Enhancing strategic placement of dredged material with nature-based features for sediment retention

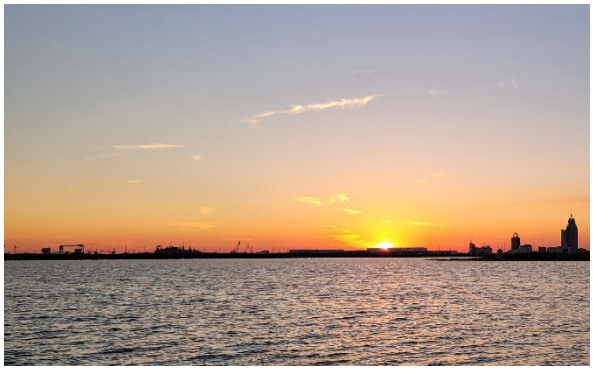
Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS BUILDING STRONG®

Focus Area

Innovation in Sediment Management & Dredged Material Management

Problem



Sediment removal from navigational channels is essential to maintain proper depths and widths for vessel traffic. However, finding suitable open-water placement or confined disposal sites is becoming increasingly difficult due to availability and capacity constraints. Low-lying coastal regions, which often benefit from sediment deposition to maintain habitat area and other environmental benefits, are often closer to these channels which would reduce the cost of dredging. Careful consideration is required to ensure that sediment placement enhances, rather than harms, these critical habitats. Current strategies like thin-layer placement have successfully restored marsh platforms, utilizing approximately 45% of the yearly average dredged material. Further exploration of alternative strategies is crucial to increase the percentage of dredged material used beneficially. Evaluating the feasibility of using flow direction (unidirectional or tidal) and sediment retention berms (natural or constructed) to guide dredged sediment placement may offer USACE districts with an effective, cost-effective alternative for sediment management.

Study Description

This study aims to investigate tidal channel characteristics suitable for direct dredge material placement as these channels enhance sediment retention by using natural flow currents to move sediment into target areas. By leveraging natural marsh structures and tidal flow, this method offers a novel, site-specific sediment placement strategy not currently in use. Initial evaluation of suitable channel characteristics using simplified numerical scenarios followed by field-scale implementation and monitoring of sediment characteristics, transport patterns during placement, and short-term fate are critical next steps to evaluate performance. This strategy has the potential be widely applied to sediment-starved coastal systems, enhancing restoration outcomes across multiple USACE districts.

Products

- Document workflow detailing tidal channel characteristics and hydrodynamic conditions which are and are not likely to have favorable results from placing dredged material directly in the channel.
- Technical report or journal article manuscript documenting numerical simulation results.
- Journal article manuscript(s) documenting placement test case and monitoring.

Summary

Additional strategies for the beneficial use of dredged material are needed for USACE to reach the target of using 70% of dredge material beneficially by 2030. This project aims to expand USACE placement strategies by evaluating the feasibility of directly placing material in tidal channels with natural retention features to deliver sediment to targeted areas that would benefit from an increase in sediment supply.

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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