

**MILITARY OCEAN TERMINAL CONCORD  
(MOTCO)  
WHARF MAINTENANCE DREDGING PROJECT  
CONTRA COSTA COUNTY, CONCORD,  
CALIFORNIA**

**Calendar Years 2022-2031**



**Draft Environmental Assessment  
May 2021**



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**DRAFT  
ENVIRONMENTAL ASSESSMENT  
FOR  
WHARF MAINTENANCE DREDGING PROJECT  
AT MILITARY OCEAN TERMINAL CONCORD, CA**

**Submitted to:  
Military Ocean Terminal Concord  
5110 Port Chicago Highway  
Concord, CA 94520**

**May 2021**

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**DRAFT ENVIRONMENTAL ASSESSMENT**

**FOR**

**WHARF MAINTENANCE DREDGING PROJECT AT**

**MILITARY OCEAN TERMINAL CONCORD, CA**

**Proponent: Military Ocean Terminal Concord**

**NEPA Lead Agency: Surface Deployment and Distribution Command (SDDC) at the Military Ocean Terminal Concord**

**APPROVAL**

This Environmental Assessment meets the requirements of NEPA, 40 CFR 1500-1508 and 32 CFR 651.

25 May 2021

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Date

  
  
LTC, LG  
CDR, 834th Trans BN (SDDC)  
Military Ocean Terminal Concord

## **FINDING OF NO SIGNIFICANT IMPACT (33 C.F.R. pt. 230-325)**

### **Maintenance Dredging of the Military Ocean Terminal (MOTCO), Concord in Suisun Bay Calendar Years 2022 - 2031**

**1. Introduction:** The Military Ocean Terminal, Concord (MOTCO), proposes to implement operations and maintenance dredging of the navigation approaches to the three wharves, Barge Pier and a proposed boat ramp in Suisun Bay, California, for a period of 10 years (2022 through 2031). The navigation approaches and preferred placement site is within Contra Costa County. However, the geographic scope may be expanded to identify an appropriate placement site in the greater San Francisco Bay geographical area.

**2. Action:** The Proposed Action is to implement maintenance dredging of the navigation approaches to the wharves at MOTCO in Suisun Bay, California, as described under the Proposed Action/Project. Specifically, the navigation approaches to the MOTCO Wharves 2, 3, 4, Barge Pier, and proposed boat ramp from the Suisun Bay Channel will be dredged biennially using a mechanical dredge. Dredged material will be placed at an appropriate disposal site, or at a secondary site, determined by the Dredge Materials Management Office, as discussed under the Proposed Action.

Under the Proposed Action, additional best management practices will be employed during maintenance dredging to minimize potential impacts to fish resources. This includes, but is not limited to, dredging in the annual work window, between August 1 and November 30.

Using the existing best management practices and the additional best management practices not previously used at MOTCO identified under the Proposed Action, will ensure that the Proposed Action does not adversely affect Federally-listed fish.

**3. Factors Considered:** Factors considered for this Finding of No Significant Impact were direct, indirect, and cumulative impacts on geology, soils, and sediment quality; hydrology and water quality; biological resources, including Federally-listed species; cultural and paleontological resources; and hazards and hazardous materials. Environmental resources that are not present in, or affected by the dredging, transportation of materials, or dredge disposal areas include forestry and agricultural land use, energy, noise, recreation, aesthetics, population, housing, utilities, transportation, air quality, and regional growth. These factors were previously analyzed in the Federal channels dredging compliance documents, and therefore additional analysis is not required in this document.


**4. Conclusion:** Based on a review of the information incorporated in the Environmental Assessment and supported by the administrative record, the United States Army Corps of Engineers concludes the proposed activity will not significantly affect the quality of the physical, biological, and human environment. In addition, avoidance, minimization, and mitigation measures are proposed to further support this determination. Therefore, pursuant to the

provisions of the National Environmental Policy Act of 1969, the preparation of an additional Environmental Impact Statement will not be required.

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Date

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LTC, LG  
CDR, 834th Trans BN (SDDC)  
Military Ocean Terminal Concord

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## ACRONYMS AND ABBREVIATIONS

ADNWR	Antioch Dunes National Wildlife Refuge
BAAQMD	Bay Area Air Quality Management District
Basin Plan	Water Quality Control Plan for the San Francisco Basin
Bay Plan	San Francisco Bay Plan
BCDC	San Francisco Bay Conservation and Development Commission
BMP	best management practice
CAA	Clean Air Act
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CDF	confined disposal facility
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
BRAC	Base Realignment and Closure
CEQA	California Environmental Quality Act
CEQAnet	online environmental database of the State Clearinghouse
CESA	California Endangered Species Act
CMA	Critical Maneuvering Area
72 COLREGS	International Regulations for Preventing Collision at Sea
CRHR	California Register of Historical Resources
CSCC	California State Coastal Conservancy
CSLC	California State Lands Commission
CRRP	Cullinan Ranch Restoration Project
CWA	Clean Water Act
CY	cubic yard
CZMA	Coastal Zone Management Act
dB	decibel
DDT	dichloro-diphenyl-trichloroethane
Delta	Sacramento-San Joaquin River Delta
DMMO	Dredged Material Management Office
DMMP	Dredged Material Management Plan
DMMS	Dredged Material Management Site
DMPS	Dredged Material Placement Site
DoD	United States Department of Defense
DPS	Distinct Population Segment
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIR	Environmental Impact Report

## ACRONYMS AND ABBREVIATIONS

EIS	Environmental Impact Statement
ESA	Endangered Species Act (Federal)
Estuary	San Francisco Bay/Delta Estuary
ESU	Evolutionarily Significant Unit
FMP	fisheries management plan
FR	Federal Register
FTA	Federal Transit Administration
FY	fiscal year
GHG	greenhouse gas
hp	horsepower
ICRMP	Integrated Cultural Resource Management Plan
INRMP	Integrated Natural Resource Management Plan
IPCC	Intergovernmental Panel on Climate Change
ITM	Inland Testing Manual
LTMS	Long-Term Management Strategy
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MALSF	Marine Aggregate Levy Sustainability Fund
mg/L	milligrams per liter
MLLW	mean lower low water
mm	millimeter
MOTCO	Military Ocean Terminal Concord
MPRSA	Marine, Protection, Research and Sanctuaries Act
MWRP	Montezuma Wetlands Restoration Project
NAVFAC	Naval Facilities Engineering Command
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Unit
NUAD	Non-suitable for unconfined aquatic disposal
NWSSBDC	Naval Weapons Station Seal Beach Detachment Concord
OESS	Ordnance Explosive Safety Specialist
OR&R	Office of Response and Restoration
OTM	Ocean Testing Manual
PAH	polycyclic aromatic hydrocarbon

## ACRONYMS AND ABBREVIATIONS

PCB	polychlorinated biphenyl
pH	measure of the acidity or basicity of an aqueous solution
Regional Water Board	San Francisco Bay Regional Water Quality Control Board
RHA	River and Harbors Act
RMS	root mean square
SAP	Sampling and Analysis Plan
SCC	State Coastal Commission
SF-9	Carquinez Strait placement site
SF-16	Suisun Bay placement site
SF-DODS	San Francisco Deep Ocean Disposal Site
SFEI	San Francisco Estuary Institute
SPL	sound pressure level
SRDWSC	Sacramento River Deep Water Ship Channel
SUAD	suitable for unconfined aquatic disposal
TSS	Total suspended solids
U.S. Army ERDC	United States Army Engineer Research and Development Center
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTM	Upland Testing Manual
UXO	Unexploded ordnance
WETA	San Francisco Bay Area Water Emergency Transportation Authority
WQC	water quality certification

## 1.0 INTRODUCTION

### 1.1 INSTALLATION DESCRIPTION AND CURRENT STATUS

On behalf of the Military Ocean Terminal Concord (MOTCO), the U.S. Army Corps of Engineers (USACE) has prepared this Environmental Assessment (EA) to address the environmental effects of the operations and maintenance dredging of the navigation approach and berthing areas for Wharves (Piers) 2, 3, 4, Barge Pier, and proposed boat ramp, along with the associated placement of dredged materials for a period of 10 years. The three wharves, Barge Pier and proposed boat ramp are served by a Federal navigation channel – Suisun Bay Channel. The navigation channel, wharf approaches, and nearest approved placement/disposal sites located in Contra Costa and Solano Counties. This EA is prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) (42 United States Code [U.S.C.] § 4321 et seq.); Council on Environmental Quality (CEQ) NEPA regulations (40 Code of Federal Regulations [CFR] Parts 1500–1508); and Army’s NEPA regulations (32 CFR Part 651). As the internal draft EA was circulated for review prior to the September 14, 2020 effective date of CEQ’s updated NEPA regulations, CEQ’s pre-2020 version of its NEPA regulations apply. The Surface Deployment and Distribution Command (SDDC) at MOTCO is the NEPA lead agency for this EA. The Proposed Action and Alternatives are described in Chapter 2.

Located near Concord, California (CA), along Suisun Bay (Figure 1 and Figure 2), MOTCO is an Army Military Surface Deployment and Distribution Command (SDDC) munitions and general cargo transshipment facility. Maintaining the authorized approach depth to all wharves and proposed boat ramp is important to MOTCO’s continued operational capability.

The dredging process involves the excavation of accumulated sediment from the navigation approaches to the wharves. MOTCO, as mandated by Congress, is responsible for maintaining the navigability of Wharves 2, 3, 4, Barge Pier, and the proposed boat ramp location to historic and/or authorized depths or lesser regulatory depths. Accumulation of the sediment that settles in these the navigation approaches can impede navigability. Maintenance dredging removes this sediment and returns the the navigation approaches to the established depths necessary to provide safe, reliable, and efficient waterborne transportation systems (channels, harbors, and waterways) for the movement of ships and operations in support of the MOTCO mission. Dredge materials will be placed at the former Navy dredge materials placement site on MOTCO.

The environmental effects of maintenance dredging of the Federal navigation channels, including Suisun Bay, have been previously described in USACE’s Final Composite Environmental Impact Statement for Maintenance Dredging of Existing Navigation Projects, San Francisco Bay Region in December 1975, and updated in the Long-Term Management Strategy (LTMS) for Placement of Dredged Material in the San Francisco Bay Region, Final Policy Environmental Impact Statement / Programmatic Environmental Impact Report (EIS/EIR) in 1998 and 2015 Federal Navigation Channels EA/EIR. Initially, sediment would be placed at MOTCO to support removal of UXO from the dredged materials. Placement would occur in a manner consistent with LTMS permit conditions established by the applicable regulatory agencies. Alternatively, in the future suitable materials screened to remove UXO may be transported to a permitted facility or location for beneficial reuse.

This EA is intended to fulfill MOTCO’s NEPA compliance requirements for maintenance dredging of the navigation approaches from the Federal Navigation Channel to the berthing areas at the MOTCO wharves and proposed boat ramp for the Federal fiscal years 2022 through 2031.

## 1.2 PROJECT LOCATION AND SCOPE OF ANALYSIS

MOTCO is located on Suisun Bay, 30 miles northeast of San Francisco, in Contra Costa County. MOTCO's infrastructure was constructed by the U.S. Navy beginning in WWII and operated as a Navy installation. The U.S. Army MOTCO began operations in 1997. Under a Base Realignment and Closure (BRAC) process, the installation was transferred to the Army in 2008. This installation is the primary West Coast common-user transshipment terminal, home to the SDDC's 834th Transportation Battalion.

Maintaining deep-draft access is needed to support MOTCO's mission. The U.S. Navy dredged the wharves, navigation approach, and the South Seal Island Channel on average every two years from 1943 through 1981 (Figure 2 and Figure 3). More than 1.8 million cubic yards (CY) was dredged over this time period averaging 87,000 CY per dredge event. Since 1981, additional dredging events are documented between 1986 and 1994. MOTCO does not have any documentation of dredge events between 1994 and 2008. Dredging has not occurred since the U.S. Army assumed the property in 2008 at the conclusion of the BRAC process. Sediment accumulation around the wharves has resulted in sediment elevations above the authorized depth of 35 feet mean lower low water (MLLW) at Wharves 2, 3, 4, and 20 feet (MLLW) at the Barge Pier, and current shoals impact the port safety and operations. Dredged material from MOTCO was historically placed on upland levee sites and infrequently at the Carquinez Strait (SF-9) and Suisun Bay disposal sites (SF-16) (see Figure 2).

The Army proposes to construct a new boat ramp in the former Navy Tugboat Basin for smaller watercraft to be quickly and easily launched and retrieved from the water for supporting MOTCO operations. The proposed boat ramp will support operation readiness to launch and/or recover security and fireboats without relying on external launch facilities. The Tugboat Basin is located at the mouth of Otter Slough and derives its name from its former use by the Navy. Navy tugboats would dock at this berthing location until needed to push boats away from the piers and wharves. Currently, small watercraft are driven (5+ miles) to Martinez to be put in the water and then driven by water back to MOTCO. Dredging of this area will provide the depth and turning radius to support launching and retrieving small watercraft.

The scope of analysis includes the navigation approaches from the Federal Navigation Channel to the berthing areas at the MOTCO Wharves 2, 3, 4, Barge Pier, and a proposed boat ramp. Placement of dredge materials on MOTCO will include material transfer and handling, removal of munitions, and management of drainage water from the site. Placement at the Carquinez Strait (SF-9), Suisun Bay disposal sites (SF-16), Montezuma Wetlands Restoration Project (MWRP), Cullinan Ranch Restoration Project (CRRP), and the Antioch Dunes National Wildlife Refuge (ADNWR) placement sites (Figure 2) are excluded from the scope of analysis evaluated in this EA, as these sites are fully permitted to accept dredged material for wetland restoration, including complying with NEPA and all other applicable environmental compliance. The potential direct and indirect impacts (e.g., noise) of the Proposed Action are evaluated within the dredging footprint.

## 1.3 PROJECT PURPOSE, NEED, AND OBJECTIVES

The purpose of the Proposed Action is to maintain the authorized navigation approach depth for MOTCO Wharves 2, 3, 4, Barge Pier, and the proposed boat ramp. Sediment accumulation around the wharves has resulted in existing depths that are above the authorized depths, limiting



ingress and egress at the wharves, and impacting safety of port operations. Maintenance dredging is needed to continue MOTCO's mission requirements.

MOTCO specific project objectives are to:

- Provide safe, reliable, and efficient navigation to Wharves 2, 3, 4, Barge Pier, and the proposed boat ramp located in Suisun Bay in a feasible manner. This objective is considered the underlying, fundamental purpose of the proposed project.
- Conduct dredging and materials placement in a manner that adequately protects the environment through compliance with existing federal and state regulations.
- Conduct dredging using methods that protect Federally-listed species.

#### **1.4 SCOPE AND CONTENT OF THE EA**

This EA evaluates the potential environmental impacts that would result within the project area adjacent to the Suisun Bay Channel.

Chapter 1 of this EA, Introduction, describes the installation background, location, project need and objectives, the project's relationship to other plans and policies, and the regulatory LTMS framework, and other background information. Chapter 2, Alternatives, describes the location of potential material placement sites, dredging operations, the alternatives development process for the project and the Proposed Action/Project and its alternatives. Chapter 3, Affected Environment and Environmental Consequences, presents the regulatory and environmental setting for the project, and the environmental impacts of the project alternatives. Chapter 4, Public and Agency Involvement, describes the public scoping and public review process, including agency coordination. Chapter 5, Findings, presents a summary of impacts and proposed mitigation measures of the Proposed Action. Chapter 6, List of Preparers, provides a list of agency staff who prepared this EA.

MOTCO would comply with all Federal, State, and local regulations for its operation and maintenance dredging projects. Specific regulations that apply to this project are described in Regulatory Authorities (Section 1.7). This includes regulations regarding the discharge of dredged materials into waters of the United States or ocean waters as detailed in 33 C.F.R. §320-332. The regulations describe the procedures that must be followed to conduct dredged material disposal in compliance with Section 404 of the CWA (for disposal in waters of the United States), Section 10 of the Rivers and Harbors Act (RHA) (for work in navigable waters), and the Marine Protection, Research and Sanctuaries Act (MPRSA) (for disposal in ocean waters). In addition, pursuant to the Federal Coastal Zone Management Act (CZMA), MOTCO's maintenance dredging and dredged material placement needs to be consistent with the State's coastal zone management program and policies to the maximum extent practicable (16 U.S.C. § 1456).

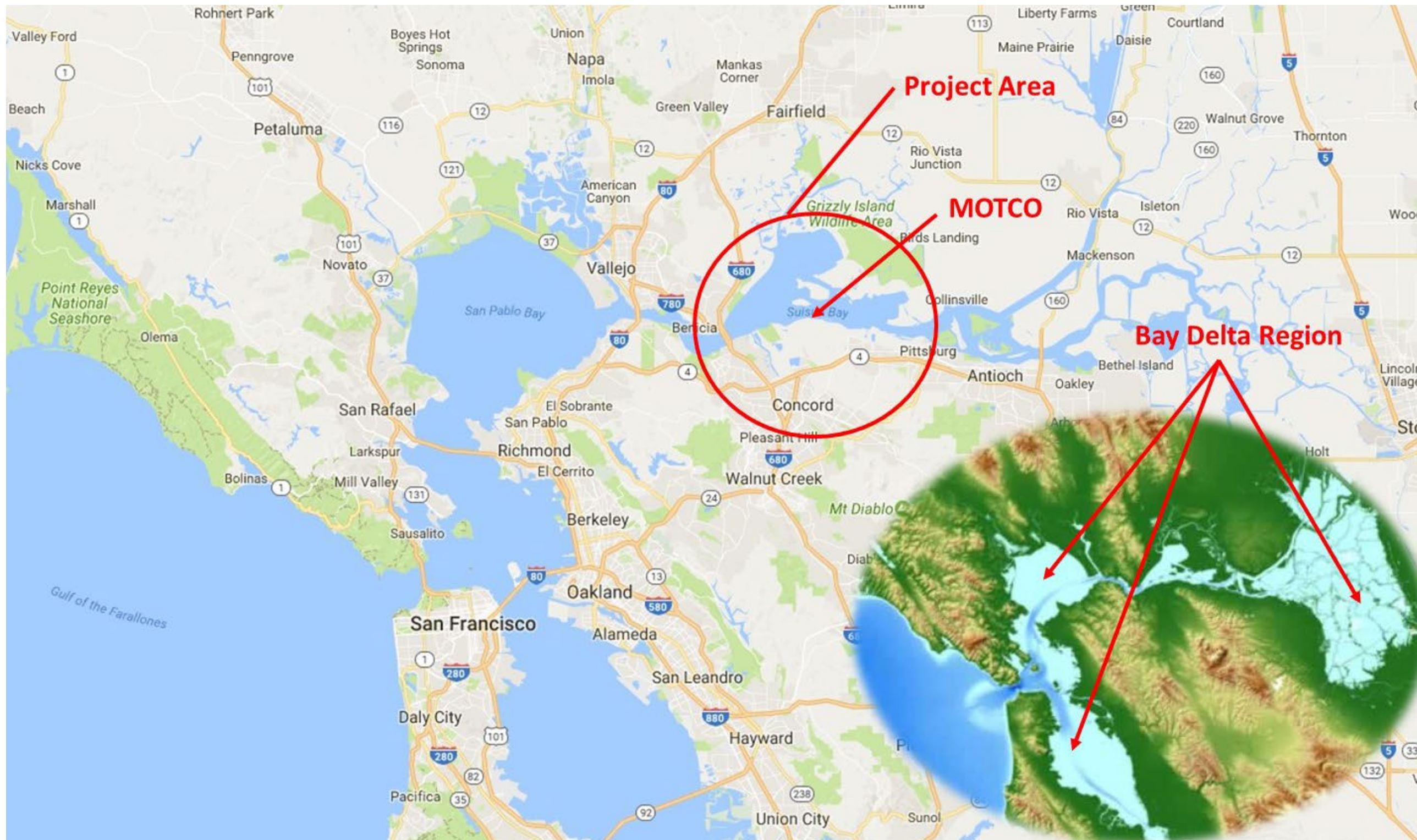


Figure 1 The greater San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Regional Area) in the Vicinity of MOTCO.





Figure 2 MOTCO Dredging Project Area and Potential Material Placement Sites.



Figure 3 MOTCO Dredging Areas Outlined. Large objects to be relocated are labeled O.

#### **1.4.1 2015 Federal Navigation Channels EA/EIR**

The 2015 EA/EIR was a joint document between USACE and the RWQCB to assess a 10-year Programmatic maintenance dredging of all Federal navigation channels in the Bay-Delta region (USACE, 2015). The EA/EIR evaluated four alternatives and demonstrated compliance with the existing BOs from NMFS and USFWS, and SHPO NHPA consultations. The 2015 EA/EIR incorporated by reference the existing LTMS EIS/EIR.

#### **1.4.2 The Long-Term Management Strategy**

The LTMS is a 50-year, interagency Programmatic planning document for dredging and dredged material disposal activities in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. The LTMS Program comprises State and Federal regulatory agencies with primary authority to review and permit dredging and disposal activities in the greater San Francisco Bay Area. Participating agencies include USACE, the USEPA, the RWQCB, the State Water Resources Control Board, the San Francisco BCDC, and the State Lands Commission. Implementation of the LTMS began in 2001 with the adoption of the LTMS Management Plan following State and Federal threatened and endangered species (listed) consultation and coordination with the NMFS and the USFWS.

Since 2011, USACE has been required to consult on effects to Delta Smelt (*Hypomesus transpacificus*) for dredging of the Navigation Channels because of documented occurrences of entrainment during monitoring of hopper dredge use. In 1997, NMFS published regulations requiring consultation for projects or programs that could adversely affect EFH in accordance with the Magnuson Stevens Fisheries Management Act. The LTMS agencies and NMFS completed a Programmatic EFH consultation for the LTMS Program in 2011 (USACE and USEPA, 2011).

In 2012, the LTMS agencies completed a comprehensive 12-year review of the program. The review process involved collecting, analyzing, disseminating, and presenting data about the LTMS Program's performance as well as a series of public meetings (each focused on a different key topic suggested by stakeholders), and preparation of a Final 12-Year Review Report summarizing the review findings. Based on this process, the LTMS agencies concluded that the LTMS goals remain appropriate and largely implementable, and that the program has been successfully implemented to date.

#### **1.4.3 Relationship to San Francisco Bay Plan**

The BCDC regulates dredging and dredged material placement in San Francisco Bay / Sacramento-San Joaquin Delta Estuary area. Under authority of the State McAttee-Petris Act of 1965, the BCDC prepared the San Francisco Bay Plan and in 1968 adopted regulations and policies regarding dredging and placement in San Francisco Bay. The San Francisco Bay Plan dredging policies were amended to adopt the LTMS findings, including reducing in-Bay disposal, maximizing beneficial reuse, and an allocation strategy to reduce in-Bay disposal. The BCDC is the State coastal management agency pursuant to the Federal CZMA for the San Francisco Bay segment of the California coastal zone. Under the Federal consistency provisions of CZMA, Federal projects need to be determined to be consistent with the State's coastal zone management program and policies to the maximum extent practicable (16 U.S.C. § 1456). The consistency determination is made by the lead Federal agency, and concurrence is sought from the CZMA managing agency which has the ability to concur, condition the project to find

consistency, or object to the project. Dredging and placement projects must be consistent with all Bay Plan policies, to the maximum extent practicable. MOTCO would complete all environmental compliance prior to contracting and commencing dredging activities.

#### **1.4.4 Relationship to Regional Water Quality Control Plan/CWA 401**

RWQCB is the State implementing agency responsible for CWA 401 permitting actions, and for developing a water quality Basin Plan. The Basin Plan is the primary document used by RWQCB for the regulation of in-Bay dredging. In 2008, the Basin Plan was amended to identify the LTMS strategy as the key process for addressing dredging operations in San Francisco Bay, achieving the LTMS goals, and adopted the guidelines contained in the 1998 USACE/USEPA Inland Testing Manual and local implementation procedures developed through the Dredged Material Management Office (DMMO) as the appropriate framework for evaluating the suitability of dredged material for disposal at in-Bay disposal sites, and providing revised permit conditions to reflect requirements of the USFWS and NMFS.

#### **1.4.5 Relationship to the CWA 404**

San Francisco Bay (including the Sacramento-San Joaquin Delta Estuary), along with its tributary rivers, streams, adjacent wetlands, and the Pacific Ocean out to the 3-mile limit, are “waters of the United States” in CWA Section 404 jurisdiction. USACE, USEPA, and RWQCB regulate the placement of dredged material in San Francisco Bay pursuant to the CWA through the LTMS DMMO, as described in Section 1.6.6. USACE implements Section 404 of the CWA, and USEPA has oversight authority. Discharge of dredged materials into waters of the United States is regulated under Section 404 of the CWA. USACE’s regulations identify factors to be considered in evaluating the discharge of dredged material into waters of the United States, including navigation and the Federal standard; water quality; coastal zone consistency; wetlands; Federally threatened and endangered species; and fish and wildlife (35 C.F.R. pt. 336.1[c]). USACE’s evaluation of discharges (placement) of dredged material in Suisun Bay and compliance with Section 404 of the CWA, the MPRSA, and the CZMA is guided by the LTMS Program, and other plans and policies described in this section.

#### **1.4.6 Management of Dredged Material**

Authorization to discharge dredged material in the open ocean, enclosed coastal waters, upland sites, or for beneficial reuse is provided through a variety of Federal and State permitting processes. USACE and USEPA jointly regulate the discharge of dredged material into waters of the United States and the transportation of dredged material for the purpose of disposal in ocean waters pursuant to Section 404 of the CWA and the MPRSA (also refer to Sections 1.6 and 1.6.5). The CWA requires MOTCO to seek State water quality certification for discharges of dredged or fill material into waters of the United States. Under Section 401 of the CWA, RWQCB must certify that the activity will not violate State water quality standards and other applicable requirements before MOTCO is authorized to commence dredging. Pursuant to the consistency provisions of the CZMA, BCDC has authority over dredging and disposal of dredged material in San Francisco Bay/Sacramento-San Joaquin Delta Estuary.

##### **1.4.6.1 Dredged Material Management Office (DMMO)**

In 1996, the DMMO was created to establish a comprehensive and consolidated approach to eliminate redundancy and delays in the dredged material disposal permitting process. DMMO reviews dredging projects to determine if they comply with applicable Federal and State laws

(depending on if the applicant is a Federal or non-Federal agency), including the CWA, CZMA, RHA, Federal Endangered Species Act (ESA), and the California Endangered Species Act (CESA). DMMO is a joint program composed of USACE, USEPA, BCDC, RWQCB, and the State Lands Commission. Other participating agencies include the CDFW, NMFS, and USFWS.

#### **1.4.6.2 Testing Requirements for Placement and Beneficial Reuse of Dredged Material**

Material proposed to be dredged and placed at ocean, inland aquatic, or upland/beneficial reuse sites (including MOTCO) requires sediment characterization to predict the environmental impacts associated with dredging and dredged material placement activities. The objective of the sediment testing requirements is to determine whether disposal of dredged material at designated disposal sites can occur without causing unreasonable degradation to the surrounding environment. Generally, sediments are tested for physical and chemical attributes and/or the potential for biological toxicity. The extent of sediment characterization necessary to ensure compliance with applicable environmental laws and regulations is generally site-specific. The type and extent of testing depends on the physical characteristics of the sediment, as well as the characteristics of the dredged material placement site. The dredging action area limits associated with this project, which includes 2 feet of overdepth, has been sampled and sediment analysis completed (USACE 2020a). DMMO reviews sediment testing plans and results and determines suitability for placement of dredged material (DMMO 2020) at a given location based on sediment testing results and the LTMS Program goals.

### **1.5 DOCUMENTS INCORPORATED BY REFERENCE**

Incorporation of previous analysis by reference is encouraged by NEPA. For NEPA, the CEQ regulations (40 C.F.R. § 1500.4, 1502.21) state that agencies shall incorporate material by reference when the effect will be to reduce bulk without impeding agency and public review of the project alternatives. The incorporated material shall be cited, and its content summarized. No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment. Material based on proprietary data, which are themselves not available for review and comment, shall not be incorporated by reference.

This EA incorporates by reference information contained in the following documents:

- The Military Ocean Terminal Concord (U.S. Army) 2019 Maintenance Dredging Final Sampling and Analysis Report prepared by Pacific EcoRisk and DR Reed and Associates Inc (USACE 2020a). This document analyzed the chemical constituents of sediment sampled from the berthing approaches at MOTCO.
- The San Francisco Bay to Stockton, California, Navigation Improvement Project Final Integrated General Reevaluation Report and Environmental Impact Statement (IGRR-EIS; USACE 2020b). This document provides a regional overview of environmental impacts of climate change and maintenance dredging in the area of Suisun Bay and MOTCO.
- The 2015 Maintenance Dredging of the Federal Navigation Channels in the San Francisco Bay Final EA-Finding of No Significant Impact (FONSI) and Environmental Impact Report (EIR) prepared jointly by USACE and the San Francisco Regional Water Quality Control Board (RWQCB) (referred to as 2015 Federal Navigation Channels EA/EIR) (USACE 2015). This document analyzed the

environmental impacts associated with Programmatic maintenance dredging of Federal navigation projects in the San Francisco Bay-Delta.

- The Final Composite Environmental Statement for Maintenance Dredging of Existing Navigation Projects, San Francisco Bay Region was issued by the San Francisco District in 1975 (USACE, 1975). This document analyzed the environmental impacts associated with the maintenance dredging of 20 Federal navigation projects in San Francisco Bay, including the South Seal Island Channel and Concord Naval Weapons Station as dependent on Suisun Bay Channel dredging.
- Final Policy Environmental Impact Statement/Programmatic Environmental Impact Report (EIS/EIR), Long Term Management Strategy (LTMS) for the Placement of Dredged Material in the San Francisco Bay Region (LTMS, 1998). The LTMS EIS/EIR was jointly published by the LTMS agencies to select the overall long-range approach to conduct necessary dredging and dredged material disposal in an environmentally sound and economically prudent manner, to maximize the beneficial reuse of dredged material, and to develop a coordinated permit review process for dredging projects. Three alternative, long-term approaches were evaluated in the LTMS EIS/EIR that would achieve the LTMS goals to various extents.
- Record of Decision, LTMS for the Placement of Dredged Material in the San Francisco Bay Region (USACE et al., 1999). The Record of Decision identified, from the alternatives considered in the LTMS EIS/EIR, the alternative selected by USACE and the United States Environmental Protection Agency (USEPA) to guide dredged material placement decisions in the San Francisco Bay Region for a period of 50 years.
- Final Long Term Management Strategy Management Plan for Placement of Dredged Materials in the San Francisco Bay Region (USACE et al., 2001). This document describes the detailed measures by which the LTMS agencies are implementing the EIS/EIR's long-term plan.
- LTMS National Marine Fisheries Service Biological Opinion (NMFS, 2015). This document transmits the National Marine Fisheries Service (NMFS) Biological Opinion (BO) for the LTMS Program and its effects on Federally-listed species under NMFS' jurisdiction at the time the consultation was completed. The BO outlines implementing procedures and minimization measures.
- LTMS U.S. Fish and Wildlife Service Biological Opinion (USFWS, 1999). This document transmits the United States Fish and Wildlife Service (USFWS) BO for the LTMS Program and its effects on Federally-listed species under USFWS' jurisdiction at the time the consultation was completed. The BO outlines criteria for inclusion of projects under the Programmatic consultation, implementing procedures, and minimization measures. The BO was amended in 2004 to modify certain restrictions and minimization measures (USFWS, 2004).
- LTMS California Department of Fish and Game Concurrence on Biological Opinions (CDFG, 1998). In this document, the California Department of Fish and Game (now the California Department of Fish and Wildlife [CDFW]) concurred with the USFWS and NMFS BOs on the LTMS Program.
- Delta Smelt: 2004 Formal Programmatic Consultation with the U.S. Fish and Wildlife Service (USFWS, 2004). The USFWS issued a Programmatic BO on the issuance of Rivers and Harbors Act Section 10 permits and Clean Water Act (CWA) Section 404



permits for projects with relatively small effects on Delta Smelt and its critical habitat in the jurisdiction of USFWS' Sacramento Field Office. It should be noted that since 2011, USACE has been required to consult on impacts to Delta Smelt during dredging of the Suisun Bay Channel and New York Slough because of documented occurrences of entrainment during monitoring of hopper dredge use. Since 2011, USACE has received non-jeopardy opinions from USFWS to maintain Suisun Bay Channel with a hopper or clamshell dredge.

- Programmatic Essential Fish Habitat (EFH) Assessment for the Long-Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region (USACE and USEPA, 2009). Pursuant to Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (16 U.S.C. § 1855[b]), USACE and USEPA submitted a Programmatic EFH Assessment to NMFS for the San Francisco Bay Region LTMS. This document provides an assessment of the potential effects to EFH from the ongoing dredging and dredged material placement activities of all Federal and non-Federal maintenance dredging projects in the San Francisco Bay Region.
- Agreement on Programmatic EFH Conservation Measures for Maintenance Dredging Conducted Under the LTMS Program (USACE and USEPA, 2011). This document identified a comprehensive suite of EFH conservation measures developed in coordination with NMFS and completed the Programmatic EFH consultation covering all maintenance dredging projects under the LTMS Program.
- Final Environmental Impact Statement for the Modernization and Repair of Piers 2 and 3, Military Ocean Terminal Concord, CA (U.S. Army 2015a). This document evaluated the demolition and reconstruction of the Pier 2 and 3 infrastructure. A supplemental EA was completed in 2017 focused on Pier 2 updates.
- Final Supplemental Environmental Assessment for Pier 2 Modernization and Repair Design Changes at Military Ocean Terminal Concord, CA. (U.S. Army 2017a). This document provides additional information on affected environmental resources.
- Military Ocean Terminal Concord. Integrated Natural Resources Management Plan 2017-2022 (U.S. Army 2017b). This management plan describes habitats and species at MOTCO.

Relevant portions of all documents incorporated by reference into this EA are summarized throughout this EA where specifically noted.

## **1.6 REGULATORY AUTHORITIES**

Key Federal and State laws applicable to the development of this EA, the proposed dredging and dredged material placement activities, and the protection of aquatic resources, are summarized below. This EA incorporates by reference the 2015 Federal Navigation Channels EA/EIR regarding Federal and California State Laws. Additional details on these laws, required permits or consultations (Table 2) as well as other laws governing the protection of environmental resources, are presented in the Regulatory Setting section for each environmental resource topic analyzed in Chapter 3.

### **1.6.1 Federal Laws**

Key Federal and State laws applicable to the development of this EA, the proposed dredging and dredged material placement activities, and the protection of aquatic resources, are summarized

below. Additional details on these laws, as well as other laws governing the protection of environmental resources, are presented in the Regulatory Authorities Section 1.6 of the 2015 Federal Navigation Channels EA/EIR. Where applicable, details are also provided in the regulatory setting sections for each environmental resource topic analyzed in Chapter 3.

- Army Regulation 200-1 Environmental Protection and Enhancement
- Abandoned Shipwreck Act, 43 U.S.C. §§ 2101–2106
- Archaeological Resources Protection Act (16 U.S.C. § 470 et seq.)
- Executive Order 11593, Protection and Enhancement of the Cultural Environment
- National Historic Preservation Act (16 U.S.C. § 470 et seq.)
- National Environmental Policy Act (NEPA, 42 U.S.C. § 4321 et seq.)
- CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 C.F.R. § 1500 et seq.)
- 32 C.F.R. 651 (Environmental Analysis of Army Actions)
- 40 C.F.R. 93 (Determining Conformity of Federal Actions to State or Federal Implementation Plans)
- Clean Water Act (CWA, 33 U.S.C. § 1251 et seq.)
- Clean Air Act (CAA, 42 U.S.C. 7401 § et seq.)
- Coastal Zone Management Act (CZMA, 16 U.S.C. 1451 et seq.)
- Endangered Species Act (ESA, 16 U.S.C. § 1531 et seq.)
- Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.)
- Marine Mammal Protection Act (16 U.S.C. §§ 1361-1421h),
- Marine Protection, Research and Sanctuaries Act of 1972 (MPRSA, 16 USC § 1431 et seq. and 33 USC §1401 et seq.)
- Migratory Bird Treaty Act (16 U.S.C. § 703 et seq.)
- Rivers and Harbors Act (RHA 33 Stat. 1147; 33 U.S.C. 419)
- Executive Order 13112, Invasive Species
- Executive Order 11990, Protection of Wetlands
- Submerged Lands Act (43 U.S.C. § 1301 et seq.)

MOTCO would comply with USACE regulations for its operation and maintenance dredging projects involving the discharge of dredged materials into waters of the United States or ocean waters and work in navigable waters as detailed in 33 C.F.R. § 320-332. The regulations describe the procedures that MOTCO must follow to conduct dredged material disposal in compliance with Section 404 of the CWA (for disposal in waters of the United States), Section 10 of the RHA (for work in navigable waters) and the Marine Protection, Research and Sanctuaries Act (MPRSA) (for disposal in ocean waters). In addition, pursuant to the Federal Coastal Zone Management Act (CZMA), MOTCO's maintenance dredging and dredged material placement needs to be consistent with the State's coastal zone management program and policies to the maximum extent practicable (16 U.S.C. § 1456). USACE's regulations identify factors to be considered in evaluating the discharge of dredged material into waters of the United States, including navigation; water quality; coastal zone consistency; wetlands; Federally threatened and endangered species; and fish and wildlife (35 C.F.R. pt. 336.1[c]). USACE's evaluation of discharges (placement) of dredged material and compliance with Section 404 of the CWA, Section 10 of the RHA, the MPRSA, and the CZMA is guided by the LTMS Program, and other

plans and policies described in the following sections. Because the Federal navigation maintenance addressed in this EA is congressionally authorized, dredging and placement activities would not require a lease agreement from the California State Lands Commission (CSLC) for use of public trust lands based on the navigational servitude provisions of the Submerged Lands Act.

In addition to complying with NEPA, MOTCO is responsible for documenting compliance with relevant regulatory permit requirements needed to implement the chosen alternative. Table 2 lists agencies and their permit and authorizing responsibilities.

Table 1 Environmental Compliance Requirements.

Permits and Approvals	Agency
Section 404, Clean Water Act	USACE
Section 401, Clean Water Act	San Francisco RWQCB
Section 10, Rivers and Harbors Act	USACE
Section 7, Endangered Species Act	US Fish and Wildlife Service, National Marine Fisheries Service
Essential Fish Habitat consultation; Sections 305(b)(1)(D) and 305(b)(2-4) of the Magnuson- Stevens Fishery Conservation and Management Act	National Marine Fisheries Service
Coastal Zone Management Act Consistency Determination	Bay Conservation and Development Commission
Section 106, National Historic Preservation Act	State Historic Preservation Office (SHPO)
Notes: RWQCB = San Francisco Bay Regional Water Quality Control Board USACE = United States Army Corps of Engineers	

## 1.7 ADDITIONAL ENVIRONMENTAL COMPLIANCE REQUIREMENTS

In addition to complying with NEPA, MOTCO as the lead agency is responsible for documenting compliance with relevant Federal and state environmental laws and regulations, as well as permit requirements needed to implement the chosen alternative. Table 2 lists agencies and their permit and authorizing responsibilities. Coordination with the issuing agencies is discussed below as appropriate.

## 1.8 DECISION TO BE MADE

The decision to be made by the Commanding Officer of MOTCO is whether or not the Proposed Action qualifies for a Finding of No Significant Impact (FNSI) under NEPA, or whether an EIS must be prepared.

## 2.0 ALTERNATIVES

This section provides a discussion of the Proposed Action to conduct maintenance dredging of the navigation approaches from the Federal Navigation Channel to the wharf berthing areas and proposed boat ramp location at MOTCO from 2022 to 2031; as well as a detailed project description and description of future maintenance dredging.

Table 2 Dredging estimates for MOTCO (2021).

Target depth	Boat Ramp / Barge Pier -20 ft MLLW	Wharf 2 -35 ft MLLW	Wharf 3 -35 ft MLLW	Wharf 4 -35 ft MLLW
Dredge volume at target depth	48,395	18,379	786	3,892
Dredge volume at over-depth -1'	54,513	45,969	1,503	7,252
Dredge volume at over-depth -2'	61,410	89,315	2,827	13,909

A full description of dredging methods and equipment, and material placement is described in the 2015 Federal Navigation Channels EA/EIR. MOTCO proposes clamshell and knockdown dredging extending from the Suisun Bay Channel southward to include the MOTCO navigation approaches and berthing areas (Figure 3, Table 3). This chapter incorporates the LTMS beneficial reuse of dredged material, dredging and disposal practices, alternatives development process and screening criteria, and the alternatives that were considered but not carried forward for detailed evaluation. MOTCO specific actions relevant to an alternative are described.

### 2.1 LOCATION AND DESCRIPTION OF MOTCO NAVIGATION DREDGING AREAS

The Suisun Bay Channel is the Federal navigation channel that provides access to MOTCO's Wharves 2, 3 and 4. The Barge Pier can be approached via the Suisun Bay Channel or the South Seal Island Channel. Dredging depth is authorized at 35 feet MLLW, plus 2 feet of allowable overdepth for Wharves 2, 3, and 4, and 20 feet MLLW, plus 2 feet of allowable overdepth for the Barge Pier.

During the Navy years tugboats would dock at berthing locations in the Tugboat Basin until needed to push boats away from the piers and wharves. The Army is proposing to use this area to install a new boat ramp that will allow all smaller watercraft (depth -10 ft MLLW) needed to support MOTCO operations to be quickly and easily deployed and removed from the water as needed. Currently, all small watercraft are driven to Martinez to be put in the water and then driven by water back to MOTCO. Dredging for the proposed boat ramp (located at the mouth of Otter Slough) will provide the depth and turning radius needed to support these operations of deploying and removing the small watercraft from the water.

Prior to the Army assuming command of what is now the MOTCO installation in 2008, the installation was the U.S. Navy Naval Weapons Station Seal Beach Detachment Concord (NWSSBDC). The U.S. Navy dredged the wharves, navigation approach, berthing areas, and the

South Seal Island Channel on an average every two years from 1943 through 1981 (Table 1-1; Figure 3). More than 1.8 million CY was dredged over this time period, averaging 87,000 CY per dredge event. Since 1981, the dredging history is based on verbal accounts; exact years and dredge volumes are unknown. The last year of dredging was estimated as 2004 but may have occurred on other occasions up to 2008, at which point the Navy owned land and facilities were transferred from the Department of Navy to the Department of Army via the Base Realignment and Closure process. Since the 2008 transfer to the Army, no dredging has occurred.

Table 3 Historic MOTCO Dredging

Year	Dredge Volume	Document
1943	620,000	1975 LTMS EIS <sup>1</sup>
1944	298,000	
1945	70,500	
1950	82,300	
1951	48,500	
1953	37,000	
1957	108,700	
1959	20,900	
1960	69,700	
1962	40,000	
1965	52,000	
1967	36,800	
1969	30,000	
1970	63,200	
1975	78,000	
1976-1981	171,035	USACE (1995, 2015)
1986	unknown	
1994	unknown	
<b>TOTAL</b>	<b>1,826,635</b>	
<b>NOTES:</b> 1- <a href="http://www.spn.usace.army.mil/Missions/Dredging-Work-Permits/LTMS/December-1975-Volume-1/">http://www.spn.usace.army.mil/Missions/Dredging-Work-Permits/LTMS/December-1975-Volume-1/</a>		

Maintenance dredging for the navigation approaches from the Federal Navigation Channel to the berthing areas at the MOTCO wharves and the proposed boat ramp, would occur over approximately 38 acres for the approach and berthing areas out of a total 155-acre project area from the wharves out to the Suisun Bay Channel (Figure 3). Wharves 2, 3 and 4 are oriented west to east. Wharf 2 dredging would require up to 75,225 CY of material to be removed initially. Wharf 3 dredging would require up to 2,602 CY of material to be removed initially. Wharf 4 dredging would require up to 12,571 CY of material to be removed initially. Barge Pier would require approximately 7,835 CY of material to be removed around the immediate pier area only during the first year (Figure 3). Dredging of the wharves and Barge Pier is estimated to take 30-90 days in the first year. Dredged material has historically been placed on MOTCO

(the former NWSSBDC) or taken out for open water disposal at the San Francisco Deep Ocean Disposal Site.

## **2.2 LOCATION AND DESCRIPTION OF MOTCO NAVIGATION DREDGING AREAS**

The primary dredge material placement is the former Navy dredge materials placement site on MOTCO. Alternative sites considered for possible beneficial use of dredge materials and/or in-water disposal are described below.

### **2.2.1 MOTCO Dredge Materials Placement Area**

Dredge spoils would be placed in a designated 12.4-acre upland dredged material placement site (DMPS) formerly used for placement of dredge materials by the Navy. The DMPS is a frequently grazed (disturbed) upland habitat area (INRMP 2017) located approximately one-third mile north of the intersection of Stevens Road and Port Chicago Highway on MOTCO, located to the north of the bunker storage area. Dredged material would be pumped from the scows to an onshore 1.3-acre processing area and transported on trucks using existing roads to be placed at Sites 1 and 2, located west and east of Stevens Road, respectively. Site 1 is approximately 4.6 acres in size, while Site 2 is approximately 7.8 acres in size. Placement of dredge spoils shall avoid drivable roads, 50-foot buffers from fire breaks, shall avoid telecom and electrical manholes, and shall not fill stormwater drainages identified on the map. The spoils shall be drained of excess water with drainage channels toward the north side of the site. Dredge materials shall be deposited, leveled, and inspected for unexploded ordinance (UXO) in 1-foot lifts. When complete the spoils shall be contoured with a gradual slope to drain water, hydroseeded with an approved seed mixture to stabilize the site.

### **2.2.2 Montezuma Wetlands**

Montezuma Wetlands Restoration Project (MWRP) is a privately-owned restoration project located on the eastern edge of Suisun Marsh (Figure 2), north of the confluence of the Sacramento and San Joaquin Rivers near the town of Collinsville, in Solano County. In the early 1900s, the site was diked, drained, and used for agriculture. Since the site was diked, the land has subsided up to 10 feet. Once completed, Montezuma Wetlands is expected to restore 1,820 acres of tidal, seasonal, and managed wetlands (Collins and Grosso 2006). Approximately 17.5 million CY of dredged material are needed to raise site elevations. As of August 2017, approximately 4 million CY of dredged material have been placed at Montezuma Wetlands, contributing to the restoration of over 350 acres of wetlands ([Dredging Operations and Sediment Management](#)). The site can accept both cover and foundation material. Foundation material is allowed only in the deepest portions of the site and must be covered with at least 3 feet of clean cover material.

A detailed description of the restoration activities and associated impacts to Federally-listed species and critical habitat are fully described in the Montezuma Wetland Restoration Project's biological opinions (USFWS file numbers 1-1-99-F-12; 1-1-02-F-0175 and 1-1-04-F-0270; NMFS file number F-SA-00-6:EAC), which are incorporated into this document by reference.

Based on the above information for Montezuma Wetlands, 9,000 to 11,429 CY of dredged sediment is required to create 1 acre of wetland habitat at the above locations. Using an intermediate value of 10,000 CY per acre of habitat, the approximately 98,500 CY of dredged



sediment resulting from the proposed project is expected to create 9.8 acres of wetland habitat due to its beneficial reuse.

### 2.2.3 Cullinan Ranch Restoration Project

The Cullinan Ranch Restoration Project is located along the northern shoreline of San Pablo Bay (Figure 2), near the city of Vallejo in Solano and Napa Counties. The site consists of diked baylands that was used for agriculture until the late 1980s. Following diking and draining the site, much of it lost up to 6 feet of elevation as a result of sediment deposition, soil compaction, and loss of organic matter (USFWS 2010). The USFWS is currently restoring over 1,500 acres of the site to tidal wetlands consistent with the USFWS' recovery plan for salt marsh harvest mouse and California clapper rail. In addition, it is believed that the restored marsh would provide suitable habitat for Delta Smelt, Central California coastal Steelhead (*Onchorhynchus mykiss*), Central Valley Steelhead (*O. mykiss*), winter-run Chinook Salmon (*O. tshawytscha*), Central Valley spring-run Chinook Salmon (*O. tshawytscha*), Green Sturgeon (*Acipenser medirostris*), and western snowy plover (*Charadrius alexandrinus nivosus*) (USFWS 2010). The Cullinan Ranch Restoration Project also is expected to provide food and nutrients for aquatic species in the adjacent Napa River Estuary and San Pablo Bay.

In 2014, regulatory permits were revised to increase the volume of dredged sediment authorized for placement in support of tidal marsh habitat restoration at Cullinan Ranch (DMMO 2015). Specifically, the amount was increased from 450,000 CY to restore 50 acres to 2.8 million CY to restore 290 acres of the 1,575-acre site to elevations suitable for marsh plain establishment. As of December 2017, approximately 800,000 CY had been placed at Cullinan Ranch, leaving a remaining capacity of approximately 2 million CY.

A detailed description of the restoration activities and associated impacts to Federally-listed species and critical habitat are fully described in the San Pablo Bay National Wildlife Refuge Comprehensive Conservation Plan (USFWS 2010, 2011).

### 2.2.4 Antioch Dunes National Wildlife Refuge

The Antioch Dunes National Wildlife Refuge (ADNWR) is an approximately 55-acre refuge (Figure 2) managed by USFWS that consists of two parcels separated by a Georgia-Pacific Gypsum Plant and a Pacific Gas & Electric utility easement. The refuge was founded in 1980 and is located along the shoreline of the San Joaquin River in Antioch, California. The western parcel, the 41-acre Stamm Unit, is the only unit proposed to receive dredge sediment for this project. The ADNWR is located about 12 miles east of MOTCO.

The site is surrounded by industry including a gypsum plant to the east, a former shipyard to the west, a former wastewater treatment facility which now functions as a municipal landfill, and a set of railroad tracks to the south. A total of three Federally-listed species: the Contra Costa Wallflower (*Erysimum capitatum ssp. angustatum*), the Antioch Dunes Evening Primrose (*Oenothera deltoides ssp. howellii*), and the Lange's Metalmark Butterfly (*Apodemia mormo langei*), have been identified at ADNWR.

As part of the Comprehensive Conservation Plan (CCP) for the ADNWR, dune restoration is one of the primary objectives for habitat restoration (USFWS 2002). Beginning in 1991, the USFWS has imported sand to the ADNWR in order to create additional habitat. The CCP specifies identifying potential sources of clean sand, specifically from the Stockton DWSC, and importing the sand for habitat restoration. Due to the sandy substratum in the areas surrounding Antioch

Dunes, the shoaling that typically occurs in this section of the San Joaquin River is sand. In 2013, the Port of Stockton and the USFWS at Antioch Dunes partnered with the USACE to begin restoration efforts using dredged material. The beneficial reuse of dredged material allows the recreation of sand dunes, the natural habitat of the Contra Costa wallflower, the Antioch Dunes evening primrose, and Lange's metalmark butterfly. Continued use of this site for the beneficial reuse of dredged material will eventually allow natural restructuring of the sand dunes, possibly recreating the natural function and habitat value of the ADNWR. The site has received over 91,851 yds<sup>3</sup> of sand material since 2013, and may receive up to 400,000 yds<sup>3</sup> of dredge materials (>75% sand). This site was used as a DMPS several times since 2013.

### **2.2.5 SF-9 Carquinez Strait Placement Site**

The SF-9 placement site is a 1,000-foot by 2,000-foot rectangle, approximately 10 to 55 feet deep, 0.9 mile west of the entrance to Mare Island Strait in eastern San Pablo Bay in Solano County (Figure 2). Placement is limited to 1.0 million CY of dredged material per month and a maximum of 3.0 million CY per year during wet or above-normal water flow years; and 2.0 million CY per year during all other years.

### **2.2.6 SF-16 Suisun Bay Placement Site**

The SF-16 placement site is a single-user, in-Bay, unconfined disposal site reserved for sand dredged from the Suisun Channel and New York Slough projects only (Figure 2). SF-16 is a 500-foot by 11,200-foot rectangle adjacent to the northern side of Suisun Bay Channel, approximately 1 mile upstream of the Interstate 680 Bridge (Figure 2). The depth at this site is approximately 30 feet MLLW. Currently, the site is authorized to receive 200,000 CY of dredged sand per year.

### **2.2.7 San Francisco Deep Ocean Disposal Site**

Approximately 55 miles (48 nautical miles) west of the Golden Gate Bridge, SF-DODS is the farthest offshore and deepest (8,000 to 10,000 feet) dredged material placement site in the United States (USACE 2015). Sediment disposed at SF-DODS can have levels of contaminants slightly above that of sediment disposed at in-Bay placement sites. Therefore, disposal at SF-DODS is considered to be environmentally preferable to disposal of the same material at the traditional unconfined disposal sites in the more sensitive San Francisco Bay/Sacramento-San Joaquin Delta Estuary.





Figure 4 Modified Offloader Currently Offloading Dredged Material at Cullinan Ranch (Dutchman Slough)

### 2.3 DESCRIPTION OF DREDGING METHODS AND DISPOSAL PRACTICES

This section discusses the dredging methods considered for alternative analysis to maintain the wharf access, transport and place dredged material (USACE 2015). Dredging methods for a specific area are typically based upon site-specific characteristics, such as substrate type, water quality, site bathymetry, wave energy, dredging depth, desired production rate (i.e., cubic yards per hour), method of disposal, distance to placement area, levels of constituents of concern, and spatial feasibility. Additionally, costs and availability of dredge equipment factor into selection of a type of dredging method. Dredging equipment and techniques for the purposes of this EA are categorized by two mechanisms:

- Mechanical dredging – Removal of loose- or hard-compacted materials by clamshell, bucket, excavator, dipper, or ladder dredges. Unlike hydraulic dredging, mechanical dredges use mechanical systems to remove sediments from the dredging site.
- Hydraulic dredging – Removal of loosely compacted materials by cutterheads, dustpans, hoppers, hydraulic pipeline, plain suction, and sidecasters.

### 2.3.1 Debris Relocation

Large objects identified using side-scan sonar (Figure 3) will be moved to the nearest designated debris relocation area within the historical area dredged by the Navy to avoid interfering with dredging and contaminating dredge materials. The dredging contractor may use a clamshell dredge on a barge crane to move large objects to the relocation areas. Alternatively, a large electromagnet or grappling hook on a barge crane may be deployed as appropriate to move large quantities of metal debris to relocation areas. Moving the debris to the relocation areas will isolate debris away from water currents and ships.

### 2.3.2 Clamshell Dredge

The clamshell bucket capacity would range between 20 to 50 CY, depending on dredge availability. Up to seven scows, with a capacity of 2,000 to 4,000 CY, and four 1,800 horsepower (hp) tugs would be used to transport dredged material to placement sites. In addition, one 1,000 hp tender tug would be required to maneuver each dredge plant.

The estimated daily production rate would range between 3,100 and 6,600 CY, depending on the location of dredging and the placement site being used. For example, production rate would be approximately 5,000 CY if dredged material were placed at the upland beneficial use sites. The production rate would decrease if material were transported to the Federal Deep Ocean Disposal Site (see section 2.1.7).

A mechanical clamshell dredge consists of a crane mounted on a barge, with a clamshell bucket on the end of the crane boom (Figure 5). The deck barge has two to four spud piles attached to the platform, generally at the corners. The spud piles are long pipes that are driven vertically into the bay bottom by hydraulic assistance. The spud piles are used to anchor the dredge barge. Clamshell dredges are not self-propelled, so they require a tugboat to tow or push the dredge to and from the dredge sites. Once a tug moves the dredge into place, the spuds are driven into the bay bottom anchoring the dredge. Once the dredge is anchored in place, dredging can begin. Relocating the dredge requires approximately 1 hour to complete. On average, the mechanical clamshell dredge plant for this project would need to be relocated approximately every 3 hours. In addition, when working adjacent to the ship channel, the dredge would need to be moved out of the shipping channel to allow deep draft vessels to transit the channel.

The crane has a boom that is long enough to extend out beyond the end of the work barge in any direction and can swivel 360 degrees on its mount. A large clamshell bucket is attached to the end of a series of cables at the end of the boom, which allows the bucket to be raised and lowered into the water. The cables also open and close the bucket as it is filled with sediment and then emptied into scows. The scows are open barges that can carry large quantities of sediment and are towed with tugboats to and from placement sites. As soon as one scow is filled and hauled away, another empty scow is maneuvered into place alongside the dredge and the digging continues.

Clamshell buckets are raised from and lowered to the bottom using a system of cables. The weight of the bucket is sufficient for it to fall through the water column into the bottom sediment. The cables restrict the clamshell from going too deep, or beyond the maximum allowable overdepth. The clamshell then closes and is pulled up through the water column to above the scow. Once over the scow, the clamshell opens and deposits the dredged material into the scow. When all the material within reach of the clamshell is dredged, the spuds are raised, and the

tender tug transports the dredge and scow to the next area requiring dredging. The process is repeated until all material is dredged from the channel. Following dredging, hydrographic surveys would be conducted to ensure that the entire area is dredged to the desired depth.

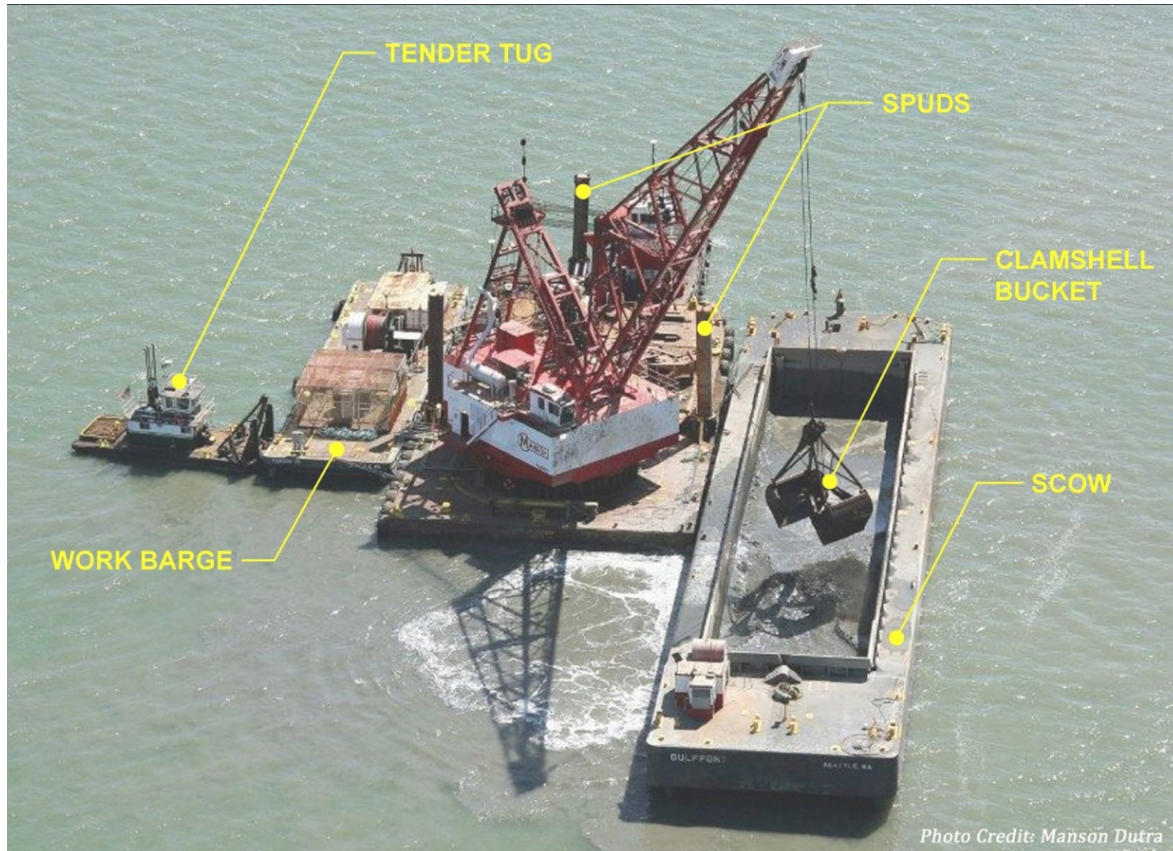


Figure 5 Typical Mechanical Clamshell Dredge and Scow

During dredging, clamshells place a slurry of sediment and water in the scows. Depending on the sediment type being dredged, the sediment-to-water ratio of the slurry is expected to be approximately 60 to 70 percent sediment and 30 to 40 percent water. The San Francisco Bay Regional Water Quality Control Board allows unrestricted overflow in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary when sediment is greater than 80 percent sand. When sediment is less than 80 percent sand, overflow is only allowed if turbidity monitoring is conducted within 500 feet of dredging operations to demonstrate that the turbidity plume generated by overflow activities does not increase the ambient turbidity by more than 10 percent above background levels, does not reduce dissolved oxygen concentrations to below 7.0 mg/L in Suisun Bay, or result in the pH going below 6.5 or above 8.5.





Figure 6 Examples a) Large scow with movable steel grizzly in the Port of Oakland (CA). b) Debris captured on 1-ft square grizzlies (California). Photos from DMMP 2015.

### 2.3.2.1 Explosives Safety Requirements

The presence of unexploded ordnance in the dredging area from the Port Chicago Naval Magazine Explosion Site (see section 3.7.2.1) and other sources requires implementation of procedures for safe handling of munitions. The clamshell dredge shall be shielded to protect the operator, and shielding will be provided for deck hands and the Unexploded Ordnance (UXO) contractor for protection from the 5-inch Mk35. All other unprotected personnel must be outside

the designated exclusion zone. The UXO contractor will be onsite during this portion of the work. All personnel on the dredge must be essential to the dredging mission. They will be behind blast shielding every time a clamshell exits the water, and the debris will be placed on an adjacent dredge scow. Initial static screening of the dredge material may be implemented by dumping sediment through a grizzly sifter to remove any munitions 3 inches or larger UXOs on the scow (Figure 6, Figure 7). If a UXO is found, the UXO contractor will contact the USACE Ordnance Explosive Safety Specialist (OESS) to confirm the presence and positive identification of a UXO. If the UXO is determined to be acceptable to move, the contractor will move the UXO to the designated MOTCO ordnance disposal area as per the MOTCO UXO Disposal Standard Operating Procedures (USACE 2013c).



Figure 7 Chain grizzly (California). Photo from DMMP 2015.

Smaller debris down to  $\frac{3}{4}$  inch shall be removed to exclude small munitions, cultural artifacts, and debris from dredge materials by UXO technicians after thin-layer spreading of the dredge material at the placement site (Figure 3). Screening the dredge materials (NAVFAC 2020) will reduce unwanted debris at the placement site for both safety and ecological objectives. A UXO contractor will examine the screened debris to remove any UXO's from other materials excluded by the screens and follow the 2013 MOTCO Explosive Safety Submission (ESS). Contractor will need to submit a work plan, standard operating procedures, emergency management plan, and a quality control plan for construction support. A final clearance letter for the spoils remaining on MOTCO will be required from the UXO contractor prior to demobilization. The contractor will submit all paperwork to USACE. The UXO contractor will sort items into munitions, possible cultural artifacts, or debris for appropriate processing and disposal. The UXO team, in partnership with the lead cultural resource monitor, will follow procedures for identifying and protecting potentially significant cultural resources outlined in the *Cultural Resources Treatment and Discoveries Plan* (U.S. Army 2016). Any UXO's found will need to be perforated using DDESB TP16 protective measures. OESS will provide up to 100% oversight and 10% QA until the process has been validated and then will be on site a minimum of one day per week to maintain operational safety during dredging.

Sediment proposed for dredging in front of the MOTCO Wharves is anticipated to classify as clay, silt, and sand with significant clods of cohesive sediment. A jet spray with clean water may be used to break up clods on the static screens for processing. The alternating layers of silty clay, clayey silt, sandy silt, silty sand, sand, and inter-bedded clay and sand are discontinuous and of varying thickness. Shells, wood debris (e.g., branches, twigs, and rootlets), and organic soils grading to peat also are expected to be encountered. Sediment directly in front of MOTCO Wharves 2, 3 and 4, and Barge Pier was <80% sand when analyzed for wharf renovations. Therefore, overflow turbidity monitoring may be required to demonstrate that the turbidity plumes are not adversely affecting water quality in the vicinity of the dredge.

### **2.3.3 Excavator**

Amphibious or barge mounted excavators may be used for shallower inshore dredging. An excavator has mechanical arm with the bucket on the end for scraping sediment up. Excavators may be mounted on a barge that is moved around by a tugboat, or on a self-propelled track system. The arm length and bucket size limit where an excavator may be effective to shallower dredging depths and close inshore areas where a clamshell dredge has less capability for production. The excavator must be up-armored to meet the unintentional detonation of the 5-inch 38 Caliber Mk 35, and the operator must be 45 feet from the bucket when it is actively excavating or placing spoils through the grizzly. Management of dredge materials to remove UXO will follow ESS Safety Requirements described in Section 2.2.2.1.

### **2.3.4 Barring Dredging**

“Barring” is a routine part of dredging episodes to smooth out high spots as needed after dredging has occurred. This method involves using a tug to pull a weighted blade across the channel bottom. As the blade encounters material, it scrapes the material into the adjoining areas with deeper depressions, redistributing the shoaled material in each channel. Barring is restricted to the dredging footprint and the authorized project depth, including the over-dredge depth allowance.

### **2.3.5 Knockdown Dredging**

Separate from barring, which is implemented at the end of dredging episodes, “knockdown” events may be implemented to improve channel conditions between dredging episodes when a full dredging event is not warranted. Knockdowns use the same equipment and procedures as barring, but apply to isolated shoals or high spots, rather than the entire dredging footprint. Knockdowns are most useful when time constraints may not allow for normal dredging, or when a shoal threatening navigation covers a small portion of a project area that is otherwise at or below its permitted depth. Conducting separate knockdown operations is often more efficient than mobilizing dredging equipment and transporting the material to a placement site. Because knockdowns typically create less resuspension than full dredging episodes (especially in the upper water column), they have at times been approved in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary to minimize necessary work outside environmental work windows.

### **2.3.6 Hydraulic Dredges**

Hydraulic dredges remove and transport sediment in liquid slurry form (generally a ratio of 80 percent water and 20 percent sediment by weight). Hopper dredges are included in the category of hydraulic dredges, even though the dredged material is hydraulically pumped into the self-

contained hopper in the dredge, rather than through a pipeline or to a scow. Hopper dredges are a type of hydraulic dredge that hydraulically pumps sediment into a self-contained hopper bin for temporary storage and transport. Other hydraulic dredges, including cutterhead dredges, are usually barge-mounted and carry diesel or electric- powered centrifugal pumps with discharge pipes ranging in diameter from 6 to 48 inches. The pump produces a vacuum on its intake side, which forces water and sediments through the suction pipe. The slurry is then transported by a pipeline or scow to the dredged material placement site.

### **2.3.7 Hopper Dredges**

Hopper dredges are seagoing vessels designed to dredge and transport material from navigation channels to open-water disposal areas. Hopper dredges are equipped with a drag arm on each side of the dredge. The drag arms are long suction pipes with drag heads attached to their ends (USACE 2015). During active dredging, the drag arms are lowered through the water column until the drag heads are on the channel bottom; next the suction is turned on, and the drag heads are slowly dragged across the shoaled material by the forward motion of the vessel. Sediment and water slurry are drawn up through the drag heads and drag arms by on-board pumps, and deposited in the hopper bin, in the vessel's midsection. When the hopper bin is full, the dredge raises the drag arms and moves to a designated disposal area to empty the dredged material through large doors at the bottom of the dredge.

Advantages of a hopper dredge include the ability to work in rough, open water; the ability to move quickly to a project site under its own power; and the ability to not interfere with or obstruct vessel traffic during operation. The use of a hopper dredge also generally reduces the sediment resuspension at the dredging site, compared to mechanical dredging. Limitations include draft and maneuvering requirements that preclude use in shallow water and narrow channels; continuously interrupted production while transiting to and from placement sites; and difficulty dredging around structures.

With the drag head buried in the sediment, the dredge moves forward cutting the shoaled sediment, thereby removing the sediment, along with water, in a slurry. The slurry is hydraulically vacuumed through drag arm to the hopper where it is temporarily stored. If the drag head or the drag arm become clogged during dredging, the drag head may be temporarily lifted out of the sediment, allowing water to be pumped through the drag arm to clear the clog. Once a cut is finished, the drag head is lifted out of the sediment, and water is pumped through the drag arm to clear sediment from the drag arm. Similar to priming, clearing clogs and sediment from the drag arm takes approximately 15 to 40 seconds, and occurs no more than 3 feet above the surface of the sediment. If the main pump is run in reverse to back flush a clog, the system will have to be re-primed.

The drag head does not have a watertight door or valve at the end that would prevent water from leaving the pipe. Once the drag head is lifted out of the water and the pipe reaches an angle that lets air into the pipe, the system is no longer closed (i.e., watertight). Sometimes, the drag heads must be lifted out of the water to manually open or close the water intake doors on the drag head; this requires the system to be re- primed before dredging can resume.

Once the hopper is full, or the 15-minute overflow limitation is met (discussed below), the drag heads are completely raised out of the water and positioned in their resting place on the side of the dredge, and the dredge transits to a placement site.



At the placement site, the hopper doors (at the bottom of the dredge's hull) open, and dredged material falls through the doors and settles on the floor of the placement site. Sandy material settles more quickly than finer-grained material (silts and clays), which tends to stay suspended in the water column longer. Water is used to flush the hopper bin. In conditions where the water is drawn from the drag arms, the drag arms are placed in the water just below the surface. In general, for drawing water in, the drag head must be maintained near the surface of the water because lowering it too deep would compromise the maneuverability of the vessel and pose a safety concern.

It is often advantageous to overflow, or decant, excess water from hopper dredges to increase the sediment load carried; however, because of water quality concerns near the dredging site, overflow may be restricted. Overflow dredging occurs when the hopper is full of sediment slurry, and pumping continues to fill the hopper with water and sediment. The heavier, coarser material settles out to the bottom of the hopper; and lighter, finer sediments remain suspended in the water. For the first 6 to 7 minutes of dredging, all material dredged is retained in the hopper, then overflow begins. As dredging continues, excess water begins to fall back into the water. This excess water is called overflow and is where fine material is returned to the water column. The amount of fine-grained material that is returned to the water column depends on the type of sediment being dredged. For hopper maintenance dredging in San Francisco Bay/Sacramento-San Joaquin Delta Estuary, overflow dredging is limited to 15 minutes at all times for fine-grained sediments; overflow is unrestricted for sandy sediments (i.e., greater than 80 percent sand) because there is little fine-grained material that remains suspended in the overflow.

### **2.3.8 Dredge Material Transport and Placement**

When the scows are full (1,500 or 3,000 CY), they would be transported by diesel-powered tugboats to the offloading facility for the DMPS. Scows would moor at the offloading facility (see example in Figure 9), for transferring sediment out of the scow to the site. Typically, sediment is pumped out of a scow (offloaded) using of a modified hydraulic pipe dredge, which serves as an offloader.

The project proposes to use an existing DMPS (12.4 acres) on MOTCO (less than 2.8 miles transport distance), with appropriate environmental approvals in place. Dredge materials would be pumped from a barge anchored adjacent to Wharf 4 to the materials processing area for initial screening and dewatering. BMPs for the DMPS and the processing area will include berms with vehicle ramps and silt fencing installed to retain sediment onsite, with silt curtains and/or silt fencing at plumbing connections to contain sediment leakage and protect habitat. The pumping route shall be surveyed prior to installation, and plumbing inspected prior to dredging. The plumbing shall be routinely monitored for sediment and turbidity leakage during pumping. If leakage is detected, then pumping shall be halted until the leak is repaired and sediment removed from the habitat.



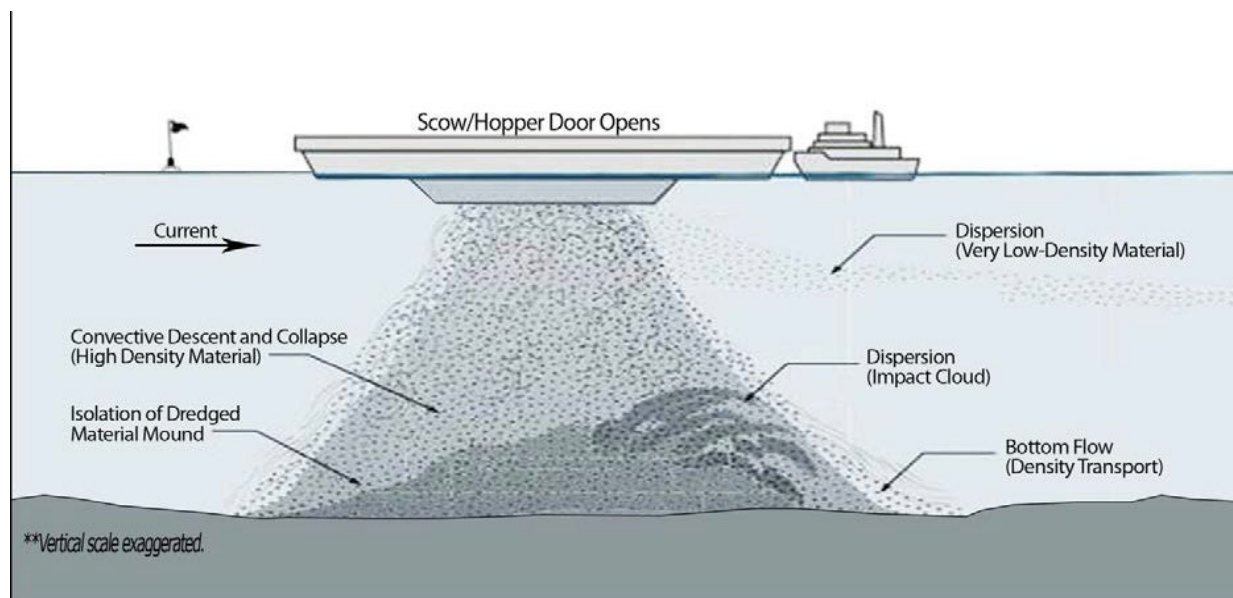


Figure 8 Aquatic Placement of Dredged Material



Figure 9 Liberty Offloader during Typical Offloading at Montezuma Wetlands Restoration Project

Dredge materials at the processing area will be allowed to drain (dewater) prior to loading. Water removed from dredge materials may be re-used for washing screens, pumping materials from the scow and decanted for infiltration into local groundwater. Materials shall be loaded onto trucks (~16 CY capacity) and transported using existing roads to the DMPS. Dredge materials shall be deposited in 1-foot (or lower) lifts, and inspected for unexploded ordinance (UXO) for effective removal of small munitions in a controlled area for safety. At the completion of each dredging episode, the DMPS shall be contoured with a gradual slope for drainage and hydroseeded with an approved seed mixture to stabilize the site for grazing between dredging episodes (see Section 3.2.2 regarding existing land use of the DMPS). Trucks shall be steam-cleaned immediately prior to entry onto the installation and upon leaving the installation to prevent the transfer of invasive species. Other BMPs included in the project description are discussed below (see Sections 2.1.2-2.1.4).

When the scow arrives at an open water placement site, the doors at the bottom of the scow would open and dredged sediment would fall through the scow doors to the bottom of the placement site (Figure 8). As material falls through the water column, some sediment is stripped from the descending plume, creating turbidity around the scow. However, most sediment would fall to the bottom of the placement site.

Montezuma Wetlands typically uses the Liberty offloader (Figure 9), which is on a floating barge. Cullinan Ranch uses an offloader that is land-based (Figure 4). Once moored, the offloader would insert a snorkel into the scow, simultaneously injecting water into the scow to create a water-sediment slurry and pumping the slurry from the scow to a designated cell within the site. The offloader's water intake system must be screened in accordance with the California Department of Fish and Wildlife's screening criteria. It takes approximately 2 hours to completely offload dredged sediment from a scow. Alternatively, a long reach excavator or clamshell bucket may be used to unload a scow for loading materials onto a dump truck.

The transport distance from MOTCO to Montezuma Wetlands averages 12 miles, and to Cullinan Ranch is 19 miles. Scows-tugs would travel approximately 7 knots (8 miles per hour) from dredge sites to the beneficial use sites. On average, each scow-tug trip to and from the beneficial use sites, including offloading, would take approximately 6 hours.

## **2.4 NO ACTION ALTERNATIVE**

Under the No Action Alternative, MOTCO would not continue all previous dredging for maintaining the navigation approaches to the Wharves 2, 3, 4, Barge Pier, and the proposed boat ramp.

## **2.5 RESUME MAINTENANCE DREDGING ALTERNATIVE ON AN AS-NEEDED BASIS**

Under the Resume Maintenance Dredging Alternative, MOTCO would continue previous maintenance dredging practices established by the Navy on an as-needed, emergency or individually-permitted, project basis to maintain authorized target depths for the navigation approaches (Table 4). Maintenance dredging practices and activities were reviewed from 1943 to 2004 to determine the typical dredge equipment type, frequency of dredging, volumes dredged, and placement site(s) for each specific maintenance dredging project (Table 4). Bathymetry data collection from 2018/2019 indicates up to 85,662 CY of material will need to be removed the first year to restore authorized channel depths. An estimate of up to 28,000 CY may need to be

removed on a biennial basis to maintain authorized depths. Dredging frequency (e.g. annual or biennial) would affect the dredged material volume. For all dredged material determined non-suitable for unconfined aquatic disposal (NUAD), placement options include upland sites and, in some cases, the MWRP. Dredge material placement may also occur at USACE only facilities if the dredging is done in conjunction with USACE's Suisun Bay Channel dredging. MOTCO would meet all Federal environmental compliance requirements. MOTCO would undertake mitigation, as appropriate and necessary, in meeting its compliance requirements.

Table 4 Resume Maintenance Dredging Alternative Summary

Location	Dredge Type	Initial Dredge Volume (CY)	Dredge Frequency	Range of Volume Dredged (CY)	Median Volume Dredge (CY)	Proposed Action Placement Site
Wharves 2, 3, 4, Barge, Pier, Boat ramp	Mechanical or Hydraulic	71,452	As needed	23,057-167,461	16,144	MOTCO

## 2.6 PROPOSED ACTION

Under the Proposed Action, MOTCO will implement the proposed maintenance dredging within the installation boundaries on Suisun Bay to maintain authorized target depths for the navigation approaches (Table 3) over a 10-year timeframe. The Proposed Action would implement best management practices to minimize impacts to salmonids, Green Sturgeon, Delta Smelt and Longfin Smelt. Use of a hopper dredge for MOTCO would be minimized to reduce impacts to Delta Smelt and Longfin Smelt. Maintenance dredging could occur on a biennial basis between August 1 and November 30 dependent on the volume of recently shoaled material. Implementation would start during the appropriate dredging window in the calendar year 2022 identified in the NMFS-USFWS BOs and would extend through calendar year 2031. All dredged material will be placed in accordance with the LTMS for the placement of Dredged Material in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, California.

To begin dredging, completion of the EA, consultation with NMFS, USFWS, and SHPO, and acquisition of CWA permits and CZMA determination, is required. MOTCO will prioritize, schedule, fund, and contract out the maintenance dredging. Coordination with USACE's Suisun Bay Channel dredging is planned as maintenance dredging may occur in conjunction with USACE's channel dredging activities. The initial MOTCO dredging is anticipated to require a total of 30-90 days to complete all dredging and/or knockdown work.

The Proposed Action was formulated to be consistent with dredging in Suisun Bay Channel. Under MOTCO's Proposed Action/Project Alternative, MOTCO would perform dredging practices to maintain the navigation approaches to Wharves 2, 3, 4, Barge Pier, and the proposed boat ramp for operational and mission capacity (totaling 40 acres). Dredging would be conducted under the LTMS. The frequency of dredging to be conducted, and volumes dredged would maintain suitable depths for navigability and cargo operations at Wharves 2, 3, and 4 (-35 feet MLLW) and the Barge Pier (-20 feet MLLW). Maintenance dredging includes dredging to



the respective project's regulatory depth, plus up to 2 feet of overdepth. MOTCO dredging operations would use a clamshell dredge depending on DMMO permit and equipment availability. Local water velocities appear to slow sediment deposition, therefore, MOTCO currently expects to dredge every 2 years when necessary to maintain navigability.

Large objects known to be within that area to be dredged will be moved to the nearest designated debris relocation area (see Figure 3) outside the wharves access area prior to dredging. Dredge material will be sifted for larger munitions (> 3") and screened for smaller munitions, cultural artifacts and debris (> ¼") (see Section 2.1.1) to provide clean sediment for the placement site.

Sediment testing for compliance with LTMS permit was performed to identify appropriate placement sites for dredge material. Current conditions and estimated dredge event volume and area are provided in Table 5. Dredging and placement would be conducted in accordance with the conditions described under the DMMO permit and associated compliance documents. For the purposes of this EA, dredging is defined as mechanical dredging with removal of loose- or hard-compacted materials by clamshell, bucket, excavator, dipper, or ladder dredges.

Table 5 Authorized Dredge Depths and Anticipated Dredge Material Volume by Structure.

Structure	Hydrographic Survey Date	Year	Proposed Dredge Parameters		
			Depth	Volume (CY)	Area (acres)
Boat Ramp / Barge Pier	7-Apr-21	2024	-20' + 2' allowable overdepth	61,410	4.6
Wharf 2	7-Apr-21	2022	-35' + 2' allowable overdepth	89,315	31.3
Wharf 3	7-Apr-21	2022	-35' + 2' allowable overdepth	2,827	1.1
Wharf 4	7-Apr-21	2024	-35' + 2' allowable overdepth	13,909	5.4
<b>Proposed 2022 Dredging</b>				92,142	32.43
<b>Post-2022 Dredging</b>				75,319	9.95

MOTCO would beneficially reuse dredged material to the maximum extent its authorities allow with appropriate sediment and water management measures. The MOTCO upland site (12.4 acres) is the preferred placement site (Figure 3; Table 6) based on distance and the results of the sediment analysis report (Appendix C), while the Montezuma Wetlands (MWRP) is the primary alternate placement site of the three proposed placement sites. Although it is assumed for the purposes of this EA that placement would occur at the identified Federal standard sites, MOTCO would place dredged material at beneficial reuse sites when costs are equivalent to the Federal standard.

Table 6 Summary of the Proposed Dredging Action / Project Summary.

Location	Dredge Type	Initial Dredge Volume (CY)	Dredge Frequency	Range of Volume Dredged (CY)	Proposed Action Placement Site
Boat ramp / Barge Pier	Clamshell	37,586	2 years	48,395-61,410	MOTCO
Wharves 2, 3, 4	Clamshell	160,341	2 years	786-89,315	MOTCO

Dredging would be conducted using mechanical dredges, with material being placed in a bottom-dumping scow. Once full, the scow will be transported by a tug to the dredged material

offloading site. The maximum anticipated volume of material proposed for maintenance dredging the first year is approximately 184,656 CY. If the dredging is continuous (24 hours a day) and the maximum daily rate of approximately 7,000 CY is achieved, the project could be completed in 27 full days. However, dredging typically does not occur 24 hours per day; rather, the effective work time (actual digging of shoaled material) is often 12 to 16 hours per day. Additionally, crew changes, relocation of the dredge, and other activities (e.g. breakdowns) limit the amount of dredging that occurs. Therefore, completing the Proposed Action's first year dredging could require anywhere from 30 to 90 days. Future dredging maintenance events are anticipated to be completed in shorter time periods. Dredging would be conducted during from August 1 through November 30.

Mechanical clamshell dredging is the preferred proposed dredge type for this project, in order to minimize and reduce the potential risk of entrainment of Federally-listed fishes. The project proposes to support beneficial use by placing dredged sediment at the MOTCO DMPS. Alternatively, dredge materials could be transported to two wetland restoration beneficial use sites, either MWRP or CRRP. These proposed dredged material placement sites are already fully permitted to accept dredged material from Bay Area dredging projects; permits include Endangered Species Act and Magnuson-Stevens Act approvals (NMFS 2001, 2010, 2011, 2015b; USFWS 2001, 2010).

Knockdown dredging of up to 1,000 CY per year may be implemented to level shoals on the navigation approaches between clamshell dredging episodes. Knockdown dredging would be used when the amount of shoaling is limited and when it would be more efficient than mobilizing dredging equipment and transporting the material to a placement site.

The 3.29-acre former Navy Tugboat Basin providing access to the proposed boat ramp shall be dredged to its previous area (circa 1988) to a depth of -10 ft MLLW (Figure 10). About 1.5 acres of the former basin has revegetated with plants that will be removed. Dredging the boat ramp area is scheduled for 2023. Construction of the proposed boat ramp will be addressed in a separate NEPA document.

All dredging would be conducted during the existing environmental work windows (August 1 through November 30) for the Suisun Bay (USACE 2014a, 2015), unless expanded environmental work windows are approved through the appropriate consultation(s). Dredging within the environmental work windows would reduce the potential impacts of the Proposed Action on sensitive life stages of Federally-listed threatened and endangered species.



Figure 10 Dredging area (3.29 acres) for the proposed boat ramp (former Navy Tugboat Basin) in 1988 (left) and 2019 (right).

## 2.7 FUTURE OPERATIONS AND MAINTENANCE ACTIVITIES

Local water velocities appear to slow sediment deposition; therefore, MOTCO currently expects to dredge every 2 years as necessary to maintain navigability starting in 2022 and continuing through 2031. Maintenance dredging includes dredging up to 2 feet of overdepth.

## 2.8 ALTERNATIVES ELIMINATED FROM CONSIDERATION

Several alternatives to the Proposed Action were identified and evaluated during project planning and development, but were eliminated from detailed analysis, and are therefore not analyzed in detail in this EA. These alternatives were eliminated from analysis because one or more of the following criteria apply, as discussed for each alternative below:

- It is ineffective (it would not respond to project purpose and need);
- Its implementation would not minimize effects on human/environmental resources;
- It is technologically infeasible; or
- Its implementation is remote or speculative.

### 2.8.1 Resume Maintenance Dredging Alternative on an As-Needed Basis

Under this scenario, MOTCO would resume maintenance dredging on an as-needed, emergency or individually-permitted, project basis, for the navigation approaches from the Suisun Channel to the wharves, Barge Pier and proposed boat ramp similar to the previous dredging by the Navy. This alternative was eliminated from further consideration because it would not meet the objectives of the LTMS for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, and the potential for entrainment and adverse effects to Delta Smelt with Hopper Dredging.

### **2.8.2 Use of Hydraulic / Hopper Dredging**

As described in the 2015 Federal Navigation Channel EA/EIR Section 3.6.2, Delta Smelt have potential to occur in the Suisun Bay dredge areas during certain seasons. Delta Smelt are not strong swimmers and are presumed susceptible to entrainment in the flow fields created around drag heads of trailing suction dredges. There is also a potential for entrainment during water intake for flushing of hopper dredges. The USFWS Biological Opinion (2019) for maintenance dredging at MOTCO authorized the use of a mechanical (i.e. clamshell) dredge operation only for maintenance dredging. Hydraulic and hopper dredging were eliminated from consideration for the foreseeable future to avoid entrainment and adverse effects to Delta Smelt.

### **2.8.3 SF-16 Suisun Bay Placement Site**

The SF-16 placement site is reserved for sand dredged from the Suisun Channel and New York Slough projects only. The percentage of sand in the sediment samples is below the threshold for disposal at the SF-16 placement site. A new authorization would be required for MOTCO Dredging to use SF-16 as a placement site.

### **2.8.4 Antioch Dunes Placement Site**

The ADNWR placement site specifies use of clean sand sources for habitat restoration for maintaining sand dunes and habitat for two plants and one insect. The high silt content at MOTCO precludes placement at ADNWR.

### **2.8.5 San Francisco Deep Ocean Disposal Site**

The transport distance to the SF-DODS (48 nautical miles west of the Golden Gate Bridge) makes this site typically the most expensive for dredge material disposal. This site would be considered if the levels of sediment contaminants are unsuitable for placement on MOTCO (Proposed Action), in-Bay disposal, or unable to be placed in-Bay for reasons unrelated to suitability (i.e. LTMS in-Bay limits).

### **3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

The MOTCO Integrated Natural Resources Management Plan (INRMP; MOTCO 2017b) provides an overview of habitat, flora and fauna found on the installation. Appropriate Conservation Measures from the INRMP, including surveys for Federally-listed wildlife and plants will continue to be implemented as required by the INRMP. The geographic scope of the San Francisco Bay to Stockton, California, Navigation Improvement Project IGRR-EIS (USACE 2020b) includes the Suisun Bay and MOTCO area.

#### **3.1 SCOPE OF ENVIRONMENTAL ANALYSIS**

This chapter describes the affected environment and the environmental impacts associated with the alternatives, as well as mitigation, where applicable, to reduce potential impacts. The affected environment sections provide an environmental baseline of each resource category, describing the conditions in the study area at the time this document was prepared. The environmental conditions described in the affected environment sections constitute the baseline conditions against which impacts are assessed. Because maintenance dredging of the wharves, and the Tugboat Basin area has occurred on a regular basis for several decades, the action of MOTCO's maintenance dredging and its associated environmental impacts have occurred on a regular basis over time from the maintenance dredging, and are considered part of the existing conditions that comprise the baseline. Accordingly, the previous Navy maintenance dredging practices, as represented by the Resume Maintenance Dredging Alternative, and the environmental impacts of these practices, are part of the baseline conditions to which the impacts of the action alternatives are compared.

The environmental consequences discussion provides an analysis of the potential adverse and beneficial environmental impacts that could result from implementing the action alternatives compared to the No Action Alternative. Impacts from dredging, transport of dredged materials, and placement of dredged materials are evaluated.

#### **3.2 ENVIRONMENTAL RESOURCES NOT APPLICABLE OR EVALUATED IN DETAIL**

Certain environmental resources are not present in the dredging or dredge disposal areas and are eliminated from further analysis in this EA. There is no anticipated modification on the proposed MOTCO Maintenance Dredging Program and its associated disposal activities over the 10-year life of the project (2022 to 2031), with dredging occurring biennially between August 1 and November 30. Any modification to the maintenance dredging program considered beyond what is discussed in this EA may require additional environmental analysis and would require approval by the Commander at MOTCO and approval by the DMMO for amending the permit. Dredging outside of the annual fish window is not included in this analysis and may trigger additional NEPA actions, including evaluation of the environmental effects, identification of mitigation measures, and the opportunity for public review and comment.

##### **3.2.1 Forestry**

Forestry resources are not present in the MOTCO project area, or placement sites, and therefore would not be impacted by dredging and placement activities.

##### **3.2.2 Land Use-Agriculture**



The Proposed Action is not expected to produce any adverse effect to land use or agriculture. There is no work or staging of equipment or materials on agricultural land at MOTCO. The DMPS is a disturbed upland habitat area and former Navy dredge materials placement site that has been revegetated and managed for grazing (INRMP 2017). Dredging the access to the proposed boat ramp in the former Tugboat Basin may remove residual submerged aquatic vegetation along the shoreline. All dredging for access to the wharves and proposed boat ramp is in-water work that would not remove terrestrial vegetation. Maintenance dredging would not contribute to changes in land uses, nor produce a permanent conversion of prime and unique farmlands to other land uses. There would be temporary effects at the DMPS during placement of dredge materials and UXO removal. Following revegetation, the DMPS would be managed for grazing between dredging episodes. There is no further discussion on land use or prime and unique farmlands with a determination of no effect on these resources.

### **3.2.3 Energy**

Although dredging and placement activities do require consumption of nonrenewable energy resources, the project alternatives would not require substantially more or less energy than historic maintenance dredging operations at MOTCO. Therefore, energy impacts are considered negligible, and this resource is not evaluated further in this EA.

### **3.2.4 Noise**

MOTCO Wharves, Barge Pier, and the proposed boat ramp are not near sensitive receptors (e.g., residences, schools, and hospitals), and do not exceed the Federal Transportation Authority's noise assessment thresholds (FTA 2006) to evaluate potential dredging noise impacts. Commercial and recreational ship traffic is an ambient noise source on the Federal navigation channels, near Wharves 2, 3, 4, Barge Pier, and the proposed boat ramp. The proposed dredging operations would not increase noise levels above the ambient level of noise associated with traffic in the Suisun Bay in the vicinity of the dredging project. Therefore, implementation of the project alternatives would have no adverse impacts on the human noise environment, and this resource is not evaluated further in this EA. Noise impacts on biological resources are discussed in Section 3.6, Biological Resources.

### **3.2.5 Recreational Resources**

MOTCO dredging would not involve the construction of recreation facilities, would not create demand for new recreational facilities, and would not result in increased use and deterioration of existing recreational facilities. Recreational vessels may travel through the adjacent Federal navigation channel; however, the dredging is not anticipated to affect the use of the channel to pass through the Suisun Bay. Waters immediately adjacent to MOTCO are off-limits to civilian activities, including all forms of recreation. Therefore, the project alternatives would not adversely impact recreational resources, and this resource is not evaluated further in this EA.

### **3.2.6 Aesthetics and Visual Resources**

There would be no long-term adverse effect to aesthetic and visual resources. Therefore, this resource is not evaluated further in this EA.

### **3.2.7 Population and Housing, Socioeconomics, and Environmental Justice**

The project represents a continuation of MOTCO's historic activities, for which there are no known environmental justice impacts. Therefore, the project alternatives would not adversely

impact population and housing, or socioeconomics, and would not result in disproportionately high and adverse impacts to environmental justice populations. Therefore, these resources are not evaluated further in this EA.

### **3.2.8 Utilities and Infrastructure**

Evaluation of effects on utilities and infrastructure includes analysis of whether the proposed dredging and dredged material disposal would not result in the relocation or loss of utilities. The preferred alternative to conduct maintenance dredging of the approach channel and berthing areas at MOTCO's Wharves 2, 3, 4, Barge Pier and proposed boat ramp would not displace any existing electrical or water utilities. The direct, indirect, and cumulative effects of maintenance dredging would not directly or indirectly affect the electrical and water utilities associated with MOTCO's Wharves 2, 3, 4, Barge Pier and proposed boat ramp. In addition, the dredging is not anticipated to affect any utilities located beneath Suisun Bay, as the depth of dredging would be within the authorized depth and overdredge depth for dredging activities, which have been ongoing. The MOTCO materials placement site does not have any utilities underneath the area. Nor would the use of existing, approved dredged material disposal sites disturb existing utilities. Therefore, there is no further discussion on utilities and infrastructure in this EA.

### **3.2.9 Transportation, Circulation, and Navigation**

The Traffic and Transportation discussion in Section 3.10 of the 2015 Federal Navigation Channels EA/EIR generally characterizes the regulatory setting, existing conditions, and the affected environment for this resource.

The direct effects to traffic and circulation found within the MOTCO installation are short-term and limited to one to four construction worker vehicles using the installation roads and ramps to access the boats used to ferry the workers to the dredge and barge twice a day. There would not be any effects to road traffic or transportation on public roads outside the installation. There is no further discussion on traffic and transportation. Dredge materials will be pumped to the processing site near Wharf 4 (Figure 3) for ordnance processing, dewatering, and loading onto trucks. The transport route from the processing site to the placement site is 0.7 miles. An estimated 11,000-12,000 truck trips (~16 CY capacity) would be required to transport 184,656 CY for the initial dredging event.

#### **3.2.10 Air Quality**

Title 40 of the C.F.R. § 93.153(c)(2)(ix) states that "Maintenance dredging, and debris disposal where no new depths are required, applicable permits are secured, and disposal will be at an approved disposal site" is exempt from conformity analyses. In accordance with 40 C.F.R. § 51.853(c)(2)(ix), MOTCO has determined the proposed action is exempt from the requirement to prepare a conformity determination under the Clean Air Act because the project consists of maintenance dredging; no new depths are required, placement would be at approved placement sites, and the necessary permits for dredging would be secured prior to dredging activities. Therefore, there is no further discussion on air quality in this EA.

#### **3.2.11 Regional Growth**

The proposed dredging and dredged material placement activities would not result in any new residences or infrastructure that could facilitate growth in the local area. Maintenance dredging, transport, and placement would not require the expansion of water or energy conveyance, nor would the project alternatives require the construction of new roads. The project alternatives

would not remove any existing obstacles to growth. Therefore, the project alternatives would have no impact on regional growth, and this topic is not further evaluated in this EA.

### 3.3 RESOURCES COVERED IN DETAIL

The resources discussed in the sections that follow are:

- Geology, Soils, and Sediment Quality
- Hydrology and Water Quality
- Biological Resources
- Cultural and Paleontological Resources
- Hazards and Hazardous Materials

For each resource section, the analysis is presented as follows:

1. Under “Regulatory Setting,” the Federal, State, and local regulatory framework applicable to implementation of the project alternatives is described.
2. Under “Environmental Setting,” the existing environmental conditions in the study area are described. The region of influence varies by resource and is defined, where appropriate, for each resource.
3. Under “Effects,” direct, indirect, and cumulative impacts are analyzed, and a full description is provided of the mitigation measures that are recommended or required to reduce project impacts for that resource area.

Direct impacts are the primary effects that are caused by the alternative and occur at the same time and place. Indirect impacts are secondary effects that are reasonably foreseeable and caused by the alternative but occur at a different time or place. Cumulative impacts result from the incremental impact of the proposed project alternatives when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions (see below for further discussion of cumulative impacts).

#### 3.3.1 Methodology and Thresholds for Significance

Significance criteria for each resource topic were used to assess the severity of the environmental impacts of the proposed project alternatives. NEPA does not have specific impact thresholds that are used to assess the significance of impacts on a given resource topic. When assessing whether a Proposed Action would significantly affect the quality of the human environment, environmental impacts should be evaluated in terms of context, intensity, and duration (40 C.F.R. § 1508.27). Context refers to the geographic area (spatial extent) of impact, which varies with the physical setting of the activity and the nature of the resource being analyzed. Intensity refers to the severity of the impact; evaluation of the intensity of an impact considers the sensitivity of the resource, as well as other factors. The duration of the impact is described as short-term or long-term.

In the resource sections, discussion of impacts is organized according to the impact type. Under each impact type title, impacts are analyzed for each alternative, and a determination of the level of the impact is presented. Where impacts would be the same for one or more alternatives, the impact discussion for these alternatives is combined to avoid redundancy.

Impacts analyzed are classified as beneficial, negligible, less than significant, or significant, which are defined as follows:

- A beneficial impact would generally be regarded as an improvement over current condition;
- A negligible impact would cause a slight, adverse change in the environment but one that generally would not be noticeable;
- A less than significant impact would cause an adverse change in the environment that would likely be noticeable, but does not meet or exceed the defined significance criteria; and
- A significant impact would cause a substantial, adverse change in the environment that would exceed the defined significance criteria;

Avoidance or mitigation measures are identified to reduce the project's impacts, where feasible. Mitigation measures in this EA are formulated to be consistent with the definitions of mitigation found in the CEQ's NEPA regulations, Section 1508.20.

### **3.3.2 Cumulative Effects**

"Cumulative impacts" refers to two or more individual effects that, when combined, could be more considerable. Potentially significant cumulative impacts can result from individually minor, but collectively significant impacts taking place over time (CEQ NEPA regulations, Section 1508.7). The discussion of cumulative impacts provides an analysis of cumulative impacts of the project, taken together with other past, present, and reasonably foreseeable future projects, producing related impacts. The goal of this analysis is twofold: first, to determine whether the overall long-term impacts of all such projects would be cumulatively significant; and second, to determine whether the project itself would cause a "cumulatively considerable" incremental contribution to any such cumulatively significant impacts. In other words, the required analysis first creates a broad context in which to assess the project's incremental contribution to anticipated cumulative impacts, viewed on a geographic scale beyond the project site itself; and then determines whether the project's incremental contribution to any significant cumulative impacts from all projects is itself significant.

The geographic scope of cumulative effects analysis for this project under the LTMS is defined as the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. The effects of this dredging project are similar to other past, present, and reasonably foreseeable dredging projects throughout the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, as analyzed in the LTMS (USACE 2015). The cumulative effects of this project would not have significant effects to waters in the immediate area or the greater San Francisco Bay area. This project utilizes measures which would minimize adverse environmental effects, including sediment analyses to identify appropriate placement sites, minimizing the effects of contaminants on sediment and water quality and mechanical dredging and work windows to minimize adverse effects on fish species. The mitigation measures and BMPs discussed below (Sections 3.4-3.8) will minimize the adverse effects of maintenance dredging at MOTCO. Placement of dredge materials on MOTCO reduces the geographic area for cumulative effects. Overall, the maintenance dredging would result in little, if any, incremental contribution to cumulative effects.

Table 7 Past, present, and reasonably foreseeable future projects considered in the cumulative effects analysis.

This list includes projects that are likely to result in impacts similar to those of the project alternatives. The list of projects generally includes those in close proximity to the Federal channels and placement site (i.e., those that could result in overlapping impacts, such as navigation and air quality), or other projects along the San Francisco Bay/Sacramento-San Joaquin Delta Estuary that could result in overlapping impacts to resources such as biological resources and water quality. Cumulative effects are addressed at the end of each resource section.

Cumulative Scenario – Present and Reasonably Foreseeable Projects				
Project Number	Project Name/ Location	Status/ Anticipated Timeline	Project Summary	Source
1	Non-Federal Maintenance Dredging in San Francisco Bay	Ongoing	More than 100 marinas, ports, and berthing slips are maintenance dredged in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. Most of the non-Federal maintenance projects are along the shorelines and in the tributaries of the Estuary.	USACE and USEPA, 2009
2	San Francisco Bay and Delta Sand Mining Project	10-year leases to continue mining sand (until 2022)	The CSLC action is a 10-year General Lease through December 31, 2022. Hanson Marine Operations proposed new, 10-year mineral extraction leases to enable the continuation of dredge mining of construction-grade sand from certain delineated areas of Central San Francisco Bay, Suisun Bay, and the western Sacramento-San Joaquin River Delta Estuary area.	CSLC, 2012; CEQAnet, 2013
3	Sacramento Deep Water Ship Channel	Planning phase could occur within 10-year planning horizon	USACE is the project sponsor for the Sacramento River Deep Water Ship Channel (SRDWSC), a 43-mile-long channel in Contra Costa, Solano, Sacramento, and Yolo Counties that serves the marine terminal facilities at the Port of West Sacramento. The 30-foot-deep SRDWSC joins the 35-foot-deep John F. Baldwin Ship Channel, allowing access to the San Francisco Bay Area harbors and the Pacific Ocean. The project involves resuming construction of the 35-foot-deep channel, as authorized in 1986. A Limited Reevaluation Report and Supplemental Environmental Impact Statement/Report are being prepared.	USACE, 2013b
4	San Francisco Bay to Port of Stockton John F. Baldwin Ship Channel Phase III Navigation Improvement Project	Planning phase	USACE is the project sponsor for deepening the John F. Baldwin channel to 45 feet MLLW and the Stockton Deep Water Channel to 40 feet MLLW for draft navigation.	USACE, 2012b
5	Stockton Deep Water Ship Channel Operations and Maintenance	Ongoing	Maintenance dredging of the Stockton portion of the channel to 35 feet MLLW by USACE Sacramento District.	USACE, 2012b
6	Suisun Marsh Restoration Plan	Planning phase	The United States Department of the Interior is the project sponsor for tidal restoration targets of 5,000 to 7,000 acres and 44,000 to 46,000 acres of managed wetlands during the 30-year implementation period.	U.S. Department of the Interior, USFWS, and CDFW, 2011
7	MOTCO Wharf 2 Modernization/Wharf 3 Repairs	Ongoing	MOTCO project to modernize Wharf 2 and repair Wharf 3. Wharf 3 repairs complete/Wharf 2 construction anticipated completion 2021?	MOTCO 2015a, 2017
8	MOTCO Wharf 4 and Lighter Berth Removal	Planning Phase	MOTCO project to remove the existing Wharf 4 and remove unused lighter berths FY28+.	MOTCO pers. comm. 2019/20
9	MOTCO Boat Ramp	Planning/Design Phase	MOTCO project to construct boat ramp in former Navy Tug Basin FY?	MOTCO pers. comm. 2019/20
10	MOTCO Barge Pier/ Small Craft Berthing Facility	Design/Construction Phase	MOTCO project to repair piles on the existing Barge Pier, replace floating barge pier used to moor fire boat with small craft berthing facility for fire and security boat mooring in FY 21.	MOTCO pers. comm. 2019/20
11	Federal Navigation Channel Dredging	Ongoing	USACE annual dredging of the Federal navigation channels in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary area.	USACE 2015
Notes: CDFW = California Department of Fish and Wildlife CEQA = California Environmental Quality Act CSCC = California State Coastal Conservancy CSLC = California State Lands Commission EIR = Environmental Impact Report			MLLW = mean lower low water SRDWSC = Sacramento River Deep Water Ship Channel WETA = San Francisco Bay Area Water Emergency Transportation Authority USACE = United States Army Corps of Engineers USCG = United States Coast Guard USFWS = United States Fish and Wildlife Service	

### **3.4 GEOLOGY, SOILS, AND SEDIMENT QUALITY**

This section evaluates the project alternatives' potential effects related to erosion and sediment quality. Sediment-related impacts on water quality (e.g., turbidity, contaminant suspension) from dredging and placement activities are discussed in Section 3.5, Hydrology and Water Quality. Potential impacts associated with sediment quality impacts on fisheries and other aquatic species are addressed in Section 3.6, Biological Resources. The parking lot (1.5 acres) at Wharf 4 is proposed as a materials processing area for the transfer of dredge materials from scows onto land for additional screening, dewatering, and transport to the placement area (12.4 acres; Figure 3). The materials processing area shall have silt fencing around the perimeter to retain sediment during dewatering. There is no change to the existing geology, soils, and seismicity relevant to the discussion of this area of the affected aquatic environment of the Suisun Bay.

#### **3.4.1 Regulatory Setting**

The Geology, Soils, and Sediment Quality in Section 3.3 of the 2015 Federal Navigation Channels EA/EIR generally characterizes the regulatory setting for this resource since the nearby existing sediment quality conditions are similar in the approach channel and berthing areas compared to the adjacent area of the Suisun Bay Channel. Coordination with the DMMO would occur prior to initiation of dredging activities, and permits would be required prior to initiation of any dredging.

The Dredged Material Management Office (DMMO) is a joint program of USACE, USEPA, the Regional Water Board, BCDC, and California State Lands Commission. Participating agencies include the California Department of Fish and Wildlife, National Marine Fisheries Service, and the U.S. Fish and Wildlife Service. The purpose of the DMMO is to cooperatively review sediment quality sampling plans, analyze the results of sediment quality sampling, and make suitability determinations for material proposed for placement in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary.

Applicants must submit results from recent sediment testing, based on an approved sediment Sampling and Analysis Plan. The applicant must submit the sampling results to the DMMO for review, and the DMMO will make a determination about where the materials can be disposed. Although the DMMO provides initial review of permit applications, applicants must eventually obtain separate approval from the appropriate DMMO member agencies (e.g., CWA Section 401 WQC from the Regional Water Board); each agency issues permit conditions and specific requirements about how the project is to be performed.

##### **3.4.1.1 Sediment Sampling and Testing**

The Inland Testing Manual (ITM, USACE and USEPA 1998), Ocean Testing Manual (OTM, USACE and USEPA 1991), and the Upland Testing Manual (UTM, USACE 2003) specify the sampling and testing requirements for dredged material based upon the potential placement site. Some upland sites may have additional requirements beyond those specified in the three manuals.

The DMMO is a forum used by project proponents and the regulatory agencies to ensure sampling and testing programs meet water quality standards and that dredged material is placed in sites that are appropriate for the type and quality of the material to be dredged. The Sampling and Analysis Plan (SAP) describes the process for compositing, analyzing and reviewing

sediment results for Federal maintenance dredging projects (see example USACE 2014b). The SAP for MOTCO dredging describes how material should be collected, shipped, stored, handled, and tested for certain physical, chemical, and biological analyses. The SAP was updated in 2019 prior to sampling in October 2019.

In accordance with the ITM, when the material to be dredged is greater than 80 percent sand and is in a high-energy environment, it is assumed to be clean and exempt from further testing. Sediment directly in front of MOTCO Wharves 2, 3 and 4, and Barge Pier is <80% sand. The sediment was previously tested in 2014 in accordance with a DMMO reviewed Sediment SAP (USACE 2014c). MOTCO submitted a Pre-dredge Sediment Sampling and Analysis Plan (U.S. Army 2019a) to the DMMO for sampling in October 2019 to provide current sediment data for identifying appropriate placement or disposal sites in the permitting compliance (EA). A comparison of DMMO criteria and bioaccumulation tissue concentration results indicate that bioaccumulation of PAHs, PCBs, pesticides and metals is not anticipated (USACE 2014c, 2020).

Dredged materials from Suisun Bay Channel have historically been comprised predominantly of sand with low levels of metals and butyltins and very low or non-detectable levels of polyaromatic hydrocarbons (PAHs), pesticides, and polychlorinated biphenyls (PCBs), which excludes these dredged materials from further chemical and biological analyses.

Confirmatory grain size analysis for the Suisun Bay Channel is conducted on a 5-year cycle, with the next episode scheduled for 2024. USACE sampled sediment in the MOTCO project area using an approved SAP (U.S. Army 2019a) and results reported in the Sediment Analysis Report (USACE 2020a).

### **3.4.2 Environmental Setting**

Composited sediment samples (U.S. Army 2019a) were collected for chemical analyses and grain-size testing of MOTCO by USACE (2020). The preliminary report shows fine sediments (silt+clay) ranging from 32.5 to 93.5 percent in the dredging permit area (USACE 2020a).

### **3.4.3 Methodology and Thresholds of Significance**

The Proposed Action alternative, neither proposes construction of new structures nor introduce elements that would increase potential risks related to rupture of a known earthquake fault; seismic shaking; or seismic-related ground failure, including liquefaction; or landslides. Similarly, because channels would be dredged to previously maintained depths, the project alternatives would not involve activities that would cause geologic units or soils to become unstable, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse; this excludes minor erosion of the channel sides from sloughing that may occur after the channels are dredged (see Section 3.4.4.1). Placement of dredged material at MOTCO or existing permitted placement sites would not be expected to result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse because the placement of dredged material at these sites is managed and monitored to avoid such impacts. Because the project alternatives would have no potential impacts related to seismic risks or unstable geologic resources, these topics are not further addressed in this section. The proposed project would not result in adverse impact on minerals (USACE 2015).



Therefore, the analysis considers whether the proposed project would:

- Result in substantial soil erosion, or
- Substantially degrade sediment quality (i.e., substantially increase sediment contaminant concentrations above ambient conditions).

#### **3.4.3.1 Exposure to Constituents of Concern and Bioaccumulation**

Sediment sampling was conducted and analyzed for MOTCO Wharf renovation (USACE 2014c). These analyses indicate there are unlikely to be constituents of concern in the sediments to be dredged. USACE conducted confirmatory sediment sampling and analysis during fall 2019 to the depths proposed for this project, plus the required overdepth, prior to dredging. The testing (U.S. Army 2020) confirmed that the sediments are chemically suitable for placement at Montezuma Wetlands, SF-9, SF-DODS, and Cullinan Ranch. Materials processing and placement at MOTCO provides for safe removal of UXO.

#### **3.4.4 Effects**

##### **No Action Alternative**

Under the No Action Alternative, dredging would not occur. There would be no temporary effects or cumulative impacts to the geology, soil, and sediments at MOTCO under the No Action Alternative.

##### **3.4.4.1 Potential for Dredging, Transport, and Placement Activities to Result in Substantial Soil Erosion**

##### **Proposed Action Alternative**

Under the Proposed Action alternative, dredging would remove sediment that has accumulated since the prior dredging event (circa 1994). Although the Proposed Action alternative may result in minimal erosion from sloughing along the wharves due to the disturbance of sediments, historic patterns of erosion and sediment accumulation would not be expected to change. Transport of dredged materials would not disturb sediments, and therefore would not result in any erosion effects.

The potential for erosion effects due to placement activities would be minimal. Open-water placement sites can be either predominantly non-dispersive (i.e., dredged materials largely remain at the placement location), or predominantly dispersive (i.e., dredged materials disperse from the site during placement or over time). The proposed long-term maintenance dredging including the Proposed Action alternatives is not anticipated to result in substantial soil erosion. Dredging would occur in the water and some sloughing of the perimeter edges along the peris may occur, but the area should stabilize shortly following dredging operations. The placement of dredge material at beneficial reuse sites is not anticipated to result in any substantial soil erosion as the required sediment and erosion controls for those sites would be implemented, as required by any plans or permits for those sites. Potential erosion control measures include grading the slope of placed materials and hydroseeding for vegetation to stabilize the site. Berm barriers and coffer dams may also be used to retain placed materials on a site during stabilization.

NEPA Determination: Under the Proposed Action alternative, erosion effects from dredging would be less than significant. The transport and placement of dredged material at the MOTCO placement site would have no effect on erosion as the materials would disperse in the currents.

The transport and placement of dredged material at MOTCO would have beneficial effects on soil resources.

#### **3.4.4.2 Potential for Dredging, Transport, and Placement Activities to Substantially Degrade Sediment Quality**

##### **Proposed Action Alternative**

Based on historic sediment testing data from the Federal navigation channels in Suisun Bay (USACE 2015) and the Proposed Action area (U.S. Army 2020c), dredged material has been determined suitable for placement, and proposed potential alternate placement sites have been identified. The proposed long-term maintenance dredging is not anticipated to result in negative changes to sediment quality.

The placement of dredge material at the MOTCO placement site is not anticipated to result in any substantial negative effects to sediment quality. The results from the sediment analysis report are consistent with the ambient analyte levels in the surrounding San Francisco Bay/Sacramento-San Joaquin Delta Estuary area. Several analytes were slightly above threshold levels but were biologically unavailable as determined by the bioaccumulations test.

NEPA Determination: Under the Proposed Action alternative, short and long-term effects to sediment quality would be less than significant (U.S. Army 2020c). The effects of dredging and material transport on sediment quality are anticipated to be negligible because the constituents are near or below ambient levels found throughout area. Placement of dredge materials based on chemical analysis would ensure the effects on sediment quality are beneficial or not significant.

#### **3.4.4.3 Potential for Dredging, Transport, and Placement Activities to Result in Cumulative Impacts on Sediments and Soils**

##### **Proposed Action Alternative**

The proposed long-term maintenance dredging included in both alternatives is not anticipated to result in cumulative impacts to soil erosion in the berthing areas at MOTCO or at the DMPS. The cumulative effect of dredging has lowered the bed in the vicinity of MOTCO, reducing the differences in depth between the berthing areas and the surrounding area. Continued long-term maintenance dredging should produce a stable slope around the berthing areas. Dredge materials placed at the DMPS would be graded for drainage and hydroseeded to stabilize the materials.

NEPA Determination: The Proposed Action alternative would not result in cumulative impacts on sediments and soils. The cumulative impacts of dredging on sediments and soils are anticipated to be negligible over the long-term. Transport and placement of dredge materials would have beneficial cumulative impacts at beneficial reuse sites or other appropriate sites.

### **3.4.5 Cumulative Impacts**

#### **3.4.5.1 Impact: Potential to Result in Cumulative Impacts to Sediment Quality**

##### **Proposed Action Alternative**

The proposed long-term maintenance dredging in the Proposed Action alternative is not anticipated to result in cumulative impacts to sediment quality. Dredging would not change sediment quality, because settling of similar sediments would be anticipated to occur within the footprint following dredging.

Recurring monitoring of sediment chemical composition required by DMMO will ensure timely identification of changes in sediment quality. Significant changes to sediment quality would result in DMMO changing the approved placement site to avoid adverse cumulative impacts. Vegetation on the DMPS would be a long-term indicator of sediment quality. The material transported to the placement site would meet the appropriate criteria for placement at that site, so changes in sediment quality are not anticipated.

NEPA Determination: The Proposed Action alternative would not contribute to significant cumulative sediment quality impacts. The cumulative impacts of dredging and material transport on sediment quality are anticipated to be negligible because of periodic monitoring of the constituents to verify chemical composition are consistent with ambient levels in the area. Chemical analysis of dredge materials would ensure the cumulative impacts on sediment quality at placement sites is either beneficial or not significant.

### **3.5 HYDROLOGY AND WATER QUALITY**

This section describes the existing hydrologic and water quality regulatory and environmental setting of San Francisco Bay/Sacramento-San Joaquin Delta Estuary and the offshore ocean environment and analyzes the potential impacts of the project alternatives on water resources. The materials processing area shall have silt fencing around the perimeter to retain sediment during dewatering. Water may be recycled for pumping sediment from scows and filtered for infiltration into local groundwater. Existing conditions and potential impacts associated with water quality impacts on fisheries and other aquatic species are addressed in Section 3.6, Biological Resources.

#### **3.5.1 Regulatory Setting**

The Hydrology and Water Quality in Section 3.4 of the 2015 Federal Navigation Channels EA/EIR generally characterizes the regulatory setting for this resource since the nearby existing water quality conditions are the same in the approach channel and berthing areas compared to the adjacent area of the Suisun Bay Channel. Coordination with the DMMO would occur, and permits from USACE (CWA 404, RHA), RWQCB (CWA 401) may be required as may a consistency determination through BCDC.

#### **3.5.2 Environmental Setting**

The Hydrology and Water Quality discussion in Section 3.4 of the 2015 Federal Navigation Channels EA/EIR generally characterizes the affected environment and management for this resource since there is no difference in the water quality of the approach channel leading to MOTCO's wharves and proposed boat ramp location compared to the existing water quality condition for the nearby Suisun Bay Channel. The wharves, Barge Pier and proposed boat ramp location are in close proximity to the existing water quality identified for the Suisun Bay Channel. Excess water from dredge materials would infiltrate into the soil at the processing area and DMPS. For the area identified as the approach channel and berthing areas to be dredged, this Draft EA discloses the short-term and long-term and indirect effects associated with maintenance dredging over a 10-year period (2022 to 2031) between August 1 and November 30.

#### **3.5.3 Methodology and Thresholds of Significance**

This EA uses the same methodology, thresholds or no impact findings as described in the 2015 Federal Navigation Channel EA/EIR Section 3.4.3.

### 3.5.3.1 Turbidity and Suspended Sediment

The Proposed Action could produce increased suspended sediments and turbidity in the action area from clamshell dredging operations and placement of spoils at the disposal site. Background turbidity in the estuary is naturally high, with total suspended solids (TSS) levels varying from 10 mg/L to more than 100 mg/L (Robinson and Greenfield 2011). However, sediment plumes would be generated from excess sediment and other material entrained (e.g. air bubbles) being discharged back into the water during dredging. Plumes typically have an increased suspended sediment concentration, and thus elevated turbidity. The degree of sediment re-suspension depends on the material, size and composition of the sediment being re-suspended. Plume size, concentration, and duration of the plume depend on environmental and operational specific factors. During dredging, sediments may become suspended because of the clamshell bucket's impact to the bottom, material washing from the top and side of the bucket as it passes through the water column, sediment spillage as it breaks the water surface, spillage of material during scow loading, and intentional overflow in an attempt to increase the scow's effective load which is only permissible for material that is 80 percent or more sand.

Turbidity plumes were measured during clamshell dredging in the Oakland Harbor and Richmond Inner Harbor, located in Central San Francisco Bay, and Redwood City Harbor, located in the South San Francisco Bay (USACE 2015). Sediment in these channels ranges from very fine silt to sandy-silt. The purpose of the turbidity monitoring was to determine if dredging and/or overflowing of scows exceeded the turbidity requirements in the project's water quality certification. The water quality certification requires that increased turbidity be less than 50 NTU or no greater than 10 percent if the baseline NTU is greater than 50 at the point of compliance (i.e., 500 feet downstream of dredging). Ambient turbidity was measured 200 feet up current from dredging, in areas that were not affected by the turbidity plume. The turbidity plumes were measured at 200 feet down current from the dredge (referred to as the early warning location) and 500 feet down current from the dredge (referred to as the point of compliance). For each location, turbidity was measured near the surface (approximately 2 feet below the surface), mid-depth, and near the bottom (approximately 2 feet above the bed). Turbidity was measured when the scow was overflowing (decanting) and when the scow was not overflowing, and also represented the range of tides in the region. Measurements were taken every 10 minutes at each location. Exceedances of the water quality turbidity standards occurred periodically for all channels, with most exceedances occurring in the Richmond Inner Harbor, where sediment is very fine-grained.

Dredging is anticipated to produce temporary, localized turbidity plumes that will be carried and dissipated by current flowing through the area. The plume would have no long-term effect on water quality. Placement of dredge material likewise would temporarily affect turbidity. At beneficial use sites, turbidity would be localized and would be mitigated using barriers to contain the plume. Placement at underwater sites would result in rapid dispersal of the turbidity plume by water currents, reducing the effects. Minimization measure for water quality certification and 404 permits would be implemented to avoid and minimize turbidity effects to the maximum extent practicable.

### 3.5.4 Effects

The Hydrology and Water Quality discussion in Section 3.4 of the 2015 Federal Navigation Channels EA/EIR characterizes the potential effects to (1) degrade water quality through the

alteration of temperature, salinity, pH, and dissolved oxygen, (2) substantially degrade water quality because of increased turbidity, and (3) result in cumulative impacts to hydrology and water quality. MOTCO's maintenance dredging and placement / disposal action(s) have the potential to substantially degrade water quality because of mobilization of sediments or release of hazardous materials.

#### **No Action Alternative**

Under the No Action Alternative, dredging would not occur. There would be no temporary effects or cumulative impacts to hydrology and water quality at MOTCO under the No Action Alternative.

#### **3.5.4.1 Potential to Substantially Degrade Water Quality through Alteration of Water Temperature, Salinity, pH, and Dissolved Oxygen**

##### **Proposed Action Alternative**

Studies have shown placement of dredged material from clamshell-bucket dredges into the water column does not cause substantial short- or long-term changes in salinity, temperature, or pH (USACE 2015). Changes in these parameters were localized and short in duration; ambient concentrations of these parameters were usually regained within 10 minutes following material release. Localized minor and temporary dissolved oxygen level reductions (1 to 2 parts per million) may occur during dredging, including barring and knockdown practices, and placement; however, the ambient conditions are shortly regained following settlement of the suspended sediment (USACE 1976).

The movement of vessels for transport of dredged materials would not be expected to affect water temperature, salinity, pH, or dissolved oxygen. Placement of materials would not cause major changes to water temperature, salinity, or pH at the placement site. The dissolved oxygen levels may be temporarily reduced at the placement site.

NEPA Determination: Under the Proposed Action alternative, the effects to water quality temperature, salinity, pH, and dissolved oxygen would be short-term and less than significant. The effects of dredging on water temperature, salinity, and pH are anticipated to be temporary and negligible. The effect of dredging on dissolved oxygen would be localized and will vary based on H<sub>2</sub>S content of the sediments. Depression of dissolved oxygen levels in open water would not have an adverse effect on organisms in the immediate area.

The effect of material transport and placement on water temperature, salinity, or pH are anticipated to be localized, temporary and negligible. The effect of dredge material on dissolved oxygen in the immediate placement area will vary based on H<sub>2</sub>S content of the sediments. Mitigation should include use of silt fencing to moderate water flow during material placement.

#### **3.5.4.2 Potential to Substantially Degrade Water Quality Because of Increased Turbidity**

##### **Proposed Action Alternative**

Under the Proposed Action alternative, dredging would cause a local re-suspension of sediments, and a temporary decrease in water clarity. Fine sediments (clay and silt) remain suspended in the water column longer than coarser sediments (sand); therefore, turbidity returns to ambient levels more quickly during dredging of sandy materials. Increased turbidity effects from dredging are short term, minor, and greatly diminish with distance from the activity.

Sediments may become suspended in the water column because of the clamshell bucket's impact to the channel bottom, material washing from the top and side of the bucket as it passes through the water column, sediment spillage as it breaks the water surface, spillage of material during scow loading, and intentional overflow in an attempt to increase the scow's effective load (permissible only for material that is 80 percent or more sand). The spatial extent of turbidity plumes during mechanical dredging operations may result in distinct plumes above background TSS concentrations for distances up to 400 meters from the source (USACE 2015). Generally, mechanical dredges result in greater suspended sediment during dredging activities than hydraulic dredges, and therefore result in greater increases in turbidity. Short-term increases in turbidity generated by knockdown and barring operations are typically concentrated in the lower portion of the water column in the local area of disturbance (USACE 2015).

Because sediment re-suspension from dredging vessel movement would be limited, the movement of vessels for transport of dredged materials would not be expected to increase turbidity above ambient ranges generated by natural hydrologic processes, weather, and existing vessel traffic.

Some degree of increased turbidity will occur with placement of dredged material in any of the placement environments, and at any placement volume. Water quality effects from ocean or in-Bay placement could be associated with plumes from the initial placement event; or in some cases, from subsequent re-suspension (from dispersive sites). In most cases, such effects would be limited to the area of the plume following placement and would be temporary and localized. The USACE studies show turbidity plumes at placement sites last only 20 minutes, and plume duration is even less during placement of sandy material because the coarse sediments settle out of the water column more quickly than fine sediments (USACE 1976a; 2015). Therefore, effects on turbidity from placement of dredged material would be minor and temporary.

Both computer modeling and real-time field monitoring of dredged material placement at SF-DODS have shown that sediment plumes dissipate quickly to background levels, and that this occurs entirely within the boundaries of the placement site. Because SF-DODS is a depositional site (in contrast to in-Bay sites), disposed material is not expected to re-suspend into the water column, and therefore would not continue to affect water quality after its initial placement. All the existing in-Bay placement sites are dispersive sites in shallow, estuarine waters, so dredged material may re-suspend in the water column following initial placement. Therefore, compared to in-water placement at SF-DODS, there is greater potential for turbidity effects to be associated with placement at any of the in-Bay sites (USACE 2005).

Placement of dredged materials at habitat restoration beneficial reuse projects (particularly wetland restoration) could result in a net benefit to water quality by increasing sediment retention, filtration of pollutants, and shoreline stabilization over the long-term. However, short-term, localized increases in turbidity levels could result during placement activities.

NEPA Determination: The effects of the Proposed Action alternative to water quality due to short-term increases in turbidity would be less than significant. Dredging will produce temporary localized turbidity around the dredge barge. Mitigation measures should include avoid overflowing the scow to increase the effective load.

**3.5.4.3 Placement of dredged materials at habitat restoration beneficial reuse projects may result in temporary increases in turbidity at placement sites. The long-term effects of appropriate material placement would be**



**beneficial on water quality. Potential to Substantially Degrade Water Quality Because of Mobilization of Contaminated Sediments or Release of Hazardous Materials**

**Proposed Action Alternative**

Dredging of contaminated sediments does present the potential for release of contaminants to the water column. However, most contaminants are tightly bound in the sediments and are not easily released during short-term re-suspension. Sediments are tested prior to dredging, and the results are reviewed by the DMMO prior to dredging and placement, including evaluation of the potential for water quality effects (refer to Section 1.6.6 for details on the DMMO and testing requirements). Sediment testing results for previous maintenance dredging episodes indicate that dredged materials from the Federal navigation channels have been suitable for in-Bay placement (suitable for unconfined aquatic disposal, SUAD). The sediment testing results for the MOTCO Wharves Modernization (USACE, 2014) and MOTCO Dredging (Appendix C) are SUAD.

The Proposed Action would place dredge materials at the DMPS on MOTCO. The relatively high silt content of the sediment has eliminated aquatic disposal of dredge materials from consideration (See Section 2.8.3). Therefore, dredging and placement activities would not be expected to increase contaminant concentrations in the water column above baseline conditions, or result in violation of a water quality standard.

Dredging, transport, and placement of dredged material would be conducted in cooperation with the DMMO. This process would identify contaminated sediments and appropriate placement site options for dredged materials based on the characteristics of the sediment and the criteria for each placement site. Additionally, MOTCO would implement BMPs and comply with water quality protection measures included as conditions to the CWA 401 Water Quality Certification issued by the RWQCB and the letter of agreement issued by the BCDC for MOTCO's consistency determination. Adherence to these measures and BMPs would minimize the potential for water quality degradation.

Dredging operation vessels would be operated in compliance with all applicable regulations related to the prevention of water pollution by fuel, harmful substances, and garbage, as well as from accidental discharges. During transport, the dredged material would be secured, with precautions in place to minimize any risk of spills. Therefore, the potential for the release of hazardous substances from vessel operations during dredging, transport, and placement activities would be minimal.

NEPA Determination: Under the Proposed Action alternative, effects on water quality as a result of potential mobilization of contaminated sediments or hazardous materials release would be less than significant. The effects of dredging and material transport on mobilization or release of contaminated sediments are anticipated to be negligible because the chemical constituents are near or below ambient levels found through area. Identification of hazardous materials in sediment would result in changes in handling techniques to avoid release.

Placement of dredge materials based on chemical analysis would ensure that handling of contaminated sediments would contain hazardous materials.

### 3.5.5 Cumulative Impacts

#### 3.5.5.1 Impact: Potential to Result in Cumulative Impacts to Hydrology or Water Quality

##### Proposed Action Alternative

The Proposed Action alternative would result in minor, short-term water quality impacts during dredging and placement activities due to short-term turbidity increases or the potential for releases of contaminants from sediments or vessel into the water. Cumulative water quality impacts could include increases in turbidity; disturbance and release of contaminated sediments; or accidental release of hazardous materials such as diesel fuel from vessels. As stated above, the proposed project's potential impacts on water quality due to mobilization of contaminated sediments and release of hazardous materials would be minimal. Although maintenance dredging and placement activities could overlap with other projects that would disturb sediments and result in increased turbidity, impacts would be isolated and short-term, and would not be substantial in the greater geographic context of the project area. Additionally, other projects involving dredging and construction in the marine environment would be subject to permitting/regulatory approval processes similar to those for the proposed project and would be required to implement similar measures to minimize water quality impacts.

NEPA Determination: The Proposed Action alternative would not contribute to significant cumulative water quality impacts. The cumulative impacts of dredging and material transport on hydrology and water quality are anticipated to be negligible because of periodic monitoring of the constituents to verify chemical composition are consistent with ambient levels in the area. Additionally, MOTCO would implement BMPs and comply with water quality protection measures required by the RWQCB and BCDC. Chemical analysis of dredge materials would ensure the cumulative impacts on water quality at placement sites is either negligible or less than significant.

### 3.6 CLIMATE CHANGE

This section describes the existing climate of San Francisco Bay/Sacramento-San Joaquin Delta Estuary and analyzes the potential impacts of the project alternatives. The Climate Change Section (2.2.5) from the San Francisco Bay to Stockton, California, Navigation Improvement Project IGRR-EIS (USACE 2020b), including Suisun Bay adjacent to MOTCO is incorporated by reference.

Existing sources of GHGs in the study area are extensive and include vehicles, marine vessels, industry, and farms. However, the effect of GHGs differ from other pollutants in that they do not directly impact local or even regional settings and are not often the effect of individual large sources. Rather, excess GHG emissions from many different sources combine to increase mean global temperatures, which in turn have numerous direct and indirect effects on the environment and humans on regional and local scales.

Observed environmental changes in California due to global warming include rising temperatures, rising sea levels, a lengthened growing season, and shifts in plant and animal ranges. At a local level, the navigation channel and surrounding area may be at greater risk of changing weather patterns, such as the current drought affecting water resources, the increasing intensity of rainfalls that can cause localized flooding, and the local effects from SLR. As

discussed above, because the effects of climate change are regional in nature, the environmental setting in regards to climate change is the same throughout the study area.

### **3.6.1 Regulatory Setting**

The Climate Change in Section 2.2.5 of the San Francisco Bay to Stockton, California, Navigation Improvement Project IGRR-EIS generally characterizes the regulatory setting for this resource since the GHG emissions are discussed for the Suisun Bay Channel.

### **3.6.2 Environmental Setting**

The Climate Change Section (2.2.5) from the San Francisco Bay to Stockton, California, Navigation Improvement Project IGRR-EIS provides the regional environmental setting (USACE 2020b) while the San Francisco Bay-Delta Climate Change discussion in the Biological Assessment / Essential Fish Habitat Assessment (Appendix G in USACE 2020b) describes the effects of sea level rise and increased water temperatures on special status fishes.

### **3.6.3 Methodology and Thresholds of Significance**

This EA uses the same methodology, thresholds or no impact findings as described in the San Francisco Bay to Stockton, California Navigation Improvement Study IGRR-EIS (USACE 2020).

### **3.6.4 Effects**

The San Francisco Bay-Delta Climate Change discussion in the Biological Assessment/Essential Fish Habitat Assessment (Section 5.5) for the San Francisco Bay to Stockton, California Navigation Improvement Project IGRR-EIS (Appendix G in USACE 2020b) generally describes the effects of sea level rise and increased water temperatures on special status fishes. Ships calling at MOTCO are a small subset of those calling at Stockton, CA. Maintenance dredging at MOTCO would not increase the number of ship calls to the installation.

#### **No Action Alternative**

Under the No Action Alternative, dredging would not occur. There would be no temporary effects or cumulative impacts compared to the NEPA baseline, and it would not result in additional GHG emissions. Therefore, the No Action Alternative would not conflict with any applicable plans, policies, or regulations adopted to reduce GHG emissions and there would be no impact as compared to the NEPA baseline.

#### **3.6.4.1 Potential to directly or indirectly exceed applicable Federal or state GHG standards**

#### **Proposed Action Alternative**

Under the Proposed Action Alternative, maintenance dredging would occur. There would be no temporary effects or cumulative impacts compared to the NEPA baseline, it would not result in additional GHG emissions. The Climate Change Induced by Project discussion in the San Francisco Bay to Stockton, California Navigation Improvement Project IGRR\_EIS (USACE 2020b) found that maintenance dredging would not result in additional GHG emissions (Impact CC-1). There would be no construction-related GHG emissions and ship calls would be the same as compared to the NEPA baseline. The impacts to GHG would be the same as the No Action Alternative. This impact is considered less than significant because maintaining the same level of

ship activity would not conflict with applicable plans, policies, or regulations designed to reduce GHG emissions and climate change impacts.

### **3.6.5 Cumulative Impacts**

#### **3.6.5.1 Impact: Potential to directly or indirectly exceed applicable Federal or state GHG standards**

##### **Proposed Action Alternative**

The Proposed Action alternative would result in less than significant, short-term increases in GHG during dredging. The cumulative impacts to GHG would be the same as the No Action Alternative.

NEPA Determination: The Proposed Action alternative would not directly or indirectly exceed applicable Federal or state GHG standards resulting in significant increase to cumulative GHG emission. The cumulative impacts of dredging on GHG levels are anticipated to be negligible.

### **3.7 BIOLOGICAL RESOURCES**

The complete list of Federal and state-listed species was evaluated during the wharves modernization EIS (U.S. Army 2015a) and the Integrated Natural Resources Management Program (INRMP 2017). Federally-listed fish species with suitable habitat in the project vicinity include Delta Smelt, Green Sturgeon, Central Valley Steelhead, Sacramento River winter-run and spring-run Chinook Salmon, and may seasonally occur in the project area. Potentially suitable habitat exists on MOTCO for Federally-listed wildlife including California Ridgway's (clapper) rail (CRR; *Rallus obsoletus obsoletus*), Salt Marsh Harvest Mouse (*Reithrodontomys raveiventris*), the California Tiger Salamander (*Ambystoma californiense*) and the California Red-legged Frog (*Rana aurora draytoni*), that could inhabit the marsh areas found along the shorelines of MOTCO and the Seal Islands. Surveys indicate these Federally-listed species do not occur in the project area (Eco and Associates, Inc. 2021), and there would be no effects from dredging or placement of materials on the species or their habitat. Therefore, no further discussion of terrestrial species is warranted. Subsequent to the completion of the LTMS EIS/EIR, USACE implemented monitoring to determine whether dredging operations were resulting in take of Federally-listed fish species. Hopper dredging equipment is not currently used for maintenance dredging in Suisun Bay, to avoid potential entrainment of Federally-listed Delta Smelt. To minimize the potential for future effects to Federally-listed fish species, the proposed project would fully address aspects of MOTCO's maintenance dredging and dredged materials placement program that could result in injury or mortality of these species.

This section incorporates by reference information contained in Section 3.6 of the Maintenance Dredging of the Federal Navigation Channels in the San Francisco Bay (USACE 2015), Section 3.5 of the Modernization and Repair of Piers 2 and 3 (U.S. Army 2015a), and section 3.4 of the 2017 Pier 2 Modernization and Repair Design Changes (U.S. Army 2017a). This section describes the existing regulatory and environmental setting in the study area for biological resources. Existing species, including Federally-listed species and habitats, including designated critical habitat, are described. The potential impacts of the project alternatives on these resources are analyzed.

#### **3.7.1 Regulatory Setting**

The Biological Resources discussion in Section 3.6 of the 2015 Federal Navigation Channels EA/EIR provides a general overview that characterizes the regulatory setting for fish and wildlife resources, including those habitats found at nearby Seal Islands and MOTCO.

### **3.7.2 Environmental Setting**

The Biological Resources discussion in Section 3.6 of the 2015 Federal Navigation Channels EA/EIR generally characterizes the affected environment for habitat types, fish, and wildlife, and Federally-listed species found within the dredging project and DMPS at MOTCO. For the purposes of this analysis, the project's study area in Suisun Bay encompasses the in-water areas in Contra Costa and Solano Counties, and land-based resources on the Seal Islands and MOTCO. MOTCO also encompasses several other islands (Roe, Ryer, Freeman, Snag and Middle Ground) north of the Suisun Bay Channel (Historical Properties in Section 3.7.2). These Islands are not part of the land-based effects analysis because there are no proposed dredging or disposal actions within proximity to them.

Vegetation surveys for wharf modernization have documented submerged aquatic vegetation (SAV) in shallower water landward of the wharves (U.S. Army 2015b, 2018b). It is unlikely for SAV to occur in the deeper water of the berthing areas and approaches. The Proposed Action to conduct maintenance dredging is limited to this portion of the Suisun Bay in the deeper approach area leading from the Suisun Bay Channel southward to the Wharves 2, 3, 4, Barge Pier, and proposed boat ramp, and disposal of sediments is limited to approved areas. Some shoreline vegetation will be removed to re-establish the basin for the proposed boat ramp.

There are negligible to less than significant anticipated effects on the fauna, benthic communities, fish, birds, marine mammals and aquatic plants in the MOTCO dredging permit area. A discussion of Federally-listed species for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, which includes Suisun Bay terrestrial and fish species, is provided below under Federally-listed Species.

#### **3.7.2.1 Federally-listed Species and Critical Habitat**

This EA evaluates dredging effects on several Federally-listed fish species. Fish species of concern include Delta Smelt, Green Sturgeon, and several salmonids (listed below). Other Federally-listed species that may potentially occur near the DMPS are the California Ridgway's (clapper) rail, Salt Marsh Harvest Mouse, the California Tiger Salamander, and the California Red-legged Frog (INRMP 2017; Eco and Associates, Inc. 2021). MOTCO initiated formal consultation and submitted Biological Assessments to USFWS and NMFS in October 2019. The respective Biological Opinions will analyze the effects of the Proposed Action on these species and their critical habitat.

The USFWS provided a list for species of concern on July 16, 2019. No terrestrial species were identified with critical habitat in the project area. None of the Federally-listed terrestrial species have been detected near the DMPS or the processing area (INRMP 2017; Eco and Associates, Inc. 2021). On Aug 30, 2019 a species list was received from National Marine Fisheries Service. This project would follow the best management practices (BMPs) and reasonable and prudent measures (RPMs) of the Long Term Management Strategy (LTMS) for the Placement of Dredge Material in the San Francisco Bay Region (USFWS 1999). This project would follow the BMPs and RPMs of the LTMS (2015a, b).

On September 18, 2019 the USFWS and NMFS participated in a conference call with MOTCO and USACE to discuss the content in the forthcoming BA(s). The conversation focused on clearly describing the proposed dredging actions at MOTCO.

### **Delta Smelt**

The USFWS ESA Section 7 Consultation was initiated on October 15, 2019 for Delta Smelt. The status of Delta Smelt (*Hypomesus transpacificus*) in the project area is summarized in the Biological Assessment to USFWS (U.S. Army 2019a, Appendix A). Critical habitat for this species includes Suisun Bay. The record low abundance of Delta Smelt in recent years has increased concern regarding the effects of dredging activities on the species. Hopper dredging has been reduced in Delta Smelt habitat to minimize entrainment. The USFWS BO dated December 30, 2019 concurred that the proposed project may affect, and is likely to adversely affect Delta Smelt, and may affect, but is not likely to adversely affect designated critical habitat for Delta Smelt.

### **National Marine Fisheries Service – ESA Consultation**

The NMFS ESA Consultation was initiated on October 15, 2019 for Central Valley spring-run Chinook Salmon, Sacramento River winter-run Chinook Salmon, Central Valley Steelhead, Central California Coast Steelhead, and the Southern DPS of North American Green Sturgeon (Appendix A). The consultation included evaluation of Essential Fish Habitat for Coastal Pelagic species (northern anchovy and the Pacific sardine), Pacific Groundfish (brown rockfish, flatfish, sharks), and the Pacific Coast (Chinook) Salmon. The NMFS letter dated April 10, 2020 concurred with the Army that the proposed action is not likely to adversely affect the subject Federally-listed species and designated critical habitats.

### **Green Sturgeon**

The Green Sturgeon (*Acipenser medirostris*) migrate through Suisun Bay between freshwater, estuarine, and nearshore marine habitats. Critical habitat for this species includes the project area. The status of Green Sturgeon in the project area is summarized in the Biological Assessment to NMFS (U.S. Army 2019b, Appendix A).

### **Salmonids**

Four Federally-listed salmonid populations migrate through Suisun Bay including Central California Coast Steelhead (*O. mykiss*), Central Valley Steelhead (*O. mykiss*), Sacramento River winter-run Chinook (*O. tshawytscha*), and Central Valley spring-run Chinook (*O. tshawytscha*). Critical habitat for these species includes the project area. The status of these salmonids in the project area are summarized in the Biological Assessment to NMFS (U.S. Army 2019b, Appendix A).

#### **3.7.2.2 Essential Fish Habitat**

Suisun Bay is classified as EFH under the Magnuson-Stevens Act. The project area serves as habitat for species of commercially important fish and sharks that are Federally-managed under three fishery management plans (FMP): the Coastal Pelagic FMP, Pacific Groundfish FMP, and the Pacific Coast Salmonid FMP.

The Coastal Pelagic FMP is designed to protect habitat for the northern anchovy and the Pacific sardine in the project area.



The Pacific Groundfish FMP is designed to protect habitat in the project area for brown rockfish, flatfish, and some sharks. This includes both rocky and soft substrates.

The Pacific Salmon FMP is designed to protect habitat for commercially important Chinook Salmon in the project area.

### **3.7.3 Methodology and Thresholds of Significance**

This EA uses the same methodology, thresholds and no impact findings as described in the 2015 Federal Navigation Channel EA/EIR Section 3.5.3 (USACE 2015).

#### **3.7.3.1 Turbidity**

Exposure to excessive suspended sediment concentrations could lead to physiological stresses such as clogged gills, eroded gill and epithelial tissues, impaired foraging activity and feeding success, and altered movement and migration patterns of juvenile and adult fish (USACE 2015). Exposure of fish to elevated suspended sediment concentrations could result in behavioral avoidance and exclusion from otherwise suitable habitat, disrupt movement and migration patterns, reduce feeding rates and growth, result in sublethal and lethal physiological stress, habitat degradation, or delayed hatching; and, under severe circumstances, could result in mortality (USACE 2015). The response of fish to suspended sediments varies among species and life stages as a function of suspended particle size, particle shape, water velocities, suspended sediment concentrations, water temperature, depressed dissolved oxygen concentrations, contaminants, and exposure duration (USACE 2015). Short-duration exposure to elevated suspended sediment concentration associated could result in sublethal effects; however, potential exposure and dosage of suspended sediment concentrations drops exponentially from the source of the plume.

#### **3.7.3.2 Noise**

Underwater sound pressure waves can harass and harm fish species (Reyff 2003, Abbott and Bing-Sawyer 2002, Caltrans 2001, Stotz and Colby 2001). As the pressure wave passes through a fish, the swim bladder is rapidly squeezed due to the high pressure, and then rapidly expanded as the under-pressure component of the wave passes through the fish. The scientific knowledge of the effects of dredge generated noise and sound waves on fishes is limited and varies depending on the species. Severe noise effects on fish can include rupture of the swim bladder, internal hemorrhage, neurological stress, and auditory damage. Studies on the effects of noise on anadromous Pacific coast fishes are primarily related to pile driving activities. The Fisheries Hydroacoustic Working Group has established interim criteria for noise impacts from pile driving on fishes (FHWG 2008). A peak sound pressure level of 206 dB is considered injurious to fishes. An accumulated sound pressure level of 187 dB for fishes that are more than 2 grams, and 183 dB for fishes below that weight are considered to cause injury. Although there is no formal agreement on a “behavioral” threshold, the NMFS uses 150 dB-root mean square as the threshold for adverse behavioral effects (NMFS 2009).

The effect of sound on fish and other species also depends on the ambient sound levels. The Suisun Bay Channel has a high level of deep draft and shallow draft vessel traffic. These vessels access ports and harbors along the Carquinez Strait and Contra Costa County waterfront and continue to the Delta. At certain times, locations, and distances from the dredge plant, dredging activities may not be perceptible relative to the ambient noise conditions.

Clamshell dredges produce a repetitive sequence of sounds generated by winches, bucket impact with the substrate, closing and opening of the bucket, and sounds associated with dumping the dredged material into a scow. The sounds are repeated with each bucket load and are stopped when dredging ceases. The most intense sounds are produced during the bucket's impact with the substrate; however, depending on the substrate being dredged, the sound intensity differs. Typically, softer material generates softer sounds and harder, more compact substrate generates louder sounds. Peak sound pressures levels measured during mechanical dredging have been recorded at 124 decibels (dB) from 490 feet (150 meters) away (Dickerson et al. 2001). Noise generated from clamshell dredging is typically lower than sounds levels that adversely affect marine species and is expected to be below specified threshold levels. However, noise from the bucket hitting the bottom or from the dredge plant could elicit avoidance behavior by Delta Smelt.

### **3.7.4 Effects**

#### **No Action Alternative**

Under the No Action Alternative, dredging would not occur. There would be no effects to underwater noise, water turbidity and water quality (no toxicity). There would be no effects from disturbance to benthic, avian roosting, avian foraging, or essential fish habitat. The No Action Alternative would not result in entrainment of Federally-listed marine fish species, Delta Smelt, Longfin Smelt, or interfere with movement of fish or wildlife through Suisun Bay, nor support the spread of invasive species. There would be no placement of dredge materials at the DMPS, and no effects to Federally-listed wildlife on MOTCO. There would be no cumulative impacts to biological resources at MOTCO under the No Action Alternative.

#### **Proposed Action Alternative**

Maintenance dredging would disturb bottom sediments, which would temporarily increase turbidity, disturb benthic habitat and associated communities of organisms living in or on the mud bottom, and generate underwater noise. This disturbance could result in the temporary loss or reduction of habitat suitable for foraging by sensitive fish species such as Steelhead, Chinook Salmon, Green Sturgeon, Delta Smelt, and Longfin Smelt. In addition, entrainment of fish in dredging equipment could occur. The behavior of marine mammals, such as harbor seals and sea lions, is not likely to be affected by dredging activities. Dredged material placement also would result in temporary increases in turbidity, which could result in similar effects on habitat, benthic habitat, and wildlife behavior. Dredge materials placed at the disturbed DMPS would be graded for drainage and hydroseeded to stabilize the materials. These materials will have discountable effects on habitat at the DMPS. These effects are discussed in more detail below.

Because sediment re-suspension from dredging vessel movement would be limited, the movement of vessels for transport of dredged material would not be expected to increase turbidity above ambient ranges generated by natural hydrologic processes, weather, and existing vessel traffic. Vessel traffic for transport of dredged material would be similar to that which has occurred during the Corp's past maintenance dredging operations, would occur in areas with frequent vessel movement, and would be negligible considering the existing volume of vessel movement in the study area. Therefore, the transport of dredged material is expected to result in less than significant effects to biological resources (USACE 2015).

### **3.7.4.1 Potential Adverse Effects of Increased Turbidity Resulting from Maintenance Dredging and Dredged Material Placement on Federally-listed Species, Critical Habitat, and Commercially Valuable Marine Species**

#### **Proposed Action Alternative**

Under the Proposed Action alternative, there would be increased turbidity as a result of dredging and placement, frequency of dredging, volumes dredged, and placement site(s). MOTCO would implement standard practices intended to minimize increases in turbidity from dredging and placement activities. Dredging and placement would be implemented during the work windows for the LTMS program.

Dredging would result in localized and temporary increases in turbidity at both the dredge locations and placement sites. As described above, this is expected to have less than significant effects on Federally-listed species, their critical habitat, or EFH.

NEPA Determination: Under the Proposed Action alternative, the effects on Federally-listed species (Delta Smelt, Green Sturgeon, Steelhead, and Chinook Salmon), critical habitat, and commercially valuable marine species from localized and temporary increases in turbidity would be less than significant.

Dredging turbidity would be localized within the proposed project area, allowing fish species to avoid the area of the plume. Mitigation measures should include avoid overflowing the scow to increase the effective load. Transport turbidity is a function of scow overflow that would be dispersed by water currents. Turbidity would be localized at the reuse placement sites and would be mitigated using silt barriers as appropriate.

### **3.7.4.2 Potential Adverse Effects of Maintenance Dredging Resulting from the Disturbance of Benthic Habitat on Federally-listed Species, Critical Habitat, and Commercially Valuable Marine Species**

#### **Proposed Action Alternative**

Dredging would directly affect benthic communities through physical disruption and direct removal of benthic organisms, resulting in the potential loss of most, if not all, organisms in the dredged area. Similarly, organisms in or immediately adjacent to the placement sites may be also be lost because of smothering or burial from sediments during dredged material placement.

Critical habitat for Steelhead, Chinook Salmon, Delta Smelt, and Green Sturgeon overlaps with some of the estuarine portions of the project areas. Benthic habitat can be an important part of critical habitat for some species by providing foraging areas, especially for Steelhead, Chinook Salmon, and Green Sturgeon. Because Delta Smelt feed in the water column, benthic habitat is less important habitat. The loss of benthic invertebrates during dredging activities may decrease the forage value of critical habitat at the dredge location.

The Proposed Action may affect two primary constituent elements of Delta Smelt critical habitat: rearing habitat and adult migration. Rearing habitat includes shallow water river and tributary habitat including Suisun Bay. Protection of this habitat is most important from February through the summer. The entire action area is within the rearing habitat primary constituent element.

With the exception of August, the work window (August 1 through November 30) is mostly protective of the Delta Smelt rearing life stage. However, rearing Delta Smelt may be affected by the Proposed Action. With respect to adult migration, adults must be provided unrestricted

access to suitable spawning habitat from December through July. Spawning areas include areas of the Sacramento and San Joaquin Rivers and tributaries, Cache Slough, Montezuma Slough, and tributaries. Although spawning habitat is not found in the action area, adult Delta Smelt begin migrating from the action area to spawning grounds in September and October. The Proposed Action may affect adults migrating from the action area to spawning grounds during this timeframe; however, the affected area would be limited to the immediate dredging or placement zone and would not substantially limit the available habitat or movement of fish.

Following sediment-disturbing activities such as dredging or the placement of dredged materials, disturbed areas are usually recolonized quickly by benthic organisms (USACE 2015). The species that recolonize first are usually characterized by rapid growth and reproduction rates. Marine benthic invertebrates often colonize disturbed sedimentary habitats via pelagic larvae that settle from the water column. Crustaceans, such as amphipods that are abundant in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, brood young to much more advanced stages than pelagic larvae, releasing what are essentially miniature adults into the sediment, and can rapidly colonize adjacent disturbed areas. Recovery may be slower in deep water; therefore, there is potential for some loss of habitat and forage to organisms that use deep water areas.

Studies have indicated that even relatively large areas disturbed by dredging activities are usually recolonized by benthic invertebrates within 1 month to 1 year, with original levels of biomass and abundance developing within a few months to between 1 and 3 years (USACE 2015).

Under the Proposed Action, MOTCO would implement maintenance dredging, dredged material placement, the frequency of dredging, volumes dredged, and placement site would be the similar to previous episodes. Regardless of the dredging methods used, similar amounts of benthic habitat would be disturbed by dredging and dredged material placement. As described above, the potential effects of benthic habitat disturbance would be short term and localized.

NEPA Determination: Under the Proposed Action alternative, the effect on Federally listed species (Delta Smelt, Green Sturgeon, Steelhead, and Chinook Salmon), critical habitat, and commercially valuable marine species from localized and temporary disturbances of benthic habitat would be less than significant. Dredged areas would be re-colonized by benthic organisms within 1-12 months from surrounding habitat. Underwater areas at placements sites may re-colonize with benthic organisms within 1-12 months. Material placement may create wetlands and other features that would be colonized by other organisms.

### **3.7.4.3 Potential Adverse Effects of Underwater Noise Generated During Maintenance Dredging on Federally-listed Fish and Marine Mammals**

#### **Proposed Action Alternative**

Mechanical dredges produce a complex combination of repetitive sounds that may be intense enough to cause adverse effects on fish and marine mammals. Clamshell dredges have a repetitive sequence of sounds generated by the winches, bucket impact with the substrate, closing and opening the bucket, and sounds associated with dumping the dredged material into the scow. The most intense sound effects are produced during the bucket's impact with the substrate, with peak sound pressure levels (SPL) of 124 decibels (dB) measured 150 meters from the bucket strike location (USACE 2015).

The scientific knowledge of the effects of dredge-generated noise and sound waves on fishes is limited and varies depending on the species. Effects may include behavioral changes,

neurological stress, and temporary shifts in hearing thresholds. Studies on the effects of noise on anadromous Pacific coast fishes are primarily related to pile-driving activities. The interagency Fisheries Hydraulic Working Group has established interim criteria for noise impacts from pile driving on fishes. A peak SPL of 206 dB is considered injurious to fishes. Accumulated SPLs of 187 dB for fishes that are greater than 2 grams, and 183 dB for fishes below that weight, are considered to cause temporary shifts in hearing, resulting in temporarily decreased fitness (i.e., reduced foraging success, reduced ability to detect and avoid predators). The NMFS uses 150 dB as the threshold for adverse behavioral effects.

For marine mammals, NMFS criteria define exposure to underwater noises from impulse sounds at or above 160 dB RMS and continuous sounds at or above 120 dB as constituting harassment to marine mammals. NMFS has also determined that noises with SPLs above 180 dB RMS can cause injury to cetaceans (whales, dolphins, and porpoises), and SPLs above 190 dB RMS can cause injury to pinnipeds (seals and sea lions).

Injury to fish from peak noise (e.g., rupture of swim bladder) is not expected to occur, but behavioral effects (e.g., changes in feeding behavior, fleeing, startle responses) could occur. All fish, listed or otherwise, would experience the same effects. In comparison, commercial shipping vessels can produce continuous noise in the range of 180 to 189 dB (USACE 2015). Although dredging could produce underwater noise that is considered to be harassment for marine mammals, it is comparable to that produced by commercial shipping vessels, which are common in the study area. Marine mammals are highly mobile and would likely avoid areas of noise and disturbance from dredging operations.

Underwater noise produced during dredging may have temporary adverse effects on fish and marine mammals but would not be expected to cause injury to fish and marine mammals. These effects include fleeing, the cessation of feeding, or other behavioral changes. Additionally, fish exposed to underwater noise above the NMFS sound exposure level thresholds may experience temporary hearing threshold shifts. All dredging activities would take place in the Federal navigation channels, which receive regular boat traffic, and therefore have high background levels of underwater noise.

NEPA Determination: Under the Proposed Action alternative, temporary adverse effects to Federally-listed fish and marine mammals from underwater noise would be less than significant.

Dredging noise (~124 dB) is lower than the NMFS threshold for adverse behavioral effects. Noise emanating from scows during material transport would not exceed other shipping traffic noise, having a less than significant effect. Material placement noise has a lower intensity than dredging below the NMFS threshold for adverse behavioral effects.

#### **3.7.4.4 Potential Adverse Effects from Entrainment on Federally-listed or Commercially and Recreationally Important Marine Species, Not Including Delta Smelt and Longfin Smelt**

##### **Proposed Action Alternative**

Mechanical dredging has a lower potential for fish entrainment during spawning and outmigration of younger fish (Green Sturgeon, Steelhead, and Chinook Salmon) life stages. Only clamshell and/or knockdown dredging would be implemented as described in the Proposed Action.

NEPA Determination: With implementation of clamshell dredging during the LTMS work windows and other standard practices intended to reduce the potential for entrainment, effects to Federally-listed and commercially important species resulting from entrainment would be less than significant under the Proposed Action Alternative. Material transport and placement would not result in entrainment of Federally-listed and commercially important species.

#### **3.7.4.5 Potential Substantial Adverse Effects and Cumulative Impacts to Delta Smelt from Entrainment**

##### **Proposed Action Alternative**

Only mechanical dredging would occur at MOTCO. Dredging would be as described in the Proposed Action (e.g. clamshell and/or knockdown only)

NEPA Determination: The potential for entrainment of Delta Smelt would be nearly eliminated using clamshell dredging during the LTMS August 1 through November 30 work window (Proposed Action). Project and cumulative impacts would be less than significant. Material transport and placement would not result in entrainment of Delta Smelt.

#### **3.7.4.6 Potential Substantial Adverse Effects and Cumulative Impacts to Longfin Smelt from Entrainment**

##### **Proposed Action Alternative**

Only mechanical dredging would occur at MOTCO. Dredging would be as described in the Proposed Action (e.g. clamshell and/or knockdown only). Although the project may contribute to cumulative impacts on Longfin Smelt, the project's contribution, compared to that from water export facilities and other factors, to cumulative impacts would not be significant.

NEPA Determination: The potential for entrainment of Longfin Smelt would be nearly eliminated using mechanical dredging (Proposed Action). Project and cumulative impacts would be less than significant. Material transport and placement would not result in entrainment of Longfin Smelt.

#### **3.7.4.7 Dredging and Placement Activities Could Result in the Disturbance of Essential Fish Habitat and "Special Aquatic Sites," Including Submerged Aquatic Vegetation (SAV) Beds and Mudflats**

##### **Proposed Action Alternative**

All portions of the project area in Suisun Bay are designated as EFH under one or more FMPs. The Programmatic EFH agreement completed in 2011 includes several conservation measures that enhance the environmental protectiveness of the LTMS Program. No further EFH consultation is required for MOTCO maintenance dredging performed in accordance with the provisions established through the formal Programmatic Federal EFH consultations for the LTMS.

SAV beds and mudflats are considered special aquatic sites and are subject to jurisdiction under Section 404 of the CWA, and the San Francisco BCDC jurisdiction under Section 66605 of the McAtter-Petris Act. Additionally, eelgrass beds and estuarine areas such as San Francisco Bay/Sacramento-San Joaquin Delta Estuary are considered "habitat areas of particular concern" with regard to EFH designations.

Mudflats serve as important foraging areas for shorebirds species and provide shallow water habitat for juvenile fish. No loss of mudflat acreage would occur as a result of maintenance dredging and placement activities. Sensitive habitats (such as marshes and mud flats) that occur in the vicinity of the project area would not be disturbed.

Limited SAV, including eelgrass, in Suisun Bay near the project area serves as a nursery ground and shelter for juvenile fish, among other functions. Eelgrass has been identified as EFH for various life stages of fish species managed by FMPs under the Magnuson-Stevens Act, as established by NMFS. Although eelgrass and other SAV does exist near the wharves (U.S. Army, 2015b), there is no known eelgrass or other SAV in the deeper portions of the project area.

Eelgrass may be indirectly affected by turbidity and increased sedimentation in areas adjacent to, or down current from, dredging operations. Turbidity plumes from dredging operations may temporarily reduce light penetration in waters adjacent to the plumes. Sediment near areas of dredging may settle on eelgrass or other SAV blades and affect the viability of the eelgrass or other SAV in beds adjacent to dredging operations. Eelgrass and other SAV beds are easily affected by changes in water quality and turbidity because their growth and survival are a direct function of light penetration in the water column. However, as discussed under Section 3.5.12.1, turbidity effects from dredging are expected to be localized and short-term.

NEPA Determination: The Proposed Action alternative effect on EFH or special aquatic sites, including eelgrass beds and mudflats, would be less than significant. Turbidity plumes from dredging would be temporary, localized around the dredge barge, and mostly in water deeper than 20'. Mitigation measures should include avoid overflowing the scow to increase the effective load. Transport of dredge material would have a negligible effect on SAV. Placement of dredge material would rely on the site BMPs to minimize effects to SAV.

#### **3.7.4.8 Interference with the Movement of Resident or Migratory Fish or Wildlife Species During Dredging and Placement Activities**

##### **Proposed Action Alternative**

The noise and in-water disturbance associated with dredging and placement activities could cause fish and wildlife species to temporarily avoid the immediate dredging or placement area when work is being conducted. Placement activities can cause temporary displacement of fish from the vicinity of the placement site, especially during high-frequency placement activity (whether due to cumulative water quality effects or due to the physical disturbance of placement). Fish tend to exhibit avoidance behavior for about 2 to 3 hours after dredged material placement, and fish community densities generally return to pre-disposal levels after about 3 hours (USACE 2015). The affected area would be limited to the immediate dredging or placement zone and would not substantially limit the available habitat or movement of fish, seabirds, or marine mammals.

NEPA Determination: The Proposed Action alternative, effects on the movement or migration of fish or wildlife species would be less than significant. Fish and wildlife would likely move around active dredging operations because of noise and turbidity but would be able to return to or move through the area within hours of cessation of operations. Mitigation includes dredging during the LTMS August 1 through November 30 work window to minimize effects to fish and wildlife. Transport of dredge material would be similar to other shipping and have a negligible



effect on fish and wildlife. Placement of dredge material would rely on the site BMPs to minimize effects to fish and wildlife.

#### **3.7.4.9 Dredging and Placement Activities Could Disturb Roosting and Foraging by Avian Species**

##### **Proposed Action Alternative**

Suisun Bay is an important stopover for many species of migratory waterfowl in the Pacific Flyway. The wharf dredging and the DMPS are in areas where human activity is consistent and ongoing. The DMPS is a disturbed upland site managed for grazing. The Barge Pier dredge area is approximately 700+ feet from the Seal Islands, and Wharves 2, 3 and 4 are in excess of 300 feet from the shoreline landward of the wharves. Birds in these areas are accustomed to human activity and noise, including that from vessel traffic. Dredging, materials transport and placement may temporarily disturb foraging and resting behaviors, decrease time available for foraging, and increase energetic costs as a result of increased flight times and startling responses. Birds that might be found in or near MOTCO wharves or placement sites are highly mobile and can avoid the open water project activity. Any effect on food availability and foraging success as a result of increased turbidity in the water column and burial of the benthic community caused from placement will be short-term and localized. Additionally, it is expected that waterbirds and shorebirds would be able find other forage resources nearby. Therefore, birds are not expected to be adversely affected by dredging and placement activities.

NEPA Determination: The Proposed Action alternative would result in short-term adverse effects, the effects on avian roosting and foraging would be less than significant. Dredging during the LTMS August 1 through November 30 work window would reduce effects to roosting and foraging birds during the breeding season and rearing of their offspring.

#### **3.7.4.10 Contaminated Sediments Could Become Re-suspended During Dredging and Placement Activities, and Could Be Toxic to Aquatic Organisms, Including Plankton, Benthos, Fish, Birds, and Marine Mammals**

##### **Proposed Action Alternative**

Dredging can disturb aquatic habitats by re-suspending bottom sediments, thereby recirculating toxic metals, hydrocarbons, pesticides, pathogens, and nutrients into the water column. Any toxic metals and organics, pathogens, and viruses, absorbed or adsorbed to fine-grained particulates in the sediment may become biologically available to organisms either in the water column or through food chain processes. However, most contaminants are tightly bound in the sediments, and are not easily released during short-term re-suspension. Most available studies suggest that there is no significant transfer of metal concentrations into the dissolved phase during dredging, even though release of total metals associated with the suspended matter may be large (Jabusch et al., 2008). Organic contaminants such as pesticides, polychlorinated biphenyls, and polyaromatic hydrocarbons are generally not very soluble in water, and direct toxicity by exposure to dissolved concentrations in the water column is not very likely (Jabusch et al., 2008).

Sediments are tested prior to dredging, and the results are reviewed by the Dredged Material Management Office (DMMO) prior to dredging and placement, including evaluation of the potential for affect to aquatic organisms. Previous sediment testing results for maintenance dredging episodes indicate that, in general, dredged materials from the subject Federal navigation

channels have been suitable for unconfined aquatic disposal. Over time, some isolated areas in or adjacent to the channels have been identified as containing sediment that is NUAD. If future testing identifies NUAD material that must be dredged, MOTCO would place all NUAD material at upland sites, and in some cases MWRP, as determined during DMMO review. MOTCO would implement sediment bioaccumulation testing, as detailed in the Agreement on Programmatic EFH Conservation Measures for Maintenance Dredging Conducted Under the LTMS Program (USACE and USEPA, 2011). Therefore, dredging and placement activities would not be expected to increase contaminant concentrations in the environment above baseline conditions.

Dredging, transport, and placement of dredged material would be conducted in accordance with permits from DMMO, RWCB, and BCDC. This process would identify contaminated sediments and appropriate placement site options for dredged materials, based on the characteristics of the sediment and criteria for each placement site. Additionally, MOTCO would implement BMPs and comply with water quality protection measures included as conditions to the Water Quality Certification issued by the Regional Water Board and the letter of agreement issued by the BCDC. Adherence to these measures and BMPs would minimize the potential for water quality degradation that could affect aquatic organisms. The results of 2019 MOTCO sediment testing (Appendix C) indicate the materials are SUAD based on composition and bioaccumulation tests.

NEPA Determination: The Proposed Action alternative effect on water quality as a result of potential mobilization of contaminated sediments or hazardous materials release would be less than significant. The effects of dredging on mobilization or release of contaminated sediments are anticipated to be less than significant because the constituents are near or below ambient levels found through area. Identification of hazardous materials in sediment would result in changes in handling techniques to avoid release.

Mitigation measures should include avoid overflowing the scow to increase the effective load. Transport of dredge materials in scows would have negligible effects. Sediment testing provides a BMP process (mitigation) to minimize adverse effects of material placement. Chemical analysis of sediments prior to dredging would ensure transfer to appropriate placement sites for contaminated sediments.

#### **3.7.4.11 Dredging and Placement Could Substantially Increase the Spread of Invasive Nonnative Species**

##### **Proposed Action Alternative**

Under the Proposed Action alternative, dredging vessels would come from areas outside of the study area. There is the potential that nonnative species could be introduced to the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. Larval forms of nonnative species can be carried in the ballast water of vessels, and if ballast water is released in San Francisco Bay/Sacramento-San Joaquin Delta Estuary, larvae can be introduced into the Bay ecosystem. The United States Coast Guard has mandatory regulations in effect that require ships carrying ballast water to have a ballast water management and reporting program in place and, without jeopardizing the safety of the crew, exchange ballast water with mid-ocean water or use an approved form of ballast water treatment, prior to releasing any ballast water in a port in the United States. Dredge equipment would comply with these regulations, as applicable.

Beneficial reuse and upland placement site operators are responsible for managing the placement of dredged materials at the placement sites in accordance with conditions of their permits and other regulatory approval, which include measures to minimize the spread of invasive nonnative species.

Therefore, project activities would not be expected to substantially increase the spread of invasive nonnative species.

NEPA Determination: The Proposed Action alternative has little potential to substantially increase the spread of invasive, nonnative species would be less than significant. The BMP for all dredging related equipment is they shall be cleaned and inspected prior to and following deployment. Clean equipment reduces the risk releasing invasive species during dredging, material transport, and placement.

### **3.7.5 Cumulative Impacts**

#### **3.7.5.1 Impact: Potential to Result in Cumulative Impacts on Biological Resources**

##### **Proposed Action Alternative**

Under the Proposed Action alternative, maintenance dredging and placement of dredged materials would have adverse effects on biological resources, including temporary impacts to foraging and species health due to temporary increases in turbidity; disturbance of benthic habitat; temporary loss or reduction of habitat suitable for sensitive fish species; alteration of behavior of marine mammals and birds; and potential exposure to contaminants in resuspended sediments. Other dredging projects also involve activities that could result in similar impacts. These activities could cumulatively impact biological resources by impacting water quality and habitat. MOTCO would comply with existing regulations, requirements, and conditions in permits approvals from NMFS, USFWS, the Regional Water Board, and BCDC for dredging, which would minimize and/or avoid adverse impacts associated with dredging. Additionally, other projects involving dredging and construction in the marine environment would be subject to permitting/regulatory approval processes similar to those for the proposed project, and would be required to implement similar measures to minimize water quality and biological impacts

NEPA Determination: The Proposed Action alternative would not contribute to significant cumulative impacts on biological resources. BMP and mitigation measures would reduce adverse effects during dredging, material transport, and placement.

### 3.8 CULTURAL RESOURCES

“Cultural resources” describes several different types of properties: prehistoric and historic archaeological sites; architectural properties such as buildings, bridges, and infrastructure; and resources of importance to Native American Tribes (traditional cultural properties and sacred sites). This analysis considers the potential effects of project implementation to cultural resources within the location of the proposed dredging.

#### 3.8.1 Regulatory Setting

##### **National Historic Preservation Act of 1966, as amended, 16 U.S.C. § 470, *et seq.***

Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to take into account the effects of a proposed undertaking on properties that have been determined to be eligible for listing or are listed in the National Register of Historic Places (National Register).

For purposes of complying with Section 106 of the NHPA, 54 U.S.C. § 306108, a Federal agency will make a determination of the area of potential effects (APE) for the project or undertaking. The APE is defined as “the geographic areas or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.” Additionally, the APE “is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.” 36 C.F.R. § 800.16(d).

The criteria applied to evaluate properties for listing in the National Register (36 § CFR 60.4) are outlined below:

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

- (a) That are associated with events that have made a significant contribution to the broad patterns of our history; or
- (b) That are associated with the lives of persons significant in our past; or
- (c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- (d) That have yielded, or may be likely to yield, information important in prehistory or history.

Meeting one or more of the criteria for eligibility is not enough to determine a resource as eligible for listing in the NRHP. In order to meet eligibility, a resource must have also retained historic integrity of those features necessary to convey its significance (U.S. Department of the Interior 1997). There are seven aspects of integrity: Location, Design, Setting, Materials, Workmanship, Feeling, and Association. Not all aspects of integrity may be relevant to a particular resource.

## **National Environmental Policy Act, 42 U.S.C. §§ 4321-4327**

Under the NEPA, 42 U.S.C. §§ 4321-4327, Federal agencies are required to consider potential environmental impacts—including those to cultural resources—and appropriate mitigation measures for projects with Federal involvement. This document has been prepared in compliance with NEPA and CEQ regulations.

## **Submerged Lands Act**

The Submerged Lands Act established state jurisdiction over offshore lands within 3 miles of shore (or 3 marine leagues for Texas and the Gulf Coast of Florida). The act did reaffirm the Federal claim to the Outer Continental Shelf, which consists of those submerged lands seaward of state jurisdiction. However, the act limited states' claims to the submerged lands inside the landward boundary of the Outer Continental Shelf. Several Federal courts rejected, for various reasons, state positions on historic preservation laws that pertained to shipwrecks within this 3-mile zone. Judicial conclusions from cases involving the Submerged Lands Act were inconsistent, yet shipwrecks in state waters were still at risk from damage and destruction. These circumstances provided the momentum for the passage of the Abandoned Shipwreck Act, which largely superseded the Submerged Lands Act. In compliance with this act, the CSLC will receive a copy of this EA and will have the opportunity to comment on its potential impacts to submerged lands. However, because the Federal navigation maintenance addressed in this EA is congressionally authorized, dredging and placement activities would not require a lease agreement from the CSLC for use of public trust lands based on the navigational servitude provisions of the Submerged Lands Act.

## **Abandoned Shipwreck Act, U.S.C. §§ 2101–2106, *et seq.***

The Abandoned Shipwreck Act is a Federal legislative act protecting shipwrecks found in state waters. The Abandoned Shipwreck Act also states that the laws of salvage and finds do not apply to abandoned shipwrecks protected by the act. Under the Abandoned Shipwreck Act, the United States asserts title to abandoned shipwrecks in state waters that are either:

- Embedded in state-submerged lands;
- Embedded in the coralline formations protected by a state on submerged lands; or
- Resting on state-submerged lands and are either included in or determined eligible for the NRHP.

The Abandoned Shipwreck Act also has a provision for the simultaneous transfer, by the Federal government, of title for those abandoned shipwrecks to the state(s) in whose waters the wrecks are located.

### **3.8.2 Cultural Setting**

MOTCO was originally constructed in 1942 as a naval base that served as a World War II armament storage depot, supplying ships for the Pacific Theater. Known then as U.S. Naval Magazine, Port Chicago, it continued to support war efforts during the Korean, Vietnam, and Gulf Wars. On October 1, 2008, properties were transferred from the U.S. Navy to the U.S. Army. The 834<sup>th</sup> Transportation Battalion at MOTCO continues operate as a munitions shipping facility. The proposed dredging will support the broader mission at MOTCO by improving access to the Wharves 2, 3, 4, Barge Pier, and the proposed boat ramp.

### 3.8.2.1 Historical Properties

Based on existing inventory efforts, the Army has identified one historic property within the proposed dredging project's APE. The Port Chicago Naval Magazine Explosion Site, located near Wharf 2, is listed on the National Register (Figure 10). The property marks the site of the July 17, 1944, Port Chicago, when a ship loaded with munitions exploded at Wharf 1. The blast killed 320 individuals and left 390 injured. The Port Chicago Naval Magazine explosion site was delineated in 2013 as the former locations of Wharf 1 and two ships, the *E.A. Bryan* and the *Quinault Victory* that were docked at the time of the explosion (Figure 10). The ships and the majority of the wharf were destroyed in the blast, but remnants of pilings from Wharf 1 are still extant and are contributing elements to the explosion site. The pilings, located approximately 800 feet from the shore, are located outside of the APE. However, debris associated with the blast are spread throughout Suisun Bay, in a radius around the disaster site as shown in Figure 11. The project area is located within this blast radius. The Army has determined that underwater debris within the blast radius, associated with the Port Chicago Naval Magazine Explosion Site, may be contributing elements to the characteristics that make the site eligible for listing in the National Register (U.S. Army, Cultural Resources Treatment and Discoveries Plan, 2016).

The Port Chicago explosion marked one of the worst homefront disasters of World War II. In addition to loss of life, the tragedy marked a turning point in the movement to desegregate the U.S. Armed Forces. Many of those who died in the Port Chicago explosion were enlisted African American men serving in segregated units. African American munitions loaders received little training and were tasked with the dangerous job of transporting munitions from railroad cars to waiting cargo ships. Following the explosion, over 250 enlisted African American sailors at Port Chicago refused their orders to continue to work under the same conditions, 50 of the enlisted men were dishonorably discharged, found guilty of mutiny and sentenced to hard labor. The court-martial of the "Port Chicago 50" was subject to public scrutiny, and under pressure from activists, including Thurgood Marshall of the NAACP, the Navy released most of the men in 1946 and reinstated them to active duty. The high-profile case would also play a role in the desegregation of the U.S. Armed Forces in 1948.

The Port Chicago Naval Magazine Explosion sites was determined eligible for listing in the National Register in 2013 under Criterion A and B (Montag, 2013):

Criterion A: The Port Chicago Naval Magazine Explosion Site is eligible for listing in the National Register of Historic Places (NRHP) under Criterion A for its association with an event that has made a significant contribution to the broad patterns of history. The Port Chicago Disaster is widely acknowledged as a watershed moment in United States military history, and as an influence on the later Civil Rights movement. The disaster and following objections by black sailors to work under unsafe conditions led to a very public court martial and convictions of mutiny for the "Port Chicago 50." The convictions had implications nationwide and eventually led to the desegregation of the Navy in 1946, and the United States Armed Forces in 1948. Additionally, safety practices in the military, and specifically the Navy, were altered after the explosion to ensure that a similar accident, the worst home-front disaster of World War II, did not occur again.

Criterion B: The Port Chicago Naval Magazine Explosion Site is eligible for listing in the NRHP under Criterion B because it is associated with the lives of persons significant to the past. In addition to the tragic deaths of 320 military and civilians, the following court martial and mutiny

of the Port Chicago 50 involved some specific individuals of note, specifically Freddie Meeks. In 1999, Meeks petitioned the president for a pardon, which was granted in December 1999. The pardon occurred well after the period of significance; however, Meeks' actions were intended as an attempt to bring the Port Chicago Disaster and aftermath to light. Collectively as a whole these individuals are considered to have had a significant impact on the country's past.

Criterion C: The Port Chicago Naval Magazine Explosion Site is not eligible for listing in the NRHP under Criterion C. Due to its nature as the location of a tragic explosion, it does not embody the distinctive characteristics of a type, period, or method of construction, and does not represent the work of a master, or possess high artistic values.

Criterion D: The Port Chicago Naval Magazine Explosion Site is not eligible for listing in the NRHP under Criterion D. Any remnants of the site likely consist of munitions such as projectile bombs, incendiary bombs and fragmented material that would be considered common ordnance and weaponry from World War II. The remaining wharves located near shore, while a visual reminder of Wharf 1, are not distinctive architecturally or historically and do not offer the opportunity to yield information important to the past. After the explosion occurred, any debris large enough to pose a hazard to navigation in the channel was removed. Extensive and repeated dredging activities in the decades since the explosion have also disturbed Suisun Bay. It is unlikely that any remaining debris from the explosion could be considered significant and could yield information important to the past, either directly related to those individuals or the time period in which the explosion occurred (1944).

### **3.8.2.2 Traditional Cultural Properties**

As documented in the 2018 update to the Integrated Cultural Resource Management Plan (ICRMP), no traditional cultural properties or sacred sites have been identified within the APE. As the study of the APE progresses, however, the Army will consult with interested Native American tribes and individuals to identify any potentially overlooked cultural properties within the APE. The Native American Heritage Commission has provided the Army with contact information for the following Federally-recognized American Indian Tribes and individuals with potential interest in the proposed APE: the Cortina Rancheria-Kletsel Dehe Band of Wintun Indians, the Confederated Villages of Lisian, the United Auburn Indian Community of the Auburn Rancheria, the Yocha Dehe Wintun Nation, the Amah Mutsun Tribal Band, the Amah Mutsun Tribal Band of Mission San Juan Bautista, the Indian Canyon Mutsun Band of Costanoan, the Muwekma Ohlone Indian Tribe of the San Francisco Bay Area, the North Valley Yokuts Tribe, the Ohlone Indian Tribe and Wilton Rancheria.

## **3.8.3 Methodology and Thresholds of Significance**

### **3.8.3.1 Methodology**

Following the Process outlined above for the assessment of adverse effects under the National Historic Preservation Act, the APE was determined to be a 330-acre area that includes the navigation approach for the three wharves and berthing areas, Barge Pier and proposed boat ramp (Figure 11). Mechanical dredging of the navigation approaches to the Barge Pier and Wharves 2, 3 and 4 in Suisun Bay would occur each year from 2022 to 2031. All proposed dredging would be in-water. The parking lot (1.5 acres) at Wharf 4 is proposed as a materials processing area for the transfer of dredge materials from scows onto land for additional screening, dewatering, and transport to the placement area (12.4 acres; Figure 3).. The proposed



ten-year dredging plan is a continuation of cyclical maintenance dating from the 1940s. Between 1943 and 1981, the navigation approaches and berthing areas around the wharves were dredged an average of every two years (Table 1).

The U.S. Navy and the Army and the have documented the 78-year history of the military base in a number of previous studies. The 2018 update to the MOTCO ICRMP includes results from records and literature searches conducted through the California Historical Resource Information System and the Native American Heritage Commission. More particularly, the APE for the proposed dredging lies within the footprint of surveys conducted in the offshore area past Wharves 2 and 3. A magnetic and side scan sonar survey completed May of 2013 and a cultural resource survey of the same area, revealed debris that could potentially be contributing elements to the Port Chicago Naval Magazine Explosion Site, a historic property located near Wharf 2 (Southeastern Archaeological Research, 2013; Montag, 2013).

### **3.8.3.2 Threshold of Significance**

For purposes of Section 106 of the NHPA, an effect to a cultural resource would be considered significant if it rose to the level of an adverse effect, as defined under Section 106 of the NHPA. That said, a finding of adverse effect on a historic property does not necessarily require an EIS under NEPA (36 CFR 800.8[a][1]), denoting the differing definitions of “significance” under NEPA and “significant” under the Section 106 NHPA regulations. If adverse effect(s) to historic properties are identified in evaluating a proposed project, Section 106 contains processes for resolving adverse effects through avoidance, minimization or mitigation.

Section 106 outlines the process in which Federal agencies are required to determine the effects of their undertakings on historic properties. Analysis of the potential impacts was based on evaluation of the changes to the existing historic properties that would result from implementation of the project. In making a determination of the effects to historic properties, consideration was given to:

- Specific changes in the characteristics of historic properties in the APE;
- The temporary or permanent nature of changes to historic properties;
- The introduction of visual, atmospheric, or audible elements that diminish the integrity of the property’s historical features; and
- The existing integrity considerations of historic properties in the APE and how the integrity was related to the specific criterion that makes a historic property eligible for listing in the National Register.

The threshold also applies to any cultural resource that has not yet been evaluated for its eligibility to the National Register or if the Proposed Action disturbs a traditional cultural property. Analysis of potential impacts to cultural resources may be the result of physically altering, damaging, or destroying all or part of a resource, altering characteristics of the surrounding environment by introducing visual or audible elements that are out of character for the period the resource represents, or neglecting the resource to the extent that it deteriorates or is destroyed. Analysis considers both direct and indirect impacts. Direct impacts refer to the causality of the effect to historic properties. This means that if the effect comes from the undertaking at the same time and place with no intervening cause, it is considered “direct” regardless of its specific type (e.g., whether it is visual, physical, auditory, etc.). Indirect impacts to historic properties are those caused by the undertaking that are later in time or farther removed in distance but are still reasonably foreseeable. Any adverse effects on historic properties are

considered to be significant under Section 106 of the NHPA. Effects are considered to be adverse if they alter, directly or indirectly, any of the characteristics of a cultural resource that qualify that resource for the National Register so that the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association is diminished.



Figure 11 Port Chicago Explosion Site Pier 1 Location



Figure 12 Port Chicago Debris Field and APE

### 3.8.4 Effects

#### No Action Alternative

Under the No Action Alternative, dredging would not occur. In accordance with Section 106 of the NHPA, the Port Chicago Naval Magazine Explosion Site and potential submerged cultural resources at MOTCO would not be affected under the No Action Alternative.

#### Proposed Action Alternative

Under the Proposed Action alternative, dredging would disturb sediment that has accumulated since the prior dredging event (circa 1994) and would require the Army to consult with the SHPO under Section 106 of the NHPA. Depending on the project-specific dredging area, the Army's finding would be either no effect to historic properties, or no adverse effects to historic properties. For example, project-specific dredging near the Port Chicago Disaster area would most likely result in a finding of no adverse effects to historic properties. Project-specific dredging near the proposed boat ramp would most likely result in a finding of no effect to historic properties.

Under the Proposed Action, the APE of the proposed dredging lies within the Port Chicago blast zone and the Port Chicago Naval Magazine Explosion Site, a historic property listed on the National Register. Debris from the explosion that may remain within the APE could be contributing elements to the explosion site. The probability of finding intact remains within the APE, however, is low. Following the explosion, crews cleared the area of large debris so that the Naval base could continue operations. Furthermore, the berthing areas near the Barge Pier and Wharves 2, 3 and 4 were dredged an average of every two years between 1943 and 1981 (Table 1). However, it is possible that debris and human remains associated with the Port Chicago disaster could have entered into the previously dredged areas over time, via erosional processes.

In accordance with Section 106 of the NHPA, the Army would consult with the SHPO with a recommended finding of no adverse effects to historic properties within the APE. However, the Army has determined that the inadvertent discovery of debris and inadvertent disturbance of human remains associated with the Port Chicago Disaster during project activities represents a potential impact to cultural resources that could result from the implementation of the Proposed Action. In light of this, the Army would provide monitors and would implement the *Cultural Resources Treatment and Discoveries Plan: Military Ocean terminal Concord (MOTCO) Pier 2 Modernization & Pier 3 Repair Projects*. Implementation of this plan would reduce this potential impact to less-than significant levels.

#### 3.8.4.1 Adverse Effect to Historical or Archaeological Resources

##### Proposed Action Alternative

NEPA Determination: Under the Proposed Action alternative, the inadvertent discovery of debris associated with the Port Chicago Disaster during project activities represents a potential impact; however; the Army would provide monitors and would implement the *Cultural Resources Treatment and Discoveries Plan: Military Ocean terminal Concord (MOTCO) Pier 2 Modernization & Pier 3 Repair Projects*. Implementation of this plan would reduce this potential impact to less-than significant levels.

#### 3.8.4.2 Disturb Human Remains, including those Interred Outside of Formal Cemeteries

### **Proposed Action Alternative**

NEPA Determination: Under the Proposed Action alternative, the inadvertent disturbance of human remains during project activities represents a potential impact; however; the Army would provide monitors and would implement the *Cultural Resources Treatment and Discoveries Plan: Military Ocean terminal Concord (MOTCO) Pier 2 Modernization & Pier 3 Repair Projects*. Implementation of this plan would reduce this potential impact to less-than significant levels.

#### **3.8.4.3 Impact: Potential to Result in Cumulative Impacts on Cultural resources**

### **Proposed Action Alternative**

NEPA Determination: Under the Proposed Action alternative, cumulative impacts to historical and/or archaeological resources during project activities represents a potential impact; however; the Army would provide monitors and would implement the *Cultural Resources Treatment and Discoveries Plan: Military Ocean terminal Concord (MOTCO) Pier 2 Modernization & Pier 3 Repair Projects*. Implementation of this plan would reduce this potential impact to less-than significant levels.

## **3.9 HAZARDS AND HAZARDOUS MATERIALS**

This section describes the existing conditions for hazards, including emergency planning, and hazardous materials in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary region, and evaluates the potential hazard and hazardous materials impacts related to human health.

Potential hazardous materials impacts on sediments are described in Section 3.3 of the 2015 Federal Navigation Channels EA/EIR. Potential hazardous materials impact on water quality are described in Section 3.4.4 of the 2015 Federal Navigation Channels EA/EIR and Section 3.4 of this EA. Hazards related to marine navigation are evaluated in Chapter 3.10 of the 2015 Federal Navigation Channels EA/EIR. Hazards related to Munitions and Explosives of Concern (MEC) and Unexploded Ordnance (UXO) are evaluated in Sections 3.13 and 4.13 of the 2015 Modernization and Repair of Piers 2 and 3 at MOTCO EIS.

### **3.9.1 Regulatory Setting**

The Hazards and Hazardous Materials Section 3.6 of the 2015 Federal Navigation Channels EA/EIR, and Sections 3.13 and 4.13 of the 2015 Modernization and Repair of Piers 2 and 3 at MOTCO EIS, generally characterize the regulatory setting for Hazards and Hazardous Materials.

### **3.9.2 Environmental Setting**

The Hazards and Hazardous Materials Section 3.6 of the 2015 Federal Navigation Channels EA/EIR, and Sections 3.13 and 4.13 of the 2015 Modernization and Repair of Piers 2 and 3 at MOTCO EIS, generally characterize the existing conditions for Hazards and Hazardous Materials. The DMPS is a former Navy dredge materials placement site (see Section 2.2.1).

Following the 1944 explosion at the Port Chicago Naval Magazine Explosion Site, the USCG surveyed the blast area around Wharf 1, including marsh areas and nearby waters of Suisun Bay, by dragging bottom sediments and using divers to conduct surveys. Since that time, explosive ordnance disposal (EOD) area operations have addressed discoveries and potential risk of MEC items in the bay, marsh, and on the shoreline (U.S. Army 2011; NAVFAC 2003; USACE 2009a). There have been no recorded unexpected explosive incidents since the original explosion in 1944 (NAVFAC 2003). In addition to the emergency response actions immediately

following the 1944 explosion, maintenance dredging has removed more than 1.8 million CY of sediment (see Table 1).

In 2003, an underwater geophysical survey was performed using an Mk26 (also known as the Foerster Ferex 4.021) magnetometer (NAVFAC 2003). The purpose of the geophysical survey was to identify and remove anomalies equal to or larger than a 5-inch projectile at a depth of 4 feet below the bay bottom. (It is not expected that debris from the 1944 explosion would be buried more than several inches deep; a comparison of 1941 and 2012 NOAA bathymetric surveys confirms that most of the sediments in the area of the potential explosion debris field have either eroded or stayed at the same depth over the years [MOTCO 2013].) The Mk26 collected magnetic readings at 389 stations (3-foot intervals) along Wharf 2 and investigated 11 inboard piles using a Fisher Impulse detector.

Metallic anomalies were recorded at 254 stations, and a dive team, composed of former Navy EOD personnel, investigated each anomaly. No MEC was discovered in the 389 locations investigated within the upper 2.5 feet of sediment along the outboard face of Wharf 2 or around the base of the 11 piles identified for replacement.

The 2013 MOTCO Explosives Safety Submission (ESS) covers the munitions response action for ongoing construction activities within the Port Chicago Water Explosion Area (see Figure 11). While the MOTCO wharf areas have been dredged repeatedly since 1944, continued reinstating maintenance dredging would require MEC-UXO Standby Support.

### **3.9.3 Methodology and Thresholds of Significance**

#### **3.9.4 Effects**

##### **No Action Alternative**

Under the No Action Alternative, dredging would not occur. There would be no potential for public or environmental exposure to hazardous materials under the No Action Alternative. There would be no temporary effects or cumulative impacts from the transport, use, and disposal of hazardous materials.

##### **3.9.4.1 Potential Public or Environmental Exposure from the Transport, Use, and Disposal of Hazardous Materials**

##### **Proposed Action Alternative**

Under the Proposed Action alternative, the DMMO would require sediment analysis and approval. Requirements would include development of a sampling plan, sediment characterization, a sediment removal plan, and handling and disposal in accordance with applicable permit conditions. All Federal, State, and local regulations regarding the use, transport, and disposal of hazardous materials would be adhered to during project activities. Human health and safety impacts would be avoided through adherence to these procedures, conditions, and regulations. The DMPS (Section 2.2.1; Figure 3) located on MOTCO has controlled access and the shortest transport distances.

Although hazard sites exist in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, these releases or potential releases are considered not adverse because the proposed dredge and placement operations would not interfere with cleanup activities or involve fishing operations or waterborne recreation in contaminated areas. Therefore, the project alternatives would not pose a human health risk.

Dredged material is not usually transported by land because this method is more expensive and inefficient compared to in-water transport. Transport of dredged material by truck or train would only occur in rare circumstances, where dredged material that is non-suitable (NUAD) is initially placed via dredge or barge at a re-handling site, and requires land-based transport for secondary placement at a land-based facility, such as a landfill, after the material has dried. The transport of dried sediment via truck or train is not expected to result in the emissions of hazardous materials that would pose a human health concern; in a dried state, the sediment would be easily contained and there would be no expected release of contaminants. Therefore, impacts from land transport would be negligible.

As a result of the 1944 Port Chicago disaster and historic Navy operations, presence of MEC-UXO in the dredging areas cannot be discounted. Dredging contractors would follow all scheduling, coordination, security, safety, permitting and other matters pertinent to work accomplished in accordance with DOD Manual 6055.09, *DOD Ammunition and Explosives Safety Standards*. This includes the following documents, plans and procedures:

- MOTCO 2013 Explosives Safety Submission (ESS)
- Contractor's UXO Anomaly Avoidance Plan
- UXO Support During Construction Activities Plan
- Environmental Protection Plan

- Quality Control Plan
- Hazard Analysis
- Safety and Health Plan
- Explosives Safety and Health Requirements Manual
- Standard Operating Procedures for demolition.

The Work Plan shall be submitted in accordance with:

- Engineering Pamphlet 385-1-95, *Safety and Health Concerns for Munitions and Explosives of Concern Projects* (2007) and 385-1-95b, *Explosives Safety Submission*.
- DOD Manual, 6055.09, *DOD Ammunition and Explosives Safety Standards: General Explosives Safety Information and Requirements* (2010).
- Department of the Army Pamphlet 385-64, *Ammunition and Explosives Safety Standards* (2011).

NEPA Determination: The Proposed Action alternative, would have no impact on hazards and hazardous materials. With adherence to the ESS and additional required plans and procedures, impacts associated with military munition response program sites are considered minor.

### **3.9.5 Cumulative Impacts**

Because the project would not cause adverse impacts related to hazards and hazardous materials, it would not contribute to cumulative hazards and hazardous materials use impacts.

NEPA Determination: The project would not contribute to cumulative hazards and hazardous materials impacts.



#### 4.0 PUBLIC AND AGENCY INVOLVEMENT

The Draft Environmental Assessment would be circulated for 30 calendar days to interested Federal, State, and local agencies, organizations and the public (Appendix C). All comments received in the 30-day period would be considered and incorporated into the Final EA, as appropriate.

Biological Assessments were mailed to the USFWS and NMFS on October 11, 2019. Biological Assessments were also circulated to BCDC, RWQCB on October 11, 2019. The Biological Assessment to NMFS was updated on December 18, 2019. The USFWS BO dated December 30, 2019 concurred that the proposed project may affect, and is likely to adversely affect Delta Smelt, and may affect, but is not likely to adversely affect designated critical habitat for Delta Smelt. The NMFS letter dated April 10, 2020 concurred with the Army that the proposed action is not likely to adversely affect the subject Federally-listed species and designated critical habitats.

The USACE San Francisco District Regulatory Division issued a public notice on November 12, 2019 (SPN-2018-00119) for MOTCO's application for a permit to mechanically dredge approximately 378,000 cubic yards of sediment over 10 years from Wharves 2, 3, 4, Barge Pier, and proposed boat ramp of the MOTCO installation in Concord, Contra Costa County, California. <https://www.spn.usace.army.mil/Missions/Regulatory/Public-Notices/>

Prior to initiating maintenance dredging, MOTCO would present the proposed dredging plan and sediment analysis plan before the DMMO and regulatory permitting agencies for approval. DMMO is a joint program composed of USACE, USEPA, BCDC, RWQCB and the CSLC. Other participating agencies include the CDFW, NMFS and USFWS.

In accordance with 32 CFR Part 651.35, the draft Finding of No Significant Impact (FNSI) for this EA would be made available to the public for review and comment for 30 days prior to the initiation of the Proposed Action. A notification of the draft FNSI would be published in the East Bay Times. The draft FNSI would be distributed to agencies and tribes listed (Appendix C) and any other agencies, organizations, and individuals that have expressed an interest in the project. The draft FNSI would articulate the deadline for receipt of comments, availability of the EA for review, and steps required to obtain the EA. The draft EA would be available at the Concord Public Library and Bay Point Library and at the SDDC Homepage: <https://www.sddc.army.mil/motco/Pages/MOTCO.aspx>.

## **5.0 SUMMARY OF IMPACTS AND OTHER REQUIRED ANALYSES**

This chapter presents a summary of impacts and mitigation measures, and a comparison of the project alternatives. It also includes additional analysis required under NEPA.

### **5.1 COMPARISON OF THE ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES**

As stated in Section 3.2, the project would have no or negligible impacts on forestry, land-use for agriculture, energy, noise impacts on the human environment, recreational resources, aesthetic and visual resources, population and housing, socioeconomics, environmental justice, utilities and infrastructure, transportation and navigation, air quality, and regional growth.

For each resource topic evaluated in detail, Table 8 presents a summary of impacts for the action alternative, mitigation measures, and the NEPA impact findings for each alternative after mitigation.

Impacts of the No Action Alternative are presented in Chapter 3.0 for comparison to those of the Proposed Action. Under the Proposed Action alternative, dredging and placement activities would have minor adverse impacts on sediments. Although not expected, inadvertent discovery of archaeological or paleontological resources could result in adverse cultural resource impacts under alternatives; with implementation of the identified mitigation measures, these impacts would not be significant. Hazards in the form of MEC-UXO could be present but are considered minor with implementation of the ESS and additional required plans and procedures.

The Proposed Action Alternative would have impacts on water quality, primarily from increased turbidity. Mechanical dredging generates more turbidity than hopper dredging over a longer period of time. The hydraulic and hopper dredging alternatives were eliminated from further consideration due to potential adverse effects to Delta Smelt in the project area. Nonetheless, under the Proposed Action Alternative, impacts to water quality would be short-term and minor.

The Proposed Action Alternative would have minor adverse impacts on certain biological resources, including: temporary, localized turbidity-related impacts on aquatic species and habitat; temporary, localized disturbance of benthic habitat; temporary adverse effects on fish and marine mammals from underwater noise; temporary, localized interference with the movement or migration of fish and wildlife species (with the exception of entrainment risks discussed below); and temporary, localized impacts on avian foraging and roosting. Under the Proposed Action Alternative, the potential for project activities to result in bio-toxicity impacts to aquatic organisms or increase the spread of invasive, nonnative species would be minimal. In summary, impacts to biological resources under the Proposed Action Alternative would be less than significant.

Mechanical dredging has a lower potential for fish entrainment during spawning and outmigration of younger fish life stages. Only mechanical (clamshell and/or knockdown) dredging would be implemented as described in the Proposed Action. With implementation of clamshell dredging during the LTMS work windows and other standard practices intended to reduce the potential for entrainment, effects to Federally-listed and commercially important species resulting from entrainment would be less than significant. Under the Proposed Action Alternative, project and cumulative impacts to Delta Smelt and Longfin Smelt from entrainment would be less than significant.

Under the Proposed Action Alternative, dredging activities may occasionally delay or temporarily impede some vessels using the Federal navigation channels, resulting in short-term, minor impacts on navigation. Mechanical dredges have the potential to impact navigation because they are stationary while operating and involve the use of multiple vessels. Therefore, potential navigation impacts would be greater when dredging the outside perimeter of the berthing areas, but still minor in magnitude and less than significant.

The Proposed Action Alternative would have less than significant cumulative impacts to Delta Smelt and Longfin Smelt from entrainment. For all other resource areas under all action alternatives, maintenance dredging, in combination with other past, present, and reasonably foreseeable future projects, would not contribute to adverse cumulative impacts, or the project's contribution to cumulative impacts would not be cumulatively considerable or significant.

The Proposed Action Alternative would have less than significant cumulative impacts to terrestrial habitat at the processing area and DMPS. The processing area is an existing parking lot, while the DMPS is a former Navy dredge materials placement site that is managed for grazing. Wildlife surveys have not documented any Federally-listed species in or near the processing area or the DMPS.

Table 8 Summary of Impacts, Mitigation Measures, and NEPA Findings for the Action Alternatives

Impact	Mitigation Measure	NEPA Finding
<b>3.4 Geology, Soils, and Sediment Quality</b>		
<b>Impact 3.4.4.1 Potential for Dredging, Transport, and Placement Activities to Result in Substantial Soil Erosion</b> Erosion impacts would be less than significant. The placement of dredged material at beneficial reuse sites would have beneficial impacts on soil resources.	No mitigation necessary.	Less- than-significant adverse impacts.
<b>Impact 3.4.4.2 Potential for Dredging, Transport, and Placement Activities to Substantially Degrade Sediment Quality</b> Impacts to sediment quality would be less than significant.	Sediment testing would identify chemical properties above ambient conditions and require material placement at appropriate sites to minimize impacts. Screen dredge materials down to ¼” to remove debris and UXO.	Less- than-significant adverse impacts.
<b>Impact 3.4.4.3 Potential for Dredging, Transport, and Placement Activities to Result in Cumulative Impacts on Sediments and Soils</b> The project alternatives would not result in cumulative impacts on sediments and soils.	Periodic testing would identify changes in sediment chemical properties and require material placement at appropriate sites to minimize cumulative impacts.	Less- than-significant adverse impacts.
<b>Impact 3.4.5.1 Potential to Result in Cumulative Impacts to Sediment Quality</b> The project alternatives would not result in cumulative impacts on sediments and soils.	Periodic testing would identify changes in sediment chemical properties and require material placement at appropriate sites to minimize cumulative impacts.	Less- than-significant adverse impacts.
<b>3.5 Hydrology and Water Quality</b>		
<b>Impact 3.5.4.1 Potential to Substantially Degrade Water Quality through Alteration of Water Temperature, Salinity, pH, and Dissolved Oxygen</b> Impacts to water quality temperature, salinity, pH, and dissolved oxygen from project activities would be minor, short-term, and localized.	No mitigation necessary.	Less- than-significant adverse impacts.
<b>Impact 3.5.4.2 Potential to Substantially Degrade Water Quality Because of Increased Turbidity</b> Dredging and placement activities would have minor, short-term, and localized impacts to water quality due to short-term increases in turbidity. Placement of dredged materials at habitat restoration beneficial reuse projects could have long-term beneficial effects on water quality.	Do not allow overflowing of scows and reduce material handling to extent possible to minimize turbidity effects.	Less- than-significant adverse impacts.
<b>Impact 3.5.4.3 Potential to Substantially Degrade Water Quality Because of Mobilization of Contaminated Sediments or Release of Hazardous Materials</b> Dredging and placement activities would not be expected to increase contaminant concentrations in the water column above baseline conditions, or result in violation of a water quality standard.	Turbidity and sediment testing BMPs with dredge material placement site requirements would minimize impacts.	Less- than-significant adverse impacts.
<b>Impact 3.5.5.1 Potential to Result in Cumulative Impacts to Hydrology or Water Quality</b> The project, in combination with other past, present, and reasonably foreseeable future projects, could result in adverse cumulative impacts on water quality; however, the project’s contribution to these cumulative impact would not be cumulatively considerable or significant.	Sediment testing would identify chemical properties above ambient conditions and require material placement at appropriate sites to minimize impacts.	Less- than-significant adverse impacts.

Impact	Mitigation Measure	NEPA Finding
<b>3.6 Biological Resources</b>		
<b>Impact 3.6.4.1 Potential Adverse Effects of Increased Turbidity Resulting from Maintenance Dredging and Dredged Material Placement on Federally-listed Species, Critical Habitat, and Commercially Valuable Marine Species</b> Localized and temporary increases in turbidity resulting from dredging and the placement of dredged material may affect marine organisms and aquatic wildlife during various life stages. Impacts may include impaired respiration; reduced visibility and the ability to forage or avoid predators; and alteration of movement patterns. Increases in turbidity from the project are not expected to have substantial effects on special- status species, their critical habitat, or EFH.	Implement conservation measures described in the Biological Assessment and comply with the conservation measures, terms and conditions of the respective Biological Opinions.	Less- than-significant adverse impacts.
<b>Impact 3.6.4.2 Potential Adverse Effects of Maintenance Dredging Resulting from the Disturbance of Benthic Habitat on Federally-listed Species, Critical Habitat, and Commercially Valuable Marine Species</b> Dredging would have localized, direct impacts on benthic communities through physical disruption and direct removal of benthic organisms. Effects would be temporary because benthic habitat is quickly recolonized.	No mitigation necessary.	Less- than-significant adverse impacts.
<b>Impact 3.6.4.3 Potential Adverse Effects of Underwater Noise Generated During Maintenance Dredging on Federally-listed Fish and Marine Mammals</b> Underwater noise produced during dredging may have temporary adverse effects on fish and marine mammals, include fleeing, the cessation of feeding, or other behavioral changes, but would not be expected to cause injury to fish and marine mammals.	No mitigation necessary. The dredging noise levels are lower than the threshold for disturbance.	Less- than-significant adverse impacts.
<b>Impact 3.6.4.4 Potential Adverse Effects from Entrainment on Federally-listed or Commercially and Recreationally Important Marine Species, Not Including Delta Smelt and Longfin Smelt</b> During dredging, organisms on the dredged material may be entrained, in addition to organisms in the water column near the dredging apparatus. With implementation of the LTMS work windows and other standard practices intended to reduce the potential for entrainment, effects to Federally-listed and commercially important species, not including Delta Smelt and Longfin Smelt, would not be significant.	No mitigation necessary. Implement conservation measures, terms and conditions of the NMFS Biological Opinion.	Less- than-significant adverse impacts.
<b>Impact 3.6.4.5 Potential Substantial Adverse Effects and Cumulative Impacts to Delta Smelt from Entrainment</b> Entrainment of Delta Smelt is unlikely with mechanical dredging. With implementation of minimization measures, effects would be less than significant. Although the project could contribute to cumulative impacts on Delta Smelt, the project’s contribution would not be significant.	Minimization measures are proposed as part the project description for both alternatives. Clamshell dredging during the LTMS work window would minimize adverse effects. Implement conservation measures, terms and conditions of the FWS Biological Opinion.	Less- than-significant adverse impacts.
<b>Impact 3.6.4.6 Potential Substantial Adverse Effects and Cumulative Impacts to Longfin Smelt from Entrainment</b> Entrainment of Delta Smelt is unlikely with mechanical dredging. With implementation of minimization measures, effects would be less than significant. Although the project could contribute to cumulative impacts on Delta Smelt, the project’s contribution would not be significant.	Minimization measures are proposed as part the project description for both alternatives. Clamshell dredging during the LTMS work window would minimize adverse effects.	Less- than-significant adverse impacts.
<b>Impact 3.6.4.7 Dredging and Placement Activities Could Result in the Disturbance of Essential Fish Habitat and “Special Aquatic Sites,” Including Eelgrass Beds and Mudflats.</b> SAV and EFH near the project dredging may be indirectly impacted by turbidity and increased sedimentation from dredging operations. Turbidity plumes from dredging operations may temporarily reduce light penetration in waters adjacent to the plumes. Sediment near areas of dredging may settle on eelgrass blades and affect the viability of the eelgrass in beds adjacent to dredging operations. Turbidity and sediment effects would be localized and short-term, and therefore less than significant.	Do not allow overflowing of scows and reduce material handling to extent possible to minimize turbidity effects.	Less- than-significant adverse impacts.
<b>Impact 3.6.4.8 Interference with the Movement of Resident or Migratory Fish or Wildlife Species During Dredging and Placement Activities</b> The noise and in-water disturbance associated with dredging and placement activities could cause fish and wildlife species to temporarily avoid the immediate dredging or placement area when work is being conducted. However, the affected area would be limited to the immediate dredging or placement zone and would not substantially limit the available habitat or movement of fish, seabirds, or marine mammals.	Implement terms and conditions from the Biological Opinions, DMMO, and other permits.	Less- than-significant adverse impacts.



Impact	Mitigation Measure	NEPA Finding
<b>Impact 3.6.4.9 Dredging and Placement Activities Could Disturb Roosting and Foraging by Avian Species</b> Dredging, materials transport and placement may disturb avian foraging and resting behaviors, decrease time available for foraging, and increase energetic costs as a result of increased flight times and startling responses. The effects of materials transport and placement would be similar for other terrestrial species. Impacts would occur outside the breeding season due to the annual dredging work window (August 1 and November 30), and would be temporary, localized, and minor.	No mitigation necessary.	Less- than-significant adverse impacts.
<b>Impact 3.6.4.10 Contaminated Sediments Could Become Resuspended During Dredging and Placement Activities, and Could Be Toxic to Aquatic Organisms, Including Plankton, Benthos, Fish, Birds, and Marine Mammals</b> Sediment testing results for navigation approach and berthing area indicates that, in general, dredged material is suitable for unconfined aquatic disposal. Dredging, transport, and placement of dredged material would be conducted in cooperation with the DMMO. This process would identify contaminated sediments and appropriate placement site options for dredged materials, based on the characteristics of the sediment and criteria for each placement site. Adherence to best management practices and conditions in regulatory approvals would minimize the potential for water quality degradation that could impact aquatic organisms.	Sediment testing would identify chemical properties above ambient conditions and require material placement at appropriate sites to minimize impacts. Screen dredge materials down to ¼” to remove debris and UXO.	Less- than-significant adverse impacts.
<b>Impact 3.6.4.11 Dredging and Placement Could Substantially Increase the Spread of Invasive Nonnative Species</b> Dredge equipment would comply with United States Coast Guard regulations for vessels intended to minimize the spread of invasive nonnative species. Beneficial reuse and upland placement site operators are responsible for managing the placement of dredged materials at the placement sites in accordance with conditions of their permits and other regulatory approval, which include measures to minimize the spread of invasive nonnative species. Therefore, project activities would not be expected to substantially increase the spread of invasive nonnative species.	Clean all equipment prior to dredging and moving outside the regional area.	Less- than-significant adverse impacts.
<b>Impact 3.6.5.1 Potential to Result in Cumulative Impacts on Biological Resources</b> The project, in combination with other past, present, and reasonably foreseeable future projects, could result in adverse cumulative impacts on biological resources; however, the project’s contribution to these cumulative impacts would not be cumulatively considerable or significant.	The BMPs for sediment testing, turbidity, dredging equipment, LTMS work windows would minimize the potential for cumulative impacts on biological resources.	Less- than-significant adverse impacts.
<b>3.7 Cultural and Paleontological Resources</b>		
<b>Impact 3.7.4.1 Adverse Effect to Historical or Archaeological Resources</b> Although unlikely, given the repeated dredging and dredged material placement activities that have historically occurred at the Federal navigation channels and existing placement sites, there remains the potential that archaeological materials could be inadvertently uncovered by project activities. Such inadvertently discovered archaeological materials could represent historical resources or unique archaeological resources, and their disturbance could adversely change their condition. As such, the inadvertent discovery of archaeological materials represents a potential project impact. Implementation of Mitigation Measure for Inadvertent Archaeological Discovery Measures, would reduce potential impacts.	Measures will be implemented to avoid potential adverse effects on inadvertently discovered NRHP- and/or CRHR-eligible or unique archaeological resources. Refer to Section 3.7 for complete mitigation measure.	Less- than-significant adverse impacts.
<b>Impact 3.7.4.2 Disturb Human Remains, including those Interred Outside of Formal Cemeteries</b> There are no known cemeteries, formal or otherwise, or other evidence of human interment in the Federal navigation channels, DMPS or other existing placement sites. Although unlikely, given the repeated dredging and dredged material placement activities that have historically occurred at the Federal navigation channels and existing placement sites, there remains the potential that previously unidentified human remains could be inadvertently uncovered with project implementation. Such disturbance of human remains represents a potential project impact. Implementation of Mitigation Measures for Inadvertent Archaeological Discovery Measures, and Treatment of Human Remains, would reduce potential impacts.	The treatment of human remains and associated, or unassociated funerary objects discovered during any soil-disturbing activity will comply with applicable state laws. Refer to Section 3.7 for complete mitigation measure.	Less- than-significant adverse impacts.
<b>Impact 3.7.4.3 Impact: Potential to Result in Cumulative Impacts on Cultural Resources</b> Project activities would not result in impacts to known historic or unique archaeological resources or to significant paleontological resources, and therefore would not contribute to any cumulative impact to these resources. If previously undiscovered archaeological resources are inadvertently exposed by the project or other reasonably foreseeable projects, an incremental effect to archaeological resources may occur.	No mitigation necessary.	Less- than-significant adverse impacts.
<b>3.8 Hazards and Hazardous Materials</b>		

Impact	Mitigation Measure	NEPA Finding
<b>Impact 3.8.4.1 Potential Public or Environmental Exposure from the Transport, Use, and Disposal of Hazardous Materials</b> Dredging contractors would follow all scheduling, coordination, security, safety, permitting and other matters pertinent to work accomplished in accordance with DOD Manual 6055.09, DOD Ammunition and Explosives Safety Standards	Mitigation Measure: Comply with DOD Manual 6055.09, DOD Ammunition and Explosives Safety Standards, and submit an ESS.	Less- than-significant adverse impacts.



## **5.2 NEPA ENVIRONMENTALLY PREFERABLE ALTERNATIVE**

The NEPA environmentally preferable alternative is the alternative that “...promotes the national environmental policy as expressed in NEPA’s Section 101” (42 U.S.C. § 4331). NEPA does not require that an EA and Finding of No Significant Impact identify the environmentally preferable alternative. However, the environmentally preferable alternative is presented here. The Proposed Action alternative provides a necessary balance between the quality of the environment, economic considerations, and MOTCO’s statutory missions.

## **5.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES**

Under 40 C.F.R. § 1502.16, NEPA requires a description of the irreversible and irretrievable resource commitments related to the use of nonrenewable resources that could result from the implementation of the proposed project. Irreversible effects would primarily result from the use or destruction of a specific resource, such as energy and minerals that could not be replaced within a reasonable time frame. Irretrievable resource commitments would involve the loss in value of an affected resource that could not be restored as a result of the action; an example of this is the extinction of a threatened or endangered species, or the disturbance of a cultural resource.

Dredging and placement activities would require the use of fossil fuels for the operation of vessels and equipment. The commitment of these resources would apply irrespective of the alternative. Under Proposed Action alternatives, the fossil fuel consumption would be similar to that of the Navy’s previous maintenance dredging operations.

An irretrievable loss of cultural resources could occur should the project uncover resources associated with the 1944 Port Chicago Disaster. However, measures have been identified that would minimize impacts; therefore, MOTCO determined that an irretrievable loss of these resources is not expected.

An irreversible loss of Federally-listed species could occur should the project result in incidental take of Federally-listed fish species. However, measures have been identified that would minimize impacts to these species; therefore, MOTCO determined that an irretrievable loss of these species’ populations is not expected.

## **5.4 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY**

Under 40 C.F.R. § 1502.16, NEPA requires consideration of the relationship between local, short-term uses of the environment, and the maintenance and enhancement of long-term productivity.

Maintenance dredging and the placement of dredged material would result in short-term impacts on sediments, water quality, biological resources, air quality, and navigation. Short-term adverse impacts include increases in turbidity, disturbance of benthic communities, effects on fish and wildlife behavior, emissions of criteria pollutants, and delayed navigation of vessels; these impacts would be minor, localized, and temporary during dredging and placement activities. Potential entrainment of Federally-listed fish species would result in permanent effects.

However, MOTCO determined that these potential adverse effects would be minimized by implementing the standard practices identified in Chapter 2 and the mitigation measures discussed in Chapter 3. Moreover, these short-term impacts are expected to be outweighed by

long-term, beneficial effects of maintaining MOTCO's wharves and proposed boat ramp to meet the Department of Army mission needs and capabilities. In addition, the beneficial reuse of dredged materials would contribute to the long-term productivity of the environment.

Therefore, the project would not be expected to adversely impact the long-term productivity of the environment.

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## 7.0 REFERENCES

- Abbott, R., and Bing-Sawyer, E. 2002. Assessment of pile driving impacts on the Sacramento blackfish (*Othodon microlepidotus*). Report prepared for Caltrans District 4.
- Anchor (Anchor Environmental, C.A., L.P.), 2003. Literature Review of Effects of Resuspended Sediments Due to Dredging Operations. Prepared for Los Angeles Contaminated Sediments Task Force, Los Angeles, California. June.
- BAAQMD, 2012a. CEQA Air Quality Guidelines. Update May 2012. Available online at: [http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines\\_Final\\_May%202012.ashx?la=en](http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines_Final_May%202012.ashx?la=en).
- California Department of Finance, 2012. Interim Projections for California and Counties: July 1, 2015 to 2050 in 5-year Increments. Available online at: <http://www.dof.ca.gov/research/demographic/reports/projections/interim/view.php>. Accessed August 13, 2013.
- CARB (California Air Resources Board). 2013. California Greenhouse Gas Inventory for 2000-2010 – by Category as Defined in the Scoping Plan. Available online at: [http://www.arb.ca.gov/cc/inventory/data/tables/ghg\\_inventory\\_scopingplan\\_00-10\\_2013-02-19.pdf](http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-10_2013-02-19.pdf).
- Caltrans. 2001. Fisheries Impact Assessment, Pile Installation Demonstration Project for the San Francisco - Oakland Bay Bridge, East Span Seismic Safety Project, August 2001. 59 pgs.
- CEQAnet Web Portal (online environmental database of the State Clearinghouse), 2014. California Office of Planning and Research, San Francisco Bay-Delta Estuary Sand Mining by Hanson Marine Operations, Notice of Determination. State Clearinghouse Number 2007072036. Available online at: <https://ceqanet.opr.ca.gov/2007072036/11>. Accessed March 3, 2020.
- CEC (California Energy Commission). 2005. Global Climate Change: In support of the 2005 Integrated Energy Policy Report. (CEC-600-2005-007. June. Available online at: <http://www.energy.ca.gov/2005publications/CEC-600-2005-007/CEC-600-2005-007-SF.PDF>.
- Clarke, D.G., and D. Wilber, 2000. Assessment of potential impacts of dredging operations due to sediment resuspension, DOER *Technical Notes Collection* (ERDC TN-DOER-E9), U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi. Available online at: [www.wes.army.mil/el/dots/doer](http://www.wes.army.mil/el/dots/doer).
- California Department of Water Resources, 2013. Bay Delta Conservation Plan. Public Draft. Prepared by ICF International (ICF 00343.12). Sacramento, California. November. Appendix 5.H: Aquatic Construction and Maintenance Effects. Bay Delta Conservation Plan Public Draft. November.
- Cohen A.N. and J.T. Carlton. 1995. Biological study, nonindigenous species in a United States estuary: a case study of the biological invasions of the San Francisco Bay and Delta. Prepared for the U.S. Fish and Wildlife Service and National Sea Grant College Program. Connecticut Sea Grant (NOAA Grant Number NA36RG0467). December.

- Collins, J.N. and C. Grosso. 2006. Second Annual Report Montezuma Wetlands Restoration Project.
- CSLC (California State Lands Commission), 2012. California State Lands Commission, Final Environmental Impact Report for the San Francisco Bay and Delta Sand Mining Project. September.
- Dickerson, C., K.J. Reine, and D.G. Clarke, 2001. "Characterization of underwater sounds produced by bucket dredging operations," DOER Technical Notes Collection (ERDC TN-DOER-E14), U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi. Available online at: [www.wes.army.mil/el/dots/doer](http://www.wes.army.mil/el/dots/doer).
- DoD (United States Department of Defense), 2013. Department of Defense, Department of the Army. Notice of Intent for preparation of an Environmental Impact Statement for Modernization and Repair of Piers 2 and 3, Military Ocean Terminal Concord, California. In Federal Register Volume 78, Number 66. April 5. Available online at: <http://www.gpo.gov/fdsys/pkg/FR-2013-04-05/html/2013-07880.htm>. Accessed July 1, 2013.
- Dredged Material Management Office (DMMO) 2015. Dredging and Placement of Dredged Material in San Francisco Bay January-December 2014 Report. 20 pgs.
- Dredged Material Management Office (DMMO) 2020. MOTCO Maintenance Dredging; Episode 1; Test Results; DMMO Serial Number: 20-015. Letter to MOTCO dated April 14, 2020.
- Dredged Material Management Program (DMMP) 2015. Debris Screening Requirements for Dredged Material Disposed at Open-Water Sites. Prepared by E. Hoffman, C. Barton, and D. Fox for the DMMP agencies. 14 pgs.
- Eco and Associates, Inc. 2021. Draft Annual Report Conservation Services. Prepared for the Military Ocean Terminal Concord, Contra Costa County, California. 68 pgs.
- ECORP, 2009. Literature Review (for studies conducted prior to 2008: Fish Behavior in Response to Dredging and Dredged Material Placement Activities. October.
- FTA (Federal Transit Administration), 2006. Transit Noise and Vibration Impact Assessment. Final Report, Report Number FTA-VA-90-1003-06, U.S. DOT Office of Planning and Environment. Prepared by Harris Miller Miller & Hanson Inc., Burlington, Massachusetts. May.
- FHWG [Fisheries Hydroacoustic Working Group]. 2008. Memorandum: Agreement in principle for interim criteria for injury to fish from pile driving activities. Accessed at [http://www.dot.ca.gov/hq/env/bio/files/fhwgcriteria\\_agree.pdf](http://www.dot.ca.gov/hq/env/bio/files/fhwgcriteria_agree.pdf)
- Garrison, B.A. 1998. Bank Swallow (*Riparia riparia*). In The Riparian Bird Conservation Plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. Available online at: [http://www.prbo.org/calpif/html/docs/species/riparian/bank\\_swallow\\_acct2.html](http://www.prbo.org/calpif/html/docs/species/riparian/bank_swallow_acct2.html). Accessed November 24, 2013.
- Goals Project, 1999. Baylands Ecosystem Habitat Goals. A Report of Habitat Recommendations Prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. First

- Reprint. U.S. Environmental Protection Agency, San Francisco, California. San Francisco Bay Regional Water Quality Control Board, Oakland, California.
- Goals Project. 2000. Baylands ecosystem species and community profiles: life histories and environmental requirements of key plants, fish, and wildlife of the San Francisco Bay Area. Prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project, Olofson, P.R., Ed. San Francisco Bay Regional Water Quality Control Board, Oakland, California.
- Hirsch, N.D., L.H. DiSalvo, and R. Peddicord, 1978. "Effects of dredging and disposal on aquatic organisms," Technical Report DS-78-55, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, NTIS No. AD A058 989.
- Jabusch, T., A. Melwani, K. Ridolfi, and M. Connor, 2008. Effects of Short-Term Water Quality Impacts Due to Dredging and Disposal on Sensitive Fish Species in the San Francisco Bay. San Francisco Estuary Institute.
- Lee, H., B. Thompson, and S. Lowe. 1999. Impacts of Nonindigenous Species on Subtidal Benthic Assemblages in the San Francisco Estuary. Report to U.S. EPA Region IX. 16 pgs.
- Lenihan, H.S., and J.S. Oliver. 1995. Anthropogenic and natural disturbances to marine benthic communities in Antarctica. *Ecological Applications* 5:311-326.
- LTMS (Long-Term Management Strategy Agencies), 1998. Long-Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region, Final Policy Environmental Impact Statement/Environmental Impact Report. Volume I.
- LTMS (Long-Term Management Strategy Agencies), 2013a. LTMS [Long-Term Management Strategy] Update: Programmatic Consultation with NOAA [National Oceanic and Atmospheric Administration]. April 24, 2013.
- LTMS (Long-Term Management Strategy Agencies), 2013b. Long-Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region, 12-Year Review Final Report. August.
- McKee, L.J., M. Lewicki, D.H. Schoelhamer, and N.K. Ganju. 2013. Comparison of sediment supply to San Francisco Bay from watersheds draining the Bay Area and the Central Valley of California. *Marine Geology, Special Issue San Francisco Bay*, Volume 345, p. 47-62. Available online at: <http://dx.doi.org/10.1016/j.margeo.2013.03.003>.
- MALSF (Marine Aggregate Levy Sustainability Fund), 2009. A Generic Investigation into Noise Profiles of Marine Dredging in Relation to the Acoustic Sensitivity of the Marine Fauna in UK Waters with Particular Emphasis on Aggregate Dredging: PHASE 1 Scoping and Review of Key Issues. Available online at: [www.alsf-mepf.org.uk](http://www.alsf-mepf.org.uk).
- NAVFAC (Naval Facilities Engineering Command) 2020. Sediment Dredging in Areas Known or Suspected of Containing Munitions and Explosives of Concern and/or Material Potentially Presenting an Explosive Hazard. August. 69 pgs.
- NMFS (National Marine Fisheries Service). 2009. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern

- Distinct Population Segment of North American Green Sturgeon; Final Rule. 50 CFR Part 226. Federal Register (Volume 74, Number 195): 52300-52351. National Oceanic and Atmospheric Administration, National Marine Fisheries Service. October 9. Available online at: [www.epa.gov/fedrgstr/EPA-SPECIES/2009/October/Day-09/e24067.htm](http://www.epa.gov/fedrgstr/EPA-SPECIES/2009/October/Day-09/e24067.htm).
- NMFS (National Marine Fisheries Service). 2020. Endangered Species Act Section 7(a)(2) Concurrence Letter and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for Maintenance Dredging at Military Ocean Terminal Concord in Suisun Bay, Contra Costa County, California. April 10, 2020.
- Naval Facilities Engineering Command (NAVFAC). 2003. Final After Action Report Underwater MEC Survey in Support of Pier 2 Repair. MOTCO. 16 May. Tetra Tech EMI. 2011. Military Ocean Terminal Concord Site Management Plan (SMP) Annual Schedule. 3 March.
- Newell, R.C., L.J. Seiderer, and D.R. Hitchcock. 1998. The impacts of dredging works in coastal waters: a review of the sensitivity to disturbance and subsequent recovery of biological resources on the seabed. *Oceanogr. Mar. Biol. Ann. Rev.* 36:127-178.
- Oliver, J.S., P.N. Slattery, L.W. Hulberg, and J.W. Nybakken. 1977. Patterns of succession in benthic infaunal communities following dredging and dredge spoil in Monterey Bay, California. Technical Report D-77-27. Dredge Material Research Program, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.
- Reine, K.J., D.G. Clarke, C. and Dickerson, 2002. "Acoustic characterization of suspended sediment plumes resulting from barge overflow," DOER Technical Notes Collection (ERDC TN-DOER-E15), U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi. Available online at: [www.wes.army.mil/el/dots/doer](http://www.wes.army.mil/el/dots/doer).
- Reine, K.J., D.G. Clarke, and C. Dickerson, 2012. Characterization of Underwater Sounds Produced by a Backhoe Dredge Excavating Rock and Gravel (ERDC TN-DOER-E36). December.
- Reine, K.J., and C. Dickerson, 2014. "Characterization of Underwater Sounds Produced by a Hydraulic Cutterhead Dredge during Maintenance Dredging in the Stockton Deepwater Shipping Channel, California," DOER-E38, U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.
- Reyff, J. A. 2003. Underwater sound levels associated with construction of the Benicia-Martinez Bridge, acoustical evaluation of an unconfined air-bubble curtain system at Pier 13. Inc., Petaluma, Calif.
- Robinson, A, and B.K. Greenfield, 2011. LTMS Longfin Smelt Literature Review and Study Plan. SFEI Contribution XXX. San Francisco Estuary Institute, Oakland, California. 40 pgs.
- SFEI (San Francisco Estuary Institute). 2008. Effects of Short-Term Water Quality Impacts Due to Dredging and Disposal on Sensitive Fish Species in San Francisco Bay. SFEI Contribution 560. San Francisco Estuary Institute, Oakland, California. September.
- SFEI (San Francisco Estuary Institute), 2011. The Pulse of the Estuary: Pollutant Effects on Aquatic Life. SFEI Contribution 660. San Francisco Estuary Institute, Oakland, California.



- SFEI (San Francisco Estuary Institute). 2013. Regional Monitoring Web Query Tool. Available online at <http://www.sfei.org/rmp/wqt>. Accessed October 21, 2013.
- Stotz, T. and J. Colby. 2001. January 2001 dive report for Mukilteo wingwall replacement Project. Washington State Ferries Memorandum. 5 pgs.+ appendices.
- University of California, Davis. Division of Agriculture and Natural Resources. 2016. Internet Address: <http://calfish.ucdavis.edu/>
- U.S. Army. 2011. Military Ocean Terminal Concord: Update Fact Sheet. March.
- U.S. Army. 2013. Military Ocean Terminal Concord. Biological Assessment for Military Munitions Response Program Remedial Investigation/Feasibility Study at Military Ocean Terminal Concord (MOTCO). March.
- U.S. Army. 2015a. Military Ocean Terminal Concord. Final Environmental Impact Statement for the Modernization and Repair of Piers 2 and 3, Military Ocean Terminal Concord, CA.
- U.S. Army. 2015b. Military Ocean Terminal Concord. Final Submerged Aquatic Vegetation Survey Report for the Modernization and Repair of Pier 2 at Military Ocean Terminal Concord, CA. December. MOTCO (Military Ocean Terminal Concord). 2017. Final Supplemental Environmental Assessment for Pier 2 Modernization and Repair Design Changes at Military Ocean Terminal Concord, CA. January.
- U.S. Army. 2017a. Military Ocean Terminal Concord. Final Supplemental Environmental Assessment for Pier 2 Modernization and Repair Design Changes at Military Ocean Terminal Concord, CA. January 2017.
- U.S. Army. 2017b. Military Ocean Terminal Concord. Integrated Natural Resources Management Plan 2017-2022: October 2017. MOTCO (Military Ocean Terminal Concord). 2018a. Military Ocean Terminal Concord. Integrated Cultural Resources Management Plan Update 2017-2022: January 2018.
- U.S. Army. 2018b. Military Ocean Terminal Concord. Submerged Aquatic Vegetation Survey Report for the Modernization and Repair of Pier 2 at Military Ocean Terminal Concord, CA. December.
- U.S. Army. 2019a. Military Ocean Terminal Concord. Pre-dredge Sediment Characterization Sampling and Analysis Plan/Quality Assurance Project Plan for Operations and Maintenance Dredging – Barge Pier, Pier 2, Pier 3 and Pier 4. Prepared by United States Army Corps of Engineers, August 2019.  
[https://www.dmmosfbay.org/site/alias\\_9077/173468/default.aspx](https://www.dmmosfbay.org/site/alias_9077/173468/default.aspx)
- U.S. Army. 2019b. Military Ocean Terminal Concord. Biological Assessment for Military Ocean Terminal Concord Pier Maintenance Dredging Contra Costa and Solano County, California. Prepared by United States Army Corps of Engineers, October 2019.
- U.S. Army. 2019c. Military Ocean Terminal Concord. Biological Assessment and Essential Fish Habitat Assessment for Military Ocean Terminal Concord Pier Maintenance Dredging Contra Costa and Solano County, California. Prepared by United States Army Corps of Engineers, October 2019.
- U.S. Army. 2019/2020. Military Ocean Terminal Concord. Personal communications.



- U.S. Army. 2020. Military Ocean Terminal Concord. Military Ocean Terminal Concord (MOTCO) 2019 Maintenance Dredging Final Sampling and Analysis Report. March 2020. Prepared for the U.S. Army Corps of Engineers, San Francisco, CA. USACE (United States Army Corps of Engineers), 1976. Dredge Disposal Study, San Francisco Bay and Estuary, Appendix C, Water Column.
- USACE (United States Army Corps of Engineers), 2003. Evaluation of Dredged Material Proposed for Disposal at Inland, Nearshore, or Upland Confined Disposal Facilities – Testing Manual. ERDC/EL TR-03-1. January.
- USACE (United States Army Corps of Engineers). 2009. Environmental Assessment for calendar Year 2009 Maintenance Dredging of the Jack D. Maltester Channel. March.
- USACE (United States Army Corps of Engineers). 2009a. Final Explosives Safety Submission for Munitions and Explosives of Concern at MOTCO. April
- USACE (United States Army Corps of Engineers). 2011a. Environmental Assessment for San Rafael Channel and Across the Flats Maintenance Dredging for Calendar Year 2011. September.
- USACE (United States Army Corps of Engineers). 2011b. Military Ocean Terminal Concord Integrated Natural Resources Management Plan Update. 834th Transportation Battalion, Military Ocean Terminal Concord, California. Prepared for U.S. Army Military Surface Deployment and Distribution Command.
- USACE (United States Army Corps of Engineers). 2012. Supplemental Determination for the 2012-2016 San Francisco Main Ship Channel Operation and Maintenance Dredging Activities. Letter to the California Coastal Commission. April 19.
- USACE (United States Army Corps of Engineers). 2012a. Update Report Historic Building Inventory and Evaluation, Military Ocean Terminal Concord, Contra Costa County, California. Prepared for U.S. Army Military Surface Deployment and Distribution Command.
- USACE (United States Army Corps of Engineers), 2012b. Review Plan for San Francisco Bay to Port of Stockton John F. Baldwin Ship Channel Phase III Navigation Improvement Project. December.
- USACE (United States Army Corps of Engineers), 2013a. U.S. Army Corp of Engineers, Sacramento River Deep Water Ship Channel. Available online at: <https://www.spn.usace.army.mil/Missions/Projects-and-Programs/Projects-A-Z/Sacramento-River-Deep-Water-Ship-Channel-C/>. Accessed March 3, 2020
- USACE (United States Army Corps of Engineers), 2013b. Dredging Methods in San Francisco Bay: Mechanical versus Hydraulic (Hopper) Dredging. Unpublished data prepared by USACE San Francisco District.
- USACE (United States Army Corps of Engineers), 2013c. Explosives Safety Submission. Munitions and explosives of concern removal action. Military Ocean Terminal Concord (MOTCO). 6 August 2013.

- USACE (United States Army Corps of Engineers). 2014. Final Sediment Testing Summary Report. Modernization and Repair of Piers 2 and 3 at Military Ocean Terminal Concord, Concord, California.
- USACE (United States Army Corps of Engineers), 2014a. Dredged Material Volumes for the San Francisco Bay Federal Navigation Projects. Unpublished data prepared by USACE San Francisco District.
- USACE (United States Army Corps of Engineers). 2015. Final Environmental Assessment/Environmental Impact Report, Maintenance Dredging of the Federal Navigation Channels in San Francisco Bay, Fiscal Years 2015 -2024. San Francisco District. Prepared by URS Group, Inc., April.
- USACE (United States Army Corps of Engineers). 2020a. Military Ocean Terminal Concord (MOTCO) 2019 Maintenance Dredging Final Sampling and Analysis Report. March 2020. Prepared by Pacific EcoRisk and DR Reed and Associates Inc. 849 pgs.
- USACE (United States Army Corps of Engineers). 2020b. Final Integrated General Reevaluation Report and Environmental Impact Statement, San Francisco Bay to Stockton, California, Navigation Improvement Project. Main Report and Appendix G. San Francisco District. January 2020.
- USACE (United States Army Corps of Engineers) and USEPA (United States Environmental Protection Agency), 1991. Evaluation of Dredged Material Proposed for Ocean Disposal – Testing Manual. EPA-503/8-91/001. February.
- USACE (United States Army Corps of Engineers) and USEPA (United States Environmental Protection Agency), 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. 3 – Testing Manual. EPA-823-B-98-004. February.
- USACE (United States Army Corps of Engineers) and USEPA (United States Environmental Protection Agency), 2009. Programmatic Essential Fish Habitat (EFH) Assessment for the Long-Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region. July.
- USACE (United States Army Corps of Engineers) and USEPA (United States Environmental Protection Agency), 2011. Agreement on Programmatic EFH Conservation Measures for Maintenance Dredging Conducted Under the LTMS Program. June 9.
- U.S. Census Bureau. 2016. Population Demographics for Contra Costa County, California in 2016 and 2017. Available online at: <https://suburbanstats.org/population/california/how-many-people-live-in-contra-costa-county>
- U.S. Department of the Interior (United States Department of the Interior), USFWS (United States Fish and Wildlife Service), and CDFW (California Department of Fish and Wildlife), 2011. Suisun Marsh Habitat Management, Preservation, and Management Plan, Final EIR, State Clearinghouse Number 2003112039. November.
- USFWS (United States Fish and Wildlife Service). 2004. 5-year review of the delta smelt. [https://ecos.fws.gov/docs/five\\_year\\_review/doc731.pdf](https://ecos.fws.gov/docs/five_year_review/doc731.pdf)
- USFWS (United States Fish and Wildlife Service). 2008. Formal Endangered Species Act Consultation on the Proposed Coordinated Operations of the Central Valley Project

- (CVP) and State Water Project (SWP). United States Fish and Wildlife Service, Sacramento, CA.
- USFWS (United States Fish and Wildlife Service). 2010. Biological opinion/intra-Service section 7 consultation on implementation of the proposed Cullinan Ranch Restoration Project, Napa and Solano Counties, CA. Tracking#: SFB-2010-01/May 7, 2010.
- USFWS (United States Fish and Wildlife Service). 2011. San Pablo Bay National Wildlife Refuge Final Comprehensive Conservation Plan. 135 pgs.
- USFWS (United States Fish and Wildlife Service). 2019. Biological Opinion for the Proposed Maintenance Dredging at Military Ocean Terminal Concord Project, Contra Costa and Solano Counties, California. December 30, 2019.
- USGS (United States Geological Survey), 1997. USGS Web Site. Available online at: <http://water.usgs.gov/wid/html/sfb.html>. Last updated April 1, 1997. Accessed November 20, 2013.
- USGS (United States Geological Survey), 2014. Synthesis of Studies in the Fall Low-Salinity Zone of the San Francisco Estuary, September – December 2011. Available online at: <http://pubs.usgs.gov/sir/2014/5041/pdf/sir2014-5041.pdf>.
- Wang, R., and E. Ateljevich. (2012). A Continuous Surface Elevation Map for Modeling (Chapter 6). In *Methodology for Flow and Salinity Estimates in the Sacramento-San Joaquin Delta and Suisun Marsh, 23rd Annual Progress Report to the State Water Resources Control Board*. California Department of Water Resources, Bay-Delta Office, Delta Modeling Section.
- Wilber, D.H., and D.G. Clarke, 2001. Biological effects of suspended sediments: A review of suspended sediment impacts on fish and shellfish with relation to dredging activities in estuaries, *North American Journal of Fisheries Management* 21(4):855-875.
- Zimmerman, R.C., Reguzzoni, J.L., and R.S. Alberte. 1995. Eelgrass (*Zostera marina* L.) transplants in San Francisco Bay: Role of light availability on metabolism, growth and survival. *Aquat. Bot.* 51: 67-86.

## 7.1 REFERENCES FROM BIOLOGICAL ASSESSMENTS

- AMOG Consulting. 2010. Olympic Dam EIS Project: Assessment of Waves and Propeller Wash Associated with Shipping. Final Report. October 19, 2010.
- Baxter, R. 2018. Introduction and overview of longfin smelt conceptual model. Presented paper at the Interagency Ecological Program 2018 annual workshop. March 6-8, 2018, Folsom, CA.
- Baxter, R., R. Breuer, L. Brown, M. Chotkowski, F. Feyrer, M. Gingras, B. Herbold, A. Mueller-Solger, M. Nobriga, T. Sommer, and K. Souza. 2008. Pelagic organism decline progress report: 2007 synthesis of results: Stockton, Calif., Interagency Ecological Program for the San Francisco Estuary, Technical Report 227, 86 pgs., [http://www.water.ca.gov/iep/docs/pod/synthesis\\_report\\_031408.pdf](http://www.water.ca.gov/iep/docs/pod/synthesis_report_031408.pdf).
- Bennett, W.A. 2005. Critical assessment of the delta smelt population in the San Francisco Estuary, California. *San Francisco Estuary and Watershed Science* 3: <http://repositories.cdlib.org/jmie/sfews/vol3/iss2/art1>.

- Bennett, W.A., W.J. Kimmerer, and J.R. Burau. 2002. Plasticity in vertical migration by native and exotic estuarine fishes in a dynamic low-salinity zone. *Limnol. Oceanogr.* 47(5): 1496-1507.
- Bouley, P. and Kimmerer, W.J., 2006. Ecology of a highly abundant, introduced cyclopoid copepod in a temperate estuary. *Marine Ecology Progress Series*, 324:219-228.
- Brown, L., W.A. Bennett, R.W. Wagner, T. Morgan-King, N. Knowles, F. Feyrer, D.H. Schoellhamer, M.T. Stacey, and M. Dettinger. 2013. Implications for future survival of delta smelt from four climate change scenarios for the Sacramento–San Joaquin Delta, California. *Estuaries and Coasts* 36:754–774
- California State Water Board, 2019. Dredging Operations and Sediment Management. [https://www.waterboards.ca.gov/sanfranciscobay/water\\_issues/programs/dredging.html](https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/dredging.html). Accessed August 29, 2019.
- Cloern J.E., N. Knowles, L.R. Brown, D. Cayan, M.D. Dettinger, T.L. Morgan, D.H. Schoellhamer, M.T. Stacey, M. van der Wegen, R.W. Wagner, and A.D. Jassby. 2011. Projected evolution of California’s San Francisco Bay-delta-river system in a Century of Climate Change. *PLoS ONE* 6(9):e24465. <http://doi:10.1371/journal.pone.0024465>
- Department of the Army (DOA) 2015. Environmental Impact Statement for the Modernization and Repair of Piers 2 and 3 at Military Ocean Terminal Concord, Concord, CA.
- DOA 2016. Follow-on Section 7 Consultation Regarding Revised Design for the Project to Replace/Upgrade Pier 2 at Military Ocean Terminal Concord, Concord, CA. Letters to NMFS and USFWS.
- Feyrer, F, Nobriga, ML, Sommer, TR. 2007. Multi-decadal trends for three declining fish species: habitat patterns and mechanisms in the San Francisco Estuary, California, USA. *Canadian Journal of Fisheries and Aquatic Sciences* 64:723-734.
- Feyrer, F., K. Newman, M. Nobriga, and T. Sommer. 2011. Modeling the effects of future outflow on the abiotic habitat of an imperiled estuarine fish. *Estuaries and Coasts* 34: 120-128.
- Fisher, F.W. 1994. Past and present status of Central Valley Salmon. *Conservation Biology* 8:870-873.
- Hasenbein M, Fangue NA, Geist J, Komoroske LM, Truong J, McPherson R, Connon RE (2016) Assessments at multiple levels of biological organization allow for an integrative determination of physiological tolerances to turbidity in an endangered fish species. *Conserv Physiol* 4: doi:10.1093/conphys/cow004.
- Healey, M.C. 1991. Life history of chinook salmon (*Oncorhynchus tshawytscha*). Pages 311-394 in C. Groot and L. Margolis, editors. *Pacific salmon life histories*. University of British Columbia Press, Vancouver.
- Hobbs, J. 2018. Re-evaluating the life history of longfin smelt. Presented paper at the Interagency Ecological Program 2018 annual workshop. March 6-8, 2018, Folsom, CA.
- Hobbs, J., and P. Moyle. 2018. Will delta smelt have a happy new year? Posted on January 14, 2018 to the California WaterBlog. <https://californiawaterblog.com/2018/01/14/will-delta-smelt-have-a-happy-new-year/>

- Jassby et al. 1995 Isohaline Position as a Habitat Indicator for Estuarine Populations. *Ecological Applications* 5: 272-289.
- Kimmerer, W., J.R. Burau, and W.A. Bennett. 1998. Tidally oriented vertical migration and position maintenance of zooplankton in a temperate estuary. *Limnology and Oceanography* 43:1697-1709.
- Kimmerer W.J., E.S. Gross, and M.L. MacWilliams. 2009. Is the response of estuarine nekton to freshwater flow in the San Francisco Estuary explained by variation in habitat volume? *Estuaries and Coasts* 32: 375-389.
- Kimmerer, W. 2013.
- Lott, J. 1998. Feeding habits of adult and juvenile delta smelt from the Sacramento-San Joaquin river estuary. *Interagency Ecological Program for the Sacramento-San Joaquin River Estuary Newsletter* 11(1)—Winter 1998:14-16.
- Moyle, P.B. 2002. *Inland Fishes of California*. University of California Press, Berkeley. 502 pgs.
- Moyle, P.B., B. Herbold, D.E. Stevens, and L.W. Miller. 1992. Life history and status of delta smelt in the Sacramento-San Joaquin Estuary, California. *Transactions of the American Fisheries Society* 77:67-77.
- NMFS. 2001. Biological opinion/formal section 7 consultation/EFH consultation for the proposed Montezuma Wetlands Restoration Project – Waste Discharge. Tracking #: SWR-1999-2322/July 11, 2001.
- NMFS. 2010. Concurrence letter/informal section 7 consultation for the proposed Cullinan Ranch Restoration Project, Napa and Solano Counties, CA. Tracking #: SWR-2009-6112/April 5, 2010.
- NMFS. 2011. Biological opinion/formal section 7 consultation/EFH consultation for the proposed Montezuma Wetlands Restoration Project, 2009 re-initiation. Tracking #: SWR-2008-2876/April 22, 2011.
- NMFS 2014. Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Department of the Army's (DOA) proposed Modernization and Repair of Piers 2 and 3 Project at Military Ocean Terminal Concord, California. November 19, 2014.
- NMFS. 2015a. Concurrence letter/informal section 7 consultation/EFH consultation for the proposed Cullinan Ranch Restoration Project, Napa and Solano Counties, CA. Tracking #: WCR-2014-1738/January 21, 2015.
- NMFS. 2015b. Biological opinion/programmatic section 7 consultation for the Long-term Management Strategy for the Placement of Dredge Material in the San Francisco Bay Region. Tracking #: WCR-2014-1599/July 9, 2015.
- NMFS. 2016a. 5-year status review: summary and evaluation of Central Valley spring-run Chinook salmon Evolutionarily Significant Unit. California Central Valley Recovery Domain. West Coast Region, April 2016. 41 pgs.

- NMFS. 2016b. 5-year status review: summary and evaluation of Sacramento River winter-run Chinook salmon ESU. California Central Valley Recovery Domain. West Coast Region, December 2016. 41 pgs.
- Nobriga, M.L., T.R. Sommer, F. Freyer, and K. Fleming. 2008. Long-term trends in summertime habitat suitability for delta smelt (*Hypomesus transpacificus*). San Francisco Estuary and Watershed Science 6(1): 1-13.
- Oliver, J. S., P. N. Slattery, L. W. Hulberg & J. W. Nybakken 1977. Patterns of succession in benthic infaunal communities following dredging and dredged material disposal in Monterey Bay. U.S. Army Corps of Engineers. Technical Report D-77-27.
- Rose, K. A., W. J. Kimmerer, K. P. Edwards, and W. A. Bennett. 2013a. Individual-based modeling of delta smelt population dynamics in the upper San Francisco Estuary. I. Model description and baseline results. Transactions of the American Fisheries 142:1238-1259.
- Rose, K. A., W. J. Kimmerer, K. P. Edwards, and W. A. Bennett. 2013. Individual-based modeling of delta smelt population dynamics in the upper San Francisco Estuary. II. Alternative baselines and good versus bad years. Transactions of the American Fisheries 142:1260–1272.
- Slater, S.B., and R.D. Baxter. 2014. Diet, prey selection, and body condition of age-0 delta smelt, *Hypomesus transpacificus*, in the Upper San Francisco Estuary. San Francisco Estuary and Watershed Science 12(3) doi: <http://dx.doi.org/10.15447/sfew.2014v12iss3art1>
- Sommer T. and Mejia F. 2013. A place to call home: A synthesis of delta smelt habitat in the upper San Francisco Estuary. San Francisco Estuary and Watershed Science 11(2): <https://escholarship.org/uc/item/32c8t244>
- Tobias, V. 2018. Data-driven patterns of longfin smelt occupancy in the San Francisco Estuary. Presented paper at the Interagency Ecological Program 2018 annual workshop. March 6-8, 2018, Folsom, CA.
- USACE (United States Army Corps of Engineers). 2013. Biological Assessment for maintenance dredging of the Suisun Bay Channel Solano and Contra Costa Counties, California. San Francisco District.
- USACE. 2014a. Biological Assessment for maintenance dredging of the Suisun Bay Channel Solano and Contra Costa Counties, California. San Francisco District.
- USACE. 2014b. Suisun Bay Channel and New York Slough 2014 Maintenance Dredging Sampling and Analysis Report.
- USACE. 2014c. Final Sediment Testing Summary Report: Modernization and Repairs of Piers 2 and 3 at Military Ocean Terminal. Concord, California.
- USACE. 2015. Final Environmental Assessment/ Environmental Impact Report, Maintenance Dredging of the Federal Navigation Channels in San Francisco Bay, Fiscal Years 2015 - 2024. San Francisco District. Prepared by URS Group, Inc., April.



- USACE and USEPA (United States Environmental Protection Agency), 2011. Agreement on Programmatic EFH Conservation Measures for Maintenance Dredging Conducted Under the LTMS Program. June 9.
- USFWS (United States Fish and Wildlife Service). 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California.
- USFWS (United States Fish and Wildlife Service). 2001. Endangered and Threatened Wildlife and Plants; 12-Month Finding for a Petition to List the Yellow-billed Cuckoo (*Coccyzus americanus*) in the Western Continental United States (July 25, 2001).
- USFWS (United States Fish and Wildlife Service). 2004. 5-year review of the delta smelt. [https://ecos.fws.gov/docs/five\\_year\\_review/doc731.pdf](https://ecos.fws.gov/docs/five_year_review/doc731.pdf)
- USFWS (United States Fish and Wildlife Service). 2006. California Least Tern (*Sternula antillarum brownii*) 5-year Summary and Evaluation.
- USFWS (United States Fish and Wildlife Service). 2007. Recovery Plan for the Pacific Coast Population of the Western Snowy Plover (*Charadrius alexandrinus nivosus*). Sacramento, California.
- USFWS (United States Fish and Wildlife Service). 2008. Formal Endangered Species Act Consultation on the Proposed Coordinated Operations of the Central Valley Project (CVP) and State Water Project (SWP). United States Fish and Wildlife Service, Sacramento, CA.
- USFWS (United States Fish and Wildlife Service). 2010. Biological opinion/intra-Service section 7 consultation on implementation of the proposed Cullinan Ranch Restoration Project, Napa and Solano Counties, CA. Tracking #: SFB-2010-01/May 7, 2010.
- USFWS (United States Fish and Wildlife Service). 2015. Southern Sea Otter (*Enhydra lutris nereis*) 5-Year Review: Summary and Evaluation. Ventura Office.
- USFWS (United States Fish and Wildlife Service). 2015. Biological Opinion for the Modernization and Repair of Piers 2 and 3 at Military Ocean Terminal Concord, Contra Costa County, California Formal Consultation on the 2015 Maintenance Dredging of the Suisun Navigation Channel Project, Solano and Contra Costa Counties, California. February 4, 2015.
- USFWS (United States Fish and Wildlife Service). 2015. Biological Opinion for the Formal Consultation on the 2015 Maintenance Dredging of the Suisun Navigation Channel Project, Solano and Contra Costa Counties, California.
- USFWS (United States Fish and Wildlife Service). 2018. Delta Smelt Q & A. Bay-Delta Fish & Wildlife Office. <https://www.fws.gov/sfbaydelta/EndangeredSpecies/Species/Accounts/DeltaSmelt/DeltaSmeltQandA.htm>.

## **8.0 APPENDICES**



**APPENDIX A**  
**FEDERAL ENDANGERED SPECIES ACT**  
**CONSULTATION DOCUMENTATION**

**APPENDIX B**  
**CULTURAL RESOURCES CONSULTATION**

**APPENDIX C  
PUBLIC INVOLVEMENT**

## Interagency and Intergovernmental Coordination

As part of the public involvement process, interagency and intergovernmental coordination letters were sent to the following federal, tribal, state, and local governmental agencies and representatives. The following organizations were consulted in the development of the Environmental Assessment for Wharf Maintenance Dredging Project at Military Ocean Terminal Concord, CA.

<b>Federal Agencies</b>
Fish and Wildlife Service (USFWS)
National Marine Fisheries Service (NMFS)
National Park Service (NPS)
U.S. Army Corps of Engineers (USACE), SPN Regulatory
Environmental Protection Agency, Region 9 (USEPA)
11 <sup>th</sup> Congressional District
<b>Native American Tribes (12 tribes represented)</b>
Cortina Band of Indians
Ione Band of Miwok Indians
<b>State Agencies</b>
California Department of Fish and Wildlife
California State Clearinghouse
State Historic Preservation Officer (SHPO)
Regional Water Quality Control Board (RWQCB)
Bay Conservation and Development Commission (BCDC)
State Assembly, District 14
<b>Local Agencies</b>
Contra Costa County Board of Supervisors, District V
Contra Costa County Board of Supervisors, District IV
Mayor of Concord

The initial dredging application and supporting documents were sent to the interagency Dredge Materials Management Office (DMMO) on 30 April 2020 for agency review and comment. The Regional Water Quality Control Board requested additional information for processing the permit application.

The Notice of Availability for this Environmental Assessment was published in the Contra Costa Times and Contra Costa Post on XXX, 2021. The closing date was XXX, 2021. The Army's intent during the Draft EA review process was to provide a responsible level of opportunity for

government agencies, special interest groups, and the general public to learn about the alternatives being evaluated in the EA and offer several ways for those interested to express their comments regarding the proposal

Page reserved for the Notice of Availability  
For Public Review of the Draft Environmental Assessment

**APPENDIX D  
SEDIMENT ANALYSIS REPORT**