

## **Alternative 3**

# **Yolo Bypass Conveyance Facility**

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#### **Emphasis**

This alternative emphasizes relocating export diversion facility above critical Delta smelt habitat through development of isolated conveyance facilities with numerous environmental, water quality, and levee measures.

#### **Distinguishing Features**

##### Physical and Structural Features

A new diversion point (approximately 10,000 cfs) on the west side of the Sacramento River above Sacramento near the Sacramento Weir. The diversion would be connected to the export pumps using an isolated transfer facility that may use existing infrastructure such as the Sacramento Ship Channel or the Yolo Bypass. A new storage facility in the north Delta is connected to the isolated system. Convert one or more southern Delta islands to storage facilities. A moderate level of physical and environmental improvements are included in and above the Delta, including habitat restoration, new screens and facility to prevent salmon from entering Old River. Also included are moderate levels of water reclamation and levee improvements.

##### Operational and Management Features

Diversions, at the Sacramento River intake, take place year round except when closures are needed to protect fish. Storage in the north Delta allows occasional closure of the Sacramento River intake without the need to curtail export pumping. Release water from the new southern Delta storage facility as needed to insulate Delta fish from impacts of export pumps or to increase Delta outflow. Purchase approximately 100 TAF from the San Joaquin River or tributaries for environmental water supply purposes. Modify Clifton Court Forebay operations in real time to reduce entrainment. Operate the system using real-time management to minimize diversion impacts.

##### Institutional and Policy Features

Subsidence management program on Delta islands. A variety of other programmatic elements, including hatchery operations, management of water quality, dredging policy, and land use programs. No major institutional elements identified. However, water facilities and real time management components have major institutional implications.

#### **Benefits**

- Improves physical habitat
- Improves San Joaquin River instream flows
- Reduces fish mortality caused by diversions
- Reduces pollutant mass loading and improves timing of discharges
- Improves export water quality
- Improves flexibility of diversion timing
- Increase dry year reliability of system
- Increase opportunities for market transfers, particularly north-south transfers
- Improves Sacramento Valley and export supply reliability
- Reduces vulnerability of export supplies
- Reduces Delta island vulnerability
- Increase reliability of water supply by reducing smelt entrainment

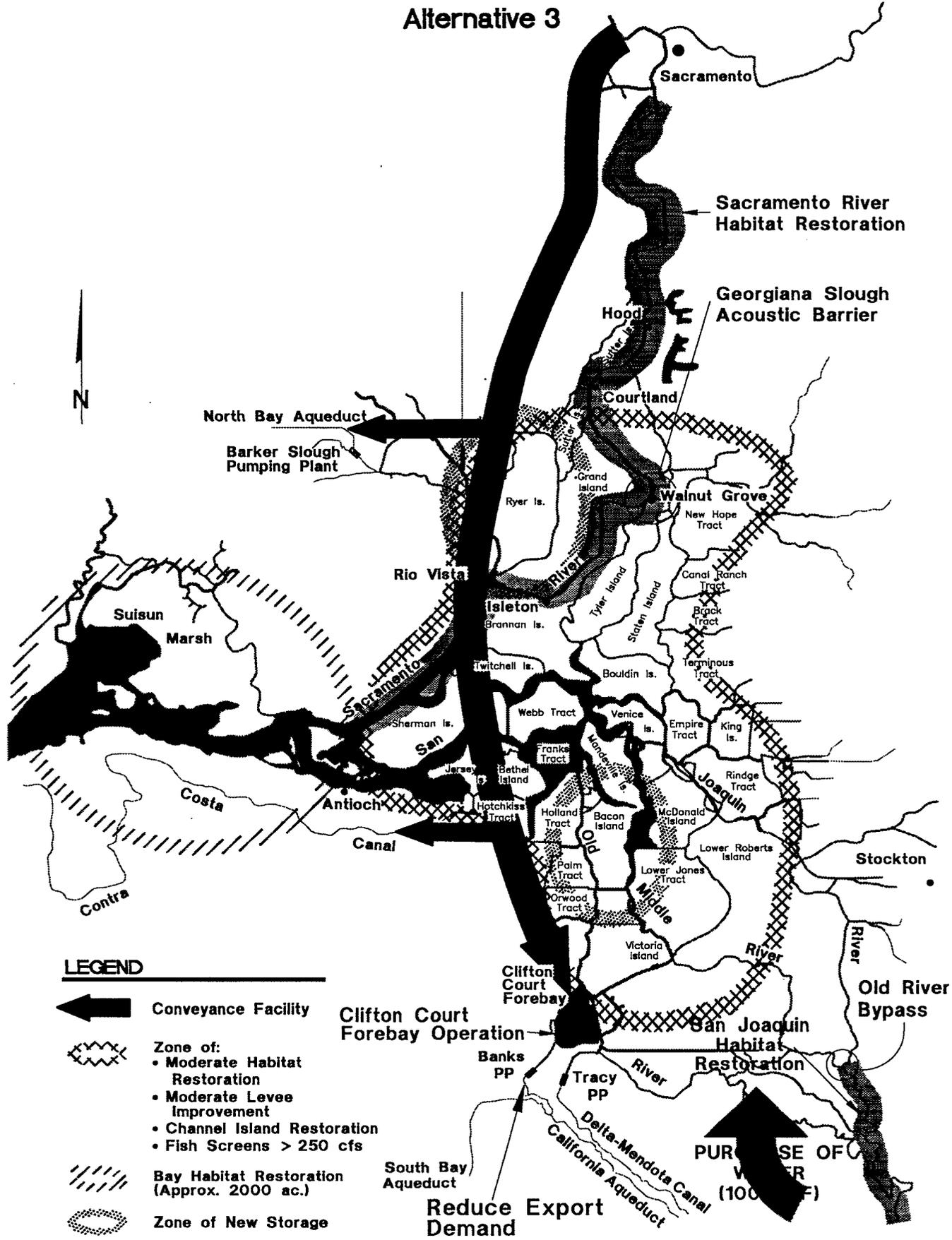
#### **Constraints and Concerns**

- Mortality in south Delta export facilities not eliminated
- Possible reductions in south Delta water quality
- Possible new entrainment of salmon smolts into the Sacramento diversion intake

# Sacramento Ship Channel Conveyance

PRELIMINARY DRAFT

## Alternative 3



**LEGEND**

-  Conveyance Facility
-  Zone of:
  - Moderate Habitat Restoration
  - Moderate Levee Improvement
  - Channel Island Restoration
  - Fish Screens > 250 cfs
-  Bay Habitat Restoration (Approx. 2000 ac.)
-  Zone of New Storage

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### **Yolo Bypass Channel Conveyance Facility**

This alternative focuses on increasing populations of anadromous and Bay-Delta native fish to eliminate to the maximum extent possible export curtailments due to "take" caused by the export pumps and non-project associated losses. To avoid entrainment of Delta Smelt a portion of the export diversions is moved from the south-Delta to a location upstream on the Sacramento River. Fish populations will be increased through habitat improvement and creation, environmental water purchases and exchanges, in Delta storage, diversion operational changes, and decreased entrainment. Habitat will be created in the river systems upstream from the Delta, in Delta and in areas west of the Delta. Water purchases will be made for environmental purposes. This water would be used in concert with an in-Delta storage facility. Operations at Clifton Court forebay would be adjusted to reduce fish attraction into the forebay.

Riverine, riparian, wetland, and adjacent terrestrial habitat will be restored and enhanced on the Sacramento and San Joaquin Rivers at the most feasible and productive sites. In-Delta levee water side and land side modifications to provide shallow water habitat and riparian habitat will be made at the most productive sites. Dredge material will be used to recreate new shallow water and Delta island habitat. Some long term conversion of land use of islands to wetland habitats will be implemented. About 100,000 acre feet would be purchased from the San Joaquin River System to be used by the fisheries agencies to flush fish at critical times or to exchange with export water when needed. In-Delta storage would be developed (around 200,000 to 300,000 acre feet) that would be used to provide water to the export pumps at critical fish migration times. Operation of the Clifton Court Forebay would be modified to reduce intake of fish at critical times. Additional shallow water habitat would be developed near the Van Sickle-Montezuma Island area using clean dredge spoils from the Delta.

A small isolated facility will be constructed with a diversion in the Sacramento River upstream of the "Critical Habitat for Delta Smelt" at the Sacramento Weir. This screened diversion will divert around 10,000 cfs into a canal that connects to the Sacramento Ship Channel. The ship channel will be converted from a conveyance for shipping to a water conveyance facility. At the ship channel's southern terminus the water will be conveyed by siphons and canals, across the Delta to the south Delta pumps. About 200,000 af of regulatory new storage will be constructed along the channel (e.g. Ryer Island). Direct connections could be made to North Bay Aqueduct, Contra Costa Canal, and the South Bay Aqueducts and exchanges made that could improve the

operational flexibility of the Delta pumps to minimize fish impacts. The channel would be capable of discharging to the Delta as well as to the export pumps.

Water supply reliability would greatly increase due to the diversion location above smelt habitat and new technology screening for winter run. Water supply reliability would also improve at the pumps because of the increased flexibility the fishery agencies have to move fish away from the pumps and by levee protection measures. Water quality for Delta water quality is improved through agricultural, industrial, and municipal wastewater reclamation and reuse. The vulnerability of Delta land use, Delta water supply, agricultural export water supply and Delta ecosystem function to catastrophic failure is reduced by improving levees on critical western islands, and elsewhere.

### **Physical and Structural Features**

***Delta Levee Habitat Restoration***— Restore approximately 100 levee miles of shallow water, riverine and riparian habitat in the Delta to provide forage and cover habitat for resident and anadromous fish, and to provide other benefits associated with riparian habitat. Actions might include setback levees, creation of berms, creation of shallow water habitat, and increased vegetation on levees. Considerations for site selection will include distance from hazards such as pumping plants, protection from waves generated by wind and boat wakes, importance of island integrity to the maintenance of Delta water quality, and need to improve channel capacity and structural stability of levees. Good candidate areas are Twitchell Island along Three Mile Slough and Seven Mile Slough, Georgiana Slough, and the north and south forks of the Mokelumne River.

***Delta Habitat Restoration***— Restore shallow water and tidal wetland habitat in the Delta to provide spawning areas, forage areas, and escape cover for juvenile salmon, Delta smelt, splittail, and other species. Candidate areas include Prospect Island, Liberty Island, Little Holland Tract, Decker Island, Hastings Tract, Yolo Bypass, and the southeast Delta. Also restore shallow water shoreline habitat along margins of the lower Sacramento and San Joaquin channels, and tributary sloughs including Georgiana Slough, Barker Slough, Lindsey Slough, and Parker Island. Riparian, wetland, and terrestrial habitat would also be restored on Delta islands and upland areas adjacent to river channels.

***San Joaquin River Habitat Restoration***— Restore channel features to improve fish survival. Actions may include restoration of deeper, narrower channel areas to keep

water cooler, and isolation of quarry areas to protect young fish from predation and straying.

***Bay Habitat Restoration***— Restore about 2,000 acres of tidal wetlands between Collinsville and Carquinez Strait. Actions may include conversion of diked wetlands to tidal wetlands or use of dredge spoils to create wetland areas. The resulting habitat types will provide wet year spawning habitat for Delta smelt, rearing areas for salmon, as well as habitat for diverse wildlife including canvasback and redhead ducks.

***Channel Islands***— Restore and protect channel islands. Evaluate contribution of upstream meander belts to sediment deposition at channel islands. Establish zones for different types of boating use so some areas are protected from large boat wakes.

***In-Delta Storage Close to the Pumps***— Convert one or more Delta islands such as Bacon Island, Mandeville Island, or Victoria Island into a reservoir to provide operational flexibility and generate up to 300,000 acre feet of storage. The levee around the storage reservoir will be up to several hundred feet wide to support riparian forest cover and provide opportunities for creation of pockets of shallow water habitat. The shallow inward slopes of the levees might support water grass habitat for migratory waterfowl, depending on reservoir operation. The reservoir might be suitable for Sacramento perch habitat. Water will be diverted onto islands through screened diversions during the months of November, December or January depending on the type of water year. Water will be released from March to July to provide water to the pumps at times when project operations would otherwise draw fish into the Delta or to the pumps. Water may also be used to provide other fisheries benefits.

***Storage Along Ship Channel***— Construct about 200,000 af of storage along the ship channel (e.g., Ryer Island).

***New Diversion***— Construct a diversion with a state-of-the-art fish screen above Sacramento near the Sacramento Weir. The diversion would be located upstream from critical Delta Habitat and would be sized to divert around 10,000 cfs without danger to “winter run”.

***Sacramento Ship Channel Conveyance***— Construct a conveyance canal from the weir to the upper end of the Sacramento Ship Channel. Convert the use of the Ship Channel into a water conveyance facility.

***Cross Delta Conveyance Facility***— At the ship channels southern terminus the water will be conveyed by siphons and canals, across the Delta to the south Delta pumps. Direct connections could be made to North Bay Aqueduct, Contra Costa Canal, and the South Bay Aqueducts and exchanges made that could improve the operational flexibility of the Delta pumps to minimize fish impacts.

***Install Bypass at Mouth of Old River***— Construct a bypass at the mouth of Old River that will encourage outmigrants to stay in San Joaquin River while allowing a managed flow down Old River.

***Fish Screens***— Install fish screens on diversions over 100 cfs that are on fish migration routes in the Delta, rivers, and tributaries.

***Flood Protection Level***— Action provides a moderate level of protection to Delta system levees. First, all levees not yet providing a level of protection equivalent to the hazard mitigation plan (HMP) will receive the necessary upgrades to their levees to meet HMP standards. A level of flood protection equivalent to the US Army Corps of Engineers' Public Law (PL)- 99 standard would be provided to: (1) critical western Delta islands (such as Sherman and Jersey islands), with important regional infrastructure (e.g. the Mokelumne Aqueduct, transmission lines, Highway 160, etc.); (2) other islands having infrastructure of local importance (such as New Hope Tract, Bouldin Island, Sherman Island, Palm Tract, Lower and Upper Jones Tracts, and Lower Roberts Island); and (3) islands having valuable habitat, but not necessarily infrastructure, (including, but not necessarily limited to Canal Ranch, Brack Tract, Staten Island, Venice Island, Rindge Tract, Webb Tract, Big Mandeville Island, Twitchell Island, and Bradford Island).

***Channel Improvements and Levee Maintenance***— A moderate level of channel improvements (e.g. widening for improved conveyance), levee maintenance and stabilization (e.g. stabilizing berms), the modification of agricultural practices to reduce subsidence potential, setback levees, providing funding for maintenance and stabilization, and maintaining and/or reconstructing levees are indicative of the range of actions that would be implemented with the intent of reducing the risk of the Delta levee system with respect to its value in providing water supply, water quality, ecosystem quality, and land use/infrastructure benefits.

## **Operational and Management Features**

***Real Time Monitoring***— Establish an adequate real-time monitoring to determine location of species of special concern so that project operations can be effectively managed to reduce losses of fish and minimize effects on habitat.

***Acoustic Barrier at Mouth of Georgiana Slough***— Operate an acoustic barrier at the mouth of Georgiana Slough. Work to improve the effectiveness of behavioral barriers. Evaluate use of acoustic barriers at the Delta Cross Channel and 3-Mile Slough.

***Storage of Agricultural Tile Drain Water***— Develop a program with irrigation districts to store tile drain water to be released at times when pulse flows can provide dilution.

***Modify Clifton Court Forebay Operation***— Modify operations of Clifton Court Forebay so that it does not entrain as many fish into the forebay during typical “Big Gulp” operation. Install regulating gates into Italian Slough so that water can be drawn in over time at a lower velocity. This will reduce the number of fish lost to predation in the forebay.

***Mark Hatchery Fish***— Mark salmon produced in hatcheries to facilitate selective catch by commercial and recreation fisheries.

***Pen Rearing of Striped Bass***— Rear striped bass in pens to maintain recreational fishery and avoid operational constraints on water projects due to spawning bass.

***Improve Pollutant Source Controls***— Existing source control regulations for pollutants may not be sufficiently comprehensive nor enforced by levels required to protect beneficial uses in the Bay-Delta system and tributary rivers. These actions would provide for increased source reduction activities such as additional regulation of agricultural and urban drainage, establishing BMP's, and supporting and enhancing existing land retirement and fallowing programs for agricultural lands with salt or other contaminant drainage problems.

***Implement Onsite Mine Drainage Remediation Measures***— Remediate discharges from abandoned mines in tributaries of the Upper Sacramento River downstream of Shasta Dam.

***Modify Timing of Releases and Diversions***— Improve Delta flow through operational modifications using real time monitoring and adaptive management to modify upstream reservoir releases from New Melones, Folsom, and other reservoirs both seasonally and annually. Improve Delta water quality through dilution of pollutants, including salt, by managing the timing of Delta and export diversions to increase selected Delta channel flows during poor water quality conditions.

### **Institutional and Policy Features**

***Water Quality Standards***— Maintain current standards for Delta water quality and position of X2.

***Other Programs***— Implement recommended habitat restoration actions from other programs, including CVPIA and the Anadromous Fish Restoration Plan. Examples of specific actions include small dam removal on Clear Creek, dam removal on Battle Creek, establishment of a population of winter run chinook salmon on Battle Creek.

***Obtain Environmental Water***— Obtain about 100,000 acre feet from San Joaquin water users to reduce conflicts between fisheries and diversions. Water could be used to provide pulse flows to move Delta smelt downstream, away from diversion points. Another use might be dilution of poor quality San Joaquin River flows, providing benefits for fisheries, water supply, and water quality. New south-of-Delta storage would allow this water to be used as exchange water so that Delta diversions could be reduced at critical times to protect fisheries without affecting export supplies.

***Sacramento River Habitat Restoration***— Restore riparian, shaded riverine, and shallow water habitat along the Sacramento River from Sacramento to Collinsville. First step will be to provide matching funds for Corps of Engineers feasibility study. Subsequent restoration would be funded 75% by COE.

***Preserve Agricultural Land Uses***— Establish programs to preserve agricultural land uses that help to protect the ecosystem. Examples include limiting levee restoration to levels that are inadequate to permit residential construction on Delta islands, and incentive programs to preserve habitats such as pasture, which is important for sandhill cranes.

***Implement a Subsidence Management Program***— Develop and implement a very long-term subsidence management program that prescribes land use strategies related to the degree of subsidence. For some deep Delta islands (below -10 feet in elevation) eliminate traditional agriculture in favor of seasonal wetland management to stop and reverse subsidence. At elevations from -10 to -3 feet, stabilize subsidence by rotating seasonal wetland with wildlife-friendly agricultural use. At elevations from -3 to +3 feet, maintain agricultural uses on some parcels, identify other areas for restoration to tidal wetlands.

***CALFED Regulatory Team***— Determine how to implement a regulatory team to facilitate getting permits for environmental restoration projects. Each member agency would have a key person on team.

***Response Program for Introduced Species Control***— Establish and fund a rapid response program among environmental agencies to provide a fast and effective means of managing introduced species in the Bay-Delta. Carry out continuing management programs for nuisance species such as water hyacinth.

***Dredge Materials***— Establish a policy that all future clean dredge material out of the Delta above Chipps Island should go into Delta restoration projects.

***Safe Harbor for Maintenance***— Encourage farmers and levee maintenance districts to leave habitat areas undisturbed when feasible by providing protection from ESA provisions.

***Subsidence Reduction***— Efforts to reduce the subsidence on Delta islands with deep peat soils (such as parts of Grand, Twitchell, Sherman, Andrus, and Bouldin islands) will include the establishment of a landside buffer zone between 50 and 100 yards in width, located adjacent to the levee.

***Emergency Levee Management Plan***— An emergency levee management plan would provide necessary funding and direction to reclaim Delta islands in the event of inundation to continue protection of Delta functions as an integrated resource system. Funding would be provided to ensure that a suitable amount of equipment and materials would be readily available to rapidly respond to flood fights.

## **Preliminary Assessment**

## ***Benefits***

***Ecosystem Quality***— This alternative will greatly enhance ecosystem quality through restoration and enhancement of riverine, riparian, wetland, and adjacent terrestrial habitat. Expansion of floodway habitat, channels, and meander belts in the Bay-Delta and upstream in rivers and tributaries will help to restore fish spawning, rearing, and feeding habitats and improve fish survival. Purchased fish water from the San Joaquin will greatly enhance the ability to assist fish passage from the rivers through the Delta. The in-delta storage will add flexibility for exchange with export water to reduce the cross Delta movement of fish toward south Delta pumping plants. Improvements to Clifton Court Forebay will also help in reducing the numbers of fish diverted into the forebay and increasing survival of fish that are drawn into the forebay. Moving a major portion of the south Delta diversions to screened locations upstream of the Delta will also reduce impacts on fisheries.

***Water Supply***— This alternative improves water supply and reliability by relocating a large portion of the south-Delta diversion outside the Delta, increasing water supply and reliability reducing impacts on fisheries. This alternative also improves the reliability of water supply by providing for the release of south Delta storage during key seasons, by increasing fish populations (through habitat improvements and reduce diversion effects), and by using stored and purchased water to help avoid interruptions in pumping. Provide increased opportunities for water transfers.

***Water Quality***— This alternative improves export water quality by relocating the diversion upstream of the Delta. Delta water quality is improved through reclamation of agricultural, municipal, and industrial wastewater. Other water quality improvements are achieved by point and non-point source controls and mine drainage. Remediation to improve water quality.

***System Reliability***— Construction of new conveyance facilities reduces the risk that operations will be interrupted by a failure of in-Delta facilities. Creation of shallow water habitat simultaneously provides better levees and protection for adjacent land uses. Improvement of the levees around the critical western islands protects those islands as well as protecting in-Delta and agricultural export water supplies from salinity intrusion due to island failure. Other core actions improve

the reliability of in-Delta facilities through levee management, and levee reconstruction.

***Constraints and Concerns***

***Fisheries***— Though great improvements to habitat and fish survival will occur, complete restoration of important fish populations may not be possible without eliminating the use of the Delta as a water supply conduit and reducing exports from the south Delta even more. Mortality rates in South Delta export facilities remain significant. Possible new entrainment of salmon smolts and Delta smelt into Sacramento diversion.

***Water Quality***— Possible reductions in south Delta water quality.