A Framework for Systematic Beneficial Use of Dredged Sediments in Aquatic Habitats

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS BUILDING STRONG®

Focus Area

Environmental Resource Management

Problem

Coastal resiliency efforts including coastal wetland restoration have increased in the previous years due to accelerating rates of sea level rise (SLR) and in response to recent major storm events. Navigational dredged material is frequently considered as a source of sediment for construction of new wetlands, expansion of existing wetland areas, or increasing wetland elevation via thin layer placement (TLP) or strategic placement of sediments. However, many estuaries suffer from reduced sediment loading and suspended sediment content (SSC) due anthropogenic alterations to normal sediment transport pathways such as damming of fluvial sediment sources, coastal inlet management, and shoreline hardening. These sediment deficiencies are exacerbated when navigational dredged material management utilizes practices that remove more sediment from estuarine systems through the use of ocean placement, confined disposal facilities (CDFs), or upland placement. With many hectares of aquatic habitats including wetlands identified for restoration and many more at risk of sediment deficits, shifting placement from oceans, uplands, and CDFs to BUDM is a logical and required change given the decreasing SSC in many estuarine waters. The successful beneficial use of dredged material (BUDM) in these habitats at the scale of the entire estuarine system requires the alignment of dredging, restoration, and resiliency activities.

Study Description

The main goal of this study is to determine the potential for BUDM to support intertidal habitat (mudflats and marshes) based on dredged sediment resources, dredging economics, sediment processes, wave processes, tidal marsh processes and sea level rise. We propose to integrate existing sources of data such as topography, bathymetry, ambient SSC, shoreline condition, and current wetland extent and planned wetland restoration with existing tools and models such as the Marsh Equilibrium Model (MEM) including MEM-TLP, which adds the capability of simulating wetland TLP, the Channel Shoaling Analysis Tool (CSAT), and Dredged Material Management Decisions (D2M2) to analyze how to best utilize dredged material resources in a way to support wetland resiliency and restoration goals at a regional scale. We will apply this framework to the San Francisco Bay Estuary as a case study to demonstrate the efficacy of such an approach in dredged material management and as a technique to achieve regional wetland resiliency goals.

Products

Tools: An operational workflow for the identification of well-aligned maintenance dredging and aquatic habtiat restoration projects

Reports: Systematic Beneficial Use of Dredged Sediments from Federal Navigation Channels: A case study from the San Francisco Bay Estuary

Summary

This project will demonstrate how to optimize BUDM to support sustainable dredged material management as well as supporting tidal and subtidal restoration and resiliency goals, minimizing dredged material transportation and placement costs and adverse impacts while facilitating collaboration with USACE maintenance dredging operations and coastal wetland managers.

Balancing operational and environmental initiatives and meeting complex challenges of dredging and dredged material placement in support of the navigation mission.

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