Mississippi River Sediment Diversions: Process

2012 MASTER PLAN
(Mississippi River Diversion Recommendations)

- LOWER BRETON (50,000 cfs)
- LOWER BARATARIA (50,000 cfs)
- MID BRETON (5,000 cfs)
- MID BARATARIA (50,000 cfs)
- MID BARATARIA (250,000 cfs)
- UPPER BRETON (250,000 cfs)

WINTER 2014
CPRA DECISION TO ADVANCE PARTICULAR ALTERNATIVES VIA VERIFICATION OF MASTER PLAN BENEFITS AND COSTS (Land/Site/Size/Cost/Constructability)

- FEASIBILITY & ENGINEERING MODELING
  (Site specific data collection and refined 2012 MP Models, river modeling, and localized Delft3D)

- MR HYDRODYNAMIC & DELTA MANAGEMENT
  (River and basin side modeling)

- BASIN-WIDE INTEGRATED HYDRODYNAMIC, MORPHOLOGICAL & NUTRIENTS MODELING
  (Analyze Sequencing and Operation of recommended suite of diversions)

- ECOLOGICAL MODELING
  (CASM and EwE coupling with Basin-Wide Delft3D and MRHDM AdH)

- PRELIMINARY DESIGN
  (varying levels – LCA feasibility, 10%, 30%)

- EXTERNAL TECHNICAL REVIEW
  (Review/comparison of cost and design assumptions and constructability determination)

- SOCIOECONOMIC EVALUATION
  (Social, economic, and fisheries impacts – past/present/future)

- DECEMBER 2016
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  (Federal Interest Determination – Chief’s Report)

- FALL 2015
  CPRA DECISION TO IMPLEMENT
  (Advance to full engineering and design)

- FALL 2015
  SWAMP
  (Pre/post construction and coast-wide monitoring, adaptive management)

- DATA SYNTHESIS/VISUALIZATION
  (SSPM and Coastal Sustainability Studio)

- 2017 MASTER PLAN
  (Recommendations would be included as part of evaluation)
Lower Barataria: BA-163
Lower Breton: BS-023
Sediment Diversions Feasibility

February 12, 2015

Kent Bollfrass
Coastal Resource Scientist
Project Study Area
Master Plan factsheet map

Proposed Lower Barataria Sediment Diversion (50,000 cfs)
Master Plan Project No. 002.DI.15
First Implementation Period
Project Study Area
Master Plan factsheet map

Proposed Lower Breton Sediment Diversion (50,000 cfs)
Master Plan Project No. 001.DI.02
First Implementation Period
Purpose and Need

**Purpose**: Construct sediment diversions to transport sediments from the Mississippi River into the Lower Barataria Basin and Lower Breton Sound Basin to reestablish deltaic processes in order to build, sustain, and maintain wetlands.

**Need**: In order to achieve, in part, the goals in the 2012 Louisiana Coastal Master Plan, the project is needed to restore the connection between the Mississippi River and the Lower Barataria Basin and Lower Breton Sound Basin to address land loss within each basin caused by reduced sediment input from the river.
Objectives and Constraints

• Planning Objectives
  • Maximize the capture of sediment from the Mississippi River, therefore increasing the related potential to build, sustain, and maintain wetlands.
  • Build, sustain and maintain wetlands.

• Planning Constraints
  • Do not increase flood risk to coastal communities as evaluated against the FWOP condition
  • Maintain navigation purpose of the Mississippi River as evaluated against the FWOP condition
Lower Diversions Alternatives

Master Plan Locations
Feasibility Modeling

Tools Being Developed:

River Models
- 3D hydrodynamic and sediment transport *(Ehab Meselhe, The Water Institute of the Gulf)*
- Local and regional 3D hydrodynamic and morphological models *(Ehab Meselhe, The Water Institute of the Gulf)*

Basin-side Models
- Site-Specific Delft 3D morphological model using West Bay as an analogue *(Ehab Meselhe, The Water Institute of the Gulf)*

*All models runs will use site specific data *(Mead Allison, The Water Institute and Sam Bentley, LSU)*

What we will evaluate:

- Screening information for site selection:
  - Flow, nutrient and sediment load into the basin
  - Sediment/water ratios
  - Impacts to navigation
  - River morphology
  - Flood stage
  - Long-term assessment (~50 years)
- Wetland building
- Future projections of wetland vegetation
- Guidance for engineering features to stimulate wetland development
- Impacts to sediment delivery
- Long term diversion performance
  - RSLR and subsidence
  - Effects on river morphology
Lower Diversions Data Collection

• River Data Collection
  – Multi-beam bathymetry for 15 mile stretch of MR not covered by existing multi-beam data
  – High-discharge Bar Hydrodynamics and Sediment Dynamics
    • River x-sectional and longitudinal velocities
    • Suspended sediment load and bedload
    • Bed grain size
Lower Diversions Data Collection

• Receiving Basin Data Collection
  – Vibracores (5 m) providing subsurface stratigraphy
  – Wetland surface, shallow submerged soil, and submerged soils analyses providing shear stress strength profiles (3 m)
  – Seismic profiling providing continuous stratigraphy (20 m)
Lower Diversions Data Collection

• West Bay Analogue Data Collection
  – Single-beam and multi-beam bathymetry between emergent bars and river outflow
  – Boat-based LIDAR topography of emergent bars
  – Velocity profiles of channels and river outflow
  – Suspended sediment and bedload characteristics
  – Water level, turbidity, salinity, wave current velocity in receiving basin
Lower Diversion Conceptual Design

- Initial screening conceptual design report: very basic designs and preliminary cost estimates on all alternatives
- Final screening conceptual design report: refined, more detailed designs and cost estimates on subset of alternatives
Lower Barataria Initial Screening
## Lower Barataria Initial Screening Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Magnolia (RM 47)</th>
<th>Diam- PS (RM 42)</th>
<th>P.S. Canal (RM 39)</th>
<th>Empire (RM 30)</th>
<th>Buras (RM 23)</th>
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<tr>
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<td>Design and Const. Cost (Preliminary)</td>
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<td>• Construction (million)</td>
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<tr>
<td>Infrastructure of Concern</td>
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<td>No</td>
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Lower Barataria Alternative: Magnolia

River Mile 46.5
Lower Barataria Alternative: Diamond-Port Sulphur

River Mile 40.5
## Lower Barataria Final Screening Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Magnolia (RM 46.5)</th>
<th>Diam-P.S. (RM 40.5)</th>
<th>How to Evaluate? [Responsible Party]</th>
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<tr>
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<tr>
<td>Infrastructure of Concern</td>
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<td>No</td>
<td>ARCADIS</td>
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Lower Breton Initial Screening
## Lower Breton Initial Screening Criteria

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<td>Infrastructure of Concern</td>
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<td>No</td>
<td>YES</td>
<td>(URS)</td>
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</table>

Coastal Protection and Restoration Authority of Louisiana
Lower Breton Alternative:
Mardi Gras Pass
Lower Breton Alternative: Port Sulphur
### Lower Breton Final Screening Criteria

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<thead>
<tr>
<th>Criteria</th>
<th>Mardi Gras Pass (RM 43)</th>
<th>Port Sulphur (RM 38)</th>
<th>How to Evaluate? [Responsible Party]</th>
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<td>LGS [CPRA]</td>
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<td>Design and Const. Cost</td>
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<td>Cost Est. [URS]</td>
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<td>Infrastructure of Concern</td>
<td>Back Levee Canal</td>
<td>Downstream P.S Anchorage</td>
<td>URS</td>
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Lower Diversions Next Steps

• Basin-wide and Ecological modeling, Socioeconomic evaluation
• Wetland morphology, Ecohydrology, vegetation production runs on preferred plans
• Feasibility report
• Engineering Independent Technical Review
• General outreach
# Lower Diversions Schedule

<table>
<thead>
<tr>
<th>Milestone</th>
<th>2014</th>
<th>2015</th>
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<td>Plan Selection</td>
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<td>Final Engineering Reports</td>
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<td>Geotech Data Collection (Lower Breton)</td>
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<td>3rd Party Engineering Review</td>
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<td>Feasibility Report</td>
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<td>TSP MP Production Runs</td>
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<td>Basin-wide Delft3d</td>
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<tr>
<td>Fisheries and Socioeconomic Model</td>
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Questions, comments, discussion

Lower Barataria and Lower Breton Sediment Diversions
Kent Bollfrass, kentbollfrass@la.gov 225.342.4733