



# Comprehensive Modeling Approach to Evaluate Habitat and FRM Benefits from BU Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS

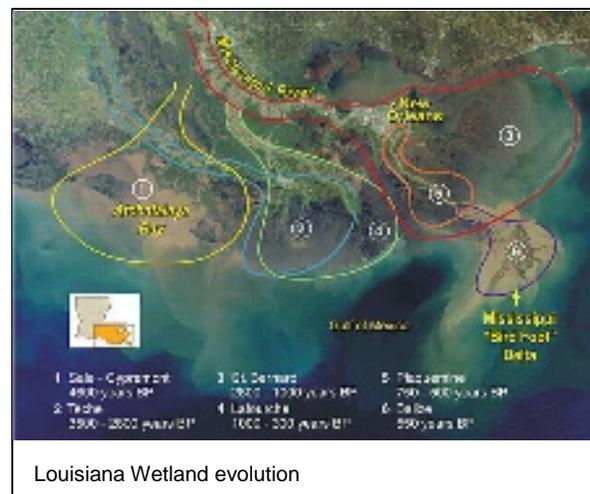
BUILDING STRONG®

## Focus Area

Sediment Dredging Processes (co-funding from EMRRP)

## Problem

Ecosystem models and circulation/wave/transport process models are typically performed separately, although output from the transport models are processed and used as input to the ecosystem models. This external processing generally requires reduction in spatial and temporal process variability and reduces fidelity of the subsequent ecosystem modeling. Increased CPU capacity and transport process understanding now permits model coupling. Organizations such as DHI and Deltares are developing coupled modeling systems and are using these to evaluate system evolution and compare design alternatives (example: Delft3D simulations of West Bay Diversion hydrodynamics, transport, ecosystem evolution, and response to events). To address Dredged sediment management options and dredged sediment beneficial Long Term Management Strategy (LTMS), ERDC requires coupled models that include fidelity necessary to compare alternatives.



## Study Description

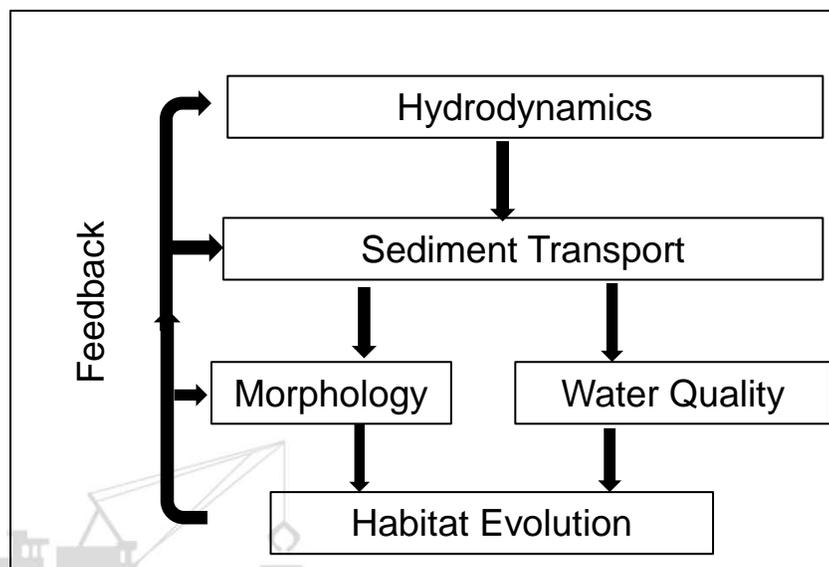
The project will develop a coupled modeling system for waves, circulation, sediment transport, water quality, and coastal wetland ecosystem evolution. Existing physical, chemical, and ecological models will be applied and modified to develop this system. Ecosystem evolution, including morphology change, stem density, and ecosystem filtering of water will provide feedback to the circulation, wave transformation, sediment transport, and water chemistry model components. The model will operate on appropriate scales to support evaluation of waterway, sediment, and ecosystem management alternatives which can support resilient ecosystems which support ecosystem restoration and flood risk management USACE business lines.

## Products

- Coupled physical/chemical/ecological modeling system
- Documentation and Guidance for system
- Training/Workshop

## Summary

This research will develop a coupled physical processes/ water quality/ wetland ecosystem evolution model with fidelity required to evaluate design alternatives for sustainable, resilient ecosystems, including sustainable dredged material management strategies to support wetlands. Guidance for developing similar modeling systems for other habitats will also be developed.



*Balancing operational and environmental initiatives and meeting complex challenges of dredging and dredged material placement in support of the navigation mission.*