Primary Problem/Objective Statement

Ecosystem Quality

Problem

Much of the focus on ecosystem problems has centered on fisheries, especially those populations which have been designated as threatened or endangered under Federal and State laws, however, the underlying problem is much broader and more far-reaching. Declining fish populations and endangered species designations have generated major conflicts between beneficial uses of water in the Bay-Delta system. A primary reason for the decline is an overall loss of habitat to support various life stages of aquatic biota. The Bay-Delta system no longer supports a broad diversity of habitats nor the habitat quality necessary to ensure those ecological functions and connectivity necessary to maintain and propagate healthy populations and communities of plants and animals. The steady decline in habitat quantity, diversity, and quality results from many activities both in the Delta and upstream.

The earliest major damaging event was the unrestricted use of hydraulic mining in the river drainages along the eastern edge of the Central Valley. Overall, the effect of hydraulic mining was more serious than just causing habitat degradation in the Central Valley. The increase in frequency and extent of periodic flooding caused by mining debris accelerated the need for flood control measures to protect adjacent agricultural lands. Levee construction to protect these lands eliminated fish access to shallow overflow areas, and dredging operations to construct levees eliminated tule bed habitat along the river channels. Since the 1850s, 700,000 acres of overflow and seasonally inundated land in the Delta have been converted to agriculture or urban uses. Many of the remaining stream sections have been either dredged or channelized to improve navigation, to increase stream velocity during periods of flood, and to facilitate water export.

B-000655

Upstream water development, depletion of natural flows and the export of water from the Delta have changed seasonal patterns of inflow, reduced annual outflow and muted the natural variability of flows into and through the Delta. Facilities constructed to support or mitigate the impacts of water diversion cause straying or direct losses of fish (e.g. unscreened diversions) and increased unnatural predation (e.g. Delta cross channel and Clifton Court Forebay).

Water quality degradation caused by natural and introduced pollutants may also have contributed to the overall decline in the health and productivity of the Delta. In recent years, an increase in the rate of colonization and the abundance of exotic species has resulted in competition for available space and food supplies, often to the detriment of native or economically important introduced species. Entrainment and export of substantial quantities of food web organisms, eggs, larvae and young fish further exacerbate the impacts from overall habitat decline.

Objective

The primary program objective for ecosystem quality is to improve and increase the quantity, diversity and quality of aquatic and terrestrial habitats and to improve ecological functions in the Bay-Delta system to support increased and sustainable populations of diverse and valuable plant and animal species.

Linkages

The decline of species dependent on the Bay-Delta system for all or part of their life cycle now results in considerable conflict between beneficial uses of the Delta and highlights the urgent need for resolution and restoration. Key issues which affect ecosystem quality are water export, outflow, levee and channel maintenance, and other nonflow related issues. Ecosystem quality can be restored or improved through changes in export timing and the method(s) of export. Enhanced flexibility in diversion and export activities can contribute

significantly to restoration efforts. If additional water supplies are developed or water needs are reduced, more functional Delta outflow can be provided. Improvement in levee maintenance and stabilization can be achieved by incorporating habitat restoration on or in levees and channels into future actions. If the conflicts over levee maintenance versus habitat could be addressed, levees could be rebuilt or improved using sound levee stabilization techniques which incorporate habitat elements such as shaded riverine, riparian and waterside berms. Additional habitat restoration could also be accomplished during efforts to address Delta island subsidence.

Primary Problem/Objective Statement

Water Supply Reliability

Problem

The Bay-Delta system provides the water supply for a wide range of instream, riparian, and other beneficial water uses which are authorized by appropriative, riparian, and pre-1914 water rights. While some water users depend on the Delta system for only a portion of their water supply, others have become highly or totally dependent on Delta water supplies. As water use and competition between uses with respect to the timing of water availability has increased during the past several decades. Conflicts have increased between uses of Delta water which in turn has magnified the impact from natural fluctuations in the hydrologic cycle.

In response to declining fish and wildlife populations, water flow and timing requirements have been established for certain fish and wildlife species with critical life stages dependent on freshwater flows. The quantity and timing of the demand has become less flexible as hydrologic uncertainty continues and the uncertainties associated with regulatory actions to protect the ecosystem have increased. This basic disparity between water demand and water supply has created economic uncertainty in the water service areas and increased potential conflict over supplies.

A corollary concern is the vulnerability of the Delta water transport system of levees and channels to catastrophic failure due to overtopping during high water events and seismic activity. This system is also vulnerable to general failure as a result of decreasing levee stability. Such failures in the system could result in interruptions in water use in the Delta or water transport across the Delta for periods which could vary in length from days to several months.

B-000658

Objective

The primary objective for water supply reliability is to reduce the conflict between water supply beneficial uses and to provide a better match between quantity and timing of supply and projected beneficial uses dependent on the Bay-Delta system. This disparity needs to be addressed for both the short and long-term planning horizons and from both the supply and demand sides. Flexibility in the transport of water across the Delta needs to be enhanced so that all of the water management tools, including demand management, water transfer, and supply augmentation, are available to the water service agencies to match quantity and timing of supply with beneficial use patterns. Steps need to be taken to more effectively manage the risk associated with catastrophic failure of the Delta water transport system.

Linkages

A critical issue which affects water supply reliability is the impact of water supply diversions on the ecosystem, especially endangered species. As such, water supply reliability can be improved by actions which recover and protect endangered species. By reducing the conflict between the ecosystem and water diversions, the opportunities to transport water through the Delta can be increased. This reduction in conflict will create flexibility to more effectively use water supplies through water management programs such as water transfers (e.g. drought year transfers) and augmentation of water supply. Supply augmentation program elements may consist of conjunctive use, coordinated operation of existing reservoirs, developing offstream surface and groundwater storage programs, developing storage capabilities within the Delta, development of groundwater resources, and water reclamation.

Water management programs which alter the timing of Delta inflow in ways which provide Delta inflow in periods of time which are beneficial to the Delta aquatic habitat and to the water quality in Delta channels can produce synergistic benefits. Similarly, water

management programs which provide opportunities for altering timing of Delta outflows in ways that benefit Suisun Bay and San Francisco Bay while at the same time providing opportunities for additional water supply transport across the Delta can reduce conflict between beneficial uses and produce a win-win situation for the ecosystem and for water supply reliability. In order to effectively reduce the conflict between the ecosystem and the beneficial use of water dependent on the Bay-Delta system, most of these water management programs will need to include demand management elements and elements which improve both Delta water transport capabilities and reduce the risk to the transport system from catastrophic failure.

Primary Problem\Objective Statement

Water Quality

Problem

The Delta is a source of drinking water for millions of Californians and is critical to the state's agricultural sector. In addition, good water quality is required to maintain the high quality habitat needed in the Bay-Delta system to support a diversity of fish and wildlife populations. Yet, despite improvements in Bay-Delta water quality, the issue remains a primary concern in the Delta.

Pollutants enter the Delta through a variety of sources including sewage treatment plants, industrial facilities, forests, farms and farm fields, mines, residential landscaping, urban streets, and natural sources. They find their way to even the Delta's most remote areas where they interact with water, sediment, plants, and animals. The pollutants, pathogens, natural organics, and salts in Delta waters impact to varying degrees existing fish and wildlife, as well as human and agricultural use of these waters. The salts, entering the Delta through the Bay from the ocean and from agricultural returns upstream, decreases the utility of Delta waters for many purposes including agriculture, drinking water and the ecosystem. The level of natural organics in the water (mainly resulting from the natural process of plant decay on many of the Delta peat soil islands) is of concern because of the way natural organics react with other chemicals during the treatment process necessary to produce safe drinking water. During this treatment, certain "by-products" are created which may produce potentially adverse human health effects. Pathogens, which include viruses, Giardia and cryptosporidium, enter the Delta through a variety of sources and pose both human health and treatment related concerns.

Objective

The primary objective for water quality is to provide good quality water to better support all the beneficial uses of the Bay-Delta system. In this context, the term "beneficial uses" covers a wide range of water uses and includes fish and wildlife use, municipal and industrial use, agricultural use, recreational use, and other uses. In most cases, the specific water quality objectives for the various beneficial uses relate to reducing constituent levels. In other cases, the specific objective is to better manage water quality through a variety of measures including minimizing the cost of treating the source waters.

Linkages

The quantity and timing of the water flowing into and out of the Delta directly affects water quality in the Bay-Delta system. Quantity and timing are a function of the natural runoff patterns, changes in land and water use, operations of upstream water projects, diversions (upstream and in-Delta), and exports from the Delta. Thus, any modification to system operations to improve ecosystem quality or to reduce the conflict between ecosystem and water supply, will directly affect water quality for specific beneficial uses, either positively on negatively. Similarly, modifications to system operations to improve water quality will directly affect water supply reliability. This linkage is especially apparent in some reaches of the San Joaquin River within the Delta. While managing and improving water quality is a primary objective of the CALFED Bay-Delta Program, the achievement of the key specific water quality objectives is closely tied to the linkage to ecosystem and water transport.

Primary Problem/Objective Statement

System Vulnerability

Problem

Levees were first constructed in the Sacramento-San Joaquin Delta during the late 1800s, when settlers began to turn tidal marshes into agricultural land. Over time, both natural settling of the levees and subsidence (oxidation and consolidation which lowers the level of the land over time) of Delta island soils resulted in a need to increase levee heights to maintain protection. There is a growing concern about the vulnerability of the Delta levees to natural disasters. Failure of Delta levees can result in flooding of Delta island farmland in addition to a loss of habitat for wildlife and a loss of wintering grounds for migrating species. Long-term loss of an island or tract can expose adjacent islands to increased wave action and possible levee erosion. Levee failure on specific islands can have impacts on water supply distribution systems such as the Mokelumne Aqueduct. Similarly, flooding of key Delta islands can increase the potential for sea water intrusion further up the Delta, especially in a low water year when less freshwater would be available to repel the incoming salt water. Such a failure could result in a lengthy delay to in-Delta and export use of Delta water by both urban and agricultural users.

Local reclamation districts are concerned with the cost of maintaining and improving the levee and channel system. The complex array of agencies with planning, regulatory, and/or permitting authorities over levees makes rehabilitation and maintenance efforts difficult. Regulatory measures which protect endangered species or critical habitat sometimes conflicts with and prolongs levee rehabilitation and maintenance work, which can further increase the vulnerability of the system.

Objective

The primary program objective for addressing Bay-Delta system vulnerability is to reduce the conflict between the long-term productivity of the system functions and ecosystem, water supply, and water quality functions of the system. The vulnerability of the land use/economic activity, infrastructure for water supply conveyance, water quality, and aquatic/terrestrial habitat protection functions of the Bay-Delta system to both general failure and sudden catastrophic failure can be reduced by implementing an integrated and comprehensive program for Delta levees and channels. This plan would need to streamline and consolidate the planning, regulatory, and permitting processes which affect the system, and provide a stable and constant funding source for system maintenance and rehabilitation. By reducing the conflict between protection of endangered species/habitat and levee maintenance activities, the risk to the Bay-Delta system posed by potential levee failure can be managed to reduce the vulnerability of Bay-Delta functions.

Linkages

A critical issue which affects the vulnerability of the Bay-Delta system is impact of levee maintenance and stabilization activities on the ecosystem, especially with respect to endangered species and the riparian and aquatic habitat which supports these species. In many cases, benefits to both the system vulnerability and the riparian and aquatic habitats contained on or in the levees and channels which make up the system, can be achieved by incorporating habitat restoration and protection elements in the levee system stabilization actions. Conversely, the same observation is true of riverine and riparian enhancements in the Delta. A second critical linkage can be in the resolution of conflict between some island land surface subsidence, which can occur in Delta island peat soils when subjected to some farming practices, and efforts to provide long-term stability of levees. Both the Delta ecosystem (including the aquatic habitat and the terrestrial habitat found on the levees and inside the islands) and system stability can benefit from reducing land surface subsidence adjacent to the levees. Such synergism can be implemented both where levee

stabilization is proposed and where habitat enhancement (riverine and riparian) is proposed. One method to accomplish this, the creation of shallow wetlands adjacent to the landside toe of the levee, also serves to enhance habitat. However, special design and implementation techniques need to be employed where Delta islands are well below sea level as more traditional techniques employing set back levees and breaching of existing levees will not produce the desired shallow wetland habitat.