Modeling Framework for the Development of Adaptive Environmental Windows

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS BUILDING STRONG®

Focus Area

Environmental Resource Management

Problem

Environmental Windows are intended to protect sensitive species from negative impacts during dredging and placement activities, but their rigidity can negatively impact the feasibility of environmentally beneficial projects. Flexible, adaptable Environmental Windows may be able to improve the USACE's ability to conduct dredging operations and implement placement projects while simultaneously protecting sensitive species and overall environmental quality. Quantitative exploration of the tradeoffs of adjusting Environmental Windows is necessary to ensure that the USACE is achieving the optimal monetary and environmental benefits related to dredging and beneficial reuse projects.

Study Description

This project will develop a framework for creating adaptive Environmental Windows for dredge operations that can assess the effects of operations on multiple ecological resources with changing environmental conditions. Scalable functions will be created for the positive and negative effects of dredging and placement activities on ecological conditions. Cost functions will also be developed for dredge operations. The developed functions will then be integrated into an optimization framework and tested on scenarios in USACE districts. This desktop experimentation will allow exploration of relaxing Environmental Windows constraints to achieve site- and system-wide benefits over longer time horizons.

Products

1) Findings will be synthesized into a practical optimization framework and guide that helps districts to strategically manage the most sensitive Environmental Windows in their area. 2) USACE district case study results will be published.

Summary

An optimization framework for refining Environmental Windows to simultaneously protect sensitive species while increasing dredge operations efficiency will be developed, tested, and iteratively improved through a series of applications. The process will be documented in a playbook to aid USACE districts to explore tradeoffs and develop quantitative information to engage resource agencies. It is expected that short-term impacts can be balanced with long-term, system-wide benefits and that these can be systematically explore in an optimization framework. This can help USACE districts to overcome current challenges to realizing benefits by placing dredge material to create and restore natural infrastructure.

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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