

**Alternative 11**

**Improved Through-Delta Conveyance with  
Screened Diversion at Hood**

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#### **Emphasis**

This alternative reduces the cross-Delta diversion of Sacramento fish and provides a more reliable and higher-quality water supply from the Delta by increasing through-Delta conveyance.

#### **Distinguishing Features**

##### Physical and Structural Features

Constructs a screened intake on the Sacramento River and improves north Delta channels by dredging, levee reinforcement, and gradient-control facilities to maximize Delta conveyance capacity. Provides a moderate package of habitat restoration and also creates habitat, including seasonal and tidal wetlands, riparian, and upland habitats. Acquires Delta island and tracts in floodplain from willing sellers for habitat.

##### Operational and Management Features

As conditions warrant, allows export pumps to operate at full capacity under appropriate conditions to increase supply flexibility and reliability. Uses real-time monitoring to minimize fish entrainment. Obtain 100 TAF on San Joaquin River and manage for environmental purposes.

##### Institutional and Policy Features

Includes a levee management plan with stable funding. Institutes introduced species control programs to combat the negative impacts of established species and limit further introductions. Includes obtaining permits to allow maximum pumping flexibility.

#### **Benefits**

- Improves quality of export water
- Decreases loss of anadromous and Bay-Delta fish
- Improves water supply flexibility and reliability
- Substantially improves the quality and quantity of
- Delta habitat
- Reduces vulnerability of Delta land uses and water supply
- Improves Delta water quality

#### **Constraints and Concerns**

- Continues loss of fish and fish habitat associated with Delta diversions
- Continues cross-Delta flow of Sacramento River water
- Screens on Sacramento River may increase
- predation
- Water quality in the south Delta may not improve sufficiently
- No adequate guarantees of Delta outflows
- High costs of implementation



## **Alternative 11**

### **Improved Through-Delta Conveyance with Screened Diversion at Hood**

This alternative is developed around improving the existing through-Delta transport of water in combination with the installation of a fish screen at a relocated diversion point on the Sacramento River near Hood. This alternative is intended to achieve substantially greater protection of fish from entrainment effects; improved aquatic habitat productivity in the Delta, and a more reliable and higher quality supply of water for export from the Delta.

The screening of the Sacramento diversions to the central Delta would provide substantial reductions in the mortality rate of downstream migrating salmon in the Sacramento River. The increased through-Delta flows increases lower San Joaquin River flows (eliminates reverse flows), which reduces entrainment effects on resident fish. Through-Delta channel improvements would include habitat restoration elements. Further habitat restoration in the Delta would improve rearing habitat for anadromous and resident fish. These improvements are needed because the intake points would remain at current locations in the Delta, and would be effective because the elimination of reverse flows would decrease the vulnerability of Delta fish to entrainment effects. The water supply would be more reliable because it would be substantially less constrained by pumping restrictions to protect fish from entrainment in the Delta. Export water quality may be somewhat improved because of reduced mixing with high-salinity Bay water. Flood protection throughout the Delta would be improved to protect existing land uses and infrastructure and to protect Delta water quality.

### **Physical and Structural Features**

*Construct a Screened Diversion Facility at Hood*— Divert up to 12,000 cfs of Sacramento River water into the North and South Mokelumne rivers at Hood, increasing the flow and improving the water quality of the San Joaquin River below the Mokelumne River confluence. Improvements to existing through-Delta conveyance channels would improve the efficiency of water movement to the export facilities, reducing entrainment effects and improving water quality in the south Delta.

*Delta Islands Habitat Restoration and Subsidence Control*— Acquire Delta island properties from willing sellers, convert land use to diverse and permanently flooded

wildlife habitat to minimize or reverse subsidence in the west Delta. Also acquire Delta island and tract properties from willing sellers within the 100 year flood plain for creation of tidal and seasonal wetlands, creation of diverse riparian and uplands habitats, and providing flood storage areas. Because export intakes would remain at existing locations in the south Delta, these habitat restoration measures would be implemented at high levels.

***Increase Diversion Capacity***— Installing an additional gate on Clifton Court Forebay and obtain permits to pump at full export capacity when flows are high and entrainment risks are low, as determined by real-time monitoring.

***Channel Capacity Improvements***— Improve channel capacities of the north Delta area with dredging, levee reinforcement, and gradient control facilities. Improvements to existing through-Delta Conveyance channels would improve the efficiency of water movement to the export facilities for times when exports exceed the capacity of the small isolated transfer facility, thereby reducing fishery entrainment effects and improving water quality in the south Delta.

***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.

***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 Georgianna 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.

***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 250 cfs that are on fish migration routes in the Delta, rivers, and tributaries.

### **Operational and Management Features**

***Groundwater Banking and Conjunctive Use***— Expanding conjunctive use programs will increase the availability of water supplies and increase flexibility in the timing of diversions and exports.

***Real Time Monitoring***— Implement intensive sampling of fish distribution and abundance to help operate diversion facilities to minimize fisheries impacts.

***Improved Pollutant Source Controls***— Existing source control regulations for pollutants may not be sufficiently comprehensive nor enforced to levels required to protect beneficial uses in the Bay-Delta system and tributary rivers. These actions would provide for an array of increased source reduction activities such as additional regulation of agricultural and urban drainage and better enforcement, establishing BMP's for a range of activities affecting Delta water quality such as levee maintenance and pest control practices, and supporting and enhancing existing land retirement and fallowing programs. Using a watershed management approach, identify and control high priority pollutant sources through a combination of source reduction and treatment actions. Provide regulatory incentives and develop institutional agreements to enable focusing resources on priority sources. Intense application of core level actions such as implementing source control regulations for pollutants, levee maintenance best management practices to encourage use of materials compatible with good water quality, retirement of lands with serious drainage disposal problems, retirement or fallowing agricultural lands with salt or other contaminant drainage problems to reduce land-derived salt contamination, management of irrigation tailwater, retention and management of stormwater runoff, and

management of discharges from abandoned mining sites would improve water quality management.

Implement on-site mine drainage remediation measures based on requirements in current regulations. Through changes in water pollution requirements give urban areas flexibility to fund high-priority mine cleanup in lieu of increasing expenditures on treatment plant improvements.

***Close Delta Cross Channel***— The Delta Cross Channel would be closed with locks installed to allow boat traffic but prevent the movement of fish into the central Delta.

***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.

***Management of Water Quality***— Implement actions such as source control regulations for agricultural drainage, retiring lands with drainage problems, and other cost-effective

management of urban, agricultural, and industrial discharges and runoff to improve Delta water quality.

### **Institutional and Policy Features**

***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.

***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.

***Control Introduced and Nuisance Species***— Implement programs to reduce the likelihood of introducing non-native species and to combat the deleterious effects of those which have become established.

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

***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.

***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.

***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.

***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.

***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.

## **Preliminary Assessment**

### ***Benefits***

***Ecosystem Quality***— The loss of fish from the Sacramento River across the Delta to the South Delta pumping plants would be reduced. Habitat restoration actions in the Delta would be implemented near the maximum level in this alternative because the export would continue from the south Delta. Additional improvements to ecosystem quality would be achieved through reducing diversion and reverse flow impacts currently associated with Delta exports. Consequently, productivity improvements would be expected in the western Delta and lower San Joaquin River. Losses of anadromous and resident fish from the Sacramento River, Suisun Bay and the Delta to exports at the south Delta pumping plants would be reduced.

***Water Supply***— Under this alternative, 1995 Water Quality Control Plan objectives would remain in place. However, the improved through-Delta conveyance would allow a more reliable and higher quality water supply.

***Water Quality***— Water quality will be enhanced to varying levels for areas receiving Delta export water, as well as in-Delta diverters because of the greater isolation of export water from sea water intrusion and more dilution of Delta agricultural drainage.

***System Reliability***— The system reliability would be increased within the Delta due to the more stable levees in the Mokelumne River system. Western Delta habitat restoration and levee maintenance would also improve system reliability.

### ***Constraints and Concerns***

***Fish***— Fish would continue to be exported from the Delta in high numbers. Sacramento River salmon and steelhead returning via the Delta would have their return route more complicated and potentially more inhibited than at present. Mokelumne River salmon and steelhead may also have more complex and difficult migration pathways with the revised Delta configuration. Large screens on the Sacramento river will be costly and difficult to maintain, and may not be completely effective in minimizing fish entrainment and impingement.

***Water Quality***— Water quality problems in the Delta would continue to limit beneficial uses.