MISSISSIPPI COASTAL IMPROVEMENTS PROGRAM (MsCIP)

Comprehensive Barrier Island Restoration Plan

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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
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
MsCIP Restoration Elements

Hancock County

Harrison County

Jackson County

Interim Projects
Phase I Projects
Ecosystem Restoration Studies
Other Studies

Katrina Inundation Limits
1% Chance Flood Risk
High Hazard Risk Area
Katrina Inundation Limits
Littoral Zone Placement of Sand
O&M Beneficial Use Placement

Hurricane / Storm
Salt Water Intrusion
Shoreline Erosion
Fish & Wildlife

Bay St. Louis
Waveland
Gulfport
Biloxi
Gautier
Pascagoula
Moss Point
Pascagoula

Cat
Ship
Horn
Petit Bois

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14
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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.
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
Original Placements for Restoration of Sediment Budget – Mississippi Barrier Islands
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

  - 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)
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
### Geophysical And Geotechnical Investigations

**USGS & USACE**

<table>
<thead>
<tr>
<th>Sampling Event</th>
<th>No. of Vibracore Borings</th>
<th>No. of Lab Samples</th>
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<tr>
<td>2010</td>
<td>369</td>
<td>649</td>
</tr>
<tr>
<td>2011</td>
<td>89</td>
<td>176</td>
</tr>
<tr>
<td>2012</td>
<td>230</td>
<td>488</td>
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<tr>
<td>2013</td>
<td>206</td>
<td>455</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>894</strong></td>
<td><strong>1,768</strong></td>
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</tbody>
</table>

**Legend**

- **2013 R/V Tommy Munro**
- **2010 S/V Irvington**
- **2010 R/V Tommy Munro**
- **2010 CatBoat (shallow)**
- **2008-2009 USGS (NGOM)**
  - 2013 USACE Vibracores
  - 2010 USACE Vibracores
  - 2010 USGS Vibracores (NGOM)
Geotechnical Investigations & Identified Borrow Sources
<table>
<thead>
<tr>
<th>Borrow Site</th>
<th>D50 (mm)</th>
<th>Required Dredge Volume (mcy)</th>
<th>Allowable Dredge Volume (mcy)</th>
<th>Haul Distance to Ship Island (miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petit Bois Pass- AL East</td>
<td>0.33</td>
<td>12.0</td>
<td>2.7</td>
<td>37</td>
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<tr>
<td>Petit Bois Pass- AL West</td>
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<td>3.9</td>
<td>1.2</td>
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<tr>
<td>Petit Bois Pass- MS</td>
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<td>1.6</td>
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<tr>
<td>Petit Bois Pass- OCS East</td>
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<td>3.0</td>
<td>1.2</td>
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<tr>
<td>Petit Bois Pass- OCS West</td>
<td>0.27</td>
<td>10.4</td>
<td>5.3</td>
<td>31</td>
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<tr>
<td>Horn Island Pass</td>
<td>0.29</td>
<td>2.8</td>
<td>2.1</td>
<td>23</td>
</tr>
<tr>
<td>Ship Island</td>
<td>0.21</td>
<td>2.1</td>
<td>0.6</td>
<td>3</td>
</tr>
<tr>
<td>Cat Island</td>
<td>0.20</td>
<td>2.9</td>
<td>1.4</td>
<td>1.5</td>
</tr>
</tbody>
</table>
Recommended Plan For Ship Island Restoration
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
Ship Island Phase 1 Construction Details

Phase I: Awarded to Great Lakes Dredge and Dock Co.

Award: 18 January 2017 - $88.5M

Actual Start: 8 December 2017

Equipment: New hopper dredge “Ellis Island”

Status: Placed approximately 0.5 million cubic yards

Anticipated Completion Date: September 2018
Existing Dredge Material Disposal Areas for Pascagoula
Proposed Modification to Dredge Material Disposal Plan
Placement Quantity = 2.1 mcy

FILL PLACEMENT AREA

BORROW AREA
West Ship Island North Shore Restoration

Fill Volume: 565,000 cy
Berm Length: 9,700 ft
Project Cost: $7,219,501
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
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
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
  • 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)
CAT ISLAND BEACH AND DUNE RESTORATION

Placement Quantity = 2.1 mcy
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 dunes.

Dune Planting
• Started: November 6, 2017
• 4,750 LF of sand fence.
• Approximately 85,000 planting units.
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.
QUESTIONS?