



Sand Enhancement from the Dredging Process

Dredging Operations Environmental Research Program (DOER)

U.S. ARMY CORPS OF ENGINEERS

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Problem

Placement of dredged material based on its inherent “quality” is managed by local, state, and Federal rules and standards. The sediment parameter thresholds are normally measured at the dredge or borrow site, not at the placement location. For example, in the state of Florida, Florida Administrative Code 62B-41.007(j)(k) also known as the “Sand Rule” defines a threshold of percent fines criteria of the material from a particular source that can be placed for beneficial use (i.e. beach, nearshore). For navigation dredging projects, a maximum content of 10% fines content passing the #230 US Standard sieve as measured in the channel for beach placement and 20% fines content is allowed for nearshore placement. This same rule for beach nourishment projects allows only half of this threshold at 5% fines content for material placed on the beach and 10% fines content for material placed in the nearshore as measured at the borrow site. Empirically determining the percentage of fines lost between the dredge intake and final placement on the beach or in the littoral zone as a function of the dredge equipment and construction method will provide justification for a fundamental shift in the current conservative regulatory approach to a more actual risk based set of permit requirements.



Study Description

This initiative will develop a better understanding of sediment behavior and losses throughout the dredging and placement process. Current regulations base beneficial use options for dredged material on the in-situ fine fraction. However, evidence indicates that a significant amount of these fines are released during the dredging process and are not present at the placement site. An objective of this study is to develop a methodology to determine exactly where fines are winnowed (lost) during the dredging process and to empirically provide an approximation of the amount of fines lost at each stage in the dredging process. Methods will include collecting numerous samples of intake and pump-out material at a wide variety of locations and aboard various dredge types. This data will be used to empirically estimate the reduction in fines as a function of the amount of fines in situ as well as by dredge type used for construction.



Products

Empirical fines reduction estimates will be based on location, material type, and dredge equipment/methodology. Various analytical methods will be applied to develop “rules of thumb”, establish relationships and trends which may be defined as a function of the amount of fines in situ and dredge type. The overall total loss of fines will also be quantified by analyzing historical fines reduction losses from previous projects by comparing pre-fill compatibility/quality assurance plan data and post-fill compatibility analysis to empirically estimate the loss of fines due during beach and littoral zone placement using both the USACE and Florida Department of Environmental Protection (FDEP) databases.



Summary

Understanding the losses of fine material during the initial dredging and placement process provides an opportunity to better utilize currently unacceptable sediment from navigation channels while not negatively impacting the environmental functionality of beaches. This opportunity will also reduce the need for expansion of Offshore Dredge Material Disposal Sites (ODMDS) and upland Dredge Material Management Areas (DMMA's) or Confined Disposal Facilities (CDF's). Furthermore, it will save O&M dollars by opening up placement areas close to shore. Results of this initiative are not only important to Regional Sediment Management (RSM) goals and basic principles of retaining sand to the littoral zone but also rely on the sorting of sediment during dredging and the natural sorting of sediment once placed to match background conditions that are key principles of Engineering With Nature (EWN) and strategic placement.



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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