Utilizing Mississippi River Sediments to Restore Coastal Wetlands

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2012 Coastal Master Plan

Protection AND Restoration

Projects Included:
- Structural Protection
- Bank Stabilization
- Oyster Barrier Reef
- Ridge Restoration
- Shoreline Protection
- Barrier Island Restoration
- Marsh Creation
- Sediment Diversion
- Hydrologic Restoration

Projects for Further Planning:
- Lake Pontchartrain Barrier
- Lake Charles Protection
- Terrebonne Bay Rim Marsh Creation
- Channel Realignment (Not Shown)
Keystone of the 2012 Master Plan: 
Reconnecting the Mississippi River

- Bayou Lafourche Diversion: 1,000 cfs maximum
- West Maurepas Diversion: 5,000 cfs maximum
- Central Wetland Diversion: 5,000 cfs maximum
- Upper-Breton Diversion: 250,000 cfs maximum
- Mid-Breton Diversion: 5,000 cfs maximum
- Lower Breton Diversion: 50,000 cfs maximum
- Atchafalaya River Diversion: 150,000 cfs maximum
- Increased Atchafalaya Flow: 20,000 cfs maximum
- Mid-Barataria Diversion: 50,000 / 250,000 cfs maximum
- Lower Barataria Diversion: 50,000 cfs maximum

Coastal Protection and Restoration Authority of Louisiana
Sediment Diversion
Mid Barataria Sediment Diversion

Diversion Location:
• Plaquemines Parish; 8 mi E of Lafitte, LA
• RM 60.7

Problems in Outfall Area:
• Land Loss, Habitat Shift, Saltwater Intrusion, Subsidence, Hydrology alteration, Sediment deprivation

Diversion Size:
• 75,000 cfs Sediment Diversion Complex

Components of Sediment Diversion:
• Inlet structure (Gate and Controls), Channel, guide levees, outlet structure

Total Cost:
• $571,000 E&D and Construction
Diversion size

75,000 cfs – Dr. Ehab Meselhe’s results (sediment/water ratios)

<table>
<thead>
<tr>
<th></th>
<th>Mississippi Channel OA-RM60.2-15K</th>
<th>Diversion Channel ND-RM60.7-15K</th>
<th>Diversion Channel MA-RM60.7-45K</th>
<th>Diversion Channel ND-RM60.7-45K</th>
<th>Diversion Channel ND-RM60.7-75K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Discharge (m3/s)</td>
<td>19.821</td>
<td>322</td>
<td>361</td>
<td>955</td>
<td>937</td>
</tr>
<tr>
<td>Water Discharge (CFS)</td>
<td>700.000</td>
<td>11,369</td>
<td>12,733</td>
<td>33,735</td>
<td>33,075</td>
</tr>
</tbody>
</table>

Sediment Load (metric tons/d) - 32 Micron: 233.539, 2,786, 4,189, 15,306, 13,819, 24,789
Sediment Load (metric tons/d) - 63 Micron: 10.839, 104, 188, 663, 619, 1,156
Sediment Load (metric tons/d) - 96 Micron: 21.816, 144, 335, 1,230, 1,150, 2,357
Sediment Load (metric tons/d) - 125 Micron: 34.437, 133, 420, 1,837, 1,675, 3,726
Sediment Load (metric tons/d) - 250 Micron: 23.460, 2, 44, 218, 528, 1,607

Total 63 - 250 Micron Load (metric tons/d): 99.554, 982, 987, 3,748, 3,972, 8,847
Sediment/Water Ratio (SWR): 0.26, 0.60, 0.85, 0.93, 1.12

Location

Based on an intensive Mississippi River data collection and modeling effort, the location of the intake channel and the outfall channel alignment has been carefully selected at river mile 60.7 above Head of Passes to optimize the capture of sediment from the river.
Design of Construction Features

Currently bringing the following to a 15% to 30% Level:

- Dredging plan for excavation in front of flume
- Revetment Removal
- MR&T Levee Tie-In
- Flume
- Structure

- Channel & Guide Levees
- Highway 23 Detour
- Highway 23 Bridge
- Pump station/Drainage Plan
- Back Hurricane Levee Tie-in
Restoration via Hydraulic Dredging
Inland Dredging - Marsh Restoration/Creation

Dedicated Dredging at Barataria Landbridge
Offshore Dredging - Barrier Island Restoration

Pelican Island Restoration
Dredging from the Mississippi River
Renewable Sediment Sources
Renewable Sediment Sources
Alliance Anchorage Borrow Site
Mississippi River Borrow Area Design Criteria

- USACE Mississippi River Permissible Dredging Restrictions and dredging offsets.
- Navigational Safety Concerns- MNSA.
- Proposed USACE Saltwater Barrier Sill Coordination.
- Existing Revetment offset requirements.
- Mississippi River Levee Crossing Requirements.
- Mississippi River Stage Seasonal Variation.
- Required Volume for Marsh Fill Areas.
- Required Volume for dredging- Cut Volume typically 1.3 -1.5 times fill volume.
- Need additional volume due to unforeseen conditions- debris, anomalies, etc.
- Monitor Mississippi River Borrow Infilling rates.
Observed **Refill Rates** after BA-39 Dredging

- Post BA-39 Dredging April 2010
- Refill as of August 2011
# Borrow Area Refill Rates

<table>
<thead>
<tr>
<th>Borrow Area</th>
<th>1 yr</th>
<th>~3 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alliance Anchorage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SWB Measured</td>
<td>72% (0.8 Mcy)</td>
<td>93%</td>
</tr>
<tr>
<td>-60 ft cut (1.1 Mcy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BA-39 Measured</td>
<td>45% (1.7 Mcy)</td>
<td>?</td>
</tr>
<tr>
<td>-60 to -70 ft cut (3.9 Mcy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDSP Modeled</td>
<td>63% (2.4 Mcy) +/- 16% (0.6 Mcy)</td>
<td>90%</td>
</tr>
<tr>
<td>-70 ft cut (3.4 Mcy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDSP Modeled</td>
<td>67% (4.4 Mcy) +/- 20% (1.3 Mcy)</td>
<td>95%</td>
</tr>
<tr>
<td>-90 ft cut (6.5 Mcy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3 Sites dredged to -90 ft</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wills Point Anchorage</td>
<td>47%</td>
<td>77%</td>
</tr>
<tr>
<td>Alliance Anchorage</td>
<td>42%</td>
<td>80%</td>
</tr>
<tr>
<td>Alliance South</td>
<td>20%</td>
<td>40%</td>
</tr>
</tbody>
</table>
Current Projects Utilizing Mississippi River Sediment
Marsh Creation

Dedicated Dredging at the Barataria Landbridge
Lake Hermitage Marsh Creation

Project Overview

- Largest CPRA Marsh Creation Project to utilize Mississippi River sediment
- Sediment dredged and pumped through over 9 miles of pipeline
- Volume of Sediment: 4,516,522 CY
- Acres Created: 650 acres
- Cost: $32,697,879
Lake Hermitage Marsh Creation

Pipeline Conveyance
Lake Hermitage Marsh Creation

Construction
Lake Hermitage Marsh Creation

Construction
Lake Hermitage Marsh Creation

Construction
Mississippi River Long Distance Sediment Pipeline/Bayou Dupont Ridge/Marsh
Linking Existing & Proposed Projects to Re-establish Backbone of Barataria Landbridge

- **Preferred LDSP Alignment**
- **Potential Future LDSP Extension**
Project Objectives

• Design and construct an **efficient sediment delivery** pipeline system from a **renewable resource** in the Mississippi River to strategic locations in Barataria Basin.

• The LDSP project is designed to:
  – Facilitate large-scale marsh creation in Barataria Basin by reducing future costs
  – Provide immediate restoration to natural landscape features: *Ridge and Marsh Complex*
  – Re-establish multiple benefits to the landscape by combining existing and new projects (ridge, marsh creation, freshwater introduction)
## Design Quantities

<table>
<thead>
<tr>
<th>Project</th>
<th>Marsh Area (acres)</th>
<th>Fill Volume (Mcy)</th>
<th>Dredged Volume (Mcy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bayou Dupont (BA-48)</td>
<td>Create 196</td>
<td>2.15</td>
<td>3.23</td>
</tr>
<tr>
<td></td>
<td>Nourish 93</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ridge 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MR Long Distance Sediment Pipeline</td>
<td>338</td>
<td>2.64</td>
<td>3.95</td>
</tr>
<tr>
<td>Total</td>
<td><strong>647</strong></td>
<td><strong>4.8</strong></td>
<td><strong>7.2</strong></td>
</tr>
</tbody>
</table>
Barrier Island Restoration
Coastal Protection and Restoration Authority of Louisiana
Scofield Island Restoration

Project Overview

- **Historical Erosion Rates:**
  - ~16.5 ft/yr
  - Near term rate over 49 ft/yr

- **Acres Created/Restored:** 640 acres

- **Volume of Sediment:** 3,393,500 CY

- Sediment dredged from the Mississippi River and pumped over 22 miles through pipeline (includes two levees and a harbor canal)

- **Cost:** $46,482,913

- **Completion Date:** September 2013
Unique Aspects of the Project

• Excavation of riverine sediments in one of the nations busiest navigational waterways
• Delivery of riverine sediments over 22 miles
• A conveyance corridors that requires:
  ▪ Micro-tunneling casing pipe installation under two highways
  ▪ Crossing of 2 levees and a harbor canal
  ▪ Pipeline installation along 18 miles of the Empire Waterway
  ▪ Providing 6 navigational crossings for commercial and recreational use over sediment pipeline
Scofield Island Typical Section

Project Design & Benefits
Scofield Island Restoration

Pipeline Conveyance
Scofield Island Restoration

Construction
Scofield Island Restoration

Construction
Scofield Island Restoration

Construction
Scofield Island Restoration

Construction
Scofield Island Restoration

Construction
Scofield Island Restoration

Construction
Shell Island Restoration

*Project Overview*

- **Acres Created/Restored:** 307 acres
- **Volume of Sediment:** 2,525,000 CY
- Sediment dredged from the Mississippi River and pumped over 22 miles through pipeline (includes two levees and a harbor canal)
- **Cost:** $43,000,000
- **Completion Date:** Fall 2013
Shell Island - Project Plan View

Shell Island Restoration

Construction
Shell Island Restoration

Construction
QUESTIONS

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