Determining and Quantifying Ecosystem and Spatial Benefits of The Nation's Dredge Material Placement Areas

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS BUILDING STRONG®

Focus Area

Environmental Resource Management

Problem

There are currently an estimated 2000 dredge placement areas (DPA) in the US. These DPAs are heterogenous in size, species composition and are located in both coastal and inland habitats, creating a diverse network of habitat patches. This network of DPAs has not received much research attention to date, yet could be providing unknown, yet critical, ecosystem services and benefits to the Nation, such as engineering benefits and connectivity and stopover habitat for threatened and endangered migratory species. Neither the benefits of DPAs nor their spatial location within the landscape have been quantified, which limits USACE's recognition for these benefits. If new DPAs need to be constructed, then a spatial analysis can provide operations managers with a quantitative tool to optimize the location of a new DPA to maximize its benefits within the broader DPA and landscape network. In order to quantify the overall system benefits of the DPAs network, an approach that incorporates both spatial and ecological processes will be needed. Spatially-explicit integrated ecological modeling can quantify system-scale benefits of heterogenous networks like the DPAs.

Figure 1. Dredge placing material at a DPA

Study Description

This research will develop a multiscale, spatially-explicit integrated ecological model that will provide the USACE with quantitative approach to understand how DPAs function within the landscape, what benefits they provide, and how to best plan future networks of DPAs. The methods and practices will support Engineering with Nature®, navigation, beneficial use, and other business lines. The overall approach will focus on using state of the art remote sensing to quantify and categorize habitat types of with the DPA network, then using those habitat associations to parameterize an integrated ecological model that will quantify the ecosystem and engineering benefits of the network. Engineering benefits will be quantified following the procedures explained in the guidance for natural and nature-based features. Spatial statistics and analytics will be used to place DPAs in the broader landscape context relative to ecosystem services across multiple scales. Connectivity among the DPAs will be analyzed at multiple spatial scales (e.g., local, regional, and landscape-level) to determine if they serve as potential stopover habitat for migratory species. DPAs will be categorized into classes to more acutely examine how they do or do not act as corridors at the local patch/habitat scale versus broader landscape and ecosystem scale.

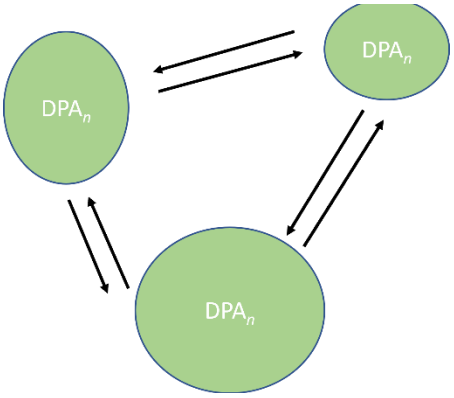

Figure 2. Conceptualization of connectivity among DPAs

Products

DPA hard deliverables will include a webinars describing the DPA network, the associated models developed, and the overall findings. Journal articles will be developed describing the benefits quantification across scales. Additionally, the this project will be highlighted in a corporate communication video that will be posted on the DOER website and ERDC YouTube channel.

Summary

The objectives of this research task will be to quantify the engineering and environmental benefits of the USACE dredge placement area network. This effort will provide USACE operations managers with a quantitative tool to optimize the location of a new DPA to maximize its benefits within the broader DPA and landscape networks.

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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