

# Engineering With Nature

## Project Fact Sheet



### **Title**

Resilience of Nature Based Features for Protection of Constructed Wetlands

### **Background**

Wetlands support both habitat and flood risk reduction missions of the Corps. Wetlands that are managed or supported by the Corps are often near navigation infrastructure or in open-water. Therefore, protection from erosive forces is sometimes required. The Corps therefore builds berms to absorb wave energy and protect both constructed and natural wetlands from erosive forces produced by naturally occurring waves or navigation activity. These constructed berms are typically sandy. Dredged sediment is sometimes used in the construction process. However, most dredged sediment is a mixture of sand, silt and clay which limits their application to berm construction. Increased use of mixed sediment for construction of protective berms would greatly expand this sustainable, beneficial use of dredged material.



Berm construction in Louisiana

### **Objectives**

The first objective of this research is to develop guidance and predictive models that will expand the use of dredged sand/silt/clay mixtures as construction material for nearshore berms that protect adjacent wetlands. To achieve this objective, tools will be developed to predict the evolution of these berms during both the construction and post-construction phases. The second objective of this research is to develop the predictive tools necessary to optimize marsh function in response to various design alternatives for protective structures, including mixed sediment berms. These tools will be used to optimize marsh function in response to protective structures by evaluating the long-term response of the marsh to design alternatives.



Marsh construction in Galveston Bay

### **Approach**

The Galveston District is constructing a mixed sediment berm to protect constructed wetlands using dredged sediment from the Houston Ship Channel. This project provides a unique opportunity to obtain the data required to understand evolution of mixed sediment berms during construction and post-construction phases. This research task will collect the data required to develop guidance and build predictive models that can be used Corps-wide for design and expected maintenance requirements for nearshore mixed sediment berms constructed at other sites. In addition, models are required that predict long-term (decade-century) evolution of marsh function (erosion, habitat creation, etc.) under various alternative designs for protective structures. These models can then be applied to evaluate design alternatives, minimize construction costs, and optimize function of protected marshes.

### **Outcomes**

A series of technical notes, technical reports, journal articles, data bases and models will support expanded application of mixed grain size dredged material as a construction material for protective berms. The developed tools will permit users to demonstrate feasibility and optimize design of mixed grain sediment berms. The tools can also be used to evaluate the expected maintenance requirements (renourishment) for these berms. Existence of berms or other protective structures impact wetland function. A model will also be developed that supports optimization of wetland function in response to alternative protective structures. This model will be used to select protective structure options that minimize negative impacts and maximize benefits to wetland function influenced by these structures.

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