

Engineering With Nature Project Fact Sheet



Investigation of Long-term Variations of Restored Shoreline and Marsh on Deer Island

Background

Deer Island, a spindle-shaped 4.5-mile long island, is an extension of the Mississippi coastal mainland. The island suffers severe erosion from high waves and turbulent currents induced by hurricanes. Restoration of Deer Island's ecosystem is a multi-phase initiative for which the dredged sediment from the Federal channel is being used to restore and repair damage to the island caused by hurricanes, and to create emergent wetland. The ongoing Mississippi Coastal Improvement Program (MsCIP) Deer Island Restoration project led by the USACE Mobile District will create another 400 acres of emergent wetland. Because of the complexities of the restoration history, as well as changes in environmental conditions, evaluation of environmental and social benefits of the ecosystem restoration over this long-term project period is a challenge.

Objectives

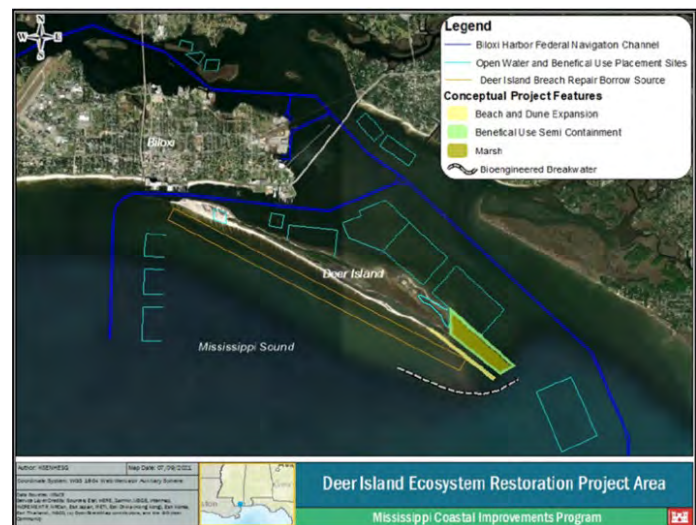
This EWN project is to investigate long-term variations of graded sediment transport, shoreline positions, and beach width in the restored southern shoreline, as well as impacts of the restored emergent tidal marsh and newly-planned breakwaters on wave attenuation and sedimentation. By using the field data and simulation results from the validated models, this project aims to develop tools and procedures to quantify the environmental and social benefits of wetland restoration with coastal protection measures such as restoration of marsh and beach.

Approach

We plan to study the variations of the environmental variables and project impacts by starting with collecting and analyzing historical field data. On the basis of field data and a better understanding of the physical conditions driving sediment transport and morphological changes, we will then develop multi-dimensional and multiple process numerical models to simulate hydrodynamic and morphodynamic processes around the island and surrounding water areas of the Mississippi Sound. Those simulation results will be used to quantify spatiotemporal variations of sediment transport rates, shoreline erosion rate, wave attenuation, and sedimentation through the marshes. Collaborating with the Mobile District and Northeastern University, we will develop an assessment approach to quantify environmental and social benefits of the restoration project for the southern shoreline and the wetland protected by the proposed breakwaters. By using the field data and simulation results, retention of sediment volumes (eliminated beach erosion) and reduction of flood risk (i.e. wave attenuation and slowing surge currents) will be used to calculate the cost and benefits of the restored wetland.

Outcomes

This EWN project will produce a suite of validated simulation models for the USACE-SAM Deer Island Restoration project, multi-scale model simulation results, simulation and data-based assessment methodology, technical reports, journal articles, and technical transfer materials. The developed tools and assessment procedures will facilitate evaluation and quantification of environmental and social benefits of Deer Island restoration project proposed by the USACE Mobile District and other restored wetlands.



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