

2, 2, 1

no \$ I-067

Phase II, Category III Inquiry Proposal

Project Title: A Learning Laboratory for Restoring Subsided Lands in the Delta: Phase II

Applicants: Department of Water Resources Natural Heritage Institute
U.S. Geological Survey Philip Williams and Associates, Ltd.
Northwest Hydraulic Consultants, Inc. Steve Deverel, Ph.D

Contact Persons: Curt Schmutte (916) 227-7567 Greg Thomas (415) 288-0550

Description and Primary Ecological Benefits: This inquiry proposal describes the second phase of a learning laboratory to test and learn from large scale implementation of the most promising subsidence reversal techniques and to determine where and how they can best be replicated. The first phase of this project is described in a proposal titled "A Learning Laboratory to Restore Subsided Lands in the Delta: Phase 1." This inquiry proposal describes additional subsidence reversal restoration projects on Bradford Island and a Delta-wide analysis to identify opportunities for a broad scale tidal perennial aquatic habitat restoration program. This project would create 500-1,000 acres of tidal perennial aquatic habitat on Bradford Island and also gather information necessary to apply the techniques learned on Bradford and Twitchell Island throughout the Delta.

The goal of this project is to develop technical design recommendations for a broader, long-range, cost effective and environmentally sound Delta island restoration program. Both phase I and II activities will test the efficacy and impacts of various subsidence reversal techniques, but phase II will achieve the additional objective of identifying *where* in the Delta different subsidence reversal techniques can be cost effectively implemented to harvest natural sediment transport processes, reuse dredge spoils, and maximize species benefits while maintaining water quality.

Approach/Tasks/Schedule:

- **Bradford Island Project (1998-2002):** Develop work plans, obtain permits, construct, and monitor approximately 1,000 acres of subsidence reversal and perennial tidal aquatic marsh (habitat) restoration on Bradford Island. This component will expand on the restoration experiments on Twitchell Island. Approximately 1,000 acres on the north side of Bradford Island will be transformed into three or four large plots to test various restoration techniques. Some plots would be restored to tidal flow while the others would be used to test techniques on the landward side of the levees.

Plots will be restored to tidal flow by controlled levee breaches. Breaches in the existing levee will be carefully configured to capture bed load sediment, and a network of beams will be constructed in the newly flooded area to decrease wave action and thus accelerate deposition of suspended sediment. The existing set-back levee, existing levee, and berm network will be planted with wetland and riparian vegetation to create target habitats and accelerate sediment deposition.

Bradford Island is ideally suited to test large scale subsidence reversal techniques that restore tidal perennial aquatic marsh habitat, harness natural sediment transport and deposition processes, and reuse dredge spoils. Linear, historic sand dunes on Bradford Island provide a stable base to construct set-back levees with dredged materials, and Bradford Islands proximity to the Stockton deep water ship channel facilitate reuse of dredge material and capture of natural sediments.

- **Delta-wide Sediment Supply and Transport Analysis (1998-2000):** The sediment transport and deposition dynamics of the delta are not well understood and have never been systematically studied. A better understanding of these processes will allow CALFED to harness natural sediment transport processes for the purpose of island surface accretion. This project will be integrated with a complementary USGS proposal (submitted to CALFED as "Delta Sedimentation") survey of sediment supply and transport in order to identify the best locations to harness natural sediment transport processes.
- **Water Quality Analysis (1998-2000):** Assess the biogeochemical processes controlling release of dissolved organic carbon and disinfectant by-product precursors, carbon mass balances, and net biomass accretion.
- **Resource characterization study (1998-2000):** Development of a long term tidal marsh restoration program would be best guided by an analysis and consideration of the factors that will determine the suitability of various lands for restoration. Lands throughout the Delta will be systematically characterized according to their suitability for restoration to tidal marsh. This suitability analysis will be guided by at least five factors: 1) opportunity for natural sediment capture, 2) seismic risk of levee failure, and 3) availability of willing sellers, 4) predicted impacts on water quality, and 5) value to target species.
- **Develop guidelines and recommendations for a broad scale tidal perennial restoration project in the Delta (2000):** Based on the information gained in phase I and the actions described above, we will develop recommendations regarding the most cost effective and environmentally beneficial means of restoring future tidal marsh and soil elevations where compatible with local interests throughout the Delta and identify additional research requirements. This information will allow CALFED to apply the information learned on Twitchell and Bradford Island to restoration efforts throughout the Delta.

Justification for Project Funding by CALFED: Phase II of the learning laboratory project is necessary to translate the data learned from experimental restoration plots into information that will allow CALFED to develop a broad scale plan for tidal perennial aquatic habitat restoration.

Applicant Qualifications: The project applicants have years of experience in the fields of engineering, applied hydrology and geomorphology, wetlands restoration, chemistry, and natural resources planning and conservation.

Monitoring and Data Evaluation: Both biological and physical monitoring are an integral part of the learning laboratory. The learning laboratory will not only monitor the degree to which specific CALFED targets are achieved, but will evaluate the efficacy and broader applicability of the various subsidence restoration techniques.

Local Support/Coordination with other Programs/Compatibility with CALFED objectives: This project enjoys widespread support.