Dredgers

Josh Gravenmier ▪ Arcadis
Bridgette DeShields ▪ Integral Consulting Inc.
Maureen Dunn ▪ Chevron
John Coleman ▪ Bay Planning Coalition
Cameron Carr ▪ Bay Planning Coalition

History and Need for Dredging

San Francisco Bay has been dredged for over 150 years (LTMS 1975, 1998, 2001; Dow 1973) with the first legislation issued in 1863 by Governor Leland Stanford to authorize dredging to maintain the waters alongside docks, piers, and wharves in San Francisco and allow for further waterfront construction. The main ship channel in the Bay was first dredged in 1922 (USACE 1975), with multiple deepening projects continuing through the 1970s. Other port and harbor areas were created starting in 1920 and deepened, including the major deepening project at the Port of Oakland in 2009. Much of this dredged material was placed in the Bay, some of it serving as fill to create additional land mass with other material simply side-cast to adjacent areas. Beginning in the early 1970s, efforts increased to manage dredged material disposal, but disposal was limited to a few state and federally designated sites, with most material taken to a site near Alcatraz (USACE et al. 2001). From an average annual dredging of 7 million cubic yards (cy) by the US Army Corps of Engineers (Corps) alone in the 1970s and an additional 3-6 million cy dredged by others, total maintenance volumes decreased to approximately 3 million cy by the 1990s.

Evolution of Regulations

With few existing regulations, the establishment of the San Francisco Bay Conservation and Development Commission in 1969 by Governor Ronald Reagan (Dow 1973), provided a responsibility to regulate all filling and dredging in the Bay. In 1978, Public Law 95-269 further changed dredging operations in the Bay, as the Corps ceased being solely dredgers and became managers of dredging (Newton 1990).

The Federal Water Pollution Control Act, which, with amendments, became known as the "Clean Water Act" (CWA) in 1972 included provisions for dredged material in Sections 401 and 404. At the same time, the Marine Protection, Research, and Sanctuaries Act of 1972 required any proposed dumping of dredged material into ocean waters to be evaluated through the use of criteria published by the US Environmental Protection Agency (USEPA) (40 CFR 220-228), resulting in the creation of the "Green Book" (USEPA/USACE 1991). While early testing was rudimentary, suitability evaluations of dredged materials for disposal evolved, with an Inland Testing Manual (USEPA/USACE 1998) to further regulate "inland waters, near coastal waters, and surrounding environs." Building on these initial regulations, the current framework for the suitability determination process is very detailed and stringent, ensuring that any dredged sediment placed in the aquatic environment is considered "suitable."

The Dredged Material Management Office (DMMO), established in 1995, is an interagency virtual office with a mission to increase efficiency and coordination between the member agencies and foster a comprehensive and consolidated approach to handling dredged material management issues.

From a Waste to a Resource

For many years following the passage of regulations on dredging and disposal, dredged material was referred to as "spoils," portraying the material in a negative light and as material that could negatively impact water quality. However, as early as the 1970s, beneficial reuse of dredged material began being explored. Now clean and even mildly contaminated sediment is considered a valuable commodity.

With expanded regulations and increased value of dredged material usage realized, the Long-term Management Strategy for San Francisco Bay (LTMS; USACE et al. 1998, 2001) was initiated due to environmental concerns surrounding dredged material disposal and sought to limit in-Bay disposal to sustainable levels.

Economics and Necessity of Dredging

Maintaining navigation channels in the naturally shallow Bay is vital for our economy. Sufficient depths in navigational channels allow commercial industry vessels to operate at full capacity, reducing the need for lightering ships which can lead to increased emissions and potential for spills due to the increased numbers of ships. Examples of the importance of dredged shipping channels include the following.

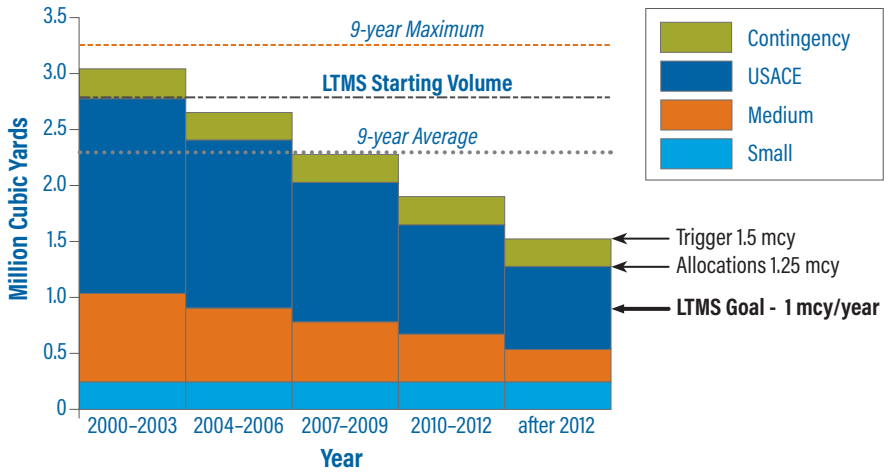
- The total economic value of the marine cargo and vessel activity at the Port of Oakland, including the revenue and value-added at each stage of moving an export to the Port or import from the marine terminals, is estimated at $60 billion per year.
- The Bay Area manages 44% of the oil refining capacity in the state, with total annual state and local tax revenue from oil refineries estimated at $3.4 billion.
- The total number of jobs in the Bay Area supported by the oil and gas industry is estimated at 81,510 people. The Port of Oakland and its partners provide 84,144 jobs in the region.

Future Sediment Management

As ships continue to move in the Bay and potentially grow larger, dredging and possibly additional deepening will be necessary, but the shoreline around the Bay is at risk to sea level rise (SLR) impacts (both communities and sensitive infrastructure). The LTMS has been a fixture in the Bay since the year 2000, but what does the future look like?

Sea Level Rise: Effective Reuse of Dredged Material Is More Important Than Ever

A change in sediment regime, climate change, SLR, and other landscape drivers, without sediment augmentation, could cause the Bay's tidal marshes and flats to convert to a different habitat type, due to a lack of natural sediment supply to allow elevation gains to keep pace with SLR. According to the SFEI report "Sediment for Survival: A Strategy for the Resilience of Bay Wetlands in the Lower San Francisco Estuary," the volume of sediment needed for tidal marshes and tidal flats by the



year 2100 is approximately 450 million cy, of which only about 30% will be supplied by current landscape and management approaches. Without additional sediment supplies, the Bay shoreline and associated communities risk inundation.

Strategic Placement: Using the Power of Nature

Tidal marshes and flat areas protect us from SLR, king tides, and storms. Very few permitted restoration sites exist in the Bay, and they are only at specific locations and have limited capacity. The expansion of the Hamilton Wetland Restoration Project to include the Bel Marin Keys Unit V parcel would beneficially re-use 24.4 million cy of dredge material for habitat restoration, but additional sites are needed to accommodate the volume of sediment necessary to adapt to SLR. One option being considered is strategic placement of dredged materials in nearshore environments, using natural processes to bring the material onshore. Legislation from 2016 required the Corps to establish 10 pilot programs for the beneficial reuse of dredged material. The San Francisco District was funded for one pilot program and is currently evaluating a strategic shallow water placement of sediment to see if it would be a cost-effective method to create resilience.

Reuse Site Permit Streamlining: BRRIT Is Underway

The Bay Restoration Regulatory Integration Team (BRRIT) was formed in 2019 to improve the permitting process for multi-benefit habitat restoration projects and associated flood management and public access infrastructure in the Bay and its shoreline. The BRRIT began permitting projects and is showing promise for improving multi-benefit wetland restoration projects in the Bay as it brings together the six state and federal regulatory agencies.

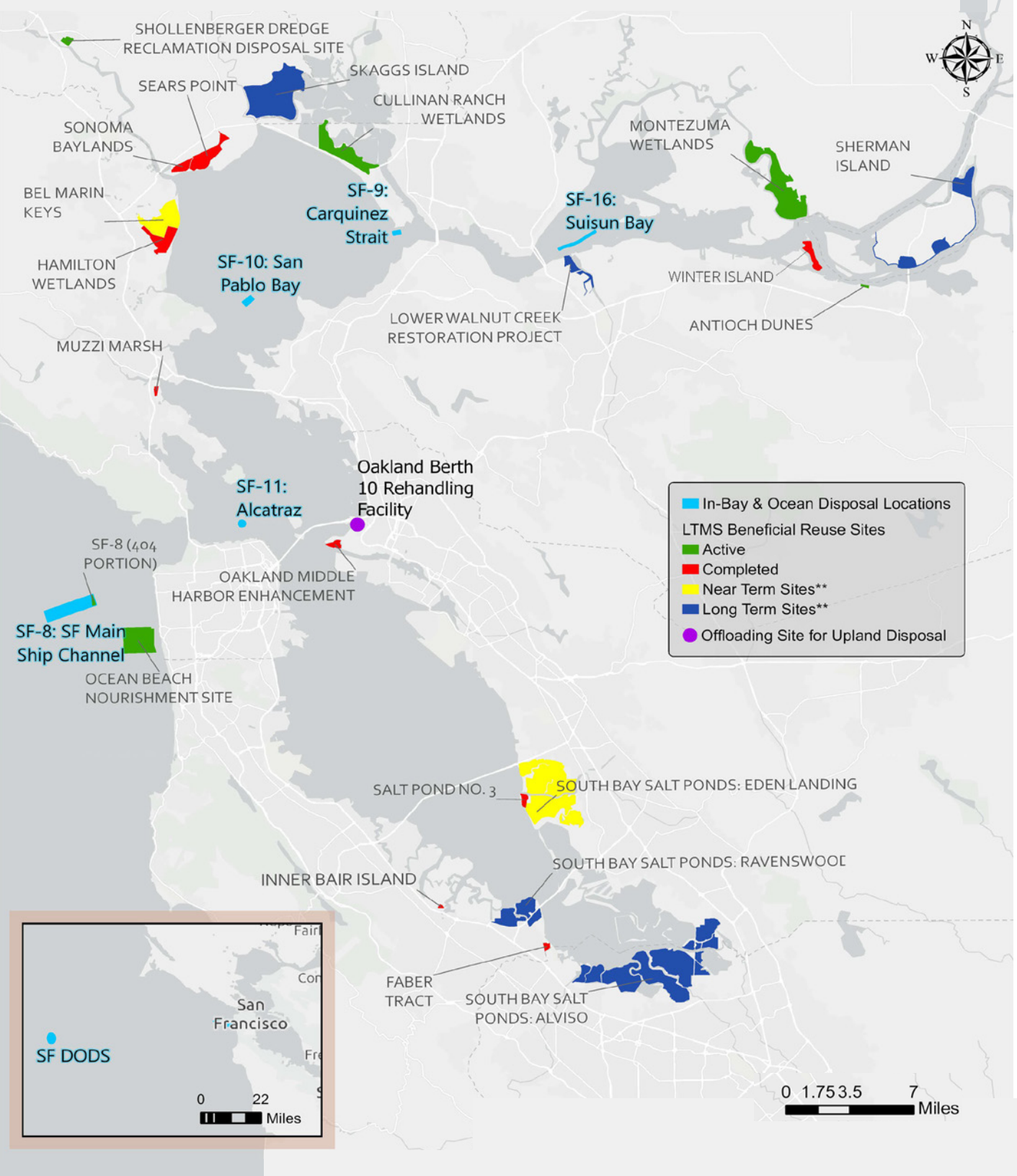
New Cost-share Opportunities: Measure AA

Measure AA was approved in 2016 to raise $500 million via a 20-year parcel tax in the nine Bay Area counties, focused on building up the Bay's defense against SLR by restoring marshes for both habitat creation and flood protection, as well as improving public access. To date, almost $117 million in Measure AA funding has been authorized for 28 projects, restoring 6,402 acres to tidal marsh, tidal flat, and shallow bay areas. Funds can be used for dredging and beneficial reuse projects, but there is clearly not enough funding to meet current or future needs.

Regulations and Science: Updates Needed

The LTMS has been successful in implementing its desired goals and continues to have applicability into the future. Fundamentally, the LTMS goal is to minimize the cumulative environmental impacts and to maximize cumulative environmental benefits to the region as a whole. Similarly, the LTMS seeks to manage dredged material as a valuable resource for long-term benefits, as opposed to viewing it as a waste to be disposed of as inexpensively as possible in the short term. Even though the LTMS emphasized a balance between ocean disposal and beneficial reuse, with limited in-Bay disposal, it did not consider SLR or declining sediment loads to the Bay, as it was based on information from the late 1980s.

Available dredged material could be better utilized considering current and future conditions. We have to do things differently to bridge the anticipated gap in sediment volume needed to achieve resilience by the year 2100. Maximizing in-Bay sediment placement in appropriate near-shore locations and utilizing natural processes would be one helpful lever to pull. Another would be identifying additional funding streams (like Measure AA) to augment the costs to beneficially reuse dredge material without reducing the funding available to maintain navigation channels. Developing beneficial reuse locations throughout the Bay would directly increase resilience throughout the region. The BRRIT shows promise for improving the permitting process for multi-benefit wetland restoration projects, but is still constrained. Only by increasing state and federal funding, taking a regional perspective, and streamlining the permitting process will we enable dredged sediment to be utilized to the maximum extent possible to help mitigate SLR impacts and facilitate the movement of goods with fully maintained navigation channels. The RMP is providing valuable data, evaluations, and modeling that will assist in these efforts. §



Dredged Sediment Placement Locations*

* Sites located within LTMS Program Area, as of May 2020. Does not represent all sites where beneficial reuse is possible or has occurred.

** Defined as being available to receive dredged material within the next three years (Near Term Sites) or more than three years (Long Term Sites)

Source: 2021 Dredgers Handbook (https://www.spn.usace.army.mil/Portals/68/docs/Dredging/guidance/LTMS_DredgersHandbook_ADA_final_020221.ver=6yYVtXfmDBkYJpSjhruw9g%3d%3d)