**CALFED Bay-Delta Program**

# Ecosystem Restoration Program
# Conservation Strategy for Stage 2
# Delta-Suisun Marsh Planning Area

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## ERP Conservation Strategy Map and Covered Habitats for the Delta-Suisun Marsh Planning Area

Given recent events of litigation and water operations, the focus on the Delta for improving conditions for Delta smelt and other pelagic organisms has become paramount. While the ERP continues to develop the Delta Restoration Plan and its Conservation Strategy for the entire CALFED Solution Area, it became apparent that a graphical component that illustrated a biological vision for the future of the Delta was needed. Although this draft vision is habitat based, we believe it would improve the condition of the aquatic system that benefits Delta smelt and other native Delta dependent species.

The ERP agencies recognize the importance of finding solutions to reverse the decline of Delta smelt, but remain committed to broader restoration planning and conservation efforts for multiple species. In looking at the historical conditions of the Delta, we drafted a graphical representation that identifies restoration opportunities within the Delta-Suisun Planning Area based upon existing elevations and habitat and natural process requirements of pelagic organisms and other native fishes (Appendix C). For purposes of this initial draft of the strategy, we have identified five broad land categories for restoration. We have shifted away from the focus on shallow water habitat in the original ERP documents to intertidal habitat which will allow the reestablishment of food web support and the types of habitat which were most abundant in the historic Delta. These categories include inter-tidal, channel, floodplain, grassland/vernal pool transition corridor, upland transition, and managed wetland and wildlife friendly agriculture.

This is a biological view of how the Delta could be configured to restore historic form and function to the maximum extent. The main thrust of the strategy at this juncture is to present a GIS-based overview of the Delta-Suisun Marsh Planning Area, showing areas with potential for various kinds of habitat restoration. Elevation and soil type are the drivers for this preliminary depiction that does not include water conveyance options infrastructure, or land use patterns. The first step in developing the map for the conservation strategy directly addresses habitat restoration. In subsequent versions ecosystem processes, such as hydrodynamics, temperature, salinity, residence times, etc., will be addressed. In addition, the strategy will eventually address species recovery and how the restoration of habitat and ecosystem processes will benefit individual species. Detail on restoration actions that address flow and river operations, which are the primary drivers of aquatic systems and habitats, will be incorporated in future phases once the Delta Restoration Plan conceptual models (summer, 2007) and the anadromous fish recovery plans (summer, 2008) are completed. A key element of the models is the identification of critical limiting factors, as well as and linkages with other components of the system.

After incorporating an elevation map of the delta (from the DWR Status and Trends Report; data from 2002), rough contour lines were drawn to identify potential restoration opportunity areas. Ecological rationale for mapping decisions was driven by historical conditions and elevations to accommodate sea-level rise and climate change. Map

elevations were presented in 5-foot increments. One major assumption was that -5 to 0 feet and 0 to 5 feet elevations may have opportunities for tidal marsh. Land above 5 feet was considered to be upland/transition habitat. Land below -5 feet was considered deeply subsided and not conducive to restoration of habitat for native species.

In identifying restoration opportunity areas, we started with consideration of pelagic organism needs and constraints for improving conditions for them. Looking at the existing elevations and conditions in the Delta, it is clear that the central or deep Delta is not very compatible with restoration of habitats and processes that increase habitat area and food productivity for pelagic organisms. Considering the Delta Risk Management Strategy and levee sustainability, the likelihood of sustainable restoration of the deep Delta for these purposes is limited. Thus, we have identified the deep Delta as an area we refer to as Managed Wetland and Wildlife Friendly Agriculture.

For the purposes of this draft of the strategy and the initial focus on pelagic organisms, the Managed Wetland and Wildlife Friendly Agriculture category is intended to highlight the fact that restoration actions in the deep Delta are extremely limited or non existent in a sustainable manner that benefit critically endangered native fish species. Given existing elevations and current understanding of ecology of flooded islands like Frank's Tract, benefits to pelagic organisms and other species would not be achieved. The focus from a habitat perspective in these areas should be actions to counter subsidence and benefit wildlife and/or encourage agricultural practices that do not contribute to continued subsidence and benefit wildlife, particularly waterfowl and sandhill cranes.

The strategy recognizes the value of some existing land use practices in this area of the Delta for many other species, the sustainability of these lands are in question based on interior land elevations and the threat to levee integrity from seismic events, sea level rise, and global warming; therefore, the ERP does not anticipate funding projects in this region of the Delta. Methods that minimize or reverse subsidence have shown promise, and so the focus should be shifted to large scale implementation of such programs. There have been several studies done on Twitchell Island that have examined processes and rates of accretion and, based on those findings, large scale implementation on whole-island scales should be pursued.

Implementation of large scale, whole island approaches to reverse subsidence would be beneficial for multiple purposes. While opportunities for contributions to aquatic species are limited under existing conditions, programs that offer incentives for 10- or 20-year studies for subsidence reversal on large tracts of land could help improve sustainability of Delta levees and reduce the level of risk of catastrophic failure. This would improve long term sustainability of the Delta and allow future restoration of additional native fish habitat areas. These efforts should be focused on raising elevations on the interior of the islands as rapidly as possible, rather than on optimizing habitat for multiple species.

With regard to island levee habitats, there have been significant expenditures on alternative levee designs and planning by ERP and other CALFED programs. The ERP will consider re-evaluation of levee habitat recommendations in this region for habitat

value and sustainability reasons. This is not to say that habitat requirements would no longer exist, but that maybe evaluations should be made to focus riparian restoration and conservation in areas of the Delta where natural processes and conditions support it, where it provides the greatest functional value, and where riparian might have been historically present. This approach might assist in streamlining the permit process for levee improvements in consideration for island management methods that promote accretion in some regions of the Delta.

The category of intertidal is focused on areas of the Delta suitable for tidal perennial aquatic, Delta sloughs, mid channel islands and shoals, saline and fresh emergent wetland, riparian and riverine aquatic, seasonal wetlands, and inland dune scrub habitats. Properly functioning estuarine systems have deep open water channels connected to shallower channels that are imbedded in and supported by marsh plains. This part of the system, which we are referring to as intertidal, offers the opportunity to restore diverse plant communities that can contribute to the overall productivity of the Delta. These habitats once totaled approximately 400,000 acres, and today consist of only a few thousand acres. These diverse communities provide structure and processes that benefit both aquatic and terrestrial sensitive species. While species such as Delta smelt may not be limited by food sources, production from tidal habitats that is hydraulically connected to the channels of the Delta could improve conditions for pelagic organisms.

The areas identified as floodplains are also highly productive habitats with a direct linkage to aquatic species. Restoration opportunities for riparian and riverine aquatic, fresh emergent wetland, seasonal wetland, nontidal and tidal perennial aquatic, and perennial grassland habitats are the focus. There has been extensive research on the Yolo Bypass and Cosumnes River that indicate that native and migratory fish respond well when they have access to floodplain habitats. For example, those studies suggest that juvenile salmon on the floodplain have better body conditioning and survival rates. Splittail is another species that benefits from floodplain for spawning. While duration and timing of flooding plays an important role in the value and benefits of floodplain for aquatic species, we are not going into any detail on flow requirements at this time.

The strategy assumes that new floodplains would be shaped and developed based upon availability of flows or changes in river or export operations that might influence/contribute to restoration. In those areas where old flood structures such as Paradise Cut along the San Joaquin River exist, restoration and enhancement opportunities should take into consideration the flow and duration needs of species. It is fair to recognize that a new paradigm is needed for how floodplain and, more importantly, flood control is considered. The historic view has been to construct and design channels that transport water quickly away rather than providing over flow areas where flows can spread out over terrestrial dominated landscapes. Evidence on the Cosumnes River indicates that dynamic processes are needed to support complex riparian habitats and upland systems. The energy and forces from the seasonal events are critical processes that shape sediment accretion, suspension, and ultimately the floodplain habitats.

The area identified as upland transition is best characterized as land well above sea level (>5 feet). Habitats compatible with this category include annual and perennial grassland, riparian and riverine aquatic, seasonal wetland, vernal pools, and inland dune scrub. This category highlights the importance of maintaining diverse assemblages of habitats, both spatially and elevationally, and allowing the system to respond to drivers of change, such as sea level rise. This diversity at the system level enables the environment to respond to change and sustain itself. With the growing evidence of future sea level rise and global warming, the Delta environment and species are going to require space to respond to change. Tidal areas might be displaced in the future with higher waters so providing space that accommodates change and allows for natural succession is critical.

Specific areas of opportunity are identified on the map considering current knowledge. Stewart Tract and the eastern portion of Fabian Tract were designated as bypass floodway. The western portion of Fabian Tract is considered to be suitable for tidal marsh, which is consistent with our designation based solely on elevation. Based on elevation, large portions of Fabian Tract, Union Island, Drexler Tract, and Middle Roberts Island appear to have opportunities for tidal marsh restoration, and lands to the south would be appropriate for upland/transition habitat. The narrow strip of land along the eastern edge of the delta may have potential for tidal marsh restoration (West of I-5 and north of Stockton to McCormack Williamson Tract). Urban development around the City of Stockton limits the availability of land for upland/transition habitat north to about Bear Creek. North of Bear Creek there is higher elevation with potential for upland/transition habitat. The future of Staten Island may be dictated in part by current management plans. McCormack-Williamson Tract is 0 to +5 feet in elevation, and was designated as tidal marsh. Deadhorse Island could be tidal marsh but elevation is subsided and 2 to 4 feet of accretion would be necessary. The islands along the Sacramento River contain areas of inorganic, mineral soils and orchards (primarily pear), which correspond to historic natural levees which supported riparian and upland habitats. The northern Yolo bypass was designated as managed bypass with reference to the Yolo Bypass 5-Step plan (Putah Creek, Lisbon Weir, Additional multi-species habitat development, Tule canal connectivity, and Multi-species fish passage). Portions of the Yolo area are outside the legal Delta.

The ERP implementing agencies will be continuing to refine the Conservation Strategy over the next 6 to 12 months based on ongoing research, new information from other studies (Delta Risk Management Strategy, Suisun Marsh Implementation Plan, ERP End of Stage 1 review, and species recovery plans) and technical and public input. Elevation mapping sourced from LiDAR (an aircraft-based mapping technology using lasers) data will refine initial designations. A soil layer will be used to help further refine potential vegetation types. In order to address ecological processes (including resulting effects on temperature, salinity, etc.), conveyance options and hydrodynamics will be included. Installation of in-Delta barriers to remove connections between rivers (cross-channels) for a more dendritic drainage system, and levee setback to achieve shallow water habitat and flow heterogeneity will be considered in future versions. Plans will be determined for subsided islands and areas proposed for restoration will be prioritized.

**Relationship of Delta-Suisun Marsh Map categories to Ecosystem Restoration Program Plan habitat categories.**

| | **Managed Wetland and Wildlife Friendly Ag** | **Inter-tidal** | **Floodplain** | **Upland Transition** | **Grassland/ Vernal Pool Transition Corridor** | **Channel Islands** | **Water** |
|---|---|---|---|---|---|---|---|
| Tidal Perennial Aquatic Habitat | | X | X | | | | |
| Nontidal Perennial Aquatic Habitat | | | X | X | | | |
| Delta Sloughs (dead-end) | | X | | | | | |
| Delta Sloughs (open-ended) | | X | | | | | |
| Mid-channel Islands and Shoals | | X | | | | X | |
| Saline Emergent wetland | | X | | | | | |
| Fresh Emergent Wetland | | X | X | | | | |
| Seasonal Wetlands | X | | X | X | X | | |
| Riparian and Shaded Riverine Aquatic Habitats | | | X | X | X | | |
| Riparian and Riverine Aquatic Habitats (scrub, woodland, forest) | | X | X | X | X | | |
| Freshwater Fish Habitats | | X | X | | | | X |
| Essential Fish Habitats | | X | X | | | | X |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Inland Dune Scrub Habitat | | | | X | X | | |
| Perennial Grassland | | | X | X | X | | |
| Agriculture Lands (wetlands) | X | | | | | | |
| Agriculture Lands (uplands) | X | | | | | | |