

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN FRANCISCO BAY REGION

TENTATIVE ORDER

REISSUED WASTE DISCHARGE REQUIREMENTS and WATER QUALITY CERTIFICATION for:

U.S. ARMY CORPS OF ENGINEERS, SAN FRANCISCO DISTRICT SAN FRANCISCO BAY FEDERAL CHANNEL MAINTENANCE DREDGING PROGRAM, 2020 THROUGH 2024

The California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), finds that:

Purpose

1. This Order constitutes Waste Discharge Requirements (WDRs) and Water Quality Certification (Certification) for the U.S. Army Corps of Engineers, San Francisco District's (USACE) federal navigation channel maintenance dredging program in the San Francisco Bay Area and for disposal of dredged material created by these activities over the January 2020 through December 2024 five-year period. USACE previously implemented San Francisco Bay Area navigation maintenance dredging under WDRs and Water Quality Certification Order No. R2-2015-0023 issued for a five-year period starting in 2015. To fully address potentially significant impacts of hydraulic dredging, i.e., entrainment of fish species listed as threatened or endangered under State and federal endangered species acts, this Order conditions dredging activities to reduce the use of hydraulic suction hopper dredges in San Francisco Bay.

Scope

2. USACE maintains the navigability of federally-authorized channels at the entrance to and in San Francisco Bay. USACE removes accumulated sediment (primarily silt and clay) by hydraulic (e.g., self-propelled hopper, hydraulic cutter head) or mechanical (e.g., clamshell) dredges and typically disposes of the dredged material by either self-propelled hopper, dump scow, or by use of a pipeline to transport material to beneficial reuse sites.
3. This Order applies only to maintenance dredging, which is performed on a periodic basis to previously authorized depths and removes recently deposited materials. This Order does not apply to "new work" dredging, which removes material to new authorized depths and may involve dredging consolidated materials or historically-contaminated materials.
4. For the five-year period covered by this Order, USACE proposes to perform maintenance dredging at several locations in the Bay Area (Figures 1 - 11). Based on the range of volumes that USACE has proposed for planning purposes over the next five years (Tables 1 and 2), the maximum total dredging volume within San Francisco Bay is 12.9 million cubic yards (mcy) and the maximum

total dredging volume in the San Francisco Main Ship Channel (MSC) west of the Golden Gate, outside San Francisco Bay is 2.25 mcy.

Long-Term Management Strategy for Disposal of Dredged Material

5. The Water Board and USACE are agencies that participate in the Long-Term Management Strategy (LTMS) for the Placement of Dredged Material in the San Francisco Bay Region. Other agencies participating in LTMS are U. S. EPA, the San Francisco Bay Conservation and Development Commission (BCDC), and the California State Lands Commission (CSLC). These LTMS agencies evaluated alternative management options for disposal and reuse of dredged sediment over a 50-year planning horizon in a Policy Environmental Impact Statement/Programmatic Environmental Impact Report (EIS/EIR) completed in October 1998. The EIS/EIR indicated that dredged material disposal may have adverse impacts on the beneficial uses of the waters of San Francisco Bay and that in-Bay disposal should be reduced from historical levels.
6. The LTMS agencies determined that the preferred alternative is to reduce disposal in the Bay to a long-term average of 1.25 mcy or less per year, with approximately 80 percent of dredged sediment to be targeted for beneficial reuse or out-of-Bay disposal and only 20 percent targeted for in-Bay disposal. This long-term goal can be accomplished by maximizing beneficial reuse of dredged material suitable for habitat restoration along the Bay margins and disposing suitable dredged material outside the Bay only when beneficial reuse is not practicable. As the science and knowledge regarding climate change and the resulting rise in sea levels has grown, it is now recognized that the low-lying areas of the Bay, which were once historical marshes, are in jeopardy of being inundated both by rising sea levels and storm surges that are occurring more frequently and at greater intensity than previously experienced. In addition, in the mid-2000s, scientists from the U.S. Geological Survey identified a significant reduction in suspended sediment loading from the Sacramento-San Joaquin river system. Less sediment in suspension and circulation within the Bay impairs the ability of shorelines, mudflats, and tidal wetlands to withstand erosion and inundation, especially as sea level rises. The Water Board therefore finds that it is in the public interest to encourage beneficial reuse of suitable dredged material as one component of regional adaptation to climate change and reduced suspended sediment loading to the Bay.
7. Specific guidance for implementing the LTMS long-term goal of reducing in-Bay disposal is described in the LTMS Management Plan (Management Plan), approved in July 2001 by the LTMS Executive Committee. To achieve the goal, the Management Plan included an in-Bay disposal target of 1.25 mcy or less annually over a three-year period. To allow time for planning, budgeting, and creating alternatives to in-Bay disposal, the Management Plan established a 12-year transition period for achieving the in-Bay disposal target. The transition period's disposal volume limits were voluntary as long as the long-term goal was met overall. Public assurance that in-Bay disposal would in fact decrease was provided by language identifying when strict volume allocations

to individual dredgers would be triggered (i.e., a disposal allocation trigger). The transition period successfully concluded in 2012 with in-Bay disposal targets met every three years as described in the Management Plan.

USACE is the largest dredger in the Bay Area. Efforts by USACE to reduce in-Bay disposal are critical to successful implementation of the LTMS long-term goal. In keeping with the LTMS long-term goal, USACE must reserve sufficient monthly capacity at in-Bay disposal sites for smaller non-USACE projects. The 1.25 mcy annual in-Bay disposal target allocates 0.25 mcy/year to “small” dredging projects, defined in the Management Plan as those projects that generate less than 50,000 cy per year on average with a design depth of less than -12 feet MLLW, leaving the remaining 1.0 mcy of the disposal goal plus a 0.25 mcy “contingency volume” to be split between USACE and the medium-sized maritime industry dredgers. If the total average annual in-Bay disposal volume from the prior three-year averaging period exceeds 1.5 mcy (1.25 mcy target plus 0.25 mcy contingency), both the Management Plan and the Basin Plan direct the Water Board to consider imposition of mandatory in-Bay disposal allocations for all dredgers.

Since transitioning to the final in-Bay disposal target in 2012, USACE’s dredging has accounted for approximately 70 percent of the total volume of sediment dredged in San Francisco Bay by all dredgers. USACE’s combined average annual in-Bay disposal volume over the first two post-2012 LTMS averaging periods (2013 – 2015 and 2016 - 2018) was 0.816 mcy per year. Neither the 1.5 mcy average annual in-Bay disposal allocation trigger nor the 1.25 mcy average annual in-Bay disposal target was exceeded during these averaging periods. For years 2020 through 2024, we expect USACE to continue to maintain an average annual in Bay disposal volume of 0.816 mcy or less without resulting in exceedance of the in-Bay disposal allocation trigger. The total not to exceed in-Bay disposal volume for this Order is therefore 4.08 mcy (calculated as 0.816 mcy times five years).

This Order authorizes the Executive Officer to consider allowing USACE to exceed 4.08 mcy of in-Bay disposal provided that the additional volume will not result in an exceedance of the 1.5 mcy allocation trigger and also that 50 percent of the excess volume will be beneficially reused at an aquatic habitat creation or restoration project. This will ensure that the allocation trigger will not be exceeded. It is also consistent with the LTMS goals of maximizing the use of dredged material as a resource. In addition, it takes into consideration the USACE’s disproportional use of in-bay disposal by providing 10 percent more than the minimum beneficial reuse percentage in the preferred alternative in the EIS/EIR for the LTMS Management Plan (Alternative 3, LTMS EIS/EIR), which included a minimum of 40 percent beneficial reuse (LTMS Management Plan, p. 1-12). USACE’s disproportional use of in-bay disposal reduces the availability of in-bay disposal for other dredgers thereby increasing their burden to achieve a minimum of 40 percent beneficial reuse. Thus, requiring USACE to beneficially reuse 10 percent more than the minimum beneficial use goal for this excess volume will offset the loss of in-

bay disposal volume for other dredgers by providing a greater proportion of dredge material for beneficial reuse.

Dredging Projects Summary

8. USACE's maintenance dredging program provides for maintenance of ten federal navigation channels inside San Francisco Bay, including six channels dredged annually or biennially and four channels with less frequent dredging cycles. These ten channels have a combined surface area that equates to approximately 2.22 percent of the total surface area of San Francisco Bay. During each fiscal year or every other year from 2020 to 2024, USACE plans to dredge the channels most critical to the region's maritime trade and to regional and national economies: Oakland Harbor, Richmond Outer Harbor, Richmond Inner Harbor, Suisun Bay and New York Slough, Pinole Shoal (San Pablo Bay), Redwood City Harbor (not including the San Bruno Channel). Other channels that USACE may dredge once at some point during the next five years, if funding becomes available, include the San Rafael (Inner) Canal and Across the Flats, the Napa River (upper and lower reaches), Petaluma River (upper portion and Across the Flats), and the San Bruno Channel. Each of these channels is either due or overdue for dredging.
USACE also annually dredges the Main Ship Channel outside San Francisco Bay, which is not part of the LTMS Program. Although the eastern portion of the channel is within the seaward limit of State submerged lands (three nautical miles from the coastline) and is therefore within Water Board jurisdiction, dredging has not taken place in this portion of the channel over the past 20 years and USACE does not expect this condition to change during the next five years.

The general locations of the channels are depicted collectively in Figure 1. The channel boundaries are more precisely shown on the project maps provided in Figures 2 - 10. Since this Order is a five-year WDR/Certification, the actual shoaling locations are not yet known. Dredging will be confined within the channel boundaries shown in Figures 2 - 10 and shall not exceed the project depth, as shown in Tables 1 and 2, plus an over dredge depth of 2 feet. Placement of dredge material will be confined to the boundaries of the placement sites depicted in Figures 1 - 10.

Table 1 summarizes USACE's 2020 - 2024 dredging activities under the LTMS Program and Table 2 summarizes USACE's 2020 - 2024 dredging of the Main Ship Channel, including maximum estimated dredging volumes, the Water Board's preferred placement sites, the federal standard placement sites, and alternate placement sites. The volume estimates are based on historical data.

Table 1. 2020 – 2024 San Francisco Bay Dredging Project Summary

Project	Maintenance Depth (feet below MLLW)¹	Dredge Type	Expected Dredging Frequency in 2020-2024	Maximum Planning Volume per Dredge Episode (cy)	Water Board Preferred Placement Site	Federal Standard Placement Site²	Alternate Placement Site
Richmond Inner Harbor	38	Clamshell-Bucket	Annual	350,000	Habitat Restoration Beneficial Reuse	SF-DODS	Upland Beneficial Reuse
Richmond Outer Harbor	45	Clamshell-Bucket or Hopper*	Annual (Biennial)	350,000 (700,000)	Habitat Restoration Beneficial Reuse	SF-11	Other In-Bay Site (SF-10)
Oakland Inner and Outer Harbor	50	Clamshell-Bucket	Annual	950,000	Habitat Restoration Beneficial Reuse	SF-DODS	Upland Beneficial Reuse
Pinole Shoal	35	Clamshell-Bucket or Hopper*	Annual (Biennial)	300,000 (600,000)	Habitat Restoration Beneficial Reuse	SF-10	Other In-Bay Site (SF-11)
Suisun Bay Channel and New York Slough ^{3,4}	35	Clamshell-Bucket	Annual	200,000	Habitat Restoration Beneficial Reuse	SF-16	Other In-Bay Site (SF-9)
Redwood City Harbor (Harbor Channel)	30	Clamshell Bucket	Twice (2021 & 2023)	300,000	Habitat Restoration Beneficial Reuse	SF-11	SF-DODS

Project	Maintenance Depth (feet below MLLW)¹	Dredge Type	Expected Dredging Frequency in 2020-2024	Maximum Planning Volume per Dredge Episode (cy)	Water Board Preferred Placement Site	Federal Standard Placement Site²	Alternate Placement Site
Redwood City Harbor (San Bruno Shoal)	30	Clamshell or Hopper	Once	16,000	Habitat Restoration Beneficial Reuse	SF-11	SF-DODS
Petaluma River Channel	8	Hydraulic Cutterhead-Pipeline	Once	350,000	Habitat Restoration Beneficial Reuse	Shollenberger Park (Upland Sponsor-Provided Site)	Upland Beneficial Reuse
Petaluma River (Across the Flats)	8	Clamshell Bucket	Once	250,000	Habitat Restoration Beneficial Reuse	SF-10	Upland Beneficial Reuse
Hopper Dredge Sea Trials	NA	Hopper	Up to five times	12,000	Beach Nourishment Beneficial Reuse	SF-11	SF-8
Lower Napa River Channel (Mare Island Strait Causeway to Asylum Slough)	9 ⁵	Clamshell-Bucket	Once	13,000	Habitat Restoration Beneficial Reuse	Upland (Sponsor-Provided)	Other Upland Site

Project	Maintenance Depth (feet below MLLW) ¹	Dredge Type	Expected Dredging Frequency in 2020-2024	Maximum Planning Volume per Dredge Episode (cy)	Water Board Preferred Placement Site	Federal Standard Placement Site ²	Alternate Placement Site
Upper Napa River Channel (Asylum Slough to Third Street)	9 ⁶	Clamshell-Bucket	Once	55,000	Habitat Restoration Beneficial Reuse	Upland (Sponsor-Provided)	Other Upland Site
San Rafael Creek Channel	6 (Inner Canal); 8 (Across the Flats)	Clamshell-Bucket	Once	87,000	Habitat Restoration Beneficial Reuse	SF-10	Other In-Bay Site (SF-11)

Notes:

- * Both Richmond Outer Harbor and Pinole Shoal cannot be dredged with a hopper in the same year - see Provision 9.
- ¹ Typical 2-foot overdredge allowances beyond these depths are not shown.
- ² The federal standard is defined as the least-costly dredged material disposal or placement alternative consistent with sound engineering practices, and meeting the environmental standards established by the 404(b)(1) evaluation process or ocean dumping criteria (33 C.F.R. § 335.7).
- ³ Aside from regularly scheduled maintenance of this navigation project, USACE would take urgent action outside the work window, as needed, to remove the hazardous shoaling at Bulls Head Reach.
- ⁴ Due to rapid shoaling at Bulls Head Reach, this portion of the Suisun Bay Channel may be advance maintenance dredged by up to 4 feet, plus an additional 2 feet of allowable overdepth.
- ⁵ The authorized depth is -15 feet MLLW but infrequent maintenance has caused some areas to be as shallow or shallower than -10 feet MLLW. To avoid conversion of delta smelt shallow water habitat (-10 feet MLLW or shallower), the project will be dredging to 9 feet MLLW plus 1 foot of overdepth for its entire length per the terms of the U.S. Fish and Wildlife Service's Programmatic LTMS Biological Opinion.
- ⁶ The authorized depth is -10 feet MLLW but infrequent maintenance has caused some areas to be as shallow or shallower than -10 feet MLLW. To avoid conversion of delta smelt shallow water habitat (-10 feet MLLW or shallower), the project will be dredging to 9 feet MLLW plus 1 foot of overdepth for its entire length per the terms of the U.S. Fish and Wildlife Service's Programmatic LTMS Biological Opinion.

cy = cubic yards

mcy = million cubic yards

SF-9 = Carquinez Strait placement site

SF-10 = San Pablo Bay placement site
 SF-11 = Alcatraz Island placement site
 SF-16 = Suisun Bay placement site

SF-DODS = San Francisco Deep Ocean Disposal Site (55 miles west of Golden Gate)

Table 2. Main Ship Channel Dredging Summary

Project	Maintenance Depth (feet below MLLW)¹	Dredge Type	Expected Dredging Frequency in 2020-2024	Maximum Planning Volume per Dredge Episode	Water Board Preferred Placement Site	Federal Standard Placement Site²	Alternate Placement Site
San Francisco Harbor – Main Ship Channel	55	Hopper	Annual	450,000	Ocean Beach Onshore	SF 8	SF 17

Notes:

¹ Typical 2-foot overdredge allowances beyond these depths are not shown.

² The federal standard is defined as the least-costly dredged material disposal or placement alternative consistent with sound engineering practices, and meeting the environmental standards established by the 404(b)(1) evaluation process or ocean dumping criteria (33 C.F.R. § 335.7).

Ocean Beach Onshore = Onshore Ocean Beach placement site

SF-8 = San Francisco Bar Channel Disposal Site

SF-17 = Ocean Beach placement site (near shore site, includes the Ocean Beach demonstration site)

Placement Sites for Dredged Material

9. It is LTMS' goal that sediment dredged from San Francisco Bay be beneficially reused for a variety of purposes, such as wetland restoration, levee maintenance, or construction fill. Existing fully permitted beneficial reuse sites include the Montezuma Wetlands Restoration Project (regulated by Water Board Order No. R2-2012-0089) and the Cullinan Ranch Restoration Project (regulated by Water Board Order No. R2-2010-0108) with remaining sediment placement capacities of approximately 10 mcy and 1.5 – 1.9 mcy, respectively (Figures 1, 5, 6, and 8). The Eden Landing Ecological Reserve Wetland Restoration Project Phase II and the Bel Marin Keys Unit V expansion of the Hamilton Wetland Restoration Project are two other wetland restoration projects currently in the permitting phase and expected to be ready to receive sediment within the next five years (Figures 7 and 9). The dredged sediment reuse capacities of these two sites are 7.2 mcy and 9.5 mcy, respectively. At their own discretion, dredging contractors or the project sponsors may propose to use other permitted beneficial reuse locations. All necessary environmental documentation must be completed for a site prior to it receiving any dredged material.

Disposal in the Bay consistent with the goal occurs at four designated aquatic disposal sites (Figure 1): the Alcatraz Island Disposal Site (SF-11), the San Pablo Bay Disposal Site (SF-10), the Carquinez Strait Disposal Site (SF-09), and the Suisun Bay Disposal Site (SF-16). Ocean disposal for Bay dredged material occurs at the San Francisco Deep Ocean Disposal Site (SF-DODS), about 55 miles (48 nautical miles) west of the Golden Gate and thus beyond the three-mile offshore limit of Water Board jurisdiction. Under the federal Marine Protection, Research and Sanctuary Act, U.S. EPA must concur with disposal at SF-DODS.

Sand dredged from the San Francisco MSC may be placed for beneficial reuse (nourishment of the San Francisco littoral cell to help combat erosion at Ocean Beach) at the easternmost portion of the San Francisco Bar Disposal Site (SF-8) (Figure 2), within the three nautical mile limit of Water Board jurisdiction. Pre-site-designation studies concluded that the area would be dispersive, meaning that waves would spread the sand shoreward to the surf zone and beach at such a rate that accumulation would be minimal. However, surveys indicate that spreading occurs at a much slower rate than expected and that underwater shoals impair safe operation of hopper dredges during rough seas. USACE therefore limits use of SF-8 to the extent feasible. USACE is currently conducting a beach nourishment beneficial reuse pilot demonstration study at the Ocean Beach Near Shore Demonstration Site, which is encompassed by the future SF-17 placement site (SF-17), in waters of the Pacific Ocean adjacent to the south-of-Sloat-Boulevard stretch of Ocean Beach (Figure 2). SF-17 is located where waves can potentially feed sediment toward the southern reach of Ocean Beach, which may ultimately help mitigate ongoing shoreline erosion in the area that threatens significant municipal infrastructure, including segments of the Great Highway and major sewer lines running underneath and alongside it. USACE and the U.S. EPA are in the process of formally designating SF-17 as a permanent nearshore placement site for the beneficial use of clean dredged sand under 40 CFR Part 230.8 for Advance Identification of Disposal Sites and section 404 of the Clean Water Act.

Review of Dredging Episodes

10. The Water Board participates in the Dredged Material Management Office (DMMO); a working group with representatives of the State and federal agencies with regulatory authority over Bay Area dredging projects. Staff representatives of the Water Board, USACE, U.S. EPA, BCDC, and CSLC meet regularly to jointly review dredging projects and make consensus-based recommendations to their respective agencies about the suitability of sediments for proposed placement sites based on sediment testing conducted according to DMMO testing requirements. Material proposed to be dredged and placed at ocean, inland aquatic, or beneficial reuse sites 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 ensure that disposal of dredged material at designated disposal sites occurs without causing unreasonable degradation to the surrounding environment. Generally, sediments are tested for physical and chemical attributes and/or the potential for biological toxicity.

Representatives from the California Department of Fish and Wildlife (CDFW), the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) also participate in the DMMO in an advisory capacity. Each DMMO agency retains its independent decision-making authority, but the group has significantly reduced project review time by concurrent consideration of projects. USACE handles the logistics for the operation of the DMMO.

This Order requires that dredging episodes carried out under this Order will be reviewed by the DMMO for a recommendation on the suitability for disposal or beneficial reuse of the dredged material. Each dredging episode must be approved in writing by Water Board staff.

Barring and Knock-down Dredging

11. ***Barring as part of a dredging episode:*** USACE plans to implement “barring” as 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 within the project area. Barring will be restricted to the channel footprint and the project depth, including the over dredge depth allowance. If barring were not utilized as part of dredging episodes, the vessel operator would likely have to dredge below project depth in certain areas in order to ensure safe navigation, resulting in an increased volume of material dredged and decreasing overall efficiency.

Knock-down performed in lieu of dredging: Separate from barring, which is implemented at the end of dredging episodes, USACE anticipates performing several “knock-down” events in lieu of conducting full dredging episodes. Knock-downs would use the same equipment and procedures as barring but would apply to isolated shoals or high-spots rather than an entire channel. Knock-downs are most useful when time constraints may not allow for normal dredging or when a shoal threatening navigation covers a small area of a project area that

is otherwise at or below its permitted depth. Conducting separate knock-down operations is often more efficient than mobilizing dredging equipment and transporting the material to a disposal site. Knock-down events occurring separately from full dredging episodes, or in combination with a dredging episode occurring in a different location within the same channel, will be subject to the same coordination with the DMMO as full dredging episodes. The volume of material above project design depth to be knocked down under these separate operations is not anticipated to exceed 15,000 cy per year in each deep draft channel. Each knock-down that is a stand-alone event, and not associated with a dredging episode, must be approved by Water Board staff. Depending on the volume of sediment, contaminant concentrations, and other project-specific details, water quality monitoring may be required and will be coordinated during the episode approval process described in Provision 3 of this Order.

Advance Maintenance Dredging

12. Advance maintenance dredging is utilized in areas where typical shoaling patterns create navigational restrictions on an ongoing basis. Advance maintenance dredging that does not exceed the yearly maximum volume of dredge material shall be allowed and shall be coordinated through the typical DMMO process. Advance maintenance is restricted to areas that exhibit rapid shoaling and the material shall be characterized through the standard DMMO process. If advance maintenance dredging for any channel is expected to exceed the maximum volume shown in Table 1, or reconfiguration of a channel becomes necessary, USACE will notify the Executive Officer pursuant to Provision 2 of this Order.

Emergency Dredging

13. USACE is required to ensure that all navigation channels are dredged to a safe depth. If an area is found to be an unacceptable hazard to life or navigation or threatens to cause an immediate and unforeseen significant economic hardship if corrective action is not taken quickly, USACE may carry out dredging on a limited basis even though that project is not scheduled for dredging. In such cases, an expedited testing and approval process is often necessary. USACE does not anticipate performing more than three emergency dredging episodes consisting of less than 30,000 cy each per year. The Water Board recognizes the need for expedited review of emergency dredging episodes and expects that USACE will still follow the procedures outlined in Provision 3 of this Order for written approval of emergency dredging episodes.

In atypical conditions, such as after an extraordinary storm event, a shoaling situation may be such an immediate hazard that even an expedited review process is not feasible. The Water Board recognizes that USACE has the authority to remove the immediate hazard without the Executive Officer's approval pursuant to this Order.

Management of the in-Bay Disposal Sites

14. The in-Bay disposal sites are operated as "dispersive" sites, that is, material disposed of at the sites should be dispersed by currents and tidal flows, and the

sites should not accumulate material. USACE is responsible for managing and monitoring the sites. USACE manages the total volume, timing, and locations of disposal at the sites and performs regular bathymetric surveys at the sites to determine whether dredged material is accumulating.

15. In the late 1980s, USACE surveys of the Alcatraz disposal site showed a drastic decline in depth and unexpected bottom topography ("mounding"). USACE changed management practices at the Alcatraz site, directing disposal episodes to specific areas within the disposal site, and reducing the monthly allowable volume of disposal during winter months (USACE Public Notice No. 93-3). Table 3, below, shows the monthly and annual maximum volume targets for all dredgers currently in effect for the in-Bay disposal sites. To minimize water quality impacts associated with in-Bay dredged sediment disposal such as temporary increased suspended solids loading and benthic habitat disruption, Provisions 16 and 17 of this Order require that USACE continue to monitor and manage the disposal sites so that the volume targets in Table 3 are not exceeded.

Table 3. Monthly and Annual Maximum Volume Targets

Designated Disposal Site	Monthly Target Volume (cy)	Annual Target Volume (cy)
Alcatraz Island (SF-11)		
October – April	400,000	NA
May – September	300,000	NA
Carquinez Strait (SF-9) – Any Month	1,000,000	NA
San Pablo Bay (SF-10) – Any Month	500,000	NA
Suisun Bay (SF-16)		200,000
Three-year average of the total in-Bay Disposal Volume		1.25 million ^a

Notes

^a This volume does not include an allowable contingency volume of 250,000 cy per year but does include the 250,000 cy small dredger allowance

Impacts of Dredging and in-Bay Disposal

16. **Consultations and Work Windows for Dredging:** During the preparation of the 1998 LTMS EIS/EIR, the LTMS agencies initiated State and federal endangered species act (ESA) consultations with CDFW, NMFS, and USFWS for maintenance dredging and disposal projects, covering threatened and endangered species and species of special concern, such as the Pacific herring. These programmatic consultations reduced the need for consultation on each individual dredging project by establishing programmatic work windows. These programmatic work windows are based on presence/absence information for

various sensitive species and establish times and locations where dredging and disposal activities may take place without further consultation.

The programmatic consultations resulted in biological opinions issued by NMFS and USFWS that provide federal endangered or threatened species “incidental take” authorization for projects operating in the environmental work window for their area. This “take authorization” protects the dredger from enforcement action in the event of accidental harm to a listed species resulting from the dredging project. The programmatic biological opinions issued by NMFS and USFWS do not address incidental take of State-listed species. Coordination with CDFW is necessary if take of State-listed species is expected. As a federal agency, USACE is not required to obtain authorization from CDFW for incidental take of State-listed species because there has been no waiver of federal sovereignty with respect to the California Endangered Species Act (CESA). The Water Board, however, as explained further in Finding 18, must comply with CESA when issuing WDRs and water quality certifications.

Beginning in 2011, USFWS required USACE to annually consult on impacts to delta smelt during dredging of Suisun Bay Channel and New York Slough due to documented occurrences of entrainment during monitoring of hopper dredge use in 2011. USACE has not used a hopper dredge in the Suisun Bay Channel and New York Slough since 2014, as required by USFWS in biological opinions it has issued from 2015 forward. USACE proposes using only mechanical clamshell dredges in the Suisun Bay Channel and New York Slough in 2020 through 2024.

In July 2015, NMFS updated its programmatic LTMS biological opinion to include green sturgeon, which was listed as threatened under the federal ESA in 2006. The updated biological opinion also expanded the salmonid work window to year-round if dredging is conducted with a clamshell dredge and the sediment is placed at a beneficial reuse site, such as a tidal wetlands restoration, that NMFS agrees will provide aquatic habitat benefits for salmonids. Under the updated biological opinion, USACE may opt to dredge certain federal navigation channels with a clamshell dredge outside the work windows and place sediment at a beneficial reuse site without additional consultation with NMFS. All other dredging outside the work window (i.e., hydraulic dredging or clamshell dredging with placement at a non-beneficial reuse site) requires consultation with NMFS and, if applicable, the other resource agencies.

This Order requires that USACE comply with the programmatic LTMS work windows established through consultation with CDFW, NMFS, and USFWS. If USACE proposes dredging outside the established work windows, it must notify the Water Board and implement all applicable mitigation measures established in the programmatic LTMS consultations or individual project consultations.

17. ***Entrainment of Special-Status including Longfin Smelt and Delta Smelt:*** All forms of dredging have the potential to incidentally remove fish and other aquatic life from the environment with the dredged material, a process referred to as entrainment. Animals and plants on top of or embedded in the sediment as well as those in the water column near the dredging apparatus may be entrained. In general, smaller organisms with limited or no swimming

capabilities are more susceptible to entrainment. Mechanical dredging is generally accepted to entrain far fewer fish than hydraulic dredging, because much less water is removed along with the sediment. However, it still may remove demersal fish and crustaceans that live in or on the sediment. Entrained fish are likely to suffer mechanical injury or suffocation during dredging, resulting in mortality. Longfin smelt and delta smelt are not strong swimmers and are presumed susceptible to entrainment in the flow fields created around the intakes of hydraulic suction dredges. Longfin smelt have the potential to occur in any of the project areas in any season. Delta smelt have potential to occur in the portions of the San Francisco Estuary that include the Napa River Channel, San Pablo Bay/Mare Island Strait, and Suisun Bay Channel dredge areas during certain seasons. Delta smelt occur in San Pablo Bay in lower numbers than in the Napa River or Suisun Bay; however, they may be present in San Pablo Bay in increased numbers during high water outflow years. Delta smelt are not expected to occur in the other federal channels.

Entrainment Study: Over the past two decades, according to CDFW survey data, abundance indices for various life stages of delta smelt have hit record lows, indicating that the species is in imminent danger of extinction. In response, the State elevated its listing status from threatened to endangered in 2010. USFWS listed delta smelt as threatened on March 5, 1993, and designated critical habitat for this species on December 19, 1994. On April 7, 2010, USFWS submitted a 12-month petition finding to reclassify delta smelt as endangered. They found that reclassification is warranted but precluded by other higher-priority listing actions. Similarly, CDFW longfin smelt annual abundance indices from the fall mid-water trawl surveys show that the population has declined 99 percent or more in the last 45 years, with record lows in the past decade. On March 9, 2009, the State Fish and Game Commission listed longfin smelt as threatened under CESA. On April 2, 2012, USFWS released a 12-month review of longfin smelt status in which it concluded that the listing of the longfin smelt as a threatened species is warranted but is currently precluded by other higher-priority listing actions. As a result, longfin smelt is currently a candidate species for listing under the federal ESA.

In 2013, the United States Army Engineer Research and Development Center (ERDC) prepared a modeling study of entrainment of longfin and delta smelt in San Francisco Bay by hydraulic dredges. In the study, the risk of smelt entrainment was assessed by comparing fish abundances in the environment (CDFW monthly trawls described above) to fish collections in entrainment monitoring samples (screened sub-samples of dredged material) collected during dredging by the hopper dredge *Essayons* in San Francisco Bay in 2010 and 2011. Due to the technical and logistical limitations of sampling on board the working vessel, only a very small fraction, less than one percent of the total volume dredged, was actually sampled.

Modeled estimates of longfin smelt entrainment during hydraulic dredging in 2011 based on 2011 abundance indices are 3,848 for the low entrainment scenario, 6,528 for the medium entrainment scenario, and 10,260 for the high

entrainment scenario (up to approximately 8 percent of the median annual population abundance). Modeled estimates of delta smelt entrainment during hydraulic dredging in 2011 based on 2011 abundance indices are 394 for the low entrainment scenario, 1,444 for the medium entrainment scenario, and 3,694 for the high entrainment scenario (up to approximately 29 percent of the median annual population abundance). Many factors are associated with the accuracy of these projections. The small sample size of entrained fish (18 longfin smelt and 4 delta smelt), combined with the low percentage of dredged material sampled, result in a high degree of uncertainty as to the accuracy of the entrainment estimates.

2016-2019 Entrainment Monitoring: Entrainment monitoring aboard the hopper dredge *Essayons* took place under the previous Order R2-2015-0023 in June, September, and October 2016; June and November 2017; June and October 2018; and in August 2019. No delta smelt were entrained in the monitoring apparatus during these monitoring events, most likely because the *Essayons* dredged in areas where the salinity exceeded the tolerance limit of delta smelt. However, monitoring during this period demonstrated that entrainment of longfin smelt occurred.

18. **Compliance with CESA:** As a federal agency, USACE is not required to obtain authorization from CDFW for incidental take of State-listed species because there has been no waiver of federal sovereignty with respect to CESA. The Water Board, however, must comply with CESA when issuing WDRs and water quality certifications. In a letter to CDFW dated February 13, 2014, the Water Board requested guidance on the significance of entrainment impacts to special status fish species and on appropriate mitigation measures. In its March 14, 2014, reply to the Water Board (attached), CDFW indicated that impacts would be significant. It noted the ERDC estimates of entrainment and stated that “the Project, as proposed, would substantially reduce the number of an endangered, rare, or threatened species.” To reduce dredging-related impacts to special status fish species to a less-than-significant level, CDFW recommended reducing hopper dredging to a minimum in San Francisco Bay and implementing the avoidance, minimization, and mitigation measures listed below.

Fish and Game Code section 2053 states “the policy of the State that State agencies should not approve projects ... which would jeopardize the continued existence of any endangered species ... if there are reasonable and prudent alternatives available consistent with conserving the species.” This Order includes the measures identified by CDFW to avoid, minimize, and mitigate for entrainment impacts, consistent with conserving the species.

Avoidance, Minimization, and Mitigation Measures for Entrainment Impacts: Based on the ERDC entrainment study and guidance from CDFW, the Water Board has determined that implementation of the following measures combined with minimization of hopper dredge use in San Francisco Bay and compensatory mitigation, as required under Provisions 9 and 10, will mitigate potential entrainment impacts to a less-than-significant level:

- a. No dredging will occur in water ranging from 0 to 5 parts per thousand salinity between December 1 and June 30.
 - b. USACE will coordinate with the appropriate regulatory and resource agencies to perform compensatory mitigation for hydraulic dredging anywhere when water temperature is below 22.0 degrees Celsius.
 - c. USACE will implement a worker education program for listed fish species that could be adversely impacted by dredging. The program will include a presentation to all workers on biology, general behavior, distribution and habitat needs, sensitivity to human activities, legal protection status, and project-specific protective measures.
 - d. Pump priming, drag head clearing, and suction of water at the beginning and end of each hopper load will be conducted within three feet of the seafloor.
 - e. Hopper drag head suction pumps will be turned off when raising and lowering the drag arms from the seafloor.
 - f. Hydraulic hopper dredging in Suisun Bay will be completed between August 1 and September 30 to avoid impacts to spawning adult longfin and delta smelt.
 - g. Hydraulic hopper dredging in Central Bay (Richmond Outer Harbor) and San Pablo Bay (Pinole Shoal) will be completed between August 1 and November 30 to avoid impacts to young-of-the-year and spawning adult longfin smelt.
 - h. The drag head, cutterheads, and pipeline intakes will remain in contact with the seafloor during suction dredging.
 - i. The drag head water intake doors will be kept closed to the maximum extent practicable in locations most vulnerable to entraining smelt. In circumstances when the doors need to be opened to alleviate clogging, the doors will be opened incrementally (i.e., the doors will be opened in small increments and tested to see if the clog is removed) to ensure that doors are not fully opened unnecessarily.
19. The Water Board has implemented the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP) since 1992. The RMP is a coordinated and comprehensive long-term monitoring program with the goal of monitoring water and sediment quality to provide the scientific foundation for managing and improving the health of the San Francisco Bay aquatic ecosystem. Additionally, the RMP provides for special and pilot studies of interest to program participants. USACE is a participant in the RMP and contributes to the program by funding the United States Geological Survey (USGS) to monitor suspended sediments at an array of locations in the Bay. This monitoring has and will continue to improve understanding of sediment transport processes and create a comprehensive database for various numerical modeling efforts.

CEQA

20. **California Environmental Quality Act (CEQA):** The Board, together with the USACE, prepared a joint Final Environmental Assessment/Environmental Impact Report for Maintenance Dredging of the Federal Navigation Channels in San Francisco Bay Fiscal Years 2015 – 2024 (FEIR). The Board adopted and certified the FEIR on May 13, 2014, when it adopted waste discharge

requirements and water quality certification Order No. 2015-0023 for the 2015 to 2019 period of maintenance dredging activities. The FEIR analyzed maintenance dredging activities and disposal through 2024 and the project authorized by this Order is within the scope of the FEIR. The Board has considered the FEIR, which considered four alternatives:

- No Project Alternative - USACE would conduct maintenance dredging practices for the projects it maintains in the Bay, which include hydraulic suction hopper dredging in three channels inside the Bay (Suisun Bay/New York Slough, Pinole Shoal, and Richmond Outer Harbor) with implementation of all but four of the avoidance, minimization, and mitigation measures for entrainment impacts to longfin smelt and delta smelt listed in Finding 18 and Provision 11.
- Proposed Project Alternative - Dredging and placement would be conducted as under the No Project Alternative. Also, USACE would implement four additional avoidance, minimization, and mitigation measures for entrainment impacts to longfin smelt and delta smelt (measures f, g, h, and i in Finding 18 and Provision 11) and purchase 0.92 acre mitigation credit at the Liberty Island Conservation Bank, or other approved site, annually for potential impacts to listed species. Provision 10 includes the details on calculation of this mitigation credit.
- Reduced Hopper Dredge Use Alternative 1 (MSC and One In-Bay Channel) - The government hopper dredge *Essayons*, or similarly-sized hopper dredge, would only be used to dredge the MSC and a maximum of one in-Bay federal channel, either the Richmond Outer Harbor or the Pinole Shoal Channel, annually. The channel not selected as the additional hopper dredge channel (i.e., either Pinole Shoal or Richmond Outer Harbor) would be dredged with a mechanical dredge. Suisun Bay/New York Slough Channel would be dredged with a mechanical dredge under this alternative, instead of a hopper dredge. USACE would purchase mitigation credit for entrainment impacts to listed smelt species during hopper dredging in Pinole Shoal or Richmond Harbor as described in the Proposed Project Alternative.
- Reduced Hopper Dredge Use Alternative 2 (MSC only, No In-Bay channels) - The government hopper dredge *Essayons*, or similarly-sized hopper dredge, would be used to dredge the MSC. Pinole Shoal, Richmond Outer Harbor, and Suisun Bay/New York Slough Channel would be dredged with a mechanical dredge under this alternative, instead of a hopper dredge. All other dredging, placement activities would be as described for the Proposed Action/Project.

The FEIR concluded that the Proposed Project Alternative would have significant effects related to the entrainment of delta smelt and longfin smelt. A public agency may not approve a project for which an environmental impact report has been prepared unless either the project will not have a significant effect on the environment or the agency has eliminated or substantially lessened all significant effects where feasible and determined that any remaining unavoidable significant effects are acceptable due to overriding concerns. (Cal. Code Regs., tit. 14, § 15092, subd. (b).) Information in the record indicates that both Alternative 1 and

Alternative 2, which entail reduced hopper dredging, will substantially lessen the significant environmental effects of the Proposed Project Alternative analyzed in the FEIR. The FEIR concludes that both of these alternatives will reduce the impacts to delta smelt and longfin smelt to a less than significant level; all other impacts would be less than significant with mitigation. This is also consistent with CDFW's March 14, 2014, memorandum to the Water Board stating that impacts could be made less than significant by reducing hopper dredging to a minimum, implementing the other avoidance, minimization, and mitigation measures identified in Finding 18 and Provision 11, and implementing the compensatory mitigation approach described above. There is no information in the record that indicates either Alternative 1 or Alternative 2 is infeasible. For this reason, this Order permits either Alternative 1 or 2.

Since this Order authorizes Alternatives 1 and 2, it will not have a significant impact on the environment. Specifically, the following potential significant impacts to delta smelt and longfin smelt have been reduced to less than significant as follows:

Impact 3.6-5: Potential Substantial Adverse Effects and Cumulative Impacts to Delta Smelt from Entrainment

Entrainment of delta smelt could occur during hopper dredging. They are not strong swimmers and are presumed susceptible to entrainment in the flow fields created around the intakes of hydraulic suction dredges. Delta smelt have potential to occur in the portions of the San Francisco Estuary that include the Napa River Channel, San Pablo Bay/Mare Island Strait, and Suisun Bay Channel dredge areas during certain seasons.

Findings: Changes or alterations have been required in, or incorporated into, this Order that avoid or reduce the environmental effect identified in the FEIR to less than significant.

Facts Supporting the Findings:

- This Order requires minimization of hopper dredging inside San Francisco Bay consistent with what the FEIR found would reduce impacts to less-than-significant levels. At a maximum, a hopper dredge would be used to maintain one federal channel inside the Bay and possibly urgent action removal of a hazardous shoal at Bulls Head Reach in the eastern approach to the Benicia-Martinez Bridge in Suisun Bay Channel if a mechanical dredge is not available (Provision 9).
- This Order requires compensatory mitigation for delta smelt entrainment in the form of mitigation credit purchase at a resource agency-approved habitat conservation bank. The amount of mitigation credit is calculated from an equation ($3.0 \text{ million acre-feet} / 800 \text{ acres} = \text{volume dredged} / X \text{ acres of mitigation habitat}$) that was developed by resource agencies to determine mitigation requirements for other projects with entrainment impacts resulting from pumping water (Provision 10).
- This Order requires implementation of specific avoidance, minimization, and mitigation measures, which combined with minimization of hopper dredge

use, mitigates potential entrainment impacts to a less-than-significant level (Provision 11).

Impact 3.6-6: Potential Substantial Adverse Effects and Cumulative Impacts to Longfin Smelt from Entrainment

Entrainment of longfin smelt could occur during hopper dredging. They are not strong swimmers and are presumed susceptible to entrainment in the flow fields created around the intakes of hydraulic suction dredges. Longfin smelt have the potential to occur in any of the project areas in any season.

Findings: Changes or alterations have been required in, or incorporated into, this Order that avoid or reduce environmental effect identified in the FEIR to less than significant.

Facts Supporting the Findings:

- This Order requires minimization of hopper dredging inside San Francisco Bay consistent with what the FEIR found would reduce impacts to less-than-significant levels. At a maximum, a hopper dredge would be used to maintain one federal channel inside the Bay and possibly urgent action removal of a hazardous shoal at Bulls Head Reach in the eastern approach to the Benicia-Martinez Bridge in Suisun Bay Channel if a mechanical dredge is not available (Provision 9).
- This Order requires compensatory mitigation for longfin smelt entrainment in the form of mitigation credit purchase at a resource agency-approved habitat conservation bank. The amount of mitigation credit is calculated from an equation ($3.0 \text{ million acre-feet} / 800 \text{ acres} = \text{volume dredged} / X \text{ acres of mitigation habitat}$) that was developed by resource agencies to determine mitigation requirements for other projects with entrainment impacts as a result of pumping water (Provision 10).
- This Order requires implementation of specific avoidance, minimization, and mitigation measures, which combined with minimization of hopper dredge use, mitigates potential entrainment impacts to a less-than-significant level (Provision 11).

This Order also imposes those mitigation measures that the FEIR identified are necessary to reduce to less than significant levels impacts to other marine species and the disturbance of archaeological resources, human remains, and paleontological resources (see Provisions 11, 13, 15 and 21).

Basin Plan

21. ***San Francisco Bay Basin Water Quality Control Plan (Basin Plan)***
California Water Code section 13240 authorizes the Water Board to develop a Water Quality Control Plan for the San Francisco Bay Basin, which is the Water Board's master water quality control planning document (the Basin Plan). The Basin Plan designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes implementation programs and policies to achieve those objectives for all waters addressed through the plan. The Basin Plan was duly adopted by the Water

Board and approved by the State Water Board, U.S. EPA, and the Office of Administrative Law where required. The latest version can be found on the Water Board's website at

http://www.waterboards.ca.gov/sanfranciscobay/basin_planning.shtml.

Requirements in this Order implement the Basin Plan.

The existing beneficial uses of San Francisco Bay in the vicinity of the dredging and disposal areas are:

- Industrial service supply
- Industrial process supply
- Commercial and sport fishing
- Shellfish harvesting (Central Bay only)
- Estuarine Habitat
- Fish migration
- Preservation of rare and endangered species
- Fish Spawning
- Wildlife habitat
- Water contact recreation
- Noncontact water recreation
- Navigation

Notification

22. USACE and interested persons have been notified of the Water Board's intent to issue requirements for USACE and have been provided with the opportunity to submit their written comments.

The Water Board, in a properly noticed public hearing on December 11, 2019, heard and considered all comments pertaining to the project.

IT IS HEREBY ORDERED, pursuant to the provisions of Division 7 of the California Water Code and regulations adopted thereunder and other State regulations, as applicable, and to the provisions of the federal Clean Water Act, as amended, and regulations and guidelines adopted thereunder, that USACE shall comply with the following:

A. RECEIVING WATER LIMITATIONS

1. The dredging and disposal activities shall not create a nuisance as defined in section 13050(m) of the California Water Code.
2. The discharge shall not cause a violation of any applicable water quality objectives for receiving waters adopted by the Water Board and the State Water Board as required by the Clean Water Act and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved

pursuant to section 303 of the Clean Water Act, or amendments thereto, the Water Board will revise and modify this Order in accordance with such more stringent standards.

B. PROVISIONS

Project and Project Changes

1. This Order authorizes:
 - a. San Francisco Bar Channel - Placement of approximately 2.25 mcy of sand at SF-8, OBDS/SF-17, and, if approved by applicable regulatory and resource agencies, the Ocean Beach onshore placement site.
 - b. San Francisco Bay - Dredging up to 12.9 mcy of sediment (based on dredging volumes in Table 1, assuming that Redwood City Harbor is dredged biennially and that the smaller, non-annual projects [Napa River Channel, Petaluma River Channel, and San Rafael Creek Channel] are dredged once each between 2020 and 2024) with disposal of a maximum of 4.08 mcy at the in-Bay disposal sites. Placement of dredged material at beneficial reuse locations within the Water Board's jurisdiction is regulated through site-specific Water Board orders for each location. Disposal of dredged material may also occur at the Deep Ocean Disposal Site, SF-DODS, beyond the jurisdiction of the Water Board.
2. The District Engineer shall inform the Executive Officer in writing of any changes to the project plan in Table 1 of this Order. The Executive Officer shall determine whether such a proposed change requires modification of the WDRs and Certification issued herein, in which case the District Engineer shall submit a request for revised WDRs and Certification for action by the Board. Proposed changes that would require modification to this Order include but are not limited to any changes that may result in an increased threat to water quality. The Executive Officer may approve minor project changes that do not require modification to this Order and will not result in an increased threat to water quality.

To gain approval for in-Bay disposal above 4.08 mcy, USACE must submit a written proposal, acceptable to the Executive Officer, that documents how (a) the additional in-Bay disposal will not result in an exceedance of the 1.5 mcy allocation trigger for total in-Bay disposal from all dredgers combined in any three-year averaging period, and (b) at least 50 percent of the excess volume will be beneficially reused at an aquatic habitat creation or restoration project.

Episode Approval

3. Dredging and disposal episodes, including knock-down events, shall not commence until authorized in writing by Water Board staff. At least 45 days prior to a dredging episode, USACE shall provide an episode approval request package to Water Board staff for each proposed dredging project. USACE may also group several projects together in a single episode approval request package. This package shall include the following information specific to each dredging project: (a) the estimated volume to be dredged, with overdepth volume identified separately from the volume of sediment above design depth; (b) the

proposed disposal or beneficial reuse (placement) site/s, and (c) a discussion of sediment quality explaining why the sediment is suitable for the proposed placement site(s), including a summary of the most recent sediment testing results.

Criteria for granting episode approvals:

- Sediment proposed for dredging is suitable for proposed placement sites based on results of physical, chemical, and biological testing program that follows the protocols and evaluation criteria specified in the DMMO guidance, "Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region" (USACE Public Notice 01-01 or most current version). For upland sites and wetland beneficial reuse placement sites, the requirements of individual site-specific permits issued by the Water Board will be considered. The Water Board's May 2000 draft staff report, "Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines," or most current revised version, may also be considered, as appropriate.
- The proposed sediment placement sites for each dredging project are consistent with the approved evaluation of alternative disposal sites for all USACE dredging projects described in Provision 8.
- The cumulative in-Bay disposal volume is consistent with the limits specified in Provision 2.

Episode Approval Package Due Date: A minimum of 45 days prior to anticipated dredging start date.

4. USACE conducts a pre-dredge survey within 30 days to two weeks before the dredge start date. The estimated volumes based on the pre-dredge survey shall be evaluated against the volumes estimated from the condition survey. If there is a 15 percent or greater increase in the estimated dredge volumes, USACE shall notify Water Board staff immediately. This notification shall include the new estimated volume and USACE's proposal for placement of that material if the volume has increased. USACE shall notify Water Board staff of any changes in material placement location, regardless of any volume changes.

Dredging and Disposal Operations

5. Dredging at each project location shall be limited to the project depths shown in Tables 1 and 2 with no more than two feet of over-dredge allowance.
6. Return water overflow from hopper-type suction dredges shall be limited to no longer than 15 minutes at the dredge site for each hopper load except in channels where the shoaled material contains greater than 80 percent sand. There is no overflow restriction if the dredged material is greater than 80 percent sand.
7. During transportation from the dredging site to the placement site, no dredged material shall be permitted to overflow, leak, or spill from barges, bins or dump scows.

Alternatives Analysis

8. USACE shall, as part of the episode approval process, submit to the Water Board an evaluation of alternative disposal sites pursuant to section 404(b)(1) of the Clean Water Act. This type of evaluation, also known as an “Integrated Alternatives Analysis,” or IAA, shall incorporate all USACE dredging projects (annual and non-annual) over as many years/dredging cycles as possible, up to a maximum of five years, and shall evaluate the practicability of the following beneficial reuse and disposal options:
 - a. Habitat Restoration Beneficial Reuse: USACE shall evaluate the practicability of placing dredged sediment from the federal navigation channels at tidal marsh and other appropriate types of habitat restoration sites within the San Francisco Bay Region and USACE shall take dredged sediment to those sites where it is practicable. USACE shall make good faith efforts to coordinate with habitat restoration projects that are seeking dredged sediment.
 - b. Levee Restoration Beneficial Reuse: USACE shall evaluate the practicability of placing dredged sediment from the federal navigation channels at levee restoration sites within the San Francisco Bay Region and USACE shall take dredged sediment to those sites where it is practicable. USACE shall make good faith efforts to coordinate with levee restoration projects that are seeking dredged sediment.
 - c. Other Beneficial Reuse Sites and Rehandling Sites: USACE shall evaluate the practicability of placing dredged sediment from the federal navigation channels at other types of beneficial reuse sites and dredged sediment rehandling sites within the San Francisco Bay Region and USACE shall take dredged material to those sites where it is feasible.
 - d. Coordination with other USACE Projects: USACE shall evaluate the feasibility of combining placement of dredged sediment from the federal navigation channels with material from other USACE projects implementing beneficial reuse when both projects will occur at similar times or locations or will be performed by the same contractor.

USACE shall submit the initial IAA by January 31, 2020, and subsequent annual updates by January 31 of years 2021 through 2024.

Protection of Special Status Species

9. ***Minimization of Hydraulic Suction Hopper Dredging Inside San Francisco Bay***: According to CDFW, minimization of hopper dredging inside San Francisco Bay, combined with the measures described in Provision 11, is necessary to mitigate potential entrainment impacts to longfin and delta smelt to a less-than-significant level. Therefore, USACE shall minimize hydraulic dredging inside San Francisco Bay by the government hopper dredge *Essayons*, or similarly sized hopper dredge, by implementing one of the following options on an annual basis:
 - a. *MSC and One In-Bay Channel*: Limit hopper dredge use to a maximum of one in-Bay federal channel, either the Richmond Outer Harbor or the Pinole Shoal Channel, but not the Suisun Bay Channel. Certain

conditions, including rough seas, strong currents, fog, heavy rain, strong winds, heavy vessel traffic, or a combination of these factors may preclude safe dredging with a hopper dredge at the MSC. Dredging an in-Bay channel, whereby the dredge would move into San Francisco Bay and work on the identified channel, then return to the MSC as soon as conditions allow, would maximize efficient use of the hopper dredge.

The MSC, Pinole Shoal Channel, and Richmond Outer Harbor are not within the typical range of the delta smelt; therefore, the potential adverse effects to delta smelt resulting from dredge entrainment would be largely eliminated under this alternative. Because urgent action dredging of the Bulls Head Reach may occur at any time of year, it is likely that some longfin smelt and delta smelt would be entrained during some dredging episodes if a mechanical dredge is unavailable and a hopper dredge must be used. The potential for entrainment would be reduced with the use of a mechanical dredge. Because the extent and frequency of critical dredging episodes at Bulls Head Reach cannot be predicted, appropriate mitigation for these episodes, if warranted based on expected impacts, would be determined in coordination with regulatory agencies at time they occur.

- b. *MSC Only, No In-Bay Channels*: Limit hopper dredge use to the MSC and urgent action removal of any hazardous shoal at Bulls Head Reach in the eastern approach to the Benicia-Martinez Bridge in Suisun Bay Channel if a mechanical dredge is not available. Due to the strong currents and waves in the MSC, a hopper dredge is the only equipment that can safely dredge the channel. Because this option avoids and minimizes entrainment take of longfin and delta smelt to the maximum extent practicable, no compensatory mitigation or further entrainment monitoring is required.

Because urgent action dredging of the Bulls Head Reach may occur at any time of year, it is likely that some longfin smelt and delta smelt would be entrained during some dredging episodes if a mechanical dredge is unavailable and a hopper dredge must be used. The potential for entrainment would be reduced with the use of a mechanical dredge. Because the extent and frequency of critical dredging episodes at Bulls Head Reach cannot be predicted, appropriate mitigation for these episodes, if warranted based on expected impacts, would be determined in coordination with regulatory agencies at time they occur.

10. ***Compensatory Mitigation for Implementation of Reduced Hopper Dredging Option 9a.***: The mitigation credit formula ($3.0 \text{ million acre-feet} / 800 \text{ acres} = \text{volume dredged} / X \text{ acres of mitigation habitat}$) was developed by the resource agencies to determine mitigation requirements for other projects with entrainment impacts resulting from pumping water, including the State Water Project. Available government hopper dredge total sediment and water volume throughput for the 2006 through 2012 period were reviewed and the highest volumes for Pinole Shoal and Richmond Outer Harbor were used in the calculation, resulting in 0.19 acre mitigation credit is for Pinole Shoal and 0.34 acre mitigation credit s for Richmond Outer Harbor.

USACE shall purchase no less than 0.19-acres mitigation credit at the Liberty Island Conservation Bank, or other CDFW-approved conservation bank providing habitat benefitting listed smelt species if Pinole Shoal is dredged with a hopper, and no less than 0.34 acre mitigation credit if Richmond Outer Harbor is dredged with a hopper. If the total annual volume dredged for either project is greater than the volume used to calculate the minimum required mitigation credit, USACE shall purchase additional credits corresponding to the additional volume dredged and document the purchase of additional credits per Provision 19 (post-dredge reporting).

11. ***Avoidance, Minimization, and Mitigation Measures for Entrainment***

Impacts: USACE shall implement the following measures to mitigate potential entrainment impacts to a less-than-significant level:

- a. No dredging shall occur in water ranging from 0 to 5 parts per thousand salinity between December 1 and June 30.
- b. USACE shall coordinate with the appropriate regulatory and resource agencies to perform compensatory mitigation for hydraulic dredging anywhere when water temperature is below 22.0°C.
- c. USACE shall implement a worker education program for listed fish species that could be adversely impacted by dredging. The program shall include a presentation to all workers on biology, general behavior, distribution and habitat needs, sensitivity to human activities, legal protection status, and project-specific protective measures.
- d. Pump priming, drag head clearing, and suction of water at the beginning and end of each hopper load shall be conducted within three feet of the seafloor.
- e. Hopper drag head suction pumps shall be turned off when raising and lowering the drag arms from the seafloor.
- f. Hydraulic hopper dredging in Suisun Bay shall be completed between August 1 and September 30, to the extent feasible¹, to avoid impacts to spawning adult longfin and delta smelt.
- g. Hydraulic hopper dredging in Central Bay (Richmond Outer Harbor) and San Pablo Bay (Pinole Shoal) shall be completed between August 1 and November 30, to the extent feasible¹, to avoid impacts to young-of-the-year and spawning adult longfin smelt.
- h. The drag head, cutterheads, and pipeline intakes shall remain in contact with the seafloor during suction dredging.
- i. The drag head water intake doors shall be kept closed to the maximum extent practicable in locations most vulnerable to entraining smelt. In circumstances when the doors need to be opened to alleviate clogging, the doors shall be opened incrementally (i.e., the doors shall be opened in small increments and tested to see if the clog is removed) to ensure that doors are not fully opened unnecessarily.

¹ Feasibility is contingent upon the availability of federal funds (e.g., timing of Congressional appropriations) to execute the dredging work, as well as by the availability of dredging equipment to perform the dredging work at the referenced time and locations.

12. ***Entrainment Monitoring for Implementation of Reduced Hopper Dredging Option 9 a.*** By March 31, 2020, USACE shall submit a five-year entrainment monitoring plan, acceptable to the Executive Officer, for collecting data to increase the accuracy of existing entrainment rate estimates for delta smelt, longfin smelt, and other special status fish species in hydraulic hopper dredges during maintenance dredging in San Francisco Bay. Annual monitoring reports are due by January 31 of the year following dredging activity monitored. At a minimum, the plan shall include the following elements:
- a. On-board monitoring during active dredging.
 - b. Sampling during all phases of the dredging cycle.
 - c. Sampling associated with flood/ebb tides and spring/neap tides.
 - d. Visual monitoring of vessel hold for fish that are not captured by sampling screens during active dredging.
 - e. Procedures for evaluating the effectiveness of the avoidance, minimization, and mitigation measures required by Provision 11.

By March 31 of years 2021 through 2024, USACE shall submit an annual update to the plan (or an acceptable rationale justifying that no update is necessary or proposed).

13. Dredging and disposal activities shall be limited to the work windows set out by CDFW, NMFS, and USFWS in their most recent programmatic consultations on the LTMS. If USACE proposes dredging outside the established work windows, it shall notify Water Board staff in writing and implement all applicable mitigation measures established in the programmatic LTMS consultations or individual project consultations.
14. This Order does not allow for the take, or incidental take, of any special status species. USACE shall use the appropriate protocols, as approved by the CDFW, NMFS, and/or USFWS, to ensure that project activities do not adversely impact preservation of rare and endangered species, a beneficial use of San Francisco Bay and its tributaries as set forth in the Basin Plan.
15. USACE shall comply with the Conservation Measures set forth in the June 9, 2011, Programmatic Essential Fish Habitat (EFH) Consultation Agreement between USACE, U.S. EPA, and NMFS. The Conservation Measures are intended to enhance the environmental protectiveness of the LTMS program for EFH, which the Magnuson-Stevens Fishery Conservation and Management Act defines as “waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity,” for all managed fish species.

Management and Monitoring of Dredging and Disposal of Dredged Material

16. USACE shall continue bathymetric monitoring of the in-Bay disposal sites (monthly surveys at the Alcatraz disposal site, quarterly surveys elsewhere). USACE shall keep a record of these surveys on file and shall make them available for inspection by the Water Board, other regulatory agencies, and interested members of the public upon written request to USACE staff.

17. USACE shall maintain administrative controls on disposal volumes at the in-Bay disposal sites for all navigation dredging projects under the LTMS so that target volumes in Table 3 of this Order are not exceeded. USACE shall manage overall disposal volumes and disposal locations within each site to prevent build-up of dredged material at the sites.
18. **Post-Dredge Survey:** USACE shall ensure that post-dredge bathymetric surveys for federal dredging projects are conducted within 30 days of completion of dredging in all federal navigation channels, regardless of whether they are dredged by a contractor or by a federal government dredge.
19. **Post-Dredge Report:** For each calendar year covered by this Order, USACE shall provide an annual post-dredge report shall to Water Board staff and the USACE DMMO database manager within 60 days of completion of all federal dredging projects in that calendar year. For each dredging project, the report shall contain the dates of dredging, maps of the dredging footprint, the calculated final dredging volume, the placement location or locations and volumes per location if more than one site was used, and documentation of purchase of the appropriate number of mitigation credits for hydraulic hopper dredging calculated per Provision 10.
20. USACE shall provide a technical report that documents monitoring efforts designed to evaluate the water quality impacts of the dredged material discharge on waters of the State, pursuant to California Water Code (Water Code) section 13267.

Regional Monitoring Program: Provision 20 is a requirement for a technical report. The Water Board requires dischargers of waste materials to the Bay, including those who dispose of dredged material, to monitor the impacts of their discharges pursuant to Water Code section 13267. This monitoring provides necessary information about ambient Bay water quality and potential long-term impacts of dredged material disposal. USACE may elect to participate in the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP) to fulfill this requirement or provide comparable data on an individual basis. The RMP is a coordinated and comprehensive long-term monitoring program with the goal of monitoring water and sediment quality to provide the scientific foundation for managing and improving the health of the San Francisco Bay aquatic ecosystem.

USACE has historically participated in the RMP by funding the U.S. Geological Survey (USGS) to monitor suspended sediment concentrations (SSC) at an array of locations in the Bay on an annual basis. Suspended sediment monitoring has and will continue to improve understanding of sediment transport processes and create a comprehensive database for various numerical modeling efforts. According to the RMP 2017 - 2019 Dredger Fee Schedule, USACE's annual contribution to USGS should be no less than \$400,000.

Implementation or funding of the RMP study program or other Water Board-approved study will constitute fulfillment of this provision.

Disturbance of Historical or Unique Archaeological Resources, Human Remains, or Significant Paleontological Resources

21. In the unlikely event that any of the resources listed above are discovered during maintenance dredging in the federal channels, USACE will immediately cease dredging, notify Water Board staff, and consult a qualified expert for the particular resource discovered (e.g., archeologist, paleontologist, local coroner, Native American Heritage Commission).

Standard Provisions

22. The discharge of dredged materials to the waters of the State shall cease immediately whenever violations of this Order are detected by USACE or by Water Board staff, and the discharge shall not resume until compliance can be assured to the Executive Officer's satisfaction.
23. USACE shall provide the Water Board or its authorized representative, in accordance with Water Code section 13267(c), with the following:
 - a. Entry upon premises in which any required records are kept.
 - b. Access to copy any records required to be kept under terms and conditions of this order.
 - c. Access to inspect monitoring equipment or records.
 - d. Access to sample any discharge.
 - e. Small craft transport to offshore locations or vessels for the purpose of inspection, provided that it is within normal business hours.
24. This Order does not remove liability under federal, State, or local laws, regulations or rules of other programs and agencies, nor does this Order authorize the discharge of wastes without appropriate permits from other agencies or organizations.
25. This Order supersedes Order No. R2-2015-0023. Order No. R2-2015-0023 is hereby rescinded.

C. CERTIFICATION

1. The Water Board hereby certifies that any discharge from the referenced project will comply with the applicable provisions of Clean Water Act sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 303 (Water Quality Standards and Implementation Plans), 306 (National Standards of Performance), and 307 (Toxic and Pretreatment Effluent Standards), and with other applicable requirements of State law. Clean Water Act section 401 directs the agency responsible for certification to prescribe effluent limitations and other limitations necessary to ensure compliance with the Clean Water Act and with any other appropriate requirement of State law. Section 401 further provides that State certification conditions shall become conditions of any federal license or permit for the project. The provisions conditioning this Certification must be met to ensure that the project will comply with water quality standards, any applicable effluent limitation, standard of performance, prohibition, effluent standard, or pretreatment standard required pursuant to the Clean Water Act sections listed above and to ensure that the project will comply with any other appropriate requirements.
2. This Order applies to the project as proposed in application materials and conditioned and approved in this Order. Failure to implement the project as proposed, conditioned, and approved is a violation of this Order. Violation or threatened violation of the conditions of this Order is subject to remedies including, but not limited to, penalties or injunctive relief as provided under applicable State or federal law.
3. This Order is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to Water Code section 13330 and 23 CCR section 3867. The Water Board may add to or modify the conditions of this Order, as appropriate, to implement any new or revised water quality standards and implementation plans adopted and approve pursuant to the Water Code, or section 303 of the Clean Water Act, or in response to new information concerning the conditions of the project.
4. This Order is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to 23 CCR subsection 3855(b) and that application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

I, Michael Montgomery, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on December 11, 2019.

MICHAEL MONTGOMERY
EXECUTIVE OFFICER

ATTACHMENTS:

CDFW Memorandum dated March 14, 2014

Figure 1. Federal Navigation Projects and Dredged Material Placement Sites

Figure 2. San Francisco Main Ship Channel

Figure 3. Oakland Harbor

Figure 4. Richmond Harbor

Figure 5. Suisun Bay Channel and New York Slough

Figure 6. Pinole Shoal

Figure 7. Redwood City Harbor

Figure 8. Napa River Channel

Figure 9. Petaluma River Channel

Figure 10. San Rafael Creek Channel

State of California
Department of Fish and Wildlife



Memorandum

Date: March 14, 2014

To: Bruce H. Wolfe, Executive Officer
Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1500
Oakland, CA 94612

A handwritten signature in black ink, appearing to read "Craig Shuman".

From: Craig Shuman, Regional Manager
Marine Region
1933 Cliff Drive, Suite 9
Santa Barbara, CA 93109

A handwritten signature in blue ink, appearing to read "Scott Wilson".

Scott Wilson, Regional Manager
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558

Subject: California Department of Fish and Wildlife Response to Request for Guidance on CEQA Issues Related to Take of State-Listed Fish Species under the U.S. Army Corps of Engineers San Francisco Bay Navigational Dredging Program

The California Department of Fish and Wildlife (Department) has reviewed your memorandum dated February 13, 2014 requesting input from the Department regarding the significance of impacts to biological resources and proposed mitigation for the U.S Army Corps of Engineers (USACE) Operation and Maintenance Dredging of Federal Channels in San Francisco Bay for ten years (Project) as it is evaluated in the Administrative Draft Environmental Impact Report (EIR) being prepared by the Regional Water Quality Control Board (RWQCB). In addition, the Department has reviewed portions of the EIR and the USACE Risk Assessment for Hopper Dredging in San Francisco Bay, and has participated in the Interagency Longfin Smelt Working Group since 2010 to assess the impacts of the Project on protected fish species and proposals for minimization and mitigation measures.

Under Fish and Game Code (FGC) section 711.7, the Department is designated as trustee for the State's fish and wildlife resources. The Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (FGC §1802). The Department administers the California Endangered Species Act (CESA) (FGC §2050, et seq.) and other provisions of the FGC that conserve the State's fish and wildlife public trust resources. The Department also serves as a trustee agency in the California Environmental

Mr. Bruce H. Wolfe

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Quality Act (CEQA) process, as a state agency with jurisdiction over the fish and wildlife resources affected by the Project, specifically Delta smelt, listed as endangered, and longfin smelt, listed as threatened under CESA [14 C.C.R. §§ 670.5(a)(2)(O), (b)(2)(E)]. It is in our role as a trustee that we have participated in the Interagency Longfin Smelt Working Group and are providing our recommendations.

Your memorandum dated February 13, 2014 asked five questions about the significance of impacts from USACE hopper dredging and mitigation and monitoring for those impacts. The Department has prepared the following responses for your consideration:

1. *Consistent with CEQA Guidelines section 15065 (a) (1), Mandatory Findings of Significance, is it CDFW's opinion that ongoing hopper dredging as proposed by the Corps (in light of the administrative record) will substantially reduce the number of an endangered, rare or threatened species (defined in CEQA Guidelines section 15380)?*
 - The Department recognizes that the determination of Significance is at the discretion of the Lead Agency.
 - The USACE estimated the range of take from the Project in 2011 as 3,848 to 6,058 longfin smelt and 394 to 2,822 Delta smelt. Entrainment of these fish is "take" as defined in the Fish and Game Code (FGC §86). The Project includes ten years of dredging operations. It is the Department's belief that the Project, as proposed, would substantially reduce the number of an endangered, rare, or threatened species. In addition, the combined cumulative impact associated with this Project and the effects of other projects causing related impacts would be significant.
 - Due to uncertainty in the sampling data to date, it is prudent to take a precautionary approach and assume that the estimates of take are low for State-listed species that are potentially impacted by the dredging activity. In addition, a Significance determination should consider the overall population abundance of these species, which is currently very low compared to historic levels.
2. *If the impact is considered significant because of the substantial reduction in the number of threatened or endangered species, what potentially feasible mitigation does CDFW recommend to avoid or substantially reduce the impact to a less-than-significant level, assuming the worst-case take scenario?*
 - The Department offers the following recommendations to reduce the impacts of USACE dredging on state-listed species.
 - Reduce hopper dredging to a minimum in San Francisco Bay. The Reduced Hopper Dredge Alternative 1 in the Administrative Draft EIR would reduce hopper dredging to only one channel inside the Bay per year. All other navigational channels would be dredged annually using mechanical methods. The Department will review all alternatives that are developed and comprehensively evaluated in the Draft EIR, in order to consider potential impacts to all fish and wildlife resources.

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- Dredge in Central Bay later in the year from August 1--November 30 to allow young-of-the-year longfin smelt to grow larger and spawning adults to return upstream.
 - Dredge in Suisun Bay earlier during the dredging window from August 1--September 30 to avoid spawning adults.
 - Keep water intake ports on drag-heads closed at all times during dredging in San Francisco and Suisun bays.
 - Turn off drag-arm pumps when vessel is repositioning, moving to other locations, and drag-heads are off-bottom.
 - Follow the minimization measures currently in place for the navigational dredging in San Francisco Bay according to the Department's 2011 letter to the USACE.
- The Department has recommended that the USACE mitigate for its take of both longfin and Delta smelt by purchasing appropriate credits from an approved mitigation bank.
 - Currently, the USACE has calculated its mitigation for hopper dredging using the State Water Project mitigation equation, using the highest pump volume over the past eight years. This provides a compensatory mitigation of 0.92 acres per year of the Project.
3. *What is CDFW's opinion of the effectiveness of the mitigation proposed by the Corps to avoid or substantially reduce the impact to a less-than-significant level?*

USACE proposed 0.92 acres of restored and managed tidal wetlands per year as compensatory mitigation to reduce impacts to less-than-significant level. The amount and type of mitigation appropriate to reduce an impact to a less-than-significant level depends on the level of impact. While additional Project monitoring would provide a more accurate level of impact to State-listed fish, the mitigation proposed by USACE is generally consistent with mitigation applied to other projects that cause take of longfin smelt and Delta smelt associated with water diversion or extraction. Therefore, in the Department's opinion, it would not be inappropriate for RWQCB to rely on the identified minimization measures and the identified compensatory mitigation approach to reduce Project impacts to a less-than-significant level.

4. *What monitoring, if any, does CDFW recommend?*

The Department believes that further monitoring should occur to evaluate the effectiveness of the proposed minimization measures, more specifically quantify the level of take, and determine whether additional minimization measures or mitigation measures are warranted. On-board monitoring has only occurred during two years of dredging (2010 and 2011) and encompassed a very small fraction of the dredge volume both years (<1%). To increase understanding of the impact of dredging on State-listed species and develop adaptive management measures, the Department recommends the following:

- On board monitoring during active dredging.

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- Sampling during all phases of the dredging cycle.
- Sampling both drag-arms to capture a greater percentage of the pump volume during active dredging.
- Sampling associated with flood/ebb tides and spring/neap tides.
- Visual monitoring of vessel hold for fish that are not captured by sampling screens during active dredging.
- Presence/absence fish monitoring in the bay around the dredge during active dredging to understand if sampling is effective.

If implemented, monitoring should be conducted for the two years following Project approval. This data compiled in a final report would provide guidance on future minimization measures related to dredging efforts conducted in the San Francisco Bay and Estuary for both federal, State, and private dredging efforts.

5. *What adaptive management or remedial measures does CDFW recommend in response to monitoring results?*

- Refinement of current minimization and monitoring measures.
- If necessary, additional minimization measures such as additional work window restrictions and/or a further reduction in hopper dredge use.

We appreciate the opportunity to assist RWQCB with the assessment of CEQA considerations for this Project. The Department is available to discuss our responses in more detail. If you have any questions, please contact Ms. Becky Ota, Environmental Program Manager-Marine Region, at (650) 631-6789 or Becky.Ota@wildlife.ca.gov; or Mr. Jim Starr, Environmental Program Manager-Bay Delta Region, at (209) 234-3440 or Jim.Starr@wildlife.ca.gov.

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Naomi Feger
Regional Water Quality Control Board, San Francisco Region
(Naomi.Feger@waterboards.ca.gov)

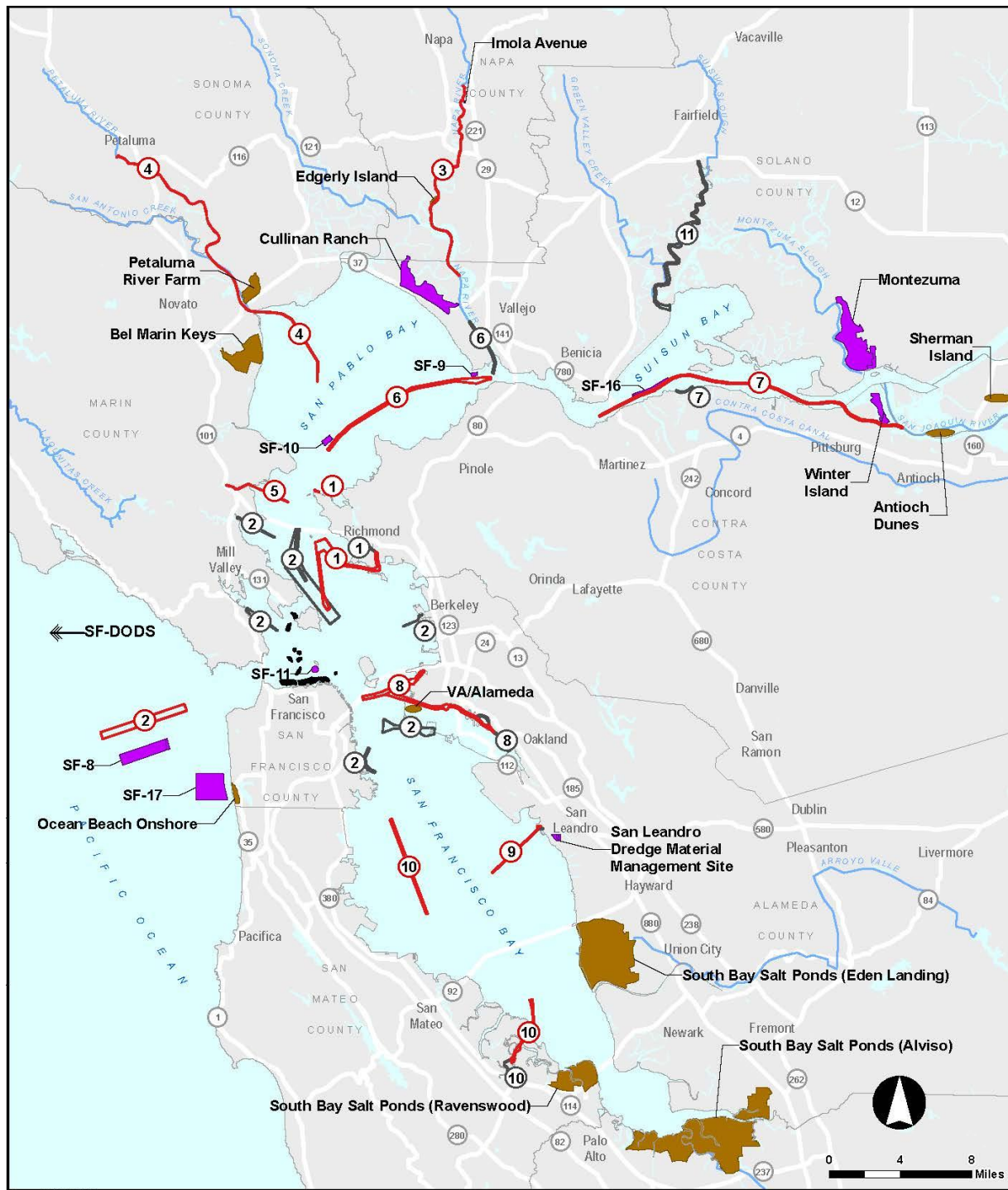
Elizabeth Christian
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Arijs Rakstins
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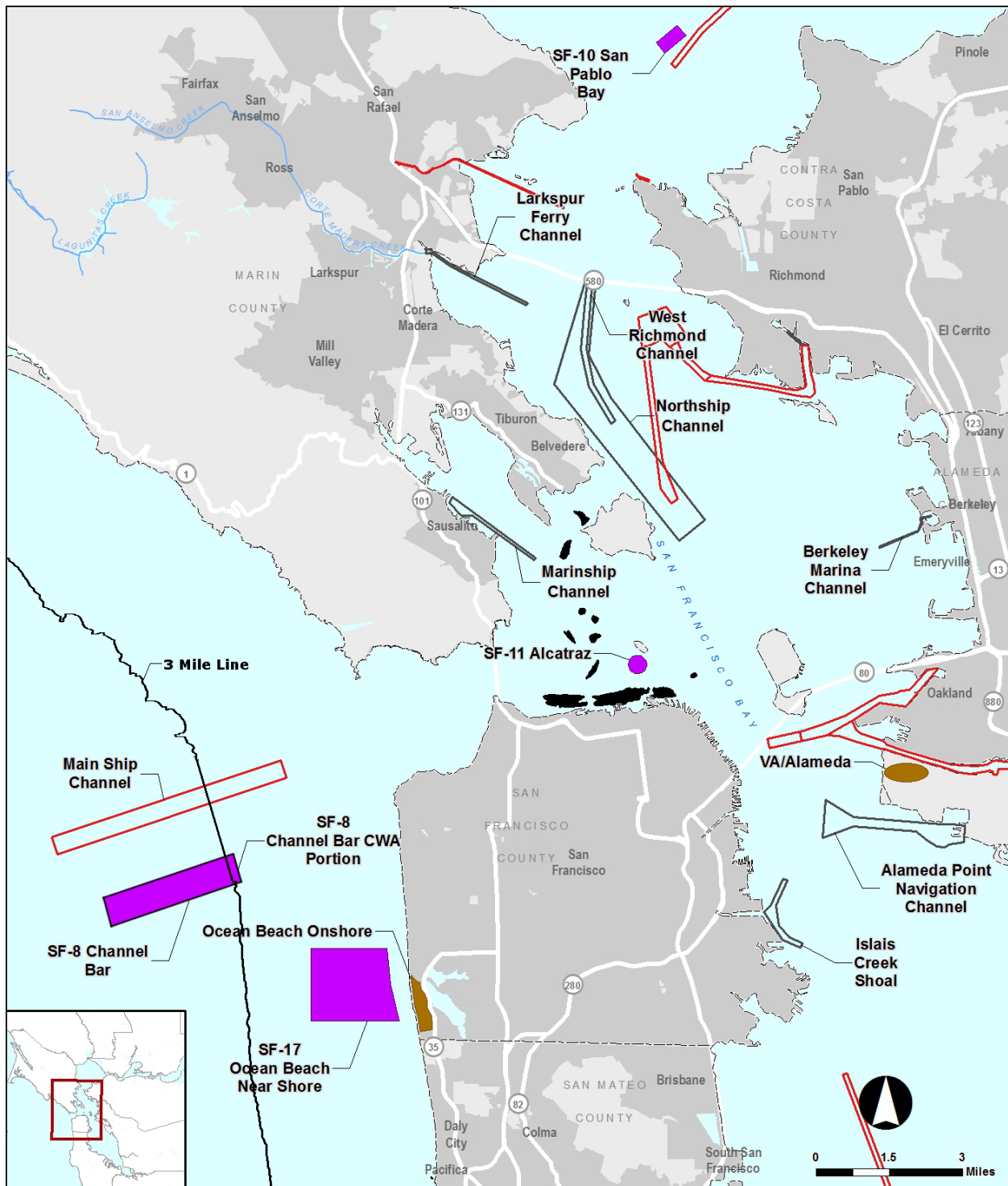
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Jessica Burton Evans
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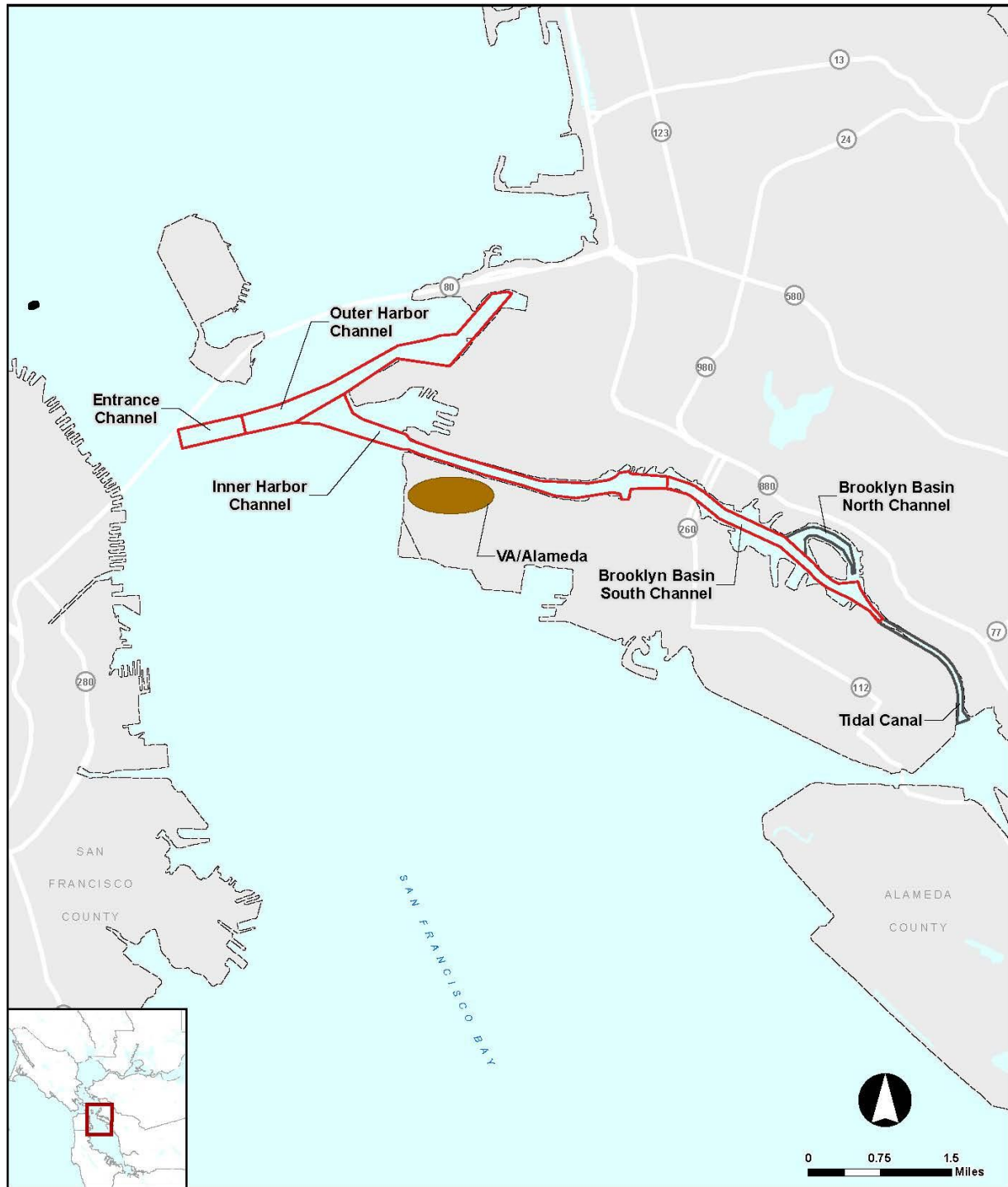
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|---|---|--|
| Existing Placement Site | 1 Richmond Harbor | 7 Suisun Bay Channel |
| Potential Future Placement Site | 2 San Francisco Harbor | 8 Oakland Harbor |
| Dredge Locations | 3 Napa River Channel | 9 San Leandro Marina (Jack D. Maltester Channel) |
| Included in EA/EIR | 4 Petaluma River Channel | 10 Redwood City Harbor |
| Not Included in EA/EIR | 5 San Rafael Creek Channel | 11 Suisun Slough Channel |
| Shoaling Area—Not included in EA/EIR | 6 San Pablo Bay/ Mare Island Strait | |

Figure 1. Federal Navigation Projects and Dredged Material Placement Sites



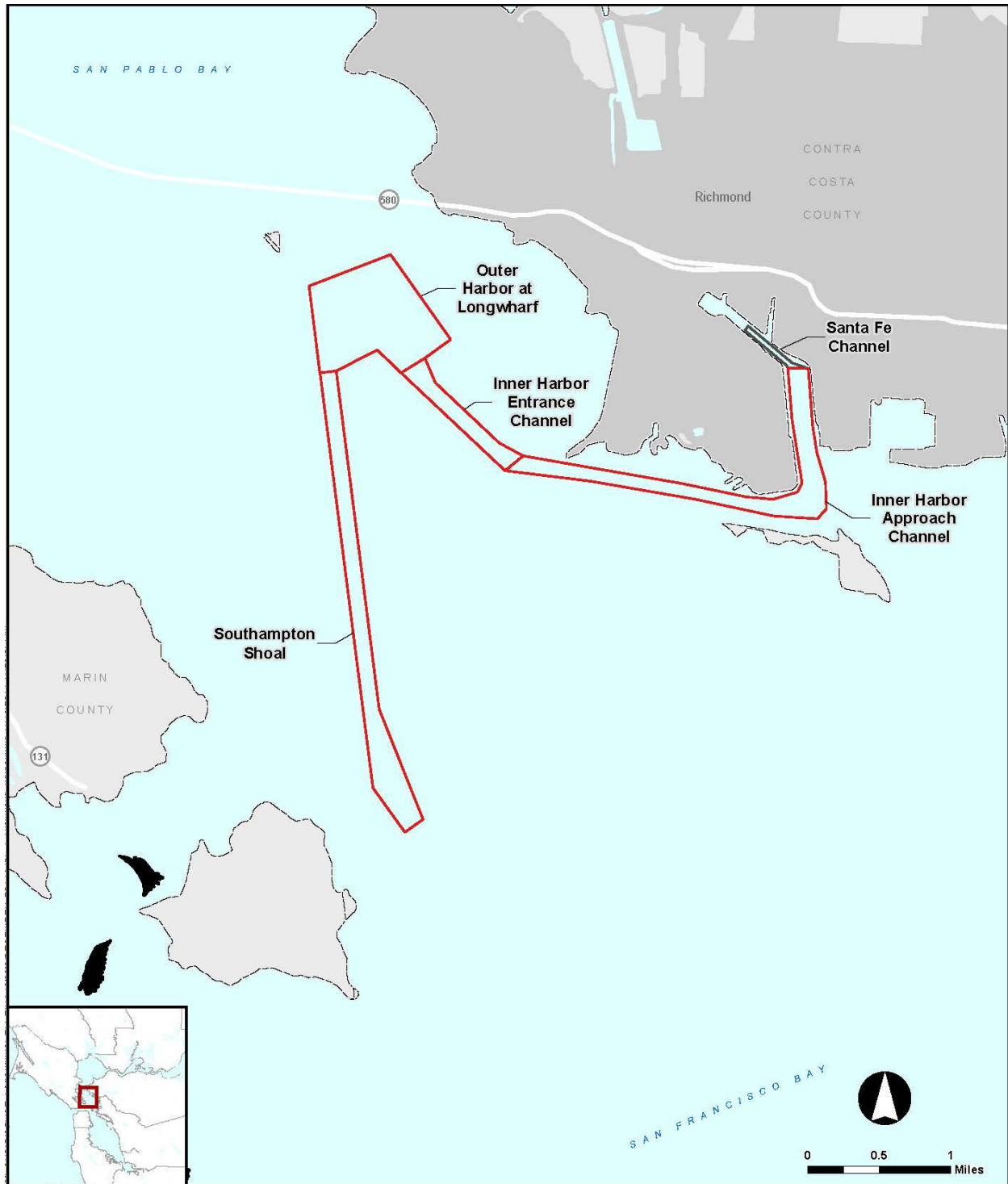
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- Potential Future Placement Site
- County boundary
- Dredge Locations Included in EA/EIR
- Dredge Locations Not Included in EA/EIR
- Shoaling Dredge Area – Not included in EA/EIR

Figure 2. San Francisco Harbor – Main Ship Channel



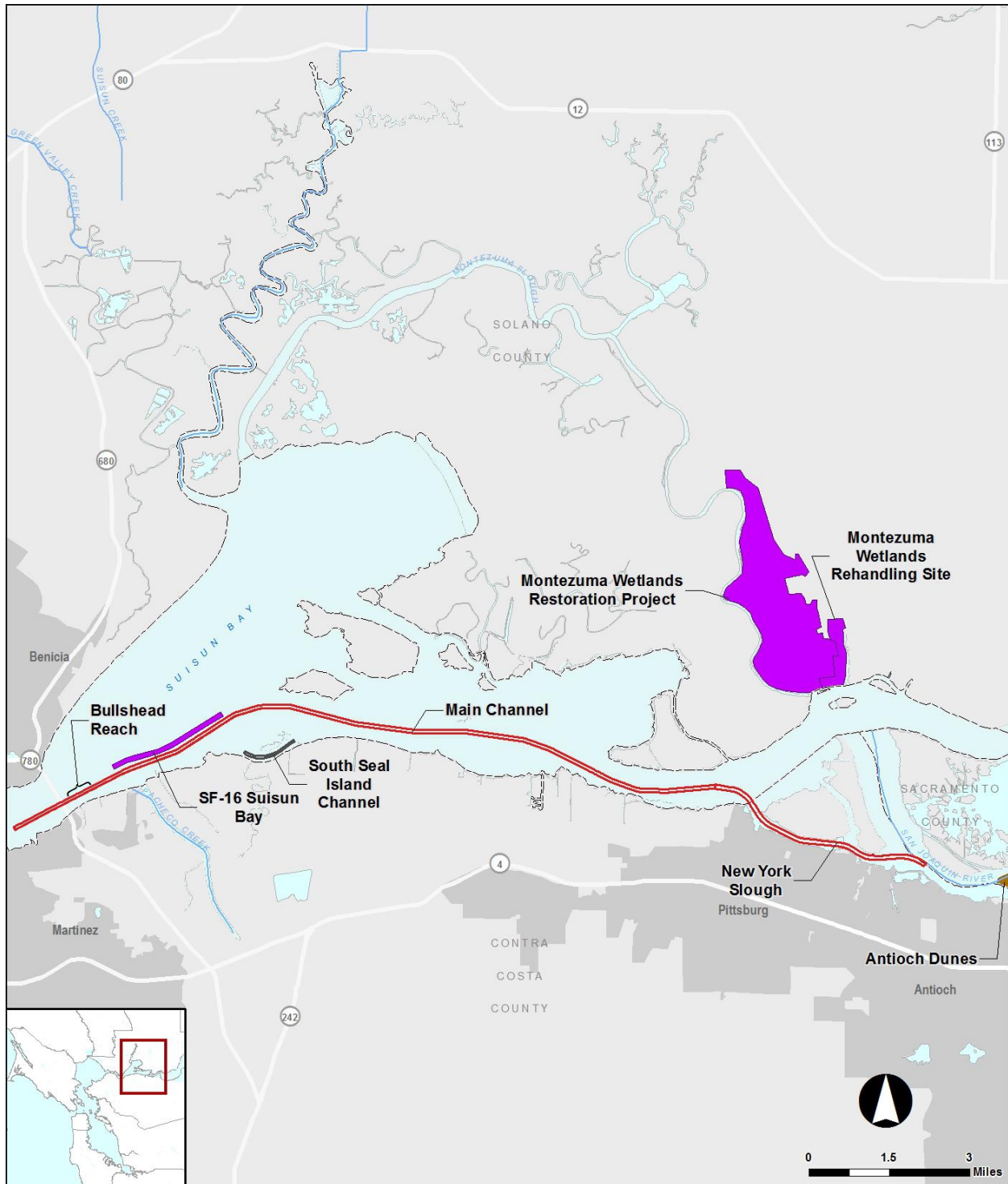
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- Potential Future Placement Site
- County boundary
- Dredge Locations
 - ▭ Included in EA/EIR
 - ▭ Not Included in EA/EIR
 - ▭ Shoaling Dredge Area – Not included in EA/EIR

Figure 3. Oakland Harbor



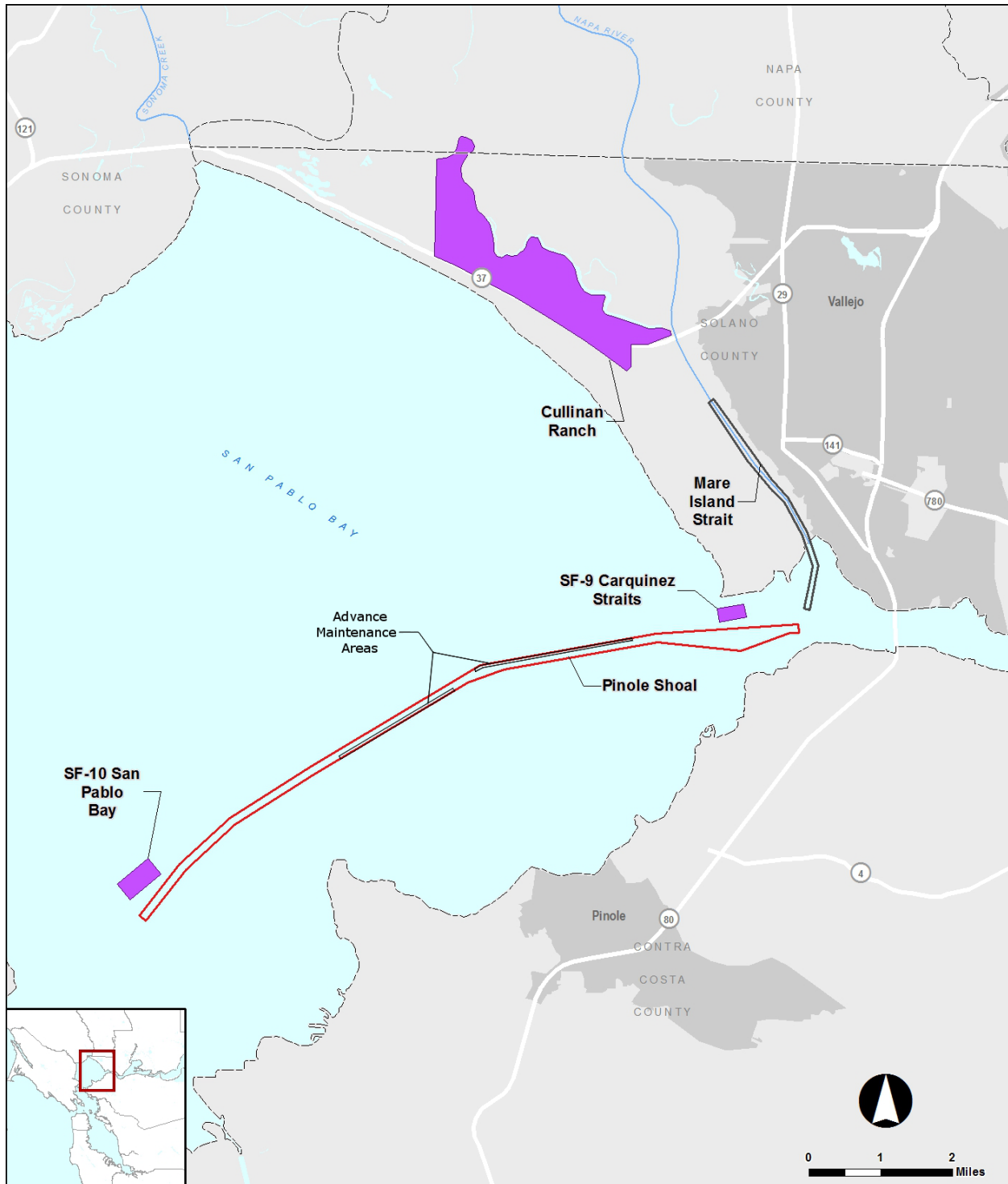
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- ▭ Dredge Locations Not Included in EA/EIR
- Shoaling Dredge Area – Not included in EA/EIR

Figure 4. Richmond Harbor



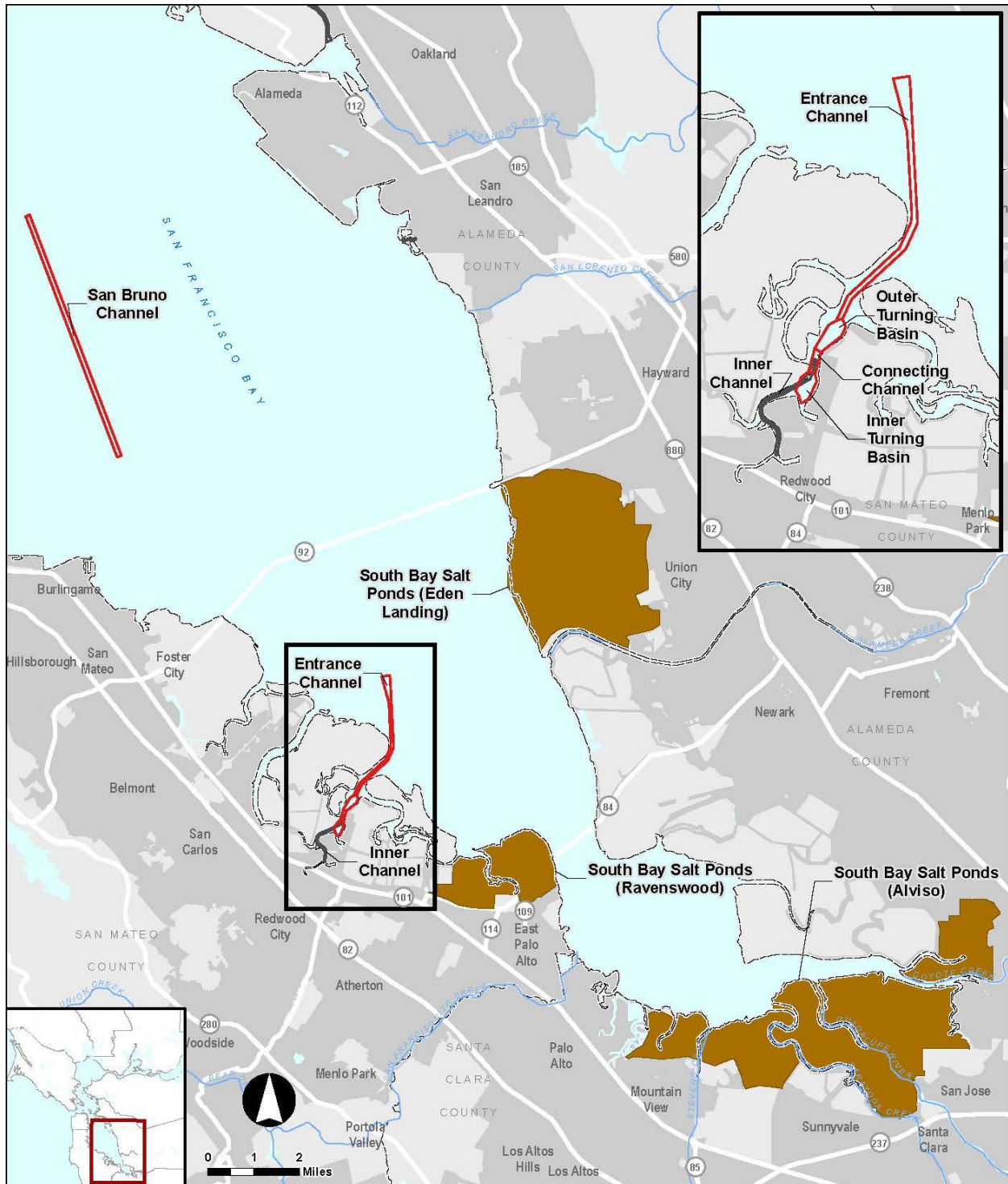
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- Existing Placement Site
- Potential Future Placement Site
- County boundary
- Dredge Locations Included in EA/EIR
- Dredge Locations Not Included in EA/EIR

Figure 5. Suisun Bay Channel and New York Slough



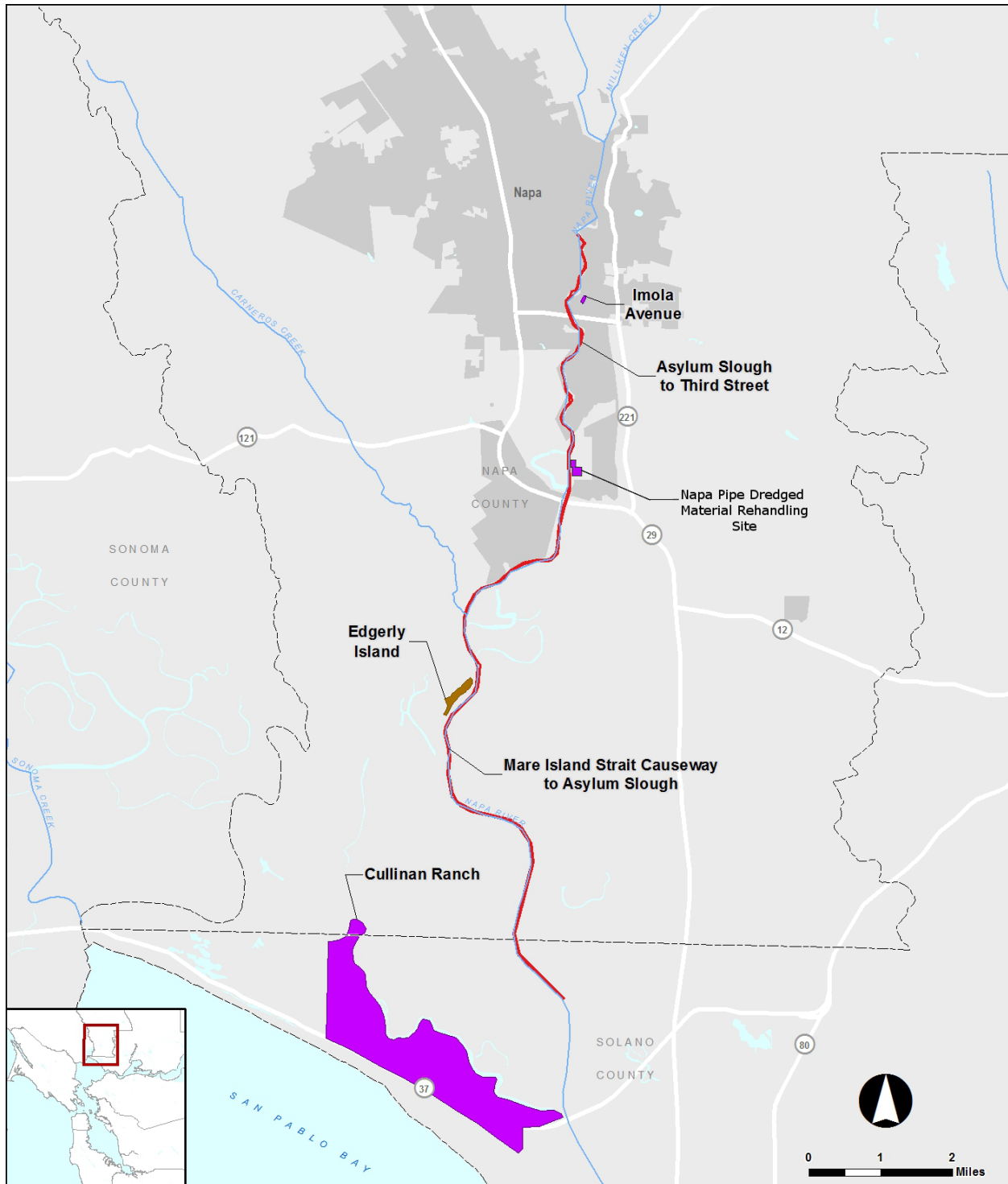
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- Placement site
- County boundary
- Dredge Locations Included in EA/EIR
- Dredge Locations Not Included in EA/EIR

Figure 6. Pinole Shoal



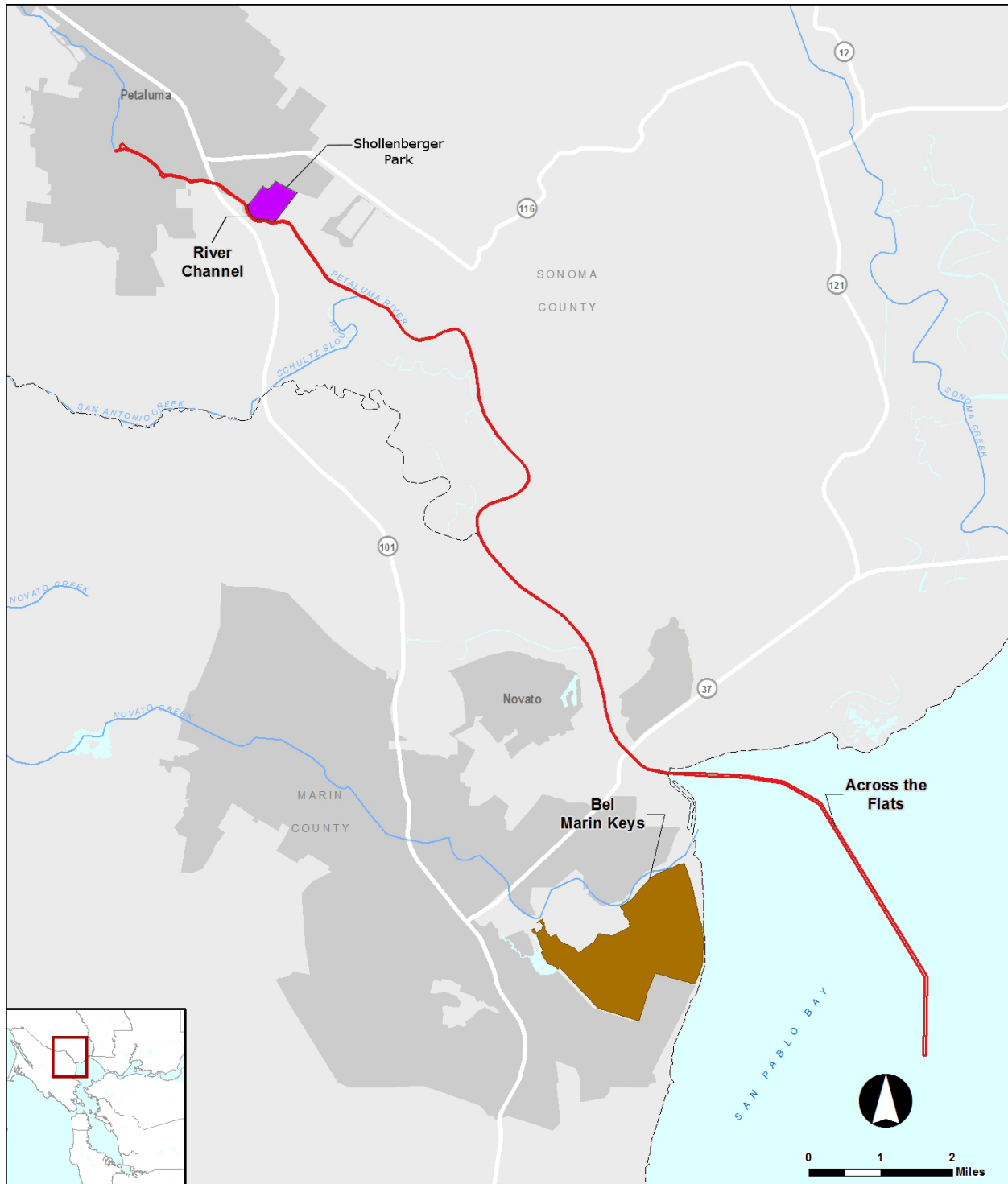
- ① Highway
- Existing Placement Site
- Potential Future Placement Site
- County boundary
- Dredge Locations Included in EA/EIR
- Dredge Locations Not Included in EA/EIR

Figure 7. Redwood City Harbor



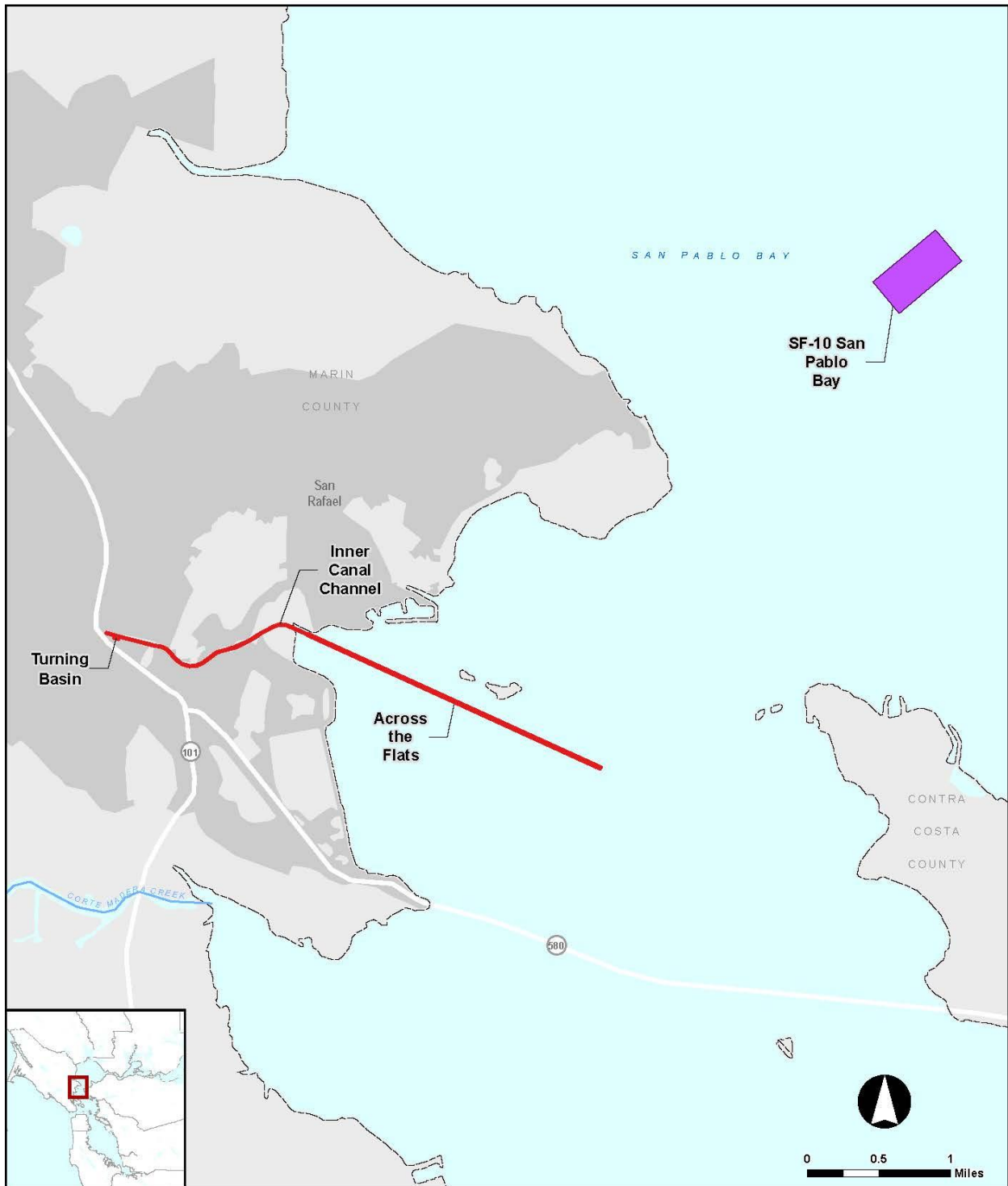
- ① Highway
- Existing Placement Site
- Potential Future Placement Site
- County boundary
- Dredge Locations Included in EA/EIR

Figure 8. Napa River Channel



- ① Highway
- Potential Future Placement Site
- ▭ County boundary
- ▭ Dredge Locations Included in EA/EIR

Figure 9. Petaluma River Channel



- ① Highway
- County boundary
- ▭ Dredge Locations Included in EA/EIR
- ▭ Existing Placement Site

Figure 10. San Rafael Creek Channel