

# MISSISSIPPI COASTAL IMPROVEMENTS PROGRAM (MsCIP)

## Comprehensive Barrier Island Restoration Plan

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*"The views, opinions and findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation."*



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# Presentation Outline

- History of the Mississippi Coastal Improvements Program (MsCIP)
- Development of the Comprehensive Barrier Island Restoration Plan
- Investigations, Analyses, & Modeling Performed in Support of the Project
- Description of Recommended Plan for Ship Island
- Overview of the Cat Island Construction Project

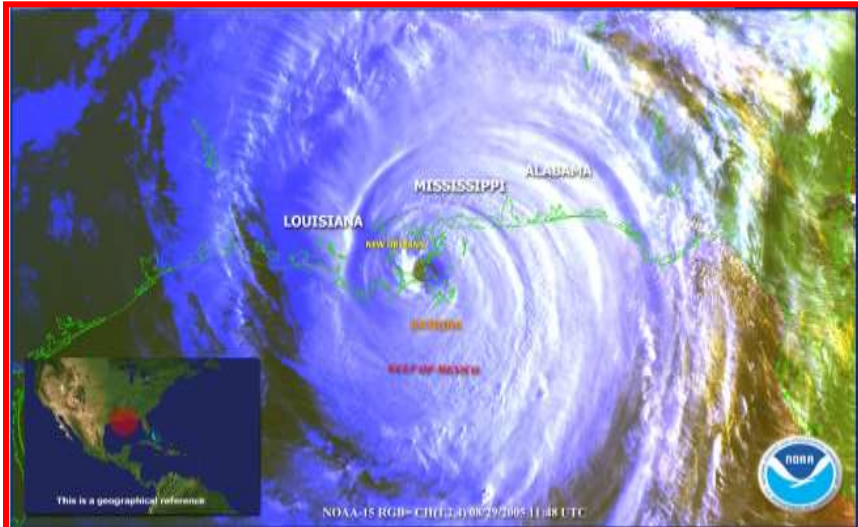


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# Mississippi Coastal Improvements Program (MsCIP)

- P.L. 109-148, 30 December 2005
- Comprehensive Planning to Address
  - Hurricane and Storm Damage Reduction
  - Salt Water Intrusion
  - Shoreline Erosion
  - Fish and Wildlife Preservation
  - Other Water Related Resource Projects
- Cost Effective Projects in lieu of NED benefits
- No Incremental Benefit-Cost Analysis
- Report requirements
  - Interim Report within 6 months
  - Comprehensive Plan within 2 years
- Compatible with State Coastal Restoration Plan



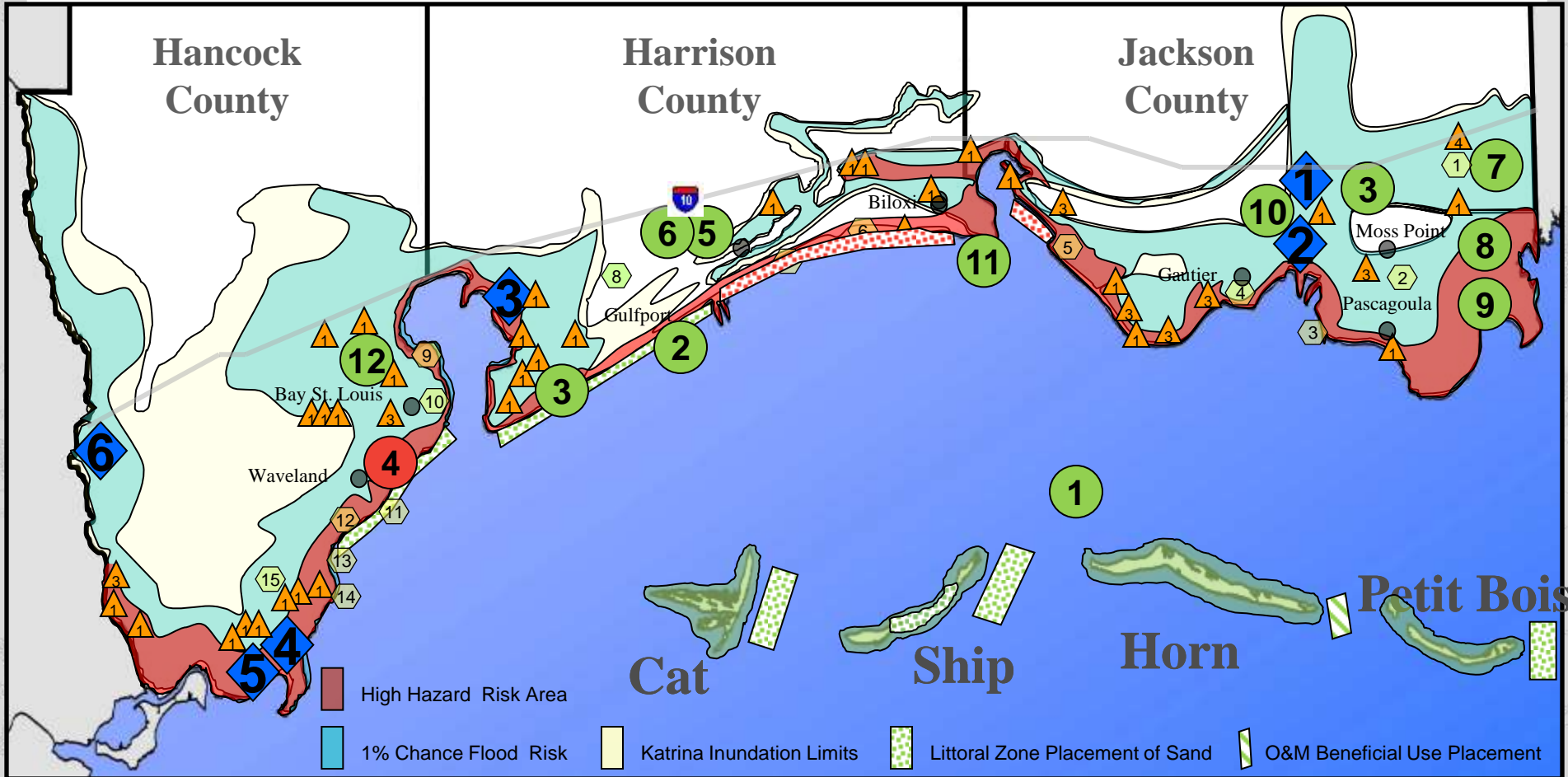
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-  Hurricane / Storm
-  Salt Water Intrusion
-  Shoreline Erosion
-  Fish & Wildlife

# MsCIP Restoration Elements

-  Interim Projects
-  Phase I Projects
-  Ecosystem Restoration Studies
-  Other Studies



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# Objectives of Comprehensive Barrier Island Restoration Plan

- Restore the barrier islands structure to reduce storm damage impacts on the mainland coast of Mississippi.
  - Barrier islands are the MS mainland's first line of defense for storm protection
  - Barrier islands also act to manage the productivity of the estuaries in their lee
- Enhance long-term sediment drift along the Mississippi barrier islands.
- Maintain the estuarine ecosystem and resources of the Mississippi Sound.
- Preserve the natural and cultural resources of the Mississippi barrier islands.



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# Comprehensive Barrier Island Restoration Plan Components

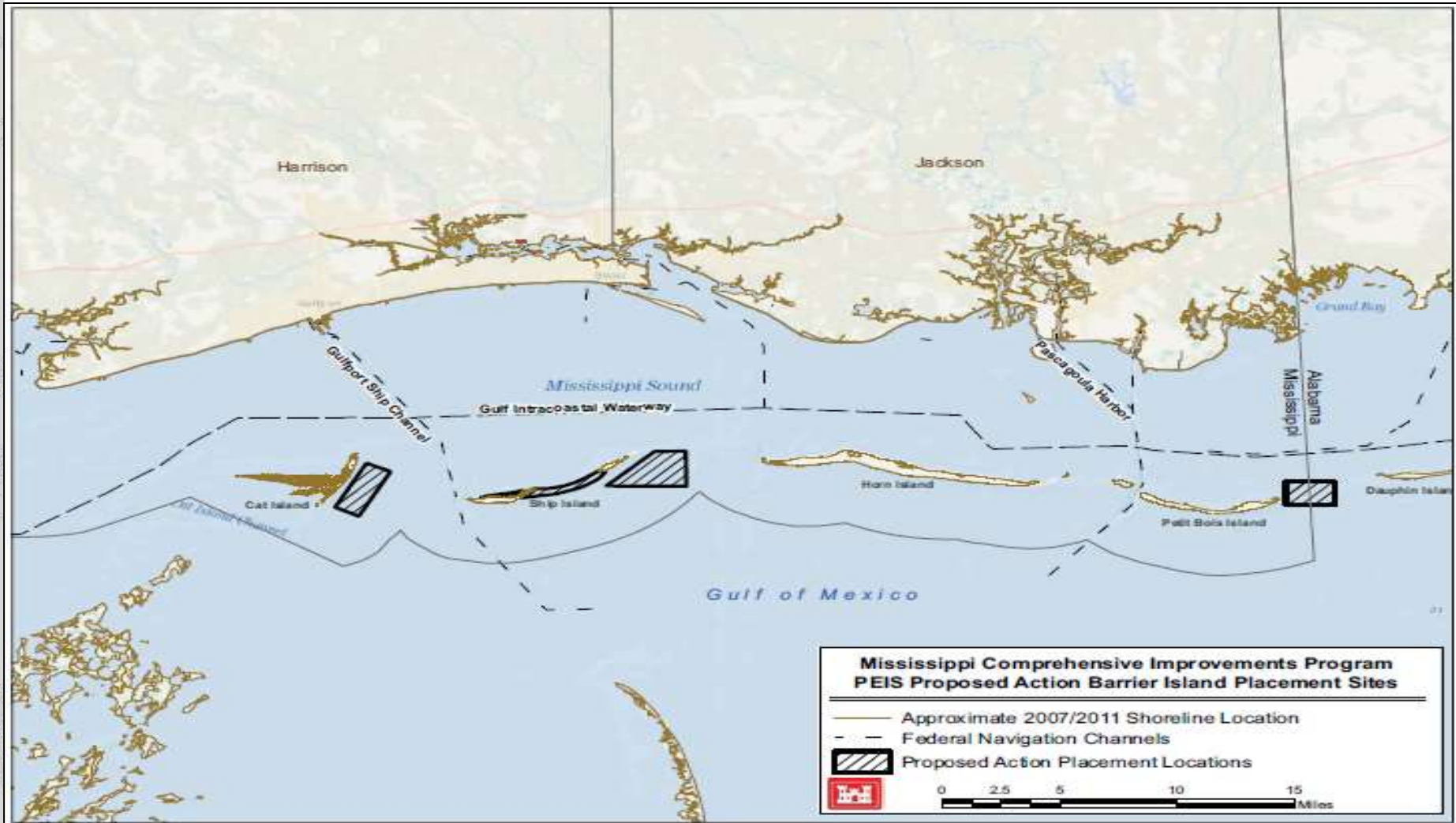
- Sediment budget of barrier island chain
- Eastern shoreline of Cat Island
- Revised dredge material disposal plan for Pascagoula navigation channel
- Northern shoreline of West Ship Island



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# Original Placements for Restoration of Sediment Budget – Mississippi Barrier Islands



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# **Modeling/Analyses Completed in Support of the Project**

## **Barrier Island Sediment Budget (1917/20 – 2005/10) – Applied Coastal Engineering**

- Limits: Dauphin Island in the East to Cat Island in the West

## **Desktop Analysis – USACE, Mobile District**

- Provided a relative comparison of borrow sources. Used as a screening tool to identify alternatives for further detailed analysis and modeling

## **Hydrodynamic, Water Quality, Wave, Sediment Transport, & Morphology – ERDC & CH2MHill/Deltares/DHV**

- Circulation: ADCIRC and CH3D (ERDC)
- WQ: CH3D and CEQUAL-ICM (ERDC)
- Reduction in waves along MS coast: ADCIRC & STWAVE (ERDC)
- Nearshore sediment transport at Ship Island (1-, 10-, & 500-Year Storms): C2SHORE (ERDC)
- Wave impacts of nearshore borrow areas: STWAVE & GENESIS (ERDC)
- Morphology of the restored Ship Island & impacts to Gulfport Navigation Channel for average conditions (4-year simulation) and storm events (6 hurricanes): Delft-3D (CH2/Deltares/DHV)
- Recovery potential of the restored Ship Island to storm events: Delft-3D (CH2/Deltares/DHV)
- Optimization of construction methods (profile design, sand losses, and turbidity): Delft-3D & Unibest-TC (CH2/Deltares/DHV)

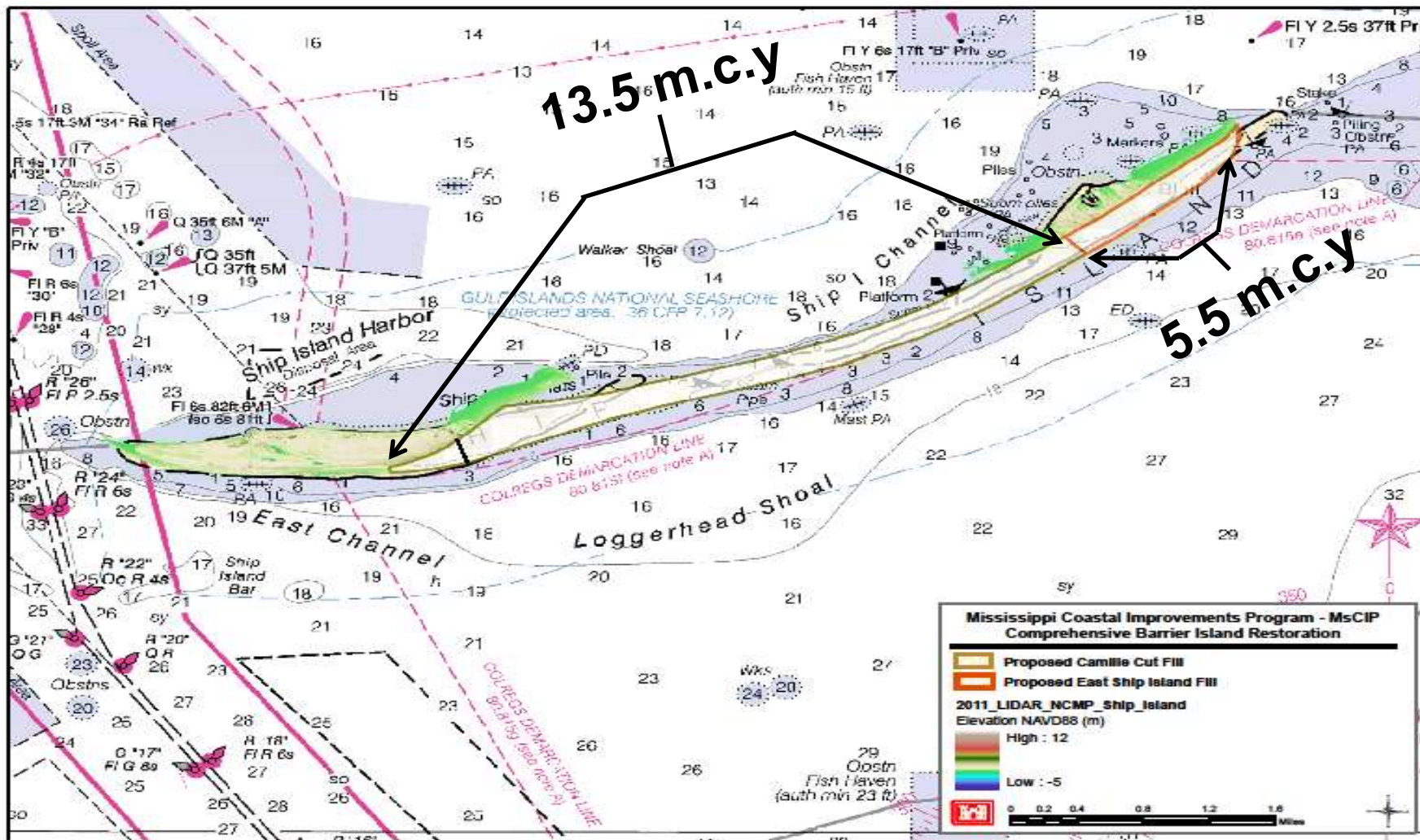


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# Recommended Placements For Restoration Of Sediment Budget – Mississippi Barrier Islands



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# Criteria for Selection of a Borrow Source

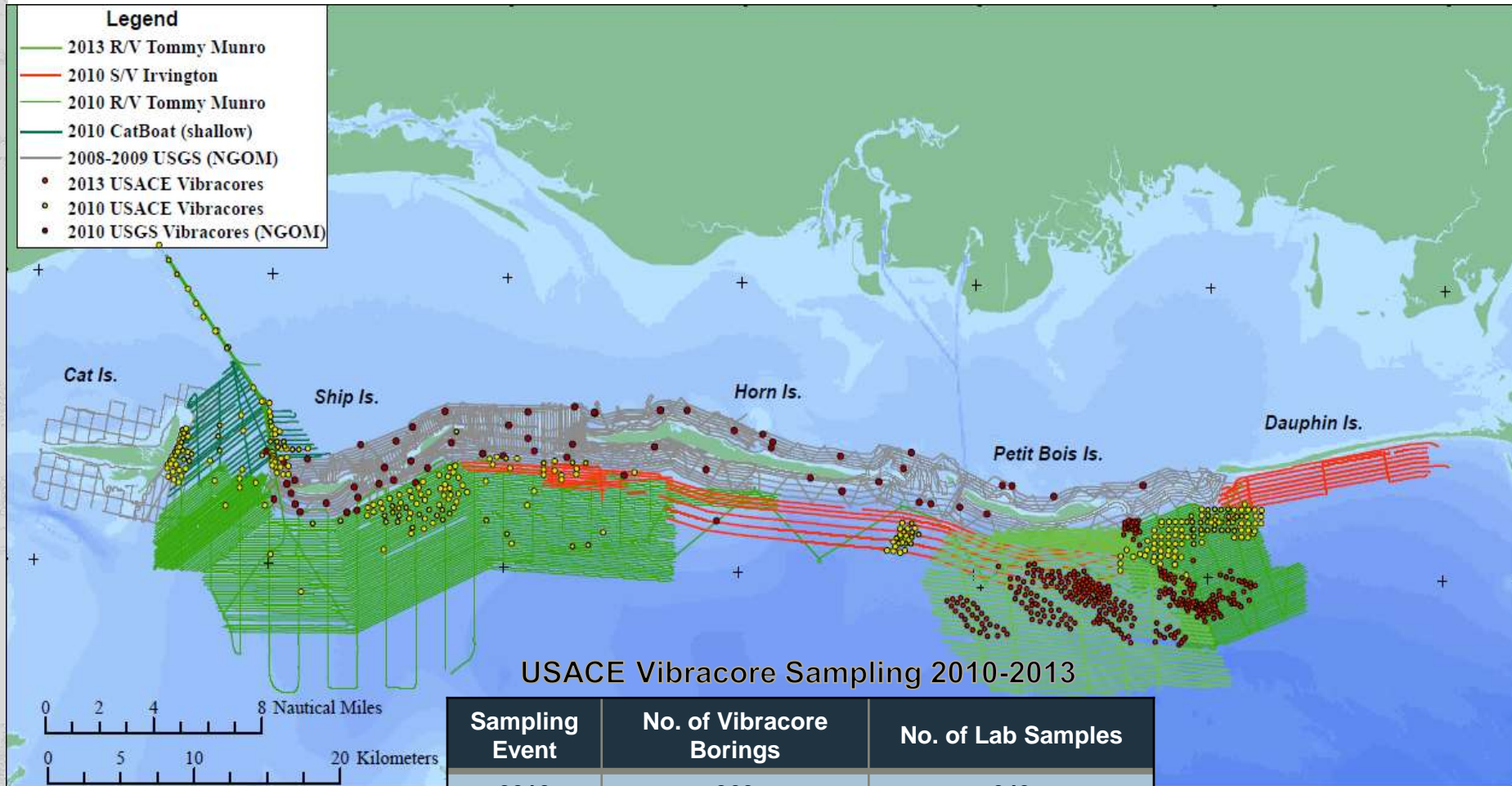
- Sand compatibility
  - Gradation (Avg  $D_{50}$  of sand on Ship Island = 0.30 mm)
  - Color
- Out of active littoral transport system
- Minimal wave focusing
- Cost



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# Geophysical And Geotechnical Investigations USGS & USACE



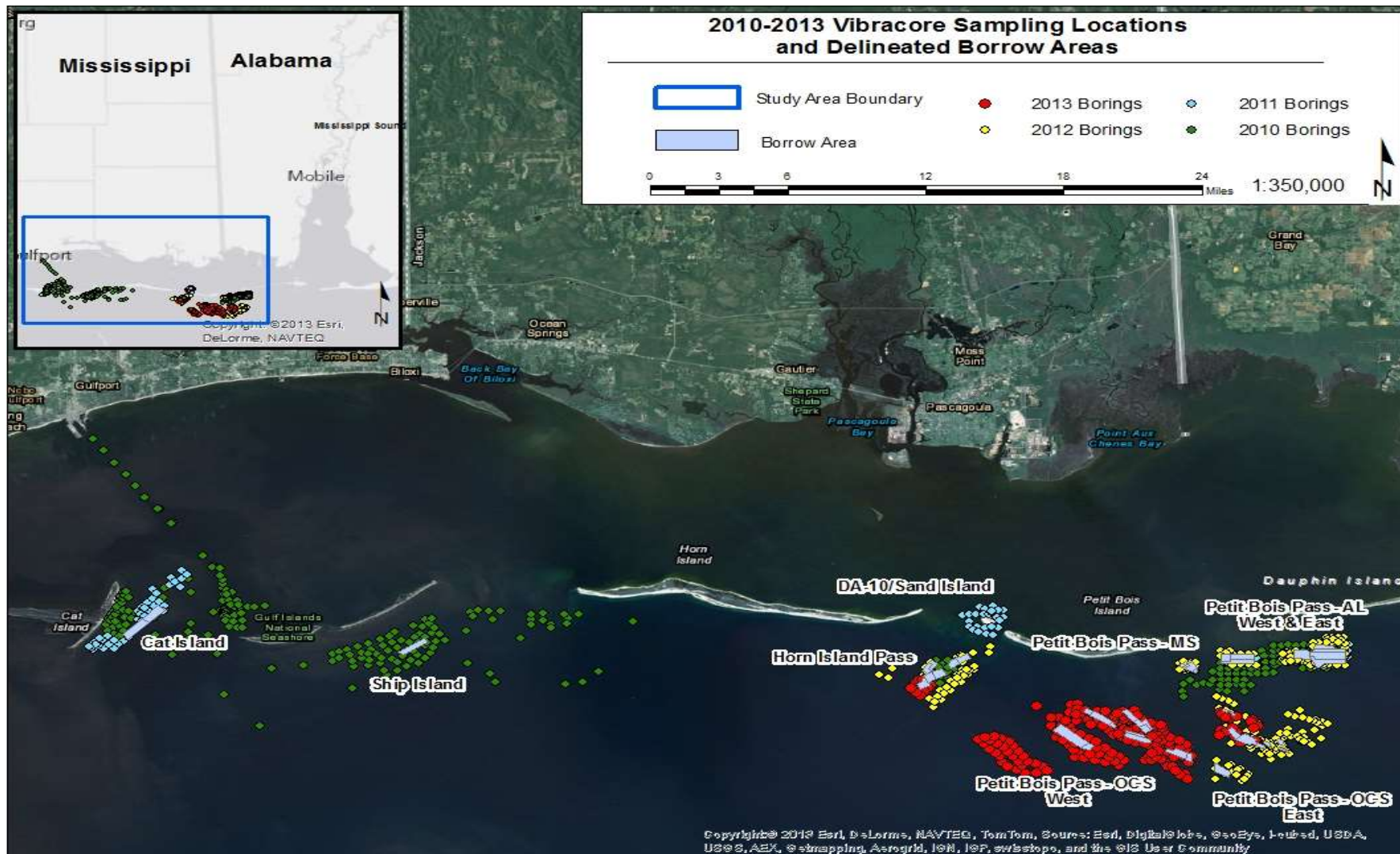
Sampling Event	No. of Vibracore Borings	No. of Lab Samples
2010	369	649
2011	89	176
2012	230	488
2013	206	455
<b>Total</b>	<b>894</b>	<b>1,768</b>



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# Geotechnical Investigations & Identified Borrow Sources



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# BORROW AREA QUANTITIES

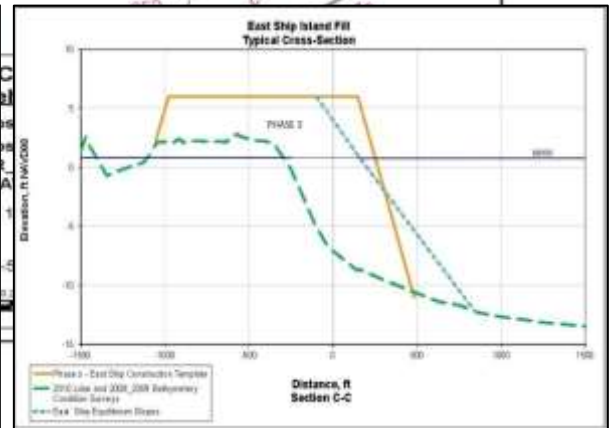
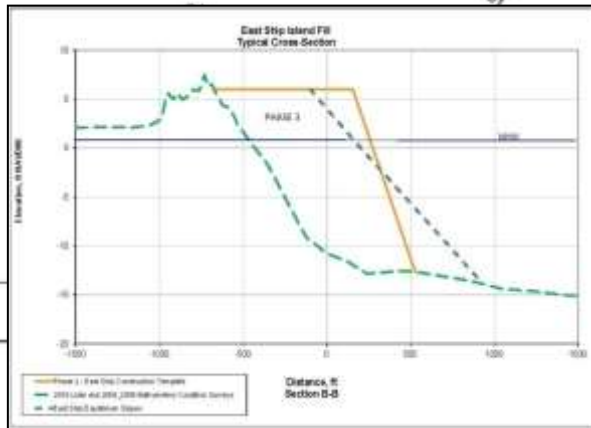
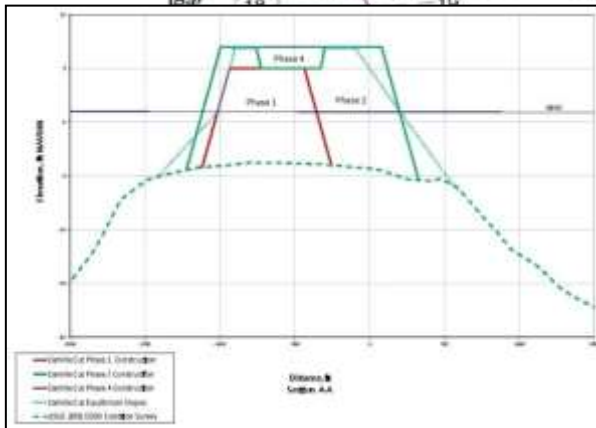
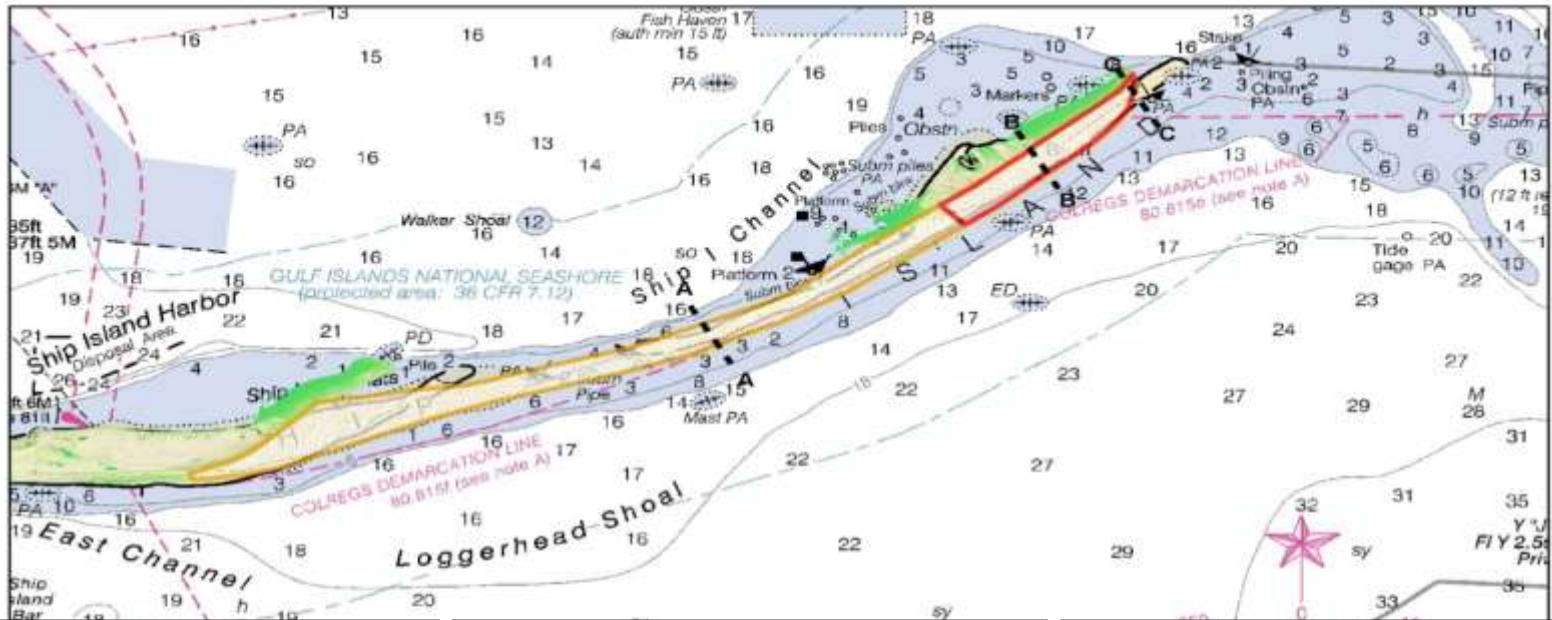
Borrow Site	D50 (mm)	Required Dredge Volume (mcy)	Allowable Dredge Volume (mcy)	Haul Distance to Ship Island (miles)
Petit Bois Pass- AL East	0.33	12.0	2.7	37
Petit Bois Pass- AL West	0.31	3.9	1.2	34
Petit Bois Pass- MS	0.31	1.6	0.4	32
Petit Bois Pass- OCS East	0.29	3.0	1.2	35
Petit Bois Pass- OCS West	0.27	10.4	5.3	31
Horn Island Pass	0.29	2.8	2.1	23
Ship Island	0.21	2.1	0.6	3
Cat Island	0.20	2.9	1.4	1.5



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# Recommended Plan For Ship Island Restoration



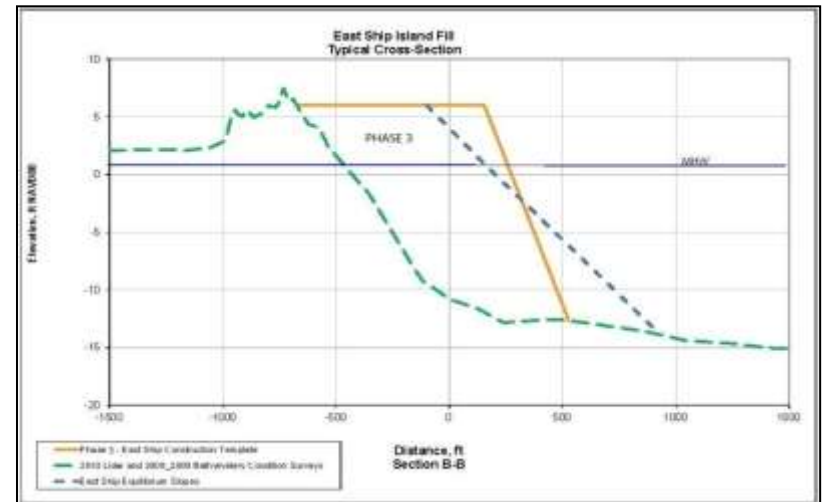
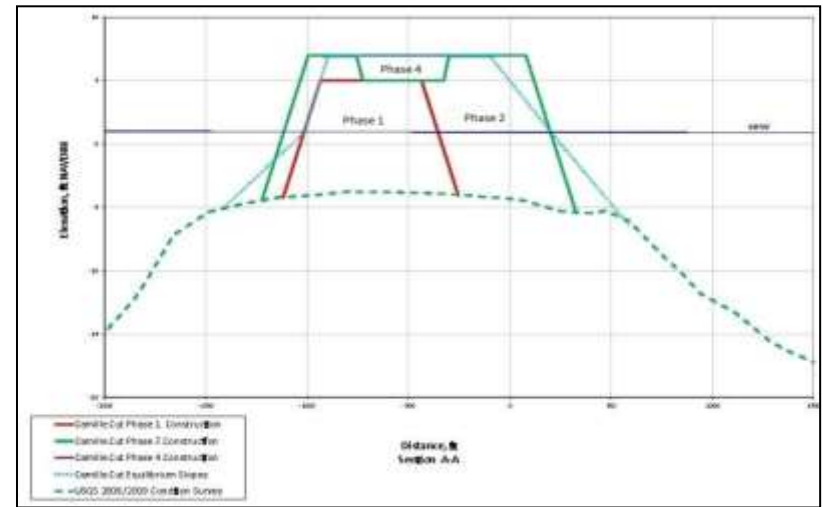
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# Ship Island Phases Of Construction

## Construction Phases

- Phase 1: (6.9 mcy)
  - Initial closure of Camille Cut
  - Top of Berm = EL. +5 ft NAVD88
  - Crest Width = 500 ft
  - Borrow Sites: PBP OCS East & West, HI Pass, & PBP MS
- Phase 2 (6.3 mcy)
  - Widen and raise Camille Cut Fill
  - Top of Berm = EL. +7 ft NAVD88
  - Crest Width = 1,000 ft
  - Borrow Site: PBP OCS West
- Phase 3 (4.7 mcy)
  - East Ship Island
  - Top of Berm = EL. +6 ft NAVD88
  - Crest Width = 1,100 ft
  - Borrow Sites: PBP OCS West & PB AL
- Phase 4 (1.1 mcy)
  - Cap Camille Cut Fill
  - Borrow Site: Ship Island



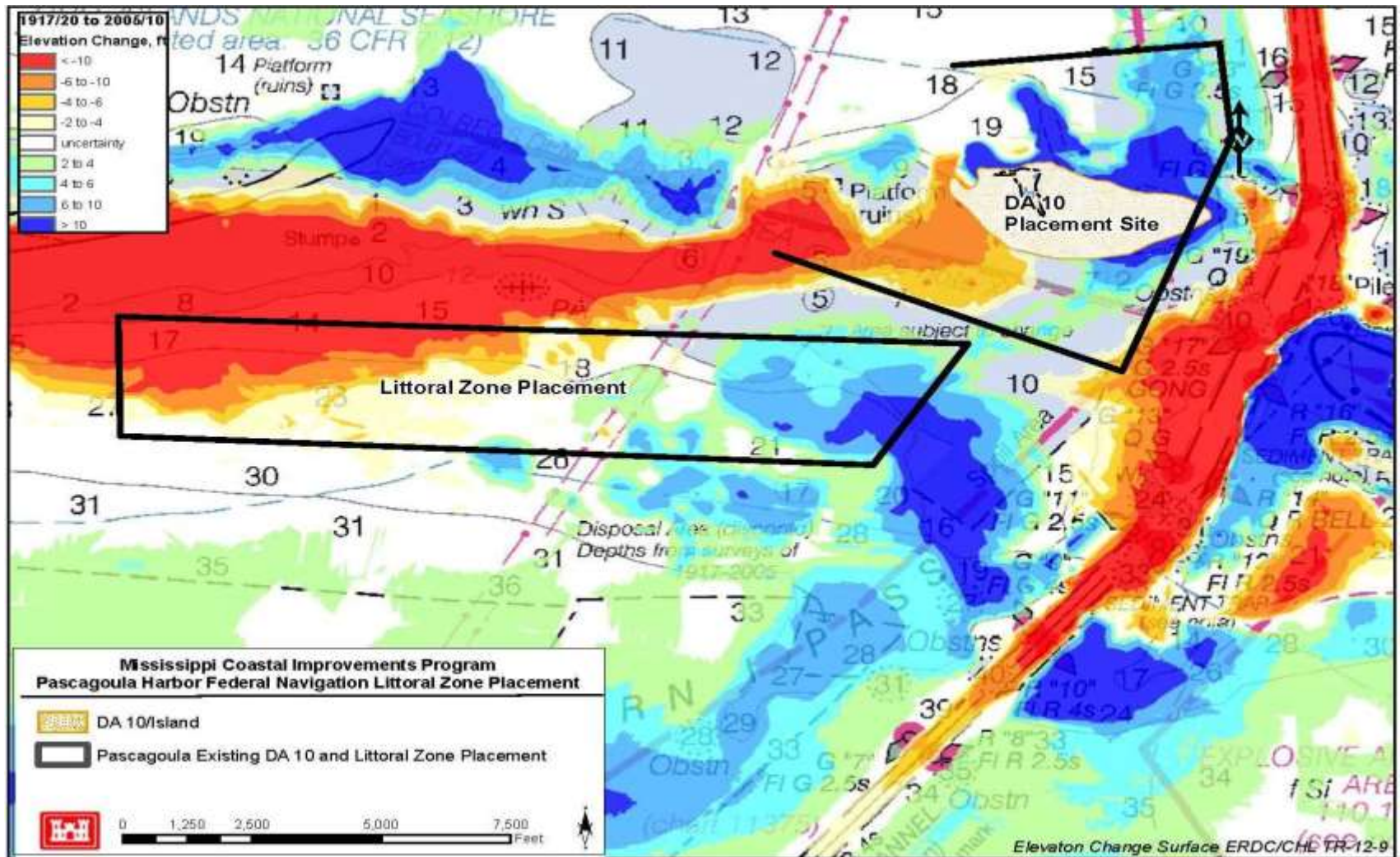
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# Existing Dredge Material Disposal Areas for Pascagoula

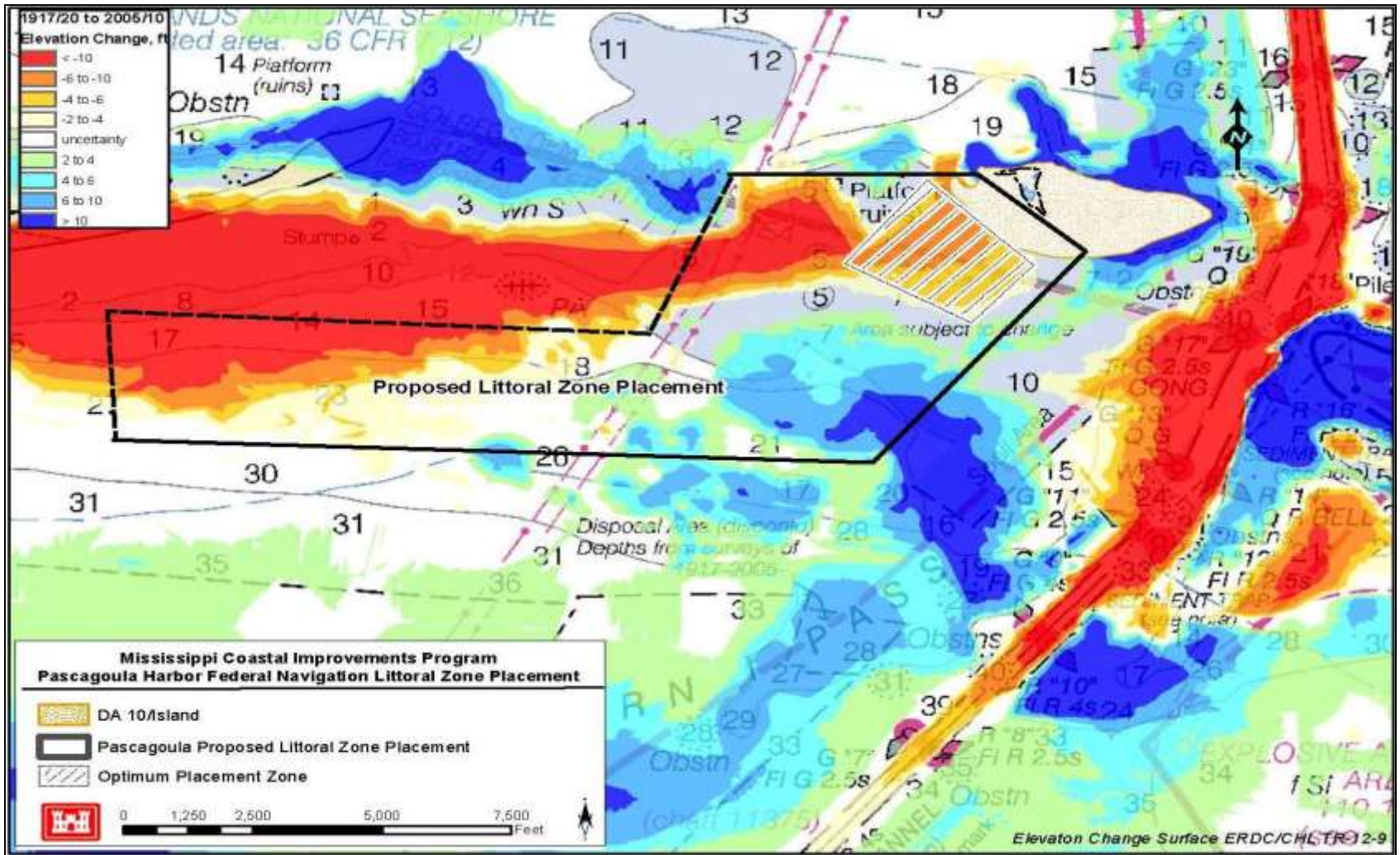


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# Proposed Modification to Dredge Material Disposal Plan



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# West Ship Island North Shore Restoration



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# West Ship Island North Shore Restoration

## Planting Phase

- Total of 272,604 plants installed
  - Sea Oats
  - Beach Panic Grass
  - Maritime Bluestem
  - Beach Tea
  - Sea Purslane
- 14,367 ft of sand fence
- Project Cost: \$2,588,933

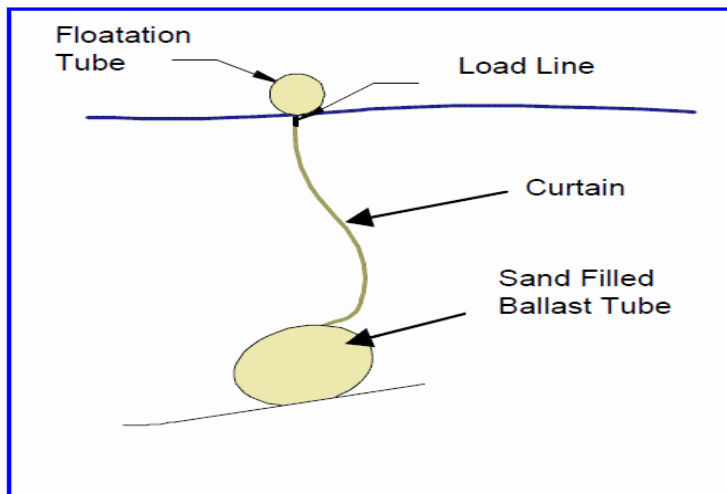


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# Protection of Submerged Aquatic Vegetation

- **Barrier System Details**
  - ▶ High strength woven fabric (same fabric used in geotubes)
  - ▶ No chains/anchors
  - ▶ Installed using small dive crew
- **Performance**
  - ▶ In place for 9 months with no failures
  - ▶ Very effective protection measure



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# Summary of Overall Restoration Plan

MsCIP Comprehensive Barrier Island Restoration Plan was developed in response to Hurricane Katrina – 4 Components

## – Objectives

- Restore the barrier islands structure to reduce storm damage impacts on the mainland coast of Mississippi.
- Enhance the long-term littoral drift system for the Mississippi barrier islands.
- Maintain the estuarine ecosystem and resources of the Mississippi Sound.
- Preserve the natural and cultural resources of the Mississippi barrier islands.

## – Restore Sediment Budget

- Placement Locations – Camille Cut/East Ship Island
- Borrow Sources – Petit Bois Pass AL, Petit Bois Pass MS, Petit Bois Pass OCS East, Petit Bois Pass OCS West, Horn Island Pass, and Ship Island
- Recommended Plan – 13.5 mcy in Camille Cut & 5.5 mcy at East Ship Island

## – Restore Eastern Shoreline of Cat Island

- Placement of approximately 2.1 mcy along eastern shoreline (complete)
- Installation of approximately 85,000 dune plants and 4,750 feet of sand fence (ongoing)
- Borrow Source – Cat Island

## – Revise Dredge Material Disposal Plan for Pascagoula Navigation Channel (Ongoing)

## – Restore Northern Shoreline of West Ship Island (Complete)



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# CAT ISLAND BEACH AND DUNE FILL

## Project Overview

- Started: July 21, 2017
- Completed: October 30, 2017
- \$16 M contract with Manson Construction Co.
- Dredge Robert M. White
- 2.1 MCY of material.
- Approximately three miles of beach template with two dunes.



## Dune Planting

- Started: November 6, 2017
- 4,750 LF of sand fence.
- Approximately 85,000 planting units.



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# CAT ISLAND BEACH AND DUNE FILL

## Hurricane Nate

- October 8, 2017
- Estimated 10-12' of storm surge.
- Over 80% of beach equipment damaged.
- Minimal sand loss in template.



## Sea Turtle Nests

- Total of 10 nests.
- Five nests relocated.
- One nest near template excavated on day 75.
- One nest on NPS land resulting in caging.



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# QUESTIONS?



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collaboration  
is everything

