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Regional Sediment Management Program

Coastal and Hydraulics Laboratory
Bureau of Ocean Energy Management
RSM Regional Center of Expertise

Sediment Sorting During the Dredging and Placement Process: Coastal Restoration Projects – Implications for Resource Management and Environmental Impacts

Description

The objective of this study is to quantify changes in sediment characteristics (i.e., grain size, sorting) and the degree, timing, and variability of sediment sorting during dredging and placement operations to determine the extent of potential sediment coarsening to better inform sediment compatibility analyses and subsequent management of sediment resources. The implications of the study are significant at a national level as the results are likely to increase beneficial use opportunities for dredged material and increase the volume of material available from offshore borrow areas which will provide value to the Navigation (NAV) program and reduce lifecycle costs to both NAV and Flood Risk Management (FRM) projects. This study builds on previous RSM and Dredging Operation and Environmental (DOER) efforts and lessons learned at Tampa Harbor. That study was partially funded by the previously mentioned research programs, as well as the Jacksonville District, and was supported by the Florida Department of Environmental Protection (FDEP). The current effort is supported through a partnership between the RSM RCX, U.S. Army Corps of Engineers (USACE) Engineering Research Development Center (ERDC), and the Bureau of Ocean Energy Management (BOEM). The study will build on USACE and BOEM's dredging and coastal management expertise and will result in the development of innovative and robust sediment sampling methodologies and professional publications focusing on management of sediment resources with an ultimate goal of increasing allowable silt content in borrow and beneficial use sites.

Figure 1. Example of hopper dredged being loaded.

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Issue/Challenge To Address

Current state regulations across the nation generally include restrictions based on sediment characteristics which require that source material (e.g., navigation channel, inlet complex, offshore borrow area) matches the sediment characteristics at a placement site (e.g., beach, nearshore). If USACE is able to quantify coarsening associated with the dredging process, we can estimate the final grain size characteristics which could allow for use of siltier source materials to be placed on coastal FRM projects or other beneficial use areas. While the concept is relatively straight forward, quantifying changes in sediment grain size distribution through the dredging and placement process is relatively complex. Methods and techniques to collect representative sediment samples and produce statistically significant results are limited. This study will take a comprehensive approach to developing and validating the methods and techniques required to assess sediment dynamics associated with the dredging and placement process and will serve as a model that could be implemented nationally throughout USACE and beyond.

Successes/ Lessons Learned

FDEP agreed to modify sediment grain size restrictions (% silt content) for the Tampa Bay study and have been supportive of USACE efforts to study grain size variability and the potential implications to coastal resources management related to USACE NAV and FRM projects. Numerous lessons learned from the Tampa Bay project will be incorporated into this study including sampling methodology and analysis to ensure statistical significance of results.

Expected Products

- Coordination Meeting with BOEM
- Annotated Bibliography with Conceptual Model
- Presentation at RSM IPR
- Technical note describing proof of concept and field sampling plan

Stakeholders/Users

Stakeholder participation in this project includes BOEM, the dredging industry, and USACE districts. Additional stakeholders such as the National Oceanic and Atmospheric Administration (NOAA) and state regulatory agencies may be included in the study once field sites are determined. Field sampling in coordination with a commercial dredge plant is likely to occur within the South Atlantic Division (SAD).

Projected Benefits Value Added

The study is likely to provide significant value to the RSM, NAV, and FRM programs. For the RSM program, the study results are likely to increase the range of grain size distribution (higher silt content) allowed for beneficial use placement and FRM projects. It also supports the principle that sediment is a valuable resource by providing additional value to material with slightly higher silt content than is currently placed on beach and nearshore environments per state regulations. For the NAV program, the study will potentially open up additional placement opportunities for siltier material which may reduce dredging/placement costs and would ease capacity limitations at Dredge Material Management Areas (DMMAs) or Ocean Dredged Material Disposal Sites (ODMDSs), providing lifecycle cost savings. For the FRM program, the study could potentially increase borrow source areas and available volumes significantly. Beach quality sand sources are extremely limited and beneficially using material from NAV projects and locating borrow sources close to FRM projects could provide substantial value for decades.

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Leveraging Opportunities

The RSM RCX and ERDC are participating in a two year Interagency Agreement (IA) with BOEM to assess the extent of sediment sorting during the dredging and placement process to better inform sediment compatibility analyses for placement of dredged material. The RCX-ERDC-BOEM study will provide funding for all project management, coordination and collaboration with BOEM, and data acquisition/analysis associated with multiple field data collection efforts. The study will leverage BOEM funding, BOEM expertise, ERDC, expertise, and national USACE expertise already committed to and funded by the RCX-ERDC-BOEM study.

Additional leveraging of funds include O&M project funds and utilization of the USACE dredge fleet for support of field sampling efforts and sharing of available project data (e.g., geotechnical data, hydrographic survey data, Plans and Specs).

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Participating Partners

Bureau of Ocean Energy Management
Florida Department of Environmental Protection
South Atlantic Division
Jacksonville District