

2024 PIANC WORKING WITH NATURE AWARD

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# Hancock County Marsh Living Shoreline and Pearl River Maintenance Dredging

Bay St. Louis, Mississippi  
United States

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DEPICTION OF NAVIGATIONAL INFRASTRUCTURE

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# Pearl River Maintenance Dredging



## DEPICTION OF NAVIGATIONAL INFRASTRUCTURE

The east access to the Pearl River and Port Bienville (the Port) had not been dredged since the 1960s. From the late 1960s to 2010, traffic patterns were predominantly from the west; therefore, there was no need to dredge the east access channel. In early 2010, the Port attained a new tenant that would use the east access channel and the Port. As a result, the Port needed to dredge the east and west access channels to the river, the Port access channel, and berthing areas.

In parallel, in 2017, an interdisciplinary team of coastal, civil, and geotechnical engineers; coastal biologists; ecologists; geologists; and hydrodynamic modelers was searching for materials to restore the Hancock County marsh, and the Port provided the source. A Working with Nature (WwN) solution for the restoration was achieved through constructing the marsh with dredged materials from the navigation channel. This was a more cost-effective beneficial use of dredged material in lieu of

upland placement and eventual truck haul to placement areas for the Port access channels or permitting additional sites. Dredged materials from the east and west access channels to the Pearl River would have been otherwise placed in open water. Because the dredged materials were very dispersive and would have filled other navigation channels to the west, there was a need to contain them.

Combining the projects resulted in a more sustainable and cost-effective solution to manage the navigation channels and provided a natural local source of materials to restore the adjacent marsh areas.

The figure on the next page shows the proximity of the two projects.

# NAVIGATIONAL INFRASTRUCTURE MAINTENANCE AND IMPROVEMENTS



DESCRIPTION OF WORKING WITH NATURE COMPONENT

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# Hancock County Marsh Living Shoreline



## DESCRIPTION OF WORKING WITH NATURE COMPONENT

The Hancock County Marsh Living Shoreline was developed to offset the environmental impacts of the Deepwater Horizon oil spill. The Mississippi Department of Environmental Quality (MDEQ; the Mississippi trustee) and the National Oceanic and Atmospheric Administration (NOAA; the federal and co implementing trustee) worked cooperatively to develop a project that would protect the shoreline and coastal habitats of the Hancock County Marsh Coastal Preserve, the second largest coastal preserve in the State of Mississippi.

The shoreline's historical erosion rate varied from 3 to 15 feet per year, resulting in a loss of marsh habitat and potential loss of rail lines that service ports along the Gulf. The early project phases were to construct a living shoreline sill to reduce erosion and restore historic shellfish reefs. The final phase of the project was to construct marsh to restore the preserve marshes between

Heron Bay Point and St. Joseph Point, protecting Heron Bay as a productive shellfish area.

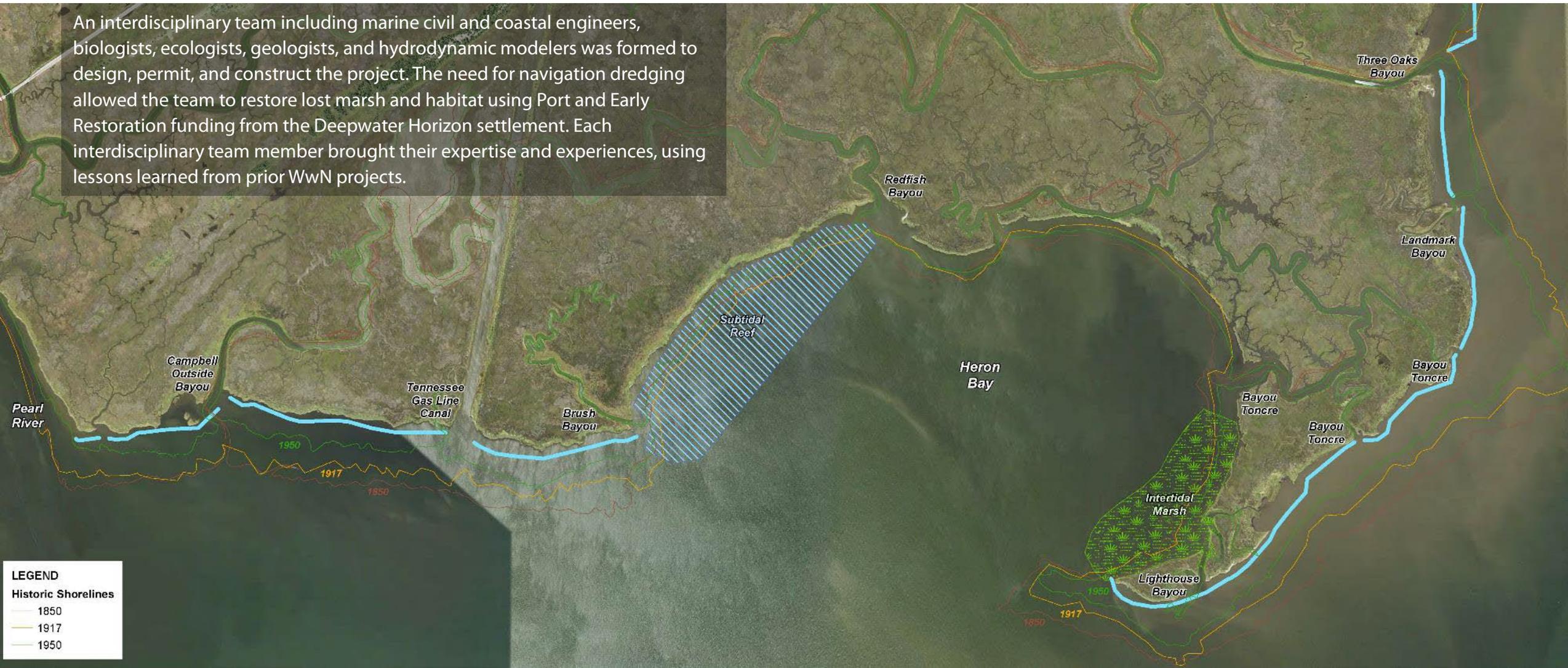
When the design team was selecting borrow sources for the creation of the marsh, Port Bienville was contacted, and they worked together to save funds and use the material beneficially for the marsh restoration and future maintenance dredged material placements.

Project components were monitored for 7 years to determine if the following project goals were incrementally attained:

- Beneficial use of dredged navigation infrastructure maintenance material
- Reduction of coastal erosion
- Enhancement of ecological productivity
- Coastal resilience

# Step 1: Establish Project Needs and Objectives

An interdisciplinary team including marine civil and coastal engineers, biologists, ecologists, geologists, and hydrodynamic modelers was formed to design, permit, and construct the project. The need for navigation dredging allowed the team to restore lost marsh and habitat using Port and Early Restoration funding from the Deepwater Horizon settlement. Each interdisciplinary team member brought their expertise and experiences, using lessons learned from prior WwN projects.



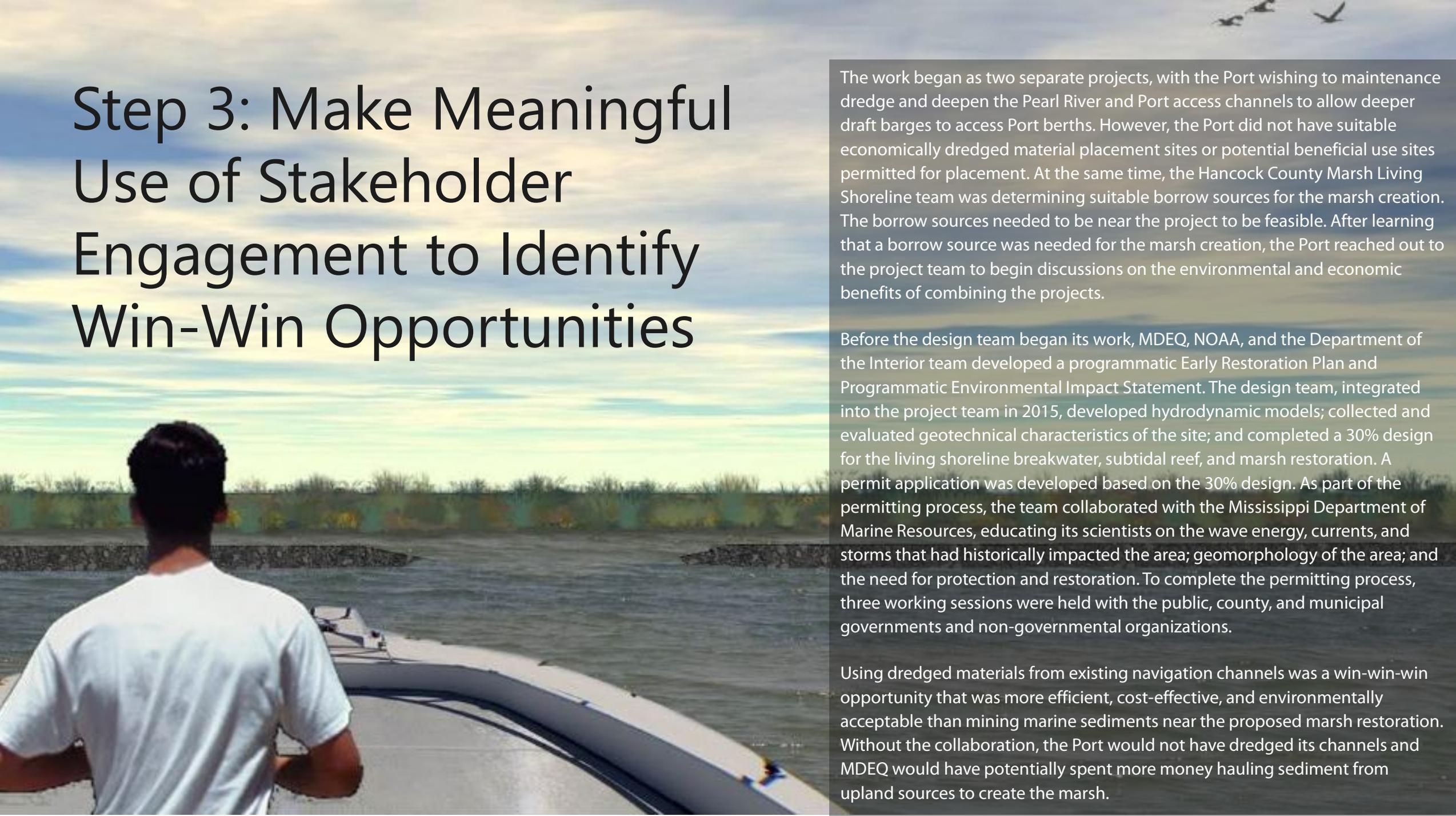
LEGEND	
Historic Shorelines	
—	1850
—	1917
—	1950

# Step 2: Understand the Environment

Cultural resources, ecology, and morphology of the project area were extensively documented before the Deepwater Horizon oil spill. The collaboration of MDEQ, NOAA, and the permitting and design team included evaluating the historical data along with significant data collection at the site. Hydrographic survey, wind, wave, and current data and geotechnical data were collected and used in the hydrodynamic models to design the structures needed to protect and restore the Hancock County Marsh Coastal Preserve using dredged material from the east Pearl River and the Port access channels.





A person in a white shirt is seen from behind, looking out over a body of water. In the foreground, there is a concrete breakwater or pier structure. The background shows a wide expanse of water and a distant shoreline with some vegetation. The sky is overcast with soft light, and a few birds are visible in the upper right corner.

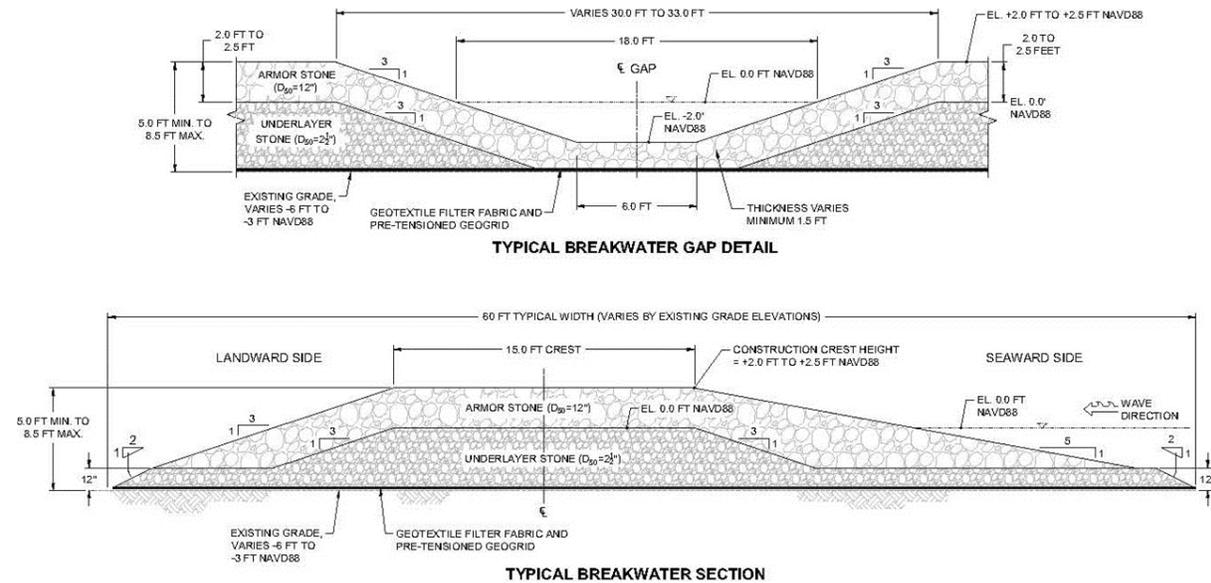
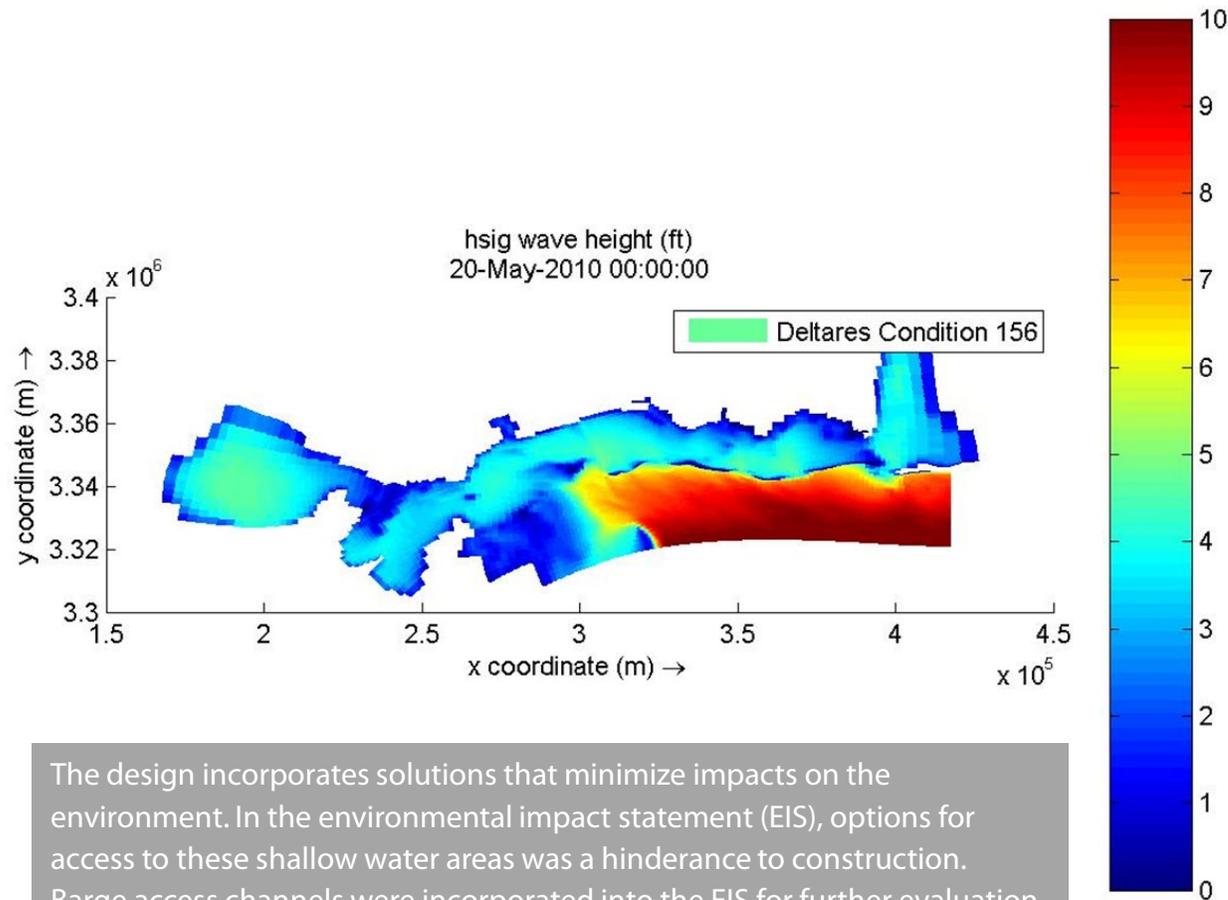
# Step 3: Make Meaningful Use of Stakeholder Engagement to Identify Win-Win Opportunities

The work began as two separate projects, with the Port wishing to maintenance dredge and deepen the Pearl River and Port access channels to allow deeper draft barges to access Port berths. However, the Port did not have suitable economically dredged material placement sites or potential beneficial use sites permitted for placement. At the same time, the Hancock County Marsh Living Shoreline team was determining suitable borrow sources for the marsh creation. The borrow sources needed to be near the project to be feasible. After learning that a borrow source was needed for the marsh creation, the Port reached out to the project team to begin discussions on the environmental and economic benefits of combining the projects.

Before the design team began its work, MDEQ, NOAA, and the Department of the Interior team developed a programmatic Early Restoration Plan and Programmatic Environmental Impact Statement. The design team, integrated into the project team in 2015, developed hydrodynamic models; collected and evaluated geotechnical characteristics of the site; and completed a 30% design for the living shoreline breakwater, subtidal reef, and marsh restoration. A permit application was developed based on the 30% design. As part of the permitting process, the team collaborated with the Mississippi Department of Marine Resources, educating its scientists on the wave energy, currents, and storms that had historically impacted the area; geomorphology of the area; and the need for protection and restoration. To complete the permitting process, three working sessions were held with the public, county, and municipal governments and non-governmental organizations.

Using dredged materials from existing navigation channels was a win-win-win opportunity that was more efficient, cost-effective, and environmentally acceptable than mining marine sediments near the proposed marsh restoration. Without the collaboration, the Port would not have dredged its channels and MDEQ would have potentially spent more money hauling sediment from upland sources to create the marsh.

# Step 4: Prepare Conceptual Project Design



The design incorporates solutions that minimize impacts on the environment. In the environmental impact statement (EIS), options for access to these shallow water areas was a hinderance to construction. Barge access channels were incorporated into the EIS for further evaluation. The design team, along with regional contractors, developed a light loading process that balanced the cost of the access channels. The channels were deleted from the final construction contracts. More than 6 miles of living shoreline were constructed without access channels.

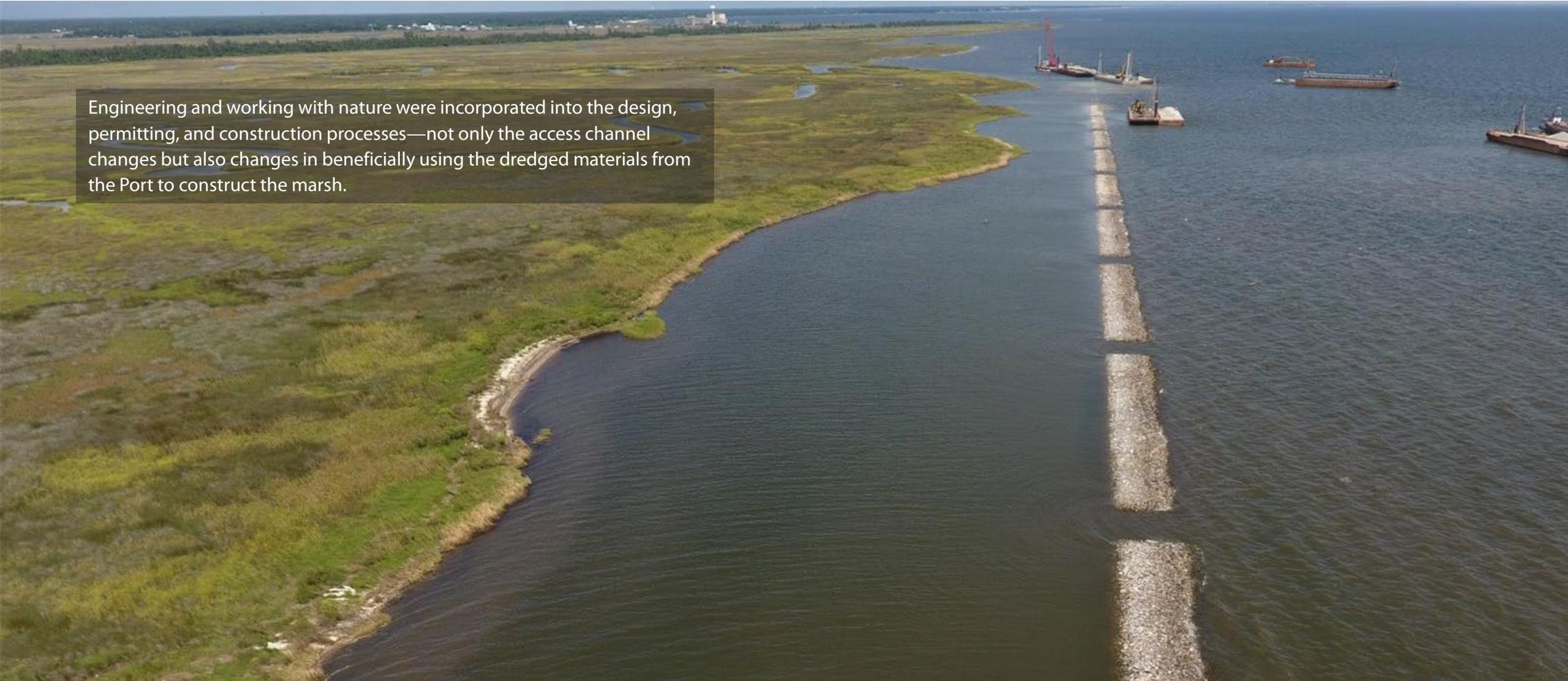
# Step 4: Prepare Conceptual Project Proposal / Design

The historical shellfish reefs in Heron Bay and the surrounding areas were leased water bottoms. When the State lease program was discontinued, the shellfish industry moved the culch from Mississippi water bottom to Louisiana, where bottom lands can be privately held and/or leased from the State. The living shoreline, subtidal reef, and surrounding marsh will be a long-term spat source and nursery ground for crabs and shrimp because Mississippi uses its Deepwater Horizon funds to restore harvestable offshore reefs. Monitoring results for the first 3 years of the subtidal reef and 2 miles of living shoreline showed an 80% increase in secondary productivity. Annual images showed increased use by recreational and commercial fishermen.

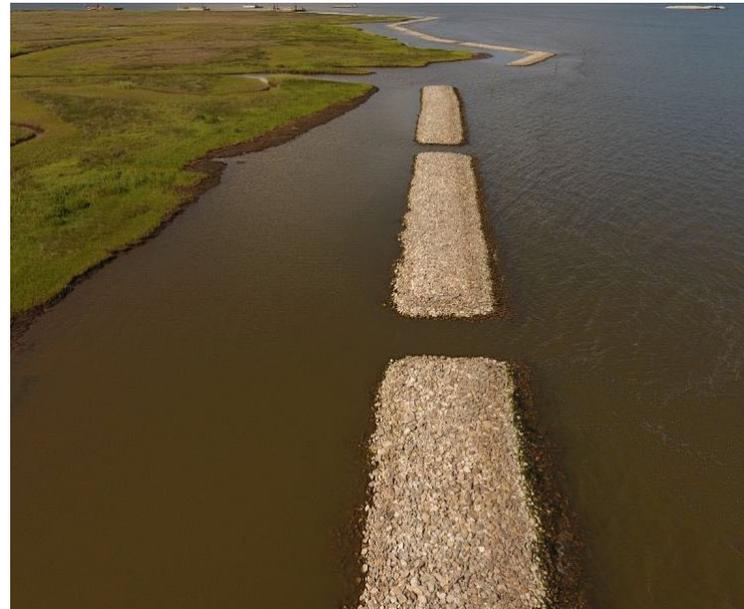


# Step 5: Build and Implement

Engineering and working with nature were incorporated into the design, permitting, and construction processes—not only the access channel changes but also changes in beneficially using the dredged materials from the Port to construct the marsh.



Geocomposite minimizes breakwater foundation consolidation



Construction of the living shoreline



# Step 6: Monitor, Evaluate, and Adapt



During the first construction season, the subtidal reef and Phase 1 of the living shoreline were constructed. These were the two easiest elements to construct and attempt the WwN processes. The design and construction management teams were able to complete minor revisions to the construction and phasing of the remaining project segments to use additional WwN features and methods. All project phases have met and exceeded their respective 7-year goals for coastal resilience and increased biomass.







Monitoring and adaptive management will take place as the marsh matures.