Characterization of the Spread of Fine-Grained Sediment for Beneficial Use of Dredge Material

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS BUILDING STRONG®

Focus Area

Sediment and Dredging Processes

Problem

In 2023, the US Army Corps of Engineers (USACE) established a goal to beneficially utilize 70% of the sediment it dredges by the year 2030. Currently, over 50% of the material being dredged by USACE is fine grained sediment (FGS). Therefore, a need exists to evaluate potential for using dredged FGS in beneficial use projects. Near-marsh, shallow-water strategic placement of sediment dredged from navigation channels is a promising method for BU of FGS by increasing marsh and tidal flat accretion as well as providing erosion protection to marsh edges. However, applications of FGS in BU projects are often limited due to concerns over the dispersive nature of the sediments and if placed FGS is likely to impact nearby channels or other resources.

Figure 1. Initial placement of material in tilt flume

Study Description

This study seeks to build upon recent research that has demonstrated the stability of placed FGS due to its cohesive nature. A combination of field and laboratory-based tests of the dredged material will be conducted to determine physical properties of the material that can be used to estimate the spread of the dredged material following placement based on local geographic and hydrodynamic conditions. The laboratory-based testing is being conducted at the ERDC tilt flume facilities in a flume that is 10 ft wide and 50 ft long. The laboratory-based testing will monitor the spread of fine-grained sediment that is mixed homogenously in groups of 275 gallons to a concentration of approximately 15-20% solids to simulate dredge placement. The tilt flume will be used to monitor the spread of FGS at various degrees of tilt. A field-based study is scheduled to be in collaboration with the Philadelphia District (NAP) at the end of FY25. The field-based study will also be conducted to monitor the spread of FGS during and after placement. Data from the study will be used to create the FGS spread calculator, a tool that will predict the dispersion of placed material based on a combination of sediment properties, hydrodynamic conditions, and geomorphic features of the placement area.

Products

The research provided by this study would aide USACE by providing guidelines and answering some uncertainties about nearshore placement of FGS for BUDM opportunities. By furthering the understanding of FGS dispersion and providing a dispersion calculator, the study could lead to increasing BU practices across the enterprise that result in healthy and resilient ecosystems. Lastly, a journal article containing the findings from both the laboratory- and field-based study will be published.

Summary

The purpose of this effort is to further the knowledge of FGS placement for BU practices by conducting both a laboratory- and field-based study. The findings of this study will be utilized in the development of a dispersion calculator and guidelines for the placement of FGS for BU. The effort will include the collaboration of multiple districts.

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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Research Products

Product Type	Product Title

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