



## Comprehensive Conservation and Management Plan

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### Dredging and Waterway Modification

#### Goals:

- Eliminate unnecessary dredging activities.
- Maximize the use of dredged material as a resource.
- Conduct dredging activities in an environmentally sound fashion.
- Adopt a Sediment Management Strategy for dredging and waterway modification.
- Manage modification of waterways to avoid or offset the adverse impacts of dredging, flood control, channelization, and shoreline development and protection projects.

#### Problem Statement

##### *Dredging*

Each year approximately 4,000 commercial oceangoing vessels move through the San Francisco Estuary carrying over fifty million tons of cargo worth an estimated \$25 billion. These vessels depend on deepwater ports and shipping channels in the Bay and Delta, which must be dredged annually to maintain their navigability.

Approximately eight million cubic yards (mcy) of sediment is dredged annually in the Estuary. In addition, nineteen mcy of one-time new work dredging has been authorized by Congress for the Oakland Harbor, Richmond Harbor, John F. Baldwin ship channel, and two Navy projects.

In recent years, most dredged materials have been disposed of at one of the three in-Bay sites: near Alcatraz Island, at Carquinez Strait, and in Central San Pablo Bay. Mounding at the region's primary disposal site, Alcatraz Island, revealed the site's limited capacity and caused navigation concerns. To control impacts from in-bay disposal sites, there are restrictions on the quantity, quality, and timing of dredged material disposal.

Concern has been raised about the impacts from dredging activities on aquatic organisms and water quality. Dredged material can disturb or bury benthic organisms, such as clams, worms, or crabs, as well as affect fishing success by increasing suspended sediments at the disposal site. Impacts can also occur beyond the disposal site when currents carry dredged material and associated contaminants to other parts of the Estuary. Organisms can also be impacted by contaminants that are redistributed into the water column during disposal of material.

Because of these impacts, new disposal alternatives must be found that maintain vital shipping and boating activities while also protecting the Estuary's resources. Each disposal option -- in-Bay, ocean, and upland -- poses its own set of economic and environmental problems that must be

resolved.

#### *Waterway Modification*

The physical character of the San Francisco Estuary has been drastically altered by human activities. Modification began with hydraulic gold mining in the 1800s, which brought huge quantities of sediment into the Estuary. This additional sediment blocked waterways, causing flooding during heavy rainfall. Since that time, channelization, dredging, and shoreline riprapping, coupled with urban development and construction of flood control projects, have eliminated or degraded wetland and riparian wildlife habitats. Spawning areas for anadromous fish and habitat for both migrating waterfowl and resident wildlife have also been adversely impacted.

Most of the Estuary's historic tidal marshes have been diked or filled and are now used for agriculture, duck clubs, salt ponds, and urban development. These activities have reduced the tidally influenced area by 60 percent and caused most of the remaining major slough channels to silt up. Channelization of streambeds and diking of flood plains have increased seasonal storm flows and changed sediment movement and distribution in the estuarine system. Upland development has contributed to the volume of sediment entering the system and increased the production of pollutants which adhere to the sediments.

A future rise in sea level as a result of global warming could cause increased coastal flooding and erosion. Delta islands would be especially vulnerable to catastrophic flooding because of land subsidence and the risk of levee failure.

#### **Existing Regulatory Structure**

The U.S. Army Corps of Engineers (the Corps) has primary responsibility for maintaining navigable waters in the United States. The Corps' review of proposed dredging activities considers impacts of proposed activities on navigation, fish and wildlife, conservation, pollution, aesthetics, and the general public interest. The National Environmental Policy Act (NEPA) of 1969 requires environmental assessment of each permit application and the preparation of an environmental impact statement where the assessment indicates significant environmental effects. In 1972, Section 404 of the Clean Water Act and Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) gave the Corps the primary authority to regulate dredging and disposal activities, authority to issue permits for discharge of dredged material into inland and near-coastal waters of the United States, and permitting authority over the transportation of dredged material for dumping into coastal waters and open ocean.

The Clean Water Act and the MPRSA also assign the U.S. Environmental Protection Agency (U.S. EPA) a major role in the management of dredged material. Section 102 of the MPRSA grants U.S. EPA authority to designate ocean disposal sites and cooperate with the Corps in the development of criteria for evaluation of environmental impacts of proposed disposal activities.

Section 404 requires U.S. EPA to perform similar functions in regulation of dredging activities in estuaries and other inland waters. U.S. EPA, in cooperation with the Corps, has developed guidelines for evaluation of environmental impacts of dredged material discharges and responsibility of reviewing permit applications and providing comments to the Corps.

The State Water Resources Control Board (SWRCB) and its nine Regional

Water Quality Control Boards regulate water quality in California. Activities affecting water quality are evaluated by the State and Regional Boards. As part of the environmental review specified by the Clean Water Act, Section 401 requires state water quality agencies to verify that a dredged material discharge will not violate water quality standards.

The state McAteer-Petris Act (1965) created the San Francisco Bay Conservation and Development Commission (BCDC) and gave it permitting authority for dredging and filling activities in San Francisco Bay. BCDC reviews proposed activities to ensure compliance with the Bay Plan.

The State Lands Commission (SLC) administers public trust lands in coastal waters (within a three-mile state territorial limit) and other tidal and submerged areas. Written authorization from SLC must be obtained prior to dredging or depositing dredged material on lands under SLC jurisdiction.

Various government agencies are involved in the review of dredging applications and provide comments to the Corps. Some agencies providing comments to the Corps include the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the U.S. Coast Guard, the California Department of Fish and Game, and the California Coastal Commission. Local government agencies have jurisdiction over some types of dredged material disposal activities.

### **Recommended Approach**

A new cooperative effort by state and federal agencies, ports, environmental and fishing groups, and others was recently launched to develop a Long-Term Management Strategy (LTMS) for dredging. The LTMS Project was created in January of 1990 as a multi-participant regional effort to provide a mechanism to build consensus and to support cost-sharing demands. It involves over thirty different participants, including government agencies, environmental organizations, development interests, ports, and fishing organizations. The LTMS Project is led by an Executive Committee of the Corps of Engineers' South Pacific Division Commander, the Environmental Protection Agency's Regional Administrator, the Chairs of the San Francisco Bay Regional Water Quality Control Board and the San Francisco Bay Conservation and Development Commission, and a State Coordinator. This group is regularly advised on pertinent issues by the Policy Review Committee.

The LTMS is designed to develop technically feasible, economically prudent, and environmentally acceptable long-term solutions over the next fifty years. Ocean, in-Bay, and upland disposal sites will be evaluated, as well as the potential for using clean dredged materials to create wetlands or restore levees.

Capitalizing on the valuable work of the LTMS Project, most of the dredging activities recommended in this program are drawn from its workplan. In addition, activities to specifically address waterway modification were developed. These include shoreline protection and acquisition of buffer areas. This program is intended to comprehensively address both dredging and waterway modification actions.

## **Dredging and Waterway Modification Actions**

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### Objective DW-1

*Determine the behavior and fate of sediments in the Estuary and adopt*

*policies to manage their modifications.*

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### **ACTION DW - 1.1**

***Conduct studies, research, and models of sediment dynamics.***

**Who:** LTMS Project

**What:** To better understand the behavior and fate of sediments in the Estuary, the following activities have been developed in the LTMS proposed workplan:

- Identify and summarize quantitative models available for application in the Estuary and the current status and variety of existing numerical modeling. As necessary, conduct tracer studies to define the short- and long-term transport of suspended particles from estuarine disposal sites. (LTMS Phase II, Task 3, Work Element F)
- Conduct an annual sediment budget for the period 1956 to 1990 and project next fifty years. Calculate the distribution of in-Bay deposits and loss to the ocean by difference between input and net accumulation. Obtain annual maintenance dredging volumes to relate annual sediment supply to maintenance requirements. (LTMS Phase II, Task 3, Work Element F)
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- Conduct field and laboratory studies to characterize suspended and deposited sediment. Complete detailed hydrographic surveys of navigation and disposal areas for verification of sediment transport models. (LTMS Phase II, Task 3, Work Element F)
- Measure sediment afflux and influx through the Golden Gate over tidal cycle to determine suspended sediment losses. (LTMS Phase II, Task 3, Work Element F)
- Develop three-dimensional sediment transport models that could be incorporated into existing two-dimensional models. (LTMS Phase II, Task 3, Work Element F)

**When:** Initiated in July of 1991, with activities to be completed by December, 1993

**Cost:** Approximately \$780,000

### **ACTION DW - 1.2**

***Conduct studies on sediment changes aimed to define accumulation and erosion processes in marsh and mudflat areas.***

**Who:** U.S. Geological Survey (lead), NOAA, and Regional Water Quality Control Boards

**What:** Through the National Coastal Plan program, study estuarine sediment dynamics with particular focus on processes acting in near-shore areas. Identify trends in accumulation and erosion sediment and what management practices may be responsible for those trends. Integrate this effort with the LTMS and other sediment research efforts and watershed plans being developed by the RWQCBs.

**When:** Begin in 1993

**Cost:** Approximately \$2,225,000

**ACTION DW-1.3**

***Adopt policies to manage modification of estuarine sediment production, movement, and deposition.***

**Who:** Lead and responsible agencies under CEQA and NEPA (i.e., U.S. Army Corps of Engineers, Regional Water Quality Control Boards, San Francisco Bay Conservation and Development Commission, and State Lands Commission)

**What:** Require applicants for waterway modification projects to avoid or minimize, where appropriate, project impacts on sediment production, movement, and deposition through development of erosion and sediment control plans and Corps of Engineers Clean Water Act Section 404 permits.

- Condition project approvals to avoid adverse impacts to estuarine sediment dynamics.

**When:** 1994

**Cost:** No direct costs

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**Objective DW-2**

*Determine the bioavailability of contaminants released by disposal of dredged material through methods such as bulk chemistry assays, toxicity bioassays, and bioaccumulation tests.*

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**ACTION DW - 2.1**

***Conduct laboratory and field bioaccumulation investigations and studies on suspended sediment effects on sensitive life stages throughout the food chain.***

**Who:** LTMS Project

**What:**

- Prepare a detailed bioaccumulation study plan and conduct field investigations to produce a baseline bioaccumulation survey with conclusions about the levels of aquatic species contamination related to deposited and suspended sediment conditions. (LTMS Phase 11, Task 3, Work Element G)
- Conduct tests with pelagic eggs of fish species representative of those that spawn in San Francisco Bay. Eggs/embryos/larvae of other species representative of species that spawn in the Estuary might also be considered.
- Document the distribution of suspended sediment in time and space from individual and multiple disposal activities in relation to long-term background concentrations of suspended sediments in the Central Bay. Hydraulically dredged sediment from hopper dredges and mechanically dredged sediment from barges will be monitored. All the data will be evaluated from a mass balance approach to assess the distribution of disposal-related suspended sediments and the role of disposal operations in the suspended sediment in the Central Bay. (LTMS Phase 11, Task 3, Work Element G)

**When:** December, 1993

**Cost:** Approximately \$250,000

**ACTION DW - 2.2**

*Develop and set sediment quality objectives.*

**Who:** State Water Resources Control Board and Regional Water Quality Control Boards

**What:** Develop a more objective method by which the results of sediment testing may be evaluated. Establish criteria that quantitatively define when test results are considered to be significant in predicting an adverse environmental effect. Establish numerical limits for pollutant levels in material proposed for dredging.

**When:** Initiated in July of 1991, scheduled to be completed by 1997

**Cost:** \$2,605,000 estimated total (\$105,000 federal and \$2.5 million state)

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Objective DW-3

*Develop a comprehensive regional strategy to better manage dredging and waterway modification and ancillary activities.*

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**ACTION DW - 3.1**

*Develop a dredge project needs assessment and, as necessary, a prioritization plan, including structural and nonstructural methods to minimize volume requirements.*

**Who:** LTMS Project

**What:**

- Compile long-term dredging volume estimates for all federal projects, public and private ports, marinas, and harbors. Prioritize the disposal needs of each individual dredging project. (\$25,000)
- Identify alternative dredging practices and general design considerations for new projects and recommend modifications for existing projects to reduce dredged material volumes. Require implementation of the dredging design modifications for all applicable projects through the Clean Water Act Section 404 permitting process. (LTMS Phase II, Task 3, Work Element C) (\$22,000)

**When:** June, 1992, through January, 1993

**Cost:** \$47,000

**ACTION DW - 3.2**

*Identify dredged material re-use and nonaquatic disposal opportunities and constraints.*

**Who:** LTMS Project

**What:**

- Complete a comprehensive inventory of geographic sites that are suitable for re-use and/or disposal alternatives. Include preliminary cost

estimates for the range of sites, review existing state or federal bonds available for restoration projects, and identify monetary benefits and intrinsic value to the public of created habitats. Working with local agencies, constraints on potential re-use sites such as laws, regulations, agency policies, engineering impediments, and environmental considerations, including contaminants, wetland impacts, endangered species, etc., will be evaluated. (Phase II, Task 2, Work Element B) (\$200,000)

- Document procedures necessary to evaluate acceptable material type, consistency, and contaminant levels for re-use projects; coordinate with regulatory and resource agencies to share information and achieve agreement(s). Estimate amount of material not acceptable for aquatic and unmanaged or unconstrained nonaquatic disposal. Identify potential benefits and impacts resulting from disposal on terrestrial, wetland, and aquatic ecosystems. Plan and conduct field/laboratory experiments/demonstrations as needed to determine effectiveness and feasibility of dredged material re-use techniques. (LTMS Phase II, Task 3, Work Element D) (\$790,000)
- Develop site-specific conceptual re-use/nonaquatic disposal plans. Provide preliminary engineering, with cost estimates, for site improvements, unloading facilities, transportation improvements, site preparation, and maintenance. Develop "value-added" guidelines to determine intrinsic value to the public for restored or created wetlands. Develop "capitalization" programs for dredge material re-use projects, such as federal or state bonds to pay for re-use projects. (LTMS Phase II, Task 3, Work Element E) (\$500,000)
- The United States Congress should authorize and appropriate funding for the U.S. Army Corps of Engineers to purchase and implement upland disposal and re-use sites within the Estuary including Sonoma Baylands Project. In addition, incentives should be developed for private disposal and wetland restoration opportunities.

**When:** January, 1991, to January, 1994

**Cost:** Approximately \$1,640,000

#### **ACTION DW - 3.4**

*Develop regulatory land use procedures to promote re-use of dredged material, wetlands restoration and/or creation, and other beneficial uses.*

**Who:** LTMS Project, local land use agencies, and regulatory agencies

**What:**

**When:** July, 1994

**Cost:** Approximately \$50,000

#### **ACTION DW - 3.4**

*Identify the aquatic and terrestrial resources that are affected by dredging and disposal and are to be protected in the Bay and Delta.*

**Who:** LTMS Project

**What:** Establish and document existing resources and beneficial uses to be protected. Document health and distribution of resources to be protected. Conduct a two-day intensive workshop on the impacts to resources and beneficial uses caused by dredging. Document effects of dredged material

disposal on resources of concern. (LTMS Phase II, Task 2, Work Element A)  
(\$50,000)

**When:** January, 1992

**Cost:** \$50,000

**ACTION DW - 3.5**

*Designate dredged material reference sites for use in development of sediment testing protocols.*

**Who:** LTMS Project

**What:** Determine background concentrations of sediment parameters in the Estuary. Compare sediments of proposed dredging projects to reference sites rather than to proposed disposal sites, in order to assess potential impacts of disposal. (\$20,000)

**When:** December, 1992

**Cost:** \$20,000

**ACTION DW - 3.6**

*Evaluate retention and removal needs for derelict structures in the Bay and Delta.*

**Who:** U.S. Army Corps of Engineers

**What:** Various derelict structures along the shoreline are affecting sediment transport and local navigation. A comprehensive inventory should be completed to assess the feasibility of removing these structures on a case-by-case basis.

**When:** December, 1994

**Cost:** Approximately \$75,000

**ACTION DW - 3.7**

*Adopt regulatory and management policies for Estuary dredging activities and develop dredging and disposal projects that are consistent with the state's existing policies in the San Francisco Bay Plan and in the San Francisco Bay and Central Valley Basin Plans.*

**Who:** Estuary regulatory, planning, and resource agencies and dredging project sponsors

**What:** Local, state, and federal agencies should modify their policies regarding dredging activities as needed to ensure that they are consistent with the policies of the San Francisco Bay Conservation and Development Commission's San Francisco Bay Plan and the respective Basin Plans of the San Francisco Bay and Central Valley Regional Boards. Ports and other dredging sponsors should plan and conduct dredging activities consistent with the state's dredging policies.

**When:** Immediately

**Cost:** No direct cost

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Objective DW- 4

*Encourage the re-use of dredged material for projects such as wetlands creation/restoration, levee restoration, landfill cover, and upland building material where environmentally acceptable.*

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**ACTION DW 4.1**

***Identify dredged material disposal options, including cost estimates and alternative disposal methods. Conduct periodic review as necessary.***

**Who:** LTMS Project

**What:**

- List all available disposal options (See Appendix A for Status and Trends Report on Dredging and Waterway Modification Long-Term Management Options for Dredging Activities) and document studies performed to date that are specific to each option and the Estuary disposal requirement. Identify disposal options feasible for the Estuary together with potential disposal capacity and document infeasible options. (LTMS Phase II, Task 1, Work Element A) (\$25,000)
- Prepare cost estimates to a preliminary level (plus or minus 25 percent) for the dredging/disposal combinations under consideration. Develop a cost estimating model covering the mobilization, excavation, hauling, disposal, and monitoring costs for the main dredging/disposal techniques under consideration. Develop methods for capitalization of costs considering funding by ports versus other methods, such as federal or state bonds. (LTMS Phase II, Task 3, Work Element B) (\$18,000)
- Summarize disposal options identified from previous actions. Categorize specific disposal options into management options and develop evaluation criteria. Criteria should consider environmental, engineering/economic, and institutional/regulatory factors. (LTMS Phase II, Task 4, Work Elements A, B) (\$20,000)
- Select dredged material disposal options. Evaluate alternative dredged material disposal approaches based on engineering, economic, and environmental criteria. Select the most practicable dredged material disposal option or options and provide the necessary documentation needed to support this selection. Develop site-specific management plans for the selected options, including site environmental and capacity monitoring, permit requirements, mitigation plans, operation procedures, guidance for site use, and delineation of site management responsibilities. (LTMS Phase III, Tasks 1, 2, and 3)
- Develop implementation component for dredged material disposal plan. The implementation plan should include administrative, procedural, management, and monitoring requirements; environmental documentation for the life of the plan; long-term water quality certification, site specific and regional permits and authorization; formalized regional mitigation strategies; and implementation of site management requirements. (LTMS Phase IV)
- Periodically re-evaluate the selected dredged material disposal plan based on changing regulatory, economic, environmental, and technological conditions. This review is to assure that decision-makers will maintain a viable implementation strategy which reflects changing conditions throughout the fifty-year implementation timeframe. (LTMS Phase V)

**When:** December, 1992

**Cost:** Approximately \$500,000

**ACTION DW - 4.2**

***Conduct modeling and field studies to determine the saltwater intrusion impacts caused by dredging projects.***

**Who:** U.S. Army Corps of Engineers and project proponents

**What:** Conduct modeling and field studies to determine the saltwater intrusion impacts caused by dredging projects. Based on the results of the studies, manage dredging projects to minimize the impacts caused by saltwater intrusion. Require project expansions and future projects to mitigate for saltwater intrusion significant impacts as identified during the NEPA process.

**When:** December, 1993

**Cost:** No direct cost

**ACTION DW - 4.3**

***Revise Public Notice 87-1, "Interim Testing Procedures for Evaluating Dredged Material Suitability for Disposal in San Francisco Bay" and develop testing procedures and protocols for ocean and upland environments.***

**Who:** U.S. Army Corps of Engineers, U.S. EPA, Regional Water Quality Control Boards, San Francisco Bay Conservation and Development Commission, and State Lands Commission

**What:** Based on past results of regulating dredging projects through Public Notice 87-1, "Interim Testing Procedures for Evaluating Dredged Material Suitability for Disposal in San Francisco Bay," revise and update Public Notice 87-1 to include sediment quality objectives, designated reference sites, and current sediment testing requirements. Prepare and implement testing procedures and protocols for each ocean disposal (using the U.S. EPA testing manual Evaluation of Dredged Material Proposed for Ocean Disposal, February, 1991, No. 503/8-91/001) and wetland restoration/upland disposal projects.

**When:** December, 1992

**Cost:** Approximately \$40,000

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**Objective DW-5**

***Identify threats to and benefits for Estuary resources from future modifications to waterways.***

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**ACTION DW - 5.1**

***Determine areas subject to flooding and erosion and identify causes.***

**Who:** The U.S. Geological Survey and local governments for local subsidence, U.S. EPA for global changes

**What:** Submit a report that identifies areas subject to extreme wave events.

Determine relative sea level change by: 1) quantifying local elevation changes along the shoreline; and 2) determining the most supportable estimate for change in global sea level.

**When:** 1993

**Cost:** Approximately \$650,000

**ACTION DW -5.2**

*Implement waterway modification policies that protect shoreline areas from detrimental flooding and erosion while maintaining natural resource values.*

**Who:** State agencies, San Francisco Bay Conservation and Development Commission, the Delta Estuarine Agency, and local governments.

**What:** Adopt enforceable policies that require preservation, where possible, of upland areas to build or enlarge protective levees or other flood control structures through local zoning, the U.S. Army Corps of Engineers, the Federal Emergency Management Agency, and the Department of Water Resources.

**When:** 1993

**Cost:** \$7,720,000 estimated total (\$7,720,000 state)

**ACTION DW - 5.3**

*Establish a program to acquire diked historic baylands listed as buffer areas for coastal flooding and sea level rise. (Cross-referenced to Wetlands Program)*

**Who:** State legislature, California Coastal Conservancy, land trusts, and State Lands Commission

**What:** Bond and mitigation funds should be provided to purchase diked baylands that can serve as buffer areas for rising sea level or that could be used to mitigate for erosion of tidal marsh.

**When:** 1992

**Cost:** \$7,520,000 estimated total (\$7,520,000 state)

The total estimated cost for the Dredging and Waterway Modification Program is \$24,172,000.

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