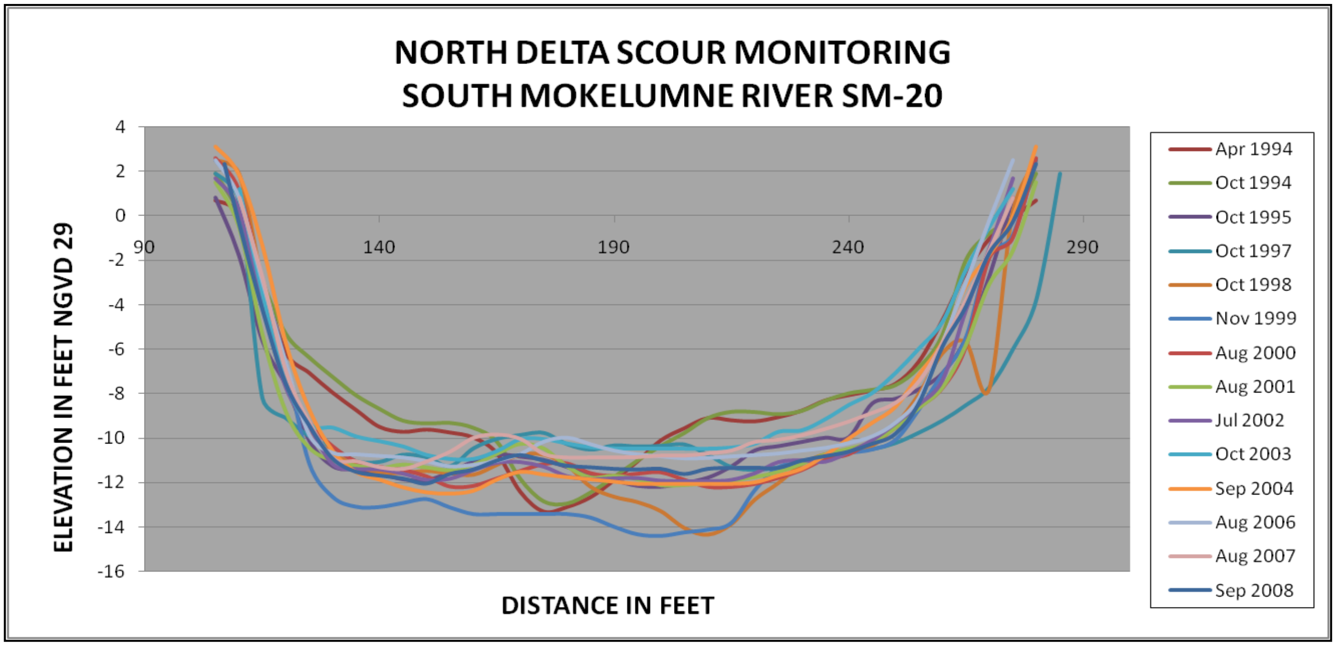
BASE AREA	962.48 sq ft	Oct 05, 1998	1520.5 sq ft	Sep 25, 2003	1264.70 sq ft
Oct 25, 1994	1014.7 sq ft	Nov 03, 1999	1432.2 sq ft	Aug 24, 2004	1224.40 sq ft
May 23, 1995	1002.9 sq ft	Aug 09, 2000	1417.6 sq ft	Aug 29, 2006	1122.20 sq ft
Oct 24, 1995	1012.8 sq ft	Aug 01, 2001	1270.2 sq ft	Aug 30, 2007	1135.70 sq ft
Oct 29, 1997	1570.7 sq ft	Jul 30, 2002	1438.3 sq ft	Sep 03, 2008	1151.48 sq ft

Figure 2-14. Dead Horse Slough: Site DH-10 Channel Cross sectional area measurements from 1994 to 2008.



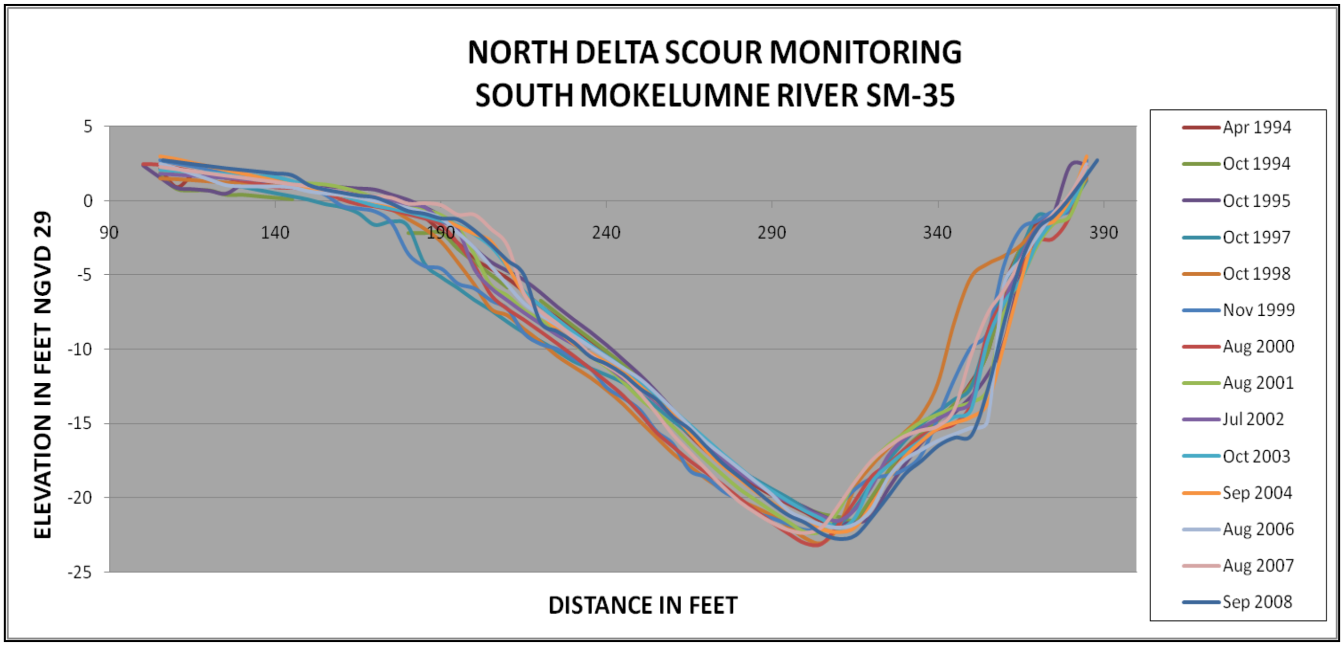
BASE AREA	1213.3	sq ft	Oct 06, 1998	1143.7	sq ft	Sep 25, 2003	1048.60	sq ft
Oct 25, 1994	1121.9	sq ft	Nov 03, 1999	1135.4	sq ft	Sep 02, 2004	1319.30	sq ft
May 24, 1995	1109.6	sq ft	Aug 08, 2000	1158.5	sq ft	Aug 30, 2006	1176.00	sq ft
Oct 24, 1995	1193.0	sq ft	Aug 01, 2001	1083.2	sq ft	Aug 22, 2007	1172.50	sq ft
Nov 05, 1997	1051.4	sq ft	Jul 31, 2002	1224.3	sq ft	Sep 04, 2008	1236.94	sq ft

Figure 2-15. South Fork of the Mokelumne River: Site SM-10 Channel Cross sectional area measurements from 1994 to 2008.



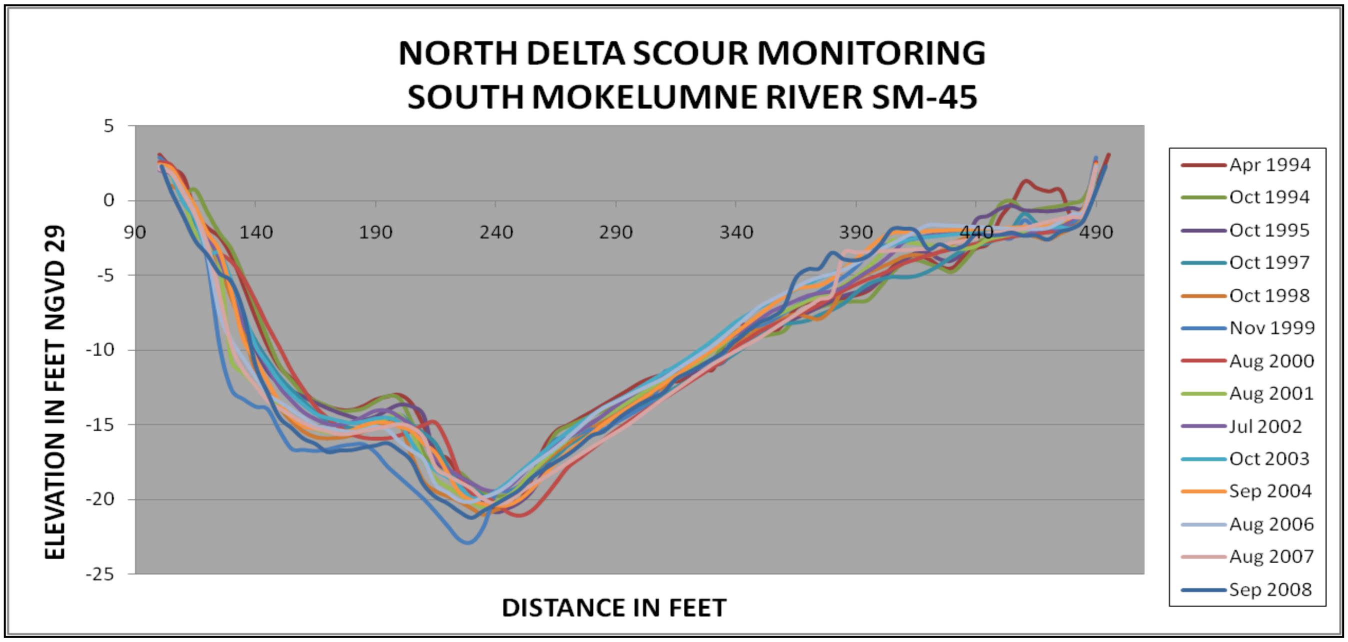
BASE AREA	1392.1 sq ft	Oct 06, 1998	1702.9 sq ft	Sep 25, 2003	1412.6 sq ft
Oct 25, 1994	1356.2 sq ft	Nov 03, 1999	1819.4 sq ft	Sep 02, 2004	1610.1 sq ft
May 24, 1995	1387.2 sq ft	Aug 08, 2000	1649.7 sq ft	Aug 30, 2006	1508.2 sq ft
Oct 24, 1995	1616.7 sq ft	Aug 01, 2001	1665.4 sq ft	Aug 22, 2007	1488.5 sq ft
Oct 30, 1997	1709.4 sq ft	Jul 31, 2002	1638.7 sq ft	Sep 04, 2008	1609.6 sq ft

Figure 2-16. South Fork of the Mokelumne River: Site SM-20 Channel Cross sectional area measurements from 1994 to 2008.



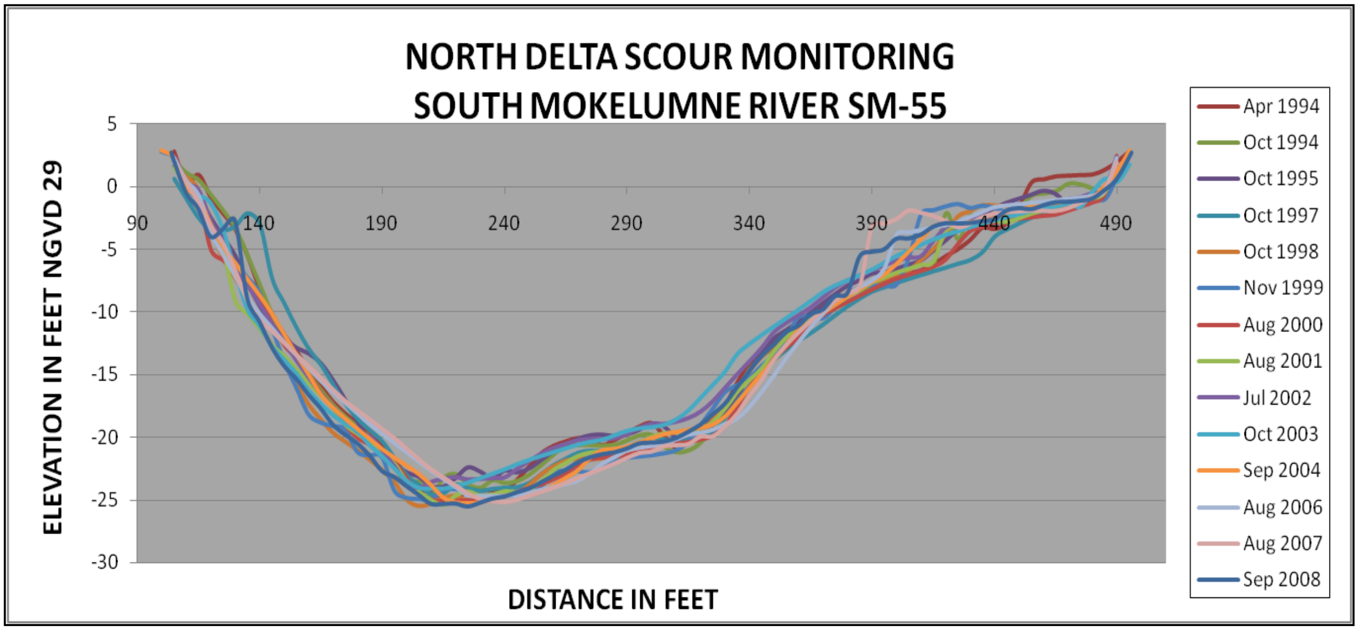
BASE AREA	2343.4	sq ft	Oct 06, 1998	2446.4	sq ft	Sep 25, 2003	2338.60	sq ft
Oct 26, 1994	2298.0	sq ft	Nov 03, 1999	3583.6	sq ft	Sep 02, 2004	2435.70	sq ft
May 24, 1995	2258.2	sq ft	Aug 08, 2000	2557.3	sq ft	Aug 30, 2006	2415.60	sq ft
Oct 25, 1995	2334.1	sq ft	Aug 02, 2001	2428.0	sq ft	Aug 22, 2007	2316.50	sq ft
Oct 30, 1997	2491.8	sq ft	Jul 31, 2002	2373.9	sq ft	Sep 04, 2008	2447.94	sq ft

Figure 2-17. South Fork of the Mokelumne River: Site SM-35 Channel Cross sectional area measurements from 1994 to 2008.



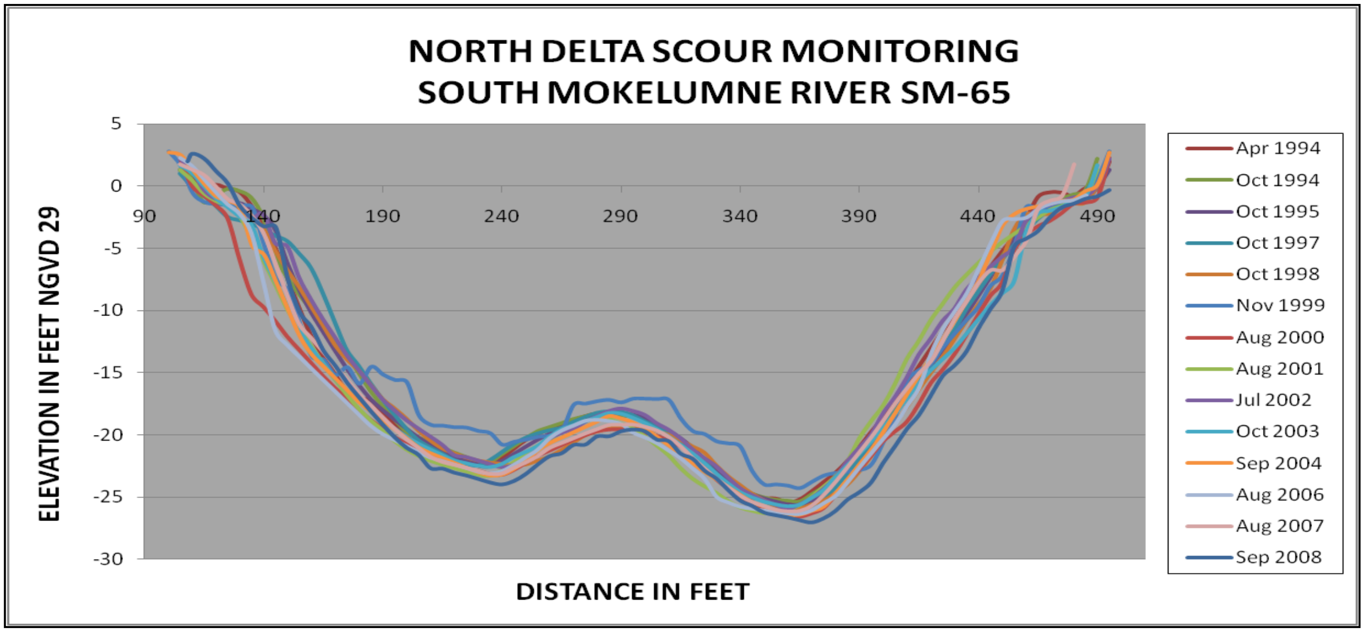
BASE AREA	3594.2	sq ft	Oct 06, 1998	3937.3	sq ft	Sep 25, 2003	3566.20	sq ft
Oct 26, 1994	3601.1	sq ft	Nov 03, 1999	4076.8	sq ft	Sep 02, 2004	3702.10	sq ft
May 24, 1995	3673.6	sq ft	Aug 08, 2000	3843.6	sq ft	Aug 30, 2006	3696.90	sq ft
Oct 25, 1995	3714.5	sq ft	Aug 02, 2001	3851.2	sq ft	Aug 22, 2007	3942.30	sq ft
Oct 30, 1997	3878.0	sq ft	Jul 31, 2002	3636.4	sq ft	Sep 04, 2008	3897.46	sq ft

Figure 2-18. South Fork of the Mokelumne River: Site SM-45 Channel Cross sectional area measurements from 1994 to 2008.



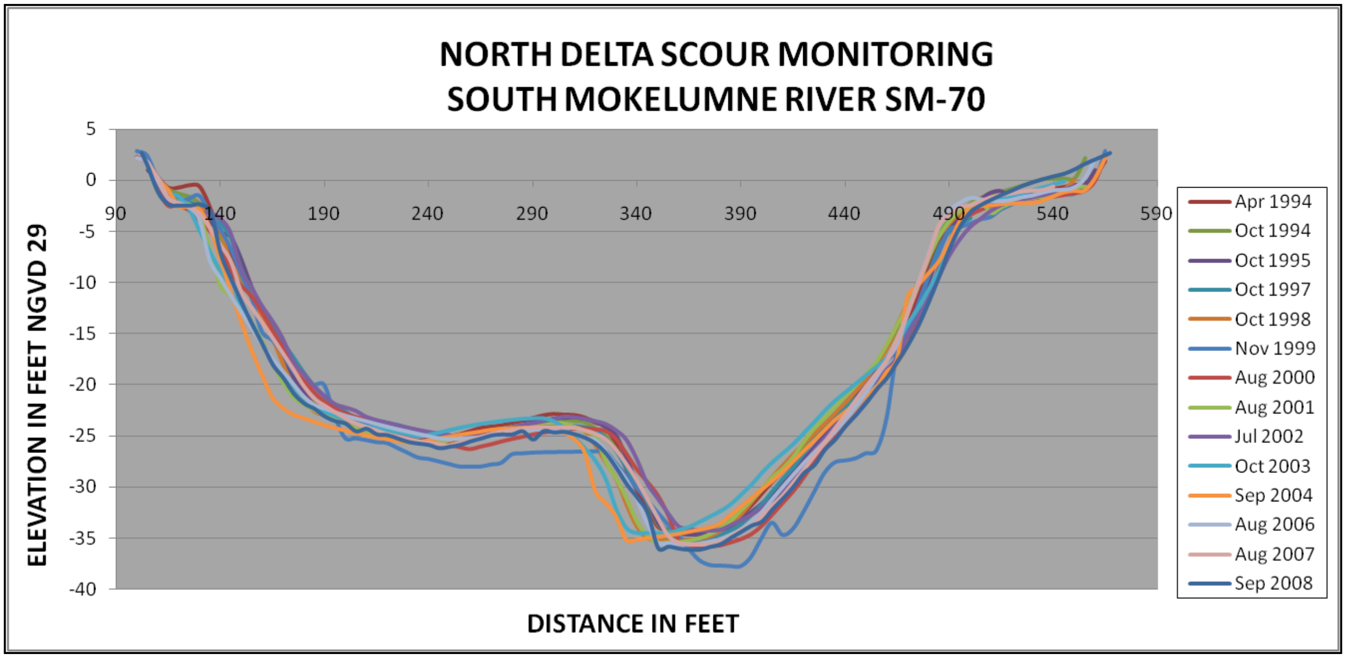
BASE AREA	4881.7	sq ft	Oct 06, 1998	5188.7	sq ft	Sep 25, 2003	4831.10	sq ft
Oct 26, 1994	4902.0	sq ft	Nov 03, 1999	5146.1	sq ft	Sep 02, 2004	5046.60	sq ft
May 24, 1995	4952.4	sq ft	Aug 08, 2000	5245.8	sq ft	Aug 30, 2006	5044.10	sq ft
Oct 25, 1995	4798.4	sq ft	Aug 02, 2001	5168.6	sq ft	Aug 22, 2007	4996.80	sq ft
Oct 30, 1997	5041.5	sq ft	Jul 31, 2002	4773.5	sq ft	Sep 04, 2008	5064.75	sq ft

Figure 2-19. South Fork of the Mokelumne River: Site SM-55 Channel Cross sectional area measurements from 1994 to 2008.



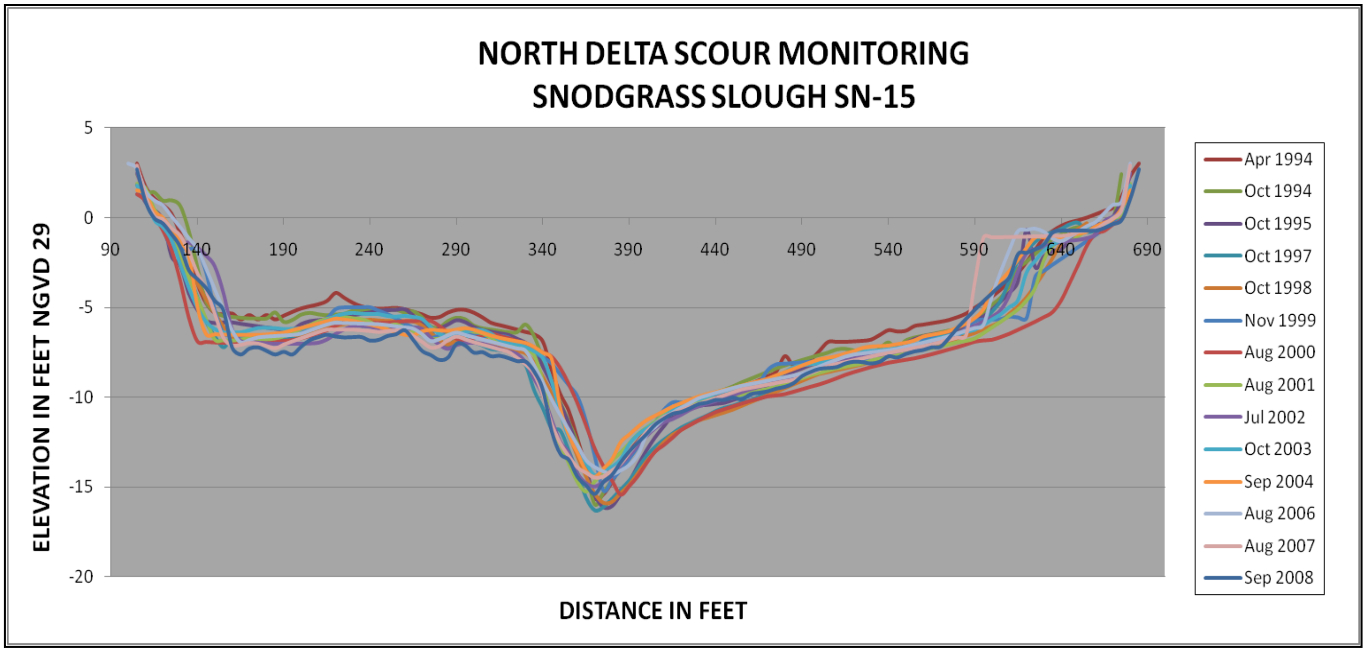
BASE AREA	5782.9 sq ft	Oct 06, 1998	5949.3 sq ft	Sep 25, 2003	6089.10 sq ft
Oct 26, 1994	5764.4 sq ft	Nov 03, 1999	5622.7 sq ft	Sep 02, 2004	6078.70 sq ft
May 24, 1995	5767.2 sq ft	Aug 08, 2000	6444.2 sq ft	Aug 30, 2006	6186.90 sq ft
Oct 25, 1995	5830.1 sq ft	Aug 02, 2001	6016.1 sq ft	Aug 22, 2007	6033.60 sq ft
Oct 30, 1997	5781.6 sq ft	Jul 31, 2002	5677.4 sq ft	Sep 04, 2008	6359.97 sq ft

Figure 2-20. South Fork of the Mokelumne River: Site SM-65 Channel Cross sectional area measurements from 1994 to 2008.



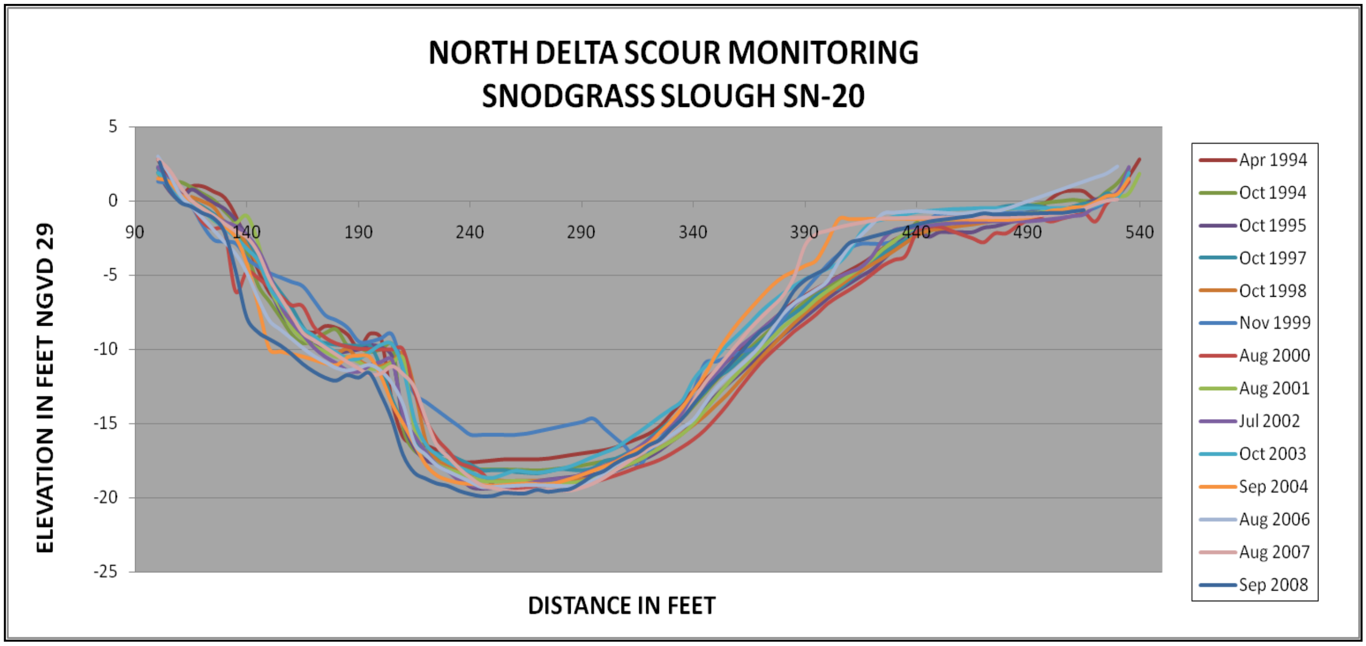
BASE AREA	8302.5	sq ft	Oct 06, 1998	8508.6	sq ft	Sep 25, 2003	8538.40	sq ft
Oct 26, 1994	8302.3	sq ft	Nov 03, 1999	9249.2	sq ft	Sep 02, 2004	9268.80	sq ft
May 24, 1995	8407.4	sq ft	Aug 08, 2000	8757.7	sq ft	Aug 30, 2006	8694.60	sq ft
Oct 25, 1995	8405.4	sq ft	Aug 01, 2001	8606.8	sq ft	Aug 22, 2007	8562.70	sq ft
Oct 30, 1997	8409.9	sq ft	Jul 31, 2002	8394.7	sq ft	Sep 04, 2008	8949.43	sq ft

Figure 2-21. South Fork of the Mokelumne River: Site SM-70 Channel Cross sectional area measurements from 1994 to 2008.



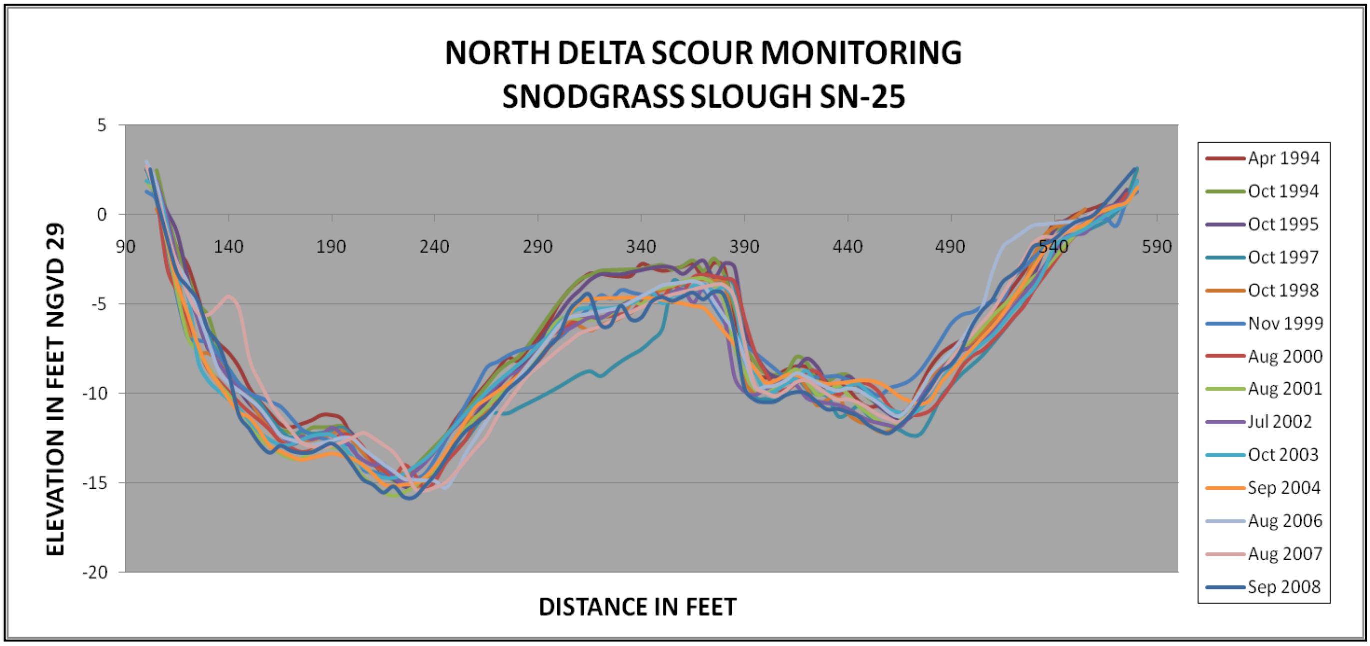
BASE AREA	3507.8	sq ft	Oct 05, 1998	4138.1	sq ft	Sep 25, 2003	3840.70	sq ft
Oct 25, 1994	3622.6	sq ft	Nov 03, 1999	3845.9	sq ft	Aug 24, 2004	3758.20	sq ft
May 23, 1995	3622.8	sq ft	Aug 09, 2000	4270.8	sq ft	Aug 29, 2006	3799.50	sq ft
Oct 24, 1995	3880.1	sq ft	Aug 01, 2001	4042.4	sq ft	Aug 30, 2007	3897.40	sq ft
Oct 29, 1997	4133.3	sq ft	Jul 30, 2002	3976.9	sq ft	Sep 03, 2008	4078.54	sq ft

Figure 2-22. Snodgrass Slough: Site SN-15 Channel Cross sectional area measurements from 1994 to 2008.



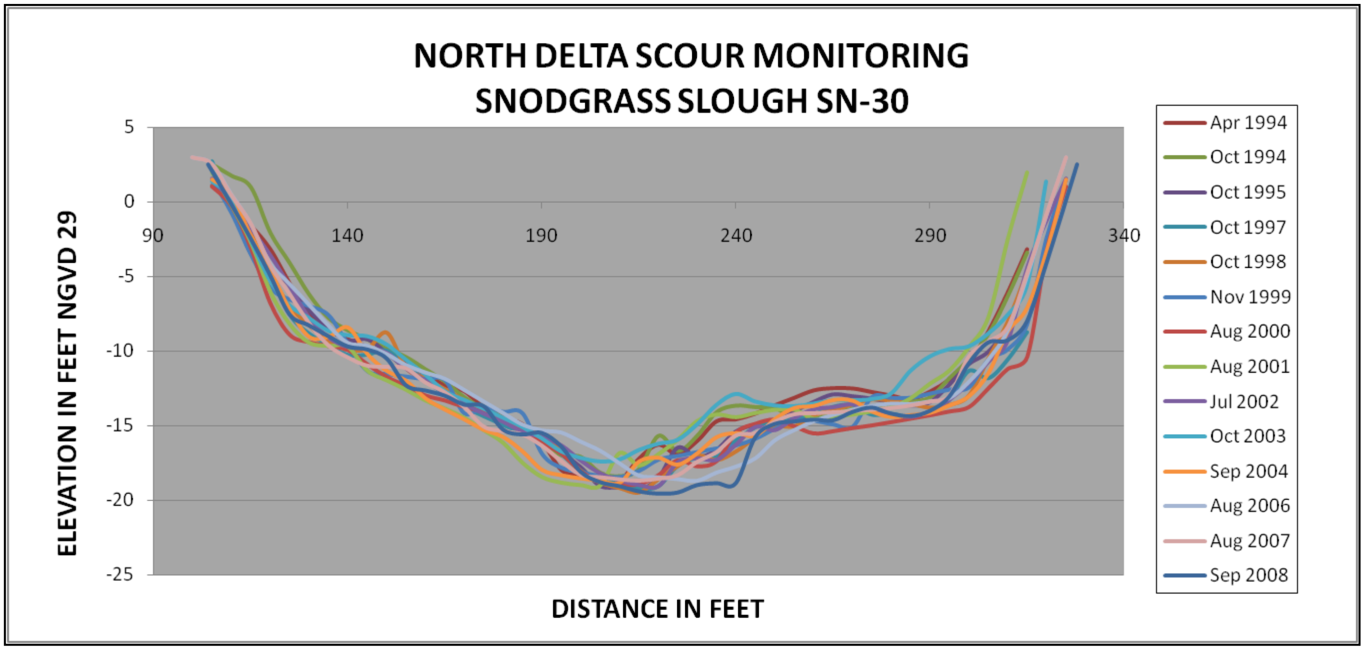
BASE AREA	3519.6 sq ft	Oct 05, 1998	3821.9 sq ft	Sep 25, 2003	3411.40 sq ft
Oct 25, 1994	no data	Nov 03, 1999	3476.1 sq ft	Aug 24, 2004	3644.20 sq ft
May 23, 1995	3737.1 sq ft	Aug 09, 2000	3974.6 sq ft	Aug 29, 2006	3804.20 sq ft
Oct 24, 1995	3884.6 sq ft	Aug 01, 2001	3828.7 sq ft	Aug 30, 2007	3552.50 sq ft
Oct 29, 1997	3675.9 sq ft	Jul 30, 2002	3749.8 sq ft	Sep 03, 2008	3957.42 sq ft

Figure 2-23. Snodgrass Slough: Site SN-20 Channel Cross sectional area measurements from 1994 to 2008.



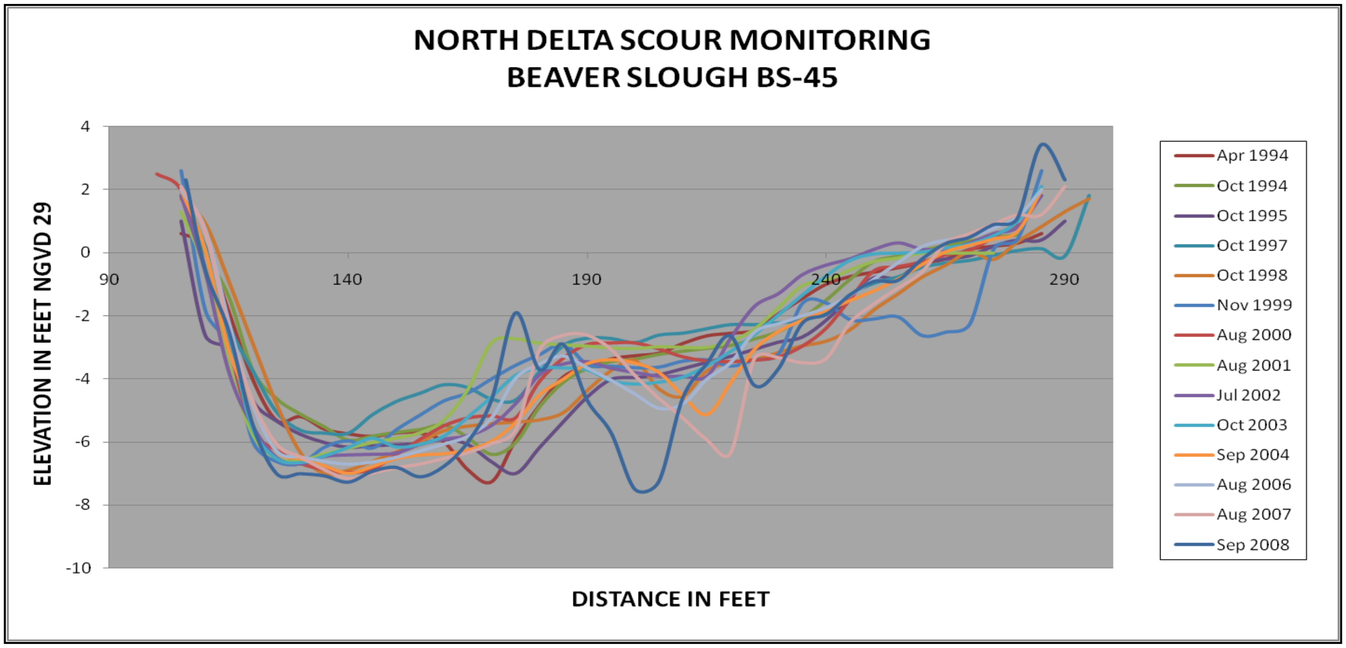
BASE AREA	3378.9	sq ft	Oct 05, 1998	3833.8	sq ft	Oct 01, 2003	3802.40	sq ft
Oct 25, 1994	3426.0	sq ft	Nov 03, 1999	3539.0	sq ft	Aug 24, 2004	3853.30	sq ft
May 23, 1995	3585.0	sq ft	Aug 09, 2000	3870.7	sq ft	Aug 29, 2006	3658.70	sq ft
Oct 24, 1995	3536.5	sq ft	Aug 01, 2001	3916.1	sq ft	Aug 30, 2007	3725.60	sq ft
Oct 29, 1997	4082.8	sq ft	Jul 30, 2002	3833.8	sq ft	Sep 03, 2008	3929.19	sq ft

Figure 2-24. Snodgrass Slough: Site SN-25 Channel Cross sectional area measurements from 1994 to 2008.



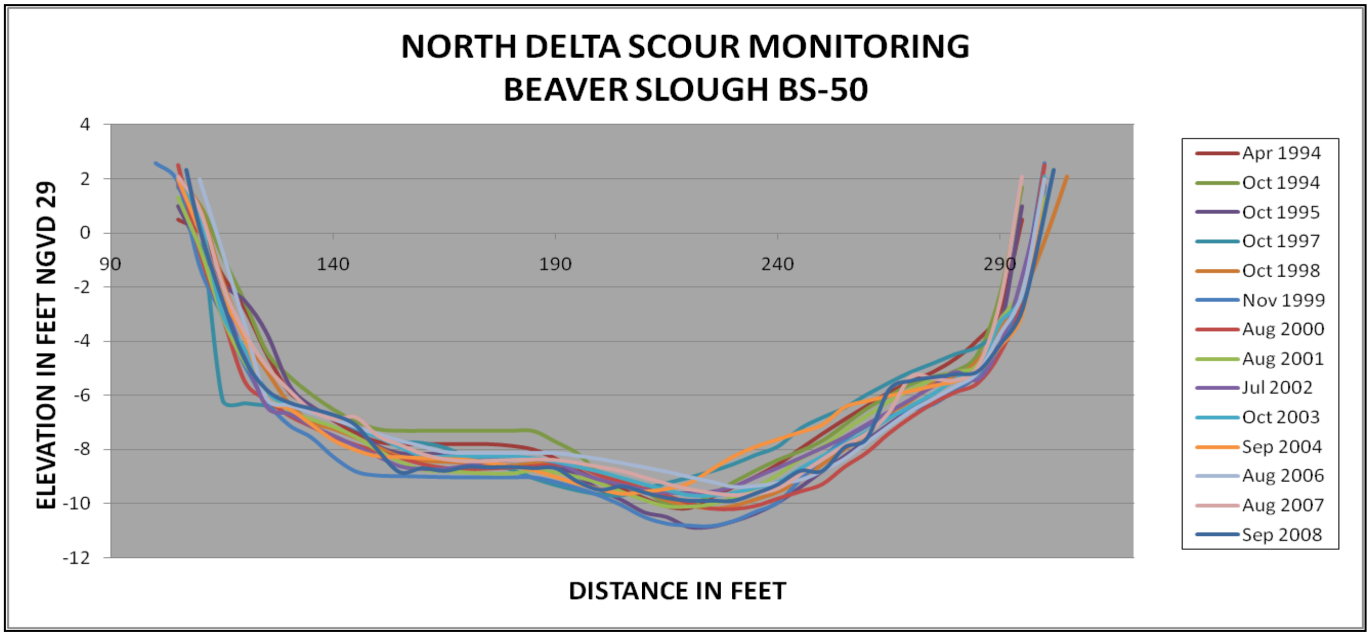
BASE AREA	2505.2 sq ft	Oct 05, 1998	2702.9 sq ft	Sep 25, 2003	2484.00 sq ft
Oct 25, 1994	2500.5 sq ft	Nov 03, 1999	2728.1 sq ft	Aug 24, 2004	2775.40 sq ft
May 23, 1995	2696.1 sq ft	Aug 09, 2000	2875.8 sq ft	Aug 29, 2006	2794.30 sq ft
Oct 24, 1995	2641.0 sq ft	Aug 01, 2001	2636.9 sq ft	Aug 30, 2007	2703.90 sq ft
Oct 29, 1997	2780.5 sq ft	Jul 30, 2002	2691.6 sq ft	Sep 03, 2008	2813.46 sq ft

Figure 2-25. Snodgrass Slough: Site SN-30 Channel Cross sectional area measurements from 1994 to 2008.



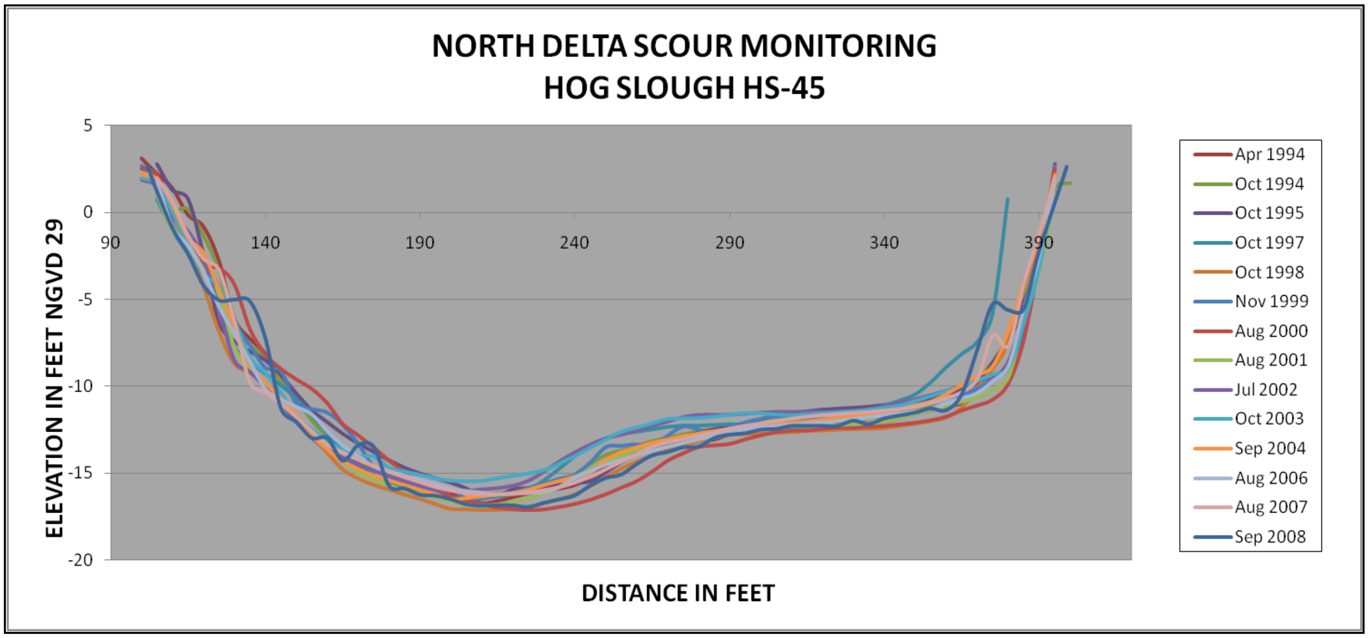
BASE AREA	553.37 sq ft	Oct 06, 1998	633.59 sq ft	Oct 02, 2003	564.91 sq ft
Oct 25, 1994	548.63 sq ft	Nov 03, 1999	617.79 sq ft	Sep 02, 2004	639.46 sq ft
May 24, 1995	513.78 sq ft	Aug 08, 2000	601.71 sq ft	Aug 30, 2006	604.77 sq ft
Oct 24, 1995	645.38 sq ft	Aug 01, 2001	509.66 sq ft	Aug 27, 2007	678.19 sq ft
Oct 30, 1997	489.69 sq ft	Jul 31, 2002	588.62 sq ft	Sep 04, 2008	678.22 sq ft

Figure 2-26. Beaver Slough: Site BS-45 Channel Cross sectional area measurements from 1994 to 2008.



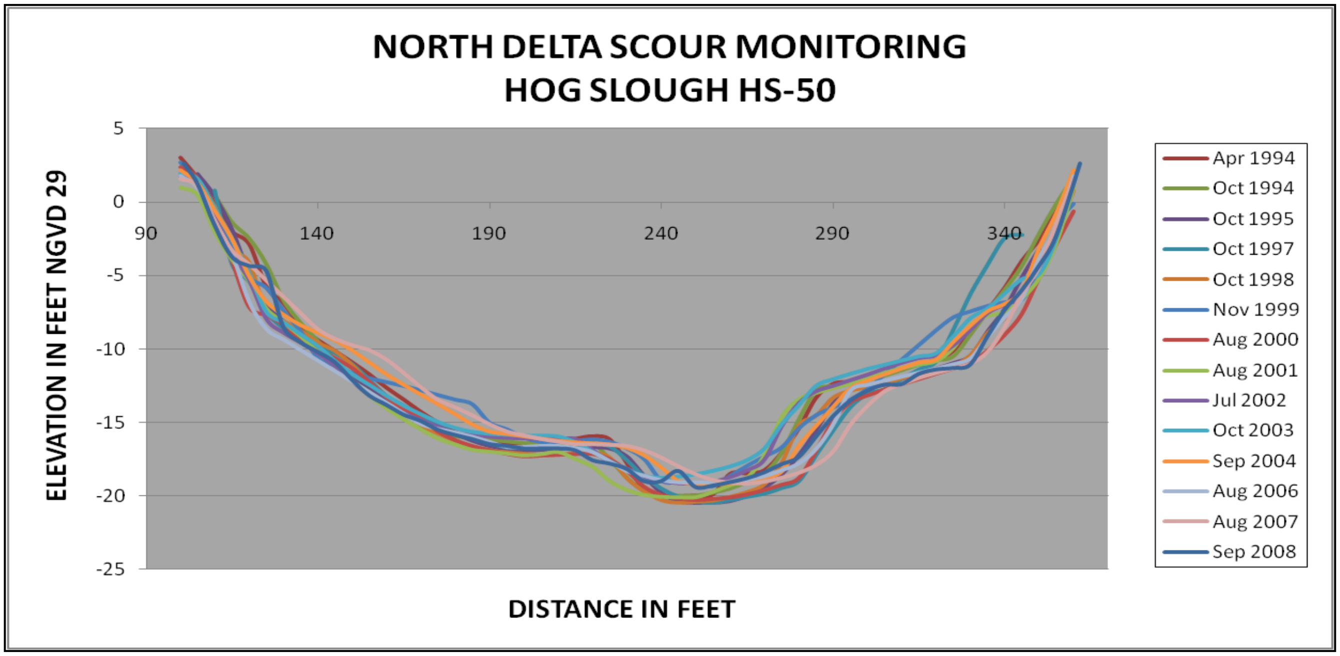
BASE AREA	1289.7	sq ft	Oct 06, 1998	1389.2	sq ft	Oct 02, 2003	1371.80	sq ft
Oct 25, 1994	1244.8	sq ft	Nov 03, 1999	1503.1	sq ft	Sep 02, 2004	1347.10	sq ft
May 24, 1995	1251.4	sq ft	Aug 08, 2000	1462.7	sq ft	Aug 30, 2006	1337.10	sq ft
Oct 24, 1995	1405	sq ft	Aug 01, 2001	1400.8	sq ft	Aug 27, 2007	1328.50	sq ft
Oct 30, 1997	1364.2	sq ft	Jul 31, 2002	1388.2	sq ft	Sep 03, 2008	1403.28	sq ft

Figure 2-27. Beaver Slough: Site BS-50 Channel Cross sectional area measurements from 1994 to 2008.



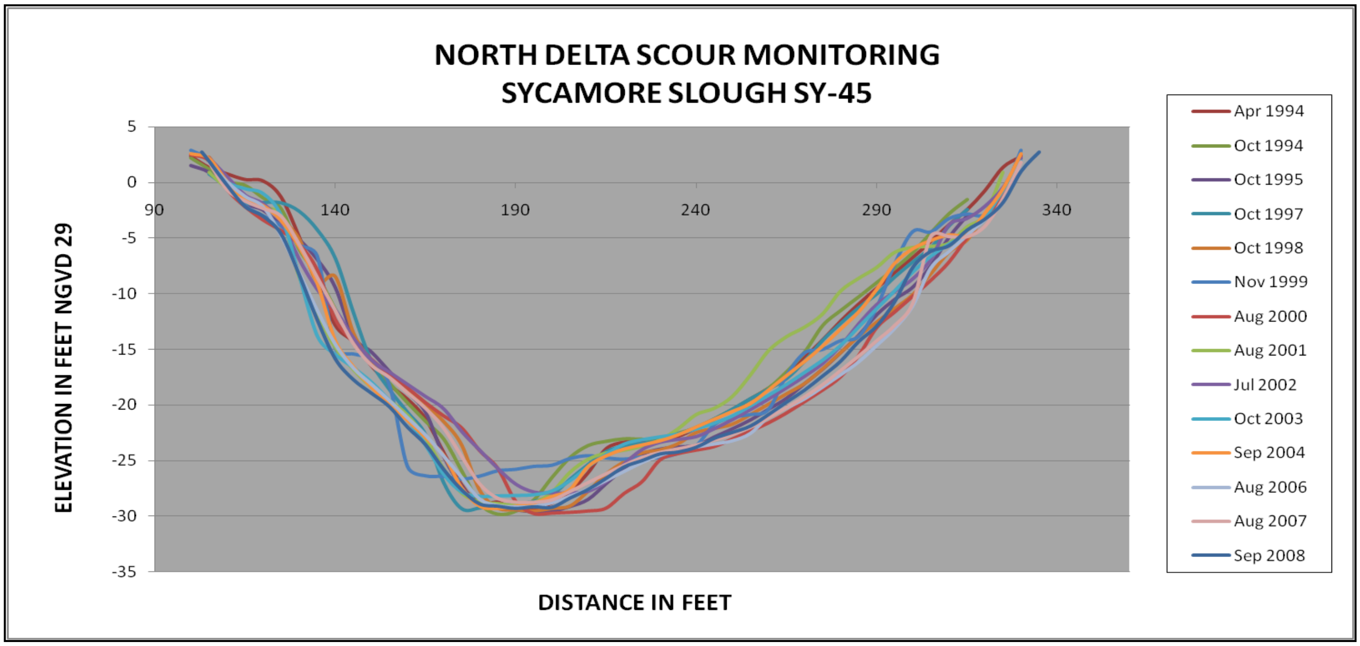
BASE AREA	3364.6 sq ft	Oct 06, 1998	3340.2 sq ft	Oct 02, 2003	3233.6 sq ft
Oct 26, 1994	3295.1 sq ft	Nov 03, 1999	3077.5 sq ft	Sep 02, 2004	3352.0 sq ft
May 24, 1995	3199.5 sq ft	Aug 08, 2000	3447.0 sq ft	Aug 30, 2006	3407.0 sq ft
Oct 25, 1995	3274.2 sq ft	Aug 01, 2001	3491.0 sq ft	Aug 28, 2007	3339.3 sq ft
Oct 30, 1997	3197.8 sq ft	Jul 31, 2002	3276.7 sq ft	Sep 03, 2008	3413.7 sq ft

Figure 2-28. Hog Slough: Site HS-45 Channel Cross sectional area measurements from 1994 to 2008.



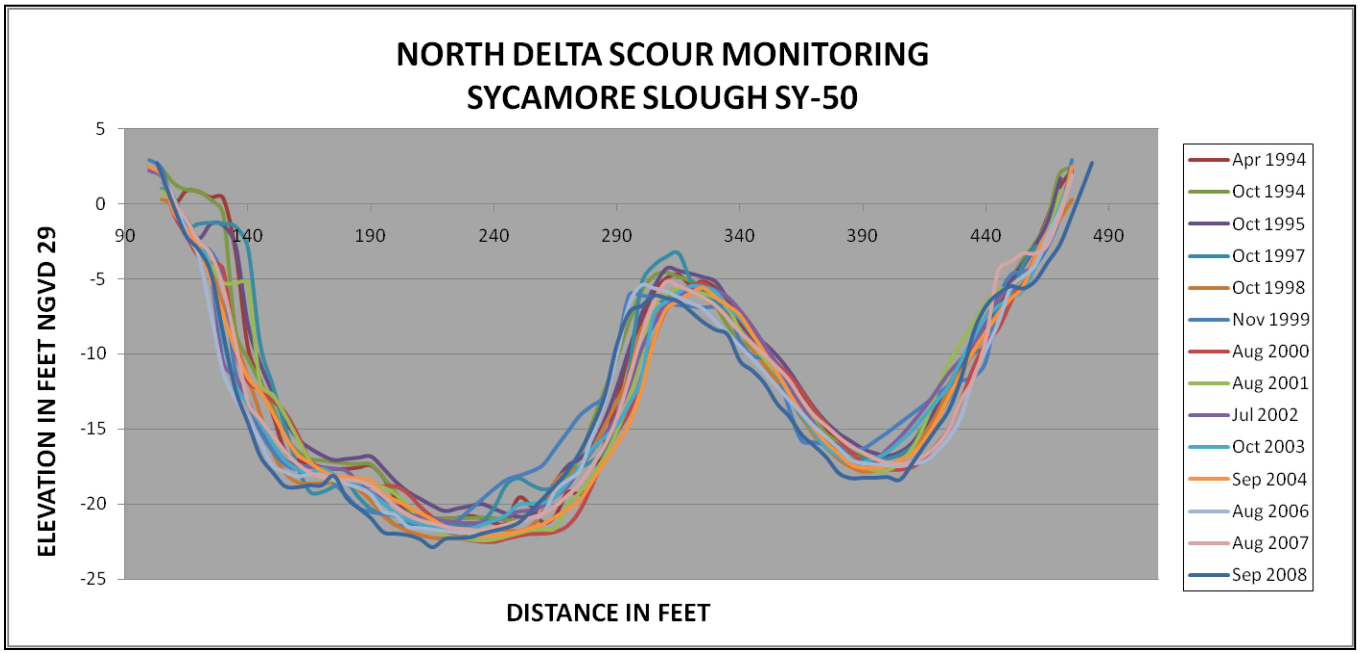
BASE AREA	3121.1 sq ft	Oct 06, 1998	3340.2 sq ft	Oct 02, 2003	3096.50 sq ft
Oct 26, 1994	3155.5 sq ft	Nov 03, 1999	3077.5 sq ft	Sep 02, 2004	3102.10 sq ft
May 24, 1995	3138.5 sq ft	Aug 08, 2000	3447.0 sq ft	Aug 30, 2006	3351.60 sq ft
Oct 25, 1995	3311.1 sq ft	Aug 01, 2001	3308.8 sq ft	Aug 28, 2007	3191.70 sq ft
Oct 30, 1997	3233.1 sq ft	Jul 31, 2002	3195.4 sq ft	Sep 03, 2008	3328.97 sq ft

Figure 2-29. Hog Slough: Site HS-50 Channel Cross sectional area measurements from 1994 to 2008.



BASE AREA	3460.5 sq ft	Dec 28, 1998	3657.0 sq ft	Oct 02, 2003	3681.90 sq ft
Oct 26, 1994	3379.9 sq ft	Nov 03, 1999	3556.1 sq ft	Sep 02, 2004	3587.00 sq ft
May 24, 1995	3501.1 sq ft	Aug 08, 2000	3812.2 sq ft	Aug 30, 2006	3935.70 sq ft
Oct 25, 1995	3688.7 sq ft	Aug 01, 2001	3475.9 sq ft	Aug 28, 2007	3739.30 sq ft
Oct 30, 1997	3451.0 sq ft	Jul 31, 2002	3681.9 sq ft	Sep 04, 2008	3902.06 sq ft

Figure 2-30. Sycamore Slough: Site SY-45 Channel Cross sectional area measurements from 1994 to 2008.



BASE AREA	4628.9	sq ft	Dec 28, 1998	5023.4	sq ft	Oct 02, 2003	4927.80	sq ft
Oct 26, 1994	4538.5	sq ft	Nov 03, 1999	4718.9	sq ft	Sep 02, 2004	5004.90	sq ft
May 24, 1995	4616.6	sq ft	Aug 08, 2000	4976.5	sq ft	Aug 30, 2006	5082.30	sq ft
Oct 25, 1995	4418.8	sq ft	Aug 01, 2001	4824.1	sq ft	Aug 28, 2007	4910.50	sq ft
Oct 30, 1997	4637.1	sq ft	Jul 31, 2002	4840.3	sq ft	Sep 04, 2008	5160.46	sq ft

Figure 2-31. Sycamore Slough: Site SY-50 Channel Cross sectional area measurements from 1994 to 2008.

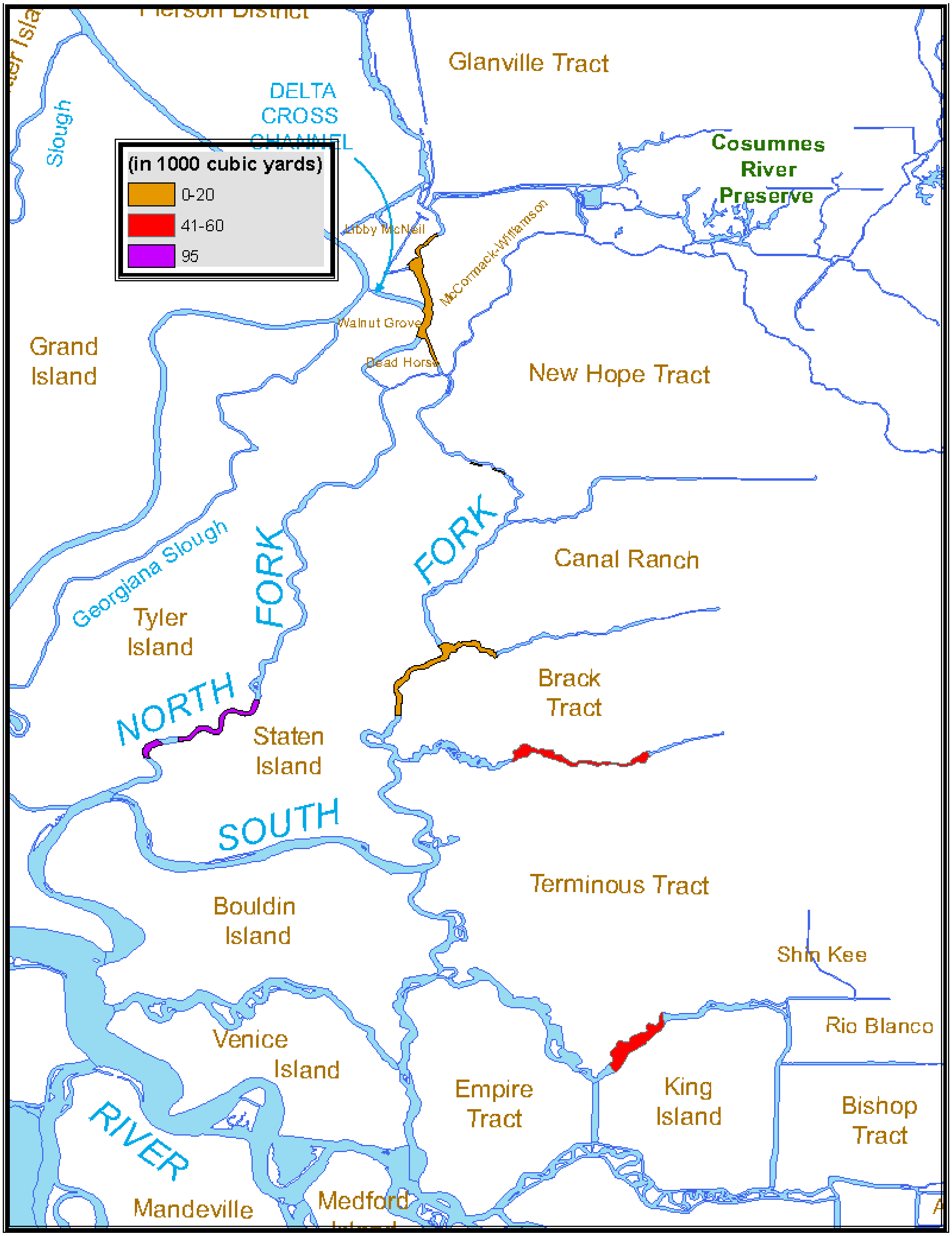


Figure 2-32. Dredging Projects Completed in the North Delta Area from 1987-2008. (DWR, FESSRO, Delta Levees & Environmental Engineering, 2009)

Setback Levee Component of Alternative 2-D

Alternative 2-D includes a modified setback levee component on the same geographic scale as proposed for the dredging actions on the Mokelumne River. Both sides of the channel are proposed to be modified, except where structures or other infrastructure cannot be easily relocated. The levees on Staten Island, New Hope Tract, Canal Ranch Tract, and Brack Tract adjacent to the South Fork Mokelumne River would therefore be included within the proposed scope of the levee modification. The modified setback levee would be located anywhere from 100' to 500' feet inland of the existing levee (see Figure 2-31of Volume 2- Figures, North Delta Flood Control and Ecosystem Restoration Project Draft EIR) and will remove several hundred acres of land from private ownership. Local landowners and Reclamation Districts have invested millions of dollars for levee construction and maintenance on the stretch of the South Fork Mokelumne River identified for modified setback levees. For example, RD 348 (New Hope Tract) is nearing completion of Phase II, a $7 million construction project to upgrade nearly 4 miles (stations 410+00 to 630+00) of levees to the PL 84-99 (100 year flood protection) standard; located on the northwestern side of the Tract. Nearly the entire length of the Phase II levee work (stations 410+00 to 600+00) falls within the boundaries of the site proposed for modified setback levees. It is therefore, unlikely that local stakeholders would be receptive to implementation of this alternative component.

The North Delta Flood Control and Ecosystem Restoration Project's Consistency with the Goals of Related Planning Efforts

The North Delta has been the focus of planning efforts for many years because of ongoing conveyance, flood control, and ecosystem health issues. In 1987, DWR launched a planning and environmental documentation process for the North Delta Program, which led to the release of a draft EIR/EIS in 1990. Many of the elements and objectives of the 1990 effort were similar to the North Delta Flood Control and Ecosystem Restoration Project EIR; however, one important difference is that the Draft 1990 EIR/EIS included water supply and conveyance benefits from modification of the Delta Cross Channel (DCC). These elements are now being studied under separate efforts. The current project improvements under this EIR are focused on flood control and ecosystem restoration benefits.

Recently, a much larger planning effort known as the Bay Delta Conservation Plan (BDCP) was created to identify a set of water flow and habitat restoration actions to contribute to the recovery of endangered and sensitive species and their habitats in California's Sacramento-San Joaquin Delta. The goal of the BDCP is to provide for both species/habitat protection and improved reliability of water supplies. The BDCP is being prepared through a collaboration of state, federal, and local water agencies, state and federal fish agencies, environmental organizations, and other interested parties known as the BDCP Steering Committee.

The Steering Committee for the BDCP is developing a comprehensive conservation plan for the Sacramento and San Joaquin Delta pursuant to a planning agreement that was executed on October 6, 2006. The BDCP planning area is the legal Delta. In first half of 2007, the Steering Committee developed a list of ten conceptual conservation strategies, evaluated those strategies, and shortened that list to four Conservation Strategy Options. The Steering Committee is intent on further narrowing the remaining Options to a single Option (derived from one or more of the evaluated Options) that will be carried forward into a detailed conservation planning process over the course of the next year. The chosen Option will serve as the nucleus for the larger conservation plan and other major elements of the strategy will be formulated around it. This larger, more comprehensive conservation plan will then be evaluated through a formal, public environmental review process under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

The Isolated Conveyance Facility (ICF) West, the All Tunnel, the ICF East, and the Separate Corridors Option are the four BDCP proposals currently under consideration; all of these options are designed to improve water supply reliability in the Delta. It is unknown at this time which proposal or variation thereof, will eventually be selected as the Preferred Alternative; however work proposed on or near the South Fork Mokelumne River; including Beaver, Hog, and Sycamore sloughs are components of the ICF East and the Separate Corridors Alternatives. The primary goal of the North Delta Project in contrast, is to implement flood control improvements in the North Delta area, and would not substantially change water supply or water quality in the lower Mokelumne River channels or in the Delta as a whole. The Group II proposed actions on the South Fork Mokelumne River may therefore be incompatible with two of the Alternatives under consideration by the BDCP.

Preferred Alternative 1-A in contrast, does not conflict with actions proposed with the BDCP alternatives. The ICF East is the one alternative which intersects the northeast boundary of McCormack-Williamson Tract; however the eastern alignment proposing tunneling underneath the tract, instead of constructing an above ground canal.

The other significant water related planning effort in the State is the Central Valley Flood Protection Plan (CVFPP). The CVFPP is being prepared under FLOODSAFE, which is a multifaceted initiative to improve integrated flood management in the State using a system-wide approach, while carrying out regional projects and enhancing DWR’s core flood management programs. The FLOODSAFE vision is to include the active pursuit of opportunities to integrate flood management programs with other water management opportunities, including ecosystem, open space, agricultural preservations, and other natural system functions.

The co-equal goals of Preferred Alternative 1-A to provide flood control and ecosystem restoration benefits in the North Delta area are consistent with the FLOODSAFE vision. CVFPP as a result, has identified Alternative 1-A as an early implementation project.

Optional Group 2 Actions

There are two actions designated as optional under Alternative 2-A:

- Retrofit or Replace Millers Ferry Bridge

- Retrofit or Replace New Hope Bridge

The selection of the No Action Alternative as the Preferred Alternative for the Group 2 actions precludes the decision of whether or not to consider retrofitting and/or replacing the New Hope and Millers Ferry Bridges as an optional action.

Implementation Schedule

Specific construction scheduling will be guided by environmental regulatory considerations, weather, soil moisture content, levee construction standards, established work windows, and availability of funding sources, for project components. A detailed construction schedule has not yet been developed based on these constraints, but the construction season is anticipated to likely occur between May 1 and October 15.

Construction is likely to be completed over two to three construction seasons, with the first possible season in 2012.

Most construction would be conducted during weekdays between the hours of 7 a.m. and 6 p.m.; however, work on key public infrastructure (such as roadways) and other schedule-sensitive elements may necessitate extended working hours 32 and work on weekends.

A likely general work sequence and schedule is presented in Table 2-7a, Table 2-7b, and Table 2-7c on pages 2-67 and 2-68 of the Draft EIR. The tables focus on construction-intensive items and do not include planning, operations, or maintenance activities. The following work sequencing assumptions may be applied generally:

- flood control and ecosystem restoration components would be implemented in a way that maintains hydraulic neutrality;
- protective levees and other infrastructure modifications (such as relocation, demolition, or decommissioning) would be implemented prior to breaching or degrading levees, which may necessitate scheduling construction over successive seasons;
- new roadways would be constructed before existing features are deactivated;
- fill on top of or with peat soils would likely require placement in lifts over successive seasons to allow for settlement and compaction;

Chapter 3
Edits to the Draft EIR

Chapter 3
Edits to the Draft EIR

Introduction

This chapter displays the edits to text in the North Delta Draft EIR in response to comments provided on the North Delta Draft EIR. The pages where edits have been made are included in this chapter with the additions of text underlined and the deletion of text in strikeout.

Changes were made in the following sections:

Volume 1 – EIR Analysis

- Acronyms and Abbreviations
- Executive Summary
- Chapter 1
- Chapter 2
- Chapter 3
- Chapter 4
- Chapter 5
- Chapter 6
- Appendix H

Volume 2 – Figures

- Figure 2-1, Alternative 1-A: Fluvial Optimization Plan
- Figure 2-15, Alternative 1-B: Seasonal Floodplain Optimization
- Figure 2-19, Alternative 1-C: Seasonal Floodplain Enhancement and Subsidence Reversal Plan

Acronyms and Abbreviations, Page xxvii

CDPH	California Department of Public Health
CNDDB	Natural Diversity Database
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
CORTESE	Cortese Hazardous Waste and Substances Site List
CS	Sacramento County Contaminated Sites
CVP	Central Valley Project
CWA	Clean Water Act
cy	cubic yards
dB	Decibel
dBA	A-Weighted Decibel
DBP	disinfection byproducts
DCC	Delta Cross Channel
DEIR	draft EIR
Delta	The Sacramento–San Joaquin River Delta
DFA	Department of Food and Agriculture
DFG	California Department of Fish and Game
DHI	Danish Hydraulic Institute's
~~DHS~~	~~Department of Health Services~~
DPC	Delta Protection Commission
DPR	California Department of Parks and Recreation
DRERIP	Delta Regional Ecosystem Restoration Implementation Plan
DSOD	Division of Safety of Dams
DWR	California Department of Water Resources
EBMUD	East Bay Municipal Utilities District
EDR	Environmental Data Resources Inc.
EIR	environmental impact report
EIS	environmental impact statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERNS	Emergency Response Notification System
ERP	Ecosystem Restoration Program
ERPP	Ecosystem Restoration Program Plan
FEIR	final EIR
FRWP	Freeport Regional Water Project

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Table ES-3 Continued

Impact	Alternative	Level of Significance	Mitigation Measures	Level of Significance After Mitigation
GEOMORPH-7: Scour and Deposition Associated with Excavation and Restoration of the Grizzly Slough Property	1-A–C	Beneficial	None required.	–
GEOMORPH-8: Increase in Scouring on South Fork Mokelumne River and Associated Increase in Deposition Downstream	1-A–C, 2-D	Less than significant	None required.	–
WATER QUALITY				
WQ-1: Release of Pollutants during Construction and Dredging	1-A–C, 2-A–D	Less than significant	None required.	–
WQ-2: Release of Organic Carbon	1-A–C	Less than significant	None required.	–
WQ-3: Release of Methylmercury	1-A–C	Significant	WQ-1: ~~Participate in an Offset Program to Ensure No Net Increase in Methylmercury Loading.~~ Monitor for mercury and methylmercury levels in water and sediments in the McCormack-Williamson Tract and Grizzly Slough vicinities both before and after restoration activities take place.	Less than significant
WATER SUPPLY AND MANAGEMENT				
WSM-1: Changes in Water Uses as a Result of the Project	1-A–C, 2-A–D	Less than significant	None required.	–
GROUNDWATER				
GW-1. Potential Increase in Groundwater Levels as a Result of Conversion of Farmland to Ecosystem Restoration	1-A–C	Beneficial	None required.	–
GW-2. Potential Groundwater Seepage to Adjacent Islands/Tracts as a	1-A–C	Significant	GW-1: Control Seepage.	Less than significant

Result of Frequent Inundation of McCormack-Williamson Tract				
GW-3. Potentially Increased Groundwater Seepage to Adjacent Lands	1-C	Significant	GW-1: Control Seepage.	Less than significant
GW-4. Potentially Increased Groundwater Recharge	1-C	Beneficial	None required.	–

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- minimize the conversion of prime, statewide-important, and unique farmlands to Project uses; and
- improve and enhance existing and future recreational use within the Project area.

Project Need

As described above, flood control improvements are needed to reduce damage from overflows caused by insufficient channel capacities and levee failures in the Project study area. The Project would address the need for flood control solutions that are integrated with ecosystem improvements. The existing and historical conditions that warrant flood control and ecosystem quality improvements are described below.

Flood Control

The Mokelumne and Cosumnes Rivers and the Morrison Creek stream group do not currently have sufficient channel capacity to safely convey peak historical flows from Sierra Nevada watersheds, such as occurred during the 1986 and 1997 flood events, through the North Delta to the San Joaquin River. Current channel capacities for the North and South Forks of the Mokelumne River are approximately 40,000 cubic feet per second (cfs). By comparison, the combined channel capacity required to safely convey flows from a 100-year flood event has been estimated at 90,000 cfs. During peak flows, water from the Mokelumne River backs up into a broad floodplain north of New Hope Tract, and the limited capacity further causes water to back up into Snodgrass Slough to the north toward Lambert Road.

The lack of channel capacity, combined with constrictions in vulnerable areas (e.g., bridge abutments)~~ and an increase in sedimentation levels,~~ makes a number of areas in the North Delta vulnerable to flooding. Since 1955, several areas have been flooded after levees failed (by breaches or overtopping), including the Point Pleasant area, McCormack-Williamson Tract, Tyler Island, Dead Horse Island, New Hope Tract, Canal Ranch Tract, Glanville Tract, and Franklin Pond area. The potential for flooding also threatens important public facilities and institutions in the North Delta area, including Interstate 5 (I-5), the Union Pacific Railroad line, and the Rio Cosumnes Correctional Center. Aside from these site-specific effects, failure of Delta levees can generally:

- result in flooding of Delta communities, farmland, habitat, and key roads and highways;
- expose adjacent islands to increased wave action, increased seepage, and possible levee erosion;
- degrade water quality through the exposure of contaminants that are otherwise trapped in or behind the levee;

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Table ES-2a. Summary of Group I Alternatives and Components

	1-A	1-B	1-C
	Fluvial Process Optimization	Seasonal Floodplain Optimization	Seasonal Floodplain Enhancement and Subsidence Reversal
Degrade McCormack-Williamson Tract East Levee to Function as a Weir	X	X	X
Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir	~~X~~	X	X
<u>Completely degrade McCormack-Williamson Tract Southwest Levee (Elevation -2.5’)</u>	<u>X</u>		
Reinforce Dead Horse Island East Levee	X	X	X
Modify Downstream Levees to Accommodate Potentially Increased Flows	X	X	X
Construct Transmission Tower Protective Levee and Access Road	X	X	X
Demolish Farm Residence and Infrastructure	X	X	X
Enhance Landside Levee Slope and Habitat	X	X	X
Modify Landform and Restore Agricultural Land to Habitat	X	X	X
Modify Pump and Siphon Operations	X	X	X
Breach Mokelumne River Levee	X		
Allow Boating on Southeastern McCormack-Williamson Tract	X		
Construct Box Culvert Drains and Self-Regulating Tide Gates		X	X
Construct Cross-Levee to Create Subsidence-Reversal Demonstration Area			X
Import Soil for Subsidence Reversal			X
Implement Local Marina and Recreation Outreach Program	X	X	X
Excavate Dixon and New Hope Borrow Sites	X	X	X
Excavate and Restore Grizzly Slough Property	X	X	X
Dredge South Fork Mokelumne River	OP	OP	OP
Enhance Delta Meadows Property	OP	OP	OP

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Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
HYDROLOGY AND HYDRAULICS				
Impacts and mitigation discussed in other sections				
FLOOD CONTROL AND LEVEE STABILITY				
FC-1: Raise Flood Elevations and Increase the Frequency of Flooding	1-A–C	Less than significant	None required.	–
FC-1: Raise Flood Elevations and Increase the Frequency of Flooding	~~1-OP1*~~ 1-A-C	Less than significant	None required as long as the alternative retains the features that minimizes impacts through implementation.	–
FC-1: Raise Flood Elevations and Increase the Frequency of Flooding	2-A–C	No impact	None required.	–
FC-2: Increase the Degree or Quantity of Seepage	1-A–C, ~~1-OP1~~, 2-A–D	Significant	FC-1: Develop a Seepage-Monitoring Program.	Less than significant
FC-3: Increase the Degree or Quantity of Levee Settlement	1-A–C, ~~1-OP1~~, 2-A–D	Less than significant	None required.	–
FC-4: Increase the Degree or Quantity of Wind Erosion	1-A–C, ~~1-OP1~~, 2-A–C	Less than significant	None required.	–
FC-5: Increase the Degree or Quantity of Scour	1-A–C, ~~1-OP1~~	Less than significant	None required.	–
FC-5: Increase the Degree or Quantity of Scour	2-A–C	–	The discussion and evaluation of potential scour impacts are presented again in Section 3.3, Geomorphology.	–
FC-6: Increase the Degree or Quantity of Subsidence Adjacent to Levees	1-A–C, ~~1-OP1~~, 2-A–D	Less than significant	None required.	–

Impact	Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
FC-7: Decrease Levee Inspection and Maintenance	1-A–C, 2-A–C	No impact	None required.	–

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Impact	Alternative	Level of Significance	Mitigation Measures	Level of Significance After Mitigation
FC-8: Decrease in Levee Stability from Proposed Construction Activities	1-A–C, ~~1-OP1~~, 2-A–D	Less than significant	None required.	–
FC-9: Decrease in Levee Stability from Non-Motorized Boating Activities	1-A	Less than significant	None required.	–
FC-10: Temporary Decrease in Flood Control or Levee Stability during Channel Dredging	1-OP2*, 2D	Less than significant	None required.	–
GEOMORPHOLOGY AND SEDIMENT TRANSPORT				
GEOMORPH-1: Temporary Increase in Sediment Accumulation and Scouring during Levee Modifications	1-A–C, 2-A–C	Less than significant	None required.	–
GEOMORPH-2: Increase in Sediment Accumulation in Channels as a Result of Levee Modifications	1-A–C, 2-A–C	Less than significant	None required.	–
GEOMORPH-3: Increase in Sediment Accumulation on Land as a Result of Levee Modifications	1-A–C	Beneficial	None required.	–
GEOMORPH-3: Increase in Sediment Accumulation on Land as a Result of Detention Basin Construction	2-A–C	Less than significant	None required.	–
GEOMORPH-4: Increase in Scouring on Levees and in Channels as a Result of Levee Modifications	1-A–C, 2-A–C	Less than significant	None required.	–
GEOMORPH-5a: Increase in Scouring on Land as a Result of Levee Modifications (McCormack-Williamson Tract East Levee)	1-A–C	Less than significant	None required.	–
GEOMORPH-5b: Increase in Scouring on Land as a Result of Levee Modifications (Mokelumne River Levee)	1-A	Beneficial	None required.	–

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Impact	Alternative	Level of Significance	Mitigation Measures	Level of Significance After Mitigation
GEOMORPH-7: Scour and Deposition Associated with Excavation and Restoration of the Grizzly Slough Property	1-A–C	Beneficial	None required.	–
GEOMORPH-8: Increase in Scouring on South Fork Mokelumne River and Associated Increase in Deposition Downstream	1-A–C, 2-D	Less than significant	None required.	–
WATER QUALITY				
WQ-1: Release of Pollutants during Construction and Dredging	1-A–C, 2-A–D	Less than significant	None required.	–
WQ-2: Release of Organic Carbon	1-A–C	Less than significant	None required.	–
WQ-3: Release of Methylmercury	1-A–C	Significant	WQ-1: ~~Participate in an Offset Program to Ensure No Net Increase in Methylmercury Loading.~~ Monitor for mercury and methylmercury levels in water and sediments in the McCormack-Williamson Tract and Grizzly Slough vicinities both before and after restoration activities take place.	Less than significant
WATER SUPPLY AND MANAGEMENT				
WSM-1: Changes in Water Uses as a Result of the Project	1-A–C, 2-A–D	Less than significant	None required.	–
GROUNDWATER				
GW-1. Potential Increase in Groundwater Levels as a Result of Conversion of Farmland to Ecosystem Restoration	1-A–C	Beneficial	None required.	–
GW-2. Potential Groundwater Seepage to Adjacent Islands/Tracts as a	1-A–C	Significant	GW-1: Control Seepage.	Less than significant

Result of Frequent Inundation of McCormack-Williamson Tract				
GW-3. Potentially Increased Groundwater Seepage to Adjacent Lands	1-C	Significant	GW-1: Control Seepage.	Less than significant
GW-4. Potentially Increased Groundwater Recharge	1-C	Beneficial	None required.	–

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Impact	Alternative	Level of Significance	Mitigation Measures	Level of Significance After Mitigation
NOISE				
NZ-1: Exposure of Noise-Sensitive Land Uses to Noise from General Construction Activities	1-A–C, ~~1-OP1~~, 1-OP2, 2-A–D	Significant	NZ-1: Limit Noise-Generating Construction Activity and Heavy Trucking to Daytime Hours.	Less than significant
NZ-2: Exposure of Noise-Sensitive Land Uses to Noise from Material Hauling Operations	1-A–C, ~~1-OP1~~, 1-OP2, 2-A–C	Significant	NZ-1: Limit Noise-Generating Construction Activity and Heavy Trucking to Daytime Hours.	Less than significant
NZ-3: Exposure of Noise-Sensitive Land Uses to Noise from Modified Pump Operations	1-A–C, 2-B, C	Less than significant	None required.	–
NZ-4: Exposure of Sensitive Land Uses to Groundborne Vibration from Construction Activity	1-A–C, ~~1-OP1~~, 1-OP2, 2-A–D	Less than significant	None required.	–
NZ-5: Exposure of Noise-Sensitive Land Uses to Noise from Hydraulic Dredging Activities	1-OP2, 2-D	Significant	NZ-1: Limit Noise-Generating Construction Activity and Heavy Trucking to Daytime Hours.	Less than significant
NZ-6: Exposure of Noise-Sensitive Land Uses to Noise from Clamshell Dredging Activities	1-OP2, 2-D	Significant	NZ-1: Limit Noise-Generating Construction Activity and Heavy Trucking to Daytime Hours.	Less than significant
NZ-7: Exposure of Noise-Sensitive Land Uses to Noise from Dragline Dredging Activities	1-OP2, 2-D	Significant	NZ-1: Limit Noise-Generating Construction Activity and Heavy Trucking to Daytime Hours.	Less than significant
NZ-8: Exposure of Noise-Sensitive Land Uses to Noise from Additional Pump Operations	2-A	Less than significant	None required.	–

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Impact	Alternative	Level of Significance	Mitigation Measures	Level of Significance After Mitigation
CR-4: Damage to or Destruction of Site P-34-39 as a Result of Soil Removal	1-A–C, 2-A–C, Dixon	Significant	[See Impact CR-1]	No impact, or less than significant to significant, depending
CR-5: Damage to or Destruction of Cultural Resources in the Dixon Borrow Site	1-A–C, 2-A–C, Dixon	Significant	[See Impact CR-3]	No impact, or less than significant to significant, depending
CR-6: Damage to or Destruction of Architectural Resources in the New Hope Borrow Site	1-A–C, 2-A–C, New Hope	Significant	[See Impact CR-3]	No impact, or less than significant to significant, depending
CR-7: Damage to or Destruction of Archaeological Site P-34-36 as a Result of Soil Removal and Other Ground-Disturbing Activities	~~1-OP1~~ 1A-C	Significant	DWR archaeologists did not identify archaeological materials at the mapped location of P-34-36 as a result of the April 2005 survey. The lack of materials may represent agricultural disturbances and looting of artifacts or insufficient mapping at the time of original recordation (1929). Both scenarios leave open the possibility that buried archaeological materials are present at the mapped location of P-34-36. The lack of specificity in the original mapping suggests that presence-absence excavation to locate P-34-36 is unwarranted. Instead, DWR will map the vicinity of P-34-36 as an environmentally sensitive area on construction and design drawings. DWR will ensure that a qualified archaeologist with full stop-work authority monitors all construction activities in the vicinity of P-34-36.	Less than significant
CR-8: Damage to or Destruction of Archaeological Site P-34-37 as a Result of Grading	~~1-OP1~~ 1A-C	Significant	Two mitigation strategies listed in the August 2000 CALFED Programmatic ROD are feasible mitigation measures for impacts incurred on P-34-37, namely mitigation strategies 2 and 3. Prior	No impact

	to approval and final design of the grading of the proposed borrow site, DWR will authorize qualified archaeologists to map the site (mitigation strategy 3) and fence the site boundaries for avoidance during construction (mitigation strategy 2). DWR should task a qualified archaeologist with periodic examinations of the fencing to ensure that the barrier is not crossed and clearly delimits the site boundaries throughout the duration of grading.	

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Table ES-3 Continued

Impact	Alternative	Level of Significance	Mitigation Measures	Level of Significance After Mitigation
CR-9: Destruction of Architectural Resources along Unexamined Portions of the Grizzly and Bear Slough Levees	~~1-OP1~~ 1A-C	Significant	[See Impact CR-3]	No impact, or less than significant to significant, depending
CR-10: Destruction of Submerged Cultural Resources as a Result of Channel Dredging	1-OP2, 2-D	Significant	[See Impact CR-3]	No impact, or less than significant to significant, depending
CR-11: Destruction of Cultural Resources as a Result of Dredge Spoil Disposal	1-OP2, 2-D	Significant	[See Impact CR-3]	No impact, or less than significant to significant, depending
CR-12: Damage to or Destruction of Archaeological Site CA-Sac-76/H at the Delta Meadows Property	1-OP4	Significant	The full range of CALFED programmatic mitigation strategies discussed under Impact CR-5 are appropriate for the mitigation of impacts on CA-Sac-76/H. Mitigation will be developed by California Department of Parks and Recreation during preparation of the Delta Meadows specific plan document.	No impact, or less than significant to significant, depending
CR-13: Damage to or Destruction of Archaeological Sites CA-Sac-47 and P-34-102	1-OP4	Significant	The full range of CALFED programmatic mitigation strategies discussed under Impact CR-8 are appropriate for the mitigation of impacts on CA-Sac-47 and P-34-102. Mitigation will be developed by California Department of Parks and Recreation during preparation of the Delta Meadows specific plan document.	No impact, or less than significant to significant, depending
CR-14: Damage to or Destruction of Architectural Resources in the Delta Meadows Property Area	1-OP4	Significant	[See Impact CR-3]	No impact, or less than significant to significant, depending

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Table ES-3 Continued

Impact	Alternative	Level of Significance	Mitigation Measures	Level of Significance After Mitigation
			Several mitigation strategies listed in the August 2000 CALFED Programmatic ROD are feasible mitigation measures for impacts incurred on P-39-356, P-39-4423, and P-39-4424, namely mitigation strategies 3–5 and 7–8. Prior to approval and final design of the North Staten Island Detention, DWR will authorize qualified archaeologists to map the sites (mitigation strategy 3), conduct surface collections and perform test excavations at the sites (mitigation strategies 4 and 5), and prepare a report to document the results of mitigation strategies 3–5 above (mitigation strategy 7). Based on the findings of these mitigation strategies, DWR will determine whether P-39-356, P-39-4423, and P-39-4424 are historical resources or unique archaeological resources for the purposes of CEQA, or are not significant cultural resources. If DWR determines the sites to be non-significant, no additional mitigation is required. Conversely, if DWR determines that the sites qualify as historical resources or unique archaeological resources, DWR will authorize qualified archaeologists to conduct full-scale excavations of P-39-356, P-39-4423, and P-39-4424 (mitigation strategy 8), prepare public interpretive documents (mitigation strategy 9), and prepare a report to document mitigation work (mitigation strategy 7), as appropriate to the qualities of the sites.	

* Optional Alternatives:

~~1-OP1 = Excavate and Restore Grizzly Slough Property.~~

1-OP2 = Mokelumne River Dredging.

~~1-OP3 = Grizzly Slough Property Levee Breaches and Re-Grading.~~

1-OP4 = Enhance Delta Meadows Property.

2-OP1 = Retrofit or Replace Millers Ferry Bridge.

2-OP2 = Retrofit or Replace New Hope Bridge.

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been considered, building upon ideas generated among DWR, public and agency stakeholders, expert technical consultants, and an ad hoc scientific review panel. The alternatives have been shaped with equal goals of providing flood control and ecosystem restoration benefits. Alternatives that have demonstrated promise have been simulated using hydraulic models (summarized in Chapter 3) and reviewed by the science panel, the NDIG, and NDAT. A technical appendix describing the alternatives development and screening process is included in this document (Appendix B). The alternatives selected for consideration in this EIR are described in Chapter 2.

Administrative Draft Environmental Impact Report

This document is the administrative draft EIR (ADEIR) for the Project. It contains a description of the Project alternatives, environmental setting, identification of direct and cumulative impacts, and mitigation measures for impacts found to be significant. The ADEIR review process includes the participation of the implementing agencies for the associated programs under CALFED (described later in this chapter). These agencies include DWR, USACE, California Bay-Delta Authority (CBDA), U.S. Department of the Interior, Bureau of Reclamation (Reclamation), the California Department of Fish and Game (DFG), the U.S. Fish and Wildlife Service (USFWS), and National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS), Delta Protection Commission (DPC), and California Department of Food and Agriculture (DFA).

Public Draft Environmental Impact Report

After input is received from the ADEIR review process, the document will be revised and released as a public draft EIR (DEIR). The document will be filed with the State Clearinghouse with a Notice of Completion (NOC), publicly noticed, and circulated for a review period of 60 days.

Final Environmental Impact Report

Written and oral comments received in response to the DEIR will be addressed in a response-to-comments document that, together with the DEIR, will constitute the final EIR (FEIR). Public agencies will be provided a minimum 10-day opportunity to review responses prepared to their comments, as provided under CEQA. Upon completion of the FEIR, DWR may act to certify the document and adopt a project. ~~Within 5 days of project adoption, a~~ A Notice of Determination (NOD) will be filed with the State Clearinghouse, triggering a 30-day period in which a legal challenge to the document may be filed.

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To be aligned with the overall goals of the CALFED program, the Project should also be compatible with and supportive of the other program elements outlined in the CALFED Programmatic EIR/EIS. Therefore, to the extent that meeting other goals does not interfere with the primary purpose of the Project, DWR will incorporate Project elements that are compatible and consistent with the following CALFED objectives:

- improve conveyance water supply reliability at the south Delta export pumps;
- improve water quality at the south Delta export facilities by facilitating reductions in salinity levels in the San Joaquin River;
- recommend ecosystem restoration and science actions in the Project area consistent with the CALFED ERP’s strategic goals and objectives;
- improve levee stability and integrity within the Project area;
- minimize the conversion of prime, statewide-important and unique farmlands to Project uses; and
- improve and enhance existing and future recreational use within the Project area.

Project Need

As described above, flood control improvements are needed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem resulting from overflows caused by insufficient channel capacities and catastrophic levee failures in the Project study area. The Project would address the need for flood control solutions that are integrated with ecosystem improvements. The existing and historical conditions that warrant flood control and ecosystem quality improvements are described below.

Flood Control

The Mokelumne and Cosumnes Rivers and the Morrison Creek stream group do not currently have sufficient channel capacity to safely convey peak historical flows from Sierra Nevada watersheds, such as occurred during the 1986 and 1997 flood events, through the North Delta to the San Joaquin River. Current channel capacities for the North and South Forks of the Mokelumne River are approximately 40,000 cubic feet per second (cfs). By comparison, the combined channel capacity required to safely convey flows from a 100-year flood event has been estimated at 90,000 cfs. During peak flows, water from the Mokelumne River backs up into a broad floodplain north of New Hope Tract, and the limited capacity further causes water to back up into Snodgrass Slough to the north toward Lambert Road.

The lack of channel capacity, combined with other constrictions in vulnerable areas (e.g., bridge abutments) ~~and an increase in sedimentation levels,~~ makes a

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Table 2-2a. Summary of Group I Alternatives and Components

	1-A	1-B	1-C
	Fluvial Process Optimization	Seasonal Floodplain Optimization	Seasonal Floodplain Enhancement and Subsidence Reversal
Degrade McCormack-Williamson Tract East Levee to Function as a Weir	X	X	X
Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir	~~X~~	X	X
Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5’)	X		
Reinforce Dead Horse Island East Levee	X	X	X
Modify Downstream Levees to Accommodate Potentially Increased Flows	X	X	X
Construct Transmission Tower Protective Levee and Access Road	X	X	X
Demolish Farm Residence and Infrastructure	X	X	X
Enhance Landside Levee Slope and Habitat	X	X	X
Modify Landform and Restore Agricultural Land to Habitat	X	X	X
Modify Pump and Siphon Operations	X	X	X
Breach Mokelumne River Levee	X		
Allow Boating on Southeastern McCormack-Williamson Tract	X		
Construct Box Culvert Drains and Self-Regulating Tide Gates		X	X
Construct Cross-Levee to Create Subsidence-Reversal Demonstration Area			X
Import Soil for Subsidence Reversal			X
Implement Local Marina and Recreation Outreach Program	X	X	X
Excavate Dixon and New Hope Borrow Sites	X	X	X
Excavate and Restore Grizzly Slough Property	X	X	X
Dredge South Fork Mokelumne River	OP	OP	OP
Enhance Delta Meadows Property	OP	OP	OP

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Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

Table 2-8a summarizes the construction operations anticipated to implement Alternative 1-A, including work sequence and schedule, equipment, material volume, and duration.

Degrade McCormack-Williamson Tract East Levee to Function as a Weir

Objective

Extensive hydraulic modeling shows that it is necessary to degrade a portion of the east and southwest levees on McCormack-Williamson Tract to achieve desired flood control benefits in the upper portion of the Project area measured as stage reductions at Benson's Ferry. Because the North Delta study area is limited by channel capacity, and McCormack-Williamson Tract levees are legally

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Operations and Maintenance

Vegetation management (by herbicide application, mowing, or removal with hand tools) may be required periodically.

Completely Degrade McCormack-Williamson Tract Southwest Levee to Match the Elevation of the Island Floor ~~Function as a Weir~~

Objective

The southwest levee of McCormack-Williamson Tract would be lowered to allow floodflows to pass out of the tract without causing a surge effect, as described above. To convey high river stages out of McCormack-Williamson Tract, the degraded southwest levee would either be reinforced as a hardened weir to direct flow and minimize erosion (Alternatives 1B and 1C) or completely degraded to match the elevation of the island floor (Alternative 1A). During low-flow seasons, the lowered southwest levee would allow tidal exchange on the island from the south.

Location

The southwest levee of McCormack-Williamson Tract is located on the southwest side of the island adjacent to Dead Horse Cut (see Figure 2-1). The affected portion of the levee is approximately 3,500 feet long.

Design & Construction

The McCormack-Williamson Tract southwest levee would be degraded along the entire length of Dead Horse Cut to match the elevation of the island floor (between –1 foot and –2.5 feet) from an existing elevation of 15 feet (see Figure 2-3). This would allow floodflows to pass out of the tract without causing a surge effect. This would also allow tidal water onto the tract from the southern end, facilitating the formation of dendritic intertidal channels at elevations near sea level and keeping the southernmost portion of the tract as shallow open water.

The potential for scour along the embankment between the untouched levee and the breach requires the placement of 24-inch angular RSP (USACE 1991) to a depth of 30 inches along the 3:1 grade-matching slope as well as the adjacent levee faces. A 60-inch launchable RSP toe should be placed along the base of the 3:1 grade and in the river channel along the levee toe. *(Note: Launchable RSP refers to an approach of placing rock in piles or rows in anticipation of erosion, such that it seeks its own resting place where needed by gravity or hydraulic force.)* The area of protection required will vary with levee geometry, the invert of the Mokelumne River, and landform elevation within the tract. One or more filter layers would be placed under all RSP to prevent scour of the underlying soil.

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excavation across the property to provide an additional 648,000 cubic yards of borrow.

A low levee paralleling New Hope Road may be proposed in final design if needed to mitigate flooding of the roadway. However, one-way or manually operated gate or culvert structures would be constructed in this levee to maintain the natural hydrology of the area and ensure that floodflows from the south are able to flow onto the Grizzly Slough property, as thought to occur under the existing conditions, so as not to increase flooding potential south of New Hope Road. This levee would be constructed to the north of the ditch paralleling New Hope Road in order to preserve habitat currently in the ditch.

An outlet would be excavated for the toe drain running parallel to the Grizzly Slough levee in order to decrease the risk of fish-stranding on the property. The outlet would be excavated on the north end of the channel, in the direction of flow.

Provisions to maintain access to a privately owned parcel landlocked within the property will be included in final design.

Flooding events would import propagules such as willows, cottonwoods, and perennial herbs that would naturally colonize frequently flooded portions of the site. Once established, young willows and cottonwoods should be able to access the relatively shallow groundwater in these areas. On higher areas, planting oaks, elderberries, native grasses, or other species may be proposed in the final Project design, if further study shows they are warranted; however, other sites in the area have exhibited successful native colonization (such as the “Accidental Forest” at TNC’s adjacent Cosumnes River Preserve).

Operations and Maintenance

The overall approach to land management would be relatively “hands off,” similar to practices at the adjacent Cosumnes River Preserve. Vegetation management (by herbicide application, mowing, or removal with hand tools) may be required periodically. Prescribed burning and strategic grazing will be evaluated as elements of the Project’s adaptive management plan. Herbivore protection shelters and fencing may also be needed to prevent plant predation from beavers, although beavers may provide a benefit by thinning forested areas to maintain diverse cover. These actions will be elements of the Project’s adaptive management plan.

Dredge South Fork Mokelumne River (Optional)

Objective

This component is optional in Group I and provides additional channel capacity through dredging the river bottom to remove ~~accumulated~~ sediment. The cross-

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Table 2-7a. Construction Sequence for Group I Components (Year 1)

Component	May	Jun	Jul	Aug	Sep	Oct
Demolish Farm Residence and Infrastructure	X					
Modify Pump and Siphon Operations	X					
Reinforce Dead Horse Island East Levee	X	X				
Modify Downstream Levees to Accommodate Potentially Increased Flows	X	X				
Excavate and Restore Grizzly Slough Property	X	X	X	X	X	X
Excavate Dixon and New Hope Borrow Sites		X	X	X		
Construct Transmission Tower Protective Levee and Access Road	X	X	X	X	X	X
Enhance Landside Levee Slope and Habitat		X	X	X	X	X
Modify Landform and Restore Agricultural Land to Habitat			X	X	X	X
Construct Box Culvert Drains and Self-Regulating Tide Gates					X	
Construct Cross-Levee to Create Subsidence-Reversal Demonstration Area				X	X	
Degrade McCormack-Williamson Tract East Levee to Function as a Weir					X	X
Degrade McCormack-Williamson Tract Southwest Levee ~~to Function as a Weir~~					X	X
Breach Mokelumne River Levee				X	X	X
Dredge South Fork Mokelumne River			X	X	X	
Import Soil for Subsidence Reversal			X	X	X	

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Component	Operation and Equipment	Material Volume
Enhance Landside Levee Slope and Habitat	Clear and grub land surface with dozer, strip and stockpile topsoil with scraper, place soil with dozer, wet surface with water truck for dust control, and imprint surface with compactor	552,500 cubic yards of levee material (imported)
Modify Landform and Restore Agricultural Land to Habitat	Reshape land surface with dozer and grader, wet surface with water truck for dust control, and imprint surface with compactor	No materials would be exported or imported.
Construct Box Culvert Drains and Self-Regulating Tide Gates	Import materials with truck, prepare bedding with excavator, import rock with barge, install materials with crane	797 tons of rock (imported)
Degrade McCormack-Williamson Tract East Levee to Function as a Weir	Clear and grub levee surface with dozer, strip and transport material with scraper for constructing features on the interior of the tract, wet surface with water truck for dust control, imprint surface with compactor, import rock with truck, and place rock with excavator	58,667 cubic yards of levee material (transported on site) and 45,000 tons of rock (imported)
Completely Degrade McCormack-Williamson Tract Southwest Levee to match elevation of island floor ~~Function as a Weir~~ (Elevation -2.5’)	Clear and grub levee surface with dozer, strip and transport material with scraper for constructing features on the interior of the tract, wet surface with water truck for dust control, imprint surface with compactor, import rock with truck, and place rock with excavator	70,500 cubic yards of levee material (transported on site) and 81,600 tons of rock (imported)
Dredge South Fork Mokelumne River	Construct landside drying basins with dozer, remove material from channel bottom and place on landside of levee with dredge, load material into truck with excavator, transport material with truck for constructing features on McCormack-Williamson Tract	1,350,000 cubic yards of channel sediment (transported on site)
Enhance Delta Meadows Property	Upgrade boat launch with imported concrete, and clear and grub parking area with dozer	18 cubic yards of concrete (imported)

Table 2-8c. Equipment Operations for Alternative 1-C

Component	Operation and Equipment	Material Volume
Demolish Farm Residence and Infrastructure	Demolish structures with dozer, load debris into truck with excavator, and haul off site with truck	484 tons of debris (exported)
Modify Pump and Siphon Operations	Dismantle pumps and piping by filling pipes with concrete or installing welded caps, and haul off site with truck	16 cubic yards of concrete (imported)
Reinforce Dead Horse Island East Levee	Import rock with barge and tugboat and place with dragline crane	34,000 tons of rock (imported)

Component	Operation and Equipment	Material Volume
Modify Downstream Levees to Accommodate Potentially Increased Flows	Import aggregate base and liquid stabilizer with truck, place and smooth material with grader, and roll surface with compactor	18,203 cubic yards of aggregate base (imported)

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Alternative NP: No Project

Under the No Project Alternative, the North Delta Flood Control and Ecosystem Restoration Project would not be implemented and the area would maintain the current level of flood protection. It is highly likely that catastrophic flooding would occur within the 20-year planning horizon that expires in 2025.

Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

Impact FC-1: Raise Flood Elevations and Increase the Frequency of Flooding.

The degradation of the McCormack-Williamson Tract east ~~and southwest~~ levees~~s~~ to function as a weir~~s~~ would increase the frequency of flooding within McCormack-Williamson Tract consistent with the goal of creating quail

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Mitigation: None required.

Impact FC-9: Decrease in Levee Stability from Non-Motorized Boating Activities.

Non-motorized boating activities would make portions of the levees more accessible to foot traffic than previously. This could cause direct trampling on the levees and possible dislodging of RSP or other protection, potentially compromising levee integrity. Signage would be enhanced to discourage trespassing on the levee slopes.

Determination of Significance: Less than significant.

Mitigation: None required.

Excavate and Restore Grizzly Slough Property ~~(Optional)~~

Impact FC-1: Raise Flood Elevations and Increase the Frequency of Flooding.

The breaching and/or degradation of Grizzly Slough property levees would increase the frequency of flooding in the property from approximately a 2- to 3-year frequency to a 1.5-year frequency consistent with enhancing ecosystem habitat in the property and providing borrow material for other Project components. Because this slightly more frequent interior flooding of the Grizzly Slough property is consistent with Project ecosystem restoration goals, and because the alternative design would incorporate protective berms for interior features as needed, the alternative would not cause impacts from raising flood elevations and increasing the frequency of flooding within Grizzly Slough.

On properties adjacent to Grizzly Slough, water surface elevation changes would be insignificant for any hydrology less frequent than the 2- to 3-year event as the Grizzly Slough property currently inundates at this frequency.

Determination of Significance: Less than significant.

Mitigation: None required as long as the alternative retains the features that minimizes impacts through implementation.

Impact FC-2: Increase the Degree or Quantity of Seepage.

Levees in the Grizzly Slough area currently have some seepage problems. Opening up Grizzly Slough land to more frequent inundation would raise the groundwater level. This would create a flow gradient toward the adjacent islands/tracts, causing more seepage there. Because the quantity of seepage is uncertain, this impact is considered significant.

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Impact FC-5: Increase the Degree or Quantity of Scour.

Impacts from the implementation of this alternative would be similar to those under Alternative 1-A. Because Alternative 1-B does not have McCormack-Williamson open to tidal flow as extensively as Alternative 1-A, the potential of scour impacts is even less for Alternative 1-B.

Determination of Significance: Less than significant.

Mitigation: None required.

Impact FC-6: Increase the Degree or Quantity of Subsidence Adjacent to Levees.

This impact is the same as described under Alternative 1-A.

Determination of Significance: Less than significant.

Mitigation: None required.

Impact FC-7: Decrease Levee Inspection and Maintenance.

This impact is the same as described under Alternative 1-A.

Determination of Significance: No impact.

Mitigation: None required.

Impact FC-8: Decrease in Levee Stability from Proposed Construction Activities.

This impact is the same as described under Alternative 1-A.

Determination of Significance: Less than significant.

Mitigation: None required.

Excavate and Restore Grizzly Slough Property ~~(Optional)~~

This impact is the same as described under Alternative 1-A.

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Excavate and Restore Grizzly Slough Property ~~(Optional)~~

This impact is the same as described under Alternative 1-A.

Mokelumne River Dredging (Optional)

This impact is the same as described under Alternative 1-A.

Alternative 2-A: North Staten Detention

This alternative provides additional capacity in the local system through construction of an off-channel detention basin on the northern portion of Staten Island. High stage in the river would enter the detention basin upon cresting a weir in the levee. Other components are combined to protect infrastructure. Similar to all detention alternatives, this alternative is designed to capture flows no more frequently than the 10-year event while having no measurable effect on the 100-year floodplain. The interior of the basin would continue to be farmed, consistent with current practices. As shown in Figure 2-22, Alternative 2-A includes the following components:

Construct North Staten Inlet Weir

Construct North Staten Interior Detention Levee

Construct North Staten Outlet Weir

Install Detention Basin Drainage Pump Station

Reinforce Existing Levees

Degrade Existing Staten Island North Levee

Relocate Existing Structures

Modify Walnut Grove–Thornton Road and Staten Island Road

Retrofit or Replace Millers Ferry Bridge *(optional)*

Retrofit or Replace New Hope Bridge *(optional)*

Construct Wildlife Viewing Area

Excavate Dixon and New Hope Borrow Sites

Impact FC-1: Raise Flood Elevations and Increase the Frequency of Flooding.

The detention basin constructed as part of this alternative would provide area flood control benefits by reducing the peak flow events that exceed the 10-year recurrence interval. Because the more frequent flooding of the acreage contained within the footprint of the detention basin is consistent with Project flood control

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would continue as described in the existing conditions analysis, requiring ongoing dredging and erosion control practices to maintain the current levee system, islands, and infrastructure in the Project area. This No Project effect is the same as under existing conditions; therefore, no impact would result.

Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

Impact GEOMORPH-1: Temporary Increase in Sediment Accumulation and Scouring during Levee Modifications.

Construction, degradation, reinforcement, and/or modification of levees would result in local accumulation of sediments during certain construction phases. This impact is considered less than significant because potential effects associated with sediment accumulation and scouring would be avoided by implementing the following CALFED Water Quality mitigation measures:

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3.4 Water Quality

Analysis Summary

The Project could have some effects on key water quality constituents of concern during construction and operation. Construction, especially dredging, could mobilize sediments and potentially release pollutants into the environment. However, the extent of chemical mobilization during dredging operations is generally found to be quite low, and these chemicals may already be in the water column. Normal sediment control measures and practices during dredging and construction would provide effective minimization of this impact and no additional mitigation would be required.

Because the only potential changes in salinity from the Project would be beneficial, and cause a slight reduction in salinity within the Mokelumne River and Delta channels, salinity is not considered to be a water quality impact variable.

Because of the infrequent occurrence of flood events, water quality during floods is not of concern. Some Project elements, however, would alter local hydrodynamic conditions during normal conditions, especially at McCormack-Williamson Tract.

Because conversion of the land use on McCormack-Williamson Tract and Grizzly Slough would increase the area of wetlands and freshwater tidal water, there is a potential for changes in the source of total organic carbon (TOC) and production of methylmercury from the inundated sediments. However, the production of TOC from agricultural lands on peat soils may be similar to that of wetland vegetation. No significant impact on TOC is likely. In contrast, any increase in methylmercury would be a significant impact, because the RWQCB has “listed” the Delta as out of compliance with regard to methylmercury. There are no recommended mitigation measures beyond research monitoring and a possible “mercury load trading” program.

The North Delta Flood Control and Ecosystem Restoration Project will include a monitoring program to collect additional information for assessing potential water quality impacts and to verify compliance with regulatory requirements. Several water quality sampling stations will be located in the vicinity of Grizzly Slough and McCormack-Williamson Tract. In the suggested program, laboratory analyses for water column samples would include some or all of the following: dissolved organic carbon (DOC), total organic carbon (TOC), UV 254, bromide, total mercury, dissolved mercury, methylmercury, nitrate, ammonia, total kjeldahl nitrogen (TKN), orthophosphate, total phosphorus, zinc, arsenic, copper, cadmium, chromium, lead, nickel, selenium, iron, aluminum, manganese, alkalinity, total dissolved solids (TDS), total coliform, fecal coliform, e. coli, and total suspended sediment (TSS).

Sediment samples would be analyzed for some or all of the following: methylmercury, total mercury, dissolved mercury, total sulfide, iron, manganese, polychlorinated biphenols (PCBs), and organochloride pesticides. Soil samples collected to meet the requirements of the Beneficial Reuse of Dredged Sediments will be analyzed for total mercury, methylmercury, an organic carbon surrogate, metals, organochlorine pesticides/PCBs, and PAHs.

Introduction

For the purposes of this water quality analysis, the constituents of primary concern are TOC and methylmercury. This section evaluates the potential for the Project to affect these constituents during construction and operation.

Sources of Information

The following key sources of information were used in the preparation of this section.

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of MeHg in Delta aquatic organisms. The following sections describe the importance of these constituents.

Organic Carbon

A considerable portion of TOC (20–50%) in Delta waters originates from drainage water from peat soils on Delta islands (Chow et al. 2006, Fujii et al. 1998). The concentration and character (i.e., nature of biochemical molecules) of organic carbon in drainage water depends on many factors, including frequency of flooding and the presence of oxygen. Mineral soils contribute less organic carbon than peat soils (Chow et al. 2005). McCormack-Williamson Tract soils are intermediate between the peaty soils of the central Delta islands and more mineral soils upstream of the Delta.

Dissolved organic carbon is one of the primary variables that influence the formation of DBPs (Chow et al. 2006; Fujii et al. 1998). Little is known about the amount or quality of organic material released from different types of wetlands and agricultural operations. The suspected risk to humans from DBPs containing carcinogens has led some communities to revise their methods of disinfecting drinking water. DBP levels in drinking water can be reduced through the use of alternatives to chlorination in treating water for human consumption (i.e., ozonation or chloromines), although other potentially harmful DBP compounds may be formed during these other disinfection processes. Reducing organic carbon concentrations in raw water before chlorination, with flocculation or granular activated carbon adsorption, can reduce all DBP levels but may be quite expensive.

Mercury

Mercury contamination from mining activities is extensive on both sides of the Central Valley, primarily from widely scattered hydraulic mining debris on the east side and ~~active~~ abandoned mines and associated debris piles on the west side. These sources continue to deposit significant amounts of mercury into the Bay-Delta system. The Cosumnes River, Yolo Bypass, and Sacramento River are the primary ongoing sources of mercury contamination in the Bay-Delta. Natural mercury contamination can originate from volcanoes, forest fires, and oceanic releases; however, it is difficult to determine what proportion of mercury is from natural sources because of the variation in natural deposition.

Mercury occurs in several forms, including pure elemental Hg and toxic methylmercury (MeHg). Mercury is mobile in aquatic systems as aqueous mercury or when attached to suspended particulate matter. MeHg is a significant water quality concern because small amounts of it can bioaccumulate in fish to levels that are toxic to humans and wildlife. There are currently health advisories for consumption of fish in 13 water bodies in northern California, including the Bay-Delta. The concentrations of Hg in Delta fish are frequently above the EPA screening level of 0.5 ppm.

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Clean Water Act, Section 401 and Section 402

Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification. Certification is obtained from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects that have a federal component and may affect state water quality must comply with CWA Section 401. In California, the authority to grant water quality certification has been delegated to the State Water Resources Control Board (State Water Board), and applications for water quality certification under CWA Section 401 typically are processed by the applicable RWQCB. Water quality certification requires evaluation of potential impacts in light of water quality standards and CWA Section 404 criteria governing discharge of dredged and fill materials into waters of the United States.

To obtain authorization for proposed storm water discharges to surface waters, the Discharger must submit a Notice of Intent (NOI) with a vicinity map and appropriate fee to the State Water Resources Control Board prior to commencement of construction activities. Coverage under the General Permit shall not occur until the applicant develops a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must identify Best Management Practices that utilize the BAT/BCT performance standard to control pollutant discharges. These controls must reduce pollutants and implement any more stringent controls necessary to meet water quality standards contained in the CVRWQCB's Basin Plan

Clean Water Act, Section 303(d)

Under CWA Section 303(d), the RWQCBs and the State Water Board list water bodies as impaired when not in compliance with designated water quality objectives and standards. A total maximum daily load (TMDL) program must be prepared for waters identified by the state as impaired. A TMDL is a quantitative assessment of a problem that affects water quality. The problem can include the presence of a pollutant, such as heavy metal or a pesticide, or a change in the physical property of the water, such as dissolved oxygen or temperature. A TMDL specifies the allowable load of pollutants from individual sources to ensure compliance with water quality standards. Once the allowable load and existing source loads have been determined, reductions in allowable loads are allocated to individual pollutant sources.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) became law in 1974 and was reauthorized in 1986 and again in August 1996. Through the SDWA, Congress gave EPA the authority to set standards for contaminants in drinking water supplies. Under the SDWA provisions, the ~~California Department of Health Services (DHS)~~ California Department of Public Health (CDPH) has the primary enforcement responsibility. The California Health and Safety Code establishes ~~DHS~~ CDPH authority and mandates drinking water quality and monitoring standards.

State Requirements

Porter-Cologne Water Quality Control Act of 1969

In 1967, the Porter-Cologne Act established the State Water Board and nine RWQCBs as the primary state agencies with regulatory authority over California water quality and appropriative surface water rights allocations. Under this act (and the CWA), the state is required to adopt a water quality control policy to be implemented by the State Water Board and the nine RWQCBs. The State Water Board also establishes water quality control plans (WQCPs) and statewide plans. The RWQCBs carry out State Water Board policies and procedures throughout the state.

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WQCPs, also known as basin plans, designate beneficial uses for specific surface water and groundwater resources and establish water quality objectives to protect those uses. WQCPs and water resource management plans relevant to the Project include the 1995 Bay-Delta WQCP and ~~the 1975 WQCB for the Sacramento River and San Joaquin River Basins~~ Water Quality Control Plan for the Sacramento and San Joaquin River Basins, 4th Edition, October, 2007. The Bay-Delta WQCP defines narrative and numeric surface water quality objectives for several parameters, including suspended material, turbidity, pH, dissolved oxygen, bacteria, temperature, salinity, toxicity, ammonia, and sulfides. In addition, the overall basin plan establishes similar standards throughout the Central Valley.

State Water Resources Control Board and Central Valley RegionalWater Quality Control Board—Construction Stormwater National Pollutant Discharge Elimination System Permit The federal Clean Water Act effectively prohibits discharges of stormwater from construction sites unless the discharge is in compliance with a National Pollutant Discharge Elimination (NPDES) permit. The State Water Board is the permitting authority in California and has adopted a statewide General Permit for Stormwater Discharges Associated with Construction Activity (General Construction Permit) (State Water Board 1999) that applies to projects resulting in 1 or more acres of soil disturbance. The Project would result in disturbance of more than 1 acre of soil. Therefore, the Project will require the preparation of a SWPPP that would specify site management activities to be implemented during site development. These management activities will include construction stormwater BMPs, dewatering runoff controls, and construction equipment decontamination.

Significance Criteria

An alternative would result in a significant impact on water quality if it would:

- result in a discernable change in TOC at a drinking water intake,
- result in an increase in methylmercury loading into the Delta because of the increased risk of biotic exposure and uptake of methylmercury, or
- result in a substantial increase of pollutants into the environment duringconstruction.

Impacts and Mitigation of the Project Alternatives

Alternative NP: No Project

There are no construction activities under Alternative NP. There are no impacts from construction or dredging. Current land practices, including farming on McCormack-Williamson Tract and on Staten Island, would continue. No changes in the release of TOC in the drainage water or floodwater would occur. Available methylmercury data are limited for methylmercury in agricultural return flows. It is assumed that Delta agriculture is a source of methylmercury

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and may contribute about 2.5% of the annual Delta load (Central Valley RWQCB 2005). No changes in the release of MeHg in the drainage or floodwater would occur.

Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

Impact WQ-1: Release of Pollutants during Construction and Dredging.

Construction activities under Alternative 1-A include degrading the east and southwest levees of McCormack-Williamson Tract, strengthening downstream levees (including Dead Horse Island east levee), excavating materials from the borrow sites, constructing the transmission tower protective levee, creating wildlife-friendly interior levee slopes, and excavating starter channels on McCormack-Williamson Tract and the Grizzly Slough property. Alternative 1-A includes an optional dredging element that would result in the removal of large

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quantities of sediment from the South Fork Mokelumne River and other local waterways (Snodgrass Slough and Dead Horse Cut). These activities could result in numerous disturbances to the soil and sediment that could cause the release of pollutants into the surrounding waterways.

To ensure that potentially contaminated dredged materials do not affect surface water or groundwater resources, <u>a Water Quality Certification must obtained from the Central Valley Water Resources Control Board (CVWRCB).</u> <u>Though the water quality requirements will be articulated with the issuance of the certification,</u> a sampling and analysis plan for proposed dredging areas will <u>probably</u> be prepared and implemented no more than 1 year before proposed dredging activities. If sampling indicates any layer of toxic materials above applicable standards, contractors will dredge so that either that layer is not disturbed or the entire layer is removed. If the sampling analysis concludes that dredged material possesses contaminants, a suitability analysis will be conducted to determine a suitable environment for the disposal of the contaminated soils.

The Department will use BMPs for sediment control during construction and will prepare a SWPPP, as required by the State Water Board. The SWPPP will contain a description of appropriate BMPs to ensure that erosion, fuel spills, and other forms of pollution are minimized during construction in accordance with the statewide General Permit for Stormwater Discharges Associated with Construction Activity. Because the pre-dredging sampling and SWPPP will be part of the Project activities, there are assumed to be no significant impacts from the release of pollutants during construction or dredging.

Determination of Significance: Less than significant.

Mitigation: None required.

Impact WQ-2: Release of Organic Carbon.

Under Alternative 1-A, land practices would be substantially changed on approximately one-half of McCormack-Williamson Tract. The southernmost portion of the tract would be converted to open-water, subtidal habitat, and an adjacent portion of the tract would be converted to intertidal marsh. Alternative 1-A also includes the restoration of Grizzly Slough, which is located approximately 5 miles upstream of McCormack-Williamson Tract and outside of the area of peaty Delta soils. Restoration of Grizzly Slough natural fluvial processes may increase organic carbon release. These tidal and vegetated areas would produce organic material through primary production of living matter (e.g., phytoplankton), decay of dead organic matter, and leaching from and microbial decay of soil (both peat and non-peat soils). However, there is scientific uncertainty regarding the level of organic carbon generated by wetlands compared to typical agricultural use. It is assumed that Alternative 1-A would not produce a significant increase in the release of TOC relative to the No Project Alternative.

Determination of Significance: Less than significant.

Mitigation: None required.

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Impact WQ-3: Release of Methylmercury

Under Alternative 1-A, land practices would be substantially changed on approximately one-half of McCormack-Williamson Tract. The southernmost portion of the tract would be converted to open-water, subtidal habitat, and an adjacent portion of the tract would be converted to intertidal marsh. Alternative 1-A also includes the restoration of Grizzly Slough. The tidal wetlands on McCormack-Williamson Tract and the enhanced fluvial processes on Grizzly Slough would produce environments that may increase the release of methylmercury. Little methylmercury production information is available for Delta wetlands; however, estimates from small experimental marshes on Twitchell Island suggest that increasing wetland acreage may increase methylmercury concentrations in water and biota (Central Valley RWQCB 2005).

There is scientific uncertainty regarding the relative production of methylmercury from wetlands versus agricultural lands. It is assumed, however, that Alternative 1-A would increase the release of methylmercury relative to the No Project Alternative.

Determination of Significance: Significant.

Mitigation Measure WQ-1: ~~Participate in an Offset Program to Ensure No Net Increase in Methylmercury Loading.~~ Monitor for mercury and methylmercury levels in water and sediments in the McCormack-Williamson Tract and Grizzly Slough vicinities both before and after restoration activities take place.

There are no known mitigation measures to reduce the production of methylmercury. Mitigation measures may be developed in the RWQCB implementation plan for the Sacramento–San Joaquin Delta Estuary TMDL for Methyl and Total Mercury. ~~If no feasible BMPs are identified in the TMDL implementation plan, DWR will participate in an offset program to ensure no net increase in methylmercury loading into the Delta as a result of Project implementation. This would require quantification of the increase in MeHg from the land conversion of Alternative 1-A, and could include participating in funding improvements to the Cache Creek Settling Basin, other projects as recommended by the Central Valley RWQCB, or purchasing credits in an existing, approved offset program.~~

The Basin Plan (4th Edition) currently includes no specific requirements for methylmercury in the Delta. However, the CVRWQCB is considering and is expected to adopt an amendment to establish Delta-specific methylmercury objectives of 0.24 and 0.8 mg/kg for large trophic level 4 and 3 fish (150-500 mm total length) and 0.03 mg/kg wet weight, for small trophic level 2 and 3 fish (less than 50 mm to tal length). The amendment will also include a two-phase implementation strategy. Phase I (2007-2014) will focus on characterizing the methylmercury problem and limiting existing methylmercury inputs. Phase II (2014 onward) will focus on developing and implementing management options, including discharge limits, prohibitions, and initiating appropriate enforcement actions based on knowledge gained during Phase I.

A water quality plan will be developed to monitor for mercury and methylmercury levels in water and sediments in the McCormack-Williamson Tract and Grizzly Slough vicinities both before and after restoration activities take place. This monitoring would provide baseline conditions at the site and will allow for comparisons between pre and post restoration methylmercury levels. The information will aid in determining potential site management changes in the future, as well as advance the general body of knowledge on the subject of methylmercury creation and export in restored tidal marshes. It is likely that these monitoring activities will be coordinated with the creation of the Delta Mercury TMDL.

Significance after Mitigation: Less than significant.

Alternative 1-B: Seasonal Floodplain Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with actions to maximize floodplain habitat to benefit fish species that spawn or rear on the floodplain. This would be accomplished by allowing controlled flooding (with some tidal action to maintain water quality) during the wet season. As shown in Figure 2-15, Alternative 1-B includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir

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of organic carbon generated by wetlands compared to typical agricultural use. It is assumed that Alternative 1-B would not produce a significant increase in the release of TOC relative to the No Project Alternative.

Determination of Significance: Less than significant.

Mitigation: None required.

Impact WQ-3: Release of Methylmercury.

Under Alternative 1-B, land practices on McCormack-Williamson Tract would change from agricultural production to natural habitat. Alternative 1-B also includes the restoration of Grizzly Slough. The tidal wetlands on McCormack-Williamson Tract and the enhanced fluvial processes on Grizzly Slough would produce environments that may increase the release of methylmercury. There is scientific uncertainty in the relative production of methylmercury from wetlands versus agricultural lands. It is assumed, however, that Alternative 1-A would increase the release of methylmercury relative to the No Project Alternative.

Determination of Significance: Significant.

Mitigation Measure WQ-1: ~~Participate in an Offset Program to Ensure No Net Increase in Methylmercury Loading. .~~ **Monitor for mercury and methylmercury levels in water and sediments in the McCormack-Williamson Tract and Grizzly Slough vicinities both before and after restoration activities take place.**

Significance after Mitigation: Less than significant.

Alternative 1-C: Seasonal Floodplain Enhancement and Subsidence Reversal

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with scientific pilot actions to create floodplain habitat (similar to but less than Alternative 1-B), combined with a subsidence reversal demonstration project in the lowest area of the tract. This would be accomplished by allowing controlled flooding (with some tidal action to maintain water quality) during the wet season, as well as sediment import. As shown in Figure 2-19, Alternative 1-C includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure

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Mitigation: None required.

Impact WQ-3: Release of Methylmercury.

Under Alternative 1-C, land practices would be changed on McCormack-Williamson Tract in a manner similar to Alternative 1-A. The southernmost portion of the tract would be converted to intertidal wetland for the purpose of subsidence reversal. In addition, riparian plantings would occur along the landside of all McCormack-Williamson Tract levees. The tidal wetlands on McCormack-Williamson Tract and the enhanced fluvial processes on Grizzly Slough would produce environments that may increase the release of methylmercury. There is scientific uncertainty in the relative production of methylmercury from wetlands versus agricultural lands. It is assumed, however, that Alternative 1-A would increase the release of methylmercury relative to the No Project Alternative.

Determination of Significance: Significant.

Mitigation Measure WQ-1: **~~Participate in an Offset Program to Ensure No Net Increase in Methylmercury Loading.~~** **Monitor for mercury and methylmercury levels in water and sediments in the McCormack-Williamson Tract and Grizzly Slough vicinities both before and after restoration activities take place. The monitoring plan may also include identification of variables onsite that affect methylmercury production and degradation, including sources of inorganic mercury. This will be followed by an evaluation and development of management practices to reduce methylmercury and elemental mercury discharges in accordance with the water quality certification process.**

Significance after Mitigation: Less than significant.

Alternative 2-A: North Staten Detention

This alternative provides additional capacity in the local system through construction of an off-channel detention basin on the northern portion of Staten Island. High stage in the river would enter the detention basin upon cresting a weir in the levee. Other components are combined to protect infrastructure. Similar to all detention alternatives, this alternative is designed to capture flows no more frequently than the 10-year event while having no measurable effect on the 100-year floodplain. The interior of the basin would continue to be farmed, consistent with current practices. As shown in Figure 2-22, Alternative 2-A includes the following components:

- Construct North Staten Inlet Weir
- Construct North Staten Interior Detention Levee
- Construct North Staten Outlet Weir
- Install Detention Basin Drainage Pump Station
- Reinforce Existing Levees
- Degrade Existing Staten Island North Levee

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Impacts and Mitigation of the Project Alternatives

Alternative NP: No Project

Existing water use in the project area is primarily for farming. If the No Project Alternative is implemented, this use is expected to remain similar to existing conditions. Operation of the SWP, CVP, and other Delta diversions would continue in the same manner as current conditions under the same regulatory standards. No changes in water uses would occur.

Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

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Alternative NP: No Project

Under the No Project Alternative, no improvements for flood control or ecosystem restoration would be implemented. Under Future No Project conditions (2025 conditions), no improvement would occur.

No change in groundwater use in the Delta is expected under the No Project Alternative. However, subsidence of Delta islands will continue as groundwater pumping for drainage of croplands continues. No other impacts are expected in the Delta region (CALFED 2000).

Changes in groundwater conditions in the Sacramento River HR are expected to occur in response to increased local demand for groundwater. However, this concern does not apply to the Project area. A reduction in groundwater recharge may result from reduced infiltration and storage in the upper watersheds if retention capacity in the watersheds continues to decrease. This would not affect groundwater levels in the Sacramento River HR but could result in significant local impacts in the upper watersheds.

Impacts on groundwater in the upper watershed areas of the San Joaquin River HR would be similar to those described for the Sacramento River HR.

Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
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- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
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- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program

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Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5’)
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
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- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

Impact GEO-1: Increase the Potential for Structural Damage and Injury Caused by Fault Rupture.

Based on available knowledge of fault locations and locations of earthquake epicenters, the risk of surface fault rupture in the Project area is generally low because of its distance from active faults. Therefore, this impact is considered less than significant. Furthermore, DWR has incorporated requirements for standard UBC Seismic Zone 3, CBSC, and county general plan construction standards into the Project design for applicable features to minimize the potential fault rupture hazards on associated Project features. No further mitigation is required. Please refer to Environmental Commitments in Chapter 2, “Project Description.”

Determination of Significance: Less than significant.

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Impacts and Mitigation of the Project Alternatives

Alternative NP: No Project

Under the No Project Alternative, there would be no change in the characteristics of the regional transportation system, local roadways, or navigation through Delta channels. It is likely that the levee roads and other roads in the Project area would continue to be maintained by San Joaquin and Sacramento Counties. No road modifications, including raising and building new roads, would occur. Navigation would not change under the No Project Alternative. Water levels and flows are not expected to change, and channels that are currently accessible to watercraft will continue to be so. No impacts associated with the No Action Alternative have been identified. No mitigation is required.

Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
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- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

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2025 Conditions

Under the future no action conditions (2025 conditions), the SDIP would not be implemented, and there would be no additional air pollutant emissions in the Project area as a result of construction or operation. It is expected that minimal development would occur in this area. Because of continuing improvements in engine and motor technology and the retirement of older, higher-emitting engines and motors, it is anticipated that 2025 air pollutant emissions would be lower than the existing conditions described above.

Alternative 1-A: Fluvial Process Optimization

Construction and operational activities associated with Project components for Alternative 1-A will result in air pollutant emissions of ozone precursors (ROG and NO_x), CO, and particulate matter (PM10).

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5’)
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

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- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property (*optional*)

Impact NZ-1: Exposure of Noise-Sensitive Land Uses to Noise from General Construction Activities

Construction activities for Alternative 1-A: Fluvial Process Optimization would involve the use of heavy construction equipment. Table 3.10-5 summarizes maximum noise levels produce by various types of construction equipment.

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Excavate and Restore Grizzly Slough Property ~~(Optional)~~

Impact NZ-1: Exposure of Noise-Sensitive Land Uses to Noise from General Construction Activities

Construction activities for this measure would involve the use of heavy construction equipment. Construction equipment and predicted noise levels are similar to those described above for Alternative 1-A: Fluvial Process Optimization. The results in Table 3.10-5 indicate that construction operations would result in noise that exceeds 50 dBA L_{eq} within 1,600 feet and 45 dBA L_{eq} within 2,500 feet of the operations.

Because construction activities for Alternative 1-OP1: Grizzly Slough Property Levee Breaches and Regrading (optional) would take place within 2,500 feet of two residences, this impact is considered to be significant.

Determination of Significance: Significant.

Mitigation Measure NZ-1: Limit Noise-Generating Construction Activity and Heavy Trucking to Daytime Hours.

Significance after Mitigation: Less than significant.

Impact NZ-2: Exposure of Noise-Sensitive Land Uses to Noise from Material Hauling Operations

Under Alternative 1-OP1, truck traffic would increase temporarily to remove and import levee materials and import riprap and other construction materials. A description of anticipated trucking activity is provided in Section 3.8, Transportation and Navigation. Noise from heavy truck hauling is expected to similar to the truck hauling noise described under Alternative 1-A.

Determination of Significance: Significant.

Mitigation Measure NZ-1: Limit Noise-Generating Construction Activity and Heavy Trucking to Daytime Hours.

Significance after Mitigation: Less than significant.

Impact NZ-4: Exposure of Sensitive Land Uses to Groundborne Vibration from Construction Activity

Noise-sensitive land uses could be exposed to vibration resulting from heavy equipment operation. For the reasons discussed under Alternative 1-A, this impact is considered to be less than significant

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- Before construction begins, DWR would obtain all necessary permits pertaining to affected waters of the United States. Grading or other construction activities in all habitats on the waterside of levees would require a Streambed Alteration Agreement from DFG. Discharge of dredged or fill materials into waters of the United States, including that associated with gate construction and placement of siphon extensions, would require a CWA Section 404 permit from USACE and Section 401 certification from the RWQCB. Grading would require a CWA Section 402 permit and preparation of SWPPP. Because the Project area includes navigable waterways, work within the channels is also subject to USACE jurisdiction under the Rivers and Harbors Act of 1899. The permitting process would also require compensation for construction, initial dredging, and maintenance dredging impacts.
- Irrigation and drainage pumps that are being used for agricultural purposes will be selectively decommissioned or reused to facilitate habitat development. This is not considered to have a significant effect on vegetation and wetland resources in this analysis and is therefore not discussed further.
- Boating will be allowed as an optional component on southeastern McCormack-Williamson Tract. Speeds will be kept to less than 5 miles per hour, consistent with the surrounding Delta Meadows property, and no construction will be required. This is not considered to have a significant effect on wetland resources in this analysis and is therefore not discussed further.

To assist in evaluating project effects, anticipated land cover types and impacts are shown in Figures 4.1-2 through 4.1-15 (at the end of this section).

Alternative NP: No Project

Under the No Project Alternative, if the Project were not implemented, the Project components described under the alternatives in Chapter 2 would not be constructed. It is expected that farming would continue and cropland would be the dominant cover type consistent with the existing condition.

Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- <u>Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5’)</u>
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~

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at 24ºC), and has a significant potential to bioaccumulate in aquatic organisms (Zamora, et al. 2003:2). Because some organophosphate may accumulate in living organisms, they may become toxic to fish species, especially those life stages that remain in the system year-round and spend considerable time there during the early stages of development, such as Chinook salmon, steelhead, splittail, and delta smelt.

Mercury contamination from historical mining activities is extensive on both sides of the Central Valley, and occurs primarily from widely scattered hydraulic mining debris along eastside tributaries and ~~active~~ abandoned mines and associated debris piles on the west side. These sources continue to deposit significant amounts of mercury into the Bay-Delta system. The Cosumnes River, Yolo Bypass, and Sacramento River are the primary ongoing sources of mercury contamination in the Bay-Delta. Mercury occurs in several forms, including pure elemental mercury and toxic methylmercury. Mercury is mobile in aquatic systems as aqueous mercury or when attached to suspended particulate matter. Methylmercury is a significant water quality concern because small amounts can bioaccumulate in fish to levels that are toxic to humans and wildlife. In the Delta, mercury concentrations in bluegill, Sacramento sucker, and largemouth bass have been found to exceed the human health standard of 0.5 ppm by 2 to 6 times (Slotten 1991).

Other contaminants of particular concern in the Bay-Delta include high concentrations of trace elements such as selenium, copper, cadmium and chromium; however, their effects on higher trophic levels are poorly understood, in part as a result of the complex distribution of high concentrations in both time and space (Herbold et al. 1992:14). In general, it appears that the highest concentrations occur in areas where human activity adjacent to the bay is also the highest. Although these trace elements also occur naturally, concentrations of these trace elements have been found to be high enough to adversely affect the growth and reproduction of aquatic animals in laboratory experiments (Herbold et al. 1992:14)

Further discussion on water quality constituents of concern in the Delta can be found in Section 3.4, “Water Quality.”

Predation

Nonnative species cause substantial predation mortality on native species. Studies at Clifton Court Forebay estimated predator-related mortality of hatchery-reared fall-run Chinook salmon to be from about 60% to more than 95%. Although the predation contribution to mortality is uncertain, the estimated mortality suggests that striped bass and other predatory fish, primarily nonnative, pose a threat to juvenile Chinook salmon moving downstream, especially where the stream channel has been altered from natural conditions. Turbulence after passing over dams and other structures may disorient juvenile Chinook salmon and steelhead, increasing their vulnerability to predators. Predators such as striped bass, largemouth bass, and catfish also prey on delta smelt and splittail (U.S. Fish and Wildlife Service 1996). However, the extent that these predators may affect delta smelt and splittail populations is unknown.

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While birds and piscivorous fishes may benefit from stranded fish, it is believed that the creation of large areas of rearing habitat results in the creation of refuges for young fish and decreases the probability that young fish will encounter a predator (Sommer et al. 2005:1502).

The creation of shallow-water habitat, however, may result in an increase in predator habitat, especially if permanent shallow-water habitat is created. In general, floodplain habitat that is seasonally inundated in winter and spring and then dewatered during summer and fall tends to favor native floodplain-spawning and -rearing fish species, while avoiding creating conditions that benefit alien species at the expense of native species.

Alternative NP: No Project

Under the No Project alternative, the Project components would not be built or operated. There would be no efforts to increase flood control or restore habitat for wildlife and fish. Under this alternative, all construction- and operation-related impacts that potentially could occur with implementation of the Project components would be avoided, including beneficial impacts. The existing conditions discussed above would be expected to continue. For example, there would be no creation of new floodplain spawning and rearing habitat for native fishes. Under this alternative, the trend in native fish population abundance and distribution would likely continue to follow existing long-term trends in response to changing habitat conditions and ongoing effects associated with introduced species. Alternately, the possibility for unintended colonization of newly restored native fish habitats by invasive species would be avoided.

Alternative 1-A: Fluvial Process Optimization

This section identifies potential construction- and operation-related impacts and mitigation for the Fluvial Process Optimization (1-A) alternative (Figure 2-1). Project action elements associated with this alternative include:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5’)
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations

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The Project would require the removal of riparian vegetation in several areas in the Project area. Removal of riparian vegetation would expose soils to erosive forces such as wind and rain, and could reduce overhead and instream cover (e.g., SRA cover). Cover encompasses the physical components of the stream environment that provide shelter, hiding, resting, and feeding areas for fish and other aquatic organisms. Construction-related activities may disturb or remove riparian vegetation, large woody debris, aquatic vegetation, and channel substrates and directly affect the quantity and quality of cover for fish and aquatic invertebrates. Project components that could affect riparian vegetation and cover include:

- degrading and breaching levees,
- placement of RSP, and
- dredging (see Dredge South Fork Mokelumne River Optional Alternative).

Impact Fish-4: Loss of Shaded Riverine Aquatic Cover as a Result of Construction.

Some construction actions under this alternative (levee degradation, levee breaching) would result in the direct removal of riparian vegetation, some of which supports SRA cover habitat. Currently, much of the McCormack-Williamson Tract east levee and the levees surrounding the Grizzly Slough property are covered with riparian vegetation that provides extensive habitat heterogeneity and SRA cover habitat.

Construction elements of Alternative 1-A would involve the following:

- degrading 3,700 feet of the McCormack-Williamson Tract east levee to function as a weir;
- degrading 3,500 feet of the McCormack-Williamson Tract southwest levee to match the elevation of the island floor (Elevation -2.5’) ~~function as a weir~~;
- reinforcing 3,000 feet of the Dead Horse Island east levee;
- breaching 300 feet of the Mokelumne River levee of McCormack-Williamson Tract; and
- breaching or degrading portions of levees along the DWR-owned Grizzly Slough property adjacent to Bear and Grizzly Sloughs.

  These actions would result in the permanent and temporary loss of up to 166.07 acres of valley/foothill riparian land cover types (see Impact VEG-1 in Section 4.1, “Vegetation and Wetlands,” and Tables VEG-1 and VEG-2 in Attachment 4.1-1). Because much of this habitat also supports riparian vegetation that makes up SRA cover, these actions also would remove SRA cover. However, not all affected riparian vegetation supports SRA cover. For example, riparian vegetation on the interior levees of McCormack-Williamson Tract that would be inundated following degrading of the southwest levee would not result in any

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29. Restore habitat temporarily disturbed by on-site construction activities immediately following construction.

30. Restore rare natural communities, significant natural areas, and wildlife use areas temporarily disturbed by on-site construction activities immediately following construction. Example actions include direct planting of native plants, controlling nonnative plants to improve conditions for reestablishing native plants, and enhancing and restoring the original site hydrology to allow for the natural reestablishment of the affected plant community.

31. Restore and enhance suitable habitat areas that are occupied by, or are near and accessible to, special-status species that have been adversely affected by the permanent removal of occupied habitat areas.

Alternative NP: No Project

Under the No Project Alternative, if the Project were not implemented, the Project components described under the alternatives in Chapter 2 would not be constructed. It is expected that farming would continue and cropland would be the dominant cover type consistent with the existing condition.

Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program

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14. Purchase trail rights-of-way or recreational easements.
15. Provide or improve vehicle access and parking for recreation areas.
16. Provide access to waterfront areas and island edges.
17. Create new day-use boating and camping areas.

Impacts and Mitigation of the Project Alternatives

Alternative NP: No Project

Under No Project conditions, no change in land use, recreation, or economics from current conditions is expected, although long-term impacts to land use may result with flooding, subsidence and/or effects from climate change.

Agricultural production would continue on McCormack-Williamson Tract, the Grizzly Slough property, and Staten Island. However, as described in Section 3.2, Flood Control and Levee Stability, there is a possibility that McCormack-Williamson Tract will experience flooding again within the 20-year planning horizon. Given the current conditions of the island (ownership, marginal agricultural profitability, water supply issues that limit crop types), it is uncertain whether the island would be restored to agriculture after a flooding event

Demand for recreational opportunities in the North Delta area would continue to increase, without the beneficial impacts of the recreational enhancements proposed by the Project (described below under Impacts REC-3, REC-4, REC-5, and REC-7.)

Alternative 1-A: Fluvial Process Optimization

This section summarizes the impacts for Alternative 1-A.

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5’)
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure

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- a minority or low-income population affected by cumulative or multiple adverse exposures to environmental hazards.

Impacts and Mitigation of the Project Alternatives

Alternative NP: No Project

Existing land uses in the Project area would continue. There would be no change in the regional demand for housing compared to existing conditions. As reported in the San Joaquin and Sacramento County General Plans, the North Delta region experiences little population and housing growth. Population growth is controlled by the agricultural land use and lack of infrastructure mandated by the County's General Plans. Population growth rates similar to existing conditions would continue. Development would continue in accordance with the County's General Plan. The Project vicinity would continue to face threats and damage from flooding.

Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property

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be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
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- Demolish Farm Residence and Infrastructure
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- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

Impact PUB-1: Increase in Use of Energy.

Construction of the proposed new levees and demolition of the proposed old levees and weirs would require the use of heavy equipment such as scrapers and bulldozers that use diesel fuels. Dredging would require the use of heavy equipment such as barges, cranes, and pumps that use diesel fuels as well. A slight increase in energy would be required to relocate existing structures such as pipelines and aboveground transmission lines to new locations outside the intertidal zones. However, construction activities are short-term and would not require a significant amount of energy to complete. The Project would not result in a substantial long-term permanent increase in energy use. Retrofitting the pump station would require minimal amounts of energy. The siphon only needs to be retrofitted to accommodate the new purpose.

Determination of Significance: Less than significant.

Mitigation: None required.

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- result in the inefficient, wasteful, or unnecessary consumption of nonrenewable resources.

Impacts and Mitigation of the Project Alternatives

Alternative NP: No Project

Existing power use in the project area is primarily for farming. If the No Project Alternative is implemented, this use is expected to remain similar to existing conditions.

Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

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Alternative 1-A: Fluvial Process Optimization

This alternative facilitates controlled flow-through of McCormack-Williamson Tract during high stage combined with a scientific pilot action of breaching a levee to optimize fluvial processes. The southernmost portion of the tract would be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property (*optional*)

Impact VIS-1: Temporary Visual Change as a Result of Construction Activities.

Construction of the proposed project would create temporary changes in the views of and from the project area. Construction activities would introduce heavy equipment and associated vehicles, including cranes, scrapers, excavators, and graders, into the viewshed of the Project. However, the Project area is subject to the continual presence of tractors, trucks, and other equipment used in agriculture under existing conditions, although of differing types and intensity.

Roadway users, residents, and local workers would have limited visibility of action under this alternative because most actions are concentrated on the interior of McCormack-Williamson Tract. Residents located along Thornton Road and New Hope Road will experience large haul trucks driving within their

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Mosquitoes cause more human suffering than any other organism—more than 1 million people worldwide die from mosquito-borne diseases (known as arboviruses) every year. Not only can mosquitoes carry diseases that afflict humans, but they also transmit several diseases and parasites to which dogs and horses are very susceptible. These include canine heartworm, West Nile virus, and ~~eastern~~ equine encephalitis[1]. Mosquito-vectored diseases include protozoan diseases such as malaria, and viruses such as dengue[2], encephalitis, and yellow fever[3] (American Mosquito Control Association 2004). Table 5.6-3 describes several mosquito-borne diseases.

Table 5.6-3. Diseases Associated with Mosquitoes

Disease Name	Description of Disease
Encephalitis	Encephalitis~~, also known as sleeping sickness~~, is commonly caused by a virus that can cause inflammation of the brain. Severe cases ~~result in mental retardation, motor impairment, or~~ can progress to focal paralysis, intractable seizures, coma, and death. Mosquitoes become infected while feeding on birds that harbor the virus. They can then transmit the virus to other animals. California vectors are the encephalitis mosquito *(Culex tarsalis)* and the wetlands mosquito *(~~Ochlerotatus~~ Aedes melanimon)* (Sacramento-Yolo Mosquito and Vector Control District 2005). There are several virus agents of encephalitis in the northern United States: West Nile virus, eastern equine encephalitis[a], Western equine encephalitis[b], St. Louis encephalitis[c], La Crosse encephalitis[a], dengue[a] and yellow fever[a], all of which are transmitted by mosquitoes (American Mosquito Control Association 2005).
Malaria	Malaria, caused by a protozoan (a single-celled organism), attacks red blood cells. Symptoms of ~~M~~ malaria ~~is a~~ include chills/fever/sweating flu-like illness that recurs every 2 to 3 days. The malaria parasite can cause liver and kidney damage or death. Mosquitoes become infected while feeding on other humans that harbor the parasite. California vectors are the western malaria mosquito *(Anopheles freeborni)*, the woodland malaria mosquito *(Anopheles punctipennis)*, and the coastal malaria mosquito *(Anopheles hermsi)*. In California, ten to 15 human cases of malaria are reported annually; most of these cases are from individuals who became infected outside of the U.S. In 1986, two residents of Yolo County were infected with the malaria parasite (locally acquired) (Sacramento-Yolo Mosquito and Vector Control District 2005).
Canine Heartworm	Canine heartworm[b] can be a life-threatening disease for canines. The disease is caused by a roundworm. Dogs and sometimes other animals such as cats, foxes, and raccoons are infected with the worm through the bite of a mosquito carrying the larvae of the worm. The young worms circulate in the bloodstream of the dog. Mosquitoes become infected when they blood feed on a sick dog. Once inside the mosquito, the young worms leave the gut of the mosquito and live in the body of the insect for 2 to 3 weeks, then they move to the mosquito's mouthparts, where they will be able to infect an animal. When the mosquito blood feeds, the infective worms are deposited on the surface of the victim's skin. They enter the skin through the wound caused by the mosquito bite. The disease in dogs and cats cannot be eliminated but it can be controlled or prevented with pills and/or injections. Some risk is present when treating dogs infected with heartworms, but death is rare; still prevention is best. Cases have been reported in all 50 states (American Mosquito Control Association 2005). About 70 species of mosquito are capable of carrying the disease (Columbia Animal Hospital 2005).

[1] Eastern equine encephalitis is not known to occur in California (American Mosquito Control Association 2004).
[2] Dengue is a serious arboviral disease with a low mortality rate. It is transmitted by *Aedes* sp. It has not been reported in California (American Mosquito Control Association 2004).
[3] Yellow fever occurs only in tropical areas of Africa and the Americas (American Mosquito Control Association 2004).

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be open to tidal action. As shown in Figure 2-1, Alternative 1-A includes the following components:

- Degrade McCormack-Williamson Tract East Levee to Function as a Weir
- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
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- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property *(optional)*

Impact PH-1: Releases of Hazardous Materials during Construction.

Hazardous materials that may be used during project construction include fuel and lubricants for construction equipment and chemical dust suppressants.

These materials have the potential to be released into the environment during construction activities as a result of spills, leaks, rainwater runoff, or airborne (wind) dispersal. Some of these materials may generate residual wastes that must be managed on site as hazardous materials until they can be properly disposed of off site. While stored at the construction site, these wastes have the potential to be released in a manner similar to that described above.

The volume of fuel and lubricants required during construction depends on the number and types of equipment used and the duration of construction. Normal operation of equipment is not likely to generate large quantities of these materials as waste or through potential releases because these materials will be consumed for the most part during construction activities. The SWPPP and dust control plans described in the Environmental Commitments section of Chapter 2 would

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- Completely degrade McCormack-Williamson Tract Southwest Levee to match the elevation of the island floor (Elevation -2.5')
- ~~Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir~~
- Reinforce Dead Horse Island East Levee
- Modify Downstream Levees to Accommodate Potentially Increased Flows
- Construct Transmission Tower Protective Levee and Access Road
- Demolish Farm Residence and Infrastructure
- Enhance Landside Levee Slope and Habitat
- Modify Landform and Restore Agricultural Land to Habitat
- Modify Pump and Siphon Operations
- Breach Mokelumne River Levee
- Allow Boating on Southeastern McCormack-Williamson Tract
- Implement Local Marina and Recreation Outreach Program
- Excavate Dixon and New Hope Borrow Sites
- Excavate and Restore Grizzly Slough Property
- Dredge South Fork Mokelumne River *(optional)*
- Enhance Delta Meadows Property (*optional*)

A total of eight potential historical resources or unique archaeological resources have been identified in areas affected by Alternative 1-A. In addition, at least 80% of the downstream levee modification areas have not been surveyed for the presence of cultural resources because of restricted property access; construction in these areas without a cultural resource survey has the potential to damage or destroy as-yet-unidentified cultural resources. These impacts are discussed below.

Impact CR-1: Destruction of Archaeological Sites P-39-324, P-39-4419, and P-39-4420 as a Result of Ground Disturbance.

Construction associated with levee modification would likely result in the destruction of historic archaeological sites P-39-324, P-39-4419, and P-39-4420. These archaeological sites have not been evaluated for qualification as historical resources or unique archaeological resources for the purposes of CEQA. The potential for subsurface archaeological deposits, and therefore information of consequence to the study of local history, is present at all three sites.

Determination of Significance: Damage to or destruction of P-34-324, P-39-4419, and P-39-4420, if DWR determines that they are historical resources or unique archaeological resources, would be a **significant** impact under CEQA (14 CCR 15064.5).

Chapter 5, 5.7-29

Excavate and Restore Grizzly Slough Property ~~(Optional)~~

Levee breaching and regrading on the Grizzly Slough Property have the potential to damage or destroy archaeological sites P-34-36 and P-34-37 as a result of soil removal and other ground-disturbing activities. Furthermore, portions of Grizzly and Bear Slough levees have not yet been surveyed for the presence of cultural resources because of scheduling conflicts. This action has the potential to damage or destroy as-yet-unidentified cultural resources in these areas. These impacts are discussed below.

Impact CR-7: Damage to or Destruction of Archaeological Site P-34-36 as a Result of Soil Removal and Other Ground-Disturbing Activities.

Excavation at the Grizzly Slough borrow site for restoration purposes and acquisition of fill material would result in damage to or complete destruction of site P-34-36 by removal of soils that contain prehistoric and historic archaeological deposits. During DWR's April 2005 cultural resource inventory of the site vicinity, however, no archaeological materials were observed, indicating that site P-34-36 may have been destroyed or incorrectly mapped.

Determination of Significance: Damage to or destruction of P-34-36, if DWR determines that it is a historical resource or unique archaeological resource, would be a **significant** impact under CEQA (14 CCR 15064.5).

Mitigation

DWR archaeologists did not identify archaeological materials at the mapped location of P-34-36 as a result of the April 2005 survey. The lack of materials may represent agricultural disturbances and looting of artifacts or insufficient mapping at the time of original recordation (1929). Both scenarios leave open the possibility that buried archaeological materials are present at the mapped location of P-34-36. The lack of specificity in the original mapping suggests that presence-absence excavation to locate P-34-36 is unwarranted. Instead, DWR will map the vicinity of P-34-36 as an environmentally sensitive area on construction and design drawings. DWR will ensure that a qualified archaeologist with full stop-work authority monitors all construction activities in the vicinity of P-34-36.

Significance after Mitigation: This mitigation measure will reduce the impact described above to a **less-than-significant level**, though additional work and assessment would be required in the event of an inadvertent discovery of archaeological materials.

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Francisco Bay Basin WQCP, Inland Surface Waters Plan, the Enclosed Bays and Estuaries Plan, and the Delta Plan. Delta-specific beneficial uses protected through water quality objectives are municipal and domestic water supply, agricultural supply, industrial supply (process and service), recreation (water contact and non-contact), freshwater habitat (warm- and coldwater), fish migration (warm- and coldwater), fish spawning (warmwater fish), wildlife habitat, and navigation. The basin plans define surface water quality objectives for several parameters, including suspended material, turbidity, pH, DO, chlorides, flow, bacteria, temperature, salinity, toxicity, ammonia, and sulfides.

The Project has the potential to affect water quality in surface water or groundwater in the Central Valley region and the San Francisco Bay region, which are governed by the Central Valley RWQCB and the San Francisco Bay RWQCB, respectively. Each Project alternative considered in this EIR was analyzed for compliance with the water quality objectives set forth in the applicable WQCPs. Section ~~4.4~~ 3.4 of this EIR describes Project water quality compliance specific to these basin plans.

Water Use Efficiency

The California Constitution prohibits the waste or unreasonable use of water. Further, Water Code Section 275 directs DWR and the State Water Board to “take all appropriate proceedings or actions before executive, legislative, or judicial agencies to prevent waste or unreasonable use of water.” Several legislative acts have been adopted to develop efficient use of water in the state:

- Urban Water Management Planning Act of 1985,
- Water Conservation in Landscaping Act of 1992,
- Agricultural Water Management Planning Act,
- Agricultural Water Suppliers Efficient Management Practices Act of 1990,
- Water Recycling Act of 1991, and
- Agricultural Water Conservation and Management Act of 1992.

The purpose of the Project is to address flood control and ecosystem restoration issues; thus, the proposed action would not result in the waste or unreasonable use of water.

Public Trust Doctrine

When planning and allocating water resources, the State of California is required to consider the public trust and preserve for the public interest the uses protected by the trust. The public trust doctrine embodies the principle that certain resources, including water, belong to all and, thus, are held in trust by the state for future generations.

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that is not in conformance with the act and plan, that local government action can be appealed to the commission. The appeal "suspends" the local permit, allowing the commission the opportunity to review the action. If the commission finds the local government action to be in conformance with the act and plan, the action can go forward. If the commission finds the local government action is not in conformance with the act and plan, the commission will forward its findings to the local government for further review. In 1999, the sunset date of the commission was extended to January 1, 2010.

Clean Water Act, Section 303(d)

Under CWA Section 303(d), the RWQCB and the State Water Board list water bodies as impaired when not in compliance with designated water quality objectives and standards. A TMDL program must be prepared for waters identified by the state as impaired. A TMDL is a quantitative assessment of a problem that affects water quality. The problem can include the presence of a pollutant, such as a heavy metal or a pesticide, or a change in the physical property of the water, such as DO or temperature. A TMDL specifies the allowable load of pollutants from individual sources to ensure compliance with water quality standards. Once the allowable load and existing source loads have been determined, reductions in allowable loads are allocated to individual pollutant sources.

The currently applicable basin plan chronic water quality standard for nickel in San Francisco Bay north of the South San Francisco Bay segment is 7.1 mg/l total recoverable nickel (San Francisco Bay Regional Water Quality Control Board 1995, p. 3 to 9). The state's analysis of available data found that this standard has been exceeded 102 times since 1993 (Strauss 2003a). The state erroneously applied the dissolved nickel criterion in assessing the data and reached the conclusion that the bay meets the nickel standards based on the application of an inapplicable standard. EPA identified the Sacramento–San Joaquin Delta (portion in San Francisco Bay Region) segment for inclusion on the 2002 Section 303(d) list based on the state's analysis of available nickel data in comparison with the applicable basin plan objective. EPA established a low-priority ranking for this listing as the state is in the process of developing site-specific water quality standards for nickel that will likely be attained. Therefore, it is most reasonable to proceed with water quality standards modification that will likely prevent the need to complete a nickel TMDL for the bay (Strauss pers. comm.a and b). Implementation of the Project would assist DWR in meeting these standards.

<u>Sections of the eastern and central Delta including waterways around McCormack-Williamson Tract and Staten Island are also listed as impaired water bodies for the following contaminants:</u>

- <u>Chlorpyrifos, DDT, diazinon,</u>
- <u>Group A pesticides</u>
- <u>Mercury</u>
- <u>Exotic species</u>
- <u>Unknown toxicity</u>

Clean Water Act, Sections 401 and 402

The SWRCB it has been designated by U.S. EPA as the State agency responsible for implementing the federal CWA Section 402 (National Pollutant Discharge Elimination System, “NPDES”) and Section 401 (certification of Federal permits that might result in discharge to State waters/wetlands). Under the permit, the regulated community has the responsibility for stormwater management and protection within their respective jurisdictions, and they may prohibit or set limits for discharges to meet water quality objectives set forth in the permit.

Water Rights

The State of California recognizes riparian and appropriative surface water rights. Riparian rights are correlative entitlements to water that are held by owners of land bordering natural watercourses. California requires a statement of

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Tract, more detailed long-term local data are required in order to quantify the sediment budget relationship.

Northwest Hydraulics Consultants developed the North Delta Sedimentation Study in 2006 (Appendix F) which investigated the nature of sedimentation in the Delta using both historical and recently obtained data, and computer modeling techniques. The investigation included an evaluation of historical changes in the North Delta that have affected channel morphology including land reclamation, levee construction, dredging, hydraulic mining, impoundment of water and sediment by upstream dams and other diversions, as well as the construction of water diversion facilities and consequent alteration of flow and sedimentation patterns in the Delta. The effects of these changes in channel morphology in the project area are summarized below:

- Waterways in the project area are largely confined by levees and able to convey significantly greater flow and sediment discharges than during historic times.
- Historical cross-section data indicate that the majority of waterways in the project area have experienced some channel incision over the several decades and may be experiencing a net sediment loss over time.
- Water regulation, diversions, and the impoundment of water and sediment by dams has resulted in a decline in the total annual water and sediment outflows to the Delta from the Central Valley, a trend that is expected to continue into the future.
- The construction of large water diversion facilities such as the Delta-Mendota Canal and Delta Cross Channel in 1951, and the Delta Aqueduct in 1973 have altered the traditional flow patterns in the Delta that affect sedimentation. Water and sediment exhibit a more southerly flow in the Delta, somewhat reducing the deposition of sediment in the North and Central Delta and increasing deposition of sediment in the South Delta.
- The combination of overgrazing, deforestation, floodplain reclamation, river channelization, and most importantly, hydraulic mining for gold caused huge increases in sediment loads in the Delta system. The historic trend demonstrates a rapid decline of sediment loads in the Delta streams at the beginning of the 20th century, followed by a gradual steady reduction of sediment loads over the last half a century.

3. ECOLOGIC PROCESSES

Prior to anthropogenic disturbances during the past two centuries that radically changed the ecology of the Delta, floods deposited nutrient rich sediment on the Delta Islands, promoting growth of dense tule marshes with high biological productivity. The shallow water of the Delta marshes and sloughs provided habitat for an abundance of resident and anadromous fish and migratory birds. The delta was significantly impacted by hydraulic mining sedimentation, levee construction, land clearing for agriculture, subsidence, navigation and flood control dredging, clearing of large woody debris, and flow regulation and water diversions. Changes to the ecology also included over fishing, introduction of exotic species, and habitat alteration and loss. Today the Delta resource is managed primarily for water supply and agriculture.

a. Fish

Native fishes of concern include chinook salmon, delta smelt, Sacramento splittail, and steelhead. Four runs of chinook migrate upstream through the Delta and out-migrate back to the Pacific Ocean each year: the fall, late-fall, winter, and spring-runs; and thus are moving through the Delta during most of the year. Currently, the winter-run salmon is listed as endangered, and the spring run is listed as threatened. Adult salmon migrate up Central Valley rivers to spawn in gravel riffles. Shallow water of freshwater tidal marshes and floodplains provide feeding and rearing habitat for juvenile anadromous fish, and are important habitat during migration back to the Pacific Ocean. Riparian vegetation on Delta levees is important both for providing shade to reduce water temperatures and to provide insects as a food source.

Delta smelt are endemic to the San Francisco Bay-Estuary and historically were one of the most common species in the estuary. Currently they are listed as a threatened species. Delta smelt can spawn between February and July, but most spawn during April through May, varying from year to year with flow conditions. Spawning generally occurs in shallow, fresh or slightly brackish slough channels or channel margins in the upper Delta and Sacramento River upstream of Rio Vista (Moyle, 2002) and fish eggs are adhesive, sticking to hard substrate via a stalk, cattails and tules, tree roots, or submerged branches where there is a current. Delta smelt drift downstream, thriving where the freshwater-brackish mixing zone broadly covers area with shallow water habitat less than 1.2 m deep (Federal Register 1993) where phytoplankton and zooplankton are dense. Delta smelt populations have declined primarily due to freshwater diversions (Moyle, 1992), pollutant runoff, exotic species, and loss of habitat.

Splittail migrate upstream in January-February and spawn on seasonally inundated floodplains in March-April. They migrate back downstream in May and rear in shallow, brackish water habitat for one to two years before beginning the migratory cycle again. Physical elements important to the success of splittail include flooded floodplains for spawning, safe migration channels, brackish water rearing habitat with an invertebrate food source. Splittail populations benefit from wet-year flows. These observations are provided in a review of the biology and population dynamics of Sacramento splittail by Moyle et al., (2003).

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B. Applied Studies for Advancing Project Design and Management.

The adaptive management plan for the North Delta Ecosystem Restoration Project is intended to improve management of the current action and not in designing future restoration studies.

V. Adaptive Management Structure and Processes

A. Roles and Responsibilities, including Stakeholder Participation

~~A preferred alternative has not yet been selected, therefore logistical considerations such as which agency or entity is responsible for project construction, regulatory compliance, post-construction site management have not yet been identified.~~

There are number of “ifs” which need to be addressed before the roles and responsibilities of different entities can be determined, such as funding. However, it is expected that (1) DWR, (2) the participating Reclamation Districts, (3) the US Army Corps of Engineers, and (4) private contractors would have roles to a varying degree if and when the Project is to be implemented.

B. Decision Criteria and Tools

The development of decision trees and or Decision Analysis and Adaptive Management models to simulate costs, biological effects, etc., will be developed after a preferred alternative has been selected.

C. Dispute Resolution

~~The development of a process for resolving disputes among participants in the project will be developed prior to the implementation of the preferred alternative.~~ The North Delta Improvements Group and the North Delta Agency Team have been critical in proactively addressing potential conflicts, and it is anticipated their roles will continue as the Project moves forward.

D. Timelines for Decision-Making

~~A preferred alternative has not yet been selected. Schedules for project construction, monitoring, and performance evaluation will be determined after a preferred alternative has been identified and the EIR finalized.~~

Specific construction scheduling will be guided by environmental regulatory considerations, weather, soil moisture content, levee construction standards, established work windows where applicable for Project components, and most importantly, funding. There are a number of assumptions in the creation of a Project schedule, most notably a multi-year consistent funding source. A detailed construction schedule has not yet been developed based on these constraints, but the construction season is anticipated to likely occur between May 1 and October 15. Construction is likely to be completed over two to three construction seasons, with the first possible season in 2014.

Most construction would be conducted during weekdays between the hours of 7 a.m. and 6 p.m.; however, work on key public infrastructure (such as roadways) and other schedule-sensitive elements may necessitate extended working hours and work on weekends.

E. Science Support for Adaptive Management

Technical experts will be engaged after a preferred alternative is selected, and the EIR finalized. It is anticipated that DWR staff will continue working with the NDSP in the implementation of the preferred alternative.

F. Reporting

An outreach program to inform interested stakeholders of the project progress, findings, etc., will be developed with the implementation of the preferred alternative and identification of a funding source for the Project.

G. Data Management and Public Availability

The decision on how to store monitoring data and integrate study findings with other monitoring efforts has not been determined. Plans will be developed for the storage and sharing of monitoring data for the project after preferred alternative has been selected for the EIR and a funding source for development and management of the database has been identified.

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VI. <u>Budget and Funding</u>

<u>A. Monitoring</u>

~~A budget for the monitoring component of the ecosystem restoration project will be determined after a preferred alternative has been selected and the EIR finalized.~~

Funding has not yet been identified for Project implementation or for development of monitoring plans for water quality, ecosystem restoration, mosquito abatement, etc..

<u>B. Management and Maintenance</u>

~~A preferred alternative has not yet been selected. Funding and implementation of maintenance activities such as levee inspection, weed management, etc., subsequent to project completion will be determined at a later date.~~

Funding for implementation of Project activities has not yet been identified and as a result, maintenance work (levee inspection, weed management, etc.,) associated with management and maintenance of McCormack-Williamson Tract, Staten Island, will be determined at a later date. Reclamation Districts are typically responsible for maintenance of levees on their respective islands or tracts; it is expected these responsibilities would continue under the auspices of the RDs. Additional funding may be available either through the US Army Corps of Engineers CALFED Levee Stability Program, Subventions or Special Projects Programs managed by DWR's Delta Levees and Environmental Engineering Office.

References

Project Descriptions

DWR, 1990. Draft EIR/EIS North Delta Program, November 1990. 619 p.

DWR, 2002. North Delta Improvements Project, Critical Uncertainties, (Tuesday, November 5, 2002), 2 p.

DWR, 2003. Chapter 1., Introduction. DWR admin_ch1_04290 Draft EIR/EIS, 13 p.

DWR, 2003. North Delta Ecosystem Restoration and Flood Control Project
Ecological Coordination Meetings Idea Summary. July 29, 2003, 2 p.

DWR, 2003. Draft Screening Document. North Delta Flood Control and Ecosystem Restoration Proposed Alternatives Development Process. June 19, 2003, 8 p.

CALFED Bay-Delta Program., 2000. White Paper on North Delta Improvements. Draft. July 19, 2000, 20 p.

Hydrology and Hydraulic Modeling

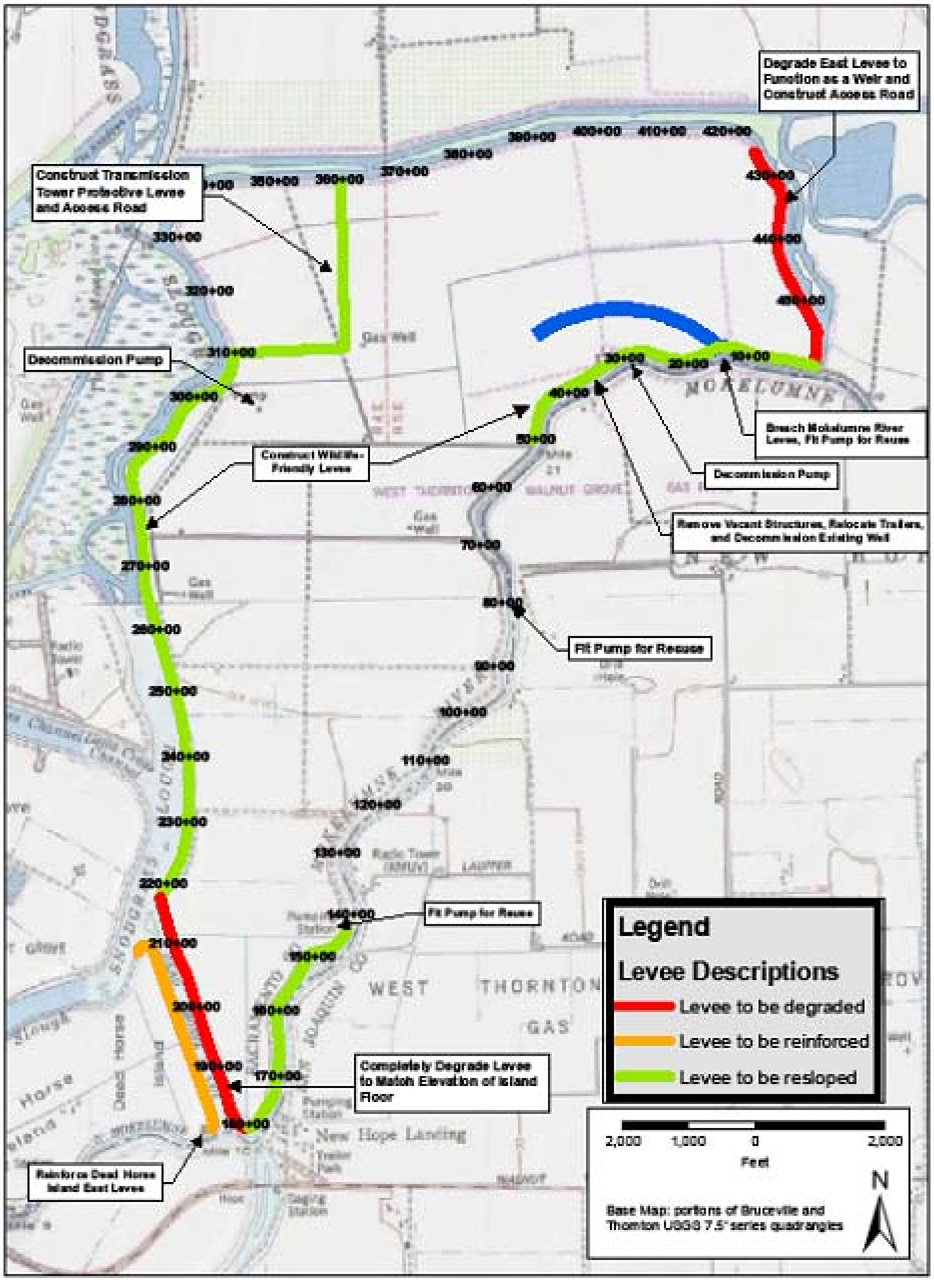
Blake, S.H. 2001, An Unsteady Hydraulic Surface Water Model of the Lower Cosumnes River California for the Investigation of Floodplain Dynamics. Masters Thesis, University of California, Davis. 78 p.

Hammersmark, C.T. 2002. Hydrodynamic Modeling and GIS Analysis of the Habitat Potential and Flood Control Benefits of the Restoration of a Leveed Delta Island. Masters Thesis, University of California, Davis. 102 p.

Knittweis, G. 2003. North Delta Area Hydraulics Summary. 8/26/2003. 2 p.

Corps of Engineers, 1990. Mokelumne River, California. 1% Flood at Franklin Road. Hydrology. Office Report, May 1990. 55 p.

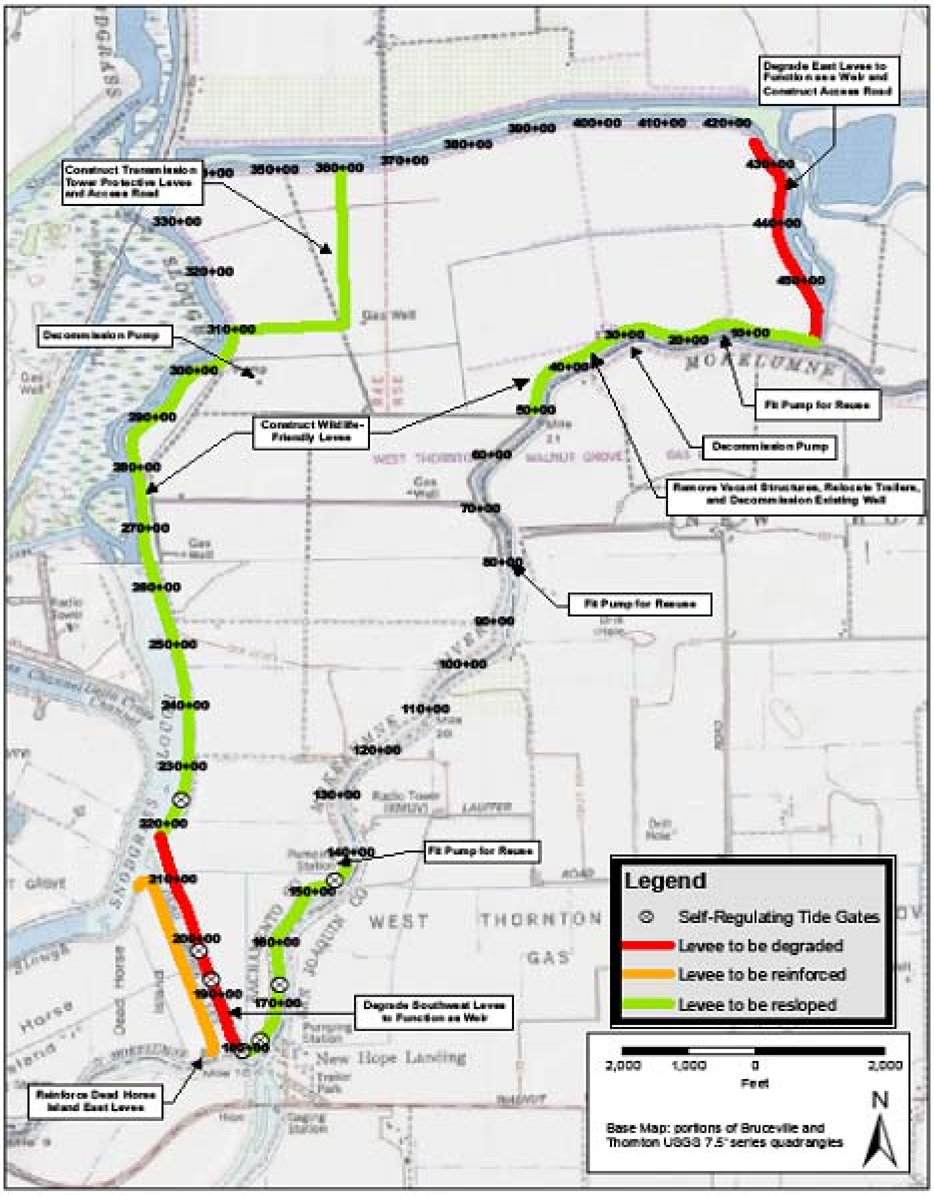
Volume 2 –Figure 2-1, Alternative 1-A: Fluvial Process Optimization Plan



***- Revisions to Figure 2-1 graphic to be consistent with DEIR (pages 2-9 and 2-13):**

- ***Wildlife friendly levees are proposed for the landside of all of McCormack-Williamson Tract levees where there are no other treatments proposed; the highlighted green sections represent the remaining length of levee proposed for re-sloping,***
- ***Alternative 1-A proposes completely degrading southwest levee to the elevation of the island floor.***

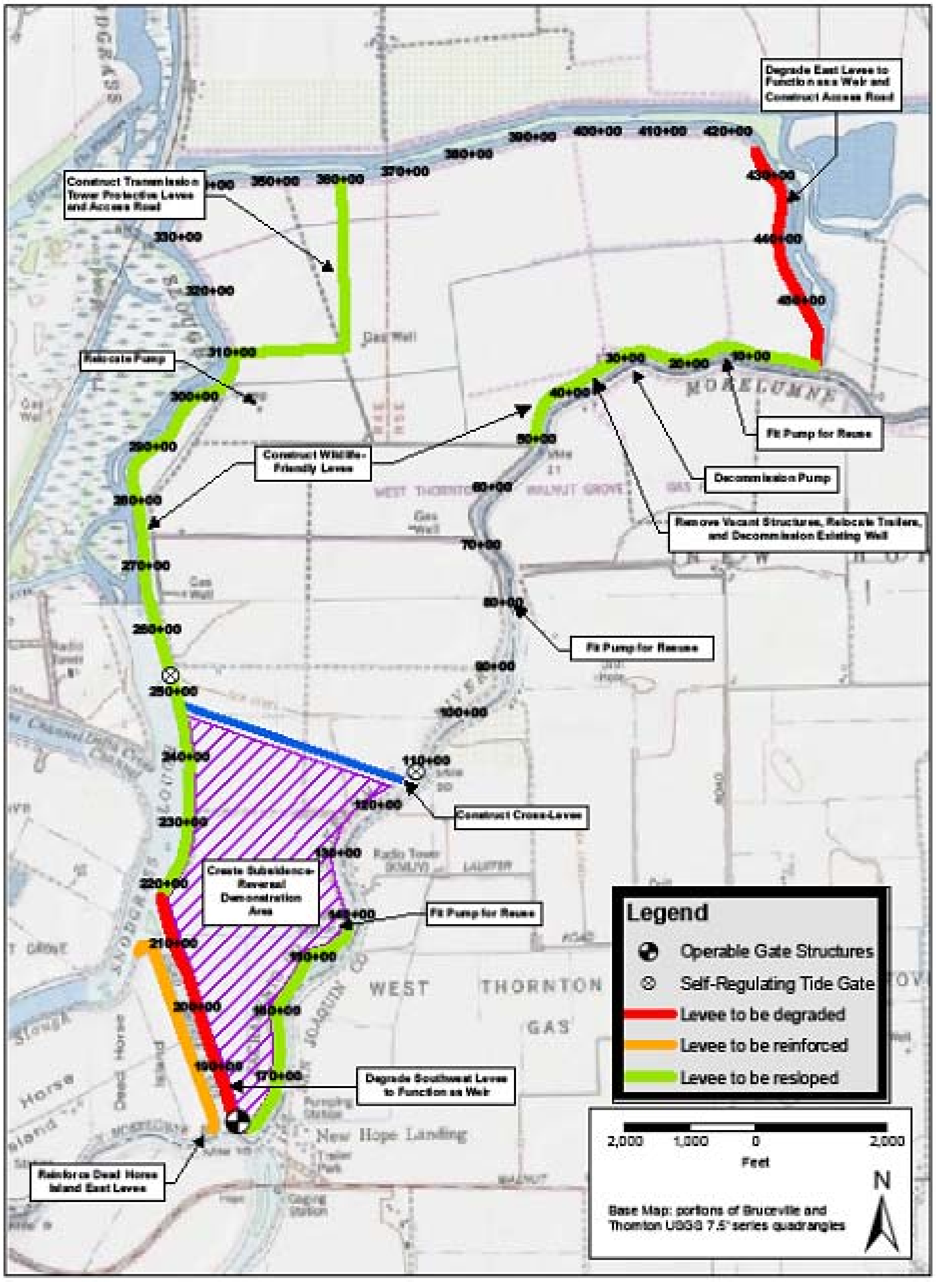
Volume 2 –Figure 2-15, Alternative 1-B: Seasonal Floodplain Optimization Plan



- Revisions to Figure 2-15 graphic to be consistent with DEIR (pages 2-9 and 2-13):

- ***Wildlife friendly levees are proposed for the landside of all of McCormack-Williamson Tract levees where there are no other treatments proposed; the highlighted green sections represent the remaining length of levee proposed for re-sloping.***

Volume 2 –Figure 2-19, Alternative 1-C: Seasonal Floodplain Enhancement and Subsidence Reversal Plan



***- Revisions to Figure 2-19 graphic to be consistent with DEIR (pages 2-9 and 2-13):**

- ***Wildlife friendly levees are proposed for the landside of all of McCormack-Williamson Tract levees where there are no other treatments proposed; the highlighted green sections represent the remaining length of levee proposed for re-sloping.***

Chapter 4
State and Local Agency Comments

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State and Local Agency Comments

This section contains copies of the comment letters received from state and local government agencies, listed in Table 4-1. Each letter is followed by responses to the comments presented in that letter. Responses to comments are numbered individually in sequence, corresponding to the numbering assigned to comments presented in that letter. The responses are prepared in answer to the full text of the original comment.

Table 4-1. State and Local Agency Comments Received on the North Delta Flood Control and Ecosystem Restoration Project Draft EIR

Code	Agency/Organization	Name
State		
DPH	Department of Public Health	Jonathan Kwan, Vector-Borne Disease Section
CVR	Central Valley Regional Water Quality Control Board	Betty Yee, Senior Water Resources Control Engineer
DOT	Department of Transportation	Tom Dumas, Chief
DOT	Department of Transportation	Dawn Cheser, Office Chief
DPC	Delta Protection Commission	Linda Fiack, Executive Director
DWR	Department of Water Resources	Chris Huitt, Staff Environmental Scientist
SLC	State Lands Commission	Marina R. Brand, Assistant Chief
Local		
CDWA	Central Delta Water Agency	Dante John Nomellini, Manager and Co-Counsel
EBMUD	East Bay Municipal Utility District	Jon A. Myers, Manager of Natural Resources
MWD	Metropolitan Water District of Southern California	Delaine W. Shane, Manager, Environmental Planning Team

Page 1 of 2

Reeve, Matthew

From: Kwan, Jonathan (CDPH-CID-DCDC) [Jonathan.Kwan@cdph.ca.gov]
Sent: Tuesday, March 25, 2008 11:38 AM
To: Reeve, Matthew
Subject: RE: North Delta Flood Control and Ecosystem Restoration Project DEIR
Attachments: DEIR comments KWAN.DOC

Matt,

The California Department of Public Health has made comments regarding the mosquito control aspect of the project (starting on pp 2-82) (see highlighted below)---CDPH's comments for this portion of the document from the last draft (Inserting the IPM/IMM portion using publications from SYMVCD, Walton, Metzger, Kwansy, etc.) were incorporated for the most part hence there is little to edit this time around---and the public health risk the mosquitoes pose (starting on pp 5.6-5) (see attached).

I introduced my last comment below in the previous draft as well as protocols in the event of a flooding disaster, but they were not answered on paper. You had mentioned ownership would be decided once/if a preferred alternative was chosen and the flooding issue is beyond the scope of the EIR. I included the comments again here to remind your team leaders this is a concern to mosquito and vector control districts (MVCDs).

- Throughout the document please revise California Department of Health Services (DHS) to California Department of Public Health (CDPH) – the Department recently went through a name change. DPH-1
- There are mosquito species (e.g., *Aedes vexans*) that will lay their eggs on the mud in anticipation of a flooding event. Consideration should be made towards the fluctuation of the water as well. DPH-2
- What are the expectations of MVCDs in the event of a flooding disaster? DPH-3
- The EIR may not be the appropriate place for it, but it would be nice to see language regarding enforcing maintenance issues regarding vegetative landscaping for mosquito development as well as other disease vectors, such as rodents and other arthropods; what agency will be responsible for maintaining the wetlands and who oversees them? MVCD should not have to bear the grunt of the work. They should be considered a last resort. With proper vegetative management, MVCDs may not be needed to act as consultants. If MVCDs are needed who will fund their services? DPH-4
    - Specifically – "A continual maintenance program must be developed." This topic should be expanded upon. How will this be achieved and funded? An endowment was mentioned as a possibility.

Please let me know if you have any questions with our comments or have problems opening the attached file.

Regards,

Jonathan Kwan, MS
California Department of Public Health
Vector-Borne Disease Section
916.552.9760 or 916.686.8421

From: owner-ndelta@dop.water.ca.gov [mailto:owner-ndelta@dop.water.ca.gov] **On Behalf Of** Reeve, Matthew
Sent: Tuesday, January 29, 2008 7:20 AM
To: ndelta@dop.water.ca.gov
Cc: Svetich, Ralph; dmraz@water.ca.gov; Brock, Bryan
Subject: North Delta Flood Control and Ecosystem Restoration Project DEIR

Good morning Stakeholders,

As promised, the Draft Environmental Impact Report for the North Delta Flood Control and Ecosystem Project is now available for review. I have attached a copy of the NOA which includes a description of the project, a listing of

12/15/2008

local libraries which have hardcopies of the DEIR, the time and date of the public hearing, and the link to the North Delta website to view the document on-line: (http://www.dfm.water.ca.gov/dsmo/northdelta/documents.htm). A news release for the DEIR will be posted on the DWR website and a public notice will be published in the Sacramento Bee in the very near future. The review period for the DEIR will be 60 calendar days instead the typical 45 calendar days. If you have any questions or comments, please contact me by phone or e-mail. Thank you.

Regards,

Matt Reeve
Staff Environmental Scientist
Delta Suisun Marsh Office
Department of Water Resources
mreeve@water.ca.gov
(916) 651-7014

12/15/2008

DPH-5

There are a few issues with the medical information that is included in the Table 5.6-3, Pages 1108-1109 that should be better clarified.

Mosquitoes cause more human suffering than any other 1 organism—more than 1 million people worldwide die from mosquito-borne diseases (known as arboviruses) every year. Not only can mosquitoes carry diseases that afflict humans, but they also transmit several diseases and parasites to which animals including dogs and horses are very susceptible. These include canine heartworm, West Nile virus, and Eastern equine encephalitis. Mosquito-vectored diseases include protozoan diseases such as malaria, and viruses such as dengue, encephalitis, and yellow fever (American Mosquito Control Association 2004). Table 5.6-3 describes several mosquito-borne diseases.

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Table 5.6-3. Diseases Associated with Mosquitoes

Disease Name	Description of Disease
Encephalitis	Encephalitis is commonly caused by a virus that can cause inflammation of the brain. Severe cases can progress to focal paralysis, intractable seizures, coma, and death. Mosquitoes become infected while feeding on birds that harbor the virus. They can then transmit the virus to other animals. California vectors are the encephalitis mosquito *(Culex tarsalis)* and the wetlands mosquito *(Aedes melanimon)* (Sacramento-Yolo Mosquito and Vector Control District 2005). There are several virus agents of encephalitis in the United States: West Nile virus, Eastern equine encephalomyelitis, Western equine encephalomyelitis, St. Louis encephalitis, La Crosse encephalitis, dengue and yellow fever, all of which are transmitted by mosquitoes (American Mosquito Control Association 2005).
Malaria	Malaria, caused by a protozoan (a single-celled organism), attacks red blood cells. Symptoms of malaria include chills/fever/sweating flu-like illness that recurs every 2 to 3 days. The malaria parasite can cause liver and kidney damage or death. Mosquitoes become infected while feeding on other humans that harbor the parasite. California vectors are the western malaria mosquito *(Anopheles freeborni)*, the woodland malaria mosquito *(Anopheles punctipennis)*, and the coastal malaria mosquito *(Anopheles hermsi)*. In California, 10 to 15 human cases of malaria are reported annually; most of these cases are from individuals who became infected outside of the U.S. In 1986, two residents of Yolo County were infected with the malaria parasite (locally acquired) (Sacramento-Yolo Mosquito and Vector Control District 2005).
Canine Heartworm	Canine heartworm can be a life-threatening disease for canines. The disease is caused by a roundworm. Dogs and sometimes other animals such as cats, foxes, and raccoons are infected with the worm through the bite of a mosquito carrying the larvae of the worm. The young worms circulate in the bloodstream of the dog. Mosquitoes become infected when they blood feed on a sick dog. Once inside the mosquito, the young worms leave the gut of the mosquito and live in the body of the insect for 2 to 3 weeks, then they move to the mosquito's mouthparts, where they will be able to infect an animal. When the mosquito blood feeds, the infective worms are deposited on the surface of the victim's skin. They enter the skin through the wound caused by the mosquito bite. The disease in dogs and cats cannot be eliminated but it can be controlled or prevented with pills and/or injections. Some risk is present when treating dogs infected with heartworms, but death is rare; still prevention is best. Cases have been reported in all 50 states (American Mosquito Control Association 2005). About 70 species of mosquito are capable of carrying the disease (Columbia Animal Hospital 2005).

Comment [j1]: Should not be referred to as sleeping sickness because there is a protozoan (Trypanosoma) that causes African Sleeping Sickness and this may be confusing

Comment [j2]: Encephalitis can be caused by more than one type of virus and even bacteria, it is just a description of a symptom.

Deleted: , also known as sleeping sickness

Deleted: ,

Deleted: result in mental retardation, motor impairment

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Comment [j3]: The genus Oclerotatus was changed back to Aedes.

Deleted: *Ochlerotatus*

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1 Eastern equine encephalitis is not known to occur in California (American Mosquito Control Association 2004).
2 Dengue is a serious arboviral disease with a low mortality rate. It is transmitted by *Aedes* sp. The *Aedes* sp has not successfully introduced itself to California yet (American Mosquito Control Association 2004).
3 Currently, yellow fever occurs only in tropical areas of Africa and the Americas (American Mosquito Control Association 2004).

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Deleted: reported in California

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Responses to Comments

DPH-1

The California Department of Health Services will be deleted and replaced with the Department of Public Health in the DEIR to reflect the name change for the Department.

DPH-2

A discussion of an Integrated Mosquito Management (IMM) program for the project is discussed beginning on page 2-83 of the document. The goal is to implement a program consistent with the IMM guidelines developed by the Sacramento-Yolo Mosquito and Vector Control District for mosquito management in wetland habitat. The IMM guidelines will be tailored toward the Group 1-A and Group 2 No Action preferred alternatives selected for the project.

DPH-3

It is not within the purview of this document to recommend or propose how Mosquito and Vector Control Districts (MVCDs) should operate during a flood event or other natural disaster. MVCDs are subject to their own policies and management decisions during emergency situations.

DPH-4

The development of a management plan and budget to implement the management plan will have to be developed in cooperation with the Reclamation District(s), the Sacramento Yolo Mosquito Abatement District, and the San Joaquin County Mosquito and Vector Control District. Reclamation Districts often include funding for pest control as part of their annual operating budget and work closely with the mosquito abatement district to monitor and treat for mosquito populations on the island(s). Staten Island and McCormack-Williamson Tract are managed by Reclamation Districts #38 and #2110.

DPH-5

The medical information listed on pages 1108-1109 will be updated to incorporate the revisions proposed by the commenter.

California Regional Water Quality Control Board
Central Valley Region
Karl E. Longley, ScD, P.E., Chair

Linda S. Adams
Secretary for Environmental Protection

Sacramento Main Office
11020 Sun Center Drive #200, Rancho Cordova, California 95670-6114
Phone (916) 464-3291 • FAX (916) 464-4645
http://www.waterboards.ca.gov/centralvalley

Arnold Schwarzenegger
Governor

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26 March 2008

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PO Box 3044
Sacramento, CA 95812-3044

SCH#2003012112: DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR), NORTH DELTA FLOOD CONTROL AND ECOSYSTEM RESTORATION PROJECT

The project proponents recognize the need for water quality certification and storm water runoff permits for projects that will become part of this project; however, in order for this project to proceed in a timely fashion, the project proponents should be informed of the need to start the process of complying with these regulatory requirements. CVR-1

The discharge of dredge or fill material to waters of the United States, or waters of the State, is subject to Section 401 of the Clean Water Act and the California Water Code (CWC). Section 401 requires that a project proponent obtain a Water Quality Certification from the State before the Corps of Engineers may issue a Section 404 permit. Any person discharging dredge or fill materials to waters of the State must file a report of waste discharge pursuant to Sections 13376 and 13260 of the CWC. The same application form may be used as a report of waste discharge and as an application for water quality certification. If waters on the project site are not under federal jurisdiction, the Discharger will still need to submit a Report of Waste Discharge (Form 200) to the Regional Water Board. However, the Regional Water Board recommends that the Discharger submit a 401 Water Quality Certification application rather than a Report of Waste Discharge because a 401 application can be processed more quickly than proceeding with Regional Water Board adopted waste discharge requirements. CVR-2

Dischargers of storm water to surface waters associated with construction activity, including clearing, grading, and excavation activities of one-acre or more, must obtain coverage under the State Water Resources Control Board, Order No. 99-08-DWQ, National Pollutant Discharge Elimination System, General Permit No. CAS000002, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity (General Permit). Dischargers must also implement Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce or eliminate storm water pollution. CVR-3

To obtain authorization for proposed storm water discharges to surface waters, the Discharger must submit a Notice of Intent (NOI) with a vicinity map and the appropriate fee to the State Water Resources Control Board prior to commencement of construction activities. Coverage under the General Permit shall not occur until the applicant develops a Storm Water Pollution CVR-4

California Environmental Protection Agency

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Prevention Plan (SWPPP). The SWPPP must identify Best Management Practices that utilize the BAT/BCT performance standard to control pollutant discharges. These controls must reduce pollutants and implement any more stringent controls necessary to meet water quality standards contained in the Regional Water Board's Basin Plan. CVR-4

The DEIR identified release of methylmercury as an impact and to mitigate this impact proposes to participate in an offset program to ensure no net increase in methylmercury loading. This mitigation is not acceptable as there is currently no authorized offset program in place. The project is located in the Sacramento-San Joaquin Delta Estuary, which is on the Federal Clean Water Act list of impaired water bodies due to elevated concentrations of methylmercury in fish. Recent data suggest that methylmercury created and discharged from seasonal and permanent wetlands may contribute to elevated methylmercury levels in fish tissue. In addition, the Regional Water Board Toxic Hot Spots Clean-up Plan (California Water Code section 13394) identified the Mercury in the Delta as a toxic hot spot. The project proponent should include plans to characterize and control methylmercury discharges. This language should be reflected in lines 24 through 28 on page 3.4-1, lines 19 through 30 on page 3.4-10 and lines 6 through 18 on page 3.4-12. CVR-5

The DEIR does not identify any impacts from inorganic mercury. Dredging activities are a source of inorganic mercury and all the alternatives include some amount of construction and dredging activities. The water quality certification process will include the need to address these discharges. CVR-6

The DEIR includes some inaccurate statements in the section on water quality. On lines 1 through 11 of page 3.4-3, there is a summary of various studies. Lines 7 through 9 summarize Yee et al. 2005 and Slotton el al. 2002 to conclude that there is no localized increase in biotic MeHg concentrations (in fish) in wetland tracts compared to adjacent aquatic habitats. This conclusion contradicts the previous sentence on lines 5 to 7, which states, "Organic-rich, vegetated wetland tracts exhibit 2-30 times greater production of MeHg than sediments of adjacent aquatic habitats (Slotton et al. 2002)." Yee et al. 2005 studied tidal wetlands in the San Francisco Bay and those results may not be applicable in the eastern Delta waterways. I suggest that the sentence on Lines 7 through 9 be deleted. The same statement appears on lines 11-15 on page 3.4-5 and should also be deleted. CVR-7

Line 27 of page 3.4-4 and line 9 of page 4.2-30 contains the following typo: "active abandoned mines." CVR-8

Line 4 on page 2.3-7 references the "1975 WQCB for the Sacramento River and San Joaquin River Basins." The correct reference should be the "Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, 4th edition, October 2007." CVR-9

Lines 5 though 12 of page 3.4-9 references requirements related to dredging activities. These requirements will need to be consistent with the water quality certification, which the project proponent has not yet obtained. This language should be considered draft until the water quality certification is issued. CVR-10

Pages 6-8 through 6-16 references federal laws and regulations applicable to this project. Clean Water Act Section 402 requirements for stormwater discharges need to be included. CVR-11

State Clearinghouse - 3 - 26 March 2008

Pages 6-18 to 6-19 describe requirements from the Porter-Cologne Water Quality Control Act. This section includes a list of the water quality control plans developed in compliance with the Porter-Cologne Water Quality Control Act that regulate discharges from this project. The San Francisco Bay Basin WQCP is not applicable and should be deleted. The Delta Plan should be corrected to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary or to the Bay-Delta Plan. The State Water Board adopted the latest Bay-Delta Plan on 13 December 2006. This section should describe the responsibility of dischargers to submit a Report of Waste Discharge and the issuance of waste discharge requirements. The Porter Cologne Water Quality Control Act also contains the provisions for Bay Protection and Toxic Cleanup. The Regional Water Board Toxic Hot Spots Clean-up Plan (California Water Code section 13394) identified the Mercury in the Delta as a toxic hot spot. CVR-12

Lines 21 through 37 on page 6-23 appear to describe water quality objectives and impaired water bodies under the jurisdiction of the San Francisco Bay Regional Water Board. These water bodies are not applicable in the project area. The State Water Board adopted California's list of impaired water bodies under section 303(d) of the Clean Water Act in 2006. Delta Waterways (eastern), which includes the waterways around the McCormack-Williamson Tract and the Grizzly Island tract, and Delta Waterways (central), which includes the waterways around Staten Island, are listed as impaired by chlorpyrifos, DDT, diazinon, exotic species, Group A pesticides, mercury and unknown toxicity. The Camanche Reservoir and the lower Mokelumne River are listed as impaired with copper and zinc. The Cosumnes River is listed as impaired with exotic species. CVR-13

Please contact me at 916-464-4643 or byee@waterboards.ca.gov if there are any questions on these comments.

Betty Yee

BETTY YEE
Senior Water Resources Control Engineer

Responses to Comments

CVR-1

Comment acknowledged.

CVR-2

Comment acknowledged.

CVR-3

Comment acknowledged.

CVR-4

Comment acknowledged.

CVR-5

The stated goal for ecosystem enhancement is not to create more habitat where high levels of mercury release would be anticipated. Methylation of mercury is greatest where soils contain a high degree of organic material and anoxic conditions are prevalent. McCormack-Williamson Tract soil is predominantly mineral rather than organic and the shallow, tidal water will produce higher oxygen concentrations than deeper water. In addition, Alternative 1-A proposes regularly inundated tidal marshes and open water habitats which appear to have the lowest rates of conversion from elemental mercury to methyl mercury.

A monitoring program for inorganic mercury and methyl mercury will be developed in response to the recommendation of the North Delta Science Panel to help answer questions as to how the pollutant functions within various habitats and subhabitats. The NDSP comprises scientific experts in a diversity of fields including hydraulics/hydrology, water quality, and terrestrial and aquatic ecology. The NDSP was convened to provide recommendations to DWR staff on the scientific efficacy of proposed alternatives to enhance ecosystems in the North Delta.

The monitoring program will be developed to collect additional information for assessing potential water quality impacts and to verify compliance with regulatory requirements. Several water quality sampling stations will be located in the vicinity of Grizzly Slough and McCormack-Williamson Tract. In the suggested program, laboratory analyses for water column samples would include some or all of the following: dissolved organic carbon (DOC), total organic carbon (TOC), UV 254, bromide, total mercury, elemental mercury, dissolved mercury, MeHg (MeHg), nitrate, ammonia, total kjeldahl nitrogen (TKN), orthophosphate, total phosphorus, zinc, arsenic, copper, cadmium, chromium, lead, nickel, selenium, iron, aluminum, manganese, alkalinity, total dissolved solids (TDS), total coliform, fecal coliform, e. coli, and total suspended sediment (TSS).

Sediment samples would be analyzed for some or all of the following: elemental mercury, methyl mercury (MeHg), total mercury, dissolved mercury, total sulfide, iron, manganese, polychlorinated biphenols (PCBs), and organochloride pesticides.

Data collected from the monitoring plan will be utilized in the evaluation and development of management practices (e.g. changes in open water management regimes) to reduce MeHg discharges and elemental mercury discharges, as well as advance the general body of knowledge on the subject of MeHg creation and export in restored tidal marshes. The monitoring plan may also include identification of variables onsite that affect MeHg production and degradation, including sources of inorganic mercury.

The development of a monitoring plan specifically for McCormack-Williamson Tract will be coordinated with the USACE, TNC, and DWR as part of the CALFED Levee Stability Program.

The reference to an Offset Program in the mitigation analysis will be deleted and the language describing a monitoring program for inorganic and MeHg will be inserted in lines 24 through 28 on page 3.4-1, lines 19-30 on page 3.4-10, and lines 6 through 18 on page 3.4-12 (please see Chapter 3, Edits to the Draft EIR).

CVR-6

Please see CVR-5.

There are no dredging activities proposed with either of the Preferred Alternatives for the Group 1 and Group 2 actions.

CVR-7

Authors described the various studies to demonstrate that there is a lack of knowledge regarding mercury methylation in different aquatic environments and the studies that have been conducted tend to have conflicting results. According to the North Delta Science Panel, “There are numerous critical uncertainties with respect to mercury methylation; however, nothing present in the current body of knowledge is a “show stopper” with respect to fluvial or tidal systems.” The reference to the scientific studies is not misleading or inaccurate and therefore will not be deleted.

CVR-8

The text on line 27 of page 3.4-4 and line 9 of page 4.2-30 will be revised to “abandoned mines”.

CVR-9

Chapter 2 of the Draft EIR is the Project Description and is not subdivided into sections; the reference described in the comments letter is not listed on the specified page. However, the reference is found on page 3.4-7 and will be revised to "Water Quality Control Plan for the Sacramento and San Joaquin River Basins, 4th Edition, October, 2007".

CVR-10

Comment acknowledged.

CVR-11

A discussion of Clean Water Action Section 402 requirements for stormwater discharges is provided on page 3.4-7, lines 10 – 24 under the heading of Regulatory Setting and Significance Criteria (page 3.4-5).

CVR-12

Pages 6-18 and 6-19 of the North Delta DEIR will be revised to include a short discussion on (1) the Regional Water Quality Control Board's Toxic Hot Spots Progam and (2) the regulated community's responsibility to comply with Waste Disharge Requirements for any discharges to surface waters.

CVR-13

The description of water quality objectives and impaired water bodies under the jurisdiction of the San Francisco Bay Regional Water Board is applicable because it is part of a larger discussion of State and Regional Plan Consistency. However, the text will be revised to reflect more specific water quality information for the North Delta region.

Jan. 31. 2008 9:47AM No. 0134 P. 2/2

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
P.O. BOX 2048 STOCKTON, CA 95201
(1976 E. CHARTER WAY/1976 E. DR. MARTIN
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January 31, 2008

10-SJ-Various
SCH#2003012112 (DEIR)
North Delta Flood
Control and Ecosystem
Restoration Project

Matt Reeve
Department of Water Resources
1416 9th Street, Room 1601
Sacramento, CA 94236-0001

Dear Mr. Reeve:

The California Department of Transportation (Department) appreciates the opportunity to have reviewed the Draft Environmental Impact Report (DEIR) for the proposed North Delta Flood Control and Ecosystem Restoration Project. The Department has no comments at this time.

If you have any questions or would like to discuss our comments in more detail, please contact Kathy Selsor at (209) 948-7190 (e-mail: kathy_selsor@dot.ca.gov) or me at (209) 941-1921.

Sincerely,

Kathy Selsor for

TOM DUMAS, CHIEF
OFFICE OF METROPOLITAN PLANNING

c: SMorgan CA Office of Planning and Research

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STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 3 – SACRAMENTO AREA OFFICE
VENTURE OAKS, MS 15
P. O. BOX 942874
SACRAMENTO, CA 94274-0001
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FAX (916) 274-0648
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March 24, 2008

08SAC0038
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North Delta Flood Control and Ecosystem Restoration Project
DEIR
SCH#2003012112

Mr. Matt Reeve
California Department of Water Resources
1416 Ninth Street, Room 1601
Sacramento, CA 94236-0001

Dear Mr. Reeve:

Thank you for the opportunity to review and comment on the proposed North Delta Flood Control and Ecosystem Restoration Project programmatic Draft EIR. Our comments are as follows:

- It appears that this is a widely scoped programmatic project with multiple "project level" project sites and actions, having to do with water supply, water quality, flood control requirements, habitat, and ecosystem restoration in its myriad activities. Caltrans would like the opportunity to review all future "project level" environmental documents that may be generated by this EIR as more specific sites and projects go forth. DOT-1

- In general, Caltrans is concerned that Transportation Management Plans (TMPs) be provided in advance of any specific projects, so that any truck haul routes and numbers of trucks associated with such projects (ie. transporting levee fill and rock materials, habitat restoration materials, etc.) could be assessed in advance of individual project approvals and determine the State highways used. Caltrans normally encourages off-peak truck hauling of materials. In advance of planned time specific projects, TMPs should be submitted to Paul Wilkinson of Caltrans District 3 Traffic Operations and he may be contacted at (916) 859-7978. A copy of the TMP is enclosed for reference. DOT-2

- Any runoff that comes from the proposed development sites must not contribute a contaminant load to storm waters handled by the State, for example oils, grease, sand, sediment, debris. All runoff that enters the State right of way must meet Regional Water Quality Control Board (RWQCB) standards for clean water. Any increases of discharge into the State drainage system must be mitigated. Existing drainage patterns must be perpetuated or improved within the State right of way. Pre and post-project discharge information should be supplied for Caltrans review. Environmental Best Management Practices (BMP) should be applied to mitigate any adverse drainage impacts from the proposed development. DOT-3

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Mr. Matt Reeve
March 24, 2008
Page 2

- Any work performed or signs placed within State right-of-way will require an encroachment permit. For permit assistance, please contact Julio Elvir of our staff at (530) 741-4204. DOT-4

If you have any questions regarding these comments, please contact Ken Champion at (916) 274-0615.

Sincerely,

Dawn Cheser, Office Chief
Office of Transportation Planning – South

Enclosure

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Responses to Comments

DOT-1

The North Delta Flood Control and Ecosystem Project was tiered off of the CALFED Programmatic EIR/EIS and is a project EIR which focuses on specific project actions and specific affected geographic areas over a different time frame. The project EIR stands alone and includes an independently developed analysis of the impacts of the Project, including direct, indirect, and cumulative impacts, alternatives, and avoidance, mitigation measures. Implementation of some of the project elements may require additional CEQA analysis, depending on specific details discovered through project development. Such additional analysis may be documented through a tiered negative declaration or technical addendum and may not require a supplemental or subsequent EIR.

The development of the project EIR has been a very transparent process involving the participation of stakeholders beyond DWR and the CALFED agencies. Involvement and outreach efforts have been focused through facilitated meetings and a dedicated website. DWR intends to continue this approach as the project moves forward towards the implementation phase.

DOT-2

Transportation Management Plans will be provided to Caltrans prior to any project activity which requires the use of trucks to transport materials using state highways, county roads, etc. DWR will coordinate with Caltrans staff to assure appropriate measures are implemented such as off-peak truck hauling to mitigate for any increased traffic on public roads.

DOT-3

Comment acknowledged. Chapter 6 of the North Delta DEIR describes in detail the major requirements for permitting and environmental review and consultation for implementation of the project including compliance with Waste Discharge Requirements. Chapter 3.4 (Water Quality) provides a more detailed discussion of the regulatory requirements related to the discharge of storm waters to surface waters including compliance with State Water Resources Control Board Order No. 99-08-DWQ, NPDES permitting, and Waste Discharge Requirements for Discharges of Storm Water Runoff associated with Construction Activity.

DOT-4

Comment acknowledged.

STATE OF CALIFORNIA—THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, *Governor*

DELTA PROTECTION COMMISSION
14215 RIVER ROAD
P.O. BOX 530
WALNUT GROVE, CA 95690
Phone (916) 776-2290
FAX (916) 776-2293
E-Mail: dpc@citlink.net Home Page: www.delta.ca.gov

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March 19, 2008

State Clearinghouse
P.O. Box 3044
Sacramento, California 95812-3044

Dear Project Manager:

SUBJECT: Draft EIR – North Delta Flood Control and Ecosystem Restoration Project (SCH #2003012112)

The staff of the Delta Protection Commission (Commission) has reviewed the subject document dated January 29, 2008. Staff understands this project will implement flood control improvements principally on and around Staten Island, Dead Horse Island, and McCormack-Williamson Tract in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. From the information provided, staff has determined that the proposed project is located within the Primary Zone of the legal Delta, and is therefore subject to consistency with the Land Use and Resource Management Plan for the Primary Zone (Management Plan) and appeal to the Commission.

The Delta Protection Act (Act) was enacted in 1992 in recognition of the increasing threats to the resources of the Primary Zone of the Delta from urban and suburban encroachment having the potential to impact agriculture, wildlife habitat, and recreation uses. Pursuant to the Act, a Management Plan was completed and adopted by the Commission in 1995.

The Management Plan sets out findings, policies, and recommendations resulting from background studies in the areas of environment, utilities and infrastructure, land use, agriculture, water, recreation and access, levees, and marine patrol/boater education/safety programs.

The policies and recommendations from the Management Plan that are relevant to this project include, but are not limited to the following:

Environment:

Policy 3: Lands managed primarily for wildlife habitat shall be managed to provide several inter-related habitats. Delta-wide habitat needs should be addressed in development of any wildlife habitat plan. Appropriate programs, such as "Coordinated Resource Management and Planning" (Public Resources Code Section 9408 c) and "Natural Community Conservation Planning" (Fish and Game Code Section 2800 et seq.) should ensure full participation by local government and property owner representatives. DPC-1

State Clearinghouse
March 19, 2008
Page Two

Relevant Recommendations in the Management Plan for implementing these Policies are:

Recommendation 1: Seasonal flooding should be carried out in a manner so as to minimize mosquito production. Delta wide guidelines outlining "best management practices" should be prepared and distributed to land managers. DPC-2

Recommendation 2: Wildlife habitat on the islands should be of adequate size and configuration to provide significant wildlife habitat for birds, small mammals, and other Delta wildlife. DPC-3

Recommendation 4: Feasible steps to protect and enhance aquatic habitat should be implemented as may be determined by resource agencies consistent with balancing other beneficial uses of Delta resources. DPC-4

Recommendation 5: Publicly-owned land should incorporate, to the maximum extent feasible, suitable and appropriate wildlife protection, restoration and enhancement as part of a Delta wide plan for habitat management. DPC-5

Recommendation 6: Management of suitable agricultural lands to maximize habitat values for migratory birds and other wildlife should be encouraged. Appropriate incentives, such as conservation easements, should be provided by nonprofits or other entities to protect this seasonal habitat through donation or through purchase. DPC-6

Recommendation 7: Lands currently managed for wildlife habitat, such as private duck clubs or publicly-owned wildlife areas, should be preserved and protected, particularly from destruction from inundation. DPC-7

Agriculture:

Policy 8: Local governments shall encourage management of agricultural lands which maximize wildlife habitat seasonally and year-round, through techniques such as sequential flooding in fall and winter, leaving crop residue, creation of mosaic of small grains and flooded areas, controlling predators, controlling poaching, controlling public access, and others. DPC-8

Water:

Policy 3: Water agencies at local, State, and federal levels shall work together to ensure that adequate Delta water quality standards are set and met and that beneficial uses of State waters are protected consistent with the CALFED [see Water Code Section 12310 (f)] Record of Decision dated August 8, 2000. DPC-9

State Clearinghouse
March 19, 2008
Page Three

Relevant Recommendations in the Management Plan for implementing this Policy are:

Recommendation 3: Programs to enhance the natural values of the State's aquatic habitats and water quality will benefit the Delta and should be supported. DPC-10

Recommendation 5: Water for flooding to provide seasonal and year-round wildlife habitat should be provided as part of State and federal programs to provide water for wildlife habitat. DPC-11

Recommendation 7: State and federal water projects are beneficiaries of the Delta waterways and levees; the projects should fund that portion of levee erosion caused by water transport and should continue programs that fund protection of Delta levees. DPC-12

Recreation and Access:

Policy 2: To minimize impacts to agriculture and to wildlife habitat, local governments shall encourage expansion of existing private water-oriented commercial recreational facilities over construction of new facilities. Local governments shall ensure any new recreational facilities will be adequately supervised and maintained. *(While this Policy is directed toward local government it is relevant for this project too.)* DPC-13

Relevant Recommendations in the Management Plan for implementing this Policy are:

Recommendation 2: Support a scientifically-valid study of the carrying capacity of the Delta waterways for recreation activities without degradation of habitat values which minimize impacts to agriculture or levees. DPC-14

Recommendation 6: State and federal projects in the Primary and Secondary Zones should include appropriate recreation and/or public access components to the extent consistent with project purposes and with available funding. State and federal agencies should consider private or user group improvements on publicly-owned lands to provide facilities (example: windsurf access at Brannan Island State Recreation Area). DPC-15

Land Use:

Policy 9: The implementation of the policies in the resource management plan shall not be achieved through the exercise of the power of eminent domain unless requested by the landowner. DPC-16

Relevant Recommendations in the Management Plan for implementing this Policy are:

Recommendation 1: A program by non-profit groups or other appropriate entities should be developed to promote acquisition of wildlife and agricultural conservation easements on private lands with the goal of protecting agriculture and wildlife habitat in the Delta. DPC-17

State Clearinghouse
March 19, 2008
Page Four

Recommendation 2: Public agencies and non-profit groups have or propose to purchase thousands of acres of agricultural lands to restore to wildlife habitat. The amount, type, and location of land identified to be enhanced for wildlife habitat should be studied by wildlife experts to determine goals for future acquisition and restoration. Lands acquired for wildlife habitat should also be evaluated for recreation, access, research and other needed uses in the Delta. Habitat restoration projects should not adversely impact surrounding agricultural practices. Public-private partnerships in management of public lands should be encouraged. Public agencies shall provide funds to replace lost tax base when land is removed from private ownership. DPC-18

Recommendation 3: Multiple use of agricultural lands for commercial agriculture, wildlife habitat, and, if appropriate, recreational use, should be supported, and funding to offset management costs pursued from all possible sources. Public agencies shall provide funds to replace lost tax base when land is removed from private ownership. DPC-19

A copy of the Management Plan and the Act are available at the Commission's website www.delta.ca.gov for your reference. Please contact me at (916) 776-2292 or lindadpc@citlink.net if you have any questions regarding the Commission or the comments provided herein.

Sincerely,

Linda Fiack

Linda Fiack
Executive Director

cc: Katherine Kelly, Chief, Bay Delta Office, Department of Water Resources

Responses to Comments

DPC-1

The ecosystem restoration goals of the North Delta Flood Control and Ecosystem Restoration Project are consistent with the DPC Management Plan; that is, restoration of floodplain forests and marshes on McCormack-Williamson Tract and the Grizzly Slough property. There are three ecological conceptual models proposed for the project each with different ecological objectives:

1. maximizing fluvial and tidal processes to create a diverse network of riverine, floodplain, and tidal habitats based on natural sedimentation and channel formation;
2. maximizing floodplain habitat to benefit fish that spawn and rear on floodplain by allowing flooding (with some tidal action to maintain water quality) during the wet season; or
3. creating floodplain habitat as described above, combined with a demonstration project to reverse subsidence and increase elevations on the tract.

All of the ecological conceptual models will create a mosaic of habitats which were common to the area before reclamation activities began in the Delta.

The project planning process has been enriched through the participation of stakeholders including local government, property owner representatives, environmental groups, etc. who have played an integral part in project development. The North Delta Improvements Group was specifically created as a forum for exchanging project information, establishing goals and objectives, developing alternatives, and discussing analysis results. The North Delta Agency Team is a subgroup of the NDIG consisting of representatives of state and federal agencies that will ultimately have approval authority for elements of the project based on various regulatory triggers.

The enhancement of the Delta Meadows Property has been selected as a component of the Preferred Group 1 Alternative. The goal of this action is to improve recreation by upgrading the recreational facilities of the property including boat launch facilities, parking areas, signage and public restrooms. This is consistent with one of the recommendations of the Delta Vision Blue Ribbon Task Force to, "create a statewide public identity for the Delta and encourage expanded tourism and recreational investment." Enhancement of the Delta Meadows Property is also consistent with the goals of the North Delta EIR to increase opportunities for recreation that are compatible with flood control and ecosystem restoration by improving public access for fishing, wildlife viewing, and boat use. The opening of the southern portion of McCormack-Williamson Tract proposed with Alternative 1-A will also create more recreational opportunities for boating and fishing.

A General Plan for the Delta Meadows property must be prepared by the Department of Parks and Recreation (DPR) prior to any permanent recreation improvements. DPR has not yet identified funding for the preparation of a General Plan for the Delta Meadows property though the completion of the Plan and upgrading the facilities is estimated to cost $250,000. DWR commits to working cooperatively with DPR to assist in preparation of the General Plan, development of a funding strategy, and implementation. DPR anticipates that passive recreation activities would be developed. These types of recreation activities are hiking, nature viewing, non-motorized boating, and fishing. Physical improvement may include upgrading boat launch facilities, parking improvements, trails, interpretive signage, and public restrooms.

DPC-2

A discussion of an Integrated Mosquito Management (IMM) program for the project is discussed beginning on page 2-83 of the document. The goal is to implement a program consistent with the IMM guidelines developed by the Sacramento-Yolo Mosquito and Vector Control District (SYMVCD) for mosquito management in wetland habitat. The IMM guidelines will be tailored toward the Preferred Alternatives selected for the project. DWR, USACE, RD 2110, and TNC staff will coordinate with SYMVCD staff in developing vegetation management, biological control, and chemical control practices specific to McCormack-Williamson Tract prior to the estimated project implementation date of 2012. DWR staff will coordinate with SYMVCD staff in developing similar mosquito management practices for Grizzly Slough which has a projected implementation date of 2013/14.

The development of Delta-wide guidelines is under the purview of the Sacramento-Yolo Mosquito and Vector Control District.

DPC-3

The project proposes creating approximately 1,800 acres of wildlife habitat on the McCormack-Williamson Tract and Grizzly Slough Property. This, in combination with the 8,400 acres of wildlife friendly farming activities on Staten Island will provide large areas of wildlife habitat for a variety of indigenous plant and animal species in the Delta.

DPC-4

DWR will continue to work closely with Fish and Wildlife agencies, Nongovernmental Organizations, and Reclamation Districts to assure that the aquatic habitat created by the project will be managed and maintained.

DPC-5

Grizzly Slough (GS) is the only publicly owned property within the boundaries of the project site. GS is owned by DWR and is located within the Cosumnes River Preserve. As such, DWR is a signatory to the Cosumnes River Preserve Cooperative Management Agreement which defines the goals, roles, and responsibilities for managing, administering, improving and restoring Preserve lands. The actions proposed for Grizzly Slough to recreate a frequently flooded riparian woodland and provide habitat for birds and fish is also consistent with the proposed goals of the Cosumnes River Preserve.

DPC-6

The 8,400 acre wildlife friendly farming operation on Staten Island managed by The Nature Conservancy provides foraging habitat for thousands of Greater Sandhill Cranes. The Group 2 actions proposing construction of detention basins on Staten Island will not significantly impact the farming operations or the Crane habitat on the island.

DPC-7

Please see DPC-5.

DPC-8

Comment acknowledged.

DPC-9

Comment acknowledged.

DPC-10

Comment acknowledged.

DPC-11

Comment acknowledged.

DPC-12

This comment does not relate to the environmental analysis or conclusion in the DEIR. The goals for this project are flood protection and ecosystem restoration, not conveyance or water supply reliability. However, the commenter's opinion will be forwarded to the decision makers for their consideration.

DPC-13

The enhancement of the Delta Meadows Property has been selected as a component of the Preferred Group 1 Alternative. The goal of this action is to improve recreation by upgrading the recreational facilities of the property including boat launch facilities, parking areas, signage and public restrooms. This is consistent with one of the recommendations of the Delta Vision Blue Ribbon Task Force to, "create a statewide public identity for the Delta and encourage expanded tourism and recreational investment." Enhancement of the Delta Meadows Property is also consistent with the goals of the North Delta EIR to increase opportunities for recreation that are compatible with flood control and ecosystem restoration by improving public access for fishing, wildlife viewing, and boat use. The opening of the southern portion of McCormack-Williamson Tract proposed with Alternative 1-A will also create more recreational opportunities for boating and fishing.

A General Plan for the Delta Meadows property must be prepared by the Department of Parks and Recreation (DPR) prior to any permanent recreation improvements. DPR has not yet identified funding for the preparation of a General Plan for the Delta Meadows property though the completion of the Plan and upgrading the facilities is estimated to cost $250,000. DWR commits to working cooperatively with DPR to assist in preparation of the General Plan, development of a funding strategy, and implementation. DPR anticipates that passive recreation activities would be developed. These types of recreation activities are hiking, nature viewing, non-motorized boating, and fishing. Physical improvement may include upgrading boat launch facilities, parking improvements, trails, interpretive signage, and public restrooms.

DPC-14

Comment acknowledged.

DPC-15

Please see DPC-13.

DPC-16

The exercise of power of eminent domain is not being considered for this project.

DPC-17

Comment acknowledged.

DPC-18

The ecosystem restoration goals of the North Delta Flood Control and Ecosystem Restoration Project are consistent with the DPC Management Plan; that is, restoration of floodplain forests and marshes on McCormack-Williamson Tract and the Grizzly Slough property. There are three ecological conceptual models proposed for the project each with different ecological objectives:

4. maximizing fluvial and tidal processes to create a diverse network of riverine, floodplain, and tidal habitats based on natural sedimentation and channel formation;
5. maximizing floodplain habitat to benefit fish that spawn and rear on floodplains by allowing flooding (with some tidal action to maintain water quality) during the wet season; or

6. creating floodplain habitat as described above, combined with a demonstration project to reverse subsidence and increase elevations on the tract.

All of the ecological conceptual models will create a mosaic of habitats which were common to the area before reclamation activities began in the Delta.

The project planning process has been enriched through the participation of stakeholders including local government, property owner representatives, environmental groups, etc. who have played an integral in project development. The North Delta Improvements Group was specifically created as a forum for exchanging project information, establishing goals and objectives, developing alternatives, and discussing analysis results. The North Delta Agency Team is a subgroup of the NDIG consisting of representatives of state and federal agencies that will ultimately have approval authority for elements of the project based on various regulatory triggers.

The purpose of the project is to implement flood control improvements in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. Farmland acreage adjacent to the three properties will be protected with the flood control improvements identified by the project. For example, the 1986 flood event inundated over 30,000 acres of farmland in addition to Staten, McCormack-Williamson Tract, and Grizzly Slough. This was due to the uncontrolled surge of water originating from the Cosumnes River, Dry Creek, and Mokelumne River watersheds. The three Group 1 alternatives were developed to regulate these peak flows in such a manner as to minimize flood-related damage both upstream and downstream of the project area, thereby protecting adjacent agricultural lands.

Grizzly Slough is publicly owned by the Department of Water Resources (purchased in 1993) and therefore does not pay property taxes to local governments; actions proposed for the site will therefore have no impact on tax revenue. Staten Island (purchased in 2002) and McCormack-Williamson Tract (purchased in 1999) are owned by The Nature Conservancy, a non-profit tax-exempt charitable organization under Section 501(c) (3) of the Internal Revenue Code. Ownership of these properties will not change with the implementation of the project.

DPC-19

Please see DPC-18.

STATE OF CALIFORNIA -- THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
(916) 653-5791

January 31, 2008

Matt Reeve
California Department of Water Resources
1416 Ninth Street, Room 1601
Sacramento, California 95814

North Delta Flood Control and Ecosystem Restoration Project
State Clearinghouse (SCH) Number: 2003012112

The project corresponding to the subject SCH identification number has come to our attention. The limited project description suggests your project may be an encroachment on the State Adopted Plan of Flood Control. You may refer to the California Code of Regulations, Title 23 and Designated Floodway maps at http://recbd.ca.gov. Please be advised that your county office also has copies of the Board's designated floodways for your review. If indeed your project encroaches on an adopted food control plan, you will need to obtain an encroachment permit from the Central Valley Flood Protection Board prior to initiating any activities. The attached Fact Sheet explains the permitting process. Please note that the permitting process may take as much as 45 to 60 days to process. Also note that a condition of the permit requires the securing all of the appropriate additional permits before initiating work. This information is provided so that you may plan accordingly. **DWR-1**

If after careful evaluation, it is your assessment that your project is not within the authority of the Central Valley Flood Protection Board, you may disregard this notice. For further information, please contact me at (916) 574-1249.

Sincerely,

Christopher Huitt
Staff Environmental Scientist
Floodway Protection Section

Enclosure

cc: Governor's Office of Planning and Research
State Clearinghouse
1400 Tenth Street, Room 121
Sacramento, CA 95814

Responses to Comments

DWR-1

The North Delta Flood Control and Ecosystem Restoration Project will not encroach upon the State Adopted Plan of Flood Control, and will therefore not need an encroachment permit prior to implementation of the project.

MAR-28-2008 FRI 03:32 PM CA STATE LANDS COMM DEPM FAX NO. 916 574 1885 P. 01/02

STATE OF CALIFORNIA

ARNOLD SCHWARZENEGGER, *Governor*

CALIFORNIA STATE LANDS COMMISSION
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825-8202

PAUL D. THAYER, *Executive Officer*
(916) 574-1800 FAX (916) 574-1810
Relay Service From TDD Phone **1-800-735-2929**
from Voice Phone **1-800-735-2922**

Contact Phone: **(916) 574-1814**
Contact FAX: **(916) 574-1885**

March 28, 2008

File Ref: SCH# 2003012112

Gwen Knittweis
Department of Water Resources
901 P Street
Sacramento, CA 95814

RECEIVED
MAR 2 8 2008
STATE CLEARING HOUSE

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e

Subject: North Delta Improvements Project

Dear Ms Knittweis:

The State acquired sovereign ownership of all tidelands and submerged lands and beds of navigable waterways upon its admission to the United States in 1850. The State holds these lands for the benefit of all the people of the State for statewide Public Trust purposes which include waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation, and open space. The landward boundaries of the State's sovereign interests in areas that are subject to tidal action are generally based upon the ordinary high water marks of these waterways as they last naturally existed. In non-tidal navigable waterways, the State holds a fee ownership in the bed of the waterway between the two ordinary low water marks as they last naturally existed. The entire non-tidal navigable waterway between the ordinary high water marks is subject to the Public Trust Easement. Both the easement and fee-owned lands are under the jurisdiction of the State Lands Commission. The locations of the ordinary high and low water marks are often related to the last natural conditions of the river, and may not be apparent from a present day site inspection.

To the extent the proposed North Delta Flood Control and Ecosystem Restoration Project involves State-owned sovereign lands, a lease will be required. Staff of the Commission will need to review each of the proposed sites prior to making that determination a lease is required. If you have any questions, please contact Diane Jones, Public Land Manager, at 916-574-1843, to discuss the Commission's leasing requirements. SLC-1

Environmental Planning and Management Comments:

The State Lands Commission recommends that any of the proposed mitigation and project construction activities consider timing of the proposed work to account for state and federally listed endangered species. All arrangements with pertinent regulatory agencies should coincide with specific protection policies regarding incidental SLC-2

Gwen Knittweis Page 2 March 28, 2008

take and avoidance measures. Consideration should include, but not limited to, seasonality of migratory or nesting species within the footprint of the project (i.e. Swainson's hawks, Salmonids, etc.). Any construction activities along the water-side bank of restoration or Flood protection improvements shall consider water quality issues affecting clarity and chemical reactions within the waters and make all the necessary arrangements to reduce or mitigate for these concerns. SLC-3

In addition, greenhouse gas emissions information consistent with the California Global Warming Solutions Act (AB 32) should be included. This would include a determination of the greenhouse gases that will be emitted as a result of construction and ongoing operations and maintenance, a determination of the significance of the impact, and mitigation measures to reduce that impact. SLC-4

If you have any questions with the environmental review, please contact Christopher Huitt, Staff Environmental Scientist, at 916-574-1938, to discuss these comments or questions.

Sincerely,

Marina R. Brand

Marina R. Brand, Assistant Chief
Division of Environmental Planning
and Management

cc: Office of Planning and Research
State Clearinghouse

Diane Jones, CSLC
Christopher Huitt, CSLC

Responses to Comments

SLC-1

Comment noted: Components of Group 1 and Group 2 actions for North Delta Project will involve State-owned sovereign lands. DWR staff will coordinate with State Lands Commission (SLC) Staff prior to implementation of the project to review the SLCs leasing requirements.

SLC-2

Chapter 4 (Volume 1) of the Draft Environmental Impact Report provides a detailed analysis of the impacts, mitigation, and benefits of the project for vegetation and wetlands, fisheries and aquatics, and wildlife. The analysis provides a setting discussion, impact analysis criteria, project effects and significance, and applicable mitigation measures.

SLC-3

Chapter 3.4 (Volume 1) of the Draft Environmental Impact Report provides an extensive environmental analysis of the water quality impacts associated with the implementation of all of the proposed alternatives including impact analysis criteria, project effects and significance, and applicable mitigation measures.

SLC-4

Chapter 3.9 (Volume 1) of the North Delta Draft Environmental Impact Report provides an extensive environmental analysis of the air quality impacts associated with the implementation of all the proposed alternatives including impact analysis criteria, project effects and significance, and applicable mitigation measures. The six criteria pollutants: ozone, carbon monoxide, oxides of nitrogen, oxides of sulfur, particulate matter, and lead were evaluated in the analysis. However, the Air Quality Impacts analysis in the Draft EIR was completed prior to the passage of Senate Bill 97 (2007), which amended CEQA to specifically establish that greenhouse gas (GHG) emissions and their impacts are appropriate subjects for CEQA analysis. The analysis of GHG emissions as a result, was not included in the North Delta Draft Environmental Impact Report. However, a GHG analysis has been completed in the FEIR to comply with the provisions of SB 97 (see below) for the Preferred Alternatives.

Greenhouse Gases and Global Climate Change

Gases that trap heat in the atmosphere are called greenhouse gases. The major concern is that increases in greenhouse gases are causing Global Climate Change. Global Climate Change is a change in the average weather on earth that can be measured by wind patterns, storms, precipitation and temperature. DWR is actively engaged in developing a set of water and flood management policies that will provide a comprehensive approach to climate change (Snow, 2007).

Greenhouse gases allow sunlight to enter the atmosphere, but trap a portion of the outward-bound infrared radiation and warm up the air. The process is similar to the effect greenhouses have in raising the internal temperature, hence the name greenhouse gases. Both natural processes and human activities emit greenhouse gases. The accumulation of greenhouse gases in the atmosphere regulates the earth's temperature; however, emissions from human activities such as electricity production and motor vehicles have elevated the concentration of greenhouse gases in the atmosphere. This accumulation of greenhouse gases has contributed to an increase in the temperature of the earth's atmosphere and contributed to Global Climate Change. The principal greenhouse gases are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF6), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and water vapor (H_2O). Carbon dioxide is the reference gas for climate change because it gets the most attention and is considered the most important greenhouse gas. To account for the warming potential of greenhouse gases, greenhouse gas emissions are often quantified and reported as CO_2 equivalents (CO_2e). Large emission sources are reported in million metric tons of CO_2e ($MMTCO_2e$). HFCs are used in refrigeration systems as substitutes for chlorofluorocarbons (CFCs), which were banned for destroying the ozone layer.

Regulatory Framework

In 2005, in recognition of California's vulnerability to the effects of climate change, Governor Schwarzenegger established Executive Order S-3-05, which sets forth a series of target dates by which statewide emission of greenhouse gas would be progressively reduced, as follows:

- By 2010, reduce greenhouse gas emissions to 2000 levels;
- By 2020, reduce greenhouse gas emissions to 1990 levels; and
- By 2050, reduce greenhouse gas emissions to 80 percent below 1990 levels.

Assembly Bill 32 (AB 32)

In 2006, California passed the California Global Warming Solutions Act of 2006 (Assembly Bill No. 32; California Health and Safety Code Division 25.5, Sections 38500, et seq., or AB 32), which requires the CARB to design and implement emission limits, regulations, and other measures, such that statewide greenhouse gas emissions will be reduced to 1990 levels by 2020. In December 2007, CARB approved the 2020 emission limit of 427 million metric tons of CO_2 equivalents of greenhouse gases. The 2020 target of 427 million metric tons of CO_2e requires the

reduction of 169 million metric tons of CO_2e, or approximately 30 percent, from the state's Projected 2020 emissions of 596 million metric tons of CO_2e (business-as-usual).
Also in December 2007, CARB adopted mandatory reporting and verification regulations pursuant to AB 32. The regulations will become effective January 1, 2009, with the first reports covering 2008 emissions. The mandatory reporting regulations require reporting for certain types of facilities that make up the bulk of the stationary source emissions in California. Currently, the draft regulation language identifies major facilities as those that generate more than 25,000 metric tons/year of CO2e. Cement plants, oil refineries, electric-generating facilities/providers, cogeneration facilities, and hydrogen plants and other stationary combustion sources that emit more than 25,000 metric tons/year CO2e, make up 94 percent of the point source CO2e emissions in California (CARB, 2007c).

In June, 2008, CARB published its *Climate Change Draft Scoping Plan* (CARB, 2008b). The *Climate Change Draft Scoping Plan* reported that CARB met the first milestones set by AB 32 in 2007: developing a list of early actions to begin sharply reducing greenhouse gas emissions; assembling an inventory of historic emissions; and establishing the 2020 emissions limit. After consideration of public comment and further analysis, CARB released the *Climate Change Proposed Scoping Plan* in October, 2008 (CARB, 2008c). The Proposed Scoping Plan proposes a comprehensive set of actions designed to reduce overall carbon emissions in California. Key elements of the Proposed Scoping Plan include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;

- Achieving a statewide renewables energy mix of 33 percent;

- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;

- Establishing targets for transportation-related greenhouse gas emissions for regions throughout California, and pursuing policies and incentives to achieve those targets;

- Adopting and implementing measures pursuant to existing state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and

- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the state's long-term commitment to AB 32 implementation. (CARB, 2008c)

The *Climate Change Proposed Scoping Plan* notes that "[a]fter Board approval of this plan, the measures in it will be developed and adopted through the normal rulemaking process, with public input" (CARB, 2008c).

The *Climate Change Proposed Scoping Plan* states that local governments are "essential partners" in the effort to reduce greenhouse gas emissions, and that they have "broad influence and, in some cases, exclusive jurisdiction" over activities that contribute to greenhouse gas emissions. The plan acknowledges that local governments have broad influence and, in some cases, exclusive authority over activities that contribute to significant direct and indirect greenhouse gas emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations. Many of the proposed measures to reduce greenhouse gas emissions rely on local government actions. The plan encourages local governments to reduce greenhouse gas emissions by approximately 15 percent from current levels by 2020 (CARB, 2008c).

The *Climate Change Proposed Scoping Plan* also included recommended measures that were developed to reduce greenhouse gas emissions from key sources and activities while improving public health, promoting a cleaner environment, preserving our natural resources, and ensuring that the impacts of the reductions are equitable and do not disproportionately impact low-income and minority communities. These measures shown in Table 4.2, also put the state on a path to meet the long-term 2050 goal of reducing California's greenhouse gas emissions to 80 percent below 1990 levels. These measures were presented to and approved by the CARB on December 11, 2008. The measures in the *Scoping Plan* approved by the Board will be developed over the next two years and be in place by 2012.

Table 4.2
List of Recommended Actions by Sector

Measure No.	Measure Description	GHG Reductions (Million Metric Tons per year of CO_2e)
Transportation		
T-1	Pavley I and II – Light Duty Vehicle Greenhouse Gas Standards	31.7
T-2	Low Carbon Fuel Standard (Discrete Early Action)	15.0
T-3[a]	Regional Transportation-Related Greenhouse Gas Targets	5.0
T-4	Vehicle Efficiency Measures	4.5
T-5	Ship Electrification at Ports (Discrete Early Action)	0.2
T-6	Goods Movement Efficiency Measures • Ship Electrification at Ports • System-Wide Efficiency Improvements	3.5
T-7	Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Measure-Aerodynamic Efficiency (Discrete Early Action)	0.93
T-8	Medium- and Heavy-Duty Vehicle Hybridization	0.5
T-9	High Speed Rail	1.0
Electricity and Natural Gas		
E-1	Energy Efficiency (32,000 GWh of Reduced Demand) • Increased Utility Energy Efficiency Programs • More Stringent Building & Appliance Standards • Additional Efficiency and Conservation Programs	15.2
E-2	Increase Combined Heat and Power Use by 30,000 GWh (net reductions include Avoided transmission line loss)	6.7
E-3	Renewable Portfolio Standard (33% by 2020)	21.3
E-4	Million Solar Roofs (including California Solar Initiative, New Solar Homes Partnership and solar programs of publicly owned utilities) • Target of 3000 MW Total Installation by 2020	2.1
CR-1	Energy Efficiency (800 Million Therms Reduced Consumption) • Utility Energy Efficiency Programs • Building and Appliance Standards • Additional Efficiency and Conservation Programs	4.3

Table 4.2
List of Recommended Actions by Sector (cont.)

Measure No.	Measure Description	GHG Reductions (Million Metric Tons per year of CO_2e)
CR-2	Solar Water Heating (AB 1470 goal)	0.1
Green Buildings		
GB-1	Green Buildings	26.0
Water		
W-1	Water Use Efficiency	1.4[b]
W-2	Water Recycling	0.3[b]
W-3	Water System Energy Efficiency	2.0[b]
W-4	Reuse Urban Runoff	0.2[b]
W-5	Increase Renewable Energy Production	0.9[b]
W-6	Public Goods Charge (Water)	TBD[b]
Industry		
I-1	Energy Efficiency and Co-Benefits Audits for Large Industrial Sources	TBD
I-2	Oil and Gas Extraction GHG Emissions Reduction	0.2
I-3	GHG Leak Reduction from Oil and Gas Transmission	0.9
I-4	Refinery Flare Recovery Process Improvements	0.3
I-5	Removal of Methane Exemption from Existing Refinery Regulations	0.01
Recycling and Water Management		
RW-1	Landfill Methane Control (Discrete Early Action)	1.0
RW-2	Additional Reductions in Landfill Methane • Increase the Efficiency of Landfill Methane Capture	TBD[b]
RW-3	High Recycling/Zero Water • Commercial Recycling • Increase Production and Market for Compost • Anaerobic Digestion • Extended Producer Responsibility • Environmentally Preferable Purchasing	9.0[b]
Forests		
F-1	Sustainable Forest Target	5.0
High Global Warming Potential (GWP) Gases		
H-1	Motor Vehicle Air Conditioning Systems: Reduction of Refrigerant Emissions from Non-Professional Servicing (Discrete Early Action)	0.26
H-2	SF_6 limits in Non-Utility and Non-Semiconductor Applications (Discrete Early Action)	0.3
H-3	Reduction of Perfuorocarbons in Semiconductor Manufacturing (Discrete Early Action)	0.15
H-4	Limit High GWP Use in Consumer Products Discrete Early Action (Accepted June 2008)	0.25

Table 4.2
List of Recommended Actions by Sector (cont.)

H-5	**High GWP Reductions from Mobile Sources** • **Low GWP Refrigerants for New Motor Vehicle Air Conditioning Systems** • **Air Conditioner Refrigerant Leak Test During Vehicle Smog Check** • **Refrigerant Recovery from Decommissioned Refrigerated Shipping Container** • **Enforcement of Federal Ban on Refrigerant Release during Servicing or Dismantling of Motor Vehicle Air Conditioning Systems**	**3.3**

H-6	**High GWP Reductions from Stationary Sources**
	• **High GWP Stationary Equipment Refrigerant Management Program:**
	  ○ **Refrigerant Tracking/Reporting/Repair Deposit Program**
	  ○ **Specifications for Commercial and Industrial Refrigeration Systems**
	• **Foam Recovery and Destruction Program**
	• **SF_6 Leak Reduction and Recycling in Electrical Applications**
	• **Alternative Suppressants in Fire Protection Systems**
	• **Residential Refrigeration Early Retirement Program**
		10.9

H-7	**Mitigation Fee on High GWP Gases**	**5.0**
Agriculture		
A-1	**Methane Capture at Large Dairies**	**1.0**[b]

[a] **This is not the SB 375 regional target. CARB will establish regional targets for each MPO region following the input of the regional targets advisory committee and a consultation process with MPOs and other stakeholders per SB 375**

[b] **GHG emission reduction estimates are not included in calculating the total reductions needed to meet the 2020 target**

SOURCE: CARB, 2008c

Senate Bill 97

The provisions of Senate Bill 97, enacted in August 2007 as part of the State Budget negotiations, direct the Office of Planning and Research (OPR) to propose CEQA Guidelines “for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions.” SB 97 directs OPR to develop such guidelines by July 2009, and directs the State Resources Agency, the agency charged with adopting the CEQA Guidelines, to certify and adopt such guidelines by January 2010.

OPR Technical Advisory, CEQA and Climate Change

On June 19, 2008, OPR published a technical advisory on CEQA and Climate Change. The advisory provides OPR’s perspective on the emerging role of CEQA in addressing climate change and greenhouse gas emissions, while recognizing that approaches and methodologies for calculating greenhouse gas emissions and addressing environmental impacts through CEQA review are rapidly evolving. The advisory recognizes that OPR will develop, and the Resources Agency will adopt amendments to the CEQA Guidelines pursuant to SB 97. In the interim, the technical advisory “offers informal guidance regarding the steps lead agencies should take to address climate change in their CEQA documents” (OPR, 2008).

The technical advisory points out that neither CEQA nor the CEQA Guidelines prescribe thresholds of significance or particular methodologies for performing an impact analysis. “This is left to lead agency judgment and discretion, based upon factual data and guidance from regulatory agencies and other sources where available and applicable” (OPR, 2008). OPR recommends that “the global nature of climate change warrants investigation of a statewide threshold of significance for GHG emissions” (OPR, 2008). Until such a standard is established, OPR advises that each lead agency should develop its own approach to performing an analysis for projects that generate greenhouse gas emissions (OPR, 2008).

OPR sets out the following process for evaluating greenhouse gas emissions. First, agencies should determine whether greenhouse gas emissions may be generated by a proposed project, and if so, quantify or estimate the emissions by type or source. Calculation, modeling or estimation of greenhouse gas emissions should include the emissions associated with vehicular traffic, energy consumption, water usage and construction activities (OPR, 2008).

Agencies should then assess whether the emissions are “cumulatively considerable” even though a project’s greenhouse gas emissions may be individually limited. OPR states: “Although climate change is ultimately a cumulative impact, not every individual project that emits GHGs must necessarily be found to contribute to a significant cumulative impact on the environment” (OPR, 2008). Individual lead agencies may undertake a project-by-project analysis, consistent with available guidance and current CEQA practice (OPR, 2008).

Finally, if the lead agency determines emissions are a cumulatively considerable contribution to a significant cumulative impact, the lead agency must investigate and implement ways to mitigate the emissions (OPR, 2008). OPR states: “Mitigation measures will vary with the type of project being contemplated, but may include alternative project designs or locations that conserve energy and water, measures that reduce vehicle miles traveled (VMT) by fossil-fueled vehicles, measures that contribute to established regional or programmatic mitigation strategies, and measures that sequester carbon to offset the emissions from the project” (OPR, 2008). OPR concludes that “A lead agency is not responsible for wholly eliminating all GHG emissions from a project; the CEQA standard is to mitigate to a level that is “less than significant” (OPR, 2008). The technical advisory includes a list of mitigation measures that can be applied on a project-by-project basis.

OPR Proposed Amendments to the CEQA Guidelines

On April 13, 2009, OPR submitted to the Secretary for Natural Resources its proposed amendments to the state CEQA Guidelines for GHG emissions, as required by Public Resources Code section 21083.05 (Senate Bill 97) (OPR, 2009). These proposed CEQA Guideline amendments would provide guidance to public agencies regarding the analysis and mitigation of the effects of GHG emissions in draft CEQA documents. The Natural Resources Agency adopted the Guidelines on December 30, 2009; followed by Office of Administrative Law approval on February16, 2010. The amendments were finalized on March 16, 2010.

The amendments suggest relatively modest changes to various portions of the existing CEQA Guidelines. Modifications address those issues where analysis of GHG emissions may differ in some respects from more traditional CEQA analysis.

Amendments include a new section (15064.4) to assist lead agencies in determining the significance of the GHG impacts. This section urges lead agencies to quantify, where possible, the GHG emissions of proposed projects. In addition to quantification, this section recommends consideration of several other qualitative factors that may be used in determination of significance including: (1) the extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting; (2) whether the GHG emissions exceed a threshold of significance that the lead agency determines applies to the project; and (3) the extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions. The amendments include a new subdivision 15064.7(c) to clarify that in developing thresholds of significance, a lead agency may appropriately review thresholds developed by other public agencies, including the CARB's recommended CEQA Thresholds, or suggested by other experts, such as the California Air Pollution Control Officers Association; so long as any threshold chosen is supported by substantial evidence. The amendments also include a new subdivision 15130(f) to emphasize that the effects of GHG emissions are cumulative, and should be analyzed when the incremental contribution of those emission may be cumulatively considerable.

In addition, the amendments add a new set of environmental checklist questions (VII. Greenhouse Gas Emissions) to the CEQA Guidelines Appendix G. The new set includes the following two questions:

> a) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?
>
> b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHG?

California Air Pollution Control Officers Association (CAPCOA)

In January 2008, the California Air Pollution Control Officers Association (CAPCOA) issued a "white paper" on evaluating and addressing GHGs under CEQA (CAPCOA, 2008). This resource guide was prepared to support local governments as they develop their programs and policies around climate change issues. The paper is not a guidance document. It is not intended to dictate or direct how any agency chooses to address GHG emissions. Rather, it is intended to provide a common platform of information about key elements of CEQA as they pertain to GHG, including an analysis of different approaches to setting significance thresholds.

The paper notes that for a variety of reasons local agencies may decide not to have a CEQA threshold. Local agencies may also decide to assess projects on a case-by-case basis when the projects come forward. The paper also discusses a range of GHG emission thresholds that could be used. The range of thresholds discusses includes a GHG threshold of zero and several non-zero thresholds. Non-zero thresholds include percentage reductions for new projects that would allow the state to meet its goals for GHG emissions reductions by 2020 and perhaps 2050. These would be determined by a comparison of new emissions versus business as usual emissions and the reductions required would be approximately 30 percent to achieve 2020 goals and 90 percent (effectively immediately) to achieve the more aggressive 2050 goals. These goals could be varied to apply differently to new project, by economic sector, or by region in the state.

Other non-zero thresholds are discussed in the paper include:

- 900 metric tons/year CO_2e (a market capture approach);

- 10,000 metric tons/year CO_2e (potential CARB mandatory reporting level with Cap and Trade); 25,000 metric tons/year CO_2e (the CARB mandatory reporting level for the statewide emissions inventory);

- 40,000 to 50,000 metric tons/year CO_2e (regulated emissions inventory capture – using percentages equivalent to those used in air districts for criteria air pollutants),

- Projects of statewide importance (9,000 metric tons/year CO_2e for residential, 13,000 metric tons/year CO_2e for office project, and 41,000 metric tons/year CO_2e for retail projects), and

- Unit-based thresholds and efficiency-based thresholds that were not quantified in the report.

CARB Draft GHG Significance Thresholds

On October 24, 2008, CARB released its *Preliminary Draft Staff Proposal on Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the California Environmental Quality Act* for review and public comment (CARB, 2008c). The Proposal identifies benchmarks or standards that assist lead agencies in the significance determination for industrial, residential, and commercial projects. Staff intends to make its final recommendations on thresholds in early 2009, consistent with OPR's timeline for issuing draft CEQA guidelines addressing GHG emissions and to provide much needed guidance to lead agencies in the near term. The *Proposal* currently focuses on two sectors for which local agencies are typically the CEQA lead agency: industrial projects; and residential and commercial projects. Future proposals will focus on transportation projects, large dairies and power plant projects.
In summary, the *Proposal* recommends:

- In general, categorical exemptions will continue to apply.

- If GHGs are adequately addressed at the programmatic level (i.e., consistent with regional GHG budgets), the impact of certain individual projects can be found to be less than significant.

- Project below screening levels for industrial projects (10,000 metric tons/year CO_2e) and commercial/residential projects (3,000 metric tons/year CO_2e) can be found to be less than significant.

- Projects that meet performance standards (i.e., 30 percent less than Business As Usual [BAU]), or include equivalent mitigation, can be found to be less than significant.

- If a project cannot meet the above requirements, it should be presumed to have significant impacts related to climate change and all feasible GHG mitigation measures (i.e., carbon offsets) should be implemented.

For residential and commercial projects, CARB staff's objective is to develop a threshold on performance standards that will substantially reduce the GHG emissions from new projects and streamline the permitting of carbon-efficient projects. Performance standards will address the five major emission sub-sources for the sector: energy use, transportation, water use, waste, and construction. Projects may alternatively incorporate mitigation equivalent to these performance standards, such as measures from green building rating systems.

Greenhouse Gas Emission Estimates for Construction of Preferred Alternatives 1-A and the No Action Alternative (Group 2 Actions) for the North Delta Flood Control and Ecosystem Restoration Project

The North Delta Flood Control and Ecosystem Restoration Project and related projects would contribute to GHG primarily through the use of diesel-powered construction equipment. There would be no net long-term emissions (permanent sources) of GHG from the North Delta Flood Control and Ecosystem Restoration Project. The combustion of diesel fuel in off-road construction equipment and on-road vehicles (trucks, etc.) would emit greenhouse gases consisting mainly of carbon dioxide (CO_2), along with small amounts of methane (CH_4) and nitrous oxide (N_2O).

While emissions will be created through the operation of construction and earth moving machinery, wetland restoration projects such as the North Delta Flood Control and Ecosystem Restoration Project are expected to become long-term carbon sinks, eventually offsetting emissions from all associated vehicular traffic and short term operation of construction equipment. Further, the cessation of agricultural activities would eliminate current GHG sources such as vehicle traffic, sheep grazing, and pumps operation. Vegetation in wetlands can capture carbon by taking in atmospheric CO_2, converting it to plant mass through photosynthesis, and then sequestering the carbon in the inundated soils that form as plant matter decomposes. Pilot studies being undertaken in mature tule marshes on Twitchell Island have found a very high primary productivity (carbon fixation) and sequestration of below ground carbon (C-immobilization, or long term "storage") that would remain stable. On the other hand, wetlands can release greenhouse gases, including methane, under certain conditions. To address these uncertainties, DWR and USGS have initiated research on the processes that affect the carbon cycle in re-establishing wetlands. This research, being conducted on a farm-scale wetland on Twitchell Island, will attempt to more accurately quantify biogeochemical processes and net GHG sequestration. In addition, the California Climate Action Registry is underwriting the development of research to help quantify the GHG balance in tidally-influenced wetland systems.

Recent research has indicated that in mature tule marshes as much as 25 metric tons of carbon per acre per year may be sequestered, and that as much as 0.5 metric tons of carbon per acre per year may be produced as methane (Robin Miller pers comm.). These results are widely variable depending upon many factors such as temperature, inundation regime, and plant species. It should be noted that sea level rise could potentially increase or decrease carbon fixation and sequestration, depending on the rate of sea level rise. Gradual sea level rise keeps tule marshes productive and peat (and sequestered carbon) buried. Rapid sea level rise could drown tule marsh, make sediment more mobile, and increase tidal energy and erosion, mobilizing sequestered carbon.

For the North Delta Flood Control and Ecosystem Restoration Project, there will be open water, intertidal vegetated wetlands, channels, riparian areas, and uplands. Acreage of subtidal wetlands (much of the subtidal habitat will be less than 1.6 feet deep) vary between the alternatives and options, but range between approximately 1200 and 1300 acres for Alternative 1-A, and approximately half of that area is expected to develop into tule marsh capable of sequestering significant amounts of carbon. All the open water and wetland areas are expected to release methane, though at varying rates depending upon plant type and cover. There will be roughly 500- 600 acres of these habitats. Rates of sequestration and emission depend upon many factors, including plant species, depth and duration of inundation, and the age of the wetlands. There are too many variables to accurately estimate the amount of carbon the mature wetlands will sequester, but based on the Department's most current understanding of these systems, the restored wetlands are anticipated to be a net carbon sink. It is estimated based on recent research results, that approximately forty-seven acres of mature tule marsh could sequester the total CO_2 produced (1192 metric tons) during the construction phase of the project in one year's time.

Post-construction Greenhouse Gas Emission Estimates for Operation and Maintenance (Preferred Alternative 1-A and the No Action Alternative for Group 2 Actions)

One of the actions proposed with implementation of Preferred Alternative 1-A is the decommissioning and removal of six (4 electric, 2 diesel, and 2 propane pumps) of the twelve pumps located on McCormack-Williamson Tract. The diesel and propane pumps are typically operated 10 hours per day, 6 days per week during June, July, and August for crop irrigation. The total CO_2 equivalent emissions for operation of these pumps are approximately 388 metric tons of CO_2 e/yr, or 3880 metric tons every ten years. The reduction in GHG emissions resulting from the decommissioning of the pumps in combination with the creation of wetland habitat (acting as a carbon sink) will substantially offset the GHG emissions produced (1192 metric tons CO_2e total) during the construction of the project.

Under the No Action Alternative for Group 2 actions, expected and potential sources of air pollutant emissions would continue as at present. Air pollution sources would include equipment used with agricultural operations and irrigation, drainage, and domestic well pumps. Because no new facilities would be constructed and modifications to existing facilities would not occur, there would be no increase in air pollutant emissions and thus no air quality-related impacts.

Under the future no action conditions (2025 conditions) there would be no additional air pollutant emissions in the project area as a result of construction or operation. It is expected that minimal development would occur in this area. Because of continuing improvements in engine and motor technology and the retirement of older, higher-emitting engines and motors, it is anticipated that 2025 air pollutant emissions would be lower than the existing conditions described above.

The co-equal benefits of flood control improvements and ecosystem restoration provided with the project implementation will also contribute to long-term reduction in GHG emissions. The 500-600 acres of wetland habitat (Alternative 1-A) restored with the project will: (1) sequester carbon at an estimated rate of 25 metric tons of carbon per acre per year and (2) provide rearing habitat for protected fish species such as steelhead and Chinook salmon, and spawning habitat for the Sacramento splittail. The flood control improvements will help prevent damage to agricultural lands, infrastructure, and the Bay-Delta ecosystem originating from the Cosumnes, Morrison Creek, Dry Creek, and Mokelumne River watersheds. The 1986 flood event for example, inundated over 30,000 acres of farmland in addition to Staten, McCormack-Williamson, and Grizzly Slough parcels (Van Loben Sels pers. com.). Future inundation of the North Delta area is inevitable if the flood control improvements proposed by the project are not implemented. As a consequence, the GHG emissions produced by heavy equipment (pumps, construction equipment, barges, cranes, transportation to and from site, etc) to reclaim the flooded islands and to restore the infrastructure will be considerably higher than the GHG emissions produced from the construction and maintenance of the project. The 2004 Jones Tract flood event for example, required continuous pumping over a four month period to drain the floodwaters and reclaim the 12,000 acre island. The calculated GHG emissions produced as a result of the pumping (see Table 4.3) were estimated at nearly 5450 metric tons of CO_2e. The calculations do not include the emissions produced by the construction equipment, the tugboats used for moving barges, or transportation of flood emergency staff to and from the flood site. A 1986 magnitude North Delta flood event in comparison would likely triple the GHG emissions produced in reclaiming the 30,000+ acres of inundated land, infrastructure, and private property.

Table 4-3. Greenhouse Gas Emissions Inventory and Calculation for 2004 Jones Tract flood event

Jones Tract Pumping Equipment Emissions

Type of Equipment	Maximum Number per Day	Total Operation Days/Year	Total Operation hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel[3]	Total CO_2 Equivalent Emissions (metric tons)
42" Centrifugal Ag Pump, 350 HP	4	128	3072	18	221,184	0.0103914	2,298.41
40" Centrifugal Ag Pump	4	128	3072	17	208,896	0.0103914	2,170.72
30" Centrifugal Ag Pump	2	128	3072	15	92,160	0.0103914	957.67
TOTAL					**522,240**		**5,427**

[1] A 24-hour work day is assumed

[2] Based on information in North Delta Draft EIR

[3] World Resources Institute-Mobile combustion CO2 emissions tool. June 2003 Version 1.2

Total Greenhouse Gas Emissions 5,426.8 MT CO_2 equivalents

Mitigation Measures and Impacts

Mitigation Measures

Mitigation Measure 1a: DWR shall ensure that contractors implement a fugitive dust control program pursuant to the provisions of SMAQMD Rule 403. The purpose of this rule is to reasonably regulate operations that periodically may cause fugitive dust emissions into the atmosphere.

Mitigation Measure 1b: DWR shall ensure that construction equipment is properly tuned and maintained in accordance with manufacturer's specifications.

Mitigation Measure 1c: DWR shall ensure that contractors maintain and operate construction equipment so as to minimize exhaust emissions. During construction, trucks and vehicles in loading and unloading queues would turn their engines off when not in use to reduce vehicle emissions. Construction emissions shall be phased and scheduled to avoid emissions peaks and discontinued during second-stage smog alerts.

Mitigation Measure 1d: Electricity from power poles rather than temporary diesel- or gasoline-powered generators shall be used where available.

Mitigation Measure 1e: All construction vehicles shall be prohibited from idling in excess of five minutes, both on- and off-site.

Mitigation Measure 1f: Coatings and solvents used in the proposed project shall be consistent with applicable SMAQMD rules and regulations**.**

Mitigation Measure 1g: Wheel washers shall be installed where vehicles exit the construction site onto paved roads.

Mitigation Measure 1h: Haul vehicles shall be covered or comply with the vehicle freeboard requirements of Section 23114 of the California Vehicle Code for both public and private roads.

Mitigation Measure 1i: Prior to removing the existing drainage system down-stream of the dam, DWR shall inventory materials that may be asbestos-containing. Any asbestos containing materials including cement pipe (transite) will be removed and disposed of by certified asbestos workers in compliance with applicable asbestos abatement regulations (40 CFR Part 763 and 29 CFR Part 1910).

Significance Criteria

According to Appendix G of the *CEQA Guidelines*, the project would have a significant effect on air quality if it would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any nonattainment pollutant (including releasing emissions that exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollutant concentrations;
- Create objectionable odors affecting a substantial number of people; or
- Conflict with or obstruct implementation of California Global Warming Solutions Act of 2006 (AB 32);
- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or

- Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing emissions of GHG.

As with other individual relatively small projects (i.e., projects that are not cement plants, oil refineries, electric generating facilities/providers, co-generation facilities, or hydrogen plants or other stationary combustion sources that emit more than 25,000 MT CO_2E/yr), the project specific emissions from this project would not be expected to individually have an impact on Global Climate Change (AEP, 2007) and the primary concern would be whether the project would be in conflict with the state goals for reducing greenhouse gas emissions.

Three types of analyses are used to determine whether the project could be in conflict with the state goals for reducing greenhouse gas emissions. The analyses are reviews of:

A. The potential conflicts with the CARB's thirty-nine recommended actions in the Climate Change Scoping Plan;

B. The relative size of the project in comparison to the estimated greenhouse reduction goal of 174 MMTCO2E by 2020 and in comparison to the size of major facilities that are required to report greenhouse gas emissions (25,000 metric tons of CO_2e/yr)[4]; and

C. The basic parameters of a project to determine whether its design is inherently energy efficient, will lead to wasteful energy use, or is neutral with regard to future energy use.

Because of the SMAQMD's regulatory role in the Basin, the significance thresholds and analysis methodologies in the SMAQMD's *CEQA Air Quality Handbook* are used in evaluating project impacts.

With regard to **Item A (**The potential conflicts with the CARB's thirty-nine recommended actions in the Climate Change Scoping Plan), the project does not pose any apparent conflict with the most recent list of CARB early action strategies.

With regard to **Item B (**The relative size of the project in comparison to the estimated greenhouse reduction goal of 174 MMTCO2e by 2020 and in comparison to the size of major facilities that are required to report greenhouse gas emissions (25,000 metric tons of CO_{2e}/yr)4) , the estimate for construction-related emissions for Preferred Alternative 1-A is 1192 metric tons of CO_2e and 0 metric tons of CO_2 e for the No Action Alternative for the Group 2 actions (please see Table 4-4) for a total of 1192 metric tons of CO_2e. The emission estimate was developed using the methodology described below:

DWR staff estimated the emissions-based carbon footprint for the construction of the North Delta Flood Control and Ecosystem Restoration Project using:

- estimated number of anticipated workers needed for construction, their average commute distance, and associated fuel consumption; estimated construction equipment needed, their fuel consumption, and total hours of operation;

4 The State of California has not provided guidance as to quantitative significance thresholds for assessing the impact of greenhouse gas emissions on climate change and global warming concerns. Nothing in the *CEQA Guidelines* has yet addressed this issue.

- estimated number of days for construction;
- estimated volumes of imported fill and on-site grading and cut-and-fill.

The project would not be classified as a major source of greenhouse gas emissions (the lower reporting limit for major sources is expected to be 25,000 metric tons of CO_2e/yr).

When compared to the overall state reduction goal of approximately 174 million metric tons CO2E/yr, the maximum greenhouse gas emissions for the project (1192 metric tons CO_2e during construction or 0.0006 percent of the state reduction goal) are small and would not conflict with the state's ability to meet the AB32 goals. The operations and maintenance estimate is considerably lower at 8.4 metric tons CO_2e/yr or 0.000005 percent of the state reduction goal.

Project construction greenhouse gas emissions for the entire project would total approximately 1192 metric tons of CO_2e, which is 4.7 percent of the 25,000 CO_2 e/yr lower reporting limit, and 0.0006 percent of the state reduction goal.

With regard to **Item C (**The basic parameters of a project to determine whether its design is inherently energy efficient, will lead to wasteful energy use, or is neutral with regard to future energy use, the project is efficient with regard to energy use.) Project construction would use borrow materials within 2 miles of the site, thereby minimizing transportation GHG emissions. Project implementation would also comply with best management practices (BMP) articulated in mitigation measures 1-A through 1h.

Significance: Less than Significant

Table 4-4. Greenhouse Gas Emissions Inventory and Calculation for Preferred Alternative 1-A.

Construction Equipment Emissions

Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel[3]	TotalCO_2 Equivalent Emissions (metric tons)
Backhoe	1	77	924	3	2,772	0.0104	28.80
Excavator	1	121	1452	9	13,068	0.0104	135.79
Bulldozer	1	121	1452	19	27,588	0.0104	286.68
Water Truck	1	121	1452	3	4,356	0.0104	45.26
Dump truck	1	121	1452	8	11,616	0.0104	120.71
Pickup/ Flat Bed Truck	5	121	7260	2	14,520	0.0104	150.88
Loader	1	121	1452	10	14,520	0.0104	150.88
Tugboat	1	55	660	7	4,620	0.0104	48.01
Dragline Crane	1	55	660	3	1,980	0.0104	20.57
Compactor	1	121	1452	10	14,520	0.0104	150.88
TOTAL					**109,560**		**1,138.48**

[1] A 12-hour work day is assumed, multiplied by the maximum number per day. This list of equipment is estimated and could change depending on equipment availability.
[2] Caterpillar Performance Handbook, Edition 36
[3] World Resources Institute-Mobile combustion CO2 emissions tool. June 2003 Version 1.2

Construction Workforce Transportation Emissions

Average Number of Workers per Day	Total Number of Workdays	Average Distance Travelled (round trip)	Total Miles Travelled	Average Passenger Vehical Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline[3]	Total CO_2 Equivalent Emissions (metric tons)
6	90	15	8100	20.8	**389.4**	0.00901	**3.5**

[4] United States Environmental Protection Agency. 2008. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2008. [EPA420-R-08-015]

Construction Materials Transportation Emissions

Trip Type	Total Number of Trips[5]	Average Trip Distance	Total Miles Travelled	Average Semi-truck Fuel Efficiency	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel[3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	1210	10	12100	6	2016.6	0.0104	20.96
Spoils	1210	10	12100	6	2016.6	0.0104	20.96
TOTAL					**4033.3**		**41.91**

[5] Total Number of Trips determined by taking the Project length in days (242) and multiplying by the number of trucks (5) available on the site. Assuming one trip per truck per day.

Operational Emissions

Average Annual Electricity Needed	NA	2	2420	6	403	0.0104	4.19
Average Annual Production Emissions	NA	2	2420	6	403	0.0104	4.19
TOTAL	**0**				**806**		**8.38**

Total Greenhouse Gas Emissions	**1192.31**	**MT CO_2 equivalents**
Construction Equipment Emissions	1,138.5	
Workforce Transportation Emissions	3.5	
Construction Materials Emissions	41.91	
Operational Emissions	8.4	

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CENTRAL DELTA WATER AGENCY
235 East Weber Avenue • P.O. Box 1461 • Stockton, CA 95201
Phone 209/465-5883 • Fax 209/465-3956

March 10, 2008

Via email mreeve@water.ca.gov

Matt Reeve
Delta Suisun Marsh Office
Department of Water Resources
1419 Ninth Street, Room 1601
Sacramento, California 94236-0001

Re: North Delta Flood Control and Ecosystem Restoration Project

Dear Sir:

Containment of Flood Waters and Seepage

We are very concerned and very much opposed to using any part of Staten Island as a detention basin. It is extremely difficult to contain and control the floodwaters introduced into Staten Island. The likely result will be another flooded island with the resulting ongoing uncontrollable seepage into adjoining islands and levees. The experience with the flooding of Upper and Lower Jones Tracts in 2004 where significant seepage flowed into Woodward Island, Victoria Island, McDonald Island, Lower Roberts Island, Drexler Tract and Highway 4 embankment shows what can be expected. When adjoining island land surfaces are lower than the water level in the detention basin, seepage into the adjoining islands is likely. The underseepage could cause adjoining island levee failure. Shallow flooding consistent with the customary winter flooding for agricultural and waterfowl purposes is usually controllable with the existing adjoining area drainage facilities and should not present a problem. CDWA-1

Other than seepage, the detention basins present significant challenges including containment of erosion at the inlet and outlet weirs, levee landside erosion, drainage system and levee damage, avoiding containment levee blowouts, lower end levee blowouts and scour, and dewatering flooded areas. The reoccurring costs of restoring the detention basins after flooding will be large. Establishing funding mechanisms to assure that such restoration will be carried out is difficult and has not been adequately considered. CDWA-2

Matt Reeve
Delta Suisun Marsh Office
Department of Water Resources 2 March 10, 2008

To a lesser extent, flooding of McCormack-Williamson Tract presents similar concerns. CDWA-3

The DEIR acknowledges the potential significant impacts but then assumes that adequate and feasible mitigation will be provided. The analysis does not provide an adequate basis for such a conclusion. The recent concern for seepage and underseepage impacts on levee stability has spawned the development of new standards which are still evolving. Additionally, DWR has been given the task of developing a plan of flood control for the Central Valley with new hydrology and hydraulics. Projected impacts of climate change could dramatically alter the expected floodwater elevations used in the analysis for the subject project. CDWA-4

With regard to seepage impacts, the project relies on monitoring and then mitigation with cutoff walls or passive relief and pumping wells. (See GW-1, page 3.6-13). The effectiveness of such measures cannot be assumed based on the geotechnical information and analysis provided. Unless there is a continuous layer of relatively impervious soil underlying the entire flooded area, the cutoff wall may prove to be ineffective especially for prolonged flooding. The current attitude of the DWR and Corps of Engineers technical folks appears to be disfavorable towards relief wells as a method to address underseepage. The effectiveness of relief wells assuming they can practically be properly designed, constructed, operated and maintained has not been demonstrated on a scale necessary to mitigate the subject impacts. The potential for seepage paths to vary from location to location and at various depths makes it extremely difficult to effectively intercept the seepage. A test using pumped relief wells was conducted on McDonald Island across from flooded Mildred Island in connection with the proposed Delta Wetlands project. The head in the bank of relief wells was effectively lowered but the seepage into the fields landward of the relief wells was uninterrupted. Theoretically it may be possible to intercept the seepage but the feasibility has not been established. CDWA-5

Loss of Agricultural Production and Habitat

The Staten Island Detention Alternatives 2-A, 2-B and 2-C could render unfarmable and even unsuitable for Sandhill Cranes well over a thousand acres. If the floodwaters are not successfully contained in the detention areas, the lower portion of Staten Island could be flooded for long periods or even permanently with ten to twenty feet of water. Diligence in dewatering the detention area will be dependent upon the funding being available and the good faith of the operator of the facility. CDWA-6

Development of Wetland Habitat

If the habitat is connected to the Mokelumne River, the flooding could attract and/or propagate predators which could adversely impact salmonids, particularly the outmigrating CDWA-7

Matt Reeve
Delta Suisun Marsh Office
Department of Water Resources 3 March 10, 2008

salmonids. The predators could be fish, river otter or even birds such as herons and cormorants. The establishment of permanent wetlands as opposed to the infrequent floodwater overflow of bottom land will clearly increase predation from local predators such as black bass and migratory predators such as striped bass. The seasonal wetlands could attract migrating predators and even result in the temporary relocation of the local predators. CDWA-7

Energy Use

The dewatering of flood detention area and the control of seepage could result in significantly greater use of energy. CDWA-8

Reduction in Seasonal Wetland/Floodwater Overflow Habitat

The reduction in stage upstream of McCormack-Williamson Tract could reduce the area subject to overflow, could reduce the amount of water percolating into the underground and the rate and amount entering into the upper soil profile. All of these could affect the propagation of wetland habitat vegetation and wetland animal species. CDWA-9

Reduction in Flood Water Detention

The reduction in upstream stage reduces the amount of upstream flood water detention. Current State and federal flood control policy has emphasized the importance of flood water detentions in the natural overflow areas. All of the proposed alternatives appear to be contrary to this policy. The impact on upstream stage from the 2-D Alternative without the 1-B (Base Case) is not set forth and apparently not proposed. CDWA-10

Reduction in Groundwater Recharge

The reduction in upstream stage will reduce both the areal extent and depth of overflow. Both reductions will reduce the amount of percolation or recharge into the groundwater. CDWA-11

Growth Inducing Impact

The growth inducing impact analysis in the draft does not address the impact of stage reduction in the upstream floodwater overflow areas. The historical urban encroachment into the Morrison Creek, Cosumnes and Mokelumne River flood plains is obvious. Reduction of floodstage will induce the construction of new levee systems and new urban encroachment into the area. The current FEMA criteria for limiting new encroachment is .1 ft. increase in the floodwater elevation. The draft shows the project caused reduction in peak stage at Point Pleasant as ranging from .4 to 2.7 ft. The resulting growth inducing impact is significant and should be mitigated. Altering the proposed project alternatives to avoid the upstream reduction in flood stage and/or acquisition of conservation or other urban development limiting easements over the upstream areas where flood stage will be reduced should be considered. Reduction in CDWA-12

Matt Reeve
Delta Suisun Marsh Office
Department of Water Resources 4 March 10, 2008

floodwater detention in the currently existing natural overflow areas should not proceed in advance of the DWR formulation of the new Plan of Flood Control for the Central Valley. CDWA-13

Alternatives

It would appear that the so-called surge effect could be eliminated by armoring the interior and exterior of the east and southwest levees of the McCormack-Williamson Tract levees, without reduction in elevation and improving (including raising) portions of the remaining levees so the east and southwest armored levees will act as weirs. This would appear to eliminate the upstream stage reduction and avoid the resulting inducement of construction of new encroaching levee systems and urban development into the historic floodwater overflow areas. CDWA-14

Dredging to remove sediments combined with some levee setbacks in the upper reaches of the north and/or south forks of the Mokelumne and around portions of Deadhorse Island would appear to provide flood control benefit in the critical area and some improvement in water conveyance. The needed improvement in downstream levees is an objective shared with other state programs. CDWA-15

Trespass and/or Vandalism Related to Development of New Public Facilities

The placement of new public access in locations where significant trespass is not already occurring may induce greater trespass and vandalism onto private property and increase damage to the environment rather than reduce it. Safe and convenient recreation facilities and infrastructure need adequate policing, garbage and litter control, restrooms and aggressive maintenance. Local police, sheriff and Fish and Game warden capability is already stretched to the limit. Opening new intrusions into non-public areas creates the need for additional policing. If not properly policed, landowners, the public and the environment will suffer. Improving or adding to existing facilities where all the elements for safe and convenient access are already in place and effectively functioning will have the least adverse impact. CDWA-16

Yours very truly,

DANTE JOHN NOMELLINI
Manager and Co-Counsel

DJN:ju
cc: Directors
Thomas M. Zuckerman
John Herrick
Dean Ruiz

Responses to Comments

CDWA-1

Modern levee construction methods will provide much more dependable levees than ongoing rebuilt levees we must now maintain. Containment of floodwaters will be more secure than current containment of the rivers. Anecdotal evidence exists that dredging of adjacent channels encourages seepage under levees due to exposure of more permeable lenses. It is this evidence that supports the idea that flooded islands will produce more seepage into neighboring islands. The neighboring islands that may experience seepage from infrequent flooding of detention basins are the islands that will benefit most from reduced flood risk due to the stage reductions produced by the detention basin. Seepage from dredging is only a temporary concern as it 'heals' itself, with sediments plugging the leaks, and the detention basins will be drained in a relatively short time frame.

The level of seepage associated with the detention basins would be moderated with: (1) the frequency at which the detention basin floods (less than once in every ten years theoretically) (2) the design of the fixed weir (overtopped for events of 10-year or greater occurrence), and (3) the fact that the detention basins would be drained within a relatively short time frame (approximately 30 days).

The North Delta Seepage Monitoring Program was initiated in 1993 to establish baseline groundwater conditions adjacent to stream channels in the North Delta that were proposed to be enlarged as part of the North Delta Program. Since the program's inception groundwater levels have been measured at 71 sites near the North and South Forks of the Mokelumne River on Tyler Island, Staten Island, Bouldin Island, Terminous Tract, McCormack-Williamson Tract, Canal Ranch Tract, Andrus Island, and New Hope Tract. The baseline data collected over several years could be used to compare with the data collected after the implementation of the project to determine if seepage rates have changed and if so, what mitigation measures should be implemented.

The flood protection provided with the construction of the detention basin will result in far less seepage than has occurred as a consequence of past flood events (most recently in 1997).

CDWA-2

The construction methods for detention basins are well established and used in daily practice. All of these factors (containment of erosion at the inlet and outlet weirs, levee landslide erosion, drainage system and levee damage, avoiding containment levee blowouts, lower end blowouts, scour, dewaterering flood areas) have been considered in the design and potential costs for each of the proposed detention basins.

The cleanup of flooded detention basins is not expected to occur for storm events more frequent than 10 years and many of those will only produce minimal flooding of the basin. Even with some flooding of the basin the restoration will require minimum effort to ready it for wildlife friendly agriculture. Furthermore, the cleanup and reclamation costs associated with a levee failure would be considerably higher in comparison to the restoration of a designed, properly constructed detention basin.

CDWA-3

DWR is aware of the potential damages associated with underseepage. However, there has never been a documented levee failure in the Delta directly resulting from flooding of an adjacent island. This includes (1) any of the islands that were flooded but later reclaimed (any Delta island that has flooded), and (2) any of the islands surrounding the Delta flooded islands of Franks Tract, Little Franks Tract, Mildred Island, lower Sherman lake, Big Break, Liberty Island. Areas with a high potential for underseepage risk can be identified and mitigated for that risk. Jones Tract for example, contained a few localized spots of underseepage which were addressed. It is DWR's opinion that neighboring islands were not at significant risk of levee failure due to localized areas of underseepage on Jones Tract.

The North Delta Seepage Monitoring Program was initiated in 1993 to establish baseline groundwater conditions adjacent to stream channels in the North Delta that were proposed to be enlarged as part of the North Delta Program. Since the program's inception groundwater levels have been measured at 71 sites near the North and South Forks of the Mokelumne River on Tyler Island, Staten Island, Bouldin Island, Terminous Tract, McCormack-Williamson Tract, Canal Ranch Tract, Andrus Island, and New Hope Tract. The baseline data collected over several years could be used to compare with the data collected after the implementation of the project to determine if seepage rates have changed. To the extent that the seepage monitoring indicates impacts attributable to the project, relief wells will be installed to mitigate such impacts.

The costs associated with implementing any of the Group 1 flood control actions on McCormack-Williamson Tract will be far less expensive than the costs associated with a levee breach or other flood related damages.

CDWA-4

The analysis was performed with the best information available. It is clear that the future Delta will be very different from today's Delta and indeed the Delta of the past. However, changes will not be predictable and known until they occur and decisions cannot wait until then. It is inevitable that some adaptation will need to be made as the effects of climate change occur or become better understood. Current hydraulic modeling work cannot capture all the effects of sea level rise with or without island flooding. McCormack-Williamson tract elevations are currently inter-tidal and would be expected to keep up with sea level rise and remain inter-tidal for the next century or beyond. Most climate change predictions suggest that winter flood events could occur more frequently and increase the benefits of the proposed work. In the North Delta sea level rise will probably have a smaller impact on stage than actual design flows.

CDWA-5

The level of seepage associated with the detention basins would be moderated with: (1) the design of the fixed weir (overtopped for events of 10-year or greater occurrence), and (2) the fact that the detention basins would be drained within a relatively short time frame (up to 30 days). It is a common engineering technique to intercept seepage (e.g. soil-bentonite slurry cut-off wall) and though it is true each event is unique and may result in additional expense; there is nothing from a purely technical standpoint that is impossible about controlling seepage. The US Army Corps of Engineers is utilizing deep cut-off walls as the preferential method to intercept seepage for the project levees in the Central Valley.

The North Delta Seepage Monitoring Program was initiated in 1993 to establish baseline groundwater conditions adjacent to stream channels in the North Delta that were proposed to be enlarged as part of the North Delta Program. Since the program's inception groundwater levels have been measured at 71 sites near the North and South Forks of the Mokelumne River on Tyler Island, Staten Island, Bouldin Island, Terminous Tract, McCormack-Williamson Tract, Canal Ranch Tract, Andrus Island, and New Hope Tract. The baseline data collected over several years could be used to compare with the data collected after the implementation of the project to determine if seepage rates have changed and if so, what mitigation measures should be implemented.

In any event, the long term consequences of sea level rise and continued subsidence will lead to increased seepage even with the No Action Alternative. Anecdotal evidence exists that dredging of adjacent channels encourages seepage under levees through more permeable lenses. It is this evidence that supports the idea that flooded islands will produce more seepage into neighboring islands. Seepage from dredging, for example, has proven to be only a temporary concern as it "heals itself", with sediments plugging the channel bottom. Therefore, in addition to cutoff walls, seepage will be naturally mitigated, although over time, seepage will continue to increase with or without a project.

The flood protection provided with the construction of the detention basin will result in far less seepage than has occurred as a consequence of past flood events (most recently in 1997).

CDWA-6

The cleanup of flooded detention basins is not expected to occur for storm events more frequent than 10 years and many of those will only produce minimal flooding of the basin. Even with some flooding of the basin the restoration will require minimum effort to ready it for wildlife friendly agriculture. Corn and other crops typically farmed on the island are not in the ground during the flood season and if the detention basins were to flood, the water in the basin would be fully removed (up to 30 days) before saturation of the levees occurs and to allow farming to resume in the spring.

CDWA-7

Creating wetland habitat with a hydrologic connection to the Mokelume River will provide habitat for floodplain rearing fish species such as the Chinook salmon and floodplain spawning fish such as the Sacramento Splittail and even the Delta Smelt, though it is rarely found in this area of the North Delta. The comment that predation will increase as a result of providing additional habit is possible; yet this is more than outweighed by the cover and food provided by the additional wetland and riparian habitats which will benefit multiple native plant and animal species.

DWR, in consultation with DFG, NMFS, and USFWS, will prepare a Floodplain and Shallow Water Tidal Marsh Habitat Restoration and Monitoring Plan to ensure that ecosystem restoration benefits for fish species are maximized, while minimizing the potential for adverse effects on native fish species from habitat creation (e.g., creation of predator habitat). The plan will provide the Corps and the resource agencies with sufficient information to determine the adequacy of the proposed mitigation and to issue a Section 404 permit. The Corps will approve the plan prior to project construction activities that affect the Corps jurisdictional areas in the project area.

The plan will be prepared to meet or exceed the specifications and mitigation requirements pertaining to Corps jurisdictional areas as specified by resource agency requirements. The plan will also be provided to the State Water Board to determine the adequacy of the proposed mitigation with respect to water quality and to issue a Section 401 water quality certification for the project.

The goal of the mitigation effort is to avoid and minimize adverse effects on native species from creation of predator habitat, as well as maximizing benefits to native fish species through ecosystem restoration. To support this goal, the Floodplain and Shallow Water Tidal Marsh Habitat Restoration and Monitoring Plan will meet the following objectives:

- to the extent practicable, design floodplain and shallow water tidal marsh habitats to maximize potential benefits to native fish species, while minimizing the creation of habitat favoring predatory fish species;
- facilitate early development of floodplain and shallow water tidal marsh habitats so that potential benefits are maximized as close to construction as is practicable;
- integrate concerns for special-status species (e.g., Delta smelt, splittail, and Chinook salmon) into the habitat restoration design to the maximum degree practicable; and
- design the floodplain and shallow-water tidal marsh habitats so that, once established, they will require little or no maintenance.

DWR will submit a performance monitoring report to the Corps at the end of each monitoring year. The report will summarize monitoring methods, results, progress toward meeting the final performance standards, and corrective actions taken.

Alternatives 1-A, 1-B, and 1-C were developed by DWR and other government scientists based on the recommendations from the North Delta Science Panel (NDSP). The NDSP comprises scientific experts in a diversity of fields including hydraulics/hydrology, water quality, and terrestrial and aquatic ecology. Their recommendations are the basis for the three ecological conceptual models, each with different ecological objectives:

1 Maximizing fluvial and tidal processes to create a diverse network of riverine, floodplain, and tidal habitats based on natural sedimentation and channel formation;
2 maximizing floodplain habitat to benefit fish that spawn and rear on floodplain by allowing flooding (with some tidal action to maintain water quality) during the wet season; or
3 creating floodplain habitat as described above, combined with a demonstration project to reverse subsidence and increase elevations on the tract.

The NDSP recognized the necessity for a greater range of alternatives to meet the goal of ecosystem restoration at McCormack-Williamson Tract and the need to focus on creating sustainable function rather than a particular habitat due to dynamic nature of the Delta.

CDWA-8

Increased energy usage resulting from seepage will occur whether or not the project is implemented, due to future sea level rise and continued subsidence of the peat islands. As for the detention basins, the weirs would be designed to overtop during one in ten year events, so increased pumping and energy usage would probably occur once every several years. Pumps would be used to lower the water level as soon as possible to at least 3 feet below the crest of existing levees. The action would protect the existing levees and the detention levee from excessive erosion and overtopping from wind generated waves. The basin would then be drained within approximately 30 days. The water in the basin would be fully removed before saturation of the levees and to allow farming to resume in the spring. The amount of energy used for draining the detention basin will be far less in comparison to the energy costs associated with a levee failure and reclamation of a flooded island(s).

CDWA-9

The reduction of stages upstream will mostly occur only for events of 10-year or greater occurrence while flooding nearly 2/3 of McCormack-Williamson tract on an ongoing basis. In addition, 10 year flood events generally occur during the winter months when the ground is already saturated with water. The net result is more acres covered over time to supplement groundwater. Areas that don’t undergo inundation more often than every ten years do not of themselves support wetland habitat.

CDWA-10

The reduction of stages upstream will mostly occur only for events of 10-year or greater occurrence while flooding nearly 2/3 of McCormack-Williamson tract on an ongoing basis. The net result is more acres covered over time to supplement groundwater.

Please provide a reference substantiating the existence of such a policy, and please define "natural overflow areas". The Delta is it exists today is mostly anthropogenic with a small patchwork of undisturbed sites, such as Elk Slough, which are more reminiscent of the natural Delta. Historical overflow areas such as New Hope Tract and the Franklin Pond are not the most appropriate method to improve flood control in the area, which is why the North Delta Flood Control and Ecosystem Restoration Project proposes flood control improvements on McCormack-Williamson Tract and Staten Island. These actions will protect surrounding properties from future flood related damage that would otherwise occur if the project is not implemented.

None of the flood alternatives were simulated by themselves. Each was simulated with ecological option 1-B, an arbitrary choice, as a way to compare each flood option against one another. However, examination of Table E-6, E-7 and E-8 do provide information on how the 2D dredging alternative modifies the hydraulics. The dredging clearly suggests that the flow split between the South Fork and North Forks will be changed, increasing the conveyance on the South Fork. Consequently, the stages on the North Fork are lowered while those on the South Fork show mixed changes.

CDWA-11

The Preferred Alternative 1-A for the Group 1 Actions proposes completely degrading the southwest levee to the elevation of the island floor; thereby allowing tidal water onto the southern end of McCormack-Williamson Tract. Perennial tidal wetlands and emergent tidal wetlands would inundate 2/3 of the Tract on a daily basis. The net result is more acres covered over time to supplement groundwater.

The reduction of stages upstream that would occur with the construction of the detention basins would not impact groundwater recharge because the filling of the detention basins would occur during the winter months when the ground is already saturated. Secondly, the detention basins are designed to overtop during 10 year or greater flood events; the basins would therefore be dry most years having no impact on upstream stages.

CDWA-12 and CDWA-13

The designed project does not propose changing the 100-year floodplain and as such would have no impact on urban inducement. Additionally, the project area is mostly in the Delta Primary Zone and under the auspices of the Delta Protection Commission and the newly formed Delta Stewardship Council. One of the major responsibilities of the Delta Protection Commission is "to protect maintain and, where possible, enhance and restore the overall quality of the Delta environment, including, but not limited to, agriculture, wildlife habitat, and recreational activities." Page 7-3 of Chapter 7 (Growth Inducing and Cumulative Impacts) provides a more detailed discussion of why none of the alternatives for the project propose modifications substantial enough to change the 100-year floodplain.

CDWA-14

If the other levees on McCormack-Williamson Tract held up to the additional stress (not likely) then the result would be to increase the flooded upstream area of Franklin Pond to a higher elevation than now occurs since failure now comes with any overtopping of the northeast levee. In actuality another levee on McCormack-Williamson Tract, or another nearby tract, would likely fail, changing the location of the typical surge but not lessening the effect.

CDWA-15

The rationale for moving ahead with a dredging project on the scale proposed in the North Delta must be substantive in lieu of the complex and costly regulatory requirements for new projects (and to a lesser extent, maintenance dredging projects). There must be evidence to support that sedimentation of the waterway has significantly reduced the cross sectional area and conveyance capacity of the stretch of the Mokelumne River identified in the alternative (see Figure 2-8). According to the bathymetry data results collected for the North Delta Scour Monitoring Program, that is not the case. DWR's North Delta Scour Monitoring Program was initiated in 1993 to evaluate changes in channel cross sections at 38 sites in the North Delta; including 7 sites located on the North Fork of the Mokelumne River. The stretch of the Mokelumne River proposed for dredging in the North Delta Project (UM-15, UM-25, UM-30, SN-25, SN-30, NM-10, DH-10, SM-10, SM-20, SM-35, SM-45, and SM-55,) has either increased in Cross Section Area or remained at steady state at the monitoring sites over the 15 year period of the ongoing study. There are additional monitoring sites upstream and in the sloughs which intersect the south fork of the Mokelumne River that follow a similar pattern of erosion instead accumulation of sediment. Figure 2-9 displays a map of the site locations on the North Fork of the Mokelumne River and figures 2-10 through 2-31 display changes in cross sectional area for each of the monitored sites. The BASE AREA referred to in graphs is the cross sectional area of the site in 1994, the first year of bathymetry data collection.

The North Delta Scour Monitoring results are supported by the findings of the North Delta Sedimentation Study (November, 2006) prepared by Northwest Hydraulics Consultants (NHC) for the Department of Water Resources (Volume 3 of the North Delta Flood Control and Ecosystem Restoration Project DEIR, November 2007). NHC evaluated bathymetric data from 1934 in combination with the North Delta Scouring Monitoring Program's detailed annual cross section data from 1994-2001. "At most locations, the 1934-2001 and 1994-2001 cross-section data show declines in channel invert elevation as well as increases in cross-section for the 1994-2000 period". Due to the lack of density of data points, estimates of the 1934 channel invert could be made at only 13 of the 32 cross-section locations; however almost all of the data (11 of 13) show an apparent decline in invert elevation from 1934 to 2001. Only two sites indicate a possible channel invert rise, NM-30 (+1) and SM-20 (+5)." Bathymetry data collected for both of these sites from 2001-2008 reflect an increase in cross-section area for site

NM-30 since 2001 and a slight decrease in cross-section area for SM-20; however the 2008 cross-sectional area for SM-20 is over 200 sq. ft. higher than the 1994 data (see Figures 2-16 and 5-3). Please refer to the Preferred Alternative discussion beginning on page 2-66 for more information.

Alternative 2-D includes a modified setback levee component on the same geographic scale as proposed for the dredging actions on the South Fork of the Mokelumne River. Both sides of the channel are proposed to be modified, except where structures or other infrastructure cannot be easily relocated. The levees on Staten Island, New Hope Tract, Canal Ranch Tract, and Brack Tract adjacent to the South Fork would therefore be included within the proposed scope of the levee modification. The modified setback levee would be located anywhere from 100' to 500' feet inland of the existing levee (see Figure 2-31of Volume 2- Figures, North Delta Flood Control and Ecosystem Restoration Project Draft EIR) and will remove several hundred acres of land from private ownership. Local landowners and Reclamation Districts have invested millions of dollars for levee construction and maintenance on the stretch of the south fork identified for modified setback levees. For example, RD 348 (New Hope Tract) is nearing completion of Phase II, a $7 million construction project to upgrade nearly 4 miles (stations 410+00 to 630+00) of levees to the PL 84-99 (100 year flood protection) standard; located on the northwestern side of the Tract. Nearly the entire length of the Phase II levee work (stations 410+00 to 600+00) falls within the boundaries of the site proposed for modified setback levees. It is therefore, unlikely that local stakeholders would be receptive to implementation of this Alternative 2-D component.

CDWA-16

One of the optional components of the project is not to "open new intrusions" into non-public areas but rather to improve existing recreation facilities and amenities, including boat launch facilities, parking areas, signage, and public restrooms. These upgrades would focus primarily on Delta Meadows an unclassified State Park property north of the Delta Cross Channel and west of McCormack-Williamson Tract. This property provides public access to boating, fishing, and hiking along levee trails, and the Department of Parks and Recreation offers guided canoe tours during the summer season. Other optional recreational components for the project include constructing wildlife viewing areas on Staten Island which is also currently open to the public.

EAST BAY MUNICIPAL UTILITY DISTRICT

ALEXANDER R. COATE
DIRECTOR OF WATER AND NATURAL RESOURCES
(510) 287-1663
acoate@ebmud.com

JON A. MYERS
MANAGER OF NATURAL RESOURCES
(510) 287-1121
myers@ebmud.com

March 24, 2008

Mr. Matt Reeve
Delta Suisun Marsh Office
Department of Water Resources
1416 9th Street, Room 1601
Sacramento, CA 94236-0001

SUBJECT: North Delta Flood Control and Ecosystem Restoration Project Draft EIR

Dear Mr. Reeve:

Thank you for the opportunity to comment of the California Department of Water Resources (DWR) Draft Environmental Impact Report (Draft EIR) for the North Delta Flood Control and Ecosystem Restoration Project. The Draft EIR assesses flood control improvements principally on and around Staten Island, Dead Horse Island, and McCormack Williamson Tract designed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem resulting from overflows caused by insufficient channel capacities and catastrophic levee failures.

East Bay Municipal Utility District (EBMUD) has participated in the development of the Draft EIR and continues to work collaboratively with the California Department of Fish and Game and the U.S. Fish and Wildlife Service to restore and enhance populations of fall-run Chinook salmon and Central Valley steelhead in the lower Mokelumne River.

The alternatives described and analyzed in the Draft EIR include:

- Group 1:1-A - Fluvial Process Optimization
- Group 1:1-B - Seasonal Floodplain Optimization
- Group 1:1-C - Seasonal Floodplain Enhancement and Subsidence Reversal
- Group 2:2-A - North Staten Detention
- Group 2:2-B - West Staten Detention
- Group 2:2-C - East Staten Detention
- Group 2:2-D - Dredging and Levee Modifications

It is our understanding that one alternative from each group will be selected to advance as the preferred alternative and that comments received on the administrative draft and public EIRs will be considered in determining the preferred alternative, which will be identified in the Final Environmental Impact Report (FEIR). Based on our review of the Draft EIR, East Bay Municipal Utility District recommends that alternatives 1-A (Fluvial Process Optimization) and 2-D (Dredging and Levee Modifications) would result in flood control improvements in a manner that best benefits aquatic and terrestrial habitats, species, and ecological processes. We base this recommendation on the following (text from Draft EIR in italics): EBMUD-1

375 ELEVENTH STREET . OAKLAND . CA 94607-4240 . FAX (510) 287-1275
P.O. BOX 24055 . OAKLAND . CA 94623-1055

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Juvenile fall-run Chinook salmon and Central Valley steelhead would be particularly vulnerable to entrainment with diversion of flood flows onto McCormack-Williamson Tract and Staten Island. Juvenile salmonids produced in the Mokelumne and Cosumnes Rivers would be at greatest risk for diversion onto McCormack-Williamson Tract and Staten Island during Project operations.

<u>Of the Alternatives described for Group I only Alternative 1-A has the potential to create floodplain habitat while minimizing the potential to strand juvenile fish.</u>

Page 4.2-59
Under Alternative 1-A, during receding flood events, floodwaters would naturally drain from McCormack-Williamson Tract by gravity into the adjacent channels of Snodgrass Slough and the Mokelumne River.

Page 4.2-71
Under Alternative 1-B, the potential for fish stranding as a result of Project operation would be greater than that discussed under Alternative 1-A because:
- *there would be no perennial connection between the created floodplain and adjacent river channels, such as the "starter channel" or the intertidal habitat proposed under Alternative 1-A; therefore, drainage of the floodplain would occur through the box culvert/nekton gates and by pumping; and,*
- *fish behavior or other factors may prevent or discourage fish from using the box culverts, tide gates, and pumps to reenter the Delta.*

Page 4.2-72
Operation of McCormack-Williamson Tract under Alternative 1-B is considered to be a significant impact because of the expected frequency that McCormick-Williamson Tract would flood, the relatively large extent of floodplain habitat that would be created under this alternative, the lack of a permanent open water connection between the created floodplain and the adjacent Delta channels, and the potential for Project operation to strand special-status species.

Page 4.2-77
While the potential for this impact under Alternative 1-C would be similar to that under Alternative 1-B, the potential for stranding of fish could occur in two separate areas: behind the degraded southwest levee and the cross-levee. For reasons discussed under Alternative 1-B, this impact is considered to be significant.

Although the proposed mitigation measures (Mitigation Measure Fish-5, -6 & -7) associated with Alternatives 1-B and 1-C are intended to minimize impacts resulting from stranding, Alternative 1-A appears to most effectively minimize potential stranding impacts. EBMUD-2

<u>Of the Alternatives described for Group II only Alternative 2-D has the potential to provide flood control benefits while minimizing the potential to strand juvenile fish.</u>

Page 4.2-92 (Alternative 2-A)
Salmonids originating in the Mokelumne River system (fall-run Chinook salmon, steelhead) have the greatest potential for exposure to diversion into the detention basin because the North Mokelumne River serves as a primary migration route through the Delta. During the winter and

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early spring, Chinook salmon and steelhead migrating down the North Mokelumne River may be diverted into the detention basin. However, potential diversion into the detention basin would occur infrequently (i.e., on average once every 10 years) and for short duration (as discussed before, the periods during which peak flows would be diverted are expected at most to last only for a few days). The potential for diversion of salmonids that are rearing in the North Mokelumne River in the vicinity of the inlet weir and upstream habitats, including salmonids originating in the Sacramento River, would be further minimized because many juveniles would be expected to move downstream in response to increased flows prior to water surface elevations reaching 10 ft msl. Based on the effects described above, operation of the off-channel detention basin would not be expected to divert a substantial proportion of any population of salmonids. However, the potential for entrapment and delayed migration of salmonids would conflict with the goals of the ecosystem restoration component of this project.

Page 4.2-93
Operation of the Staten Island off-channel detention basin under Alternative 2-A is considered to be a significant impact because of the lack of certainty surrounding the quantification of this potential impact with available information, the relatively large size of the detention basin, the potential for direct injury or mortality to fish as they pass through the pumps and reenter the river, and the potential for special-status fish species to be injured or killed.

Page 4.2-101
The potential for fish stranding, and direct injury and mortality from pumping under Alternative 2-B would be similar to that discussed above under Alternative 2-A; however because the capacity of the West Staten Island detention basin would be about 13,000 af less than the capacity of the North Staten Island detention basin, fewer Mokelumne River fish would probably be diverted into the detention basin under this alternative than under Alternative 2-A.

Page 4.2-105
Under Alternative 2-C, the East Staten Island detention basin would consist of approximately 1,600 acres of land with a capacity of approximately 32,400 acre feet. Impacts on fish associated with stranding and passage through pumps during basin draining would be similar to those described under Alternative 2-B, except that the location of the diversion and discharge of water would be on the South Fork Mokelumne River.

Page 4.2-111
The potential for direct injury and entrainment of juvenile salmonids from dredging [Alternative 2-D] *would largely be avoided because DWR would limit dredging to the June–August period when juvenile salmonids in the North Delta are least abundant.*

Although the proposed mitigation measures (Mitigation Measure Fish-9, -10, -11 & -12) for the significant stranding impacts associated with Alternatives 2-A, 2-B and 2-C are intended to minimize impacts resulting from stranding, Alternative 2-D appears to most effectively minimize potential stranding impacts. EBMUD-3

East Bay Municipal Utility District recommends that Alternative 1-A (Group I) and Alternative 2-D (Group II) be considered the preferred alternatives for the North Delta Flood Control and Ecosystem Restoration Project. These alternatives appear to provide flood control improvements in EBMUD-4

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a manner that minimizes the potential impacts to fall-run Chinook salmon and Central Valley steelhead produced in the lower Mokelumne River.

If you have any questions, please contact Mr. Jim Smith, Supervising Fisheries and Wildlife Biologist, at 510-287-1661.

Sincerely,

Jon A. Myers

Jon A. Myers
Manager of Natural Resources

JAM:JRS:dec

cc: Jim Smith
Joe Miyamoto

Responses to Comments

EBMUD-1

Comments received for the ADEIR and DEIR will be considered in the determination of the preferred alternatives for the project. The commenter's recommendations for Alternative 1-A (Fluvial Process Optimization Plan) and 2-D (Dredging and Levee Modification Plan) will be forwarded to the decision makers for their review.

EBMUD-2

Comment noted and acknowledged; fish stranding should be unlikely with Alternative 1-A since much of the McCormack-Williamson Tract will be subject to tidal waters and therefore hydrologically connected to the exterior channels at least on a daily basis.

EBMUD-3 and EBMUD-4

Comments noted and acknowledged.

MWD
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Executive Office

March 27, 2008 **Via E-mail and Mail**

Mr. Dave Mraz
California Department of Water Resources
901 P Street, 3rd Floor
P.O. Box 942836
Sacramento, CA 94236-0001

Dear Mr. Mraz:

Notice of Availability of the Draft Environmental Impact Report
for the North Delta Flood Control and Ecosystem Restoration Project

The Metropolitan Water District of Southern California (Metropolitan) has received a copy of the Notice of Availability of the Draft Environmental Impact Report for the North Delta Flood Control and Ecosystem Restoration Project (Project). The California Department of Water Resources (DWR) is acting as the Lead Agency under the California Environmental Quality Act for this Project. The proposed Project is to implement flood control improvements in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. Flood control improvements are needed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem resulting from overflows caused by insufficient channel capacities and catastrophic levee failures in the Project study area. This letter contains Metropolitan's comments on the Draft EIR as a potentially affected public agency.

Metropolitan has the following comments:

1. Restoring the peat soil elevations to these lands is welcome. Given the importance of levee stability, Metropolitan recommends expanding the extent of these lands devoted to growing peat. Metropolitan further recommends that DWR and The Nature Conservancy obtain carbon offset credits for growing peat. MWD-1

2. How does the Department of Water Resources intend to coordinate this project with the Bay Delta Conservation Plan efforts for a dual conveyance in the Delta which could pass through McCormick-Williamson Tract? Additionally, how is this Project consistent with the broad ecosystem visions being developed by the Governor's Blue Ribbon Task Force? MWD-2

700 N. Alameda Street, Los Angeles, California 90012 • Mailing Address: P.O. Box 54153, Los Angeles, California, 90054-0153 • Telephone: (213) 217-6000

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3. This Project includes Grizzly Slough, which was paid for by State Water Project (SWP) funds. What mitigation credits would be obtained by the SWP for use of the Grizzly Slough property? If this Project is funded as a general fund program, then the SWP needs to be reimbursed for the property's value. MWD-3

Finally, if coordinated with other current Department actions, could an Isolated Facility be used to convey flood waters and reduce North Delta project costs by eliminating expensive flood detention features on Staten Island? MWD-4

We appreciate the opportunity to provide input to your planning process. If we can be of further assistance, please contact Mr. Peter Jacobsen at (213) 217-2650.

Very truly yours,

Delaine W. Shane
Manager, Environmental Planning Team

PJ/BSM/bsm
(Public Folders/EPU/Letters/19-FEB-08A.doc –Dave Mraz, North Delta Flood Control Ecosystem Restoration)

MWD-1

Alternative 1-C is the one alternative which proposes a subsidence reversal demonstration project on the lower section of McCormack-Williamson Tract; most of which is comprised of mineral soils. A comparison of recent DWR LiDAR (2007) plotted over the USGS quadrangle (1974 survey) data has shown McCormack Williamson-Tract has not subsided in over three decades. Additional projects of this nature are not proposed; however concurrent studies are underway on several western islands in the Delta.

A carbon market has not yet been established for California though progress continues under the auspices of the California Air Resources Board. Once a market has been developed over the next several years DWR will pursue use of carbon offset credits, hopefully in cooperation with The Nature Conservancy.

MWD-2

The North Delta Flood Control Ecosystem Restoration Project is much further along in the environmental documentation process compared to the Bay Delta Conservation Plan (BDCP). Completion of the FEIR is anticipated in the spring of 2010 versus the BDCP EIR/EIS which has a completion date of December, 2010. However, one of the actions for the proposed eastern alignment is to excavate tunnels 200 feet beneath the surface of McCormack-Williamson Tract. This action would not conflict with any of the Alternatives proposed in the North Delta EIR.

The BDCP is a planning and environmental permitting process to restore habitat for Delta fisheries in a way that reliably delivers water supplies to 25 million Californians. Federal and state agencies, environmental organizations, fishery agencies, water agencies, and other organizations are all working together to develop the Plan. The goals of the BDCP are consistent with the recommendations of the Blue Ribbon Task Force.

The Blue Ribbon Task Force released their Delta Vision Strategic Plan in October, 2008; one of panel's several recommendations (Action 3.1.1, page 71) was to **"update the Draft North Delta Flood Protection Environmental Impact Report for Staten Island and McCormick-Williamson Tract to provide for integrated seasonal floodplain habitat, linkage to planned adjacent intertidal marsh, and additional flood protection for lands along the lower Mokelumne and Cosumnes River corridors."**

The primary objectives of the North Delta Draft EIR are consistent with Blue Ribbon Panel recommendations by proposing flood control and ecosystem restoration benefits for Staten Island and McCormack-Williamson Tract. These include the creation of seasonal wetlands, intertidal marsh, subtidal, supratidal, and riparian habitats as articulated in the discussion of preferred Alternative 1-A.

MWD-3

The Grizzly Slough parcel was purchased with State Water Contractor funds for the primary purpose of restoring riparian and wetland habitats as mitigation for DWR projects. The funding mechanism and determination of mitigation credits for project implementation have not yet been established. If restoration for Grizzly Slough does not included mitigation credits for the State Water Project then the State Water Contractors will be reimbursed for the property.

MWD-4

Typically there is only 4,000-5,000 cfs being exported during anticipated flood months (December – May) and the total capacity of a canal is likely to only be 10,000-15,000 cfs. This amount alone would not provide significant benefit to flood reduction. Even the maximum size of an isolated facility is also likely not to be sufficient to be of great benefit. The additional expense of the intake locations would be quite high with the need to avoid putting debris into an isolated facility and the pumping capacity needed to lift the water into the canal.

Chapter 5
Comments from Individuals

Chapter 5
Comments from Individuals

This section contains copies of the comment letters received from individuals, listed in Table 5-1. Each letter is followed by responses to the comments presented in that letter. Responses to comments are numbered individually in sequence, corresponding to the numbering assigned to comments presented in that letter. The responses are prepared in answer to the full text of the original comment.

Table 5-1. Comments Received from Individuals on North Delta Flood Control and Ecosystem Restoration Project Draft EIR

Code	Name/ Affiliation
TV	Carel (Topper) D. Van Loben Sels, Reclamation District 551 and Delta Protection Commission
SM	Steve Mello, Trustee and President of Reclamation District 563

CAREL D. VAN LÖBEN SELS
P. O. BOX 7
WALNUT GROVE, CA 95690
916-776-1229

DATE: THURSDAY, FEBRUARY 21, 2008

TO: MATT REEVE
D.W.R.
1416 9TH STREET, ROOM 1601
SACRAMENTO, CA. 95814
PHONE 916-651-7014
FAX 916-651-9678
EMAIL mreeve@water.ca.gov

T.V.L.S.

FROM: TOPPER VAN LOBEN SELS (RECLAMATION DISTRICT #551 AND DELTA PROTECTION COMMISSION)
P.O. BOX 7
WALNUT GROVE, CA. 95690
PHONE 916-439-3291
FAX 916-776-1510
EMAIL linavls@citlink.net

RE: COMMENTS ON THE NORTH DELTA FLOOD CONTROL AND ECOSYSTEM RESTORATION PROJECT

THIS PROJECT HAS THE POTENTIAL TO ACCOMPLISH THE FOLLOWING:

1. INCREASE IN DELTA RECREATION
2. IMPROVE THE NORTH DELTA ECOSYSTEM
3. ELIMINATE THE FLOOD SURGES OF 1986 AND 1997
4. LOWER FLOOD STAGES ON THE LEVEES THAT PROTECT **THE HISTORIC LEGACY TOWNS OF LOCKE, THORNTON, AND WALNUT GROVE.**
5. INCREASE CHANNEL CAPACITIES ON BOTH SIDES OF STATIN
6. MINIMIZE FLOODING OF ENDANGERED SPECIES HABITAT (SANDHILL CRANES)

THE FOLLOWING IS A LIST OF CONCERNS LOOKING DOWN AT THE BIG PICTURE FROM 30,000 FEET:

1. THE GOAL MUST BE MORE SPECIFIC
2. THE MODELING RESULTS ARE IN QUESTION
3. THE PROJECT MAY NEED TO ADDRESS SEDIMENTATION IN THE NORTH FORK OF THE MOKELUMNE RIVER
4. UPSTREAM FLOODPLAIN MANAGEMENT MUST BE INCLUDED
5. THE LEAD AGENCIES?

THE GOAL OF THIS PROJECT MUST HAVE **FLOOD CONTROL AND ECOSYSTEM RESTORATION AS CO-EQUAL VALUES.** THEY SHOULD BOTH BE GIVEN EQUAL PRIORITY. AS WE LOOK FORWARD TO FUNDING AND POLITICAL SUPPORT, THE FLOOD CONTROL STAKE HOLDERS AND THE ENVIRONMENTAL COMMUNITY MUST BE ABLE TO SUPPORT THIS PROJECT. TV-1

MORE DETAILED MODELING MUST BE COMPLETED TO CONFIRM THE RESULTS. **THE MODELING MUST BE EXPANDED** TO INCLUDE DOWN STREAM IMPACTS, CHANNEL CAPACITY INFORMATION INCLUDING BRIDGES, IN RIVER VEGETATION, SEDIMENTATION AND BANK SLOPES. TV-2

THE NORTH FORK OF THE MOKELUMNE RIVER HAS AREAS OF SEVERE SEDIMENTATION THAT MUST BE INCLUDED IN THE SCOPE OF THIS PROJECT. TV-2

AS PART OF THIS PROJECT WE MUST **LOCK IN UPSTREAM FLOODPLAINS WITH FORMAL FLOOD FLOW EASEMENTS.** AT THE SAME TIME THIS PROJECT MUST SEEK OUT ADDITIONAL UP STREAM FLOODWAYS WHERE THE WATER CAN GRAVITY IN AND GRAVITY DRAIN. TV-3

THE FEDERAL GOVERNMENT IS A MAJOR STAKE HOLDER (FEDERAL WATER PROJECT) AND THEREFORE **ONE OF THE FEDERAL AGENCIES SHOULD PARTICIPATE AS ONE OF THE LEAD AGENCIES.** ALL FEDERAL WATER THAT IS CONVEYED FROM THE SACRAMENTO RIVER TO THE TRACY PUMPS VIA THE CROSS CHANNEL FLOWS DOWN THE NORTH AND THE SOUTH FORKS OF THE MOKELUMNE RIVER. TV-4

THANK YOU FOR TAKING THE TIME TO REVIEW MY CONCERNS.

Responses to Comments

TV-1

The purpose of the project is to implement flood control improvements in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. Flood control improvements are needed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem resulting from overflows caused by insufficient channel capacities and catastrophic levee failures in the project study area.

Co-equal goals of flood control and the ecosystem have been placed on the project. Opening up McCormack-Williamson Tract eases the effects of the surge caused by frequent failure of the tract. Opening the tract also produces additional aquatic habitat and varying landscape on the tract. The detention basin proposals and dredging proposal do offer small downstream flood level benefits, but come at a relatively high price and provide limited ecosystem benefits.

TV-2

The region has now been modeled by MBK engineers using the HEC-RAS hydraulic model, and UC Davis using the MIKE 11 hydraulic model. HEC-RAS, developed by the US Army Corps of Engineers, is a one-dimensional steady flow hydraulic model designed to aid hydraulic engineers in channel flow analysis and floodplain determination. The MIKE 11 model, developed by the Danish Hydraulic Institute, is a dynamic, one-dimensional modeling package, which simulates the water level and flow splits throughout a river/channel system. Both models have been calibrated for a range of hydrologic events from large storm events to intermediate and low river flows. The MIKE 11 model acknowledged and corrected the questions that were raised in the review of the HEC- RAS model, but found little change in the results projecting stage reductions and improved flood protection with the implementation of the project alternatives (please see Chapter 3.1 of the North Delta Flood Control and Ecosystem Restoration Project DEIR) . DWR believes the two models, taken together, are accurate; and the department can reasonably rely upon the results of the models to support the final decision among the alternatives. All downstream impacts have been followed through to the San Joaquin River boundary condition. The MIKE 11model includes all the bridges within the system and the latest data available on channel geometries. Sensitivity analyses have been conducted to further demonstrate the soundness of the results. Some sedimentation and vegetation growth will occur during periods of moderate flows and will be eroded during periods of higher flow. Vegetation will have local influences on sedimentation and low flows but negligible effect on higher flows. The strength and value of a model is not that it can produce the exact results for a given year but the ability to adequately represent a broad range of events. Consequently one can investigate changes in the system and rely on the results a model predicts and have confidence that the directions of change are correct and the amounts are within reason of such a stochastic process.

The reference to "areas of severe sedimentation" on the North fork of the Mokelumne River is unsupported according to the bathymetry data results collected as part of the ongoing North Delta Scour Monitoring Program. DWR's North Delta Scour Monitoring Program was initiated in 1993 to evaluate changes in channel cross sections at 38 sites in the North Delta; including 7 sites located on the North fork of the Mokelumne River. Bathymetry data collected over a 14 year period (1994-2008) have demonstrated an increasing trend in cross sectional area over time at all of the monitored sites compared to the base area (1994); which is more indicative of erosion than sedimentation.

Similar results were evident with the eight monitoring sites on the South fork of the Mokelumne River. Figure 1 displays a map of the 38 monitoring site locations on the Mokelumne River and figures 2 through 9 display changes in cross sectional area for each of the monitored sites on the north fork, and LM50, a site downstream of the convergence of the north and south forks. The BASE AREA referred to in graphs is the cross sectional area of the site in April 1994, the first year of bathymetry data collection (bathymetry measurements were taken in both April and October of 1994).

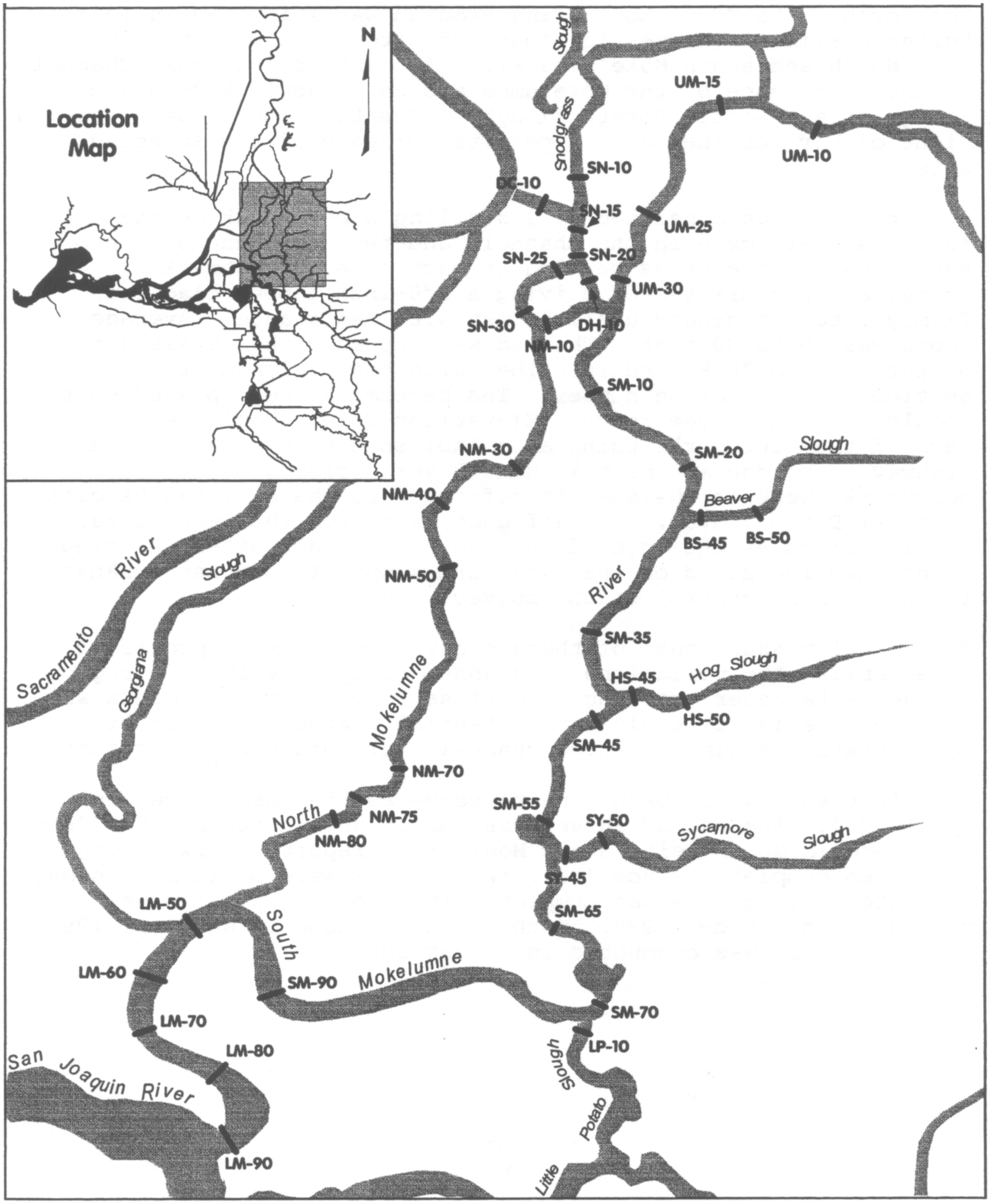
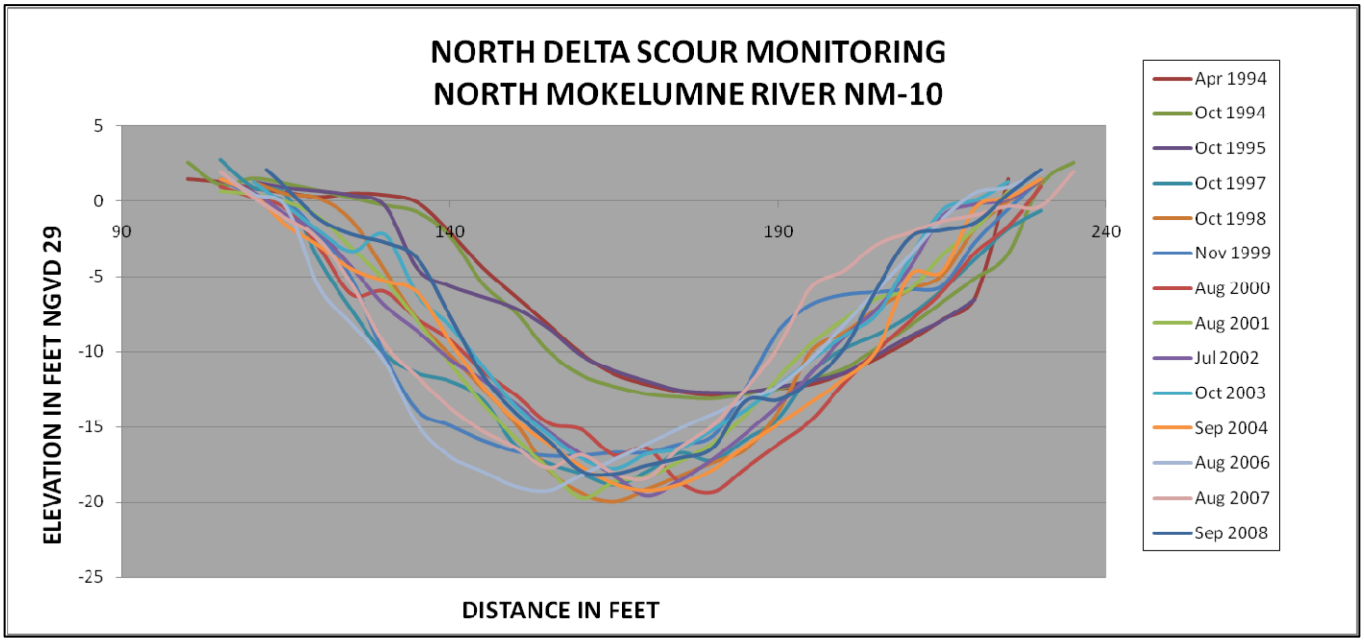
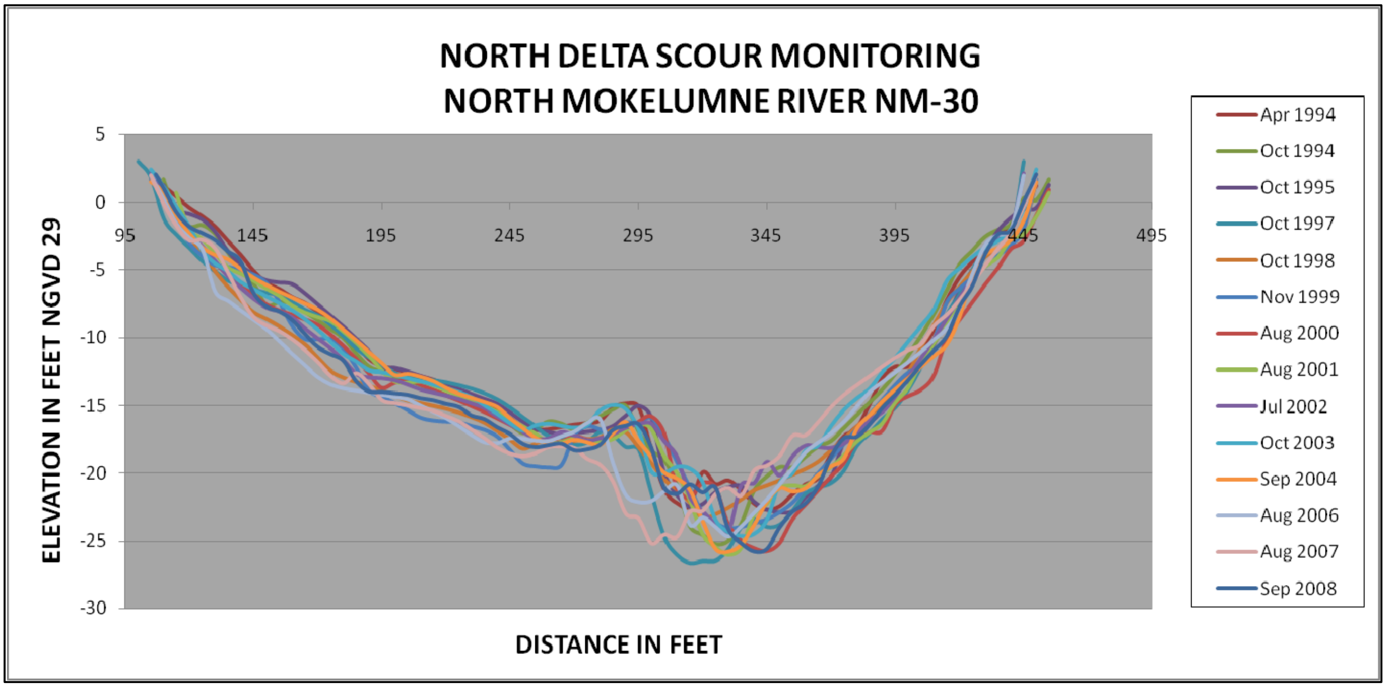


Figure 5-1. Map of the North Delta Scour Monitoring Program Sites



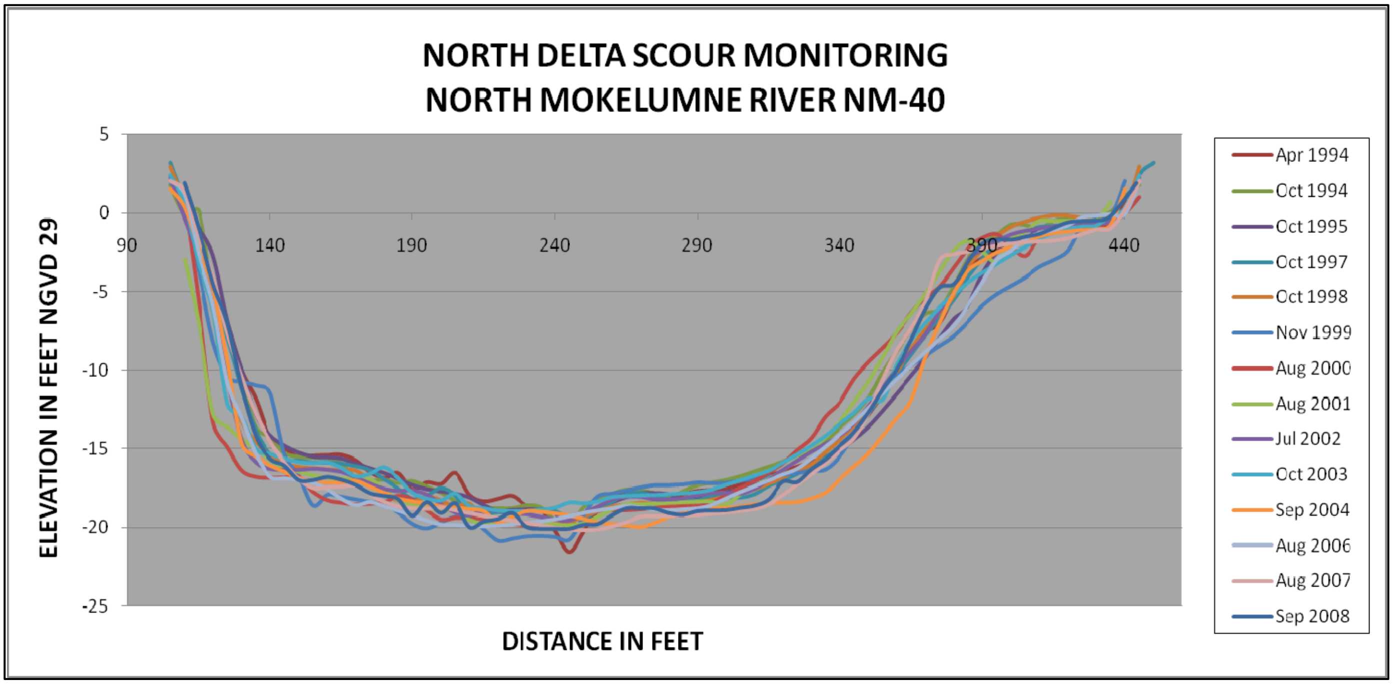
BASE AREA	836.94 sq ft	Oct 05, 1998	1161.0 sq ft	Oct 01, 2003	1021.50 sq ft
Oct 25, 1994	853.28 sq ft	Nov 03, 1999	1164.6 sq ft	Aug 24, 2004	1204.20 sq ft
May 23, 1995	790.51 sq ft	Aug 09, 2000	1234.0 sq ft	Aug 30, 2006	1236.60 sq ft
Oct 24, 1995	886.18 sq ft	Aug 01, 2001	1135.5 sq ft	Aug 29, 2007	1090.20 sq ft
Oct 29, 1997	1301.20 sq ft	Jul 31, 2002	1136.1 sq ft	Sep 09, 2008	1031.84 sq ft

Figure 5-2. North fork of Mokelumne River: Site NM-10 Channel Cross Sectional Area measurements from 1994 to 2008.



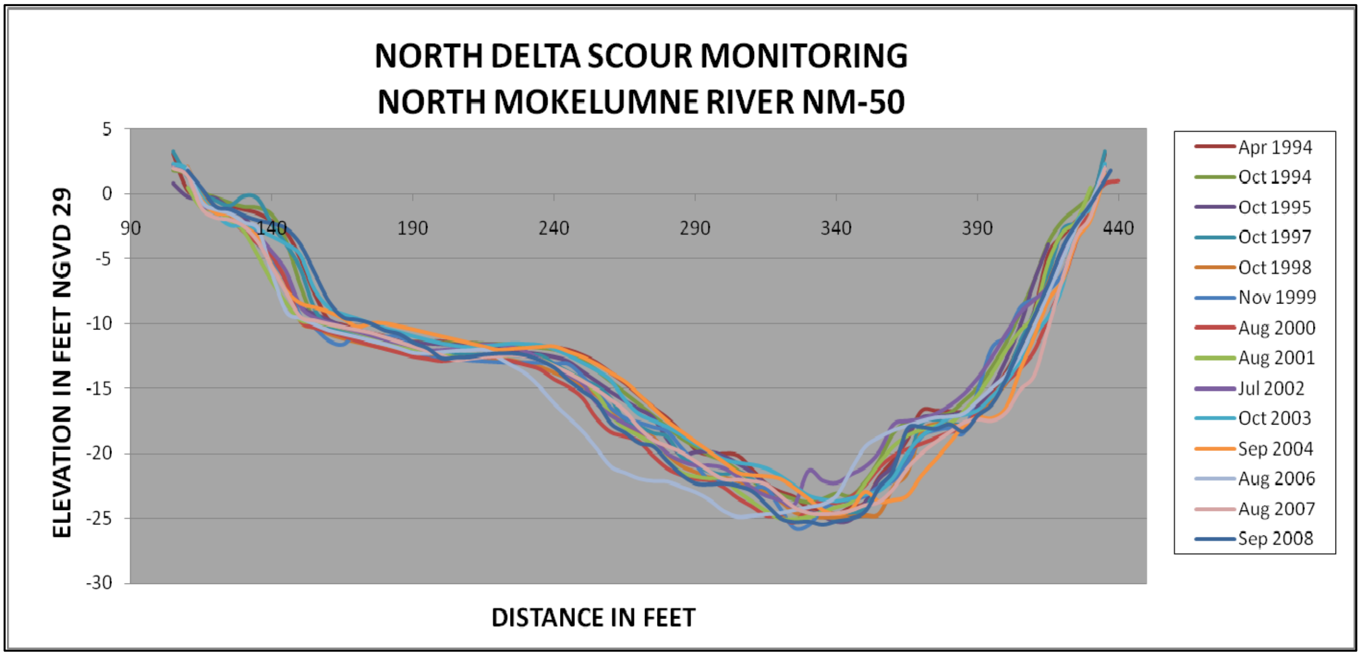
BASE AREA	4237.5	sq ft	Oct 05, 1998	4678.4	sq ft	Oct 01, 2003	4311.70	sq ft
Oct 26, 1994	4300.2	sq ft	Nov 03, 1999	4697.0	sq ft	Aug 24, 2004	4533.70	sq ft
Jul 13, 1995	4337.1	sq ft	Aug 09, 2000	4740.8	sq ft	Aug 30, 2006	4823.30	sq ft
Oct 25, 1995	4318.8	sq ft	Aug 01, 2001	4574.2	sq ft	Aug 29, 2007	4713.70	sq ft
Oct 29, 1997	4711.4	sq ft	Jul 31, 2002	4467.5	sq ft	Sep 09, 2008	4703.16	sq ft

Figure 5-3. North fork of Mokelumne: Site NM-30 Channel Cross Sectional Area measurements from 1994 to 2008.



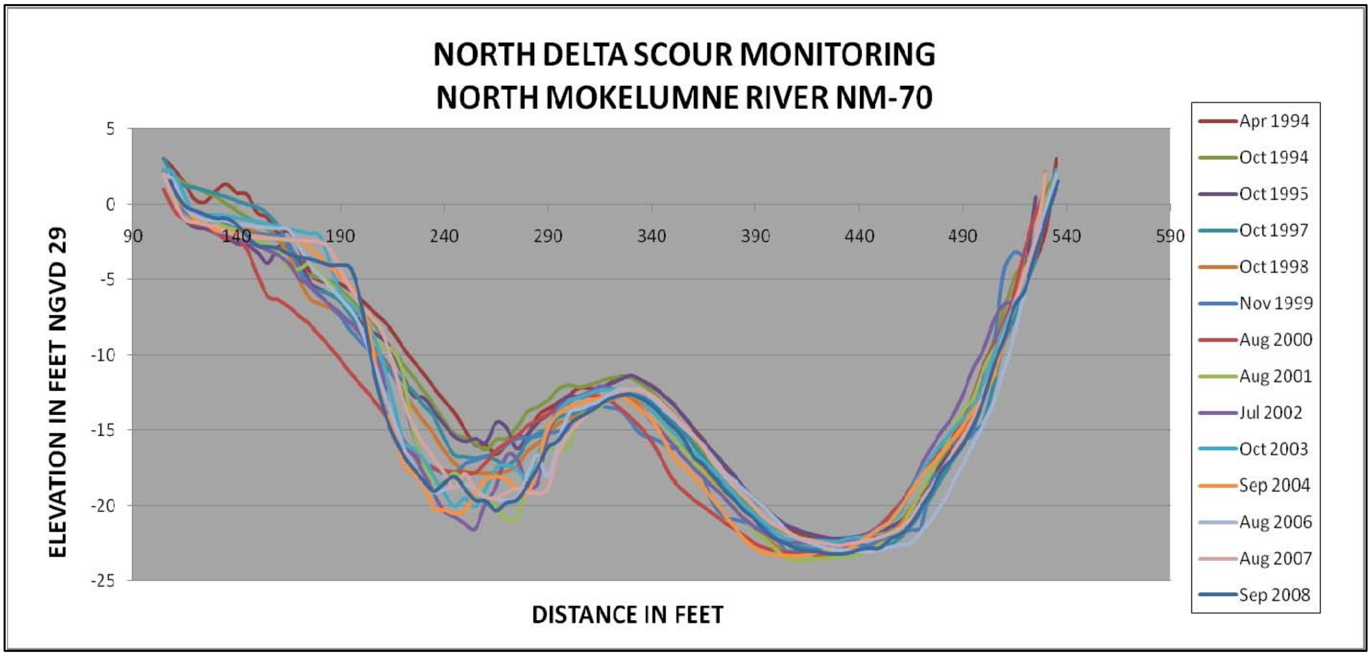
BASE AREA	4181.5 sq ft	Dec 28, 1998	4303.1 sq ft	Oct 01, 2003	4240.90 sq ft
Oct 26, 1994	4074.6 sq ft	Nov 03, 1999	4518.7 sq ft	Aug 24, 2004	4580.00 sq ft
Jul 13, 1995	4134.1 sq ft	Aug 09, 2000	4392.3 sq ft	Aug 30, 2006	4502.70 sq ft
Oct 25, 1995	4241.8 sq ft	Aug 01, 2001	4345.2 sq ft	Aug 29, 2007	4389.30 sq ft
Oct 29, 1997	4272.3 sq ft	Jul 31, 2002	4303.1 sq ft	Sep 09, 2008	4371.91 sq ft

Figure 5-4. North fork of the Mokelumne River: Site NM-40 Channel Cross Sectional Area measurements from 1994 to 2008.



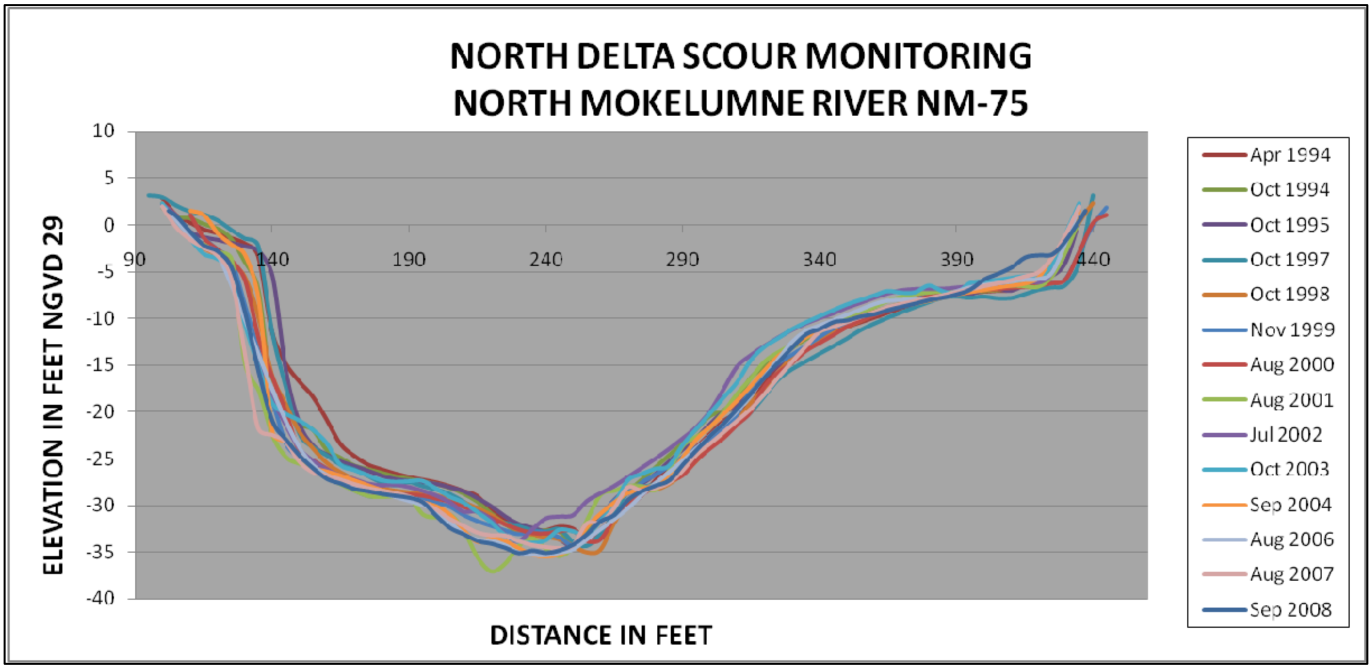
BASE AREA	4213.50	sq ft	Oct 05, 1998	4686.50	sq ft	Oct 01, 2003	4317.50	sq ft
Oct 26, 1994	4161.60	sq ft	Nov 03, 1999	4564.00	sq ft	Aug 24, 2004	4462.20	sq ft
Jul 13, 1995		sq ft	Aug 09, 2000	4778.10	sq ft	Aug 30, 2006	4765.70	sq ft
Oct 25, 1995	4337.80	sq ft	Aug 01, 2001	4576.40	sq ft	Aug 29, 2007	4711.10	sq ft
Oct 29, 1997	4460.50	sq ft	Jul 31, 2002	4352.00	sq ft	Sep 09, 2008	4535.54	sq ft

Figure 5-5. North fork of the Mokelumne River: Site NM-50 Cross Sectional Area measurements from 1994 to 2008.



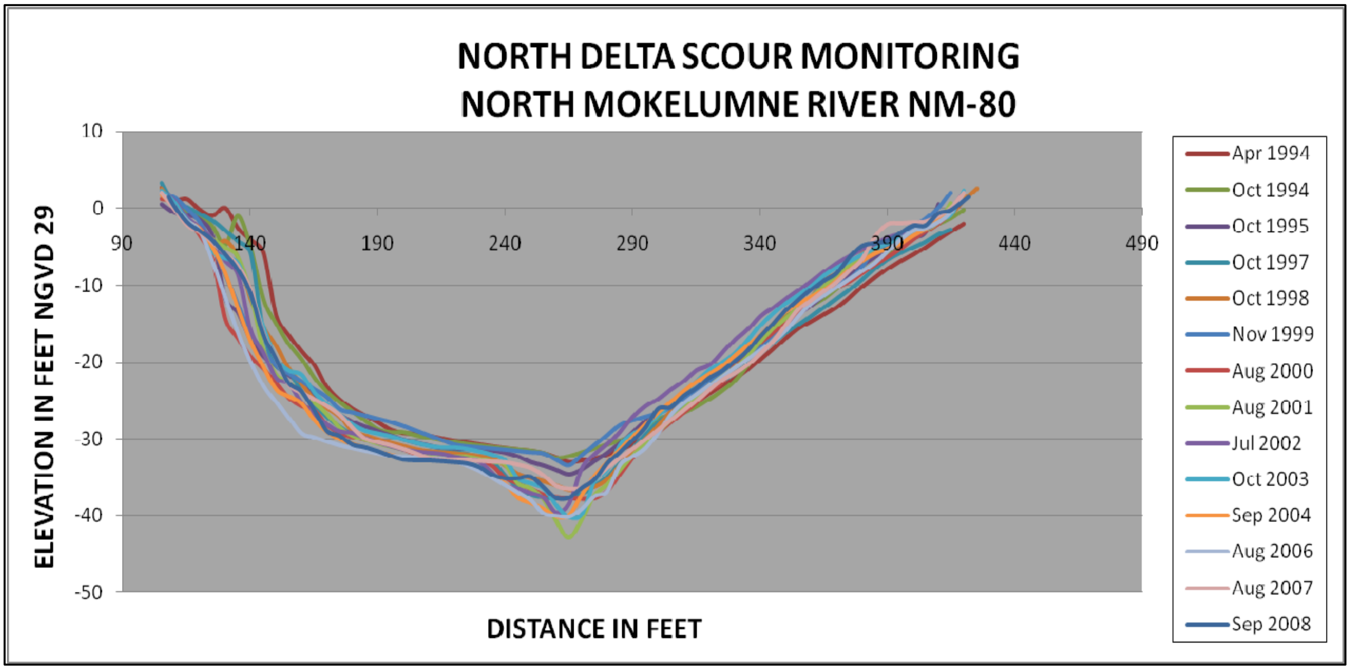
BASE AREA	5152.6 sq ft	Oct 05, 1998	5684.3 sq ft	Oct 01, 2003	5510.50 sq ft
Oct 26, 1994	5177.8 sq ft	Nov 03, 1999	5720.7 sq ft	Aug 24, 2004	5831.60 sq ft
Jul 13, 1995	5272.3 sq ft	Aug 09, 2000	5969.0 sq ft	Aug 30, 2006	5828.30 sq ft
Oct 25, 1995	5294.8 sq ft	Aug 01, 2001	5779.3 sq ft	Aug 29, 2007	5599.80 sq ft
Oct 29, 1997	5567.1 sq ft	Jul 31, 2002	5727.9 sq ft	Sep 09, 2008	5837.87 sq ft

Figure 5-6. North fork of Mokelumne River: Site NM-70 Cross Sectional Area measurements from 1994 to 2008.



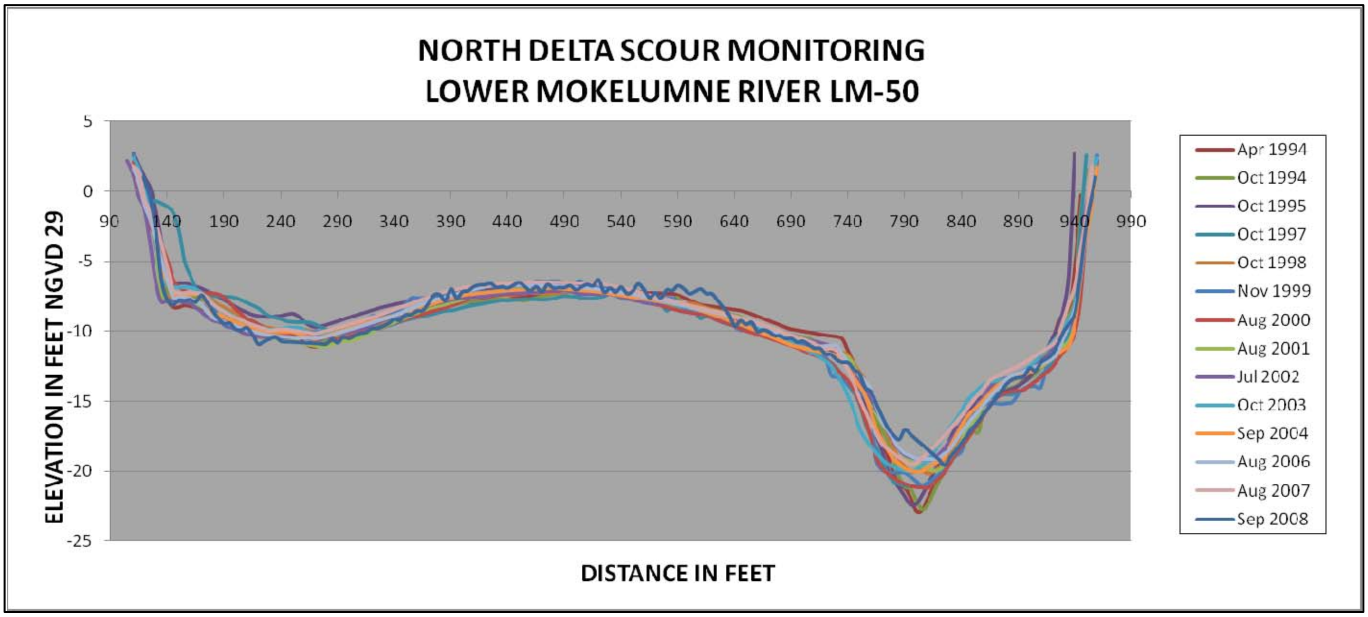
BASE AREA	5791.8	sq ft	Oct 05, 1998	6201.2	sq ft	Oct 01, 2003	5841.60	sq ft
Oct 26, 1994	5812.5	sq ft	Nov 03, 1999	6242.4	sq ft	Aug 24, 2004	6183.50	sq ft
Jul 13, 1995	5834.0	sq ft	Aug 09, 2000	6283.0	sq ft	Aug 30, 2006	6286.30	sq ft
Oct 25, 1995	5842.4	sq ft	Aug 01, 2001	6331.3	sq ft	Aug 29, 2007	6411.80	sq ft
Oct 29, 1997	6116.8	sq ft	Jul 31, 2002	5822.5	sq ft	Sep 09, 2008	6311.72	sq ft

Figure 5-7. North fork of the Mokelumne River: Site NM-75 Cross Sectional Area measurements from 1994 to 2008.



BASE AREA	6188.6 sq ft	Oct 05, 1998	6421.7 sq ft	Oct 01, 2003	6289.70 sq ft
Oct 26, 1994	6073.3 sq ft	Nov 03, 1999	6182.5 sq ft	Aug 24, 2004	6745.90 sq ft
Jul 13, 1995	no data	Aug 09, 2000	6914.2 sq ft	Aug 30, 2006	7109.00 sq ft
Oct 25, 1995	6371.8 sq ft	Aug 01, 2001	6654.3 sq ft	Aug 29, 2007	6493.60 sq ft
Oct 29, 1997	6673.1 sq ft	Jul 31, 2002	6312.1 sq ft	Sep 09, 2008	6450.29 sq ft

Figure 5-8. North fork of the Mokelumne River: Site NM-80 Channel Cross Sectional Area measurements from 1994 to 2008.



BASE AREA	8442.1 sq ft	Oct 06, 1998	8399.5 sq ft	Oct 01, 2003	8415.3 sq ft
Oct 27, 1994	8560.2 sq ft	Nov 03, 1999	8582.2 sq ft	Aug 24, 2004	8528.9 sq ft
May 25, 1995	8412.1 sq ft	Aug 08, 2000	8819.9 sq ft	Aug 30, 2006	8345.9 sq ft
Oct 30, 1995	8156.6 sq ft	Aug 02, 2001	8615.3 sq ft	Aug 29, 2007	8080.0 sq ft
Oct 30, 1997	8549.1 sq ft	Jul 31, 2002	8501.9 sq ft	Sep 9, 2008	8348.7 sq ft

Figure 5-9. North fork of the Mokelumne River: Site LM-50 Channel Cross Sectional Area measurements from 1994 to 2008.

The MIKE 11 model can easily be compared to more recent cross-section measurements and effects of accumulated sediment can easily be examined to determine if any further work would be required. However, the recent cross-sections provided as stated earlier, do not appear different from the elevations used in the model.

TV-3

The Project as proposed will provide flood control improvements that are needed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem resulting from overflows caused by insufficient channel capacities and catastrophic levee failures in the Project study area. Modeling results, which include an analysis of the impacts of existing upstream floodplains on stage elevations, have substantiated that the flood control actions proposed with the project will attenuate the peak flows entering McCormack-Williamson Tract; and prevent the surge of water that caused downstream damage in past flood events. Any further upstream work such as the construction of a detention basin, or even failure of upstream levees; would just add to the benefits demonstrated by the project because the rerouted upstream water would not return to stream flow. The identification and development of additional upstream floodplains has not been focus of the project and therefore has not been included as a component of the Group 1 or Group 2 alternatives.

TV-4

The need for implementation funding and coordination with multiple federal and state agencies is critical to move the project forward. The Department of Water Resources (DWR) has recently re-established their partnership with the US Army Corps of Engineers (USACE), The Nature Conservancy (TNC), and RD 2110 to implement flood protection and restoration actions proposed for McCormack-Williamson Tract and Dead Horse Island. The USACE is currently completing a feasibility report for the project (referred to as the preliminary draft Project Implementation Report (PIR)) as part of the CALFED Levee Stability Program. Once the feasibility report is completed, the Corps will develop a Project Management Plan which will lay out the scope, schedule, and budget to complete the PIR. The Corps will then enter into a cost-share agreement with the local project sponsor, RD 2110 to finalize the PIR. The USACE will also complete either an Environmental Assessment or an Environmental Impact Statement to comply with NEPA requirements for work to be completed on McCormack-Williamson Tract and Dead Horse Island.

Staff have recently held two meetings, one with local, state, and federal regulatory agencies (November 3, 2009) and the other with several Reclamation Districts and other interested local stakeholders (February 11, 2010) to discuss the project's progress and to present the Preferred Alternative for the Group 1 actions. Participants at both meetings were very receptive to implementation of the Group 1 actions (Alternative 1-A) proposed for McCormack-Williamson Tract and Dead Horse Island, and the partnership with TNC, DWR, and USACE.

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My name is Steve Mello. I own and rent land on Tyler Island for farming. I am a trustee and President of Reclamation District 563. I also currently serve as 1 of 5 directors on the North Delta Water agency and I am a director on the Central Valley Flood Control Association. I was an original member of the Delta Protection Commission and it's vice-chair for a number of years. I served on this commission from 1992 to 2000. I have been very involved in several proposed projects to improve flood control, water conveyance and habitat restoration in the North Delta. Those proposals include the North Delta Program Plan, Cal Fed and The North Delta Improvement Group (which worked on this proposal).

Generally I have seen habitat restoration as a result of these programs, but very little or no flood control. Flood control must come first or at worst concurrently with ecosystem restoration. SM-1

Any flood control work must start at the bottom of the system and work upstream in order to avoid increasing flood risks at the bottom during construction or in the event the whole project is not built as promised. More specifically in regard to this project, armoring the interior levees to protect against wave wash is critical. Vegetation is <u>not</u> the answer. Rock revetment (rip-rap) is. SM-2

On McCormack Williamson (MW) riprap on interior levees is essential to stop wind driven waves from destroying the levees from the inside out and then subjecting adjacent levees to big waves being driven across a long fetch of open water. SM-3

Most of the water that flows out of the downstream end of McCormackshould exit to the west into Snodgrass Slough, as there are much bigger levees to the west and much greater channel capacity. A smaller portion (10%) should be allowed to flow into the Mokulumne Rive (MR) due to the relatively narrow Mokulumne River channel and smaller levees on New Hope Tract. Seepage to adjacent lands needs to be quantified and mitigated at not only the reclamation district level but also the landowner/tenant level. Increased district pumping costs and negative impacts on agricultural use should be expected. SM-4 SM-5

A big problem on the main stem of the Mokulumne River is the presence of New Hope Marina and the intrusion into the Mokulumne River of its recreational vehicle park. Photographic evidence of this increased footprint has been submitted to substantiate this negative impact. New Hope Marina should be bought and removed or forced to return to the footprint in the Mokulumne River that was permitted. SM-6 SM-7

The creation of a shallow body of water on McCormick Williamson will cause conditions that will: SM-8

1. Increase seepage to adjacent lands
2. Increase mercury methalization
3. Increase water temperatures and hence the presence of fish species that feed on special status fish species

North Delta Flood Control and Ecosystem Restoration Project

4 Entice the presence of Delta Smelt and Long Fin Smelt that could result in the necessity to screen water diversions. The proponents of this program should pay for the installation and maintenance of these screens.
5 Increase water consumption- the evapotranspiration of open water/wetlands is more then the consumptive use for agriculture. SM-8 cont.

The creation of any of the small flood retention basins as proposed on Staten Island is not acceptable, as any of them would cause more problems then they solve. All are too small (about 22,000 acre feet) and have fixed weirs would render them meaningless in a major flood event. The 1986 flood entrained about 275,000 acre-feet on Glanville, McCormick Williamson, New Hope, Dead Horse, and Tyler Island. Flooding all of Staten Island in a major flood event through operable weirs is the only way one could justify the disruption of that islands ecosystem function. (Half of the purchase price of Staten Island went on the flood control side of the ledger at Cal Fed). SM-9

The creation of any of these proposed retention basins creates the following concerns:
1 Increased seepage to adjacent islands, resulting in increased pumping costs at the reclamation district level and negative impacts on agricultural operations.
2 Open a long fetch of water, resulting in wind born waves eroding the interior levees of Staten Island, possibly breaking out and exposing adjacent islands to increased flood risks and costs.
3 How soon after flooding would the retention areas be drained? Will you put riprap on interior levees? Will you pay for lost farm income and increased pumping costs on adjacent islands? Will you pay for additional drainage infrastructure? SM-10

The dredging of the South Fork Mokulumne River and raising of levees where needed is to be commended, but I have heard these proposals before. Both of those projects need to be completed before anything happens in regard to degrading McCormick Williamson levees. SM-11

A section of the North Fork Mokulumne River needs to be dredged to eliminate a 1,700-foot stretch of river that is only 8 to 10 feet deep instead of the 26 to 30 feet depth of channels up and down stream from this section. I have provided the bathymetry of the North Fork Mokulumne River to your staff as provided by a Reclamation District 563 survey of the channels of Tyler Slough and the North Fork Mokulumne River. SM-12

We need to put in a bit about current water surface elevations during low water flow and the fact that it is high enough to run siphons. If setbacks reduce water surface elevations during irrigation time, who pays to replace siphons with pumps and pay for their operation and maintenance? Who pays to extend the columns of current pumps and pay additional electrical bills caused by higher water lifts? SM-13

Responses to Comments

SM-1

Any ecosystem enhancement will require opening up McCormack-Williamson Tract. Hydraulic modeling using both the HEC-RAS and MIKE 11 models has shown that is the best effort to lessen flood impacts. The two events are coincidental.

SM-2 and SM-3

The decision on which component of the project will be implemented first will be based on the availability of funding, cooperation with the local and federal partners, benefits provided with implementation of the project components, construction schedule, etc. . DWR staff are currently working with the US Army Corps of Engineers (CalFed Levee Stability Program) and The Nature Conservancy as potential partners in the funding and implementation of Group 1 actions for the project.

The subject of how to best protect (rip-rap vs. no rip-rap) the inboard side of any wildlife friendly levee has not been settled; however the low-slope, pre-vegetated design proposed for the McCormack-Williamson Tract will add geotechnical stability to the levees. In addition, wildlife friendly levees without rip-rap will provide a variety of habitats including upland, riparian, scrub/shrub, emergent marsh and mudflat (when interior flooded) habitats.

Reclamation District 2110 (McCormack-Williamson Tract) staff monitor and inspect levees on a regular basis to prevent levee degradation; thereby mitigating for any potential wave fetch damage to adjacent levees. RD 2110 is a participant of the DSMO Subventions Program, so any levee maintenance work will be eligible for State funding.

SM-4

The comment recommending that only 10% of the total flood flows exiting the south end of McCormack-Williamson Tract should enter the Mokelumne River is unclear. The only other route the water can flow is through the Delta Cross Channel to the Sacramento River, and possibly into Georgiana Slough. This approach is infeasible for the following reasons:

1. the Delta Cross Channel is closed when Sacramento rivers flows approach 20,000 to 25,000 cfs, the timing of which is consistent with higher flows exiting McCormack-Williamson Tract,

2. the Delta Cross Channel gates close for a total of up to 45 days the November-January period, according to State Water Resources Control Board Decision 1641

The other interpretation of the comment would recommend that most of the flow exiting McCormack-Williamson Tract exit towards Snodgrass Slough and into the north fork of Mokelumne River, which is consistent with the MIKE 11 hydraulic modeling results. The conveyance capacity on the north fork is greater than that of the south fork of the Mokelumne River. As a consequence of capacity and current bridge restrictions at the top of each fork, the North Fork currently handles from 2-2.5 times more flow than the south fork (depends on total flow). Regardless of location of the release, the North Fork would still carry the large proportion of the flow without modifications of bridges and channel capacities. Physics will dictate the split of the flow but the release should be well distributed along the lower southwestern levee to prevent any localized stress and distribute water proportionally according to conveyance abilities of the channels.

RD 348 (New Hope Tract) is nearing completion of Phase II, a $7 million construction project to upgrade nearly 4 miles (stations 410+00 to 630+00) of levees to the PL 84-99 (100 year flood protection) standard; located on the northwestern side of the Tract. Future work is planned with available funding to upgrade levees on the southwest end of the Tract. Phase II is a follow-up to Phase I, a $4.2 million construction project to upgrade nearly 5.5 miles (stations 920+00 to 630+00) levees on the eastern side of the Tract. The project was State funded through the Special Projects program. The commenter is therefore correct in stating that New Hope's levees have historically been smaller than surrounding island levees; yet significant work has been completed in addressing those flood protection shortcomings.

SM-5

Comment acknowledged.

DWR is aware of the potential damages associated with underseepage. However, there has never been a documented levee failure in the Delta directly resulting from flooding of an adjacent island. This includes (1) any of the islands that were flooded but later reclaimed (any Delta island that has flooded), and (2) any of the islands surrounding the Delta flooded islands of Franks Tract, Little Franks Tract, Mildred Island, lower Sherman lake, Big Break, Liberty Island. Areas with a high potential for underseepage risk can be identified and mitigated for that risk. Jones Tract for example, contained a few localized spots of underseepage which were addressed.

The North Delta Seepage Monitoring Program was initiated in 1993 to establish baseline groundwater conditions adjacent to stream channels in the North Delta that were proposed to be enlarged as part of the North Delta Program. Since the program's inception groundwater levels have been measured at 71 sites near the North and South forks of the Mokelumne River on Tyler Island, Staten Island, Bouldin Island, Terminous Tract, McCormack-Williamson Tract, Canal Ranch Tract, Andrus Island, and New Hope Tract. The baseline data collected over several years could be used to compare with the data collected after the implementation of the project to determine if seepage rates have changed. To the extent that the seepage monitoring indicates impacts attributable to the project, relief wells will be installed to mitigate such impacts.

SM-6 and SM-7

It is unclear which permit is referenced in the comment; such as a 404/401 permit, or an encroachment permit. In either case, DWR is not authorized to issue these permits; the Central Valley Regional Water Quality Control Board (CVRWQCB), the US Army Corps of Engineers (ACOE), Central Valley Flood Protection Board (CVFPB), State Lands Commission (SLC) issue and oversee compliance with these and other related permits. The contact telephone numbers for these State Boards, Departments, and federal agency are listed below:

1.	CVRWQCB	Betty Yee	(916) 464-4643
2.	DPC	Linda Fiack	(916) 776-2290
3.	CVFCB	Mike Peterson	(916) 574-0685
4.	USACOE	Dennis Clark	(916) 557-7847
5.	SLC	Paul Thayer	(916) 574-1800

Early discussions in formulating project components included consideration of closing or relocating one or both of the marinas in the project area. Marina relocation or closure is no longer under consideration as an action of the project for the following reasons:

- Marina closure or relocation does not directly address the purpose and objectives of the project, as it more closely treats a symptom of the surge effect rather than the cause (uncontrolled flow) and does not directly lower stage or increase capacity in a substantial way.
- Because of local business interests and North Delta recreational use represented by the marinas, closure is not considered to be a sound political or economic option at this time.
- No readily identifiable site opportunities for relocation have emerged as viable or suitable while still meeting local needs and demands.

Therefore, marina closure or relocation will not be carried forward as a component of the project in the scope of this document.

SM-8

1. DWR is aware of the potential damages associated with underseepage. However, there has never been a documented case of levee failure in the Delta resulting from the flooding of an adjacent island. This includes (1) any of the islands that were flooded but later reclaimed (any Delta island that has flooded), and (2) any of the islands surrounding the Delta flooded islands of Franks Tract, Little Franks Tract, Mildred Island, lower Sherman lake, Big Break, Liberty Island. Staten detention basin(s) would fill infrequently, and the amount of water involved in storage (and therefore the potential underseepage) is small, and Staten's water level could be quickly pulled back down (at least for the portion of the water that could be drained by gravity) once the flood surge passes, which would effectively reduce the static pressure (therefore

underseepage) rather quickly. Areas with a high potential for underseepage risk can be identified and mitigated for that risk. Jones Tract for example, contained a few localized spots of underseepage which were addressed.

The North Delta Seepage Monitoring Program was initiated in 1993 to establish baseline groundwater conditions adjacent to stream channels in the North Delta that were proposed to be enlarged as part of the North Delta Program. Since the program's inception groundwater levels have been measured at 71 sites near the North and South forks of the Mokelumne River on Tyler Island, Staten Island, Bouldin Island, Terminous Tract, McCormack-Williamson Tract, Canal Ranch Tract, Andrus Island, and New Hope Tract. The baseline data collected over several years could be used to compare with the data collected after the implementation of the project to determine if seepage rates have changed and if so, what mitigation measures should be implemented.

Even in a no action alternative, the consequences of sea level rise and continued subsidence will lead to increased seepage. Anecdotal evidence exists that dredging of adjacent channels encourages seepage under levees through more permeable lenses. It is this evidence that supports the idea that flooded islands will produce more seepage into neighboring islands. Seepage from dredging has proven to be only a temporary concern as it 'heals' itself, with sediments plugging the channel bottom. It should be anticipated that the flooded portion of McCormack-Williamson Tract will also plug itself with the continuous supply of sediments.

The flood protection provided with the construction of the detention basin will result in far less seepage than has occurred as a consequence of past flood events (most recently in 1997).

DWR, TNC, RD 2110, and USACE are in the process of forming a partnership to implement flood protection and restoration actions proposed for McCormack-Williamson Tract. The USACE is currently completing a feasibility report for the project (referred to as a Project Implementation Report) as part of the CALFED Levee Stability Program. Once the feasibility report is completed, the USACE will develop a Project Management Plan. The Corps will then enter into a cost-share agreement with the local project sponsor, RD 2110. USACE will be required to address adverse impacts, such as underseepage to neighboring islands, should this component of the project move forward under the auspices of the CALFED Levee Stability Program.

2. The stated goal for ecosystem enhancement is to not create more habitat where high levels of mercury release would be anticipated. Methylation of mercury is greatest where soils contain a high degree of organic material and anoxic conditions are prevalent. McCormack-Williamson Tract soil is predominantly mineral rather than organic and the shallow, tidal water will produce higher oxygen concentrations than deeper water. Mitigation efforts or offsets will be pursued when identified. Since mercury releases of agricultural drainage have not been quantified it is uncertain whether the wetlands will produce more or

less methyl mercury. The precise goal of ecosystem enhancement is to increase desirable fish species. Without ecosystem enhancement recent court rulings would suggest that pumping restrictions would likely be increased. Channelization and water exports are two major contributors to the ecosystem decline and it is necessary for these two effects to contribute to any ecosystem enhancement.

A water quality plan will be developed to monitor for elemental mercury and MeHg levels in water and sediments in the McCormack-Williamson Tract and Grizzly Slough vicinities both before and after restoration activities take place. This monitoring would provide baseline conditions at the site and will allow for comparisons between pre and post restoration Hg and MeHg levels. The information will aid in determining potential site management changes in the future, as well as advance the general body of knowledge on the subject of MeHg creation and export in restored tidal marshes. It is likely that these monitoring activities will be coordinated with the development of the Delta Mercury TMDL.

3. The creation of tidal wetlands and floodplains will provide habitat for native floodplain spawning fish such as the Sacramento splittail and native floodplain rearing fish such as the Chinook salmon. These fish are adapted to these environments and will benefit from the additional habitat proposed by the project. There may be additional predation by exotic species but the creation of new habitat for the native and hatchery raised populations of Chinook salmon and Steelhead (Mokelumne River hatchery) and the Sacramento splittail will more than compensate for any losses associated with predation.

DWR, in consultation with DFG, NMFS, and USFWS, will prepare a Floodplain and Shallow Water Tidal Marsh Habitat Restoration and Monitoring Plan to ensure that ecosystem restoration benefits for fish species are maximized, while minimizing the potential for adverse effects on native fish species from habitat creation (e.g., creation of predator habitat). The plan will provide the Corps and the resource agencies with sufficient information to determine the adequacy of the proposed mitigation and to issue a Section 404 permit. The Corps will approve the plan prior to project construction activities that affect the Corps jurisdictional areas in the project area.

The plan will be prepared to meet or exceed the specifications and mitigation requirements pertaining to Corps jurisdictional areas as specified by resource agency requirements. The plan will also be provided to the State Water Board to determine the adequacy of the proposed mitigation with respect to water quality and to issue a Section 401 water quality certification for the project.

The goal of the mitigation effort is to avoid and minimize adverse effects on native species from creation of predator habitat, as well as maximizing benefits to native fish species through ecosystem restoration. To support this goal, the Floodplain and Shallow Water Tidal Marsh Habitat Restoration and Monitoring Plan will meet the following objectives:

- to the extent practicable, design floodplain and shallow water tidal marsh habitats to maximize potential benefits to native fish species, while minimizing the creation of habitat favoring predatory fish species;
- facilitate early development of floodplain and shallow water tidal marsh habitats so that potential benefits are maximized as close to construction as is practicable;
- integrate concerns for special-status species (e.g., Delta smelt, splittail, and Chinook salmon) into the habitat restoration design to the maximum degree practicable; and
- design the floodplain and shallow-water tidal marsh habitats so that, once established, they will require little or no maintenance.

Project actions planned for McCormack-Williamson Tract may be implemented by the US Army Corps of Engineers (USACE) as part of the CALFED Levee Stability Program. The USACE as a result, would have to bring in those additional elements listed by the commenter into their plan formulation and mitigate for any adverse impacts associated with their (USACE) activities.

4. Delta smelt and longfin smelt are rarely found in or near the project site and it is unknown if project implementation will change migratory spawning and rearing behaviors of these two fish species. However, the project will provide additional floodplain spawning habitat for Sacramento splittail and rearing habitat for protected species such as the Chinook salmon which are typically present in the North Delta area from January through June, and from September through November. Steelhead are (ESA Threatened Species) found in the project area as well during January through May, and November. The Mokelumne River Hatchery constructed in 1963 and owned by EBMUD (operated by DFG) releases approximately 2 million Chinook salmon and 180,000 yearling Steelhead annually into the Mokelumne River; so the presence of millions of protected fish in the project area over the past several decades has yet to trigger enforcement of fish screen requirements.

   According to Fish and Game Code Sections 5980, 6020 and 6100, fish screens are already required for siphons statewide for all diversions which affect fishery resources. Diversion in anadromous waters of the State shall be deemed to require screening unless onsite sampling demonstrates otherwise. In addition, all diversions covered by this section that are located within the essential habitat of a state (CESA) listed species, or the critical habitat of a federally (ESA) listed species, shall be deemed to require screening. The project will not create any new requirements for screening.

5. Open water and wetlands would account for up to 3feet (ft) of water loss annually. However, some crops will use nearly this much in consumptive use and on average will use over 2-ft of water. Maximum additional consumption of water would be less than 1-ft and amount to less than 1000 ac-ft of water per year.

Figures assume best possible irrigation practices and do not account for evapotranspiration from open water toe-drains and irrigation channels for agricultural uses.

SM-9

The entrainment of 275,000 acre-feet on multiple islands during the 1986 flood event has little correlation with the efficacy of detention basins to provide flood protection. Levee failure risk and related flood damage will be reduced with the diversion of up to the 48,350 acre feet (Alternative 2A) from the swollen channels to the detention basin. Alternative 2A-2C differ on: (1) the location of the detention basin on Staten Island and (2) the volume of flood water held by each of the basins. The north Staten detention alternative (2A) is designed for 48,350 acre feet (af), the west Staten detention alternative is designed for 35,600 af, and the eastern Staten detention alternative is designed to detain 32,400 af of floodwaters. All of the three of the proposed options will be designed to contain flows greater than a 10 year event but less than a 100 year event. The capacity of the basin will be designed based on the 1997 flood event. Hydraulic modeling during project design would assist in sizing the basin relative to the 1997 event while minimizing required acreage and frequency of inundation.

The Staten Island detention basins will not “disrupt ecosystem function” or agricultural operations because the areas within the detention basins will continue to be farmed and will continue to provide habitat for the Greater Sandhill Cranes. The basins’ fixed weirs are designed to overflow during a one in ten year event which means the basins will be dry and available for farming and Greater Sandhill Crane habitat for most years. When the detention basins do flood, the waters will be drained within approximately 30 days, and the land within the basin will be ready and available for spring planting.

Staten Island was purchased in 2002 by the The Nature Conservancy (TNC) with roughly $17.5 million in Proposition 13 funds and roughly $17.5 million in Proposition 204 funds under the Flood Protection Corridor Program. The two contractual agreements that provided for the transfer of grant funds by the Department of Water Resources and the Resources Agency to TNC specified the following commitments: (1) agricultural land preservation, including the economic viability of agricultural operations; (2) wildlife habitat protection; (3) protection of a floodplain area from potential inappropriate and incompatible development; and (4) potential role in future flood management and water management improvements.

TNC has honored their commitments including prevention of inappropriate and incompatible development and participating with DWR in development of the North Delta Flood Control and Ecosystem Restoration Project. The purchase of the island effectively removed the property from the real estate market thereby preventing any future development and mitigating for future flood damages that may have otherwise occurred if Staten was developed. In addition, all of the Group 2 Alternatives described in the Draft EIR propose flood control benefits for Staten either through the construction of detention basins on the island, or construction of setback levees as a component of Alternative 2-D, which proposes dredging the south fork of the Mokelumne River.

SM-10

1. DWR is aware of the potential damages associated with underseepage. However, there has never been a documented levee failure in the Delta directly resulting from flooding of an adjacent island. This includes (1) any of the islands that were flooded but later reclaimed (any Delta island that has flooded), and (2) any of the islands surrounding the Delta flooded islands of Franks Tract, Little Franks Tract, Mildred Island, lower Sherman lake, Big Break, Liberty Island. Staten detention basin(s) would fill infrequently, and the amount of water involved in storage (and therefore the potential underseepage) is small, and Staten's water level could be quickly pulled back down (at least for the portion of the water that could be drained by gravity) once the flood surge passes, which would effectively reduce the static pressure (therefore underseepage) rather quickly. Areas with a high potential for underseepage risk can be identified and mitigated for that risk. Jones Tract for example, contained a few localized spots of underseepage which were addressed.

   The level of seepage associated with the detention basins would be moderated with: (1) the design of the fixed weir (overtopped for events of 10-year or greater occurrence), and (2) the fact that the detention basins would be drained within a relatively short time frame (up to 30 days). It is a common engineering technique to intercept seepage and though it is true each event is unique and may result in additional expense; there is nothing from a purely technical standpoint that is impossible about controlling seepage.

   The North Delta Seepage Monitoring Program was initiated in 1993 to establish baseline groundwater conditions adjacent to stream channels in the North Delta that were proposed to be enlarged as part of the North Delta Program. Since the program's inception groundwater levels have been measured at 71 sites near the North and South forks of the Mokelumne River on Tyler Island, Staten Island, Bouldin Island, Terminous Tract, McCormack-Williamson Tract, Canal Ranch Tract, Andrus Island, and New Hope Tract. The baseline data collected over several years could be used to compare with the data collected after the implementation of the project to determine if seepage rates have changed and if so, what mitigation measures should be implemented.

   In any event, the long term consequences of sea level rise and continued subsidence will lead to increased seepage even with the No Action Alternative. Anecdotal evidence exists that dredging of adjacent channels encourages seepage under levees through more permeable lenses. It is this evidence that supports the idea that flooded islands will produce more seepage into neighboring islands. Seepage from dredging, for example, has proven to be only a temporary concern as it "heals itself", with sediments plugging the channel bottom. Therefore, in addition to cutoff walls, seepage will be naturally mitigated, although over time, seepage will continue to increase with or without a project.

2. Modern levee construction methods will provide much more dependable levees than ongoing rebuilt levees we must now maintain. Containment of floodwaters will be more secure than current containment of the rivers. Anecdotal evidence exists that dredging of adjacent channels encourages seepage under levees due to exposure of more permeable lenses. It is this evidence that supports the idea that flooded islands will produce more seepage into neighboring islands. The neighboring islands that may experience seepage from infrequent flooding of detention basins are the islands that will benefit most from reduced flood risk due to the stage reductions produced by the detention basin.

3. The time required to pump out the detention basins will be dependent upon the final design though it estimates to require up to 30 days. In contrast, it required approximately 4 months to pump out Jones Tract after the 2004 flood event. The Detention Basin Inlet Structures for the proposed detention basins (Figure 2-30, Volume 2-Figures of DEIR) will have riprap protection on the landside section of the inlet.

   In the unlikely event pumping costs do increase on adjacent islands as a result of detention basin construction, funding is available through the Delta Levees and Environmental Engineering's Subventions Program to assist Reclamation Districts in the maintenance and repair of their levees.

SM-11

Comment acknowledged.

SM-12

Please see TV-2 response (page 5-5) for comment proposing dredging of a 1700 foot section of the North fork of the Mokelumne River.

The data provided do not include cross-sectional transects of the channels but rather longitudinal variations; even with as many as four different longitudinal tracks for some sections, the longitudinal paths may not even catch the thalweg (the line of maximum depth in the channel). There is no guarantee that data collected in this manner will identify the thalweg. Further the data are not specified against any datum and may simply be depths of the water taken at lower-low water. Any large flow would quickly relocate the sediment shoals into the deeper pockets of the river. The figures below demonstrate the strong variations in the thalweg depths of the north fork along with the cross-section that represents the shallowest area of the provided data. Here one can see that the model does have a more shallow representation where the data for Section 11 (Figure 5-10) provided does indicate a shoaled area compared to cross-sections upstream and downstream.

As described above, certain water depth data were provided to indicate additional shoaling in the north fork of the Mokelumne River. The data were supplied as an AutoCad drawing and a JPEG (Figure 5-11) of an aerial photograph which showed where the various sections in the drawing were located. Each section was examined and the section with the worst case depths is shown in Figure 5-10. The data indicate that a few longitudinal transects were taken in this part of the river where many of the sections included only a single longitudinal transect. No transverse transects appear to have been measure so the actual thalweg could be easily missed in this type of data collection scheme. The lowest maximum depth of any cross-section on Figure 5-10 indicates a depth of 11.4 feet. No information was given as to the significance of the depths shown and the assumption is made that they were simple depths from the water surface at the time the data were collected. We further assumed that the depths were carefully taken and represented sounding to the bottom and not to any attached vegetation that might have been growing on the bottom.

The location of this cross-section within the model domain is shown in Figure 5-12 and the cross-section as used in the model is shown in Figure 5-13. The cross-section shows that the thalweg is a very narrow portion of the channel and is approximately 6.28 meters (20.6 feet) below sea level as measured against the NGVD 29 datum. It is also clear that the channel shoals to an elevation of minus 4.88 meters (16.0 feet). The exact mean tide and mean lower-low water levels are not known for this specific location on the river. Adjusted, the shoal at this cross-section in the model could be no more than 13.0 ft deep and not necessarily different from the data provided.

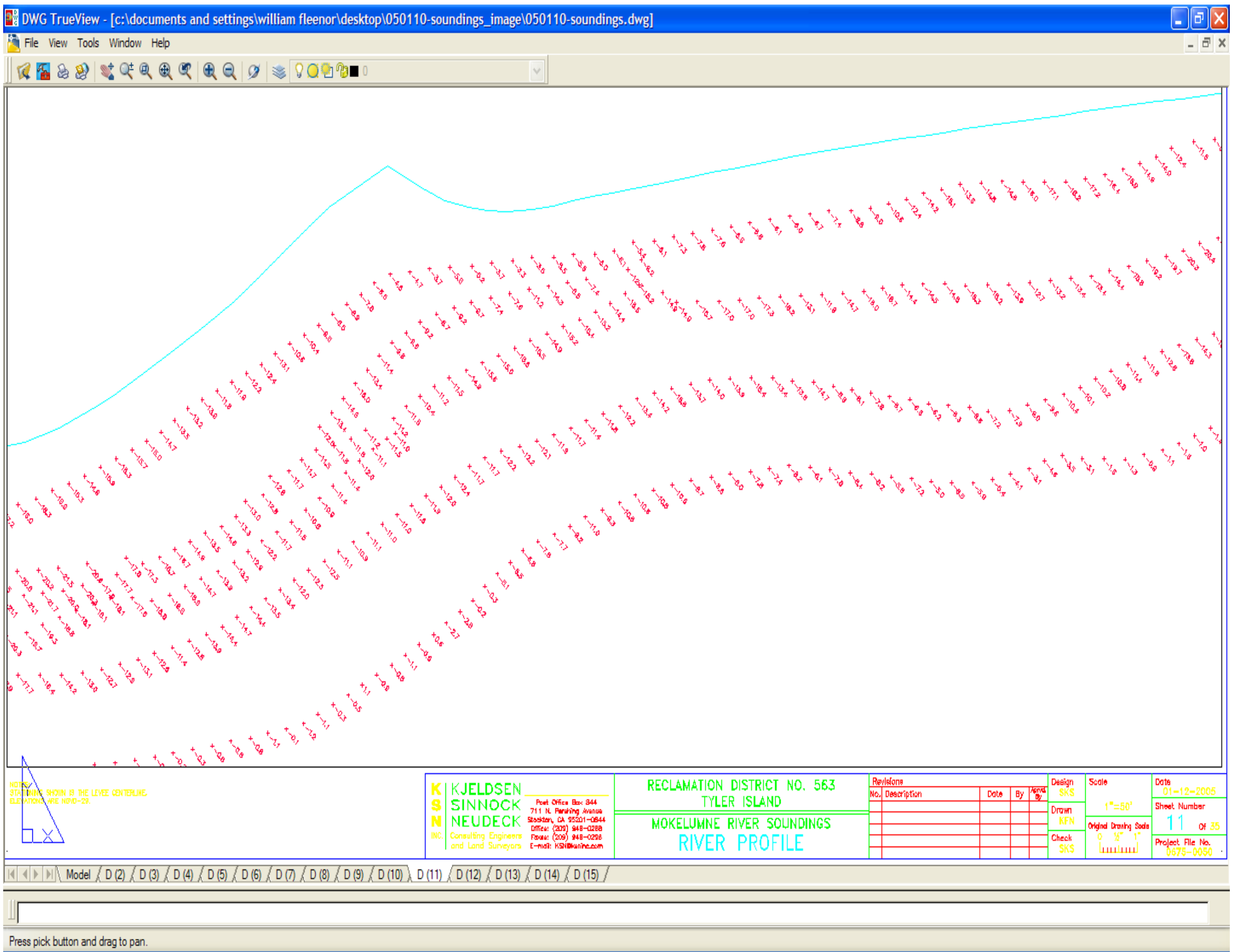

Figure 5-10. Section 11 of the depths provided on the north fork of the Mokelumne River which shows the smallest depths for any section of data provided. Minimum thalweg interpreted from cross-section of the sparse data would be 11.4 feet.

Figure 5-11. Aerial photograph shows the location of the various sections where data were supplied.

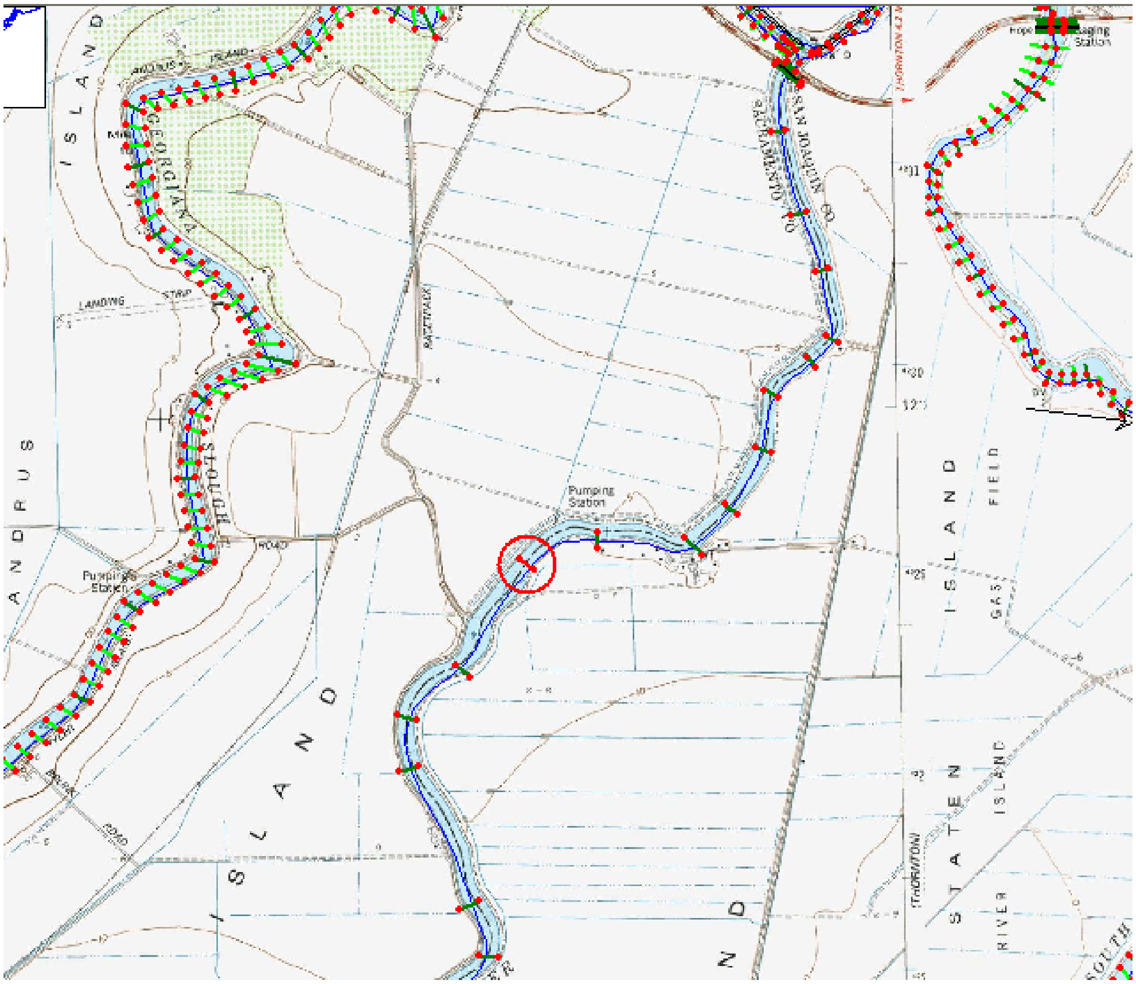

Figure 5-12. Model graphical with the location of the minimum depth cross-section of provided data encircled.

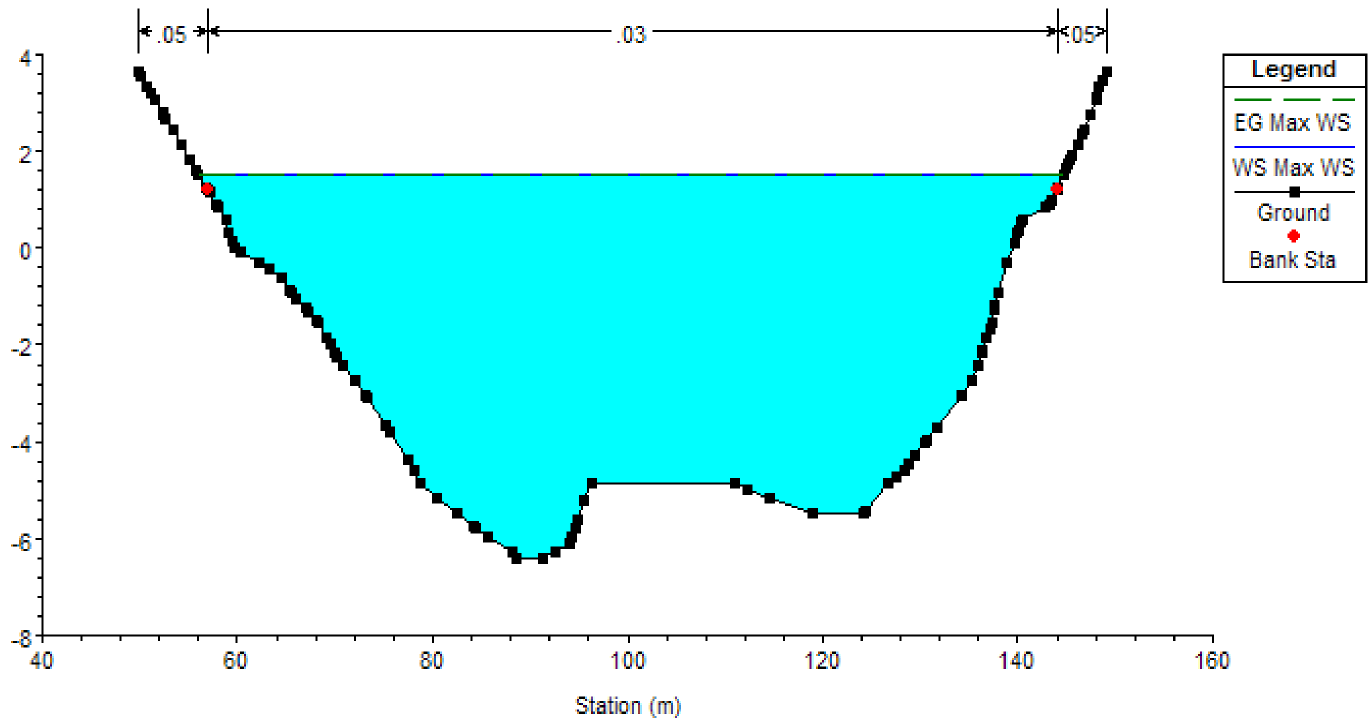

Figure 5-13. Cross-section where minimum depth values of provided data showed maximum depth of 11.4 feet. Here the thalweg is 6.28 meters below sea level against NGVD 29 datum.

SM-13

If water surface elevations are lowered as a result of the construction of setback levees on the south fork of the Mokelumne River, then impacts to the siphons will have to be mitigated. The costs associated with extending the siphons, replacing the siphons with pumps, etc. with have to be added to the overall expenses of constructing the setback levees. The Reclamation District is responsible for maintenance of levees, siphons, and pumps for their respective islands after the construction is completed.

Chapter 6
Public Hearing

Chapter 6
Public Hearing

This section contains copies of the transcripts for a public hearing held on the Draft EIR. Table 6-1 lists the date and location of the hearing and the associated comment code. Responses to comments are individually numbered in sequence, corresponding to the numbering assigned to comments in the transcript. The responses are prepared in answer to the full text of the original comment.

Table 6-1: Individuals providing verbal comments on the North Delta Flood Control and Ecosystem Restoration Project DEIR at the public hearing held in Walnut Grove, California on February 21, 2008

Code	Name/ Affiliation
TV	Topper Van Loben Sels, Reclamation District 551 and member of Delta Protection Commission
SM	Steve Mello, Trustee and President of Reclamation District 563
GL	Gil Labrie, Engineer for Staten Island (RD 38) and Brannan Andrus Levee Maintenance Districts (RD 2067, RD 407, RD 317)

PUBLIC HEARING

STATE OF CALIFORNIA

DEPARTMENT OF WATER RESOURCES

DELTA SUISUN MARSH OFFICE

NORTH DELTA FLOOD CONTROL

AND ECOSYSTEM RESTORATION PROJECT

DRAFT ENVIRONMENTAL IMPACT REPORT

JEAN HARVIE COMMUNITY CENTER

14273 RIVER ROAD

WALNUT GROVE, CALIFORNIA

THURSDAY, FEBRUARY 21, 2008

10:00 A.M.

PETERS SHORTHAND REPORTING CORPORATION (916) 362-2345

A P P E A R A N C E S

Department of Water Resources

Dale Hoffman-Floerke
Environmental Program Manager

Ralph Svetich
Supervising Engineer, Delta Suisun Marsh Office

Matt Reeve
Staff Environmental Scientist, Delta Suisun Marsh Office

Dave Showers
Delta Suisun Marsh Office

Public Participants

Topper Van Loben Sels
Reclamation District 551 and Delta Protection Commission

Steve Mello
Reclamation District 563, North Delta Water Agency, Central Valley Flood Control Association

Gil Labrie, Reclamation District 36, Brannan-Andrus Levee Maintenance District Engineer

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twenty-something slides. I am going to just do a few opening remarks that I am going to unfortunately read to you here in a minute or so as we get started. And then some staff folks from the Department of Water Resources in Sacramento will do some introductions and then we'll move into a slide presentation and then open up the room to formal comments.

This is in fact -- Excuse me. I'm on the tail end of a cold and I can tell my voice isn't going to last very long. This is a formal hearing process, if you will, to receive formal comments, verbal comments on the Draft EIR. We are not going to spend time this morning answering questions, I think I'm taking Ralph's spot now, actually answering questions but we would like to hear if you have remarks. Hold on a second.

Okay. So before I get too far off track I'll read you my opening remarks and we'll get the show on the road. And we're here for at least two hours. So if you'd like to be here as long as noon we're here for that length of time; if not, that's okay too.

So it is my pleasure to welcome you all to the public hearing this morning. We are going to hear, receive comments on and see a presentation on the Draft Environmental Impact Report for the North Delta Flood Control and Ecosystem Restoration Project. The Draft EIR is the culmination of a multi-year public process to provide flood control improvements in an ecologically responsible manner for the North Delta region.

Though the project is fully funded we implement flood control improvements principally on and around Staten Island, the McCormack-Williamson Tract and Dead Horse Island. It also provides flood controls benefits that will extend both upstream and downstream of the actual project site.

So one really important thing that I would like to stress is that the development of the North Delta Flood Control and Ecosystem Project has always been a very open process. We try to be as transparent as we can. I know that this process has been going on a lot longer than I have been involved in this project and I think that's probably safe to say with some of our other folks who haven't been with the project very long.

But the project has actually been, in various phases I think, or stages I should say, has been going on for more than ten years if I recall, since the early '90s. So your guidance and participation over the years has resulted in what we believe is a well-conceived and rigorously reviewed product.

So we now ask again for your input on what has become a critical juncture for the North Delta EIR's development. Critical in the sense that your comments today and over the entire 60 day public review period will be essential in determining the viability and the future success of the project.

So again we'd like to thank you for taking time out of your busy schedules this morning to be at this hearing and we'd like to now -- I am going to introduce Ralph Svetich who is the Supervising Engineer for the Specialized Areas Branch of the delta Suisun Marsh Office in Sacramento. So Ralph.

MR. SVETICH: Thank you, Dale. Can you all hear me now? Do I need to get at the speaker?

MS. HOFFMAN-FLOERKE: Actually I think you do need to use this because it's being recorded.

MR. SVETICH: Then I'll do this here. But again, I'm Ralph Svetich from the Delta Suisun Marsh Office in Sacramento. I'd like to welcome you all here.

One thing I want to start off again, and just as Dale said, to remind you all that this is a public hearing, not a dialogue with DWR on the EIR. For those of you, you all should have it here. There was this little document, everything you wanted to know about a public hearing but were afraid to ask. So that's back there. That will go into a lot more detail than I will go into.

If you want to come up and have a -- make a comment, a public comment, please fill out one of these little speaker cards and give it back to Mr. Dave Showers in the back there if you want to do that.

Also we have a North Delta e-mail list. And if you would like to be on our e-mail list there is a sign-up sheet back there as well so please fill that out.

The agenda we have, I am going to be followed by Matt Reeve. I think most of you know Matt. He is the environmental scientist working in the Delta Suisun Marsh Office. Matt has promised us he is going to give a short presentation here on the Draft EIR, its history, and he'll go over some of the alternatives with you.

When Matt is finished then we'll open it up to public comments. Your name will be called, you will be asked to go to that back speaker there. One thing, and we'll remind you again, if you do make a comment could you please spell your name for the people here. We are having a recording of this here and in about two weeks we'll post all the comments up on our website here.

So let's get this show on the road here. Matt, why don't you go over your presentation now.

MR. REEVE: Am I blocking anybody's view? Probably, huh. I'll move around.

As Ralph pointed out, it will be a short presentation. I couldn't do it justice in an hour or two hours. So let's get started. Here we go.

Okay, this is the North Delta Flood History. And off to the right you can see a slide. That's from the 1986 flood, at least that's my understanding. This is Dead Horse Island. I guess Tyler and that's a little tip of Staten right there.

All this information, by the way, will be -- it's all in the EIR. The only thing that's not included are the cost estimates that Jones & Stokes put together. And if you want that information we can provide that to you later on.

I'm just going to give a quick description of the hydrology of the area. I'm not a hydrologist, I'm a biologist, so I'm going to have to dumb it down for myself and hopefully you guys will bear with me.

But you've got different drainage basins here. You've got Morrison Creek, you've got Cosumnes, you've got Dry Creek and then you've got the Mokelumne. The Mokelumne at last count has 11 reservoirs so it's very well regulated, the flow. Dry Creek and Morrison Creek obviously are all rain-fed. The Cosumnes is the last, undammed river on the western slope of the Sierras and for that reason it is probably the biggest contributor. But essentially what happens is during a significant storm event, or a series of significant storm events, these drainage basins all seem to converge just east of McCormack.

Okay, and this is -- I gave a presentation for San Joaquin County and at least a few people asked, what exactly is meant by surge. Now this is -- By the way, Gil was very helpful in helping resolve some of the questions that were asked. But essentially what happens is the water converges east of McCormack. The eastern levee acts like a plug. And as the water levels get higher and higher eventually the levee is overtopped or breached. And that arrow displays that.

And then the surge occurs after that and then goes through the McCormack-Williamson Tract. It breaches the southwest levee, floods out Dead Horse Island. And that little photograph there shows houseboats, this is the 1986 flood, being crushed against the New Hope Bridge. That's another choke point. Probably should have a houseboat right there. As you go further downstream more levee breaches. That's on Staten.

The program history? It's got a very long history. There was a Draft EIR in 1990 and I don't think it got beyond the -- it didn't even get to the public comment period. They just published it and that was it. And then in the mid-90s CALFED essentially took over management of the project and they split out the Delta cross-channel component of the 1990 Draft EIR and that's pursued under separate effort. But the focus of the 1990 draft was state water supply reliability and flexibility.

Our current EIR is focused more on more on flood control and ecosystem restoration. Now these flood control goals are consistent with what I just discussed earlier. To control flood waters to the McCormack-Williamson Tract in a way that minimizes the surge, provide flood control benefits to surrounding areas by achieving stage reductions, reduce risk of catastrophic levee failures based on the 1986-97 hydrologies, and convey flood flows to the San Joaquin River without stage impacts without having to mitigate for them.

The project ecological goals. These were lifted out of the CALFED Steering Committee, Ecosystem Restoration Program Steering Committee, so they would apply to probably several restoration projects, they're fairly general. But implement science-based pilot programs, restore ecologic, hydrologic, geomorphic and biologic processes, support special status species, limit exotic species establishment, promote foodweb activity. Natural flooding, river flood plain connectivity, channel migration and sediment deposition.

I put this slide in here, this is in the EIR, but essentially just to show you the sites. The project site itself. This is Grizzly Island or Grizzly Slough, it's owned by DWR. This is the McCormack-Williamson Tract which was purchased using public funds by the Nature Conservancy in 1999. Dead Horse Island owned by the Wilson family. And this is Staten Island. This was purchased in 2002 by TNC using public funds, bond money. This is about five and a half million, that's about 35 million. This outer area is the projected, the footprint of the project, flood protection benefits.

Okay, these are the alternatives. I'll talk about the grouping, how it was designed, this EIR, but these are our Group I alternatives. And specifically these three ecological, conceptual models, the history is state and federal scientists and NGO scientists got together and put together several ecological models. Can you hear me by the way? Am I loud enough?

A science panel was put together chaired by Jeff Mount. They looked at all these different ecological models and they made several recommendations. The Agency scientists using those recommendations developed these three models.

This first one, Alternative I-A, they degrade the levee here by ten feet. It's currently 18.5 feet or close to that. One fact about all of this is this was one of the later islands reclaimed and as a result the levee heights are lower than the surrounding parcels or surrounding islands. But the idea is to lower this by ten feet.

But you still have to provide road access to the transmission tower, which is right here. It's concrete-fixed-weir. And the other thing is, we have to protect that transmission tower. It's in, I think, a 50 year lease agreement so that's one of the priorities.

And then the green are the wildlife-friendly levees. They have levees that are more gradually sloped so you can have native plantings. And this ditch is designed to provide fish habitat.

Further south here, the southwest levee. With this option it's degraded down a negative two-and-a-half feet. And the yellow is to armor or protect the levee. It's just on the northern end of Dead Horse Island.

Okay, I-B. Similar to the degraded levees. Northeast, southwest, an armored levee here, wildlife friendly levees.

I-C is, what's interesting is this is a cross-levee right here and they're looking at this as a subsidence reversal project. And the idea is to provide a certain depth for tules to grow through this area. They're assuming an increased rate of about two inches a year so it's supposed to -- this is mainly sand and peat so the idea is to raise the surface.

This is Grizzly Slough. This is displaying several alternatives. But the idea is to breach Bear Slough Levee and Grizzly Slough Levees. And it varies depending on the size of the breach. I think it's anywhere from 50 feet to the entire levee itself.

This is a swale. The idea is to hydrologically connect Grizzly and Bear Slough. And then you have the Fish & Game mitigation wetlands right there and you have some connectivity right there.

This is a levee along New Hope Road. That's controversial because sometimes you get flow from this area and this may block it. The idea is to allow that flow to connect between sloughs.

The material used for the swale will be used for the wildlife friendly levees in McCormack.

Okay, these are Group II actions. And they are all very similar, it's just they vary in the location on Staten Island. This is the northern option and there is in-the-weir, a fixed weir. It is supposed to overflow in a one-in-ten year event or above that. So you have in-of-weir and out-of-weir and a pump. The Staten Island Road which normally bisects the island would have to be re-engineered to be -- to serve as a road and as a levee.

II-B, the same theory behind everything. In-of-weir, out-of-weir, just the locations on the western side of the island. And then what you see is on the eastern side.

II-D is dredging the Mokelumne River. And that has its place in the South and North Fork. The South Fork will be dredged so that the dredging would begin up here and then go downward. And then these levees would be raised. I think in the EIR it's 1.2 inches or about one and a half inches. Dead Horse Island will be dredged all around there. And the yellow outline, those would be set-back levees.

Okay. The project groups. The reason they separated them was to allow them to be implemented independently and there is no mitigation linkage between the two. So you don't have to do this to mitigate for that. So you can pursue one of these individually or together depending on what's decided.

Okay, these are the estimated project costs. Jones & Stokes had a very detailed project cost analysis done for us back in 2006. Alternative I-A, B and C are 44 to 51 million. Now this is the base model price. If you want the options without dredging there is a scaled down dredging as an alternative or an option in these alternatives. And that would add about 11 or 12 million.

Group II, the prices are much higher, anywhere from 209 million or actually 103 if you include alternative II-D. But among II-A through C it's 209 to 327 million. Fairly expensive.

The issues, finding a long-term owner for the McCormack-Williamson Tract. I have been in contact with Dawit Zeleke. He is like the regional eco-coordinator for

TNC. And it sounds like we may be able to, at least through the restoration if this were to go through, they plan to continue owning and managing it.

Funding the project is a huge problem and I think Ralph is going to work on that and get it fixed.

Federal partner. We worked with the Army Corps, actually it was Gwen and the people before me, and somehow that fell apart. Hopefully we can partner again with the Army Corps in implementing this project and funding it.

The take on messages. As Dale pointed out, it's been a -- this thing has been scrutinized, especially the Group I alternatives. Scientifically it's been a very open process in that it's been around a long time. So I think that provides a lot of credibility to the project. And then the second, I've already pointed that out with the science panel. They reviewed it closely those Group I alternatives.

Next North Delta steps. Comments are due by March 28, 2008 and then we're hopefully going to prepare the Final EIR, which will include the preferred alternatives and responses to comments on the draft EIR and then certification of the Final EIR.

And you can send written comments to me by March 28, 2008. If you want any send any hate mail, Brian was saying, send it to Ralph. When you provide public comments today or verbal comments if you would back it up in writing that would help us. And with that, that's my presentation.

MR. VAN LOBEN SELS: Matt, I have a question. If the modeling shows that the North Fork has areas that aren't scoured out and the modeling shows an advantage from a flood control point of view to dredge portions of the North Fork could that be expanded and included in this project?

MR. REEVE: I can't, it's kind of a public hearing, Topper, so I can't respond. But yes, we're open to that.

MR. VAN LOBEN SELS: You're open to that. Thank you.

MR. SVETICH: Okay, I think now we're ready for anyone who wants to make a public comment. Do we have the list of -- Was there anyone who wanted to make a public comment?

Topper. Again Topper, if you could, make certain that you spell your name for the folks in the back. We don't want to embarrass anyone with your comments, you know. Sometimes not all of us have the best handwriting. Not saying anything Topper about you but just in general.

MR. VAN LOBEN SELS: Thank you. Is this on? Topper Van Loben Sels, Reclamation District 551 and Delta Protection Commission. And before I give you my comments, on behalf of the community I think it's important that we thank whoever has been working behind the scenes providing

TV-1

the funding. It's been going on, Steve Mello can tell you exactly how many years. But this has been going on long before the flood of 1986. So again I'd like to say thank you for getting us to this point. A lot of projects die long before they get here. TV-1 cont.

My specific comments, and they are not as detailed as I'm sure you're going to hear. My comments are more of like a 30,000 foot view of this project. And I have been involved with it for probably only about six years. And there's some areas of frustration. And I don't think that says that we can't get over them but there are some areas of concern that I think we need to address.

The first one that I felt frustrated with and I think we need to spell it out very clearly from the get-go, what is the goal of this project. TV-2

Number two -- and I'll get back to that. Number two is, I am frustrated with some of the modeling that has been done to date and some of the modeling that has not been completed. TV-3

The third area of concern for a project this big is how we are going to address flood plain management, long-term flood plain upstream management. TV-4

And the final area of concern because it is going to be dollars and cents and it's going to be politics is the lead agencies or a combination of lead agencies are critical TV-5 to get this to move forward.

As far as the goal goes, I think it's got to be from the get-go. I think it's imperative that the goal for the project, there have to be co-equal goals. And the co-equal goals have to be flood control and ecosystem restoration. We can't establish a priority or a time priority of any one above the other or politically I don't think we're going to get what we need. TV-6

The second area of frustration, and I have sensed this more from sitting around the table and listening to qualified engineers ask key questions. The modeling that has been done to date, it's modeling but it's no better than the input that you get when you go into it. So I think we have to address the modeling that's been done to date, confirm that that modeling is good. TV-7

And then the areas that we were asked to have modeled were not because of budget problems. We wanted to model configurations for the South Fork and the North Fork that would solve our flood issues. So we wanted to look at bridge constrictions, we wanted to look at additional rip-rap that had been added to the channels, we wanted to look at all in-growth trees in the channels and we wanted to look at sedimentation and where dredging would be needed. We didn't get the modeling passes that we needed because we didn't have funds so that's a frustration. TV-8

17

The third area is we have a lot of flood plain upstream that's floating us though most floods but it's not a formal agreement with those property owners and that flood plain over time has been shrinking and shrinking and shrinking. So I think as part of this project or as a bigger project we have to lock in the flood plain that we are utilizing today and then we need to extend it so that we can -- You know, we need to lower that stage. If we're shrinking flood plain we can do a lot of things down at the bottom of the flow but it's not going to solve our problem. That is the third. TV-9

And then the final is that -- this is a key question when we go for funding. There are some responsibilities here for the federal government. So I see the California Department of Water Resources stepping up to the plate but the federal government or the Army Corps of Engineers, whoever it is, 100 percent of their water that flows for the federal water project has to move through these two channels that we are addressing. One hundred percent of their water to get into San Joaquin rivers is flowing where we need to complete a flood control project. TV-10

So I think there is a responsibility here on the part of the federal government. Who is going to be the lead agency if you can have a combination of the two, I don't know, but I'd hate to see the California water resources out

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there without federal support and federal dollars. So that concludes my remarks, thank you.

MR. SVETICH: Steve Mello.

MR. MELLO: Thank you. My name is Steve Mello and I spelled it for you on the blue card.

I own and rent land on Tyler Island for farming. I am a trustee and President of Reclamation District 563. I currently also serve as one of five directors on the North Delta Water Agency and I am a director on the Central Valley Flood Control Association. I was an original member of the Delta Protection Commission as vice-chair for a number of years and I served on this commission from 1992 to 2000. I have been very involved in several proposed projects to improve flood control, water conveyance and habitat restoration in the North Delta. Those proposals included the North Delta Program Plan, CALFED and the North Delta Improvement Group, which worked on this proposal.

Generally, I have seen habitat restoration as a result of these programs but very little or no flood control.

SM-1

Flood control must come first or at worst concurrently with the ecosystem restoration as proposed here.

Any flood control work must start at the bottom of the system and work upstream in order to avoid increasing

SM-2

flood risks at the bottom during construction or in the event the whole project is not built as promised, as we have seen before. SM-2 cont.

More specifically in regard to this project: Armoring the interior of the levees to protect against wave wash is critical on these flooded area. You know, you talk about, you know, wildlife-friendly levees, et cetera, et cetera. In our opinion, people that were part of the North Delta Improvement Group process didn't cut it with us and never did. Vegetation is not the answer. Rock revetment or rip-rap is. SM-3

On the McCormack-Williamson, rip-rap on interior levees is essential to stop wind-driven waves from destroying levees from the inside-out and then subjecting adjacent levees to big waves being driven across a long fetch of open water. SM-4

Most of the water that is flowed out of the downstream end should exit to the west into Snodgrass Slough, as there are much bigger levees to the west and much greater channel capacity there. A smaller portion, say ten percent or so, should be allowed to flow into the Mokelumne River system, the main stem, due to the relatively narrow Mokelumne River channel and the smaller levees on New Hope Tract. SM-5 Seepage to adjacent lands needs to be quantified and mitigated at not only the reclamation district level but SM-6 also at the landowner/tenant level. Increased district pumping costs and negative impacts on agronomic operations will be expected. SM-6

As part of the North Delta Program Plan, Stein Buer and his staff, to their credit, instituted a system of seepage monitoring wells that have determined what background seepage is and those wells have been monitored by Department of Water Resources for a number of years. So you have some real good background information there in regards to what is natural seepage.

A big problem on the main stem of the Mokelumne River is the presence of the New Hope Marina, and I know this is controversial, and the intrusion into the Mokelumne River of its recreational vehicle park. Photographic evidence of this increased footprint has been submitted to substantiate this negative impact. New Hope Marina has expanded in the Mokelumne River and definitely, negatively impacted its flow capacity. New Hope Marina should be bought and removed or forced to return to the footprint in the Mokelumne River that existed when the New Hope Marina was founded. Something that has been brought up numerous times, nobody has ever dealt with it. SM-7

The creation of a shallow body of water on McCormack-Williamson will cause conditions that will: one, increase seepage to adjacent lands; two, increase mercury SM-8 methalization; three, increase water temperatures and hence entice the presence of fish species that feed on special status fish species; and four, entice the presence of those very special status fish species such as Delta Smelt or Long Fin Smelt that could result in the necessity to screen water diversions in adjacent channels. The proponents of this program should pay for the installation and maintenance of those screens. SM-8 cont.

Flooding an area the size of McCormack-Williamson would increase water consumption. It sounds odd but the evapo-transpiration of the open water/wetlands in McCormack-Williamson would cause more water to be lost through evapo-transpiration than is consumed for agronomic operations. SM-9

The creation of any of the small flood retention basins as proposed on Staten Island is not acceptable, as any of them would cause more problems than they solve. The fact that all are too small, they are all around 22,000 acre feet, it's a drop in a bucket, and have fixed weirs, which would allow them to flood at a very minor blip in the water surface and hence you would, you know, basically flood it before you really needed it, would render them meaningless in a major flood event. SM-10

The '86 flood entrained around 275,000 acre feet. And I'm kind of fuzzy on this, I relied on memory. That gives you an idea, 275,000 acre feet was entrained on SM-11

Glanville, McCormack-Williamson, New Hope, Dead Horse and Tyler Islands. What's 22,000 acre feet going to do? It's ridiculous and costly as you saw from your graphic on the cost estimates. SM-11 cont.

Flooding all of State Island in a major flood event through operable weirs is the only way one could justify the disruption of that island's ecosystem function. By the way, half of the purchase price of Staten Island went to the flood control side of the ledger at the CALFED process. You know, in regards to flooding Staten, there would be a lot of work done in the interior. You'd have to ring levee the headquarters, the houses, the grain storage. There would be a heck of a lot of work in regards to stabilizing the interior levees and a major concern would be how quick are you going to pump it out after it floods. SM-12

The creation of any of these proposed retention basins creates the following concerns: There would be increased seepage to adjacent islands, resulting in extra pumping costs at the reclamation district level and negative impacts on agricultural operations. They would all open a long fetch of water, resulting in wind borne waves eroding the interior levees of Staten, possibly breaking out and exposing adjacent islands to increased flood risks and costs. SM-13

So the question is, how soon after flooding would the retention areas be drained? Will you put rip-rap on the interior levees or will you rely on wildlife-friendly levees, you call them? Or will you pay and will you pay for lost farm income and increased pumping costs on adjacent islands? SM-14

The dredging of the South Fork Mokelumne River and raising of levees where needed is to be commended but I have heard these proposals before. Both of those projects need to be completed before anything happens in regard to degrading McCormack-Williamson levees. If you degrade those levees and you don't do the downstream stuff the folks downstream are going to catch it. It is going to certainly increase our flood risk. SM-15

And by the way, a section of the North Fork Mokelumne River needs to be dredged to eliminate about a 1,700 foot stretch of river that acts as a plug. It is only eight to ten feet deep. Upstream from that section the river channel is 30 feet deep and downstream from that section it is 26 feet deep. The bathymetry of the North Fork Mokelumne River has been provided to your staff by me as provided by Reclamation District 563 survey. We surveyed the channels to prove my point. That stuff is all on file. It's not been taken into account. SM-16

Thank you for allowing my input. I am available for further discussion if you wish. I mean, we have been

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dealing with this stuff since 1987 and I've reiterated time and again many of these concerns and others. As you said, we could talk about this for a couple of days. A few minutes is not going to cut it. And Matt, I will get to you with some further, more refined comments but for today's purposes this will suffice. Thank you.

MR. SVETICH: And Gil Labrie.

MR. LABRIE: I'm the engineer for Staten and Brannan-Andrus Levee Maintenance District. I just walked in. I was hoping to be later, that way i could say, well I agree with Steve and others who have already been up so I wouldn't have to say all that much.

And I do agree. I think Steve has hit on some key points. My overall impression was that there were impacts that weren't addressed. If you don't dredge and do deal with the South Fork, you reduce the surge, you send more water down the North Fork for a longer period of time. You send it down there for a longer period of time our levees are going to get more saturated. Periodic levels are going to be up, problem areas are going to get worse on Staten. I'm sure you're going to have the same issues on Tyler. GL-1

It's going to turn around, depending on what's happening in the San Joaquin, it's going to turn around and go back up towards Iana and we're going to have issues on Brannan-Andrus. The lower sections of Georgiana on Brannan- GL-2

Andrus is where all our seepage occurs starting at the BNW Bend and going around and up towards -- past Ox-Bow up to about, well actually all the way up to the cross levee. But the area that would get impacted obviously first, and we do get it when the San Joaquin gets higher, is the reverse floods. And of course it's the opposite when the Sacramento is running high and it runs back up the North Fork.

GL-2 cont.

So clearly there are some impacts there if you do not dredge. So you've got dredging as an option. It's not part of any of the rest of it but there are impacts to the North. Because the South Fork is clogged up so it's going down the North Fork so there are clearly impacts. Obviously if Steve has identified a bad spot on the North Fork then that makes the situation even worse. So you haven't touched on those impacts.

GL-3

As he indicated there are economic impacts, therefore, that are not addressed. So it's lacking in dealing with those.

GL-4

Obviously there are positives or should have been positives in the flood control. I mean, you addressed positives all up and down the ledger regarding habitat. But there's none of the positive impacts showing up so there aren't any of any significance when it gets to the flood control and the downstream. So that's been left out.

I think you need to do a cost benefit analysis. I

GL-5

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looked at the Executive Summary so I didn't have a chance to go into the detail and look at maybe your economics. The discussions I've had with my clients indicate you're probably missing the mark in some of the costs associated with this thing. But I think there needs to be a cost benefit analysis. There's got to be some benefits besides habitat to make it, to fill the void. And recreation, some slight recreation benefits, you know. Aside from that.

GL-5 cont.

A key thing I think that is meaningful to us ends up being the flood control, the impacts on our levees and our levee stability and our own internal issues that downstream, that have been -- are sorely missed. Thanks.

GL-6

MR. SVETICH: Are there any others who would like to make a public comment?

Okay, I thank you all for coming here. And again, the end of the comment period is March 28. Make certain you get the comments to Matt. All comments will be considered.

Thank you.

(Thereupon, the Public Meeting was adjourned at 10:47 a.m.)

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Responses to Public Comments provided at the Public Hearing

TV-1

The commenter's description of the project's benefits and are noted.

TV-2

The purpose of the project is to implement flood control improvements in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. Flood control improvements are needed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem resulting from overflows caused by insufficient channel capacities and catastrophic levee failures in the project study area.

Degradation of the northeast and southwest levees on McCormack-Williamson Tract eases the effects of the surge caused by frequent failure of the tract. The opening of the tract also produces additional aquatic habitat and varying landscapes. The detention basin proposals and dredging proposal do offer small downstream flood level benefits, but come at a relatively high price and provide limited ecosystem benefits.

TV-3

The region has now been modeled by MBK engineers using the HEC-RAS hydraulic model, and UC Davis using the MIKE 11 hydraulic model. HEC-RAS, developed by the US Army Corps of Engineers, is a one-dimensional steady flow hydraulic model designed to aid hydraulic engineers in channel flow analysis and floodplain determination. The MIKE 11 model, developed by the Danish Hydraulic Institute, is a dynamic, one-dimensional modeling package, which simulates the water level and flow splits throughout a river/channel system. Both models have been calibrated for a range of hydrologic events from large storm events to intermediate and low river flows. The MIKE 11 model acknowledged and corrected the questions that were raised in the review of the HEC- RAS model, but found little change in the results projecting stage reductions and improved flood protection with the implementation of the project alternatives (please see Chapter 3.1 of the North Delta Flood Control and Ecosystem Restoration Project DEIR) . DWR believes the two models, taken together, are reliably accurate; and the department can reasonably rely upon the results of the models to support the final decision among the alternatives. All downstream impacts have been followed through to the San Joaquin River boundary condition. The MIKE 11 model includes all the bridges within the system and the latest data available on channel geometries. Sensitivity analyses have been conducted to further demonstrate the soundness of the results. Some sedimentation and vegetation growth will occur during periods of moderate flows and will be eroded during periods of higher flow. Vegetation will have local influences on sedimentation and low flows but negligible effect on higher flows. The strength and value of a model is not that it can produce the exact results for a given year but the ability to adequately represent a broad range of events. Consequently one can investigate changes in the system and rely on the results a model predicts and have confidence that the directions of change are correct and the amounts are within reason of such a stochastic process.

TV-4

The Project as proposed will provide flood control improvements that are needed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem resulting from overflows caused by insufficient channel capacities and catastrophic levee failures in the Project study area. Modeling results, which include an analysis of the impacts of existing upstream floodplains on stage elevations, have substantiated that the flood control actions proposed with the project will attenuate the peak flows entering McCormack-Williamson Tract; and prevent the surge of water that caused downstream damage in past flood events. Any further upstream work such as the construction of a detention basin, or even failure of upstream levees; would just add to the benefits demonstrated by the project because the rerouted upstream water would not return to stream flow. The identification and development of additional upstream floodplains has not been focus of the project and therefore has not been included as a component of the Group 1 or Group 2 alternatives.

The project planning process has been enriched through the participation of stakeholders not affiliated with DWR as integral voices in project development. The North Delta Improvements Group for example, was specifically created as a forum for exchanging project information, establishing goals and objectives, developing alternatives, and discussing analysis results. DWR will continue to work with NDIG and other stakeholders in creating a long term flood management plan.

TV-5

The need for implementation funding and coordination with multiple federal and state agencies is critical to move the project forward. The Department of Water Resources (DWR), The Nature Conservancy (TNC), RD 2110, and US Army Corps of Engineers (USACE) are forming a partnership to implement flood protection and restoration actions proposed for McCormack-Williamson Tract. The USACE is currently completing a feasibility report for the project (referred to as a Project Implementation Report) as part of the CALFED Levee Stability Program. Once the feasibility report is completed, the Corps will develop a Project Management Plan. The Corps will then enter into a cost-share agreement with the local project sponsor, RD 2110.

Staff have recently held two meetings, one with local, state, and federal regulatory agencies (November 3, 2009) and the other with several Reclamation Districts and other interested local stakeholders (February 11, 2010) to discuss the project's progress and to present the Preferred Alternative for the Group 1 actions. Participants at both meetings were very receptive to implementation of the Group 1 actions proposed for McCormack-Williamson Tract and the partnership with TNC, DWR, and USACE.

TV-6

Please see TV-2.

TV-7

Please see TV-3

TV-8

It is important to note that the region has now been modeled by two different groups using two different models that produce supporting results. MBK engineers modeled the North Delta region using the HEC-RAS hydraulic model, and UC Davis using the MIKE 11 hydraulic model. HEC-RAS, developed by the US Army Corps of Engineers, is a one-dimensional steady flow hydraulic model designed to aid hydraulic engineers in channel flow analysis and floodplain determination. The MIKE 11 model, developed by the Danish Hydraulic Institute, is a dynamic, one-dimensional modeling package, which simulates the water level and flow splits throughout a river/channel system. Both models have been calibrated for a range of hydrologic events from large storm events to intermediate and low river flows. The MIKE 11 model acknowledged and corrected the questions that were raised in the review of the HEC- RAS model, but found little change in the results projecting stage reductions and improved flood protection with the implementation of the project alternatives (please see Chapter 3.1 of the North Delta Flood Control and Ecosystem Restoration Project DEIR) . DWR believes the two models, taken together, are accurate; and the department can reasonably rely upon the results of the models to support the final decision among the alternatives.

TV-9

Please see TV-4.

TV-10

Please see TV-5.

SM-1

Any ecosystem enhancement will require opening up McCormack-Williamson Tract and MIKE 11 and HEC-RAS hydraulic modeling results have shown that is the best approach to lessen flood impacts. The two event outcomes are coincidental.

SM-2

The decision on which component of the project will be implemented first will be based on the availability of funding, cooperation with the local and federal partners, benefits provided with implementation of the project components, construction schedule, etc. . DWR staff are currently working with the US Army Corps of Engineers (CalFed Levee Stability Program), The Nature Conservancy, and RD 2110 as potential partners in the funding and implementation of Group 1 actions for the project.

SM-3 and SM-4

The subject of how to best protect (rip-rap vs. no rip-rap) the inboard side of any wildlife friendly levee has not been settled; however the low-slope, pre-vegetated design proposed for the McCormack-Williamson Tract will add geotechnical stability to the levees . In addition, wildlife friendly levees without rip-rap will provide a variety of habitats including upland, riparian, scrub/shrub, emergent marsh and mudflat (when interior flooded) habitats.

Reclamation District 2110 (McCormack-Williamson Tract) staff monitor and inspect levees on a regular basis to prevent levee degradation; thereby mitigating for any potential wave fetch damage to adjacent levees. RD 2110 is a participant of the DSMO Subventions Program, so any levee maintenance work will be eligible for State funding.

SM-5

The comment recommending that only 10% of the total flood flows exiting the south end of McCormack-Williamson Tract should enter the Mokelumne River is unclear. The only other route the water can flow is through the Delta Cross Channel to the Sacramento River, and possibly into Georgiana Slough. This approach is infeasible for the following reasons:

1. the Delta Cross Channel is closed when Sacramento rivers flows approach 20,000 to 25,000 cfs, the timing of which is consistent with higher flows exiting McCormack-Williamson Tract,

2. the Delta Cross Channel gates close for a total of up to 45 days the November-January period, according to State Water Resources Control Board Decision 1641.

The other interpretation of the comment recommends that most of the water exiting McCormack-Williamson Tract flow towards Snodgrass Slough and into the north fork of Mokelumne River, which is consistent with the MIKE 11 hydraulic modeling results. The conveyance capacity on the north fork is greater than that of the south fork of the Mokelumne River. As a consequence of capacity and current bridge restrictions at the top of each fork, the north fork currently handles from 2-2.5 times more flow than the south fork (depends on total flow). Regardless of location of the release, the north fork would still carry the large proportion of the flow without modifications of bridges and channel capacities. Physics will dictate the split of the flow but the release should be well distributed along the lower southwestern levee to prevent any localized stress and distribute water proportionally according to conveyance abilities of the channels.

RD 348 (New Hope Tract) is nearing completion of Phase II, a $7 million construction project to upgrade nearly 4 miles (stations 410+00 to 630+00) of levees to the PL 84-99 (100 year flood protection) standard; located on the northwestern side of the Tract. Future work is planned with available funding to upgrade levees on the southwest end of the Tract. Phase II is a follow-up to Phase I, a $4.2 million construction project to upgrade nearly 5.5 miles (stations 920+00 to 630+00) levees on the eastern side of the Tract. The project was State funded through the Special Projects program. The commenter is therefore correct in stating that New Hope’s levees have historically been smaller than surrounding island levees, yet significant work has been completed in addressing those flood protection shortcomings.

SM-6

Comment acknowledged.

DWR is aware of the potential damages associated with underseepage. However, there has never been a documented levee failure in the Delta directly resulting from flooding of an adjacent island. This includes (1) any of the islands that were flooded but later reclaimed (any Delta island that has flooded), and (2) any of the islands surrounding the Delta flooded islands of Franks Tract, Little Franks Tract, Mildred Island, lower Sherman lake, Big Break, Liberty Island. Areas with a high potential for underseepage risk can be identified and mitigated for that risk. Jones Tract for example, contained a few localized spots of underseepage which were addressed.

The North Delta Seepage Monitoring Program was initiated in 1993 to establish baseline groundwater conditions adjacent to stream channels in the North Delta that were proposed to be enlarged as part of the North Delta Program. Since the program’s inception groundwater levels have been measured at 71 sites near the North and South Forks of the Mokelumne River on Tyler Island, Staten Island, Bouldin Island, Terminous Tract, McCormack-Williamson Tract, Canal Ranch Tract, Andrus Island, and New Hope Tract. The baseline data collected over several years could be used to compare with the data collected after the implementation of the project to determine if seepage rates have changed. To the extent that the seepage monitoring indicates impacts attributable to the project, relief wells will be installed to mitigate such impacts.

SM-7

It is unclear which permit is referenced in the comment; such as a 404/401 permit, or an encroachment permit. In either case, DWR is not authorized to issue these permits; the Central Valley Regional Water Quality Control Board (CVRWQCB), the US Army Corps of Engineers (ACOE), Central Valley Flood Protection Board (CVFPB), State Lands Commission (SLC) issue and oversee compliance with these and other related permits. The contact telephone numbers for these State Boards, Departments, and federal agency are listed below:

1.	CVRWQCB	Betty Yee	(916) 464-4643
2.	DPC	Linda Fiack	(916) 776-2290
3.	CVFCB	Mike Peterson	(916) 574-0685
4.	USACOE	Dennis Clark	(916) 557-7847
5.	SLC	Paul Thayer	(916) 574-1800

Early discussions in formulating project components included consideration of closing or relocating one or both of the marinas in the project area. Marina relocation or closure is no longer under consideration as an action of the project for the following reasons:

- Marina closure or relocation does not directly address the purpose and objectives of the project, as it more closely treats a symptom of the surge effect rather than the cause (uncontrolled flow) and does not directly lower stage or increase capacity in a substantial way.

- Because of local business interests and North Delta recreational use represented by the marinas, closure is not considered to be a sound political or economic option at this time.

- No readily identifiable site opportunities for relocation have emerged as viable or suitable while still meeting local needs and demands.

Therefore, marina closure or relocation will not be carried forward as a component of the project in the scope of this document.

SM-8

1. DWR is aware of the potential damages associated with underseepage. However, there has never been a documented levee failure in the Delta directly resulting from flooding of an adjacent island. This includes (1) any of the islands that were flooded but later reclaimed (any Delta island that has flooded), and (2) any of the islands surrounding the Delta flooded islands of Franks Tract, Little Franks Tract, Mildred Island, lower Sherman lake, Big Break, Liberty Island. Staten detention basin(s) would fill infrequently, and the amount of

water involved in storage (and therefore the potential underseepage) is small, and Staten's water level could be quickly pulled back down (at least for the portion of the water that could be drained by gravity) once the flood surge passes, which would effectively reduce the static pressure (therefore underseepage) rather quickly. Areas with a high potential for underseepage risk can be identified and mitigated for that risk. Jones Tract for example, contained a few localized spots of underseepage which were addressed.

The North Delta Seepage Monitoring Program was initiated in 1993 to establish baseline groundwater conditions adjacent to stream channels in the North Delta that were proposed to be enlarged as part of the North Delta Program. Since the program's inception groundwater levels have been measured at 71 sites near the North and South Forks of the Mokelumne River on Tyler Island, Staten Island, Bouldin Island, Terminous Tract, McCormack-Williamson Tract, Canal Ranch Tract, Andrus Island, and New Hope Tract. The baseline data collected over several years could be used to compare with the data collected after the implementation of the project to determine if seepage rates have changed and if so, what mitigation measures should be implemented.

Even in a no action alternative, the consequences of sea level rise and continued subsidence will lead to increased seepage. Anecdotal evidence exists that dredging of adjacent channels encourages seepage under levees through more permeable lenses. It is this evidence that supports the idea that flooded islands will produce more seepage into neighboring islands. Seepage from dredging has proven to be only a temporary concern as it 'heals' itself, with sediments plugging the channel bottom. It should be anticipated that the flooded portion of McCormack-Williamson Tract will also plug itself with the continuous supply of sediments.

The flood protection provided with the construction of the detention basin will result in far less seepage than has occurred as a consequence of past flood events (most recently in 1997).

DWR, TNC, RD 2110, and USACE are in the process of forming a partnership to implement flood protection and restoration actions proposed for McCormack-Williamson Tract. The USACE is currently completing a feasibility report for the project (referred to as a Project Implementation Report) as part of the CALFED Levee Stability Program. Once the feasibility report is completed, the USACE will develop a Project Management Plan. The Corps will then enter into a cost-share agreement with the local project sponsor, RD 2110. USACE will be required to address adverse impacts, such as underseepage to neighboring islands, should this component of the project move forward under the auspices of the CALFED Levee Stability Program.

2. The stated goal for ecosystem enhancement is to not create more habitat where high levels of mercury release would be anticipated. Methylation of mercury is greatest where soils contain a high degree of organic material and anoxic conditions are prevalent. McCormack-Williamson Tract soil is predominantly mineral rather than organic, and the shallow, tidal water will produce higher

3. oxygen concentrations than deeper water. Mitigation efforts will be pursued when identified. Since mercury releases of agricultural drainage have not been quantified it is uncertain whether the wetlands will produce more or less methyl mercury. The precise goal of ecosystem enhancement is to increase desirable fish species. Without ecosystem enhancement recent court rulings would suggest that pumping restrictions would likely be increased. Channelization and water exports are two major contributors to the ecosystem decline and it is necessary for these two effects to contribute to any ecosystem enhancement.

4. The creation of tidal wetlands and floodplains will provide habitat for native floodplain spawning fish such as the Sacramento splittail and native floodplain rearing fish such as the Chinook salmon. These fish are adapted to these environments and will benefit from the additional habitat proposed by the project. There may be additional predation by exotic species but the creation of new habitat for the native and hatchery raised populations of Chinook salmon and Steelhead (Mokelumne River hatchery), and the Sacramento splittail will more than compensate for any losses associated with predation.

DWR, in consultation with DFG, NMFS, and USFWS, will prepare a Floodplain and Shallow Water Tidal Marsh Habitat Restoration and Monitoring Plan to ensure that ecosystem restoration benefits for fish species are maximized, while minimizing the potential for adverse effects on native fish species from habitat creation (e.g., creation of predator habitat). The plan will provide the Corps and the resource agencies with sufficient information to determine the adequacy of the proposed mitigation and to issue a Section 404 permit. The Corps will approve the plan prior to project construction activities that affect the Corps jurisdictional areas in the project area.

The plan will be prepared to meet or exceed the specifications and mitigation requirements pertaining to Corps jurisdictional areas as specified by resource agency requirements. The plan will also be provided to the State Water Board to determine the adequacy of the proposed mitigation with respect to water quality and to issue a Section 401 water quality certification for the project.

The goal of the mitigation effort is to avoid and minimize adverse effects on native species from creation of predator habitat, as well as maximizing benefits to native fish species through ecosystem restoration. To support this goal, the Floodplain and Shallow Water Tidal Marsh Habitat Restoration and Monitoring Plan will meet the following objectives:

- to the extent practicable, design floodplain and shallow water tidal marsh habitats to maximize potential benefits to native fish species, while minimizing the creation of habitat favoring predatory fish species;
- facilitate early development of floodplain and shallow water tidal marsh habitats so that potential benefits are maximized as close to construction as is practicable;

- integrate concerns for special-status species (e.g., Delta smelt, splittail, and Chinook salmon) into the habitat restoration design to the maximum degree practicable; and
- design the floodplain and shallow-water tidal marsh habitats so that, once established, they will require little or no maintenance.

Project actions planned for McCormack-Williamson Tract may be implemented by the US Army Corps of Engineers as part of the CALFED Levee Stability Program. The USACE as a result, would have to bring in those additional elements listed by the commenter into their plan formulation and mitigate for any adverse impacts associated with their (USACE) activities.

5. Delta smelt and ongfin smelt are rarely found in or near the project site and it is unknown if project implementation will change migratory spawning and rearing behaviors of these two fish species. However, the project will provide additional floodplain spawning habitat for Sacramento splittail and rearing habitat for protected species such as the Chinook salmon which are typically present in the North Delta area from January through June, and from September through November. Steelhead are (ESA Threatened Species) are also present in the project area during January through May, and November. The Mokelumne River Hatchery constructed in 1963 and owned by EBMUD (operated by DFG) releases approximately 2 million Chinook salmon and 180,000 yearling Steelhead annually into the Mokelumne River; so the presence of millions of protected fish in the project area over the past several decades has yet to trigger enforcement of fish screen requirements.

   According to Fish and Game Code Sections 5980, 6020, and 6100, fish screens are already required for siphons statewide for all diversions which affect fishery resources. Diversion in anadromous waters of the State shall be deemed to require screening unless onsite sampling demonstrates otherwise. In addition, all diversions covered by this section which are located within the essential habitat of a state (CESA) listed species, or the critical habitat of a federally (ESA) listed species, shall be deemed to require screening. The project will not create any new requirements for screening.

SM-9

Open water and wetlands would account for up to 3-feet (ft) of water loss annually. However, some crops will use nearly this much in consumptive use and on average will use over 2-ft of water. Maximum additional consumption of water would be less than 1-ft and amount to less than 1000 ac-ft of water per year. Figures assume best possible irrigation practices and do not account for evapotranspiration from open water toe-drains and irrigation channels for agricultural uses.

SM-10 and SM-11

The entrainment of 275,000 acre-feet on multiple islands during the 1986 flood event has little correlation with the efficacy of detention basins to provide flood protection. Levee failure risk and related flood damage will be reduced with the diversion of up to the 48,350 acre feet (Alternative 2-A) from the swollen channels to the detention basin.

Alternative 2-A, 2-B, and 2-C differ on: (1) the location of the detention basin on Staten Island and (2) the volume of flood water held by each of the basins. The north Staten detention alternative (2-A) is designed for 48,350 acre feet (af), the west Staten detention alternative is designed for 35,600 af, and the eastern Staten detention alternative is designed to detain 32,400 af of floodwaters. All of the three of the proposed options were designed using a hydraulic model to contain flows greater than a 10 year event but less than a 100 year event. The capacity of the basin will be designed based on the 1997 flood event. Hydraulic modeling during project design would assist in sizing the basin relative to the 1997 event while minimizing required acreage and frequency of inundation, so the comment “All are too small (about 22,000 acre feet) and have fixed weirs would render them meaningless in a major flood event” is inaccurate.

The costs for construction of the detention basins (Alternatives 2-A-2-C) are significant, ranging from $209 million to $327 million. However, Alternative 2-D (dredging) is also costly; implementation is estimated at nearly $105 million not including annual dredging maintenance costs of nearly $310,000 (annual estimated maintenance costs for Alternatives 2-A, 2-B, and 2-C are $1,100).

SM-12

The DEIR does not propose flooding all of Staten Island as a flood control alternative. Protection of structures such as headquarters, the houses, and grain dryer will vary depending on what alternative is selected as the preferred alternative for Group 2 actions. Structures that may be impacted will be demolished and relocated outside of the proposed detention area assuming one of the three detention proposals is selected.

The Staten Island detention basins will not disrupt ecosystem function or agricultural operations because the areas within the detention basins will continue to be farmed and will continue to provide habitat for the Greater Sandhill Cranes. The basins’ fixed weirs are designed to overflow during a one in ten year event which means the basins will be dry and available for farming (corn is not grown during the winter months) and Greater Sandhill Crane habitat for most years.

Staten Island was purchased in 2002 by the The Nature Conservancy (TNC) with roughly $17.5 million in Proposition 13 funds and roughly $17.5 million in Proposition 204 funds under the Flood Protection Corridor Program. The two contractual agreements that provided for the transfer of grant funds by the Department of Water Resources and the Resources Agency to TNC specified the following commitments: (1) agricultural land preservation, including the economic viability of agricultural operations; (2) wildlife habitat protection; (3) protection of a floodplain area from potential inappropriate and incompatible development; and (4) potential role in future flood management and water management improvements.

TNC has honored their commitments including prevention of inappropriate and incompatible development and participating with DWR in development of the North

Delta Flood Control and Ecosystem Restoration Project. The purchase of the island effectively removed the property from the real estate market thereby preventing any future development and mitigating for future flood damages that may have otherwise occurred if Staten was developed. In addition, all of the Group 2 Alternatives described in the Draft EIR propose flood control benefits for Staten either through the construction of detention basins on the island, or construction of setback levees as a component of Alternative 2-D, which proposes dredging the south fork of the Mokelumne River.

SM-13

DWR is aware of the potential damages associated with underseepage. However, there has never been a documented levee failure in the Delta directly resulting from flooding of adjacent island. This includes (1) any of the islands that were flooded but later reclaimed (any Delta island that has flooded), and (2) any of the islands surrounding the Delta flooded islands of Franks Tract, Little Franks Tract, Mildred Island, lower Sherman lake, Big Break, Liberty Island. Staten detention basin(s) would fill infrequently, and the amount of water involved in storage (and therefore the potential underseepage) is small, and Staten's water level could be quickly pulled back down (at least for the portion of the water that could be drained by gravity) once the flood surge passes, which would effectively reduce the static pressure (therefore underseepage) rather quickly. Areas with a high potential for underseepage risk can be identified and mitigated for that risk. Jones Tract for example, contained a few localized spots of underseepage which were addressed.

Modern levee construction methods will provide much more dependable levees than ongoing rebuilt levees we must now maintain. Containment of floodwaters will be more secure than current containment of the rivers. Anecdotal evidence exists that dredging of adjacent channels encourages seepage under levees due to exposure of more permeable lenses. It is this evidence that supports the idea that flooded islands will produce more seepage into neighboring islands. The neighboring islands that may experience seepage from infrequent flooding of detention basins are the islands that will benefit most from reduced flood risk due to the stage reductions produced by the detention basin.

The time required to pump out the detention basins will be dependent upon the final design though it is estimated to be approximately 30 days. In contrast, it required approximately 4 months to pump out Jones Tract after the 2004 flood event.

SM-14

Modern levee construction methods will provide much more dependable levees than ongoing rebuilt levees we must now maintain. Containment of floodwaters will be more secure than current containment of the rivers. Anecdotal evidence exists that dredging of adjacent channels encourages seepage under levees due to exposure of more permeable lenses. It is this evidence that supports the idea that flooded islands will produce more seepage into neighboring islands. The neighboring islands that may experience seepage from infrequent flooding of detention basins are the islands that will benefit most from reduced flood risk due to the stage reductions produced by the detention basin.

In the unlikely event pumping costs do increase on adjacent islands as a result of detention basin construction, funding is available through the Delta Suisun Marsh Office's Subventions Program to assist Reclamation Districts in the maintenance and repair of their levees. Please see number 2 above for additional information regarding drainage infrastructure and pumping costs.

SM-15

Comment acknowledged.

MIKE 11 and HEC-RAS hydraulic modeling results have shown that peak stages are lowered throughout the system even in the worst flows encountered in 1997, thereby reducing not increasing flood risk downstream. The San Joaquin River stages are certainly an influence on the stage solution throughout the north Delta area and those experiences during the 1997 flood were among the highest stages on record.

SM-16

Please see TV-2 response (page 5-5) for comment proposing dredging of a 1700 foot section of the North Fork of the Mokelumne River.

The data provided do not include cross-sectional transects of the channels but rather longitudinal variations, even with as many as four different longitudinal tracks for some sections the longitudinal paths may not even catch the thalweg (the line of maximum depth in the channel). There is no guarantee that data collected in this manner will identify the thalweg. Further the data are not specified against any datum and may simply be depths of the water taken at lower-low water. Any large flow would quickly relocate the sediment shoals into the deeper pockets of the river. The figures below demonstrate the strong variations in the thalweg depths of the north fork along with the cross-section that represents the shallowest area of the provided data. Here one can see that the model does have a more shallow representation where the data for Section 11 (Figure 6-1) provided does indicate a shoaled area compared to cross-sections upstream and downstream.

As described above, certain water depth data were provided to indicate additional shoaling in the north fork of the Mokelumne River. The data were supplied as an AutoCad drawing and a JPEG (Figure 6-2) of an aerial photograph which showed where the various sections in the drawing were located. Each section was examined and the section with the worst case depths is shown in Figure 6-1. The data indicate that a few longitudinal transects were taken in this part of the river where many of the sections included only a single longitudinal transect. No transverse transects appear to have been measured so the actual thalweg could be easily missed in this type of data collection scheme. The lowest maximum depth of any cross-section on Figure 6-1 indicates a depth of 11.4 feet. No information was given as to the significance of the depths shown and the assumption is made that they were simple depths from the water surface at the time the data were collected. We further assumed that the depths were carefully taken and represented sounding to the bottom and not to any attached vegetation that might have been growing on the bottom.

The location of this cross-section within the model domain is shown in Figure 6-3 and the cross-section as used in the model is shown in Figure 6-4. The cross-section shows that the thalweg is a very narrow portion of the channel and is approximately 6.28 meters (20.6 feet) below sea level as measured against the NGVD 29 datum. It is also clear that the channel shoals to an elevation of minus 4.88 meters (16.0 feet). The exact mean tide and mean lower-low water levels are not known for this specific location on the river. Adjusted, the shoal at this cross-section in the model could be no more than 13.0 feet deep and not necessarily different from the data provided.

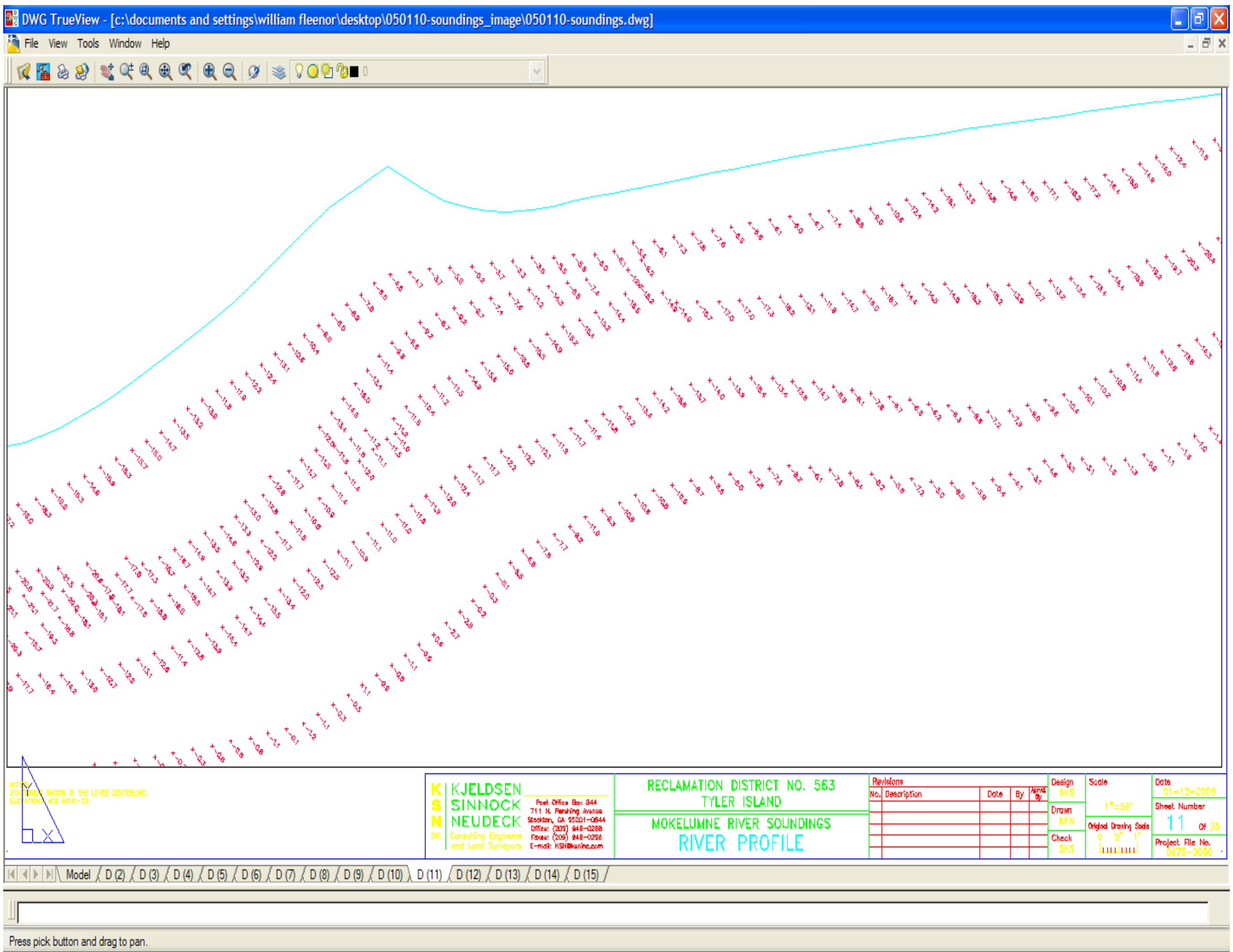

Figure 6-1. Section 11 of the depths provided on the north fork of the Mokelumne River which shows the smallest depths for any section of data provided. Minimum thalweg interpreted from cross-section of the sparse data would be 11.4 feet.

Figure 6-2. Aerial photograph shows the location of the various sections where data were supplied.

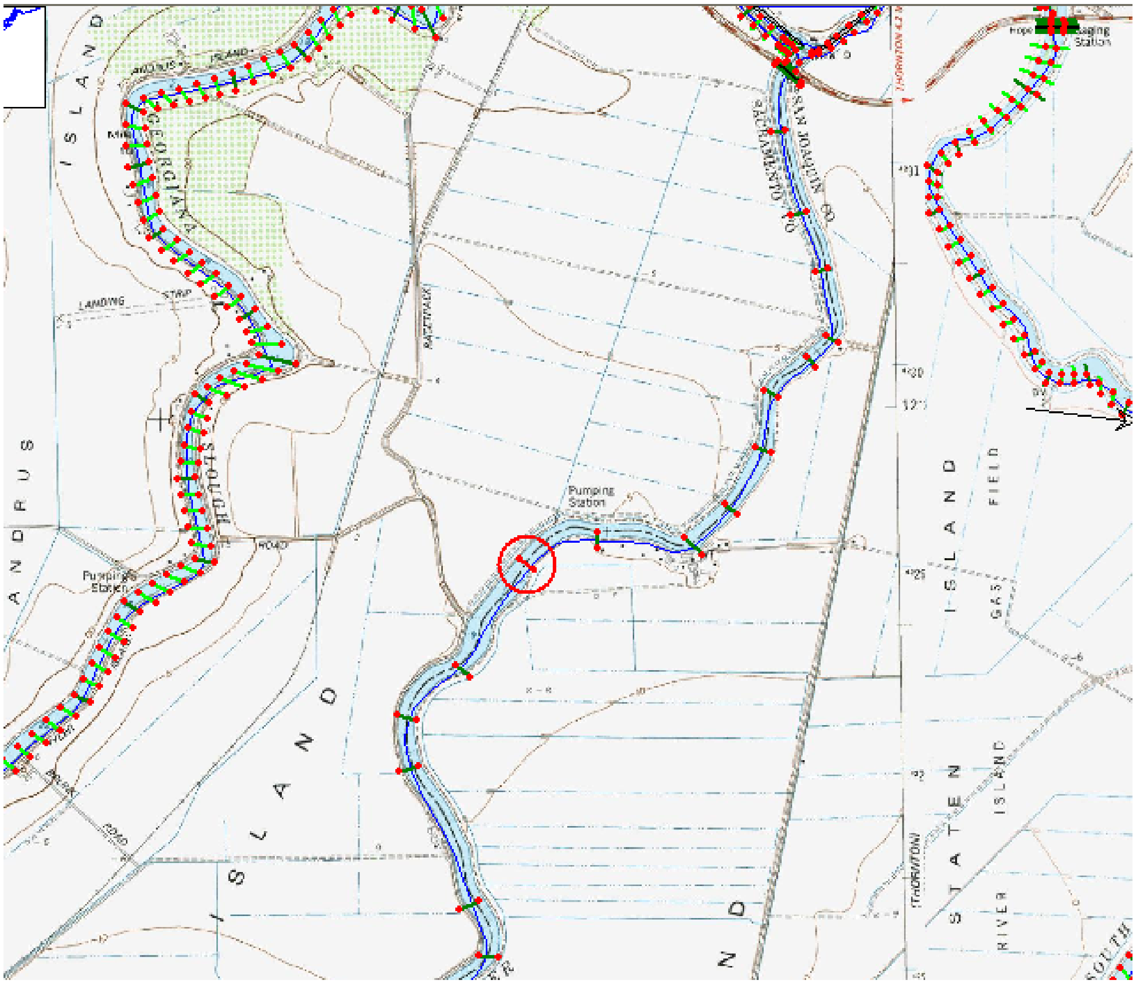

Figure 6-3. Model graphical with the location of the minimum depth cross-section of provided data encircled.

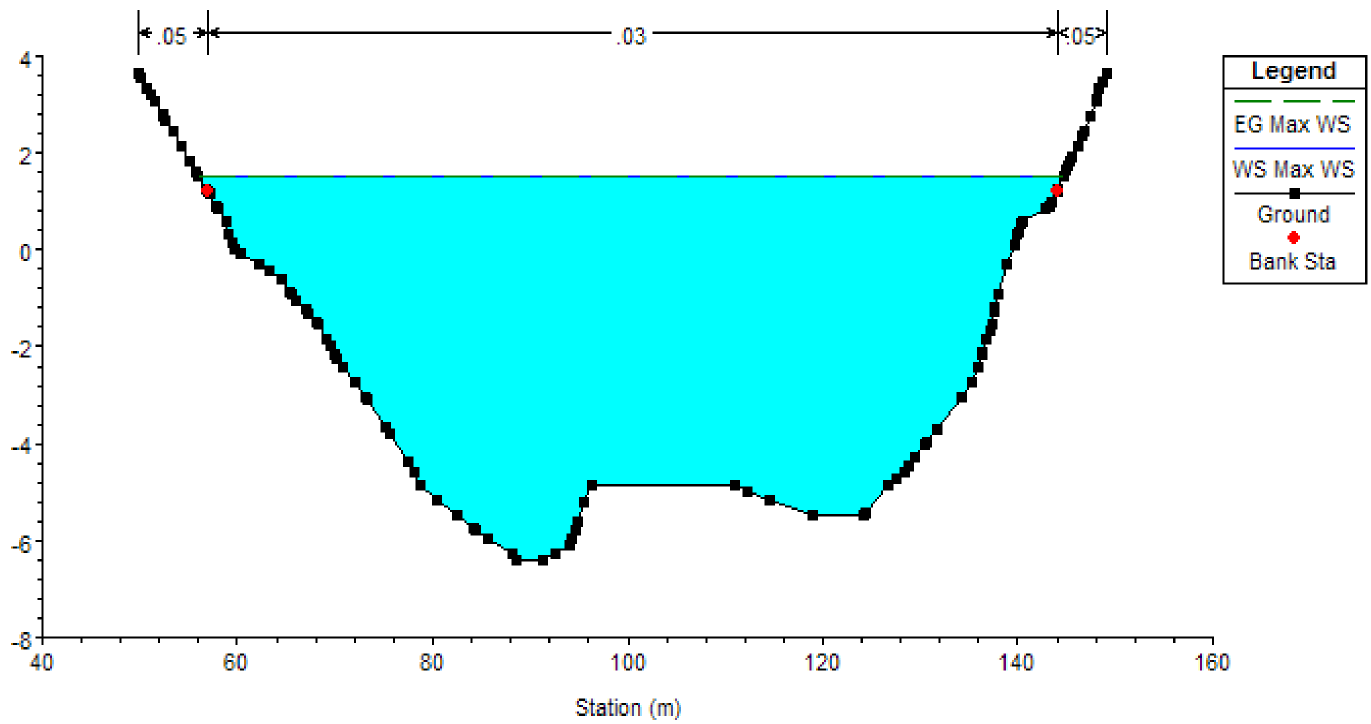

Figure 6-4. Cross-section where minimum depth values of provided data showed maximum depth of 11.4 feet. Here the thalweg is 6.28 meters below sea level against NGVD 29 datum.

GL-1

Chapters 3-5, and 7 in the DEIR provide an extensive analysis on the impacts and mitigation of each of the project alternatives for hydrology and hydraulics, flood control and levee stability, geomorphology and sediment transport, water quality, water supply and management, groundwater, geology, seismicity, soils, mineral resources, transportation, navigation, air quality, and cumulative impacts.

The rationale for moving ahead with a dredging project on the scale proposed in the North Delta must be substantive in lieu of the complex and costly regulatory requirements for new projects (and to a lesser extent, maintenance dredging projects). There must be evidence to support that sedimentation has occurred in the waterways to the extent that it presents in increased flood threat to the adjacent landowners and the North Delta region. According to the bathymetry data results collected for the North Delta Scour Monitoring Program, that is not the case. DWR's North Delta Scour Monitoring Program was initiated in 1993 to evaluate changes in channel cross sections at 38 sites in the North Delta; including 7 sites located on the North Fork of the Mokelumne River. The stretch of the Mokelumne River proposed for dredging in the North Delta Project (UM-15, UM-25, UM-30, SN-25, SN-30, NM-10, DH-10, SM-10, SM-20, SM-35, SM-45, and SM-55) has either increased in cross sectional area or remained stable at nearly all of the monitoring sites from 1994 to 2008. There are additional monitoring sites upstream and in the sloughs which intersect the south fork of the Mokelumne River that follow a similar pattern of erosion instead accumulation of sediment. Figure 5-1 displays a map of the site locations on the North Fork of the Mokelumne River and figures 2-10 through 2-25 display changes in Cross Section area for each of the monitored sites. The BASE AREA referred to in graphs is the cross sectional area of the site in 1994, the first year of bathymetry data collection.

The North Delta Scour Monitoring results are supported by the findings of the North Delta Sedimentation Study (November, 2006) prepared by Northwest Hydraulics Consultants (NHC) for the Department of Water Resources (Volume 3 of the North Delta Flood Control and Ecosystem Restoration Project DEIR, November 2007). NHC evaluated bathymetric data from 1934 in combination with the North Delta Scouring Monitoring Program's detailed annual cross section data from 1994-2001. "At most locations, the 1934-2001 and 1994-2001 cross-section data show declines in channel invert elevation as well as increases in cross-section for the 1994-2000 period". Due to the lack of density of data points, estimates of the 1934 channel invert could be made at only 13 of the 32 cross-section locations; however almost all of the data (11 of 13) show an apparent decline in invert elevation from 1934 to 2001. Only two sites indicate a possible channel invert rise, NM-30 (+1) and SM-20 (+5)." Bathymetry data collected for both of these sites from 2001-2007 reflect an increase in cross-section area for site NM-30 since 2001 and a slight decrease in cross-section area for SM-20; however the 2008 cross sectional area for SM-20 is over 200 sq. ft. higher than the 1994 data (see Figures 2-16 and 5-3). Please refer to the Preferred Alternative discussion beginning on page 2-66 for more information.

The implementation of the project will not increase the volume of water passing through the system; instead, the highest peaks of flow will be attenuated by controlling flow volumes over a longer period of time with reduced stages. The result is lower peak stages spread over a marginally longer period. The changes in river stages would last anywhere from several hours to a few days, reducing the peak flows around McCormack-Williamson Tract (such as the top of Tyler and Staten) and the overall saturation of those levees.

The primary goal of the flood control component of the Group 1 actions for the project is to control the surge of water exiting downstream of McCormack-Williamson Tract and subsequently prevent the flood related downstream damage that has occurred in earlier flood events.

GL-2

MIKE 11 and HEC-RAS hydraulic modeling has shown that peak stages are lowered throughout the system even in the worst flows encountered in 1997. The San Joaquin River stages are certainly an influence on the stage solution throughout the north Delta area and those experiences during the 1997 flood were among the highest stages on record. The implementation of the project will not increase the volume of water passing through the system; instead, the highest peaks of flow will be attenuated by controlling flow volumes over a longer period of time with reduced stages. The result is lower peak stages spread over a marginally longer period. The changes in river stages would last anywhere from several hours to a few days, reducing the peak flows around McCormack-Williamson Tract (such as the top of Tyler and Staten) and the overall saturation of those levees.

GL-3

The North Delta Flood Control and Ecosystem Restoration Project presents hydraulic modeling results (MIKE 11) which demonstrate minor stage increases on the lower south and north fork of the Mokelumne as a result of proposed project work. The sedimentation results that have been supplied do not conclusively demonstrate any appreciable change from the cross-sections used in the model. Historic cross-section sampling does not demonstrate additional sedimentation over the past decade or more and certainly none since the 1997 flood of record. Please refer to the Preferred Alternative discussion beginning on page 2-71 for more information regarding the North Delta Scour Monitoring study and bathymetry data collected for channel cross sections.

GL-4

Though the social and economic implications of a proposed project are not required as part of a CEQA (CEQA guidelines Sections 15131 and 15358(b)) an economic analysis was completed in Chapter 5.1, Land Use, Recreation, and Economics of the DEIR. Topics covered included the projects impacts on; (1) agricultural production, (2) local employment, and (3) local businesses.

The commenter does not describe which economic impacts are not addressed or how they are lacking in the DEIR, therefore developing a response is difficult.

A DWR report titled Preliminary North Delta Flood Control and Ecosystem Restoration Project Benefits Analysis was completed in 2006. This report focused on the evaluation of flood damage if the project were not implemented (no action alternative), and the benefits of alternative plans to reduce flood damage and implement ecosystem restoration. The analysis is based on existing year (2005) conditions, July 2006 price levels and a discount rate of 6 percent and utilizes existing data wherever possible. The difference between without- and with-project expected annual damage ($11.0 and $1.6 million, respectively) is the damage reduced by the proposed project, or about $9.4 million/year. The present worth of $9.4 million/year over a fifty year analysis period (assuming a 6% discount rate) is about $147 million, or stated another way, the estimated benefits of this project would justify a project with a total present worth of capital and annual operating costs over a fifty year period up to $147 million which are allocated to flood damage reduction purposes. These benefits compare favorably with the flood damage reduction benefits allocated for the Group I alternatives (approximately $34 million) but not Group II (approximately $237 million).

This analysis did not include the benefits provided by the additional habitat created by Group 1 actions, due to the difficulty in establishing a dollar value for ecosystem restoration. However, the ecosystem improvements provided by the project will only increase the monetary value of the benefits provided by the project.

The intent of this analysis was to quantify the benefits for the proposed project relying upon existing information. The final Delta Risk Management Strategy study will provide additional data on hydrology and hydraulics, levee fragility curves, structure and infrastructure inventories, etc., to improve upon the draft study findings.

GL-5

As stated on page ES-5 of the Executive Summary of the DEIR, “the purpose of the project is to implement flood control improvements in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes”. The comment stating the analysis of flood control, levee stability, and downstream impacts “are sorely missed” in the document is unsupported. The commenter stated that he “looked only at the Executive Summary of the DEIR” which would provide an incomplete picture of the extensive analysis of the flood control and ecosystem benefits provided with the implementation of the project. Please refer to Chapters 2-7 of Volume I of the DEIR analysis for more information.

A DWR report titled Preliminary North Delta Flood Control and Ecosystem Restoration Project Benefits Analysis was completed in 2006. This report focused on the evaluation of flood damage if the project were not implemented, and the benefits of alternative plans to reduce flood damage and implement ecosystem restoration. The analysis is based on existing year (2005) conditions, July 2006 price levels and a discount rate of 6 percent and utilizes existing data wherever possible. The difference between without- and with-project expected annual damage ($11.0 and $1.6 million, respectively) is the damage reduced by the proposed project, or about $9.4 million/year. The present worth of $9.4 million/year over a fifty year analysis period (assuming a 6% discount rate) is about $147 million, or stated another way, the estimated benefits of this project would justify a project with a total present worth of capital and annual operating costs over a fifty year period up to $147 million which are allocated to flood damage reduction purposes. These benefits compare favorably with the flood damage reduction benefits allocated for the Group 1 alternatives (approximately $34 million) but not Group II (approximately $237 million).

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The intent of this analysis was to quantify the benefits for the proposed project relying upon existing information. The final Delta Risk Management Strategy study will provide additional data on hydrology and hydraulics, levee fragility curves, structure and infrastructure inventories, etc. to improve upon the draft study findings.

GL-6

Please see GL-5.

As for downstream impacts, the region has now been modeled by MBK engineers using the HEC-RAS hydraulic model, and UC Davis using the MIKE 11 hydraulic model. HEC-RAS, developed by the US Army Corps of Engineers, is a one-dimensional steady flow hydraulic model designed to aid hydraulic engineers in channel flow analysis and floodplain determination. The MIKE 11 model, developed by the Danish Hydraulic Institute, is a dynamic, one-dimensional modeling package, which simulates the water level and flow splits throughout a river/channel system. Both models have been calibrated for a range of hydrologic events from large storm events to intermediate and low river flows. The MIKE 11 model acknowledged and corrected the questions that were raised in the review of the HEC- RAS model, but found little change in the results projecting stage reductions and improved flood protection with the implementation of the project alternatives (please see Chapter 3.1 of the North Delta Flood Control and Ecosystem Restoration Project DEIR) . DWR believes the two models, taken together, are reliably accurate; and the department can reasonably rely upon the results of the models to support the final decision among the alternatives. The MIKE 11 model includes all the bridges within the system and the latest data available on channel geometries. Sensitivity analyses have been conducted to further demonstrate the soundness of the results. Some sedimentation and vegetation growth will occur during periods of moderate flows and will be eroded during periods of higher flow. Vegetation will have local influences on sedimentation and low flows but negligible effect on higher flows. The strength and value of a model is not that it can produce the exact results for a given year but the ability to adequately represent a broad range of events. Consequently one can investigate changes in the system and rely on the results a model predicts and have confidence that the directions of change are correct and the amounts are within reason of such a stochastic process.

Chapter 7
Attachment to Comment Letter

Chapter 7
Attachment to Comment Letter

One of the comment letters received from the California Department of Transportation on the North Delta Flood and Control and Ecosystem Restoration Project Draft EIR contained a lengthy attachment. This attachment was provided for informational purposes and did not specifically call out comments. A copy of the attachment is listed below.

State of California

Department of Transportation

Transportation Management Plan Guidelines

Prepared By:

Division of Traffic Operations

Office of Systems Management Operations

Table of Contents

I. INTRODUCTION

A. BACKGROUND

With the construction of California's state highway system virtually complete, the California Department of Transportation (Department) major emphasis on transportation projects has largely shifted from new construction to reconstruction, operation, and maintenance of existing facilities. As traffic demand steadily increases, Department work activities can create significant additional traffic delay and safety concerns on already congested highways. Planning work activities and balancing traffic demand with highway capacity becomes more critical.

In order to prevent unreasonable traffic delays resulting from planned work, Transportation Management Plans (TMPs) must be carefully developed and implemented in order to maintain acceptable levels of service and safety during all work activities on the state highway system.

B. WHAT ARE TRANSPORTATION MANAGEMENT PLANS?

A TMP is a method for minimizing activity-related traffic delay and accidents by the effective application of traditional traffic handling practices and an innovative combination of public and motorist information, demand management, incident management, system management, construction strategies, alternate routes and other strategies.

All TMPs share the common goal of congestion relief during the project period by managing traffic flow and balancing traffic demand with highway capacity through the project area, or by using the entire corridor. Certain low-impact Maintenance and Encroachment Permit activities do not require the development of individual TMPs. "Blanket" TMPs are developed for those activities. A blanket TMP is a generic list of actions that would be taken to keep delay below the delay threshold when performing activities on highways. Each district Maintenance and Encroachment Permit office should have a list of activities to which blanket TMPs apply.

All Capital projects require individual TMPs. Blanket TMPs are suitable for minor projects. Major TMPs are required for high-impact projects. Generally, major TMPs are distinguished by being:

- Multi-jurisdictional in scope, encompassing the Department of California Highway Patrol (CHP), city, county and regional governments, state DOTs, employers, merchants, developers, transit operators, ridesharing agencies, neighborhood and special interest groups, emergency services, and Transportation Management Associations;
- Multi-faceted, comprised of an innovative mix of traffic operations, facility enhancement, demand-management and public relations strategies, as well as more traditional work zone actions, construction methods and contract incentives, customized to meet the unique needs of the impacted corridor;
- In place over a longer period of time, sometimes implemented up to a year or more prior to the start of actual construction, with specific elements often implemented incrementally to coincide with construction phasing.

C. POLICY

Department Deputy Directive 60 (DD-60) titled Transportation Management Plans (see APPENDIX) requires TMPs and contingency plans for all state highway activities.

Policy Statement:

The Department minimizes motorist delays when implementing projects or performing other activities on the state highway system. This is accomplished without compromising public or worker safety, or the quality of the work being performed.

TMPs, including contingency plans, are required for all construction, maintenance, encroachment permit, planned emergency restoration, locally or specially-funded, or other activities on the state highway system. Where several consecutive or linking projects or activities within a region or corridor create a cumulative need for a TMP, the Department coordinates individual TMPs or develops a single interregional TMP.

TMPs are considered early, during the project initiation or planning stage.

Major lane closures require District Lane Closure Review Committee (DLCRC) approval.

Definitions:

Major lane closures are those that are expected to result in significant traffic impacts despite the implementation of TMPs.

Significant traffic impact is 30 minutes above normal recurring traffic delay on the existing facility or the delay threshold set by the District Traffic Manager (DTM), whichever is less.

Contingency Plans address specific actions that will be taken to restore or minimize effects on traffic when congestion or delays exceed original estimates due to unforeseen events such as work-zone accidents, higher than predicted traffic demand, or delayed lane closures.

II. TMP DEVELOPMENT AND IMPLEMENTATION

A. OVERVIEW

Responsibilities:

The DTM:

- Acts as the single focal point for all traffic impact decisions resulting from planned activities on the state highway system.
- Determines the extent of a TMP.
- Facilitates review and approval of TMP measures and planned lane closure requests.
- Directs the termination or modification of active planned lane closure operations when traffic impact becomes significant, without compromising traveler or worker safety.

The TMP Manager:

- Acts as the single focal point for development and implementation of TMPs.

The Construction Traffic Manager (CTM):

- Serves as a liaison between Construction, the DTM and the TMP Manager.
- Reviews the TMP and traffic contingency plan for constructability issues.
- Act as a resource for the Resident Engineer, DTM and TMP Manager during TMP implementation and reviews the contractor's contingency plan.

The extent of a TMP is determined by the DTM during the preliminary studies of a capital project. For all TMPs, an itemized estimate of the proposed strategies and their respective costs are included in the Project Study Report (PSR) or Project Study Scoping Report (PSSR) for proper funding consideration. The workload required to develop and implement TMPs is estimated in advance and captured in the district work plan.

For major TMPs, a TMP team may need to be formed and led by the TMP Manager. The itemized strategies and costs are further refined in the project report stage as determined by the TMP team and appropriate functional units using the most current geometric information available. Those elements of the TMP not included as part of the main construction contract should be itemized under State Furnished Material and Expenses using the appropriate Basic Engineers Estimate System (BEES) codes in the plans, specifications and estimates. During construction, TMP activities are to be monitored and evaluated by the TMP team and those elements found not to be cost effective should be modified as deemed appropriate or eliminated. The TMP process is explained in detail in the following sections.

B. FUNDING AND PROGRAMMING

When identifying funding for various TMP elements, it is important to distinguish between capital outlay and capital outlay support.

Work done by district staff for the planning and designing of TMP activities for capital projects are a normal part of the project development process and should be captured as capital outlay support. The TMP Manager and each functional manager should work closely with the project manager to ensure that TMP activities are included in all project work plans. TMP support activities to consider include ridesharing programs, Freeway Service Patrol (FSP) contracts, public awareness campaigns, parallel route improvements and the Request for Proposal (RFP) process up to award of the contract. Note that some of these activities may also have a capital component in addition to the support component discussed here. Workload hours for TMP activities must be included in the Capital Outlay Support (COS) project's work plan in order to be resourced (funded) by COS. These activities should then be charged to each project's expenditure authorization (EA), using the appropriate Work Breakdown Structure (WBS) code for that stage of the project. TMP-related work should be charged only to the WBS codes reserved for those activities. These codes can be found on the Department's Division of Project Management's Intranet web page.

Work done by district staff for implementing TMP elements during construction of capital projects are also a normal part of the project development process. Again, workload (hours) for implementing TMP activities must be included in the COS project's work plan in order to be resourced (funded) by COS. These activities should then be charged to the appropriate project's phase three EA, and WBS code 270 (Perform Construction Engineering and Contract Administration).

Some funds necessary to implement TMP elements not done by the Department staff, including consultant contracts, can be sourced from capital outlay funds allocated by the California Transportation Commission (CTC) as itemized in the plans, specifications and estimates. Some TMP elements, such as parallel route improvements and highway advisory radios, could be a phase of the construction contract or separate construction contracts while others such as public awareness campaigns and transit subsidies must be separate contracts or cooperative agreements.

The TMP elements that need to be in place prior to start of construction are identified and funded as stage construction or first order of work under a single package presented to the CTC. If approved, the Division of Budgets may assign specific amounts for each TMP activity. All TMP activities may not necessarily be included under the main contract. Service contracts such as those for freeway service patrols, public service or consultant contracts, information campaigns, or establishing telephone hotlines must be arranged separately with consultants and other providers. For most projects, it takes four to six months to get a service contract in place. This means that all consultant contracts have been advertised, the consultant selected, and the contract ready for signature and award immediately following CTC allocation of funds. Other activities such as parallel route improvements are usually included in the main construction contract and as a first order of work under a cooperative agreement.

In some cases, the CTC can be petitioned to fund a portion of the TMP as an initial phase of the main project. This is usually for a high priority project where plans, specifications, and estimates for the main project are not yet finalized, but early funds are needed to initiate TMP activities such as making transit arrangements with local governments. The petition to fund an initial phase comes from the district, explaining why a portion of the project must proceed before funding for the main project is allocated. These early funds reduce the programmed funds for the main project accordingly.

The Federal Highway Administration (FHWA) supports the TMP concept and views major reconstruction projects as an excellent opportunity to initiate continuing traffic management strategies that provide improved traffic operations long beyond the completion of work. Examples include: installation of permanent Changeable Message Sign (CMS), full structural section shoulders, continuing auxiliary lanes, and wider shoulders for incident management during construction if cost-effective in the long term. All cost-effective transportation management activities that address the problem of delay or safety are eligible for 100 percent Federal Aid funding.

TMPs and contingency plans for Encroachment Permit projects are developed by the permittee or by Department staff. Staff time for development, review and implementation of TMPs for Encroachment Permits is charged to the permit. Maintenance normally develops TMPs for its projects; Maintenance and staff from other functional areas that expend time on Maintenance TMP charge to the designated Maintenance EA.

C. TMP IN PROJECT INITIATION DOCUMENT

The TMP is part of the normal project development process and must be considered in the Project Initiation Document (PID) or planning stage (project K phase). Since projects are generally programmed, budgeted, and given an Expenditure Authorization (EA) upon PID approval, it is important to allow for the proper cost, scope and scheduling of the TMP activities at this early stage of development. TMPs that are retrofitted to projects already programmed must be handled on a case by case basis and may require a contract change order.

Prior to PID approval, the initiating unit sends conceptual geometrics to the district Division of Operations for evaluation. The DTM estimates the extent of the TMP required and determines whether potential traffic delays are anticipated that cannot be mitigated by traditional traffic handling practices or well-planned construction staging. The TMP Manager must sign-off on the TMP DATA SHEET in the PID. A TMP cost estimate should be developed for each alternative being considered. An estimate should not be based only on the project cost. The cost of a TMP could range from a small percentage of project cost to 20 percent or more. Further guidance can be obtained from the following publications "Wilbur Smith & Associates TMP Effectiveness Study" and Frank Wilson & Associates "A Traffic Management Plan Study for State Route 91" located in Headquarters Traffic Operations, Office of System Management Operations.

TMP Elements

A list of potential TMP strategies with their respective elements is categorized in TABLE 1. As many different elements as are feasible should be considered for the proposed project's preliminary TMP.

When developing a preliminary TMP at this early stage, use the most current layout of the roadway (geometrics) information available and consider:

Contingency Plans
Lane closure policies and procedures
TMC coordination
Multi-jurisdictional communication and buy-in
CHP and local law enforcement involvement
Emergency closures
Clearance of alternate routes for STAA and oversized
Special training or workforce development
Duration of construction (months)
Length of project (miles)
Number of major construction phases
Urbanization (urban, suburban, or rural)
Traffic volumes
Expected vehicle delay (from data sheet)
Public/media exposure
Political or environmental sensitivity
Business impacts and affected activity
Percent trucks
Potential increase in accidents
Permit issues
Conflicting construction projects
Percent reduction in vehicle capacity
Special factors (if any)
Impact on Transit/Railroad services
Viability of alternative routes

Wilbur Smith Associate's TMP Effectiveness Study and Frank Wilson & Associate's A Traffic Management Plan Study for State Route 91 During Construction of HOV Lanes (both available from Headquarters Division of Traffic Operations, Office of System Management Operations) are excellent sources for guidance on selecting the most cost-effective TMP elements. The district Public Information office is also an experienced source for estimating the effectiveness of public information campaign options, and can help the TMP Manager estimate their cost and effectiveness in reducing traffic demand through the project area.

Public information campaigns serve two main purposes in TMPs. They inform the public about the overall purpose of the project to generate and maintain public support; and they encourage changes in travel behavior during the project to minimize congestion. Because they give travelers the information they need to make their own travel choices, public information campaigns can be the single most effective of all TMP elements.

The FSP is a congestion relief program of roving tow trucks operating in most metropolitan and some rural areas. The FSP program is operated by Regional Transportation Planning Agencies (RTPAs) with funding from the Department. The Department also reimburses the CHP for training and supervisory services provided for the FSP. The RTPAs contract with tow companies for commute time service and some weekend and mid-day service to assist motorists with simple repairs (i.e. flat tire, one gallon of gas) or tow the automobile from the highway.

FSP is available for incident management during construction. However, construction-related FSP service needs to be funded as part of the TMP. A cooperative agreement with the RTPA is required, outlining the services provided and the fund transfer. An interagency agreement with the CHP is required for any support services (field supervision and dispatch operator services). These agreements should be initiated with the RTPA and the CHP as soon as it is determined that FSP should be in the project TMP.

The Department's HQ Traffic Operations is currently working on Master Agreements with the RTPAs for future FSP services. This process will simplify the process for both the Department and the RTPAs by eliminating the need for a cooperative agreement for each project. Only a task order form will be needed for each project. A similar agreement is being created with the CHP. Please contact HQ Traffic Operations, Freeways Operations Branch for more information.

TABLE 1

TMP STRATEGIES AND THEIR ELEMENTS	
A. Public Information	Off peak/Night/Weekend Work
Brochures and Mailers	Planned Lane/Ramp Closures
Media Releases (including	Project Phasing
Minority Media Sources)	Temporary Traffic Screens
Paid Advertising	Total Facility Closure
Public Information Center	Truck Traffic/Permit Restrictions
Public Meetings/Speaker's Bureau	Variable Lanes
Telephone Hotline	Extended Weekend Closures
Visual Information (videos, slide shows, etc.)	Reduced Speed Zones
Local cable TV and News	Coordination with Adjacent Construction
Traveler Information Systems (Internet)	Traffic Control Improvements
Internet	Total Facility Closure
B. Motorist Information Strategies	**E. Demand Management**
Electronic Message Signs	HOV Lanes/Ramps
Changeable Message Signs	Park-and-Ride Lots
Extinguishable Signs	Parking Management/Pricing
Ground Mounted Signs	Rideshare Incentives
Commercial Traffic Radio	Rideshare Marketing
Highway Advisory Radio (fixed and mobile)	Transit Incentives

Planned Lane Closure Web Site	Transit Service Improvements
The Department's Highway Information Network (CHIN)	Train or Light-Rail Incentives
Radar Speed Message Sign	Variable Work Hours
	Telecommute
C. Incident Management	Shuttle Service Incentives
Call Boxes	
Construction or Maintenance Zone Enhanced	**F. Alternate Route Strategies**
Enforcement Program – COZEEP or MAZEEP	Ramp Closures
Freeway Service Patrol	Street Improvements
Traffic Surveillance Stations (loop detectors and CCTV) Closures	Reversible Lanes
911 Cellular Calls	Temporary Lanes or Shoulder Use
Transportation Management Centers	
Traffic Control Officers	**G. Other Strategies**
CHP Officer in TMC during construction	Application of new technology
Onsite Traffic Advisor	Innovative products
CHP Helicopter	Improved specifications
Traffic Management Team	Staff Training/Development
D. Construction Strategies	
Incentive/Disincentive Clauses	
Ramp Metering	
Lane Rental	

If the DTM determines that a major TMP is required, the TMP Manager forms a TMP development team. The team's membership will vary according to the TMP elements proposed and the project's impacts. At a minimum, it should include representatives from Construction, Public Affairs, Project Development, Traffic Operations (including Transportation Permits), the CHP and local agencies. Others to be considered as the plan gets refined are Rideshare, Transportation Planning, Public Transportation, Maintenance, Structures, CHP, local law enforcement, local transit agencies, emergency services, and FHWA. Local Maintenance field staff familiar with conditions in the project area should be team members or should be consulted as needed as the TMP develops.

D. TMP IN PROJECT REPORT

As more information becomes available during the project report phase the preliminary scope and cost of the overall TMP and the individual elements should continue to be refined. The TMP team will coordinate the TMP strategies with the project engineer and appropriate units, with each team member handling their area of expertise. For major projects, subcommittees or task forces may be formed to handle the planning, implementation, monitoring, and evaluation details of some elements. The TMP Manager will keep the Project Manager and district Construction Coordinator updated and must sign-off on the TMP data sheet of the project report.

It is appropriate at this point to develop a timeline schedule for major TMPs keeping in mind that many elements of the TMP have to begin prior to the start of construction. Many TMP elements listed in Table 1 need to be developed separately but concurrently with the project plans. They may be bid and constructed or initiated separately from the project or be included in the project plans and be installed or implemented as the first order of work.

Some tasks may take a long time depending on the complexity of the major project and the type of transportation management necessary. For example, if building new park-and-ride lots are necessary for the Ridesharing element, the planning phase would have to be extended for several months and a design phase added.

An additional activity involves analyzing the existing traffic volume in the corridor, both on the freeway and surface streets. This will provide a basis for establishing the goal of the TMP, i.e., the number of vehicles that should be removed from the freeway, and in determining the capability of the surrounding surface streets to handle the additional traffic demand. It can also provide a database for evaluating the overall effectiveness of the TMP.

E. TMP IN PS&E

Those TMP elements that are not part of the main contract, but are identified as capital outlay costs tied to the main project, should be itemized as State Furnished Materials and Expenses using the appropriate BEES item cost (see TABLE 2). The Project Engineer should consult with the TMP Manager to ensure that the appropriate "Maintaining Traffic" Standard Special Provisions (SSP) are included in the PS&E. The SSPs should always require the contractor to submit a contingency plan.

The TMP and PS&E should address oversize and overweight vehicles traveling under a transportation permit. Additional construction area signs should be provided that restrict travel to overwidth vehicles whenever the lateral clearance drops to 15 feet or less.

The DTM must concur with the PS&E and with Encroachment Permit and Maintenance TMPs.

TABLE 2

TMP BEES ITEM CODES
066003 State Furnished Materials
066004 Miscellaneous State Furnished Materials
066005 Concurrent Work
066006 Miscellaneous Concurrent Work
066008 Incentive Payment
066009 Utility Expense

066010 Work by Others
066060 Additional Traffic Control
066061 CHP Enhanced Enforcement
066062 COZEEP Contract
066063 Traffic management plan – public Information
066064 Specter Radar Unit
066065 Freeway Service Patrol
066066 Public Transit Support
066069 Rideshare Promotion
066070 Maintain Traffic
066072 Maintain Detour
066074 Traffic Control
066076 Temporary Traffic Control
066077 Install Traffic Control Devices
066578 Portable Changeable Message Signs
066825 Temporary Striping
066872 Service Contract
128602 Traffic Control System (One Way)
128650 Portable Changeable Message Signs
129150 Temporary Traffic Screen
861793 Telephone Service (Location 1)
860811 Detector Loop
860925 Traffic Monitoring Station (Count)
860926 Traffic Monitoring Station (Speed)
860927 Traffic Monitoring Station (Incident)
860930 Traffic Monitoring Station
861088 Modify Ramp Metering System
861985 Travelers Information system
869070 Power and Telephone Service
991046 Public Address System
991047 Telephone Facility
994920 Bicycle Parking Rack

995000 Bus Shelter
995002 Bus Passenger Shelter (Type S-1)
995004 Bus Passenger Shelter (Type SM-1)
995005 Bus Passenger Shelter (Type LM-1

F. TMP DURING CONSTRUCTION AND MAINTENANCE OPERATIONS

During construction, those TMP elements that are part of the main contract or Encroachment Permit are implemented under the general direction of district Construction or Encroachment Permits. Those separate contracts/agreements such as for rideshare and transit activities and public awareness campaigns will be under the direction of their respective contract managers.

Special effort should be given to assure that Changeable Message Sign (CMS), Highway Advisory Radio ()HAR) and other media tools provide accurate and timely information to motorists regarding lane closure times and

TMP elements must be carefully monitored for cost effectiveness. The TMP team should determine whether the implemented measures are reaching the predetermined goals for cost effectiveness. If an element's predetermined goal is not immediately reached during implementation, but there is a general trend toward meeting that goal, the element can remain in effect and the FHWA will continue to participate. Elements that show no sign of approaching their predetermined goals as determined by the TMP Manager must be modified as deemed appropriate or dropped.

Contractor compliance with lane closure pickup deadlines can be enforced in two ways. A "maintaining traffic" SSP allows a penalty to be assessed to the contractor for value of traffic delay when the contractor exceeds the lane closure window. The minimum penalty is $1,000 per 10 minutes, but it can greatly exceed the minimum, depending on traffic volumes and the highway facility. The DTM calculates the "delay penalty" during PS&E. The second method is for the state representative to suspend the contract work.

A contractor or the Department forces (such as Maintenance) can be ordered to pick up a lane closure early if traffic impacts become significant either due to a project incident or activities outside the project area. Early pickup should only be ordered when traveler and worker safety will not be compromised. The "maintaining traffic" SSPs for capital projects provide for compensating contractors for early pickup. Encroachment Permit provisions require the permittee to pick up a closure early without compensation.

DTM's are to ensure that lane closures will not be terminated early, or may be extended beyond the lane closure window when the activity needs to be completed for the safety of the public or workers. These activities may include structure inspections and repairs, guardrail repairs, culvert replacement.

In order to avoid significant traffic impacts, it is essential to monitor and respond immediately to delay, pick up closures on time, and have solid traffic and contractor contingency plans.

A Department staff member who can make informed decisions about implementing contingency plans and modifying, terminating or extending approved lane closures should be available to respond to significant delays and other unexpected events whenever lane closures are in place.

The designated employee(s) may be Traffic Operations, Construction, or TMC staff, depending on the district.

At the end of the project a post-TMP evaluation report must be completed by the TMP Manager for all major TMPs and for TMPs where the actual delay exceeded the threshold set by the DTM. Post-TMP meetings with the CHP and other partners can be held to identify what went well and what could have been done differently. Samples of past TMP reports can be obtained from headquarters' Traffic Operations, Office of System Management Operations and from the DTM.

Contingency Plan

Both traffic and contractor contingency plans are required for all planned work. Both blanket and individual TMPs must include contingency plans. The traffic contingency plan, prepared by the Department or a consultant, addresses specific actions that will be taken to restore or minimize affects on traffic when the congestion or delay exceeds original estimates due to unforeseen events such as work-zone accidents, higher than predicted traffic demand, or delayed lane closures. The contractor contingency plan addresses activities under the contractor's control in the work zone. After the contractor's contingency plan is submitted and approved, it becomes part of the TMP contingency plan.

The TMP contingency plan should include, but is not limited to the following:

- Information that clearly defines trigger points which require lane closure termination (i.e., inclement weather, length of traffic queue exceeds threshold;
- Decision tree with clearly defined lines of communication and authority;
- Specific duties of all participants during lane closure operations, such as, coordination with CHP or local police, etc.;
- Names, phone numbers and pager numbers for the DTM or their designee, the Resident Engineer (RE), the Maintenance Superintendent, the Permit Inspector, the on-site traffic advisor, the CHP Division or Area Commander, appropriate local agency representatives, and other applicable personnel;
- Coordination strategy (and special agreements if applicable) between DTM, RE, on-site traffic advisor, Maintenance, CHP and local agencies;
- Contractor's contingency plan;
- Standby equipment, State personnel, and availability of local agency personnel for callout (normally requires a Cooperative Agreement);
- Development of contingencies based on maintaining minimum service level.

G. RETROFITTING PROGRAMMED PROJECTS

Usually the extent of the TMP is to be determined prior to programming (PID approval). However, it may sometimes be necessary to retrofit a TMP to a project that is already programmed due to project changes, policy changes, emergencies or unforeseen conditions. These projects must be handled on a case by case basis since the course of action will depend on how far along the project development process is and how extensive the TMP needs to be. Retrofitted TMPs may require a TMP team and TMP Manager and involvement from all functional units as discussed earlier in these guidelines. The project manager is responsible for initiating a TMP investigation since they are most knowledgeable of project status. Some suggestions for funding retrofitted TMP are:

Use of Minor Funds

Minor A and B money has been used to pay for TMP measures that total less than $1,000,000. The districts will not usually be reimbursed for this even though the FHWA agrees to participate (it is not economically feasible for the Department to process minor funds for reimbursement). There have been exceptions however, and that decision is at the discretion of the Federal Resources Branch in headquarters Budgets Program.

Charge to Other Project Phase 4 (Construction) Funds

Funds from other construction contracts in the district may be used if those projects are in the vicinity of, or will be affected by, the project requiring TMP funds. At the discretion of the Deputy District Director for Construction a list of chargeable project EAs may be submitted to headquarters Accounting for prorated charging. Very few Accounting staff are aware of the process required and headquarters Traffic Operations, Office of System Management Operations should be contacted for assistance.

Project Cost or Scope Changes

The CTC has delegated to the Director of the Department the authority to increase a project's cost by up to 20 percent without prior commission approval. This authority has been delegated to other Department managers as described in Project Management Directive PMD6. This increase can be used for TMP implementation and will be 100 percent reimbursable by the FHWA. The increased costs must be absorbed by other projects in the district since the total capital outlay allocation remains the same.

H. LOCAL INVOLVEMENT

The TMP Deputy Directive 60 applies to all projects on state facilities, including those not funded by the state. District Directors are responsible for assuring local compliance. Since many measure projects are split funded, the Department and local entities must work cooperatively to develop an effective TMP. The Department is responsible for approving all PSRs and it is at this point that agreements should be reached concerning the costs and scope of TMP measures.

III. CORRIDOR, REGIONAL AND MULTI-FUNCTIONAL AREA TMPS

When multiple or consecutive projects are within the same general corridor, the cumulative impact can result in excessive traffic delays and detour conflicts. These may be multiple capital projects, the involvement of more than one district, or a combination of capital projects and Encroachment Permit and/or Maintenance activities. Corridor or regional coordination will minimize or eliminate these impacts and reduce inconvenience to the motoring public.

When multiple projects are in the same corridor or on corridors within the same traffic area, it may be possible to develop a single corridor or regional TMP. In other cases, individual TMPs are developed and funded from their own sources, and a bare-bones corridor or regional TMP addresses the cumulative impact. Each project covered by corridor and regional TMP contributes resources in proportion to its traffic impact. During TMP implementation, the TMC serves as an information clearinghouse and coordinates operations. The TMC helps identify conflicts and recommends appropriate action. When provided with accurate and up-to-date lane closure information the TMC provides real-time traffic information via electronic media, CMS, and HAR.

The TMP Manager coordinates the development and implementation of corridor and regional TMPs. The TMP Manager forms a TMP team including, as a minimum, representatives from Construction, Maintenance, Public Affairs and Traffic Operations for each of the affected districts. The initial meeting is held several months in advance of the construction season to set milestones, and allow time to gather project information and prepare and distribute information.

The corridor/regional TMP may need elements in addition to those provided by the individual TMP for each project. Those elements may include changeable message signs at key locations outside individual project limits, the establishment of an information hot line and web-sites for all projects involved. The use of the statewide Caltrans Highway Information Network (CHIN) number (1-800-427-ROAD), and particularly the use of TMCs as a central reporting hub. The Northern Valley TMC in District 3 has established reporting procedures specifically for interregional TMPs that are obtainable from headquarters Traffic Operations.

IV. MAJOR LANE CLOSURE APPROVAL PROCESS

This process applies to all major lane closures on the state highway system. Major lane closures are those lane closures that are expected to result in significant traffic impacts despite the implementation of TMPs. A "significant traffic impact" is defined in DD-60 as (a) 30 minutes above normal recurring traffic delay on the facility, or (b) the delay threshold set by the DTM, whichever is less. When a planned lane closure is expected to have a significant traffic impact, Headquarters District Lane Closure Review Committee (DLCRC) review and approval is required. The functional unit directly involved in the work must submit the major lane closure request to the DLCRC for approval as detailed below.

A traveler's trip should not be increased by more than 30 minutes due to planned Department activities. The DTM may set a lower maximum if the economic impact of a delay over 20 minutes would be high. The lesser of these delay limits is the maximum delay threshold allowed for any activity. Only the DLCRC can approve a higher delay threshold for a project.

Additionally, it should be noted that TMP activities are comprehensive, and involve actions in addition to traffic management through the work zone, as detailed in these TMP Guidelines. All lane closure operations and other planned activities should be evaluated at the earliest possible developmental stage for potential impacts and mitigation strategies. Pre-implementation meetings and contingency plans remain important aspects of all lane closure operations to minimize impacts of unforeseen events.

A. THRESHOLD CRITERIA FOR LANE CLOSURES REQUIRING APPROVAL OF THE DLCRC

DLCRC review and approval is required when planned activities are expected to result in a traffic delay that exceeds 30 minutes or the delay threshold set by the DTM, which ever is less.

DLCRC review and approval is not required for emergency closures due to natural events or incidents. However, the DTM must be notified, and every effort must be made to minimize traveler delay and reopen traffic lanes as soon as practical.

Applicability

The DLCRC, comprised of the CHP, District Public Information Officer, and Deputy District Directors of Construction, Design, Maintenance and Operations, approves all requests for major lane closures that meet the above threshold criteria. The criteria are applicable for moving or static lane closure operations. The DLCRC will decide when to submit lane closure requests that are of an interregional, statewide, environmental, or otherwise sensitive nature to the Headquarters Lane Closure Review Committee (HQLCRC) for their approval.

The DLCRC is responsible for determining when HQLCRC approval is required. The HQLCRC is comprised of the Division Chiefs for Construction, Maintenance, Design and Local Programs, and Traffic Operations along with the Headquarters Public Information Officer, and a representative from the CHP. The HQLCRC may review the closure or leave the decision to the DLCRC. The HQLCRC should be advised of all planned lane closures that exceed the above threshold criteria. All planned lane closures that exceed the above threshold criteria and are of an interregional, statewide, environmental, or otherwise sensitive nature, as determined by the district LCRC, may also require approval of the HQLCRC.

Contents of Major Lane Closure Request Submittal

The functional unit requesting the lane closure and responsible for its performance prepares a proposed lane closure submittal. Sufficient information is provided to ensure complete understanding of the proposal. The submittal is sent through the DTM for review before sending it on to the LCRC. If additional TMP efforts can reduce the expected additional delay to less then 30 minutes, then the closure does not have to go to the LCRC. The DLCRC/HQLCRC may require additional information during its review. At a minimum, the following information is recommended initially:

1. Location and vicinity maps showing the state highway(s), local street network, and other adjacent lane closures or nearby work that may affect traffic during the same period, including special events;
2. Dates, times and locations of the lane closure(s);
3. Brief description of the work being performed during the lane closure(s);
4. Brief description of each lane closure and its anticipated affect on traffic;
5. Amount of expected delay and corresponding queue length for each lane closure;
6. Summary of TMP strategies that will be used to reduce delay and motorist inconvenience during the lane closure(s) (refer to Table 1). A copy of the approved TMP for the project, if available;
7. Contingency plan (see "Contingency Plan" below).

B. EVALUATION

The LCRC is responsible for approving major lane closures and will use the items below for evaluating lane closure operations. In its evaluation of the proposal, the LCRC will give consideration to the accuracy, reliability, and completeness of information provided as well as other reliable sources of information available to the LCRC.

Proposals will be evaluated on the basis of effectiveness in the following areas:

- Promoting motorist and worker safety;
- TMP strategies;
- Plans for coordination with adjacent construction, maintenance, encroachment permits, and special events;

- Plans for coordination with TMC and field personnel;
- Plans for coordination with public media;
- Plans for use of existing field elements such as traffic surveillance loops, changeable message signs, highway advisory radio, and Closed Circuit Television cameras;
- Lines of communication and authority (top to bottom);
- Plans for monitoring delay (or corresponding queue length) during lane closure operations;
- Alternatives to proposed closures;
- Viability of contingency plans;

C. Post-Closure Evaluation Statement

A Post-Closure Evaluation statement will be submitted to headquarters' Traffic Operations Program, Office of System Management Operations, on all projects that exceed expected delay or run outside of the closure window. No more than one page is suggested. The functional unit performing the lane closure will prepare the statement within five working days of the date the lane closure exceeded the threshold criteria. The statement should explain:

- The cause and impact of delays;
- Either actions taken or to be taken to avoid or mitigate an occurrence or recurrence;
- Why the expected delay was exceeded and/or why it was necessary to exceed the closure window;
- How the situation can be avoided in the future.

Post-closure evaluation statements are only for closures formally approved by the District LCRC under this process (i.e. exceed the lesser of 30 minutes or the DTM limit).

Chapter 8
References

Chapter 8
References

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Final
Environmental Impact Report

North Delta
Flood Control and Ecosystem
Restoration Project

Appendices

Prepared by:
California Department of Water Resources
FloodSAFE Environmental Stewardship and Statewide Resources Office
1416 9th Street
Room 1601
Sacramento, CA 94236-0001

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Appendix A:

Preliminary North Delta Flood Control and Ecosystem Restoration Project Benefits Analysis

PRELIMINARY
North Delta Flood Control and Ecosystem Restoration Project Benefits Analysis

INTRODUCTION

This report summarizes a "reconnaissance level" benefits analysis for the proposed North Delta Flood Control and Ecosystem Restoration Project. This report focuses upon the evaluation of without project flood damage and the benefits of alternative plans to reduce flood damage and implement ecosystem restoration. The analysis is based on existing year (2005) conditions, July 2006 price levels and a discount rate of 6 percent and utilizes existing data wherever possible. The difference between without- and with-project expected annual damage ($11.0 and $1.6 million, respectively) is the damage reduced by the proposed project, or about $9.4 million/year. The present worth of $9.4 million/year over a fifty year analysis period (assuming a 6% discount rate) is about $147 million, or stated another way, the estimated benefits of this project would justify a project with a total present worth of capital and annual operating costs over a fifty year period up to $147 million <u>which are allocated to flood damage reduction purposes</u>. **However, because of limited supporting existing technical data, such as hydraulics and geotech which can greatly influence a flood damage analysis, results from this reconnaissance level analysis will need to be substantiated with more detailed feasibility analyses**.

Need for Project

Within the northern region of the Sacramento and San Joaquin Rivers Delta, runoff from the Sacramento, San Joaquin, Mokelumne and Cosumnes Rivers during large storm events has caused flooding of homes, infrastructure, farms and other businesses. For example, flood damage for the 1986 and 1997 flood events in the north Delta is estimated to be about $20 million (1986 dollars) and $10 million (1997 dollars), respectively.[1] Additionally, ecosystem degradation and the loss of aquatic and terrestrial habitat are also concerns in the North Delta. The CA DWR is proposing this project to address both of these concerns.

Study Area Description

The economic analysis study area includes the following islands/tracts and associated Reclamation Districts within the North Delta region (Table 1 and Figure 1). All of these islands/tracts are protected by levees maintained by the local reclamation districts. Table 2 summarizes estimated 2000 population for this study area. Although the study area is primarily rural, there are two communities: Thornton (2000 pop 762) within New Hope Tract east of I-5 and Walnut Grove (2000 pop 488) at the north end of Tyler Island. Table 3 summarizes land use within the economic study area. The study area includes about 37,600 acres, of which 34,015 are in irrigated agriculture, or about 91% of total acreage (Figure 2). The predominant crop category is field crops comprising almost 55% of total land use. Within field crops, the

[1] In 2006 dollars, these estimates are about $33 million (1986 event) and $12 million (1997 event).

major crop is corn. In 2004, there were about 80 firms within the study area with a total sales volume of about $90 million and 300 employees. Some of these firms provide critical agricultural services and products for the region. The project area is served by several highways: Interstate 5 (I-5) runs north-south through the eastern part of the study area; State Route 12 is a two-lane highway that runs east-west just south of the study area, and State Route 160 is a two-lane highway that runs north-south just west of the study area along the Sacramento River. The Union Pacific Railroad runs north-south in the eastern portion of the study area.

Table 1
Study Area Islands/Tracts and Reclamation Districts

Island/Tract	Reclamation District
Glanville Tract	RD 1002
New Hope Tract	RD 348
McCormack-Williamson Tract	RD 2110
Dead Horse Island	RD 2111
Staten Island	RD 38
Tyler Island	RD 563
Walnut Grove	RD 554

Table 2
2000 Population

Island/Tract	Population
Glanville Tract	60
New Hope Tract	1,583
McCormack-Williamson Tract	0
Dead Horse Island	4
Staten Island	40
Tyler Island	52
Walnut Grove	488
Total	2,227

Figure 1
Economic Analysis Study Area

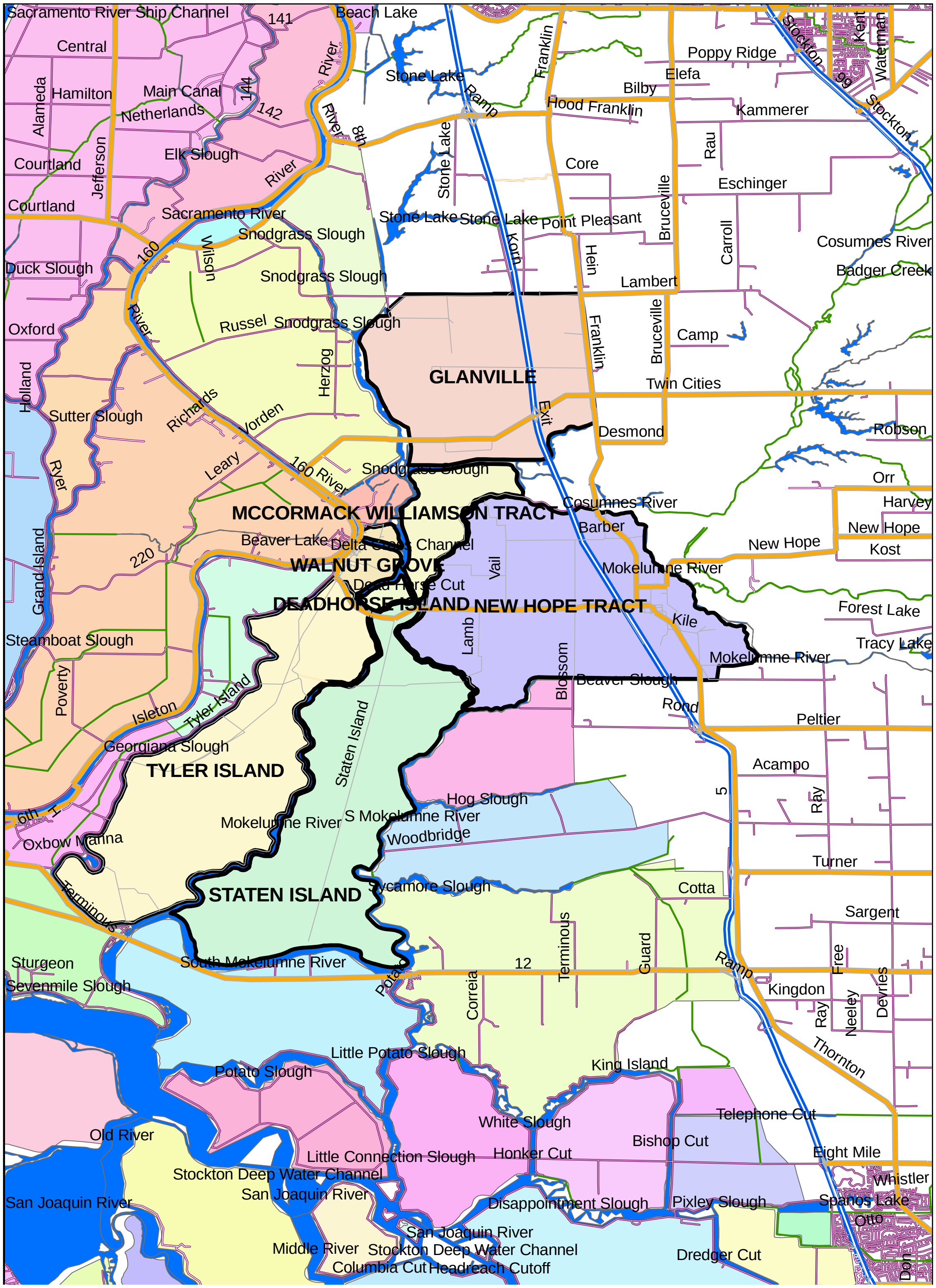
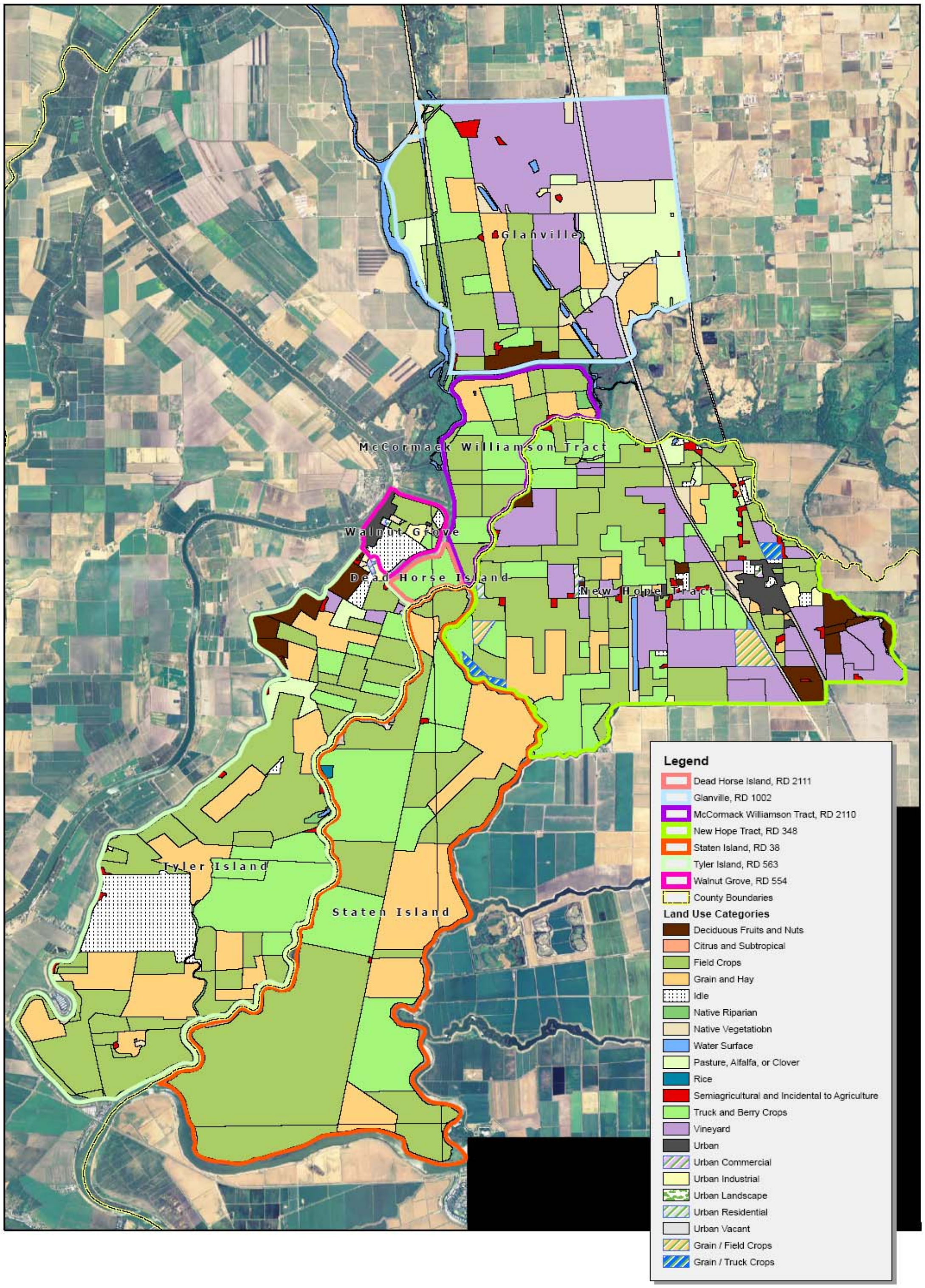


Table 3
Land Use

Irrigated Acres	RD 0038 Staten	RD 0348 New Hope	RD 0554 Walnut Grove	RD 0563 Tyler	RD 1002 Glanville	RD 2110 McCormack	RD 2111 Dead Horse	Total
	Reclamation Districts/Islands							
Field								
Alfalfa	0	0	0	181	17	0	0	198
Wheat	0	0	0	385	0	0	0	385
Clover	0	0	0	0	165	0	0	165
Grain	1,854	845	0	1,414	585	265	0	4,963
Safflower	0	576	119	358	58	174	0	1,285
Corn	4,566	2,577	0	3,124	1,340	560	0	12,167
Beans	0	48	0	0	0	0	0	48
Pasture	0	103	0	9	703	0	0	815
Sorgum	0	0	0	83	0	0	0	83
Sudan	0	130	0	0	0	0	0	130
Miscellaneous	14	80	0	231	0	13	0	338
Subtotal	6,434	4,359	119	5,785	2,868	1,012	0	20,577
Truck, Nursery and Berry								
Asparagus	0	253	0	725	0	0	0	978
Potatoes	555	84	0	0	0	0	0	639
Tomatoes	1,716	1,495	0	536	552	482	189	4,970
Miscellaneous	0	62	21	115	0	0	0	198
Subtotal	2,271	1,894	21	1,376	552	482	189	6,785
Deciduous Fruits and Nuts								
Pears	0	165	0	287	119	0	0	571
Cherries	0	35	0	0	0	0	0	35
Apples	0	118	0	0	0	0	0	118
Miscellaneous	0	19	0	0	0	0	0	19
Subtotal	0	337	0	287	119	0	0	743
Vineyards	0	2,056	0	62	2,567	0	0	4,685
Dairy	0	0	0	0	37	0	0	37
Idle	0	113	160	915	0	0	0	1,188
Total Agriculture	8,705	8,759	300	8,425	6,143	1,494	189	34,015
Total Reclamation District	9,248	9,819	494	8,929	7,204	1,664	221	37,579

Sources: DWR Sacramento (2000) and San Joaquin (1996) County land use surveys

Figure 2
Land Use



Sources: DWR Sacramento (2000) and San Joaquin (1996) County land use surveys

Proposed Project

To address the goals of flood damage reduction and ecosystem restoration, the proposed project's alternatives have been grouped into two independent groups--Group I and Group II. Only one alternative from either group will be implemented.

Group I

- Alternatives 1A, 1B or 1C would restore agricultural lands on McCormack-Williamson Tract to different combinations of native habitat (aquatic/wetland/riparian); in addition to meeting ecosystem restoration objectives, these alternatives would allow controlled flooding of this tract and thereby reduce flood damage in neighboring islands/tracts.

- Included in these alternatives are also actions to restore Grizzly Slough property and dredging along the Mokelumne River.

Group II

- Alternatives 2A, 2B or 2C would create detention space on Staten Island in different locations; detention areas would still be farmed and would capture flows no more frequently than the 10-year event.

- Alternative 2D would include dredging and levee modifications along the Mokelumne River.

FLOOD DAMAGE REDUCTION BENEFITS

Without vs. With Project Conditions

The flood damage analysis is based upon the reduction in flood damage that can be expected to occur with the proposed project compared to without project conditions over an economic analysis period (usually 50 years). Although future changes in land use and hydrology/hydraulics could be taken into account, this reconnaissance level analysis has been limited to existing (2005) conditions. The "with" project" condition assumes that an alternative from either Group I or II is implemented; alternatives from both groups would offer similar levels of flood protection.

Floodplains

Floodplains are a critical component of any flood damage analysis because they show the extent, depth and frequency of flooding. Unfortunately floodplains for without- and with-project conditions were not available for this analysis. However, floodplain extents, depths and frequencies were assumed based upon hydraulic analyses conducted to date for the North Delta project, as well as the Sacramento and San Joaquin River Basins Comprehensive Study and anecdotal information. Table 4 shows flood depths assumed for without- and with-project conditions for the 10-, 50-, 100- , 200- and 500-year events; <u>these depths were also assumed to inundate the islands and tracts uniformly</u>.

If a feasibility analysis is eventually conducted, then floodplains must be plotted for without- and with-project conditions. Plotting these floodplains may reveal other areas that were omitted from this reconnaissance level analysis which should be included and thus may significantly affect the estimation of project benefits. Floodplain depths may also significantly change.

Table 4
Assumed Flood Depths (1)
Without- and With-Project

Islands/Tracts	Flood Depths (ft) Without Project				
	10 YR	50 YR	100 YR	200 YR	500 YR
Glanville Tract	0	9.0	10.0	11.8	13.3
New Hope Tract	0	5.0	6.0	7.8	9.3
McCormack/Williamson Tract	0	13.0	14.0	15.8	17.3
Dead Horse Island	0	16.0	17.0	18.8	20.3
Staten Island	0	20.0	21.0	22.8	24.3
Tyler Island	0	17.0	18.0	19.8	21.3
Walnut Grove	0	17.0	18.0	19.8	21.3

Islands/Tracts	Flood Depths (ft) With Project				
	10 YR	50 YR	100 YR	200 YR	500 YR
Glanville Tract	0	0	0	14.0	17.3
New Hope Tract	0	0	0	10.0	13.3
McCormack/Williamson Tract	0	0	0	6.0	9.3
Dead Horse Island	0	0	0	17.0	20.3
Staten Island	0	0	0	21.0	24.3
Tyler Island	0	0	0	18.0	21.3
Walnut Grove	0	0	0	18.0	21.3

(1) Based upon hydraulic analyses conducted to date for the North Delta project, as well as the Sacramento and San Joaquin River Basins Comprehensive Study and anecdotal information

Damage Categories

For this reconnaissance level analysis, potential flood damage was estimated for the following categories:

Structures

- Residential -- includes single family and multi-family units, houses, apartments, duplexes, mobile and manufactured homes. Damage includes physical damage to the structures and contents.

- Commercial -- includes retail stores, restaurants, service stations and repair garages. Damage includes physical damage to the structures and contents.

- Industrial -- industrial plants including manufacturing plants, oil refineries, meat packing plants, and canneries. Damage includes physical damage to the structures and contents.

- Public-- public buildings including hospitals, police and fire stations, schools, municipal theatres, churches, etc. Damage includes physical damage to the structures and contents.

- Farmsteads -- includes rural residential structures with sheds and other outbuildings. Damage includes physical damage to the structures and contents. However, it does not include farm implements or other equipment (such as irrigation systems) which are included in crop damage (below).

Agriculture

- Crops -- includes the loss of cumulative cultivation costs incurred prior to flooding, the current net value of the crop affected by the flood event, the depreciated value of perennial crops lost as a direct result of flooding, clean up costs and losses to power-driven equipment (tractors, irrigation pumps, etc.).

Other

- Flood fight/reclamation -- the cost of flood fight operations, dewatering flooded lands and repairing levees

- Displacement -- additional costs incurred by property owners who must evacuate their homes and businesses due to flooding and arrange temporary housing elsewhere.

- Autos -- damage to trucks and automobiles.

- Transportation -- additional costs imposed to travelers using highways who must use alternate routes due to flooding-related closures.

- Loss of utility services – the impact of lost utility services (electric power, water supply, and wastewater) on local economies.

Flood Damage Not Included

Because of data and time limitations, not all potential damage and costs resulting from floods in the economic study area have been included in this reconnaissance level analysis but should be included in a feasibility analysis. Omitted damage and costs are:

- Loss of agricultural habitat and recreational values.
- Loss of public services functions (for example, closure of hospitals, police and fire stations, and schools).
- Loss of business income.
- Casualties

Structural Flood Damage

Using GIS and Sacramento and San Joaquin county assessor maps and databases, parcels subject to flooding in the study area were identified. Characteristics such as land use, structure type, assessed improvement value, and physical features were extracted from the databases. The number of parcels is displayed by land use in Table 5 along with the assumed number of structures.

Table 5
Parcel and Structural Inventories
Existing Conditions

Land Use Type	Number of Parcels	Number of Parcels with Structures
Residential	343	343
Commercial	36	36
Industrial	10	10
Public Service	72	12
Farmstead	25	25
Agricultural	208	0
Other (1)	285	0
Total	979	426

(1) Includes undeveloped residential, commercial and industrial lots and other miscellaneous land uses.

The value of damageable property includes both structure and content values but does not include land values. All structural values were based on "adjusted" assessed improvement values to represent depreciated replacement values. An adjustment is necessary to account for California's Proposition 13, which limits assessed values to an annual increase of two percent. This adjustment consists of these steps for each parcel:

- Reduce the current assessed improvement value by 2% per year back to the last sales recording date.

- Increase the assessed improvement value at the last sales recording date using annual construction cost indices provided by an appraisal service (Marshall & Swift).

Once the structural values are estimated, content values are assigned based upon percentages developed by past Corps of Engineers studies. These percentages of structural values are: residential and mobile homes, 50%; commercial, 100%, industrial, 150%, public/semi public, 50%; and farmsteads, 65%.[2] Table 6 displays estimated structure and content values by damage category for existing conditions.

For most structural damage categories, dollar damage increases as depth of flooding increases. To estimate potential losses, Corps of Engineers' structural and contents depth -damage curves were entered into @RISK models described below. A residential damage depth-damage curve is shown in Table 7.[3]

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[2] Farmsteads pose a significant problem because assessed improvement values can not only include buildings but permanent crops and certain equipment as well. For this analysis, a farmstead was defined as having a house plus other outbuildings, so parcels were selected which had residential "building square foot" statistics. This building square footage was multiplied by a $70/sq ft "depreciated" replacement cost value plus an additional 20% allowance was added for sheds and other out-buildings. However, it is possible that parcels with no square footage estimates but which nonetheless have buildings were excluded from this analysis; thus farmstead structural values and associated damage would be underestimated. This problem could be corrected through additional field work in a feasibility analysis.

[3] Following the devastation of Hurricane Katrina, FEMA has re-evaluated its own depth-damage curves and has concluded that any damage that is at least 50% of the structural value essentially results in the total loss of the building. These revised FEMA depth-damage curves would result in more damage than the Corps depth-damage curves used for this analysis.

Table 6
Value of Damageable Property
Without Project (Existing Conditions)
(Millions of Dollars; 2006 Price Levels)

Damage Category	Structure Value	Content Value	Total Value of Damageable Property
Residential	$34.3	$17.1	$51.4
Commercial	$18.6	$18.6	$37.2
Industrial	$2.0	$2.9	$4.9
Public Service	$6.6	$3.3	$9.9
Farmsteads	$3.7	$2.4	$6.1
Total	$65.1	$44.4	$109.5

Table 7
Corps' Residential Structural and Contents Depth-Damage Curve
(One Story Residence/No Basement)

First Floor Depth (feet)	Structural Depth-Damage		Content Depth-Damage[1]	
	Mean of Damage	Standard Deviation of Damage	Mean of Damage	Standard Deviation of Damage
-2	0%	0%	0%	3.0%
-1	2.5%	2.7%	2.4%	2.1%
0	13.4%	2.0%	8.1%	1.5%
1	23.3%	1.6%	13.3%	1.2%
2	32.1%	1.6%	17.9%	1.2%
3	40.1%	1.8%	22.0%	1.4%
4	47.1%	1.9%	25.7%	1.5%
5	53.2%	2.0%	28.8%	1.6%
6	58.6%	2.1%	31.5%	1.6%
7	63.2%	2.2%	33.8%	1.7%
8	67.2%	2.3%	35.7%	1.8%
9	70.5%	2.4%	37.2%	1.9%
10	73.2%	2.7%	38.4%	2.1%
11	75.4%	3.0%	39.2%	2.3%
12	77.2%	3.3%	39.7%	2.6%
13	78.5%	3.7%	40.0%	2.9%
14	79.5%	4.1%	39.9%	3.2%
15	80.2%	4.5%	39.6%	3.5%
16	80.7%	4.9%	39.1%	3.8%

(1) Expressed as a percent of structural value.

Agricultural Flood Damage

Agriculture is a major industry within the study area. Approximately 34,000 acres are currently cultivated within the economic analysis study area (Table 3), primarily in field crops. Annual crop gross income is about $49.4 million (Table 8).

Table 8
Annual Gross Crop Income
Without Project (Existing Conditions)
(Millions of Dollars; 2006 Price Levels)

Crops	Annual Gross Crop Income
Field	$8.1
Truck	$17.1
Orchard	$3.5
Vineyard	$20.7
Total	$49.4

Agricultural flood damage includes the loss of direct production costs incurred prior to flooding, the loss of net value (income) of crop, the loss of depreciated value of perennial crops, land clean-up and rehabilitation costs and losses to power-driven equipment (tractors, irrigation pumps, etc.). In addition to flood depths, the effects of seasonality and flooding duration are considered for each crop. Corp damage/acre estimates developed for the Sacramento and San Joaquin River Basins Comprehensive study were updated and used for this analysis.

In addition to providing food and fiber for human and animal consumption, corn and other crops in the study area also have significant habitat and recreational values. For example, Sand Hill Cranes feed upon the corn, providing opportunities for bird-watchers to view them. During the Lodi Sand Hill Crane Festival which is held in the fall, visitors pay to ride busses which take them to fields in the study area to watch cranes and other wildlife. In addition, agricultural lands are also used by hunters. Thus, these other habitat and recreational values could be threatened by flooding.[4] The key questions are: how extensive are these values, how much are they worth (monetarily) and how would they be affected by flooding?

An evaluation of similar types of values was conducted by DWR for the Corps' proposed Middle Creek Ecosystem Restoration Project in Lake County.[5] A value of $320/acre was assigned to existing agricultural lands (primarily orchards and vineyards) based upon the assumption that the physical habitat value of agricultural land was about 10 percent of natural habitat values.[6] This 10% relationship was then applied to a dollar estimate of native habitat ($3,200/acre) developed in that study.

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[4] Although it might be argued that flooded lands would also have habitat and recreational values as well.
[5] CA DWR, *Middle Creek Ecosystem Restoration Project Case Study: Benefit/Cost Analysis* (Draft, May 2005).
[6] Developed from data obtained in Jones & Stokes Associates, Inc. *Final Middle Creek Ecosystem Restoration Reconnaissance Study*, October 1997

Although the presence of these habitat and recreational values is recognized for some agricultural lands within the study area, no attempt will be made at this time to value them monetarily and assess flood damage. However, this could be done during a feasibility study.

Other Flood Damage

In addition to structural and agricultural damage, other flood damage categories evaluated include:

- Flood fight/reclamation costs -- the cost of flood fight operations, pumping out islands and repairing levee breaches following a flood event. For this analysis, a cost of about $2,400/acre/event was assumed based upon similar cost data for the Jones Tract levee failure of 2004.

- Autos -- damage to trucks and automobiles; the analysis assumes 1.25 cars/household but only half of the cars are assumed to be damaged. The average car value is assumed to be $7,150 (updated value from the Sacramento and San Joaquin River Basins Comprehensive Study) and 80% damage occurs with flood depths greater than 2 feet.

- Transportation -- additional costs imposed to travelers using Interstate 5 and other routes who must use an alternate route due to flooding-related closures. CalTrans estimated the cost of I-5 delays associated with the 1986 and 1997 events to be $2.6 to $0.5 million respectively; $2.0 million/event was assumed for this study. Delays for travelers using other routes within the study area would also occur but these have not been estimated for this analysis.

- Displacement costs -- additional costs incurred by property owners who must evacuate their homes and businesses due to flooding and arrange temporary housing elsewhere. Based upon research by David Ford and Associates, displacement costs range from about 15 – 20% of structural damage; 20% was assumed for this study because of the potentially deep flood depths and long duration times before islands/tracts can be pumped out.[7]

- Loss of utility services – the economic cost of lost utility services. FEMA has developed benefit “default values” for the loss of utility services that were used in this analysis: electric power ($188/capita/day; water supply ($103/capita/day); wastewater ($33.50/capita/day). The length of utility service outages was assumed to be 28 days for the interior islands/tracts (McCormack-Williamson, Dead Horse, Tyler and Staten) and 14 days for the eastern tracts (Glanville and New Hope).

[7] The pump out time for the Jones Tract levee failure in 2004 was five months.

Event vs. Expected Annual Damage

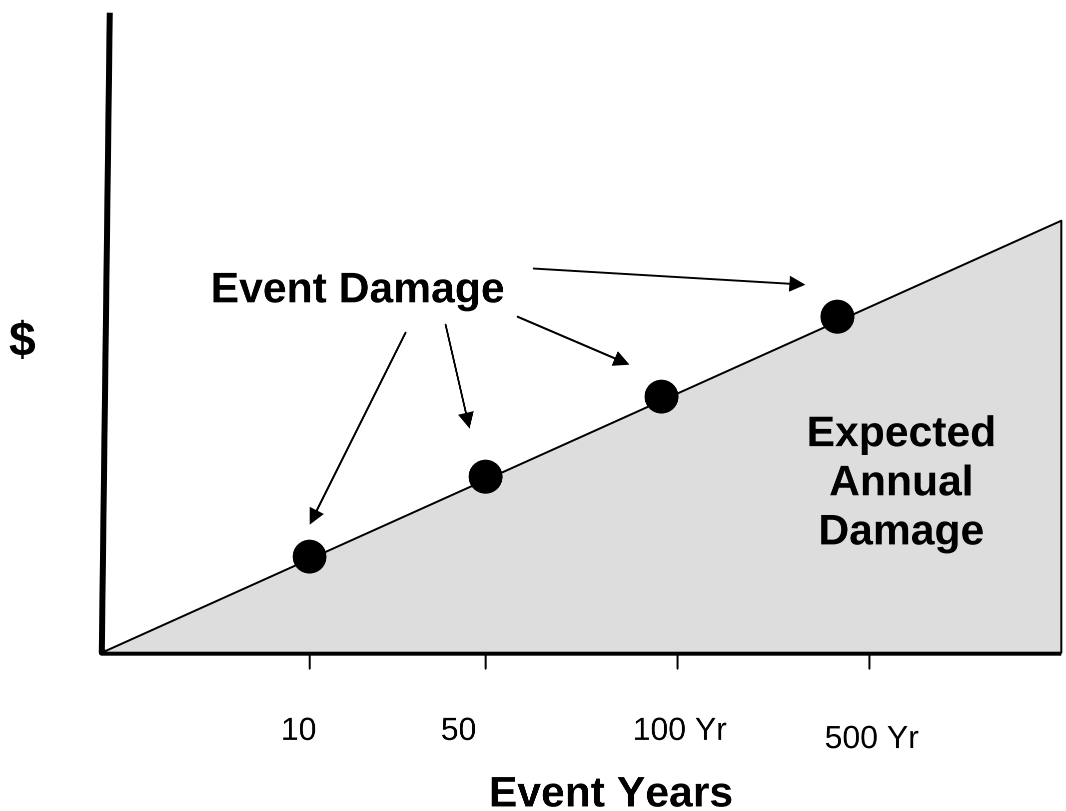
Flood damage can be expressed as either

- Event damage -- the damage expected to occur from specific flood events (examples: 10-, 50-, 100-year events) which is used for emergency planning, or

- Expected annual damage -- the "average annual" damage for all events that could be expected to occur in any given year which is used for project B/C analyses (equivalent annual damage is the present worth of expected annual damage over a study period, such as 50 years).

In Figure 3, event damage for the 10-, 50-, 100- and 500-YR events are shown on the upward sloping line; expected annual damage is the area underneath this line.

Figure 3
Event vs. Expected Annual Damage



The preferred model for estimating expected annual damage is the Corps' HEC-FDA (Flood Damage Analysis) which integrates hydrologic, hydraulic, and geotechnical engineering and economic data for the formulation and evaluation of flood damage reduction plans. The program incorporates risk-based analysis by quantifying uncertainties in the hydraulics, geotechnical and economics data utilizing Monte Carlo simulation. However, because floodplain and geotech data was not available for this reconnaissance level analysis, a spreadsheet analysis was used to estimate EAD. If a feasibility study is eventually conducted, FDA must be used.

Frequency/Damage Curves

The first step in estimating expected annual damage is to estimate event damage for two or more events. For this study, event damage was estimated for the 10-, 50-, 100-, 200- and 500-YR events. The results of this analysis are shown as frequency/damage curves in Tables 9 and 10 for without and with project conditions, respectively. Total frequency/damage curves are graphed in Figure 4. The difference in area between both curves represents the expected annual flood damage reduction ("benefit") of implementing the project.

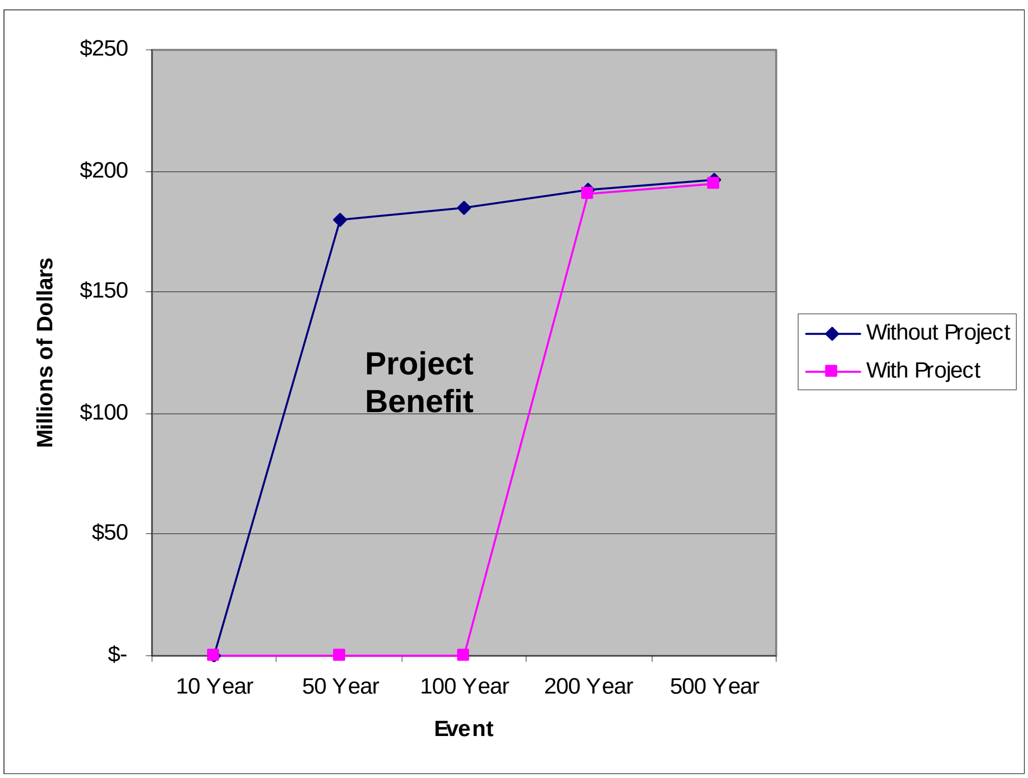
Table 9
Summary of Frequency-Damage Curves
Without Project (Existing Conditions)
(Millions of Dollars; 2006 Price Levels)

Event	Structures/ Contents	Crops/ Equipment	Displace-ment	Utilities	Autos	Highway (I-5)	Floodfight/ Reclama-tion	Total
10 Year	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
50 Year	$59.4	$36.2	$11.9	$6.2	$0.9	$2.0	$63.7	$180.2
100 Year	$63.5	$36.2	$12.7	$6.2	$0.9	$2.0	$63.7	$185.2
200 Year	$69.2	$36.2	$13.8	$6.2	$0.9	$2.0	$63.7	$192.0
500 Year	$72.5	$36.2	$14.5	$6.2	$0.9	$2.0	$63.7	$196.0
Expected Annual Damage								$11.0

Table 10
Summary of Frequency-Damage Curves
With Project (Existing Conditions)
(Millions of Dollars; 2006 Price Levels)

Event	Structures/ Contents	Crops/ Equipment	Displace-ment	Utilities	Autos	Highway (I-5)	Floodfight/ Reclama-tion	Total
10 Year	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
50 Year	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
100 Year	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
200 Year	$69.1	$35.1	$13.8	$6.2	$0.9	$2.0	$63.7	$190.9
500 Year	$72.4	$35.1	$14.5	$6.2	$0.9	$2.0	$63.7	$194.9
Expected Annual Damage								$1.6

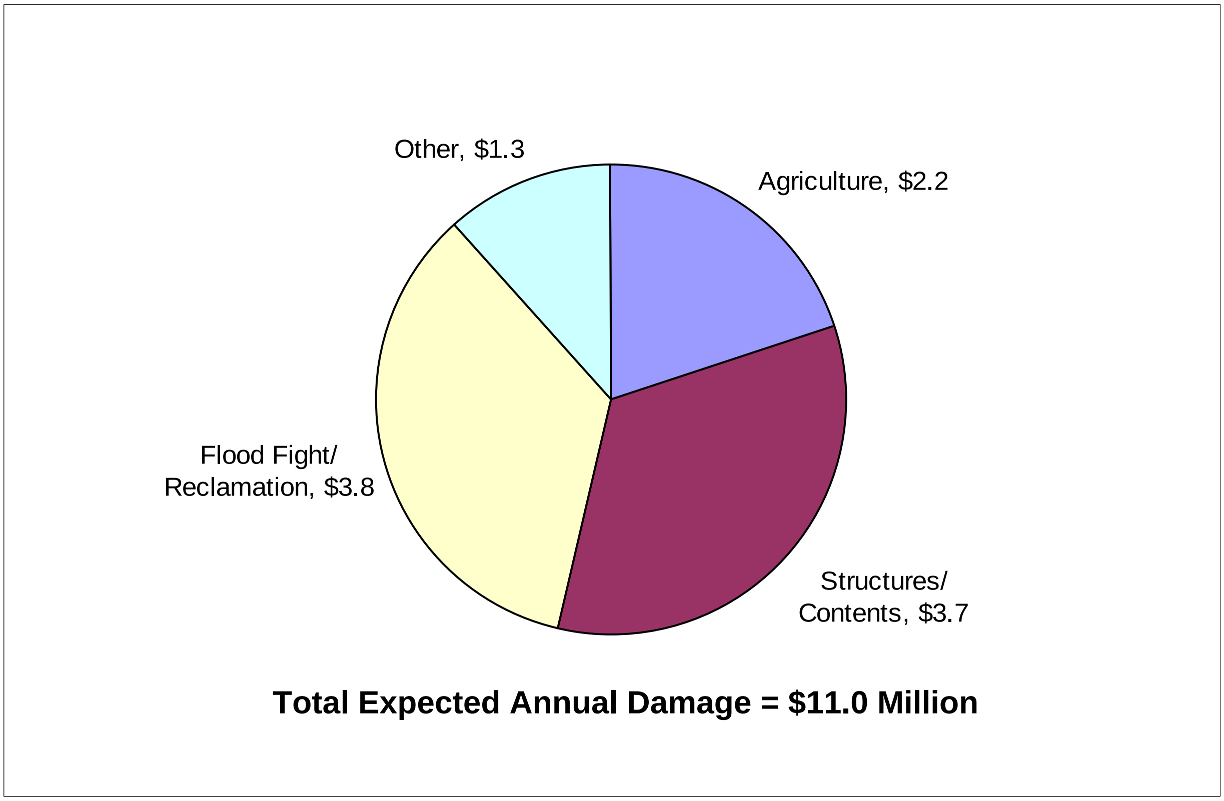
Figure 4
Frequency-Damage Curves
Without and With Project (Existing Conditions)
(Millions of Dollars; 2006 Price Levels)



Expected Annual Damage

Expected annual damage is the "average annual" damage for all events that could be expected to occur in any given year. Tables 9 and 10 show without- and with-project EAD based upon existing conditions. Without-project expected annual damage is estimated to be about $11.0 million; the distribution of these costs by damage category is shown in Figure 5. The difference between without- and with-project EAD ($11.0 and $1.6 million, respectively) is the damage reduced by the project, or about $9.4 million/year. The present worth of $9.4 million/year over a fifty year analysis period (assuming a 6% discount rate) is about $147 million, or stated another way, the estimated benefits of this project would justify a project with a total present worth of capital and annual operating costs over a fifty year period up to $147 million <u>which are allocated to flood damage reduction purposes</u>. **It must be stressed that these estimates are based upon reconnaissance level information and they would need to be substantiated with a more detailed feasibility analysis.**

Figure 5
Expected Annual Damage
Millions of 2006 Dollars
Without Project (Existing Conditions)



(1) "Other" includes displacement costs, loss of utility services, damage to highways (I-5) and autos.

OTHER PROJECT BENEFITS

In addition to flood damage reduction benefits, the project will also result in other types of benefits, including ecosystem restoration and recreation. Neither of these benefits has been estimated by this reconnaissance level study but they would have to be included in a feasibility analysis.

Ecosystem Restoration Benefits

Most of the restoration benefits would result from replacing existing agricultural production on about 1,200 acres on McCormack-Williamson Tract with different combinations of native habitat (aquatic, wetland and riparian) contained in Group I Alternatives 1A,1B or 1C. Smaller amounts of ecosystem restoration would be accomplished by levee setbacks proposed for Group II Alternatives 2B or 2C.

The incorporation of ecosystem restoration benefits into an economic analysis ultimately requires a decision whether these benefits should be valued in monetary terms. If these benefits are expressed in monetary terms, then they can be directly incorporated into benefit/cost analyses.[8] However, valuing ecosystem benefits in monetary terms is controversial and federal agencies such as the Corps of Engineers or the Bureau of Reclamation do not place monetary values on ecosystem benefits. For example, Corps guidance relies upon cost-effectiveness/incremental cost and/or tradeoff analyses of proposed ecosystem measures to formulate National Ecosystem Restoration or combined National Economic Development/ National Ecosystem Restoration plans. Essentially these types of analyses identify the "best buy" plans which provide the "most bang for the buck."[9] Thus, for plans that combine NED (for example, flood damage reduction) and NER benefits, the economic analysis includes benefit/cost analysis for the NED benefits/costs and cost-effectiveness analysis for the NER benefits/costs. If cost sharing is to be requested from the Corps, then the cost-effectiveness/incremental cost analysis will have to be used for ecosystem benefits. This analysis requires a detailed cost allocation among the different project purposes; the Separable Costs-Remaining Benefits (SCRB) method is most often used.

Monetized ecosystem restoration benefits have not been estimated for this analysis. However, a "comparative cost" analysis was conducted (see next section).

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[8] Methods exist for valuing ecosystem benefits in monetary terms. For example, the DWR Middle Creek economic analysis mentioned previously as well as a later analysis conducted for the proposed Colusa Drainage District's Integrated Watershed Management Plan incorporated monetary values for ecosystem benefits. Both of these studies can be found at DWR's Economic Analysis website: http://www.economics.water.ca.gov/
Also, an excellent reference source for these methods is the National Academies Press, Valuing Ecosystem Services: Toward Better Environmental Decision-Making, 2005.

[9] The Corps recently completed a feasibility study for the Hamilton City Flood Damage Reduction and Ecosystem Restoration Project in northern California which uses cost-effectiveness/incremental cost and tradeoff analysis methods. This study can be found at the Corps (Sacramento District) website: http://www.compstudy.net/hamilton.html

Recreation Benefits

The proposed project may also result in recreation benefits:

- The southern portion of McCormack-Williamson Tract could be opened up to boating (Group I Alternatives)

- Access and interpretive kiosks for wildlife viewing can be included on Staten Island (Group II Alternatives)

The estimation of recreation benefits for these actions would require estimates of current recreational uses (visitor days) at these locations plus estimates of how they would change with the proposed project. This visitor day data would then be combined with either user day values ($/day/activity) developed by the Corps or other organizations or preferably through more detailed studies (such as travel-cost analysis).

Project Costs

A preliminary cost allocation for the Group I and II alternatives by project purposes (flood damage reduction, ecosystem restoration and recreation) is shown in Table 11.[10] These costs are averages for each group; costs differ for specific alternatives within each group.

Table 11
Preliminary Cost Allocation (1)
(Millions of Dollars; 2006 Price Levels)

Alternative Group Costs (2)	Project Objectives			
	Flood Damage Reduction	Restoration	Recreation	Total
Land				
Group I-- Alts 1A, 1B or 1C (3)	$4.0	$2.6	$0.0	$6.6
Group II--Alts 2A, 2B or 2C (4)	$3.2	$0.0	$0.0	$3.2
Construction				
Group I-- Alts 1A, 1B or 1C	$27.1	$32.2	$0.0	$59.3
Group II--Alts 2A, 2B or 2C	$233.3	$5.1	$23.2	$261.6
O&M				
Group I-- Alts 1A, 1B or 1C	$2.6	$0.0	$0.0	$2.6
Group II--Alts 2A, 2B or 2C	$0.0	$0.0	$0.0	$0.0
Total				
Group I-- Alts 1A, 1B or 1C	$33.7	$34.8	$0.0	$68.5
Group II--Alts 2A, 2B or 2C	$236.5	$5.1	$23.2	$264.9

(1) Present worth of costs for a 50-year period, 6% discount rate.
(2) Average costs of all alternatives in each group.
(3) Value of foregone agricultural production on restored land.
(4) Damage caused by increased frequency of flooding in detention basin and land taken out of production

Total flood damage reduction benefits for either Group I or Group II alternatives are about $147 million. These benefits compare favorably with the flood damage reduction costs allocated for the Group I alternatives (about $34 million) but not Group II (about $237 million). Monetized ecosystem restoration benefits have not been estimated that could be directly compared to the ecosystem restoration costs shown in Table 11. However, most of the restoration would occur with one of the Group I alternatives which would restore about 1,500 acres of agricultural land

[10] This preliminary cost allocation is based upon engineering judgment as to the split of costs among project purposes rather than a more detailed Separable Cost-Remaining Benefit analysis which would have to be performed during a feasibility study. The SCRB method distributes costs among the project purposes by identifying separate costs and allocates joint costs or joint savings in proportion to each purpose's remaining benefits.

Figure 6
Group I Preliminary Cost Allocation
Millions of 2006 Dollars

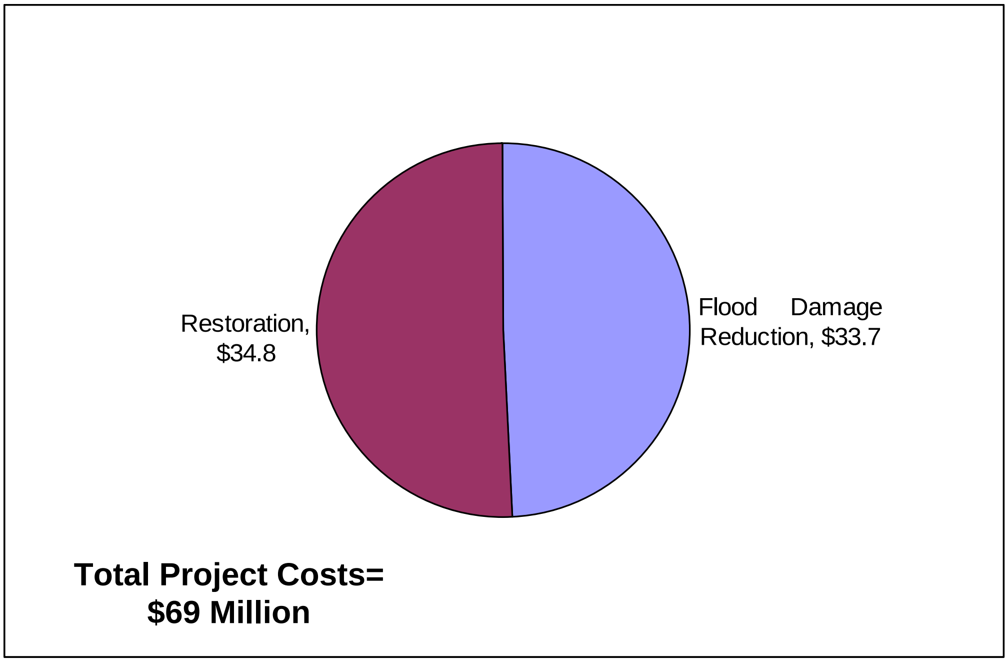
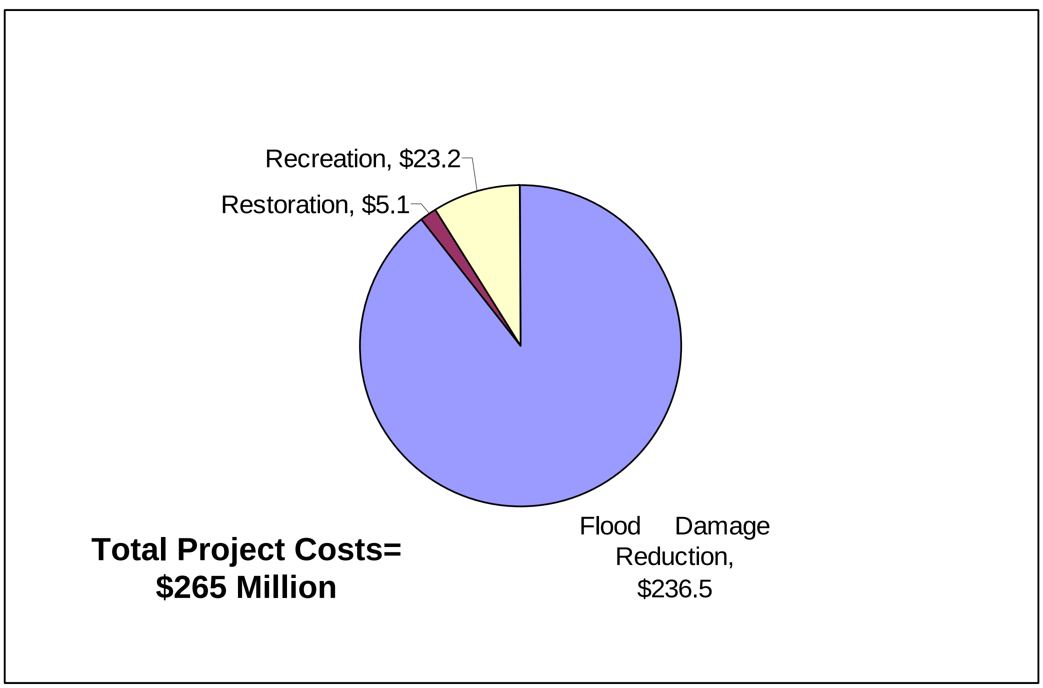


Figure 7
Group II Preliminary Cost Allocation
Millions of 2006 Dollars



with different combinations of native habitat (aquatic/wetland/riparian). This restoration would cost about $23,200 per acre. In comparison, the purchase of mitigation bank credit for similar types of habitat in the region is about $35,000 - $45,000 per acre, which includes all long-term maintenance.

Table 12. North Delta Alternatives
Comparison of Net Benefits and B/C Ratios

Alternative	PV Net Benefits (1)	B/C Ratio
Alternate 1-A	$102 M	3.2
Alternate 1B	$99 M	3.0
Alternate 1C	$96 M	2.8
Alternate 2-A	-$60 M	0.7
Alternate 2-B	-$178 M	0.5
Alternate 2-C	-$98 M	0.6
Alternate 2-D	$42 M	1.4

CONCLUSIONS

This economic analysis is a preliminary attempt to quantify benefits for the proposed North Delta Flood Control and Ecosystem Restoration Project relying upon primarily existing information. Results from this flood damage reduction benefit analysis appear promising, but it must be remembered that (1) they are based upon very limited data, particularly floodplain and geotech and (2) due to the lack of this information, HEC-FDA was not used. The purpose of a feasibility study would be to develop the necessary hydrologic/hydraulics, geotech, economics and ecosystem data to conduct significantly more detailed analyses using FDA to substantiate the benefits estimated by this reconnaissance level study.

Appendix B:

North Delta Construction Cost Estimates

North Delta Construction Cost Estimates

These are estimates only. They reflect 2006 dollars and any costs provided by contractors are not guarantees of price.

				Average Annual Flood Operations Costs	
Alternative 1-A	$56,026,264	$44,320,498	(without dredging)	$160,311	(average annual cost -- plus the average annual cost of maintenance dredging divided by 15, since maintenance dredging would only occur once every 15 years)
Alternative 1-B	$59,260,939	$47,555,174	(without dredging)	$167,211	(average annual cost -- plus the average annual cost of maintenance dredging divided by 15, since maintenance dredging would only occur once every 15 years)
Alternative 1-C	$62,613,221	$50,907,456	(without dredging)	$167,211	(average annual cost -- plus the average annual cost of maintenance dredging divided by 15, since maintenance dredging would only occur once every 15 years)
Alternative 2-A	$209,617,368			$1,120	(average annual cost divided by 10 -- island would be flooded once every ten years)
Alternative 2-B	$327,474,925			$1,120	(average annual cost divided by 10 -- island would be flooded once every ten years)
Alternative 2-C	$247,689,584			$1,120	(average annual cost divided by 10 -- island would be flooded once every ten years)
Alternative 2-D	$102,897,468			$309,438	(average annual cost divided by 15 -- maintenance dredging would occur every 15 years)

North Delta Construction Cost Estimate - Unit Breakdown

These are estimates only. They reflect 2006 dollars and any costs provided by contractors are not guarantees of price.

Group 1 Alternatives Components	Unit	Alt 1A	Alt 1A Cost	*1A Rest. Cost*	Alt 1B	Alt 1B Cost	*1B Rest. Cost*	Alt 1C	Alt 1C Cost	*1C Rest. Cost*	Assumptions/Rationale
Degrade McCormack-Williamson Tract East Levee to Function as a Weir (3,000 LF)				*60%F / 40%R*			*60%F / 40%R*			*60%F / 40%R*	
1 Clear and grub levee surface with dozer	acres	8	$40,539	*$16,215*	8	$40,539	*$16,215*	8	$40,539	*$16,215*	Calc'd from NHC designs
2 Strip and transport material with scraper for interior MWT features	cubic yards	58,667	$787,206	*$314,882*	58,667	$787,206	*$314,882*	58,667	$787,206	*$314,882*	From DWR borrow balance estimate
15 RSP - import rock with barge and place	tons	45000	$2,160,000	*$864,000*	45000	$2,160,000	*$864,000*	45000	$2,160,000	*$864,000*	Calc'd from NHC designs
6 Placement of filter layers under all RSP	square yards	270000	$601,668	*$240,667*	270000	$601,668	*$240,667*	270000	$601,668	*$240,667*	Calc'd from NHC designs
7 Pour concrete toe sill	cubic yards	334	$116,900	*$46,760*	334	$116,900	*$46,760*	334	$116,900	*$46,760*	Calc'd from NHC designs
9 Pave levee-top road - Stabilization fabric	square yards	3334	$3,889	*$1,556*	3334	$3,889	*$1,556*	3334	$3,889	*$1,556*	Calc'd from NHC designs
10 Aggregate base course, 6" deep	square yards	3334	$23,945	*$9,578*	3334	$23,945	*$9,578*	3334	$23,945	*$9,578*	Calc'd from NHC designs
11 Binder Course, 3" deep	square yards	3334	$21,244	*$8,498*	3334	$21,244	*$8,498*	3334	$21,244	*$8,498*	Calc'd from NHC designs
12 Wearing Course, 3" deep	square yards	3334	$23,765	*$9,506*	3334	$23,765	*$9,506*	3334	$23,765	*$9,506*	Calc'd from NHC designs
Degrade McCormack-Williamson Tract Southwest Levee to Function as a Weir (3725 LF)				*60%F / 40%R*			*38%F / 62%R*			*38%F / 62%R*	
1 Clear and grub levee surface with dozer	acres	5.5	$27,870	*$11,148*	5.5	$27,870	*$17,280*	5.5	$27,870	*$17,280*	Calc'd from NHC designs
2 Strip and transport material with scraper for interior MWT features	cubic yards	70,500	$945,983	*$378,393*	70,500	$945,983	*$586,510*	70,500	$945,983	*$586,510*	From DWR borrow balance estimate
14 Complete underwater excavation with dragline crane	cubic yards	51712	$170,319	*$68,127*	0	$0	*$0*	0	$0	*$0*	From DWR borrow balance estimate
15 RSP - import rock with barge and place	tons	2627	$126,096	*$50,438*	81600	$3,916,800	*$2,428,416*	81600	$3,916,800	*$2,428,416*	Calc'd from NHC designs
6 Placement of filter layers under all RSP	square yards	1628	$3,628	*$1,451*	50400	$112,311	*$69,633*	50400	$112,311	*$69,633*	Calc'd from NHC designs
Reinforce Dead Horse Island East Levee (3,000 LF)				*60%F / 40%R*			*60%F / 40%R*			*60%F / 40%R*	
15 RSP - import rock with barge and place	tons	34000	$1,632,000	*$652,800*	34000	$1,632,000	*$652,800*	34000	$1,632,000	*$652,800*	Calc'd from NHC designs
6 Placement of filter layers under all RSP	square yards	20667	$46,054	*$18,422*	20667	$46,054	*$18,422*	20667	$46,054	*$18,422*	Calc'd from NHC designs
Modify Downstream Levees to Accommodate Potentially Increased Flows (77,093 LF)				*60%F / 40%R*			*60%F / 40%R*			*60%F / 40%R*	
69 Import class 2 aggregate base	cubic yards	18203	$2,047,382	*$818,953*	18203	$2,047,382	*$818,953*	18203	$2,047,382	*$818,953*	Assume 3" deep and levee profile average is STA 1190+00
Construct Transmission Tower Protective Levee and Access Road (4,000 LF of new levee)				*60%F / 40%R*			*60%F / 40%R*			*60%F / 40%R*	
1 Clear and grub levee footprint with dozer	acres	11.2	$56,754	*$22,702*	11.2	$56,754	*$22,702*	11.2	$56,754	*$22,702*	Based on estimates of geometry from DWR
17 Prepare subgrade with compactor	cubic yards	27000	$11,664	*$4,666*	27000	$11,664	*$4,666*	27000	$11,664	*$4,666*	Based on estimates of geometry from DWR; assume 6" deep
68 Transport fill/place fill with dozer	cubic yards	91,424	$926,162	*$370,465*	91,424	$926,162	*$370,465*	91,424	$926,162	*$370,465*	From DWR borrow balance estimate
69 Import class 2 aggregate base	cubic yards	1185	$133,283	*$53,313*	1185	$133,283	*$53,313*	1185	$133,283	*$53,313*	Assume 12' wide and 8" deep
Demolish Farm Residence and Infrastructure				*60%F / 40%R*			*60%F / 40%R*			*60%F / 40%R*	
20 Demolition with bulldozers (houses)	each	1	$4,266	*$1,706*	1	$4,266	*$1,706*	1	$4,266	*$1,706*	Estimated from site visit
21 Demolition with bulldozers (outbuildings)	cubic feet	48000	$6,480	*$2,592*	48000	$6,480	*$2,592*	48000	$6,480	*$2,592*	Estimated from site visit
22 Demolition of foundation and footings	square feet	4000	$26,352	*$10,541*	4000	$26,352	*$10,541*	4000	$26,352	*$10,541*	Estimated from site visit
23 Haul materials away in dump trucks	tons	484	$2,556	*$1,022*	484	$2,556	*$1,022*	484	$2,556	*$1,022*	Estimated from site visit
24 Disposal	tons	415	$31,374	*$12,550*	415	$31,374	*$12,550*	415	$31,374	*$12,550*	Estimated from site visit
25 Hazardous material disposal	tons	69	$32,789	*$13,116*	69	$32,789	*$13,116*	69	$32,789	*$13,116*	Assume 80% of houses and outbuildings are hazardous material
Enhance Landside Levee Slope and Habitat (21,600 LF)				*40%F / 60%R*			*40%F / 60%R*			*40%F / 60%R*	
1 Clear and grub land surface with dozer	acres	60	$304,040	*$182,424*	60	$304,040	*$182,424*	60	$304,040	*$182,424*	Based on DWR sketch (Fig. 2-6 in EIR)
26 Strip and stockpile topsoil with scraper	cubic yards	96800	$721,354	*$432,812*	96800	$721,354	*$432,812*	96800	$721,354	*$432,812*	Assume 12" deep
68 Transport fill/place fill with dozer	cubic yards	552,500	$5,597,046	*$3,358,228*	552,500	$5,597,046	*$3,358,228*	552,500	$5,597,046	*$3,358,228*	From DWR borrow balance estimate
27 Replace topsoil with front-end loader	cubic yards	96800	$392,040	*$235,224*	96800	$392,040	*$235,224*	96800	$392,040	*$235,224*	
65 Restoration - planting of native trees, shrubs and grasses	acres	70	$1,050,000	*$630,000*	70	$1,050,000	*$630,000*	70	$1,050,000	*$630,000*	Estimate from DWR - based on PWA report
Modify Landform and Restore Agricultural Land to Habitat				*10%F / 90% R*			*10%F / 90% R*			*10%F / 90% R*	
28 Minor grading - reshape land surface with dozer	cubic yards	350	$3,328	*$2,995*	350	$3,328	*$2,995*	350	$3,328	*$2,995*	Assume 350 CY
29 Dig channels with excavator to avoid fish stranding	cubic yards	35556	$87,937	*$79,143*	0	$0	*$0*	0	$0	*$0*	Assume 2 channels, 20' wide and 3' deep (dimensions recommended by Jeff Kozlowski, fish biologist)
70 Hydroseeding -- allow for natural vegetation recruitment	acres	1473	$4,419,000	*$3,977,100*	1473	$4,419,000	*$3,977,100*	1473	$4,419,000	*$3,977,100*	Whitener
Modify Pump and Siphon Operations - decommission pumps				*60%F / 40%R*			*60%F / 40%R*			*60%F / 40%R*	
30 fill pipes with concrete or install welded caps	cubic yards	24	$3,480	*$1,392*	16	$2,320	*$928*	16	$2,320	*$928*	Assume 4 CY to fill each pipe (assume pipe is 18" in diameter and 60' long)
31 Remove pumps with crane and transport offsite with truck for salvage	each	6	$30,000	*$12,000*	4	$20,000	*$8,000*	4	$20,000	*$8,000*	As described in EIR project description
Breach Mokelumne River Levee/Starter Channel				*100%R*			*100%R*			*100%R*	
1 Clear and grub levee surface with dozer	acres	21.6	$109,454	*$109,454*	0	$0	*$0*	0	$0	*$0*	Calc'd from NHC designs
2 Strip and transport material with scraper for interior MWT features	cubic yards	44780	$600,867	*$600,867*	0	$0	*$0*	0	$0	*$0*	Cut estimate greater than on DWR borrow balance spreadsheet to account for extra materials removed in starter channel
14 Complete underwater excavation with dragline crane	cubic yards	2946	$9,703	*$9,703*	0	$0	*$0*	0	$0	*$0*	Assume "underwater" excavation occurs below 5.5' el. Estimated from NHC designs
15 RSP - import rock with barge and place	tons	1387	$66,576	*$66,576*	0	$0	*$0*	0	$0	*$0*	Calc'd from NHC designs
6 Placement of filter layers under all RSP	square yards	798	$1,778	*$1,778*	0	$0	*$0*	0	$0	*$0*	Calc'd from NHC designs
65 Restoration - planting of native trees, shrubs and grasses	acres	14	$210,000	*$210,000*	0	$0	*$0*	0	$0	*$0*	Assume benches planted

	Construct Box Culvert Drains and Self-Regulating Tide Gates				*60%F / 40%R*			*60%F / 40%R*			*60%F / 40%R*	
32	Box culvert drains	each	0	$0	*$0*	6	$100,800	*$40,320*	5	$84,000	*$33,600*	Assume 4' x 8' box culverts
33	Self-regulating tide gates	each	0	$0	*$0*	12	$462,756	*$185,102*	10	$385,630	*$154,252*	Assume 4' square SRT gates
61	Operable gate structures	each	0	$0	*$0*	0	$0	*$0*	1	$9,555	*$3,822*	May iclude a flashboard structure
15	RSP - import rock with barge and place	tons	0	$0	*$0*	797	$38,256	*$15,302*	1025	$49,200	*$19,680*	Calc'd from NHC designs
6	Placement of filter layers under all RSP	square yards	0	$0	*$0*	570	$1,270	*$508*	475	$1,058	*$423*	Calc'd from NHC designs
	Construct Cross-Levee to Create Subsidence-Reversal Demonstration Area (3,000 LF)				*100%R*			*100%R*			*100%R*	
1	Clear and grub levee footprint with dozer	acres	0	$0	*$0*	0	$0	*$0*	5.2	$26,350	*$26,350*	Calc'd from NHC designs
17	Prepare subgrade with compactor	cubic yards	0	$0	*$0*	0	$0	*$0*	17623	$7,613	*$7,613*	Calc'd from NHC designs
68	Transport fill/place fill with dozer	cubic yards	0	$0	*$0*	0	$0	*$0*	20,279	$205,434	*$205,434*	From DWR borrow balance estimate
15	RSP - import rock with barge and place	tons	0	$0	*$0*	0	$0	*$0*	31403	$1,507,344	*$1,507,344*	Calc'd from NHC designs
6	Placement of filter layers under all RSP	square yards	0	$0	*$0*	0	$0	*$0*	26169	$58,315	*$58,315*	Calc'd from NHC designs
	Import Soil for Subsidence Reversal				*100%R*			*100%R*			*100%R*	
68	Transport fill/place fill with dozer	cubic yards	0	$0	*$0*	0	$0	*$0*	160,000	$1,620,864	*$1,620,864*	From DWR borrow balance estimate
	Implement Local Marina and Recreation Outreach Program				*100%F*			*100%F*			*100%F*	Based on EIR project description
72	Implement Local Marina and Recreation Outreach Program	lump sum	1	$200,000	*$0*	1	$200,000	*$0*	1	$200,000	*$0*	
	Excavate Dixon and New Hope Borrow Sites				*50%F / 50%R*			*50%F / 50%R*			*50%F / 50%R*	
1	Clear and grub land surface with dozer	acres	0	$0	*$0*	0	$0	*$0*	0	$0	*$0*	Assume maximum Grizzly; no add'l fill needed
26	Strip and stockpile topsoil with scraper	cubic yards	0	$0	*$0*	0	$0	*$0*	0	$0	*$0*	Assume maximum Grizzly; no add'l fill needed
64	Excavate material/load material on trucks	cubic yards	0	$0	*$0*	0	$0	*$0*	0	$0	*$0*	Assume maximum Grizzly; no add'l fill needed
27	Replace topsoil with front-end loader	cubic yards	0	$0	*$0*	0	$0	*$0*	0	$0	*$0*	Assume maximum Grizzly; no add'l fill needed
	Excavate and Restore Grizzly Slough Property				*50%F / 50%R*			*50%F / 50%R*			*50%F / 50%R*	
64	Earthwork - degrade existing levee/grade & outlet for toe drain, load o	cubic yards	214000	$2,062,305	*$1,031,153*	214000	$2,062,305	*$1,031,153*	214000	$2,062,305	*$1,031,153*	From DWR borrow balance estimate
15	RSP - import rock with barge and place	tons	1387	$66,576	*$33,288*	1387	$66,576	*$33,288*	1387	$66,576	*$33,288*	Based on EIR project description; assume similar to breach on Moke River on MWT
6	Placement of filter layers under all RSP	square yards	798	$1,778	*$889*	798	$1,778	*$889*	798	$1,778	*$889*	Based on EIR project description; assume similar to breach on Moke River on MWT
1	Clear and grub land surface with dozer	acres	381	$1,930,654	*$965,327*	381	$1,930,654	*$965,327*	381	$1,930,654	*$965,327*	Based on GIS data
26	Strip and stockpile topsoil with scraper	cubic yards	614680	$4,580,595	*$2,290,298*	614680	$4,580,595	*$2,290,298*	614680	$4,580,595	*$2,290,298*	Assume 12" deep; assuming maximum Grizzly (topo-scrape)
64	Excavate borrow material/load material on trucks	cubic yards	616000	$5,936,355	*$2,968,178*	616000	$5,936,355	*$2,968,178*	616000	$5,936,355	*$2,968,178*	From DWR borrow balance estimate; assuming maximum Grizzly (topo scrape)
27	Replace topsoil with front-end loader	cubic yards	614680	$2,489,454	*$1,244,727*	614680	$2,489,454	*$1,244,727*	614680	$2,489,454	*$1,244,727*	
17	Prepare subgrade with compactor (levee to protect NH Road)	cubic yards	11722	$5,064	*$2,532*	11722	$5,064	*$2,532*	11722	$5,064	*$2,532*	Based on DWR estimate (e-mail on 9/20/06)
68	Transport fill/place fill with dozer (levee to protect NH Road)	cubic yards	23500	$238,064	*$119,032*	23500	$238,064	*$119,032*	23500	$238,064	*$119,032*	Based on DWR estimate (phone conversation 9/18/06)
61	Install one-way or manually operated gate or culvert structures in new	each	5	$47,777	*$23,888*	5	$47,777	*$23,888*	5	$47,777	*$23,888*	Assume 5 4-foot culverts are placed through levee to pass flows from south to north
66	Restoration - planting of native and nonnative vegetation	acres	381	$2,922,270	*$1,461,135*	381	$2,922,270	*$1,461,135*	381	$2,922,270	*$1,461,135*	Based on GIS data
	Dredge South Fork Mokelumne River				*50%F / 50%R*			*50%F / 50%R*			*50%F / 50%R*	
34	Hydraulic dredging	cubic yards	1,350,000	$11,475,000	*$5,737,500*	1,350,000	$11,475,000	*$5,737,500*	1,350,000	$11,475,000	*$5,737,500*	Assume hydraulic method used as unlikely to get any other method permitted. From DWR borrow balance estimate. Assuming 8,000 CY/day production rate and a dredge window of July 1 through August 31, it would take three dredging seasons to complete this with one dredge.
1	Clear and grub drying basin levee footprint with dozer	acres	10	$48,140	*$24,070*	10	$48,140	*$24,070*	10	$48,140	*$24,070*	Assume size is 400 acres and depth is 5 ft deep, and one edge of basin is existing levee. Based on assumption that permits allow decant water to be pumped back into the river and beneficial reuse of materials occurs between dredge seasons.
17	Prepare drying basin levee subgrade with compactor	cubic yards	7,653	$3,306	*$1,653*	7,653	$3,306	*$1,653*	7,653	$3,306	*$1,653*	Assume size is 400 acres and depth is 5 ft deep, and one edge of basin is existing levee. Based on assumption that permits allow decant water to be pumped back into the river and beneficial reuse of materials occurs between dredge seasons.
37	Construct drying basins with dozer (earthwork)	cubic yards	49196	$179,319	*$89,660*	49196	$179,319	*$89,660*	49196	$179,319	*$89,660*	Assume size is 400 acres and depth is 5 ft deep, and one edge of basin is existing levee. Based on assumption that permits allow decant water to be pumped back into the river and beneficial reuse of materials occurs between dredge seasons.
	Enhance Delta Meadows Property				*RECREATION*			*RECREATION*			*RECREATION*	
38	DWR assist DPR with general plan update	lump sum	1	$50,000	*$0*	1	$50,000	*$0*	1	$50,000	*$0*	Based on EIR project description
7	Upgrade boat launch (concrete)	cubic yards	18	$6,300	*$0*	18	$6,300	*$0*	18	$6,300	*$0*	Assume boat launch is 12' wide, 40' long, 12" deep.
1	Clear and grub parking area with dozer	acres	0.25	$1,267	*$0*	0.25	$1,267	*$0*	0.25	$1,267	*$0*	Assume road is 12' wide, 1,750' long and assume parking area is 65' wide and 175' long

9	Stabilization fabric (parking/road improvements)	square yards	3597	$4,196		*$0*	3597	$4,196		*$0*	3597	$4,196		*$0*	Assume road is 12' wide, 1,750' long and assume parking area is 65' wide and 175' long
10	Aggregate base course, 6" deep	square yards	3597	$25,834		*$0*	3597	$25,834		*$0*	3597	$25,834		*$0*	Assume road is 12' wide, 1,750' long and assume parking area is 65' wide and 175' long
11	Binder Course, 3" deep	square yards	3597	$22,920		*$0*	3597	$22,920		*$0*	3597	$22,920		*$0*	Assume road is 12' wide, 1,750' long and assume parking area is 65' wide and 175' long
12	Wearing Course, 3" deep	square yards	3597	$25,639		*$0*	3597	$25,639		*$0*	3597	$25,639		*$0*	Assume road is 12' wide, 1,750' long and assume parking area is 65' wide and 175' long
39	Trail construction	square feet	31680	$31,680		*$0*	31680	$31,680		*$0*	31680	$31,680		*$0*	Assume 6 ft. wide, 1 mile long
40	Installation of interpretive signage	each	2	$20,000		*$0*	2	$20,000		*$0*	2	$20,000		*$0*	Assume 2 signs installed
41	Construction of public restrooms	each	1	$35,000		*$0*	1	$35,000		*$0*	1	$35,000		*$0*	Assume one restroom structure with 2 individual bathrooms
			Alt 1A:	**$56,026,264**	**$29,907,093**		**Alt 1B:**	**$59,260,939**	**$31,658,620**		**Alt 1C:**	**$62,613,221**	**$35,055,085**		
	Group 2 Alternatives Components	**Unit**	**Alt 2-A**	**Alt 2-A Cost**	***2A Rest. Cost***		**Alt 2-B**	**Alt 2-B Cost**	***2D Rest. Cost***		**Alt 2-C**	**Alt 2-C Cost**	***2C Rest. Cost***		
	Construct Inlet Weir		*4,600 LF*		*100%F*		*3,000 LF*		*100%F*		*3,000 LF*		*100%F*		
42	Strip aggregate base patrol road	cubic yards	0	$0		*$0*	1111	$32,497		*$0*	1111	$32,497		*$0*	Assume aggregate base is 12' wide and 10" deep
2	Strip and transport levee material with scraper for interior Staten featu	cubic yards	0	$0		*$0*	44,000	$590,401		*$0*	71,444	$958,650		*$0*	From DWR borrow balance estimate
43	Remove old Walnut Grove-Thornton Road	square yards	10296	$71,166		*$0*	0	$0		*$0*	0	$0		*$0*	Based on GIS data
23	Haul materials away in dump trucks	tons	2780	$14,678		*$0*	0	$0		*$0*	0	$0		*$0*	Assume road is 1.5 ft deep, materials weigh 40 lbs/cubic foot
24	Disposal	tons	2780	$210,168		*$0*	0	$0		*$0*	0	$0		*$0*	Assume road is 1.5 ft deep, materials weigh 40 lbs/cubic foot
68	Transport fill/place fill with dozer	cubic yards	225000	$2,279,340		*$0*	0	$0		*$0*	0	$0		*$0*	From DWR borrow balance estimate
15	RSP - import rock with barge and place	tons	112520	$5,400,960		*$0*	65750	$3,156,000		*$0*	65750	$3,156,000		*$0*	Calc'd from NHC designs
6	Placement of filter layers under all RSP	square yards	75013	$167,159		*$0*	43834	$97,680		*$0*	43834	$97,680		*$0*	Calc'd from NHC designs
69	Import class 2 aggregate base	cubic yards	1135	$127,659		*$0*	741	$83,344		*$0*	741	$83,344		*$0*	Assume aggregate base is 10' wide and 8" deep as shown in other NHC designs (3,000 LF); however, NHC designs show no road or sill.
7	Pour concrete toe sill	cubic yards	852	$298,200		*$0*	556	$194,600		*$0*	556	$194,600		*$0*	Assume 1' wide and 2.5' deep as shown in other NHC designs (3,000 LF); however, NHC designs show no road or sill.
	Construct Interior Detention Levee		*16,000 LF*		*100%F*		*22,000 LF*		*100%F*		*17,000 LF*		*100%F*		
1	Clear and grub levee footprint with dozer	acres	135	$684,090		*$0*	186	$942,524		*$0*	144	$729,696		*$0*	Assume footprint is 367' wide, based on Hultgren-Tillis design in the "dam on peat" scenario
17	Prepare subgrade with compactor	cubic yards	326222	$140,928		*$0*	448556	$193,776		*$0*	346612	$149,736		*$0*	Assume footprint is 367' wide, based on Hultgren-Tillis design in the "dam on peat" scenario
68	Transport fill/place fill with dozer	cubic yards	2,300,000	$69,899,760		*$0*	3,380,000	$102,722,256		*$0*	2,440,000	$74,154,528		*$0*	From DWR borrow balance estimate; cost of standard earth placement is multiplied 3 times here as per direction of Ed Hultgren to account for extra effort associated with placement of plastic geogrid
44	Install plastic geogrids within core of levee	square feet	8640000	$3,628,800		*$0*	11880000	$4,989,600		*$0*	9180000	$3,855,600		*$0*	From Ed Hultgren: Assume placed vertically every 18", and that they are same width as crown of levee (30').
45	Bentonite slurry-wall	cubic feet	100800	$439,488		*$0*	100800	$439,488		*$0*	100800	$439,488		*$0*	Assume 35' deep (from Tillis rpt) and 3' wide
69	Import class 2 aggregate base	cubic yards	3951	$444,389		*$0*	5432	$610,964		*$0*	4198	$472,170		*$0*	Assume 10' wide and 8" thick
15	RSP - import rock with barge and place	tons	458667	$22,016,016		*$0*	630666	$30,271,968		*$0*	487333	$23,391,984		*$0*	Assume riprap on landside of levee, 2.5' deep
6	Placement of filter layers under all RSP	square yards	305777	$681,393		*$0*	420444	$936,917		*$0*	324889	$723,983		*$0*	Assume riprap on landside of levee
70	Restoration - hydroseeding for erosion control	acres	61	$183,000		*$0*	84	$252,000		*$0*	65	$195,000		*$0*	Assume hydroseeded on landside surface
	Construct Outlet Weir (3,000 LF)				*100%F*				*100%F*				*100%F*		
42	Strip aggregate base patrol road	cubic yards	1111	$32,497		*$0*	1111	$32,497		*$0*	1111	$32,497		*$0*	Assume aggregate base is 12' wide and 10" deep
2	Strip materials and transport for use in internal Staten features	cubic yards	1,956	$26,246		*$0*	1,956	$26,246		*$0*	0	$0		*$0*	From DWR borrow balance estimate
46	Construct outlet works (flashboard structure)	lump sum	1	$7,500,000		*$0*	1	$7,500,000		*$0*	1	$7,500,000		*$0*	Assume operable by hand, made with "H-piles" on 8-foot centers (375 sections).
	Install Detention Basin Drainage Pump Station				*100%F*				*100%F*				*100%F*		Assume no rock dissipation apron necessary since outlets will be integrated with outlet weir, as described in EIR project description.
29	Excavate slot channel with excavator	cubic yards	18056	$44,656		*$0*	0	$0		*$0*	13889	$34,350		*$0*	Assume channels are 20' wide and 3' deep (recommended by Jeff Kozlowski, fish biologist), length assumed through using DWR's elevation figure (Figure 1-4 in the EIR)
66	Restoration - planting of native and nonnative vegetation in slot chann	acres	3.7	$28,379		*$0*	0	$0		*$0*	3	$23,010		*$0*	Assume channels are 20' wide and 3' deep (recommended by Jeff Kozlowski, fish biologist), length assumed through using DWR's elevation figure (Figure 1-4 in the EIR)
47	Regular 42-inch diameter pumps	each	6	$2,100,000		*$0*	0	$0		*$0*	0	$0		*$0*	From EIR project description
48	Fish-friendly 42-inch diameter pump	each	1	$700,000		*$0*	0	$0		*$0*	0	$0		*$0*	From EIR project description

49	Regular 30-inch diameter pumps	each	0	$0	*$0*	8	$1,200,000	*$0*	7	$1,050,000	*$0*	From EIR project description
50	Fish-friendly 30-inch diameter pump	each	0	$0	*$0*	1	$300,000	*$0*	1	$300,000	*$0*	From EIR project description
Reinforce Existing Levees			*37,000 LF*		*100%F*	*19,000 LF*		*100%F*	*16,000 LF*		*100%F*	
15	RSP - import rock with barge and place	tons	278300	$13,358,400	*$0*	187500	$9,000,000	*$0*	129900	$6,235,200	*$0*	Assume 3.5:1 landslide slope, R/R from toe to crest, land elev assumed avg of elev range shown on DWR GIS figure
6	Placement of filter layers under all RSP	square yards	309222	$689,070	*$0*	208333	$464,249	*$0*	144333	$321,632	*$0*	Assume 3.5:1 landslide slope, R/R from toe to crest, land elev assumed avg of elev range shown on DWR GIS figure
Construct Setback Levee					*60%F / 40%R*	*8,500 LF*		*60%F / 40%R*	*12,500 LF*		*60%F / 40%R*	
1	Clear and grub levee footprint with dozer	acres	0	$0	*$0*	28.5	$144,419	*$57,768*	25	$126,683	*$50,673*	Estimated using DWR's setback levee figure (Figure 2-31 in the EIR)
17	Prepare subgrade with compactor	cubic yards	0	$0	*$0*	68945	$29,784	*$11,914*	60834	$26,280	*$10,512*	Estimated using DWR's setback levee figure (Figure 2-31 in the EIR)
68	Transport fill/place fill with dozer	cubic yards	0	$0	*$0*	1,057,037	$10,708,208	*$4,283,283*	1,057,037	$10,708,208	*$4,283,283*	From DWR's borrow balance estimate; assuming gradual fill scenario
69	Import class 2 aggregate base	cubic yards	0	$0	*$0*	2099	$236,085	*$94,434*	3086	$347,098	*$138,839*	Assume 10 feet wide, 8" deep
Degrade Existing Levee					*60%F / 40%R*			*60%F / 40%R*			*60%F / 40%R*	
1	Clear and grub levee surface with dozer	acres	19.5	$98,813	*$39,525*	25	$126,683	*$50,673*	20.5	$103,880	*$41,552*	For 2-A, assumed STA 25+00 levee profile; assume degraded to avg of 0 ft. For 2-B and 2-C, assumed general levee shape with 20 foot crown and 3.5:1 slopes on both sides, averaging 15 feet tall, degraded to el. 6 ft.
42	Strip aggregate base patrol road	cubic yards	1852	$54,171	*$21,668*	3148	$92,079	*$36,832*	3148	$92,079	*$36,832*	Assume aggregate base is 12' wide and 10" deep
2	Excavate levee materials with scraper and transport for internal use in	cubic yards	81,000	$1,086,874	*$434,750*	348,889	$4,681,462	*$1,872,585*	254,000	$3,408,223	*$1,363,289*	Assumung gradual fill scenario
70	Hydroseeding -- allow for natural vegetation recruitment	acres	17	$51,000	*$20,400*	16	$48,000	*$19,200*	14	$42,000	*$16,800*	For 2-A, assumed STA 25+00 levee profile; assume degraded to avg of 0 ft. For 2-B and 2-C, assumed general levee shape with 20 foot crown and 3.5:1 slopes on both sides, averaging 15 feet tall, degraded to el. 6 ft.
Relocate Existing Structures					*100%F*			*100%F*			*100%F*	
21	Demolition with bulldozers (grain dryer)	cubic feet	175000	$23,625	*$0*	0	$0	*$0*	0	$0	*$0*	Assume dimensions are 35' x 100' x 50'
20	Demolition with bulldozers (houses)	each	3	$12,798	*$0*	8	$34,128	*$0*	2	$8,532	*$0*	Estimated from site visit
21	Demolition with bulldozers (outbuildings)	cubic feet	80000	$10,800	*$0*	180000	$0	*$0*	48000	$6,480	*$0*	Estimated from site visit
22	Demolition of foundation and footings	square feet	8500	$55,998	*$0*	21000	$138,348	*$0*	5400	$35,575	*$0*	Estimated from site visit
23	Haul materials away in dump trucks	tons	1306	$6,896	*$0*	2591	$13,680	*$0*	665	$3,511	*$0*	Estimated from site visit
24	Disposal	tons	1112	$84,067	*$0*	2073	$156,719	*$0*	535	$40,446	*$0*	Estimated from site visit
25	Hazardous material disposal	tons	194	$92,189	*$0*	518	$246,154	*$0*	130	$61,776	*$0*	Assume 80% of house materials are hazardous
52	Build new grain dryer	each	1	$500,000	*$0*	0	$0	*$0*	0	$0	*$0*	
53	Build new homes	square feet	6000	$780,000	*$0*	16000	$2,080,000	*$0*	4000	$520,000	*$0*	Assume 2,000 SF each
54	Build new outbuildings	square feet	4000	$300,000	*$0*	9000	$675,000	*$0*	2400	$180,000	*$0*	Assume same size as demolished outbuildings
Modify Walnut Grove–Thornton Road and Staten Island Road					*60%F / 40%R*			*60%F / 40%R*			*60%F / 40%R*	
68	Construct Staten Island Road ramp (transport and place fill with dozer)	cubic yards	2912	$29,500	*$11,800*	0	$0	*$0*	0	$0	*$0*	Assume ramp is 36' wide, 12' tall where it meets the levee, and side buttresses slope away at slope of 1:3
9	Stabilization fabric	square yards	20039	$23,373	*$9,349*	0	$0	*$0*	0	$0	*$0*	Calc'd from NHC designs; assuming ramp is paved as well (20' wide)
10	Aggregate base course, 6" deep	square yards	20039	$143,920	*$57,568*	0	$0	*$0*	0	$0	*$0*	Calc'd from NHC designs; assuming ramp is paved as well (20' wide)
11	Binder Course, 3" deep	square yards	20039	$127,689	*$51,075*	0	$0	*$0*	0	$0	*$0*	Calc'd from NHC designs; assuming ramp is paved as well (20' wide)
12	Wearing Course, 3" deep	square yards	20039	$142,838	*$57,135*	0	$0	*$0*	0	$0	*$0*	Calc'd from NHC designs; assuming ramp is paved as well (20' wide)
55	Stripe road with truck	linear feet	13800	$19,580	*$7,832*	0	$0	*$0*	0	$0	*$0*	Assuming 1 median line and 1 shoulder line on each side of road
7	Pour concrete toe sill	cubic yards	426	$149,100	*$59,640*	0	$0	*$0*	0	$0	*$0*	Calc'd from NHC designs
15	RSP - import rock with barge and place	tons	1506	$72,288	*$28,915*	0	$0	*$0*	0	$0	*$0*	Assuming road ramp will need to be covered in riprap where not paved
6	Placement of filter layers under all RSP	square yards	1004	$2,237	*$895*	0	$0	*$0*	0	$0	*$0*	Assuming road ramp will need to be covered in riprap where not paved
Retrofit or Replace Millers Ferry Bridge					*100%F*			*60%F / 40%R*			*100%F*	
56	Retrofit or Replace Millers Ferry Bridge	square feet	7616	$1,891,434	*$0*	7616	$1,891,434	*$756,573*	7616	$1,891,434	*$0*	Based on EIR project description
Retrofit or Replace New Hope Bridge					*100%F*			*100%F*			*60%F / 40%R*	
56	Retrofit or Replace New Hope Bridge	square feet	13600	$3,377,560	*$0*	13600	$3,377,560	*$0*	13600	$3,377,560	*$1,351,024*	Based on EIR project description
Construct Wildlife Viewing Area					*RECREATION*			*RECREATION*			*RECREATION*	

1	Clear and grub parking/viewing area with dozer	acres	0.51	$2,584	*$0*	0.51	$2,584	*$0*	0.51	$2,584	*$0*	Assume parking area is 130' x 95', access to viewing area/trail loop is 6' x 1500', and viewing area is 30' square
28	Grade access and parking area with dozer	cubic yards	824	$7,836	*$0*	824	$7,836	*$0*	824	$7,836	*$0*	Assume 12" deep
9	Pave access and parking area - stabilization fabric	square yards	2372	$2,767	*$0*	2372	$2,767	*$0*	2372	$2,767	*$0*	Assume parking area is 130' x 95', access to viewing area/trail loop is 6' x 1500'
10	Aggregate base course, 6" deep	square yards	2372	$17,036	*$0*	2372	$17,036	*$0*	2372	$17,036	*$0*	Assume parking area is 130' x 95', access to viewing area/trail loop is 6' x 1500'
11	Binder Course, 3" deep	square yards	2372	$15,114	*$0*	2372	$15,114	*$0*	2372	$15,114	*$0*	Assume parking area is 130' x 95', access to viewing area/trail loop is 6' x 1500'
12	Wearing Course, 3" deep	square yards	2372	$16,908	*$0*	2372	$16,908	*$0*	2372	$16,908	*$0*	Assume parking area is 130' x 95', access to viewing area/trail loop is 6' x 1500'
41	Construction of public restrooms	each	1	$35,000	*$0*	1	$35,000	*$0*	1	$35,000	*$0*	Assume one restroom structure with 2 individual bathrooms
58	Construct viewing area (open blind/benches)	each	1	$30,000	*$0*	1	$30,000	*$0*	1	$30,000	*$0*	Based on EIR project description
40	Installation of interpretive signage	each	4	$40,000	*$0*	4	$40,000	*$0*	4	$40,000	*$0*	Assume 4 signs installed
	Excavate Dixon and New Hope Borrow Sites				*50%F / 50%R*			*50%F / 50%R*			*50%F / 50%R*	
1	Clear and grub land surface with dozer	acres	110	$557,407	*$278,703*	110	$557,407	*$278,703*	110	$557,407	*$278,703*	Based on DWR-Owned Borrow Sources spreadsheet
26	Strip and stockpile topsoil with scraper	cubic yards	177467	$1,322,484	*$661,242*	177467	$1,322,484	*$661,242*	177467	$1,322,484	*$661,242*	Assume 12" deep
64	Excavate material/load material on trucks	cubic yards	613,066	$5,908,080	*$2,954,040*	613,066	$5,908,080	*$2,954,040*	613,066	$5,908,080	*$2,954,040*	Based on DWR-Owned Borrow Sources spreadsheet; assume max is available
27	Replace topsoil with front-end loader	cubic yards	177467	$718,741	*$359,371*	177467	$718,741	*$359,371*	177467	$718,741	*$359,371*	
	Import offsite fill materials				*80%f / 20%R*			*80%f / 20%R*			*80%f / 20%R*	
71	Purchase, transport, place additional levee-grade fill	cubic yard	2245934	$60,640,218	*$12,128,044*	4817934	$130,084,218	*$26,016,844*	3477934	$93,904,218	*$18,780,844*	Based on DWR Borrow Balance Estimate; assuming gradual fill, maximum Grizzly and maximum NH/Dixon
			Alt 2-A:	**$209,617,368**	***$17,181,953***	**Alt 2-B:**	**$327,474,925**	***$37,453,461***	**Alt 2-C:**	**$247,689,584**	***$30,327,004***	
	Alternative 2-D	**Units**	**Alt 2-D**	**Alt 2-D Cost**	***2D Rest. Cost***							
	Dredge South Fork Mokelumne River				*100%F*							
34	Hydraulic dredging	cubic yards	2,700,000	$22,950,000	*$0*							Assume hydraulic method used as unlikely to get any other method permitted. From DWR borrow balance estimate. Assuming 8,000 CY/day production rate and a dredge window of July 1 through August 31, it would take five and a half dredging seasons to complete this with one dredge.
1	Clear and grub drying basin levee footprint with dozer	acres	10.6	$53,714	*$0*							Assume size is 500 acres and depth is 5 ft deep, and one edge of basin is existing levee. Based on assumption that permits allow decant water to be pumped back into the river and beneficial reuse of materials occurs between dredge seasons.
17	Prepare drying basin levee subgrade with compactor	cubic yards	8556	$3,696	*$0*							Assume size is 500 acres and depth is 5 ft deep, and one edge of basin is existing levee. Based on assumption that permits allow decant water to be pumped back into the river and beneficial reuse of materials occurs between dredge seasons.
37	Construct drying basins with dozer - fill	cubic yards	55000	$200,475	*$0*							Assume size is 500 acres and depth is 5 ft deep, and one edge of basin is existing levee. Based on assumption that permits allow decant water to be pumped back into the river and beneficial reuse of materials occurs between dredge seasons.
	Modify Levees to Increase Channel Capacity (94,378 LF)				*100%F*							
42	Strip aggregate base patrol road	cubic yards	34,955	$1,022,434	*$0*							Assume existing road is 12' wide, 10" deep
1	Clear and grub levee surface with dozer	acres	301	$1,525,267	*$0*							Based on Modified Levee Cross-Section Figure (Figure 2-34 in EIR); assume existing levee cross-section is similar to Staten Island STA 115+000
68	Transport fill/place fill with dozer	cubic yards	786,483	$7,967,387	*$0*							Additional fill needed; based on Modified Levee Cross-Section Figure (Figure 2-34 in EIR); assume existing levee cross-section is similar to Staten Island STA 115+000
28	Degrade waterside of existing levee and use to shape landside	cubic yards	480,629	$4,570,493	*$0*							Fill available from waterside degrade; estimated assuming profile similar to Staten STA 115+00
69	Import class 2 aggregate base	cubic yards	34,955	$3,931,564	*$0*							Assume road will be 12' wide and 8" deep
15	RSP - import rock with barge and place	tons	1002573	$48,123,504	*$0*							Waterside treated with RSP; assumed to el. 2 and 30" deep
6	Placement of filter layers under all RSP	square yards	668382	$1,489,422	*$0*							Waterside treated with RSP; assumed to el. 2

70	Restoration - hydroseeding for erosion control	acres	120	$360,000		*$0*	Based on Modified Levee Cross-Section Figure (Figure 2-34 in EIR); assume existing levee cross-section is similar to Staten Island STA 115+000
Raise Downstream Levees to Accommodate Increased Flows (148,983 LF)					*100%F*		
69	Import class 2 aggregate base	cubic yards	48282	$5,430,518		*$0*	Assume 3" deep and crown width is similar to STA 700+00 (35')
Retrofit or Replace Millers Ferry Bridge					*100%F*		
56	Retrofit or Replace Millers Ferry Bridge	square feet	7616	$1,891,434		*$0*	
Retrofit or Replace New Hope Bridge					*100%F*		
56	Retrofit or Replace New Hope Bridge	square feet	13600	$3,377,560		*$0*	
			Alt 2-D:	**$0**		***$0***	
Environmental Commitments							
59	Minimize construction-related effects on recreational boating	lump sum	1	$5,000			
Annual Flood Operations Costs							For operations costs, assume $100 per person hour and $100 per vehicle needed per day
Alternative 1-A							
	Operate manual gate along New Hope Road (Grizzly Slough)			$4,200			Assume this will need to take place three times per year (2 trips each time -- once to open and once to close) for a total of 6 trips @ 6 hours and 1 vehicle per trip ($700/trip)
			Total:	**$4,200**			
Alternative 1-B							
	Operate pumps			$1,400			Assume that this will need to take place once per year (2 trips each time -- once to start pumps and once to stop pumps) 2 trips @ 6 hours and 1 vehicle per trip ($700/trip)
	Pump monitoring and maintenance			$2,700			Assume monitoring and maintenance of pumps -- for duration of pumping @ 8 person hours and 1 vehicle per day for 3 days
	Tide gate maintenance			$2,800			Assume periodic checks and debris clearing 4 times per year @ 6 person hours and 1 vehicle per visit
	Operate manual gate along New Hope Road (Grizzly Slough)			$4,200			Assume this will need to take place three times per year (2 trips each time -- once to open and once to close) for a total of 6 trips @ 6 hours and 1 vehicle per trip ($700/trip)
			Total:	**$11,100**			
Alternative 1-C							
	Operate manual gate			$800			Assume this will need to take place once per year (2 trips -- once to open and once to close) at 3 person hours and 1 vehicle per trip.
	Operate pumps			$1,400			Assume that this will need to take place once per year (2 trips each time -- once to start pumps and once to stop pumps) 2 trips @ 6 hours and 1 vehicle per trip ($700/trip)
	Pump monitoring and maintenance			$2,700			Assume monitoring and maintenance of pumps -- for duration of pumping @ 8 person hours and 1 vehicle per day for 3 days
	Tide/manual gate maintenance			$2,800			Assume periodic checks and debris clearing 4 times per year @ 6 person hours and 1 vehicle per visit
	Operate manual gate along New Hope Road (Grizzly Slough)			$4,200			Assume this will need to take place three times per year (2 trips each time -- once to open and once to close) for a total of 6 trips @ 6 hours and 1 vehicle per trip ($700/trip)
			Total:	**$11,100**			
Alternatives 1-A, 1-B, and 1-C - Maintenance Dredging							
34	Hydraulic dredging	cubic yards	270000	**$2,295,000**			
1	Clear and grub drying basin levee footprint with dozer	acres	2	**$10,135**			
17	Prepare drying basin levee subgrade with compactor	cubic yards	1531	**$661**			
37	Construct drying basins with dozer - fill	cubic yards	9839	**$35,863**			
			Total:	**$2,341,659**			
Alternative 2-A							

	Operate spillway			$4,000	Assume this will need to take place once per flood year (2 trips -- once to open and once to close) at 18 person hours and 2 vehicles per trip.
	Operate pumps			$1,800	Assume that this will need to take place once per flood year (2 trips each time -- once to start pumps and once to stop pumps) 2 trips @ 8 hours and 1 vehicle per trip ($900/trip)
	Pump maintenance			$5,400	Assume monitoring and maintenance of pumps -- for duration of pumping @ 8 person hours and 1 vehicle per day for 6 days
			Total:	**$11,200**	
Alternative 2-B					
	Operate spillway			$4,000	Assume this will need to take place once per flood year (2 trips -- once to open and once to close) at 18 person hours and 2 vehicles per trip.
	Operate pumps			$1,800	Assume that this will need to take place once per flood year (2 trips each time -- once to start pumps and once to stop pumps) 2 trips @ 8 hours and 1 vehicle per trip ($900/trip)
	Pump maintenance			$5,400	Assume monitoring and maintenance of pumps -- for duration of pumping @ 8 person hours and 1 vehicle per day for 6 days
			Total:	**$11,200**	
Alternative 2-C					
	Operate spillway			$4,000	Assume this will need to take place once per flood year (2 trips -- once to open and once to close) at 18 person hours and 2 vehicles per trip.
	Operate pumps			$1,800	Assume that this will need to take place once per flood year (2 trips each time -- once to start pumps and once to stop pumps) 2 trips @ 8 hours and 1 vehicle per trip ($900/trip)
	Pump maintenance			$5,400	Assume monitoring and maintenance of pumps -- for duration of pumping @ 8 person hours and 1 vehicle per day for 6 days
			Total:	**$11,200**	
Alternative 2-D - Maintenance Dredging					
34	Hydraulic dredging	cubic yards	540000	$4,590,000	
1	Clear and grub drying basin levee footprint with dozer	acres	2.12	$10,743	
17	Prepare drying basin levee subgrade with compactor	cubic yards	1711	$739	
37	Construct drying basins with dozer - fill	cubic yards	11000	$40,095	
			Total:	**$4,641,577**	

North Delta Preliminary Construction Cost Estimate - Unit costs

These are estimates only. They reflect 2006 dollars and any costs provided by contractors are not guarantees of price.

	Unit	Cost per Unit	Cost per Unit (Means 2004)	Means Code	Means w/ 8% inflation	Cost per Unit (Sweets 2006)	Sweets Code	Yubacon (Ueda)	Biondi (Ueda)	Martin Bros (Ueda)	Other Source (a)	Other Source (b)	Assumptions/Rationale
1 Clear and grub levee surface with dozer	acres	**$5,067**	$4,900	02230-100-0160	$5,292	$4,910	02-11010-1000				$5,000		"light density wooded area assumed" (Sweets) and "brush including stumps" (Means); other source: Yuba River Levee (HDR) actual bids
2 Strip and transport material with scraper	cubic yards	**$13**	$6	02315-452-0400	$7						$20		scraper, common earth, 5,000 ft haul x 1.5 for H2O & compactor (Means); other source: Yuba River Levee (HDR) actual bids
4 RSP - placement of rock with excavator	tons		$60	02370-450-0200	$64	$46	02-27040-0150						Riprap placement (750 lb. stone) (Sweets); machine placed for slope protection (Means)
5 RSP - 24-inch angular rock	tons	**$21**	$12	02370-450-0200	$13	$29	02-27040-0150						750 lb stone (Sweets); 18-inch minimum thickness (Means)
6 Placement of filter layers under all RSP	square yards	**$2**	$1	02370-700-0020	$1	$3	02-24030-1200						jute mesh (Means - includes labor); woven filter cloth (Sweets - includes labor, converted from square foot *9)
7 Pour concrete toe sill	cubic yards	**$350**									$350		Other source: Steve Seville, P.E.
9 Pave road - stabilization fabric	square yards	**$1**	$1	02720-200-6000	$1								Stabilization fabrid, polypropylene, 6 oz/SY (Means)
10 Pave road - aggregate base course, 6" deep	square yards	**$7**	$7	02720-200-0100	$7								Aggregate base course for roadways and large paved areas, crushed 3/4" stone, compacted (Means);
11 Pave road - binder Course, 3" deep	square yards	**$6**	$6	02740-310-0160	$6								Means
12 Pave road - wearing course, 3" deep	square yards	**$7**	$7	02740-310-0046	$7								Means
13 Pour concrete pavement-containing edge (curb)	linear feet		$7	02700-300-0300	$8								6" x 18" conc, wood forms (Means)
14 Complete underwater excavation with dragline crane	cubic yards	**$3**	$3	02315-442-0310	$3	$3	02-21030-1600						dragline crane, 3 cy bucket, light clay (Means); dragline crane, 3 cy bucket, light clay (Sweets)
15 RSP - import rock with barge and place	tons	**$48**									$48		a) Jerry Neal, Chief Estimator, Dutra Group
	tons												
17 Prepare subgrade with compactor	cubic yards	**$0.43**	$0	02300-310-5020	$0								riding, vibrating roller, sheepsfoot or wobbly wheel, 6" lifts, 3 passes (Means)
18 Transport fill	cubic yards		$7	02315-490-1250	$8								20 CY dump truck, 10 mile round trip (Means); Sweets presents dump trucks each
19 Place fill with dozer	cubic yards		$2	02315-520-0020	$2								spread dumped material, no compaction, by dozer, x 1.5 for H2O & compactor (Means)
20 Demolition with bulldozers (houses)	each	**$4,266**	$3,950	02220-110-1200	$4,266								including 20 mile haul, no foundation or dump fees, 2-story house, wood, max (Means)
21 Demolition with bulldozers (outbuildings)	cubic feet	**$0.14**	$0	02220-110-0012	$0								including 20 mile haul, no foundation or dump fees, CF is volume of building standing, steel, no interior walls (Means) (halved because not large urban project)
22 Demolition of foundation and footings	square feet	**$7**	$6	02220-130-0440	$7								Floors, concrete, slab on grade, 6" thick, rods (Means)
23 Haul materials away in dump trucks	tons	**$5**	$5	02110-300-1270	$5								Truckload maximum / 18 (Means)
24 Disposal	tons	**$76**	$70	02220-330-0100	$76								Including 20 mile haul; Dump charges, building construction materials (Means)
25 Hazardous material disposal	tons	**$475**	$440	02110-300-6020	$475								Dumpite disposal charge, maximum (Means)
26 Strip and stockpile topsoil with scraper	cubic yards	**$7**	$7	02230-500-1460	$7								Loam or topsoil, remove and sotckpile on site, 6" deep, 500' haul (Means x 6 to get CY)
27 Replace topsoil with front-end loader	cubic yards	**$4**	$4	02315-210-4080	$4								Borrow, loading, and/or spreading, topsoil or loam from stockpile, front-end loader, 5 CY bucket minus materials cost (Means x 1.5 for H2O and compaction)
28 Minor grading - reshape land surface with dozer	cubic yards	**$10**	$2	02315-432-2040	$2								combination of cut/fill, multiplied by 1.5 for H20 and compaction
29 Dig channels with excavator	cubic yards	**$2**	$2	02315-424-0300	$2								Backhoe, hydraulic, crawler-mounted, 3 CY cap (Means)
30 fill pipes with concrete or install welded caps	cubic yards	**$145**				$140	03-38035-7100				$150		Placing concrete, footing concrete, by pump; Other Source: Steve Seville, P.E.
31 Remove pumps with crane and transport offsite with truck for salvage	each	**$5,000**									$5,000		Other Source: Assumption made at meeting between DWR and J&S
32 Box culvert drains	each	**$16,800**									$16,800		Assume 4' x 8' box culverts; $400/LF, FOB; multiplied by 1.75 for compactor, crane, labor, backfill or compaction; source: Steve Seville, PE
33 Self-regulating tide gates	each	**$38,563**									$38,563		Assume 4' SRT gates -- that is the estimate Waterman USA provided
	each												
34 Hydraulic dredging	cubic yards	**$9**									$9		a) Based on actual costs of hydraulic dredging at Port of Stockton
35 Clamshell dredging	cubic yards	**$6**									$6		a) Steve Mello -- based on costs for dredging around Tyler Island in 2000; included sediment testing; includes inflation
36 Dragline dredging	cubic yards												
37 Construct drying basins with dozer (earthwork)	cubic yards	**$4**	$3	02315-432-2020	$4								Excavating, bulk dozer, 50HP, 50' haul, common earth (Means x 1.5 for H20 and compaction)
38 DWR assist DPR with general plan update	lump sum	**$50,000**									$50,000		Other Source: Assumption made at meeting between DWR and J&S
39 Trail construction	square feet	**$1**									$1		decomposed granite with steel edging; Source: Chris Elliott, Licensed Landscape Architect
40 Installation of interpretive signage	each	**$10,000**									$10,000		a) Chris Elliott, Licensed Landscape Architect. Includes design, production and installation.
41 Construction of public restrooms	each	**$35,000**									$35,000		a) Chris Elliott, Licensed Landscape Architect
42 Strip aggregate base patrol road	cubic yards	**$29**						$14	$30	$44			
43 Remove old Walnut Grove-Thornton Road	square yards	**$7**	$6	02220-250-5050	$7								demolish, remove pavement, bituminous roads, 4-6" thick (Means)
44 Install plastic geogrids within core of levee	square feet	**$0.42**									$0.42		Reed & Graham, Inc. Geosynthetics -- Comtrac. Design strength of at least 5,000 lbs/foot (R&G recommends a high-strength fabric instead of a geogrid.
45 Bentonite slurry-wall	cubic feet	**$4**									$4		other source: Yuba River Levee (HDR) actual bids
46 Construct outlet works (flashboard structure)	lump sum	**$7,500,000**									$7,500,000		Source: Steve Seville ($20,000 per 8 ft section)
47 Regular 42-inch diameter pumps	each	**$350,000**									$350,000		Cast-iron, stainless steel impeller, diesel drive, mounted on baseplate, with fish screen; source: WEMCO
48 Fish-friendly 42-inch diameter pump	each	**$700,000**									$700,000		Hidrostal fish-friendly pump, cast-iron, stainless steel impeller, diesel drive, mounted on baseplate; source: WEMCO
49 Regular 30-inch diameter pumps	each	**$150,000**									$150,000		Cast-iron, stainless steel impeller, diesel drive, mounted on baseplate, with fish screen; source: WEMCO
50 Fish-friendly 30-inch diameter pump	each	**$300,000**									$300,000		Hidrostal fish-friendly pump, cast-iron, stainless steel impeller, diesel drive, mounted on baseplate; source: WEMCO
52 Build new grain dryer	each	**$500,000**									$500,000		a) Estimate by Riverside Grain Elevator, based on capacity information from Keith Whitener -- 50-60 tons/hour in the dryer and 11,000 tons total storage capacity in the silo space.
53 Build new homes	square feet	**$130**									$130		a) Steve Seville, P.E.
54 Build new outbuildings	square feet	**$75**									$75		a) Steve Seville, P.E.
55 Stripe road with truck	linear feet	**$1**	$0	02760-300-0020	$0	$1	02-28010-01	$1	$1	$1	$5		Acrylic waterborne paint, white or yellow, 4" wide (Means); Reflective paint, 4" wide (Sweets); Ueda: painted pavement markings; Other source: Yuba River Levee (HDR) actual bids
56 Retrofit or Replace Bridges	square feet	**$248**									$248		Based on Chris Kimball's bridge construction info and cost of replacing the Franklin Boulevard bridge.
58 Construct viewing area (open blind/benches)	each	**$30,000**									$30,000		a) Chris Elliott, Licensed Landscape Architect
59 Minimize construction-related effects on recreational boating	lump sum	**$5,000**									$5,000		a) Chris Elliott, Licensed Landscape Architect
61 Install one-way or manually operated gate or culvert structures in new levee	each	**$9,555**									$9,555		48" C-20 canal gate from Waterman
62 Excavate material	cubic yards		$4	02315-432-2040	$4								bulk dozer, 50' haul, clay (Means)
63 Load fill on trucks	cubic yards		$4	02315-424-0360	$4								backhoe, hydraulic, wheel-mounted, 3/4 CY cap x 1.15 for loading (Means)
64 Excavate material/load material on trucks	cubic yards	**$10**	$8	02315-432-2040	$8						$11		other source: Yuba River Levee (HDR) actual bids
65 Restoration - planting of native trees, shrubs and grasses	acres	**$15,000**									$15,000		a) Chris Elliott, Licensed Landscape Architect

66	Restoration - planting of native and nonnative vegetation	acres	**$7,670**							$4,670	a) River Partners for Bear River Setback Levee (does not include hydroseeding); Total cost includes hydroseeding cost (item 70) below
68	Transport fill/place fill with dozer	cubic yards	**$10**	$9	02315-490-1250	$10				$11	Other source: Yuba River Levee (HDR) actual bids
69	Import class 2 aggregate base	cubic yards	**$112**				$157	$100	$120	$73	Ueda: "Class 2 aggregate base"; Other source: Yuba River Levee (HDR) actual bid
70	Restoration - hydroseeding for erosion control	acres	**$3,000**							$3,000	a) Yuba River Levee (HDR) actual bids
71	Purchase, transport, place levee-grade fill	cubic yard	**$27**							$27	Other Source: ASTA Construction (could vary 10-20% up or down)
72	Implement Local Marina and Recreation Outreach Program	lump sum	**$200,000**							$200,000	a) Chris Elliott, Licensed Landscape Architect. Includes development of marina operator and agency contacts database, research and development of printed outreach materials, website development, facility inspection and reporting, development of recommendations and guidelines.