

Example 2 - Summary

Extensive Habitat Restoration

Emphasis

Increase fish populations through natural production, and reduce entrainment to such an extent that fish take at diversions no longer has a significant effect on fish populations. Improve water supply reliability by reducing the frequency and duration of Endangered Species Act (ESA) constraints on water diversions.

Distinguishing Features

This alternative provides medium to high levels of resource improvement and conflict resolution.

Physical/Structural	Operational/Management	Institutional/Policy
<ul style="list-style-type: none"> • Extensive habitat restoration and creation supports vigorous fish populations • Screens on all diversions having moderate or higher fish loss and salmon bypass at Old River lower fish mortality • South Delta island(s) converted to water storage facilities to reduce fish entrainment losses • High level of levee improvements incorporating habitat restoration reduces system vulnerability 	<ul style="list-style-type: none"> • Real-time monitoring and modified diversion operations reduce fish loss • About 100,000 AF of San Joaquin River water purchased to improve fish transport through the Delta • Pollutant source controls improve water quality 	<ul style="list-style-type: none"> • Funded levee improvements, emergency management plan, and long-term subsidence program permanently reduce system vulnerability • Increased fish populations permit substantial reduction of ESA constraints on diversions

Benefits

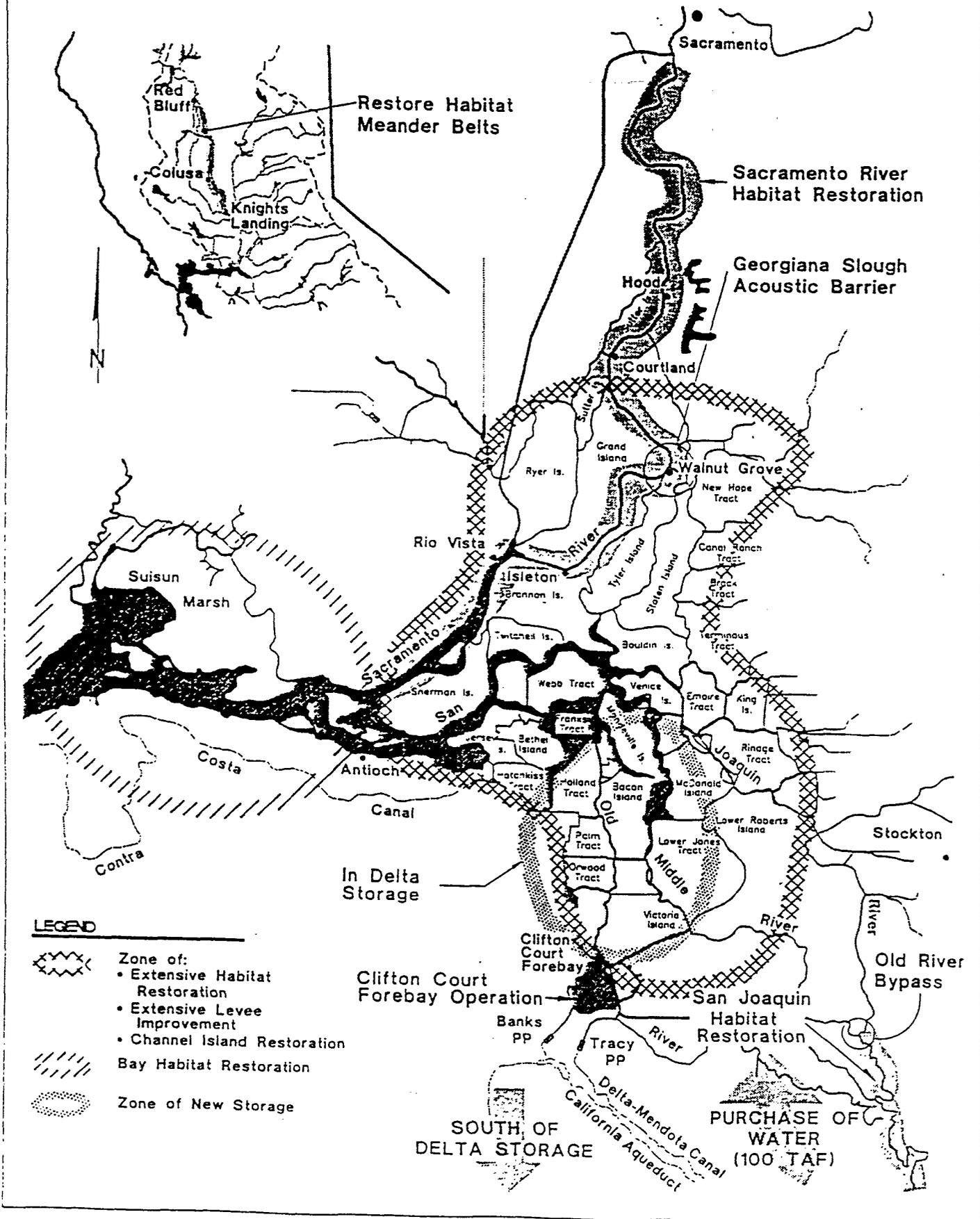
- Substantially improves and enhances habitat to support sustainability of high-interest fish species
- Improves water supply reliability by substantially reducing ESA constraints on diversions
- Substantially reduces vulnerability of Delta functions to catastrophic loss
- Moderately improves Delta water quality

Constraints and Concerns

- Uncertain of the degree to which habitat improvements will reduce diversion constraints
- Uncertain of the length of time required to achieve intended improvements in fish population and water supply reliability

Extensive Habitat Restoration

Example 2



SOUTH OF DELTA STORAGE

PURCHASE OF WATER (100 TAF)

Example 2 - Description

Extensive Habitat Restoration

Overview

Increase fish populations and reduce entrainment to such an extent that fish "take" at diversions no longer has a significant effect on fish populations. Implement extensive habitat restoration and install fish screens to increase and protect fish populations. Substantially increased fish populations can be expected to reduce the frequency and duration of Endangered Species Act (ESA) constraints on water diversions. Purchase San Joaquin basin water and develop new in-Delta island water storage to improve fish transport through the Delta. Develop habitat in concert with levee improvements to reduce vulnerability. Water quality will be improved by increasing pollutant source control.

Currently, limitations on fish entrainment (take limits) are set to avoid jeopardizing fish populations. When these limits are approached, diversions are curtailed or stopped, creating a high degree of uncertainty for water users. Fish populations are affected by many factors including diversion effects, flow, and other habitat conditions. As habitat is improved, leading to greater fish populations, diversion effects should be reduced. This allows take limits to be less constraining. The emphasis of this alternative is to increase fish populations by making habitat improvements throughout the Bay-Delta system.

Restoration of upstream habitats in the Sacramento and San Joaquin river systems will improve spawning and survival success of anadromous fish. Meander belts will be constructed and channel features will be restored to provide habitat.

In the Delta, restoration of shallow riverine and riparian habitat will provide spawning areas for native fish and increase forage areas and escape cover for juvenile salmon, Delta smelt, splittail, and other species. New habitat will be constructed along Delta channels, and levee improvements will incorporate habitat features. Substantial areas of shallow tidal habitat will be developed in the Suisun Bay for wet-year spawning and rearing of Delta smelt and the migratory needs of salmon. Fish screens and barriers will be installed to reduce entrainment and to keep out migrants in the main river channel.

A new water storage facility will be constructed in the south Delta. This facility will be filled through screened diversions when water is available and when fish entrainment effects can be avoided using real-time monitoring. Water will be released to improve fish transport conditions in the Delta. Water could also be released to allow water users to shift the timing of diversions to avoid entrainment.

Water will be purchased from willing San Joaquin basin water users and released to transport fish through the Delta and improve water quality in the San Joaquin River and south Delta.

A high level of levee improvements, an emergency management plan, and a long-term subsidence program permanently reduce system vulnerability. Water quality will be improved by controlling pollutant sources discharging into the Bay-Delta system.

By linking habitat restoration with levee improvement, system vulnerability is reduced as fish populations are increased. Increased fish populations improve water supply reliability, predictability, and flexibility.

Physical and Structural Features

Habitat Restoration

Activities	Benefits
<ul style="list-style-type: none"> Restore riparian, shaded riverine, and shallow water habitat along Delta river channels 	<ul style="list-style-type: none"> Provides substantial improvement in aquatic habitat
<ul style="list-style-type: none"> Restore Sacramento River habitat and natural channel functions 	<ul style="list-style-type: none"> Increases survival and spawning success of anadromous fish
<ul style="list-style-type: none"> Restore Delta and floodway corridor shallow water, riparian, terrestrial, and tidal wetland habitat Restore approximately 75 to 125 miles of shallow water, riverine, and riparian habitat along Delta levees 	<ul style="list-style-type: none"> Provides spawning areas for Delta native fish as well as forage areas, and escape cover for juvenile salmon, Delta smelt, splittail, and other species
<ul style="list-style-type: none"> Restore and protect channel islands from erosion and enhance habitat 	<ul style="list-style-type: none"> Provides habitat for aquatic and terrestrial plant and animal species
<ul style="list-style-type: none"> Restore about 4,000 to 6,000 acres of tidal wetlands in Suisun Bay 	<ul style="list-style-type: none"> Provides wet-year spawning habitat for Delta smelt, rearing areas for salmon, and wildlife habitat (e.g. canvasback and redhead ducks)
<ul style="list-style-type: none"> Restore riverine channel features in the San Joaquin River to lower water temperatures and reduce predation 	<ul style="list-style-type: none"> Improves fish survival
Considerations	
<ul style="list-style-type: none"> Sacramento River – Create meander belts where feasible (e.g., Red Bluff to Colusa) and riparian sections in other areas (e.g., Colusa to Knights Landing). Delta – Candidate areas for shallow water habitat restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. Candidates for Delta levee habitat restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River. Floodway Corridors –Habitat restoration must not impair capacity of floodways. Suisun Bay – Convert diked wetlands or create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait. San Joaquin River – Confine wide shallow channels and isolate quarry areas. 	

Water Storage

Activities	Benefits
<ul style="list-style-type: none"> • Convert one or more Delta islands to a water storage facility with approximately 300,000 to 400,000 AF capacity • Construct screened diversions to divert flows into storage 	<ul style="list-style-type: none"> • Provides additional diversion flexibility • Improves fish transport through the Delta • Could significantly improve response time (compared to Folsom or Shasta Reservoirs) for releasing water for improved management of X2 • Reduces entrainment of fish • Reduces frequency and duration of export curtailments
Considerations	
<ul style="list-style-type: none"> • Locate new Delta storage reservoir near export pumps on one or more islands such as Bacon, Mandeville, or Victoria. • Divert water during November, December, and January; release water from March to July as needed. With real-time monitoring, release water to move fish or release for diversion. • Creation of wide riparian and shallow water habitat corridor around perimeter of Delta island storage would provide additional benefits. 	

Fish Protection and Transport

Activities	Benefits
<ul style="list-style-type: none"> • Construct a San Joaquin River bypass at the head of Old River 	<ul style="list-style-type: none"> • Encourages out-migrating fish to stay in the San Joaquin River • Allows for managing flows down Old River
<ul style="list-style-type: none"> • Install fish screens on moderate and high priority diversions in the Delta, rivers, and tributaries 	<ul style="list-style-type: none"> • Reduces entrainment of fish
<ul style="list-style-type: none"> • Construct new screened State Water Project intake at Italian Slough 	<ul style="list-style-type: none"> • Avoids fish predation and entrainment in Clifton Court Forebay when diversion rates are low
<ul style="list-style-type: none"> • Improve drainage in floodway corridors 	<ul style="list-style-type: none"> • Reduces fish stranding
Considerations	
<ul style="list-style-type: none"> • Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility. 	

Flood Protection and Levee Stabilization

Activities	Benefits
<ul style="list-style-type: none"> • Provide a high level of protection and stabilization of Delta levees as described below in "Considerations" 	<ul style="list-style-type: none"> • Reduces vulnerability of Delta land use and infrastructure • Reduces vulnerability of urban and agricultural export water supply • Reduces vulnerability of Delta ecosystem function
<ul style="list-style-type: none"> • Construct setback levees and stabilizing berms 	<ul style="list-style-type: none"> • Reduces vulnerability of levees to failure • Improves flood conveyance • Provides opportunities for habitat restoration
Considerations	
<ul style="list-style-type: none"> • Upgrade all Delta levees to meet at least the hazard mitigation plan standards. • Provide seismic protection equivalent to 1 in 100 year earthquake standard to critical western Delta islands (such as Sherman Island and Jersey Island), islands with important regional infrastructure (such as Mokelumne Aqueduct, transmission lines, Highway 160, etc.), and levees surrounding islands used for storage. • Provide flood protection equivalent to Army Corps of Engineers PL 99 standard to islands with important local infrastructure (such as, New Hope Tract, Bouldin Island, Palm Tract, Lower and Upper Jones Tracts, Lower Roberts Island) and islands with valuable habitat (such as, Canal Ranch, Brack Tract, Staten Island, Venice Island, Rindge Tract, Big Mandeville Island, Webb Tract, Twitchell Island, and Bradford Island). • Integrate protection and stabilization of levees with Delta habitat restoration activities. • Provide stable funding mechanism for ongoing levee and habitat maintenance. 	

Operational and Management Features

Water Diversion Management

Activities	Benefits
<ul style="list-style-type: none"> • Acquire about 100,000 AF of water from willing sellers in the San Joaquin basin • Use water for pulse flows to transport fish or for diluting poor quality flows • Combine with new south Delta storage to improve timing of diversions 	<ul style="list-style-type: none"> • Transports fish through the San Joaquin River and Delta • Improves water quality • Improves management flexibility for diversions to reduce fish loss
<ul style="list-style-type: none"> • Improve real-time monitoring of locations of special-concern fish species and modify water diversions to avoid entrainment 	<ul style="list-style-type: none"> • Provides an additional tool to help reduce entrainment of special-concern species • Improves flexibility to divert water during critical fish migration periods

Activities	Benefits
<ul style="list-style-type: none"> Evaluate, improve, and install behavioral barriers for anadromous fish 	<ul style="list-style-type: none"> Diverts anadromous fish from areas of potential entrainment and predation Allows for continued water diversions at current locations
Considerations	
<ul style="list-style-type: none"> Evaluate continued use of an acoustic barrier at the mouth of Georgiana Slough. Evaluate barriers for Delta Cross Channel and Threemile Slough. 	

Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> Mark salmon produced in hatcheries 	<ul style="list-style-type: none"> Facilitates selective catch of hatchery salmon by commercial and recreational fisheries
<ul style="list-style-type: none"> Conduct net-pen rearing of striped bass to supplant natural production 	<ul style="list-style-type: none"> Maintains recreational fishery Reduces operational constraints on water diversions
Considerations	
<ul style="list-style-type: none"> How to maintain recreational fisheries as well as enhance native salmon stocks. 	

Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> Implement source control regulations for agricultural drainage 	<ul style="list-style-type: none"> Improves Delta water quality
<ul style="list-style-type: none"> Implement source control regulations for urban and industrial runoff 	<ul style="list-style-type: none"> Improves Delta water quality
<ul style="list-style-type: none"> Retain some San Joaquin Valley drainage and time discharges for maximum dilution during high river flows 	<ul style="list-style-type: none"> Improves Delta water quality
<ul style="list-style-type: none"> Implement land retirement actions for marginally productive agricultural lands with drainage problems 	<ul style="list-style-type: none"> Improves Delta water quality
<ul style="list-style-type: none"> Remediate discharges from abandoned mines in the Sacramento Valley downstream of Shasta Dam 	<ul style="list-style-type: none"> Improves Delta water quality
Considerations	
<ul style="list-style-type: none"> Determine extent and cost-effectiveness of water quality management actions. Regulation of agricultural drainage may require new temporary storage ponds. 	

Institutional and Policy Features

Habitat Programs

Activities	Benefits
<ul style="list-style-type: none"> Integrate recommended habitat restoration actions from other programs, including CVPIA and the Anadromous Fish Restoration Program 	<ul style="list-style-type: none"> Provides additional habitat restoration
<ul style="list-style-type: none"> Establish programs to preserve agricultural land uses that provide valuable habitat functions 	<ul style="list-style-type: none"> Protects existing habitats
<ul style="list-style-type: none"> Establish a coordinated CALFED regulatory team to expedite habitat restoration permits 	<ul style="list-style-type: none"> Accelerates acquiring permits for environmental restoration projects and other CALFED projects
<ul style="list-style-type: none"> Establish and fund program and rapid response team to manage introduced species 	<ul style="list-style-type: none"> Protects existing valuable species and habitat
<ul style="list-style-type: none"> Establish a program to identify and use clean dredge materials from the Delta for habitat restoration and levee maintenance in the Delta 	<ul style="list-style-type: none"> Provides materials for habitat and levee improvements
<ul style="list-style-type: none"> Encourage farmers and levee maintenance districts to leave habitat areas undisturbed through variances from regulations 	<ul style="list-style-type: none"> Protects existing habitats Increases flexibility in maintenance programs
Considerations	
<ul style="list-style-type: none"> Coordinate activities among these programs to avoid duplication. 	

Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> Establish and fund an emergency levee management plan to respond to levee failures 	<ul style="list-style-type: none"> Provides resources to protect Delta functions
<ul style="list-style-type: none"> Implement a subsidence management program to reverse decline in levels of Delta islands 	<ul style="list-style-type: none"> Provides a long-term increase in stability of Delta levees and reliability of Delta functions Provides wetlands that benefit wildlife
Considerations	
<ul style="list-style-type: none"> Determine extent and cost effectiveness of levee management programs. Successful program for reversal of subsidence would include converting agricultural use of appropriate deep Delta islands to wetlands. Management of less deeply subsided areas could include rotation of seasonal wetland with wildlife-friendly agricultural practices. 	

Water Quality Standards

Activities	Benefits
<ul style="list-style-type: none">• Maintain current standards for Delta water quality and position of X2	<ul style="list-style-type: none">• Maintains Delta water quality
<ul style="list-style-type: none">• Reevaluate Delta export/inflow ratios during triennial review as habitat effectiveness is realized	<ul style="list-style-type: none">• Facilitates higher level of water transfer based on actual fish population improvements
Considerations	
<ul style="list-style-type: none">• Continues X2 standards from 1995 Water Quality Control Plan.• Monitor to verify effectiveness of habitat and entrainment reduction programs. Develop an adaptive management program to modify habitat restoration and export inflow ratios in response to improved sustainability of important species.	

Preliminary Assessment

Benefits

Ecosystem Quality — This alternative substantially improves and enhances habitat to support sustainability of important species. Fish populations will substantially increase by restoration and improvement of critical habitat, by installation of fish screens and barriers, and by utilizing new storage and purchased flows to improve fish conveyance through the Delta

Water Supply — This alternative improves water supply reliability by substantially reducing ESA constraints on diversions. Increased fish populations, use of new Delta storage, and increased flexibility of environmental water management options reduce the likelihood of regulatory interventions in export operations.

Water Quality — Through source control regulations and discharge management, this alternative moderately improves Delta water quality.

System Vulnerability — This alternative substantially reduces vulnerability of Delta functions to catastrophic and long-term loss. Critical western islands, important regional infrastructure, and valuable habitat all receive increased protection. Export water supplies are less vulnerable to salinity intrusion in the event of failure of a Delta island.

Constraints and Concerns.

Uncertain of the degree to which habitat improvements will reduce diversion constraints.

Uncertain how much time will be required to achieve great enough fish populations to improve water supply reliability.

Complete restoration of important fish populations may not be achievable without reducing use of the Delta as a water supply conduit and greatly reducing exports from the south Delta.

Fish mortality in the Delta remains significant.