

Alternative 9



B-001169

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# Alternative 9 - Summary

## Expand Export Capacity and South of Delta Storage

### Emphasis

This alternative focuses on shifting the timing of a large portion of Delta diversions to a period of reduced impacts on the Delta environment. Modified diversion timing and expanded water storage increase water supply availability for environmental, water quality, and other water uses. Physical modifications to the Delta are limited to habitat improvements and levee and channel improvements for flood control.

### Distinguishing Features

This alternative is intended to provide a **moderate** level of resource improvement and conflict resolution.

Physical/Structural	Operational/Management	Institutional/Policy
<ul style="list-style-type: none"> <li>Construct an off-stream storage facility (1 to 1.5 million AF) on the west side of the San Joaquin Valley</li> <li>Moderate levels of habitat restoration</li> <li>Screens on high and moderate priority diversions</li> <li>Moderate level of levee improvements</li> <li>New screened intake at Italian Slough</li> </ul>	<ul style="list-style-type: none"> <li>Operate the export facilities to allow pumping at capacity during appropriate winter months when hydrologic and fisheries conditions allow</li> <li>Establish in-lieu groundwater banking in the San Joaquin basin</li> <li>Obtain about 100,000 AF of San Joaquin River basin water and manage for environmental purposes</li> <li>Real-time monitoring of fisheries to reduce entrainment</li> <li>Increase hatchery production on the San Joaquin River or its tributaries to help re-establish natural fall-run salmon populations</li> </ul>	<ul style="list-style-type: none"> <li>Implement changes to export pumping capacity</li> <li>Coordinate the implementation and approval process for water transfers</li> <li>Funded levee improvements, emergency management plan, and landside buffer zones to reduce system vulnerability</li> </ul>

### Benefits

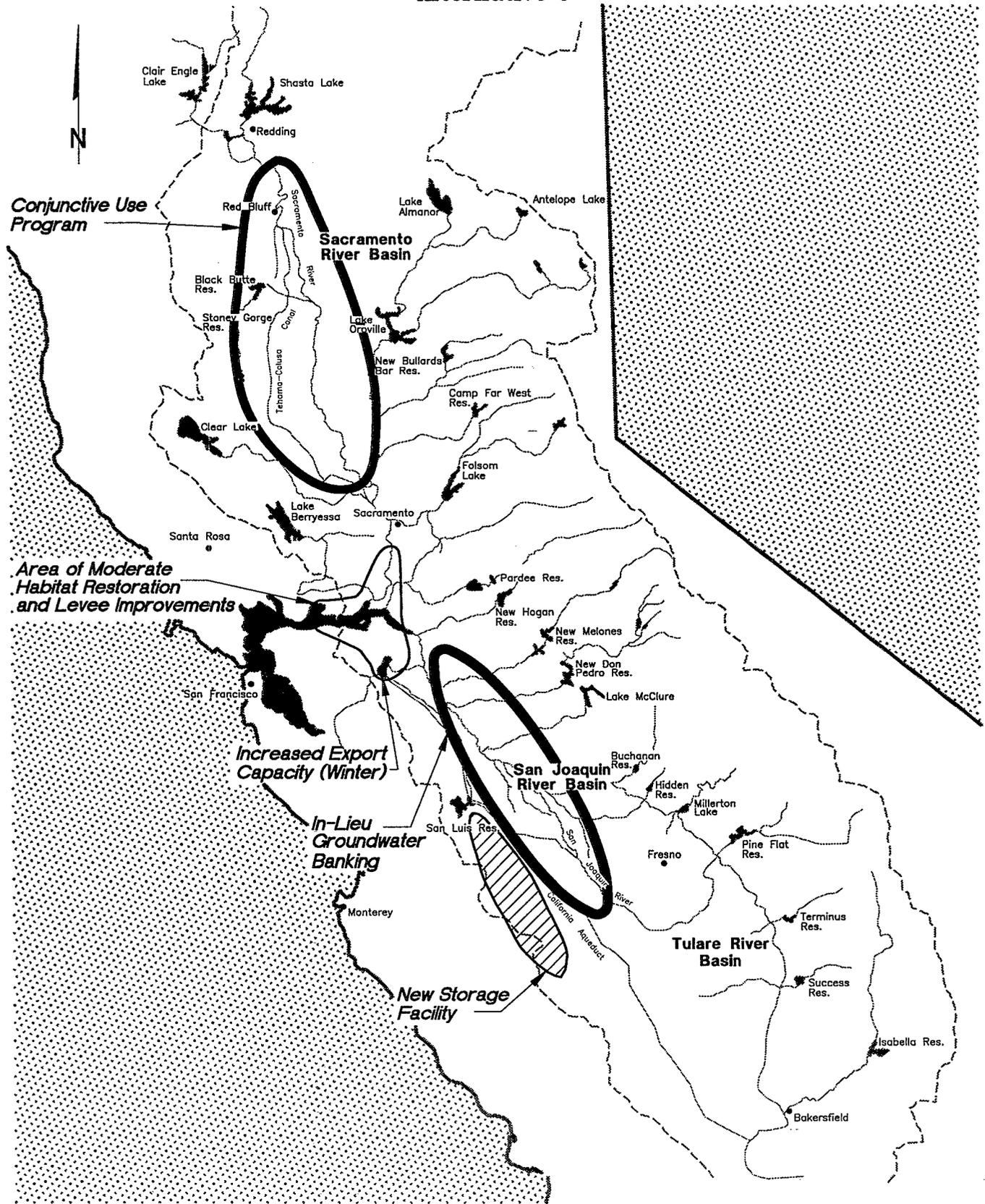
- Habitat restoration and change in diversion timing improves ecosystem quality and increases fish populations
- Increases water supply for all uses of Delta water
- Funded levee management program significantly decreases vulnerability of Delta functions
- Source control of pollutants improves water quality

### Constraints and Concerns

- Export supplies can still be highly constrained and remain vulnerable to interruption
- Delta export water quality remains problematic
- Potential for degraded water quality in south Delta
- Some Delta islands remain vulnerable
- Requires regulatory changes for exports to operate at physical capacity
- Fish mortality in south Delta export facilities remains significant and may increase for chinook salmon due to higher winter exports

# Expand Export Capacity and South of Delta Storage

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# Expand Export Capacity and South of Delta Storage

### Overview

This alternative shifts the timing of a large portion of Delta diversions to periods of reduced impact on the Delta environment. The timing of diversions together with increased water storage, increases water supply reliability, improves water quality, and supports environmental needs.

*increase water supply availability*

This alternative increases the reliability of Delta water by increasing the permitted export pumping capacity to the physical capacity of the facilities during high flow winter periods (November-February). Export timing would be managed through a new, off-stream storage facility on the west side of the San Joaquin Valley, conjunctive use north and south of the Delta, and through in-lieu groundwater banking programs.

*increase pumping capacity*

Increased permitted pumping capacity at the export pumps would be used to fill new and existing off-stream storage south of the Delta. This would shift Delta exports to more environmentally acceptable periods, reduce Delta export needs during periods critical to fish species and water quality, increase Delta export flexibility, increase the capacity for transfers during the summer and early fall periods, and increase the availability of water for environmental needs.

*1 - 1.5 million AF new south of Delta storage*

An intensive in-lieu surface water - groundwater and conjunctive use program in the southern San Joaquin basin would be developed. Surface water in-lieu of groundwater extraction would be provided to irrigators who currently rely on groundwater in over-drafted areas. Without pumping, the groundwater would be allowed to recharge. During periods of drought, these irrigators and others would return to groundwater use thereby resulting in reduced demand for the available surface water. Water purchased from San Joaquin river users and additional water storage will be used to improve fish transport through the Delta and south Delta water quality.

*in-lieu groundwater banking*

This alternative would incorporate a moderate level of demand reduction activities in areas upstream of the Delta as well as in the export areas to further increase availability and reliability of water supply. Demand reduction would include expanding water conservation best management practices (BMPs) and efficient water management practices (EWMPs).

*moderate level of habitat restoration*

Moderate levee improvements will be implemented in the Delta to protect land use, infrastructure, and water supply. Levee protection would include riparian and shallow water habitat improvements. Habitat improvements in the Delta, some upstream areas, and Suisun Marsh, will promote increased natural production and success of key Delta species. Fish screens will be installed on high and moderate priority diversion to improve fish production and survival.

*moderate level of levee improvements*

In addition, source control of pollutants will be implemented to improve Delta water quality.

*pollutant source control*

In summary, through modifying the timing of diversions and providing additional water storage, this alternative increases supply availability for all uses with physical modifications in the Delta limited to levee and channel improvements to protect system functions from catastrophic failure.

## Physical and Structural Features

### Habitat Restoration

Activities	Benefits
<ul style="list-style-type: none"> <li>Restore riparian, shaded riverine, and shallow water habitat along the <b>Sacramento River channel</b> between Sacramento and Collinsville</li> </ul>	<ul style="list-style-type: none"> <li>Provides substantial improvement in aquatic habitat as well as improvements in water supply reliability and water quality</li> <li>Increases survival and spawning success of anadromous and Delta native fish</li> </ul>
<ul style="list-style-type: none"> <li>Restore <b>Delta and floodway corridor</b> shallow water, riparian, terrestrial, and tidal wetland habitat</li> </ul>	<ul style="list-style-type: none"> <li>Provides spawning areas for Delta native fish and forage areas and escape cover for juvenile salmon, Delta smelt, splittail, and other species. Provides improvements in water supply reliability and water quality</li> </ul>
<ul style="list-style-type: none"> <li>Restore approximately 75 to 125 miles of shallow water, riverine, and riparian habitat along <b>Delta levees</b></li> </ul>	<ul style="list-style-type: none"> <li>Provides spawning areas for Delta native fish and forage areas and escape cover for juvenile salmon, Delta smelt, splittail, and other species. Provides improvements in water supply reliability and water quality</li> </ul>
<ul style="list-style-type: none"> <li>Restore and protect <b>channel islands</b> from erosion and enhance habitat</li> </ul>	<ul style="list-style-type: none"> <li>Provides habitat for aquatic and terrestrial plant and animal species</li> <li>Improves water quality</li> </ul>
<ul style="list-style-type: none"> <li>Restore about 1,500 to 2,500 acres of tidal wetlands in <b>Suisun Bay</b></li> </ul>	<ul style="list-style-type: none"> <li>Provides wet year spawning habitat for Delta smelt, rearing areas for salmon, and wildlife habitat (e.g. canvasback and redhead ducks)</li> </ul>
<ul style="list-style-type: none"> <li>Restore riverine channel features in the <b>San Joaquin River</b> above the Delta to lower water temperature and to protect young fish from predation and straying</li> </ul>	<ul style="list-style-type: none"> <li>Improves fish survival</li> </ul>

Considerations
<ul style="list-style-type: none"> <li>• <b>Sacramento River Channels</b> – Feasible and cost-effective habitat restoration implemented between Sacramento and Collinsville.</li> <li>• <b>Delta</b> – 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.</li> <li>• <b>Floodway Corridors</b> – Habitat restoration must not impair capacity of floodways.</li> <li>• <b>Suisun Bay</b> – Convert diked wetlands or create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait.</li> <li>• <b>San Joaquin River</b> – Confine wide, shallow channels and isolate in-channel gravel quarry areas. May not be self-sustaining.</li> </ul>

### Water Storage

Activities	Benefits
<ul style="list-style-type: none"> <li>• Develop about 100,000 AF of <b>new water storage</b> in the Delta dedicated to environmental uses</li> </ul>	<ul style="list-style-type: none"> <li>• Provides additional diversion flexibility</li> <li>• Reduces entrainment of fish</li> <li>• Reduces frequency and duration of export curtailments, thus improving water supply reliability</li> <li>• Improves fish transport through the Delta</li> <li>• Could significantly improve response time (compared to Folsom and Shasta reservoirs) for releasing water for improved management of X2</li> </ul>
<ul style="list-style-type: none"> <li>• Construct <b>new off-stream storage south of the Delta</b> with approximately 1-1.5 MAF</li> </ul>	<ul style="list-style-type: none"> <li>• Provides additional storage and operational flexibility for supply, quality, and the environment</li> </ul>

Considerations
<ul style="list-style-type: none"> <li>• Locate new environmentally dedicated in-Delta storage reservoir near export pumps on one or more islands such as Bacon, Mandeville, or Victoria.</li> <li>• Divert water into Delta storage reservoir during November, December, and January; release water from March to July as needed. With real-time monitoring, divert when species of concern are not present and release water to move fish or release for diversion.</li> <li>• Environmentally dedicated water storage in the Delta allows reduction in diversions during critical periods by providing offset storage withdrawals.</li> <li>• Creation of a wide riparian and shallow water habitat corridor around the perimeter of Delta island storage would provide additional fish and wildlife benefits.</li> <li>• Off-stream storage linked to south of Delta conveyance facilities for greater flexibility in the management of Delta exports.</li> <li>• Fill reservoir during November, December, and January; release water from March to July as needed. With real-time monitoring, water from storage would be released to decrease diversions from the Delta during critical environmental periods. Reservoir would include an increment of carry over storage. Releases would also be made for in-lieu groundwater banking programs.</li> </ul>

**Fish Protection and Transport**

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

**Flood Protection and Levee Stabilization**

Activities	Benefits
<ul style="list-style-type: none"> <li>• Provide a <b>moderate level of protection and stabilization</b> of Delta levees through levee maintenance and stabilization actions</li> </ul>	<ul style="list-style-type: none"> <li>• Manages vulnerability of Delta land use and infrastructure</li> <li>• Manages vulnerability of Delta water supply to salinity intrusion</li> <li>• Manages vulnerability of Delta ecosystem functions</li> <li>• Provides opportunities for habitat restoration</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Improve flood conveyance capacity</b> of Delta channels through channel maintenance and improvements such as dredging</li> </ul>	<ul style="list-style-type: none"> <li>• Manages vulnerability of Delta functions</li> <li>• Improves flood conveyance for more effective movement of water for flood control</li> <li>• Provides opportunities for habitat restoration</li> </ul>
<ul style="list-style-type: none"> <li>• Increasing Delta east side channel flood flow capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Provides for more effective movement of water to the south Delta diversions during high flow periods</li> </ul>

**Considerations**

- Provide flood protection equivalent to Army Corps of Engineers PL 99 standard for these islands:
  - All critical western islands such as Jersey Island.
  - Islands with important regional infrastructure (e.g., Highway 12) such as Terminous Island
  - Islands with both valuable habitat and important regional infrastructure (e.g., transmission lines) such as Lower Roberts Island.
- Upgrade all other Delta levees to meet at least the Hazard Mitigation Plan (HMP) standards.
- Integrate protection and stabilization of levees with Delta habitat restoration activities.
- Provide stable funding mechanism for ongoing levee and habitat monitoring, maintenance, and management.
- Improvements to channels include dredging for sediment removal in channels with restricted flood capacity.
- Integrate channel improvements with levee improvements.

**Operational and Management Features**

**Water Diversion Management**

Activities	Benefits
<ul style="list-style-type: none"> <li>• Acquire about 100,000 AF of water from willing sellers in the San Joaquin basin</li> </ul>	<ul style="list-style-type: none"> <li>• Transports fish through San Joaquin River and Delta</li> <li>• Improves water quality</li> <li>• Improves management flexibility for diversions to reduce fish loss</li> </ul>
<ul style="list-style-type: none"> <li>• Improve CVP and SWP operations through predation control, coordinating operations, and improving fish salvaging and handling</li> </ul>	<ul style="list-style-type: none"> <li>• Reduces fish losses</li> </ul>
<ul style="list-style-type: none"> <li>• Improve real-time monitoring of locations of fish species of special concern and modify water diversions to avoid fish entrainment</li> </ul>	<ul style="list-style-type: none"> <li>• Provides an additional tool to help reduce entrainment of special-concern species</li> <li>• Improves flexibility to divert water during critical fish migration periods</li> </ul>
<ul style="list-style-type: none"> <li>• Evaluate, improve, and install behavioral barriers for anadromous fish</li> </ul>	<ul style="list-style-type: none"> <li>• Diverts anadromous fish from areas of potential entrainment and predation</li> <li>• Allows for continued water diversions at current locations</li> </ul>
<p><b>Considerations</b></p>	
<ul style="list-style-type: none"> <li>• Can use San Joaquin environmental water to aid pulse flows for fish transport or diluting poor quality flows</li> <li>• Coordinate use of San Joaquin environmental water with the operation of new Delta storage to improve timing of diversions</li> <li>• Evaluate continued use of an acoustic barrier at the mouth of Georgiana Slough.</li> <li>• Evaluate behavioral barriers for Delta Cross Channel and Threemile Slough.</li> </ul>	

### Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> <li>• Increase conjunctive use for the Sacramento and San Joaquin River basins to provide 300-500 TAF of annual supply</li> </ul>	<ul style="list-style-type: none"> <li>• Provides for increased transferrable supplies</li> </ul>
<ul style="list-style-type: none"> <li>• Implement <b>groundwater banking and conjunctive use programs</b> in the <b>San Joaquin Basin</b></li> </ul>	<ul style="list-style-type: none"> <li>• Provides additional dry year water supply flexibility</li> </ul>
<ul style="list-style-type: none"> <li>• Expand <b>water conservation</b> best management practices (BMPs) and implement and expand <b>efficient water management practices (EWMPs)</b></li> </ul>	<ul style="list-style-type: none"> <li>• Reduces demand for water from Delta</li> </ul>
<ul style="list-style-type: none"> <li>• Implement feasible <b>reclamation and reuse</b> projects for urban and agricultural supplies</li> </ul>	<ul style="list-style-type: none"> <li>• Reduces demand for water from Delta</li> </ul>
<b>Considerations</b> <ul style="list-style-type: none"> <li>• Possible state and federal cosponsorship for conservation and reclamation programs.</li> <li>• Institutional needs to improve water transfers.</li> <li>• Land retirement and land fallowing will focus on marginal agricultural lands and lands from willing sellers.</li> <li>• Conjunctive use programs to prevent over-draft and water quality degradation.</li> </ul>	

### Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> <li>• <b>Mark salmon</b> produced in hatcheries</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitates selective catch of hatchery salmon by commercial and recreational fisheries</li> </ul>
<ul style="list-style-type: none"> <li>• Conduct <b>net-pen rearing of striped bass</b> to supplant natural production</li> </ul>	<ul style="list-style-type: none"> <li>• Maintains recreational fishery</li> <li>• Reduces operational constraints on water diversions</li> </ul>
<ul style="list-style-type: none"> <li>• Increase hatchery production for fall run chinook salmon on the San Joaquin river or its tributaries</li> </ul>	<ul style="list-style-type: none"> <li>• Helps re-establish the natural fall run</li> </ul>
<b>Considerations</b> <ul style="list-style-type: none"> <li>• Actions are intended to to maintain recreational and commercial fisheries as well as enhance native salmon stocks.</li> <li>• Need to assess impact of incidental mortality or native (unmarked) fish.</li> </ul>	

### Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> <li>• Increase enforcement of source control regulations for <b>agricultural drainage</b> and implement farming best management practices for water quality.</li> </ul>	<ul style="list-style-type: none"> <li>• Improves Delta water quality</li> </ul>

Activities	Benefits
<ul style="list-style-type: none"> <li>• Increase enforcement of source control regulations for <b>urban and industrial runoff</b> and implement best management practices for water quality</li> </ul>	<ul style="list-style-type: none"> <li>• Improves Delta water quality</li> </ul>
<ul style="list-style-type: none"> <li>• Integrate existing <b>land retirement and fallowing</b> programs for agricultural lands with drainage problems</li> </ul>	<ul style="list-style-type: none"> <li>• Improves Delta water quality</li> </ul>
<ul style="list-style-type: none"> <li>• Integrate existing and support appropriate on-site <b>mine drainage remediation</b> measures to the maximum extent feasible</li> </ul>	<ul style="list-style-type: none"> <li>• Improves Delta water quality</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li>• Identify priority pollutant sources such as Iron Mountain Mine and west-side San Joaquin agricultural lands.</li> <li>• Provide regulatory and institutional incentives for implementation of remediation measures.</li> </ul>	

## Institutional and Policy Features

### Habitat Programs

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

### Water Management

Activities	Benefits
<ul style="list-style-type: none"> <li>• Increase exports during periods of high winter Delta flows and when environmental concerns are low</li> </ul>	<ul style="list-style-type: none"> <li>• Increases supply predictability by shifting a large portion of diversions away from environmentally sensitive periods that currently constrain pumping activities</li> <li>• Provide export water quality benefit</li> </ul>
<ul style="list-style-type: none"> <li>• Establish a <b>coordinated CALFED program</b> to manage Delta flow operations</li> </ul>	<ul style="list-style-type: none"> <li>• Provides capability for rapid objective response to changing Delta conditions</li> </ul>
<ul style="list-style-type: none"> <li>• Create a coordinated CALFED program to expedite and expand the use of <b>water transfers</b> to meet water needs during droughts</li> </ul>	<ul style="list-style-type: none"> <li>• Provides flexibility to transfer water for environmental or export purposes</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li>• Determine institutional needs to implement programs.</li> <li>• Regulatory changes would be required to increase winter exports. Could include trade off pumping incentives for higher diversion during acceptable winter months and reduction in exports during more environmentally sensitive periods.</li> <li>• Would require increase in permitted capacity (to physical capacity) of Delta export facilities to maximize benefit of export criteria modification in conjunction with additional off-stream storage south of the Delta.</li> </ul>	

### Water Quality Standards

Activities	Benefits
<ul style="list-style-type: none"> <li>• <b>Reevaluate Delta export/inflow ratios</b> during triennial reviews as habitat effectiveness is realized</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitates higher level of water transfer as fishery populations improve</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li>• 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 dedicated to shallow wetlands.</li> </ul>	

### Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> <li>• Establish and fund an <b>emergency levee management plan</b> to respond to levee failures</li> </ul>	<ul style="list-style-type: none"> <li>• Provides resources to protect Delta functions through proactive and preventative measures</li> </ul>
<ul style="list-style-type: none"> <li>• Establish <b>landside buffer zones</b> adjacent to levees on islands with deep peat soils</li> </ul>	<ul style="list-style-type: none"> <li>• Provides increase in stability of Delta levees and reliability of Delta functions by reducing subsidence adjacent to levees</li> <li>• Could be used to provide habitat benefit</li> </ul>

**Considerations**

- Determine extent and cost effectiveness of levee management programs and buffer zones.
- Buffer strip approximately 100 to 150 yards wide.

**Preliminary Assessment**

**Benefits**

- Habitat restoration and change in diversion timing improves ecosystem quality and increases fish populations
- Increases water supply for all uses of Delta water
- Source control of pollutants improves water quality
- Funded levee management program significantly decreases vulnerability of Delta functions

**Constraints and Concerns**

- Fish mortality in south Delta export facilities remains significant and may increase for chinook salmon due to higher winter exports
- Delta export water quality remains problematic
- Potential for degraded water quality in south Delta
- Some Delta islands remain vulnerable
- Export supplies can still be highly constrained and remain vulnerable to interruption
- Requires regulatory changes for exports to operate at physical capacity