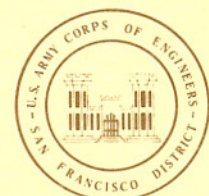


**FINAL
COMPOSITE
ENVIRONMENTAL
STATEMENT**



**MAINTENANCE DREDGING
EXISTING NAVIGATION PROJECTS
SAN FRANCISCO BAY REGION
CALIFORNIA**



DECEMBER 1975

VOLUME I



DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
100 McALLISTER STREET
SAN FRANCISCO, CALIFORNIA 94102

SPNED-E

12 December 1975

The San Francisco District, U.S. Army Corps of Engineers, has prepared a final Composite Environmental Statement for Maintenance Dredging of Existing Navigation Projects in San Francisco Bay Region, California, in accordance with provision of the National Environmental Policy Act of 1969 (42 U.S.C. Sec. 4332 et seq.) (NEPA). It was filed today with the Council on Environmental Quality.

Under NEPA, comments may be submitted to this office before 19 January 1976. These comments will become part of the official record.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "H. A. Flertheim, Jr.", is written over the typed name.

H. A. FLERTHEIM, JR.
Colonel, CE
District Engineer

STATEMENT OF FINDINGS

MAINTENANCE DREDGING EXISTING NAVIGATION PROJECTS SAN FRANCISCO BAY REGION CALIFORNIA

1. Purpose of SOF. The purpose of this Statement of Findings is to set forth the rationale leading to a recommendation that the maintenance dredging for the Federal navigation projects in San Francisco Bay be continued as authorized, and as described in the Final Composite Environmental Statement. Shoal material from the projects listed a-o are disposed in open water:

- a. San Francisco Harbor (Main Ship Channel and Islais Creek)
- b. Petaluma River (Phase I)
- c. San Pablo Bay and Mare Island Strait
- d. Richmond Harbor
- e. Oakland Harbor
- f. San Francisco Harbor and Bay - Sausalito Operations Base
- g. Suisun Bay Channel
- h. Concord Naval Weapons Station
- i. Alameda Naval Air Station
- j. Military Ocean Terminal, Bay Area - North
- k. Naval Supply Center - Oakland
- l. Military Ocean Terminal, Bay Area - East
- m. Point Molate
- n. Government Island
- o. Horseshoe Cove

The disposal sites for the following projects, p-t, are still under review. Should land disposal be selected, these projects would be subject to additional assessment followed by preparation of supplemental environmental statements and statements of findings. Should water disposal be selected, these projects are also recommended for continued maintenance as authorized and described in the Final Composite Environmental Statement:

- p. San Rafael Creek
- q. San Leandro Marina
- r. Redwood City Harbor
- s. Suisun (Slough) Channel
- t. New York Slough

Future Corps permit applications for dredging in the Bay will be evaluated on a case-by-case basis, and will be the subject of additional environmental review and future statements of findings. The Final Composite Environmental Statement will be used as a background source to aid in assessing these dredging permits in the Bay.

2. Evaluation of Methodology. A preliminary outline of the Working Paper for the Composite Environmental Statement was presented to the Dredge Advisory Group^{1/} and several conservation groups for comment in November 1974. The Working Paper was published in March 1975 and sent to Federal, State, county, city, regional agencies, civic organizations, businesses, port officials, and conservation groups to solicit comments. Comments on the Working Paper were incorporated into the Draft Composite Environmental Statement which was circulated for formal review on 31 July 1975. A Public Meeting was conducted on 14 October 1975.

Questions and issues raised during the above review process have been addressed in the Final Composite Environmental Statement and the major concerns and issues that have been expressed by other agencies and citizens in response to the Working Paper, Draft Environmental Statement, and Public Meeting have been related to the impacts of dredging and disposal in the Bay; impacts on air quality; economic and social impacts; secondary impacts related to port, marina, and oil company activities; clarification of alternatives related to land disposal, ocean disposal, and marsh creation; and the need for further studies concerning dredge and disposal impacts.

The Draft Environmental Statement was distributed in accordance with applicable directives to all Federal, State, and local agencies with responsibility for, special interest in, or expertise on the project area as well as to interested public interest groups and other private citizens. As a result of the extensive review and coordination procedures, I find that the final statement adequately addresses the issues with respect to maintenance dredging of existing navigation projects in the San Francisco Bay Region.

3. Rationale and Discussion. The possible consequences of the navigation projects have been studied for environmental, social well-being, economic effects (including regional and national economic development) and engineering feasibility. In evaluating the projects, the following points were considered pertinent:

a. Environmental Considerations.

(1) Bay Estuary - Turbidity in the upper water column from a dredging activity usually lasts less than 15 minutes with the highest turbidity values adjacent to the dredge. In addition to the turbidity plume created in the upper water column, dredging induces an ill-defined fluff zone in the channel bottom which can last up to several weeks. This fluff zone shifts with the tide but is localized to the channel boundaries, and eventually consolidates.

^{1/} The Dredge Advisory Group consists of representatives from EPA, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Corps of Engineers, Regional Water Quality Control Board, Bay Conservation and Development Commission, State Fish and Game, State Lands Commission, C-MANC, and Dredging Contractors Association, who meet monthly to discuss dredge-disposal issues. Meetings are open to the public.

Material released at open water disposal sites reaches the bottom relatively intact. Less than five percent of the material is dispersed in the upper water as the material descends. The disposed sediments are subsequently dispersed within the bottom few feet of the water column, diluted, and follow the circulation pattern of natural sediment distribution in the Bay.

Benthic organisms experience various amounts of dredging impact depending on the surface area disturbed, the numbers and species present, depth of the cut, and frequency of maintenance. In San Francisco Bay, it does not appear that sediments from disposal operations cause extensive smothering of benthic organisms because the disposal areas are high energy areas where currents are swift and continuous. Estuarine fish (including anadromous fish) are generally tolerant of relatively high turbidity and can avoid or move away from immediate areas of impact.

Dredging and disposal have adverse impacts on bottom dwelling organisms in the immediate work areas. Some organisms are destroyed at both the dredging and disposal site, while others are transported to the disposal site. Indications are that, while there is some diversity of life at project and disposal sites, these areas, in general, do not have as great an abundance of life as those areas outside the channel or disposal sites.

To date, there is no indication that dredge and disposal operations directly influence uptake of toxic constituents although there is evidence of limited release of some contaminants during sediment agitation.

(2) Terrestrial Environment - Five projects (see above) are being considered for a possible land disposal alternative. Redwood City Harbor has four land sites that are being studied, of which one will probably be selected for disposal of dredged material. Site No. 1 is the Port of Redwood City's preferred site but objections have been raised to using this site by the U.S. Fish and Wildlife Service, State Resources Agency and others. Potential land sites for the other four projects will be investigated for impacts on geologic and hydrologic conditions, vegetation and wildlife, and the long-range use of the filled site. All existing projects (Congressionally-authorized and permit dredging) from which dredged material will be placed on land (except for Redwood City Harbor if the material is disposed on Site No. 1) will require a supplemental environmental statement that will address the impacts of land disposal.

(3) 100-Fathom Ocean Disposal Site - Bay sediments have more silt, clay and heavy metals than the 100-fathom sediments. Disposed material reaches the bottom essentially intact. If this disposal site is used frequently and routinely, disposed Bay materials could inhibit or reduce recolonization of indigenous species if the material is not dispersed, and could affect spawning, nursing, or feeding in the impacted area.

(4) Endangered and Rare Species - Threatened species will not be directly affected by dredging and water disposal operations. The existence of, and impacts on, endangered and rare species will be investigated for any potential land disposal site used in the appropriate supplement.

(5) Air Quality - Total shipping activities in the Bay have only a minor impact on overall air quality. With this perspective, Corps dredging activities constitute only a small percentage of the total shipping, and therefore account for a very limited amount of the total air pollutants emitted in the Bay Area.

b. Social Well-Being Considerations.

(1) Historical and Archaeological Sites - All 20 projects are areas previously dredged. Of the five projects involving land disposal, only the Port of Redwood City has tentatively chosen a land disposal site. The site has been investigated by an archaeologist and the determination has been made that no archaeological resources exist and that no historical sites will be affected. Any other potential sites for Port of Redwood City land disposal and land disposal sites for other projects will be surveyed by a professional archaeologist, and a supplement to the environmental statement will be issued to cover this and other considerations.

(2) Demography and Land Use - Most of the 20,400 port-related jobs are in core urban areas and help sustain the economic health of those areas. Maintenance dredging is essential to port operations; thus it strengthens the inner city economies and to some extent retards the exodus from cities to suburbs.

(3) Government - Port activities comprise a vital part of socio-economic structures of city government land use plans.

(4) Transportation - Trucking and rail lines interface with waterborne commerce in the Bay area to link water and land freight transfer. Maintenance dredging serves to continue this efficient and economical land-water freight system.

(5) Recreation - Maintenance dredging benefits some recreational boaters in areas such as San Rafael Creek and San Leandro Marina as well as all other marinas covered under the Corps permit program. Cessation of maintenance dredging would have a negative social impact on such recreation activities.

(6) Scenic Resources - Land disposal would have an aesthetic impact. If land disposal is utilized, this impact will be assessed in the appropriate supplemental environmental statement.

c. Engineering Considerations.

(1) Existing Project - The Federal navigation projects under consideration have already been constructed. Hydrographic surveys are routinely done to determine when maintenance dredging is required and to estimate the amount of material to be dredged.

(2) Land Disposal - Those projects for which land disposal is being considered will be subjected to engineering review and analysis. This review and analysis will consider such items as seismic hazards, ground water, runoff, etc. Supplemental environmental statements for these projects will include these considerations.

(3) Future Projects - New dredging projects, both Federal and private requiring a permit, and expansion of current projects will be the subject of engineering review and analysis and will have separate environmental reports issued on them.

d. Economic Considerations.

(1) Economy - Maintenance of Federal navigation projects will have a positive impact on the San Francisco Bay regional economy. Dredging is considered to have beneficial long-term impacts for maintaining port facilities and navigation commerce, helping to maintain land values, public revenues, and the provision of community services. Total military and civil port investment in the Bay-Delta area was nearly \$2 billion through 1973. Over 4,500 vessel trips with ships greater than 25-foot draft, requiring dredged channels for navigation, passed through San Francisco Bay and over 56 million tons of cargo were handled in Bay-Delta ports in 1973.

(2) Employment - the Federal navigation projects maintain channels that serve commercial ports, private wharves, oil piers, and military installations that are dependent on Bay access. Approximately 7,800 jobs were related to export in the Bay area. Numerous other jobs are indirectly related to waterborne transportation.

e. Alternative Considerations.

(1) No Maintenance - In order to provide open navigation channels for commercial shipping and other purposes in the national interest, dredging in the Bay area has become a continual operation and it is doubtful that maintenance dredging would be permanently halted. Two programs of decreasing maintenance dredging activities, partial and complete moratoriums, would be extreme measures having severe negative socio-economic impacts throughout the Bay region and the nation, as well as both positive and negative environmental effects.

(2) Alternate Dredging Methods - Present dredging methods in the Bay include the hydraulic cutterhead pipeline, the hopper dredge and the clamshell dredge. Each method is uniquely suited for particular project conditions. Studies are being conducted to develop methods which may reduce impacts on the aquatic environment without decreasing dredging efficiency. All methods are required to meet the total dredging requirement.

(3) Alternate Disposal Sites - Alternative proposals for disposal in the Bay are ocean disposal, land disposal, and salt marsh development. Large scale ocean disposal by hopper and/or barge is uneconomical and not in line with energy conservation. A conceptual plan of a permanent, self-contained pipeline system to the ocean disposal site was investigated for economic feasibility, but appears infeasible in the short run. Any ocean disposal plan would require a detailed study in which alternative ocean disposal plans would be thoroughly assessed prior to approval. Land disposal is a short-term alternative and should be considered as an alternative to aquatic disposal. Should land disposal be selected for a particular project, a supplemental environmental statement will be prepared covering all aspects of this alternative. Marsh development studies have shown this to be a feasible alternative; however, like other land disposal alternatives, it should be considered short-term and of limited applicability.

(4) Economic Consideration for Alternatives - Economic analysis of the cost efficiency of alternative dredging and disposal systems were derived in the following ranking (from least expensive to most expensive): closest aquatic disposal (no constraints on disposal), closest aquatic disposal seaward of the dredge site (no constraints), ocean disposal (100-fathom contour), land disposal (Petaluma River Area), delta island reclamation (Sherman Island), and marshland development (Petaluma River Area).

(5) Reduce Shoaling Rate - Studies have been conducted involving structural plans to either prevent shoaling in the navigation channels or to increase flushing of the channels, and selection of alternative aquatic disposal sites to reduce the amount of sediments returning to the channels.

(6) Development in Dredging Technology - Important factors being considered involve improving the efficiency of dredging techniques, acquiring new equipment, applying chemical additives, and adjusting the timing, scheduling, and methodology of dredging operations. These factors are being studied by the Corps.

f. Other Public Interest Considerations.

(1) Federal Navigation Projects - Federal navigation projects planned for the coming year are announced in a single public notice. Revised public notices are issued as required.

(2) Regulatory Permit Actions - Dredging projects for which a Department of the Army permit is required are announced by public notice. For small volumes (less than 10,000 cubic yards) involving land disposal above MHHW, no public notice is issued; however, all concerned agencies are afforded the opportunity to comment on the project.

(3) Public Hearings - If requested, public hearings are held on both Federal navigation projects and permit dredging projects. These hearings afford concerned agencies and individuals additional opportunity to comment.

4. Conclusions and Recommendations. Based on an analysis and evaluation of the investigation conducted on the proposed Federal navigation projects, I find that an interdisciplinary approach has been used in the preparation of the Final Composite Environmental Statement and that all major environmental issues have been addressed. I find that where the proposed projects have adverse environmental effects, these effects are limited (based on available study results), or are substantially outweighed by other positive considerations. There are no adverse economic effects with regard to these projects. On the contrary, there are substantial positive economic benefits to be gained by the Bay Area, and a curtailment of these maintenance projects could, in fact, have a major adverse economic impact.

Therefore, based on a thorough analysis, and evaluation, I recommend that the subject Federal navigation projects be maintained as authorized, with the understanding that land disposal will be analyzed in supplements. I further recommend that the Final Composite Environmental Statement be used to aid in assessing the impacts of future permit navigation projects. I find this recommendation consistent with national policies, statutes, and administration directives.

28 November 1975



H. A. FLERTZHEIM, JR.
Colonel, CE
District Engineer

STATEMENT OF FINDINGS - Maintenance Dredging
Existing Navigation Projects
San Francisco Bay Region, California

I have reviewed the Statement and concur with the findings of the District Engineer.

5 December 1975

Richard M. Connell

RICHARD M. CONNELL
Brigadier General, U. S. Army
Division Engineer

I concur in the preceding statement of findings.

FOR THE CHIEF OF ENGINEERS:

12 December 1975
Date

Ernest Graves
ERNEST GRAVES
Major General, USA
Director of Civil Works

ERRATA SHEET

1st page after title page, #2, 8th line: "66%" should read "67%."

p. vi, IIC1b: "San Francisco Bay and Vicinity" should read "San Francisco Bay and vicinity."

p. 2, 2nd para., 8th line: "840,000 cubic yards" should read "1,000,000 cubic yards."

p. 4, 5th para., 6th line: "about 25,000 cubic yards" should read "about 26,000 cubic yards."

p. I-43, 1.117, 4th line: "25,000 cubic yards" should read "26,000 cubic yards."

p. II-35, 2.113, 1st line: First sentence should read, "Sites for disposal of dredged material in San Francisco Bay are located along the channel margins or in natural channels."

p. II-35, 2.113, 4th line: "dince" should read "since."

p. II-50: Delete footnote 3/. Period after "projects" should be deleted, and a comma inserted to make a complete sentence ("...dredging projects, they are not...")

p. II-165, 2.501, 4th line: "Archtocephalus" should read "Arctocephalus."

p. IV-43, 4.118, 8th line: "tickets" should read "ticks."

p. IV-46, 4.129: Last sentence should continue as, "These references simply reveal the uncertain state of the physiology of pertinent trace elements. This uncertainty is magnified when related to estuarine water varying greatly in salinity. Interestingly, Knauer and Martin (91) concluded: that the east Pacific oceanic environment does not seem to be heavily contaminated with total mercury; that there is little indication of significant total mercury concentration by plankton; but that there are relatively high levels of organic mercury in plankton and anchovy which suggest a natural high level condition; and that physiologically safe levels of a particular metallic element will be maintained unless natural environmental levels are grossly exceeded."

p. IV-48, 4.132, 3rd line: "they" should read "They."

p. IV-48, 4.932, 18th line: "dadmium" should read "cadmium."

p. IV-48, 4.132, 8th line from bottom: "dregree" should read "degree."

Plate IV-1 should read IV-2 and vice versa.

ERRATA SHEET (Cont'd)

p. IX-30, 9.147, 6th line: "(Umax 9-3) 1.0 foot per second" should read "Umax (-35) of 1.0 foot per second."

p. IX-33, 9.166, 1st line: "Table IV-E" should read "Table IV-3."

p. R-17, #173: "Sher" should read "Sherk."

B-12: The last sentence should read, "The draft final report is scheduled for March 1976 with the final report in June 1976."

FINAL
COMPOSITE ENVIRONMENTAL STATEMENT

MAINTENANCE DREDGING
OF EXISTING NAVIGATION PROJECTS IN
SAN FRANCISCO BAY REGION, CALIFORNIA

Prepared by
U. S. Army Engineer District, San Francisco, California
December 1975

MAINTENANCE DREDGING
OF EXISTING NAVIGATION PROJECTS IN
SAN FRANCISCO BAY REGION, CALIFORNIA

() DRAFT ENVIRONMENTAL STATEMENT (X) FINAL ENVIRONMENTAL
STATEMENT

Responsible Office: U. S. Army Engineer District, San Francisco,
California

1. Name of Action: (X) Administrative () Legislative

2. Description of Action: The maintenance dredging program of 20 federal navigation projects in the San Francisco Bay Area (from Suisun Bay to South Bay) is described. Dredged material from at least 15 projects is disposed of at five designated open water sites. The other five projects are contemplating land disposal. An average of seven million cubic yards is annually dredged from these projects, which is approximately 66% of the total annual amount dredged in the Bay. The other 33% is dredged by private interests under permit from the Corps and these projects are also briefly described. Besides assessing the impacts of the 20 projects above, this document will be used as a background source to aid in assessing future Corps permit dredging in the Bay.

3. a. Beneficial Environmental Impacts: Periodic restoration of these 20 projects to the maintenance depths insures safe navigation for waterborne commerce, military shipping and recreational boating. Maintaining these projects is essential to the military mission of the Navy, to the economic stability of the San Francisco Bay Area and its environs (such as Sacramento and Stockton areas), and to areas of the United States using the various commercial ports as an import/export shipping point.

b. Adverse Environmental Effects:

Bay Estuary - Turbidity in the upper water column from a dredging activity usually lasts less than 15 minutes with the highest turbidity values adjacent to the dredge.

In addition to the turbidity plume created in the upper water column, dredging induces an ill-defined fluff zone within the channel bottom which can last up to several weeks. This fluff zone shifts with the tide, but is localized to the channel boundaries and eventually consolidates.

Material released at open water disposal sites reaches the bottom relatively intact. Less than 5% of the material is dispersed in the upper water as the material descends. The disposed sediments are subsequently dispersed within the bottom few feet of the water column, diluted, and follow the circulation pattern of natural sediment distribution in the Bay.

Benthic organisms experience various amounts of dredging impact depending on the surface area disturbed, the numbers and species present, depth of the cut, and frequency of maintenance. Indications are that, while there is some diversity of life at project and disposal sites, these areas, in general, do not have as great an abundance of life as those areas outside the channel or disposal sites. Estuarine fish (including anadromous fish) are generally tolerant of relatively high turbidity and can avoid or move away from immediate areas of impact.

To date, there is no indication that dredge and disposal operations directly influence uptake of toxic constituents although there is evidence of limited release of some contaminants during sediment agitation.

No historic and archaeological resources in the Bay will be affected by dredging and aquatic disposal since the dredge and disposal sites have been routinely disturbed for many years.

100-Fathom Ocean Disposal Site - Bay sediments have more silt, clay and heavy metals than the 100-fathom sediments. Disposed material reaches the bottom essentially intact. If this disposal site is used frequently and routinely, disposed Bay material could inhibit or reduce recolonization of indigenous species if the material is not dispersed, and could affect spawning, nursing, or feeding in the impacted area. Areas affected beyond the dump site would depend on the extent of dispersion and dilution.

Terrestrial Environment - Land disposal for five of the federal projects is still being considered. Any permanent change of biological conditions of the sites is considered adverse. There is no evidence of significant historical or archaeological resources at land site No. 1 of Redwood City Harbor, which is the Port's preferred land disposal site. All existing projects (federal and permit dredging) from which dredged material will be placed on land (except for Redwood City Harbor if the material is disposed at Site No. 1) will require a supplemental environmental statement which will address the impacts of land disposal.

Air Quality - Total shipping activities in the Bay have minor impact on overall air quality. With this perspective, Corps dredging activities constitute only a small percentage of the total shipping, and therefore account for a very limited amount of the total air pollutants emitted in the Bay Area.

Indirect Adverse Effects - Since maintaining the Bay's navigation projects helps sustain port, marina, and certain military and commercial operations, resultant impacts of these operations on the environment are, in part, indirectly related to maintenance dredging of channels. Impacts from these operations stem from, among others, inadvertent oil spillage, runoff, waste discharge and auto air pollutants.

4. Alternatives: Alternatives to continuing the current maintenance dredging operation are: no maintenance (complete moratorium); maintenance of selected navigation projects (partial moratorium); alternative methods of dredging; alternative disposal sites (ocean, land, island creation, salt marsh creation); reduce shoaling rate; develop new dredging and disposal equipment.

5. Comments Received:

a. Federal Agencies

Advisory Council on Historic Preservation
Environmental Protection Agency
Federal Energy Commission
U. S. Department of Commerce
U. S. Department of Health, Education and Welfare
U. S. Department of Interior
U. S. Department of the Navy
U. S. Soil Conservation Service
U. S. Department of Transportation

b. State Agencies

The Resources Agency of California
State Water Resources Control Board

c. Regional Agencies

East Bay Regional Park District

d. County/Local Agencies

Marin County Department of Public Works
City of Richmond
San Francisco Department of City Planning
Santa Clara Valley Water District

e. Private Interests, Conservation Groups and Others

California Waterfowl Association
Golden Gate Audubon Society
Marine Affairs and Navigation Conference
Port of Oakland
Save San Francisco Bay Association
Stanford Research Institute
Linda K. Anderson
Joel W. Hedgpeth
Mary C. Scales
Howard O. Wright

6. Draft Statement to C.E.Q. 31 July 1975
Final Statement to C.E.Q. _____

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