

Louisiana Coastal Area Mississippi River Hydrodynamic and Delta Management Study

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Louisiana Coastal Protection
and Restoration Authority



US Army Corps of Engineers
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Presentation Outline

- MS River Hydrodynamic and Delta Management Study Overview
- Louisiana 2012 Coastal Master Plan
- Timelines
- River Efforts
- Basin Efforts
- Expected Outcomes
- Collaboration Opportunities
- LCA Website
- Contact Information



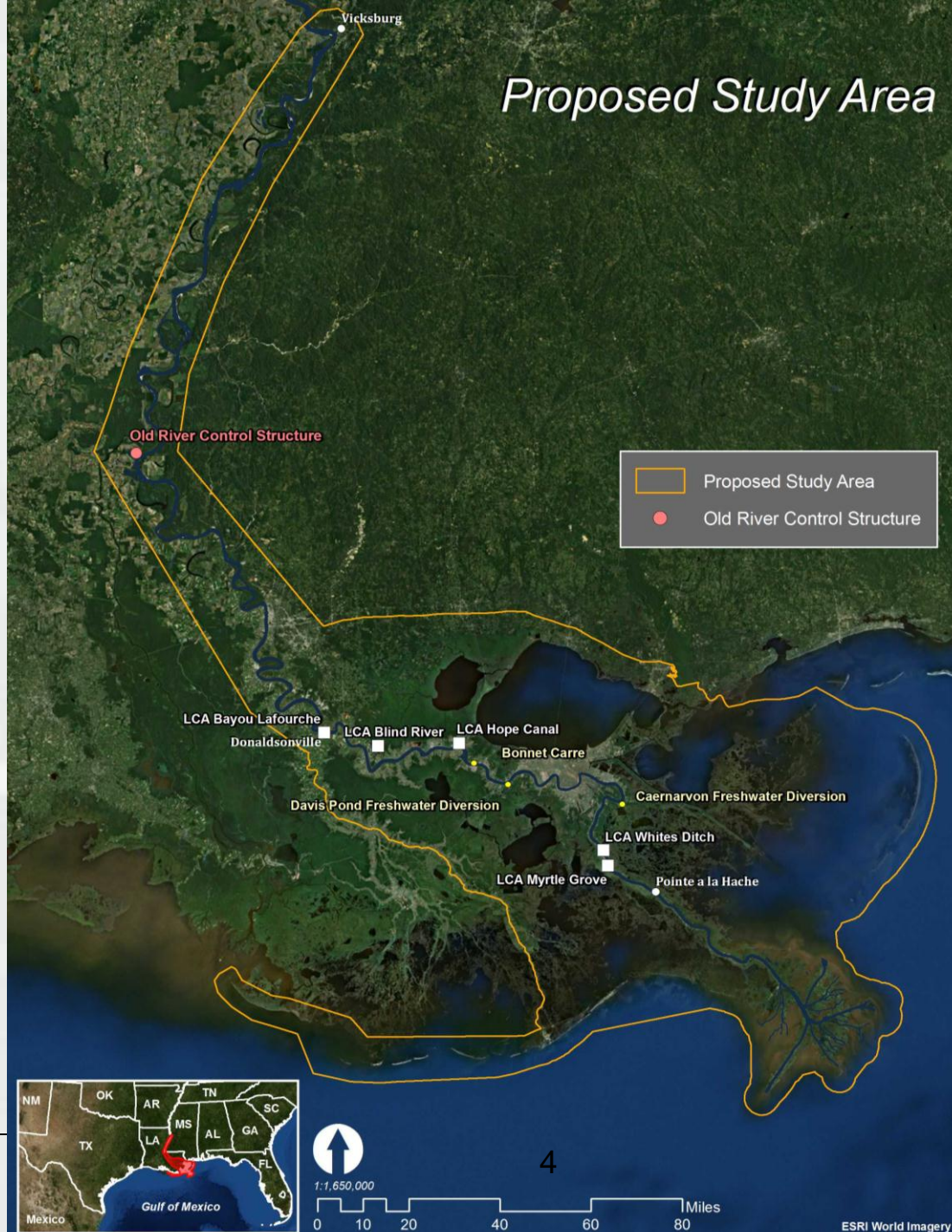
Study Overview

- MRHDM combines the first two large-scale, long-term studies
 - ▶ “Mississippi River Hydrodynamic Study”
 - ▶ “Mississippi River Delta Management Study”
 - ▶ Assessment of fundamental changes to coast and river management
 - ▶ Investigation of significant potential for achieving restoration and management objectives

- Cost-Share Agreement signed August 24, 2011
 - ▶ 5 years
 - ▶ \$25.3 M study effort



Proposed Study Area



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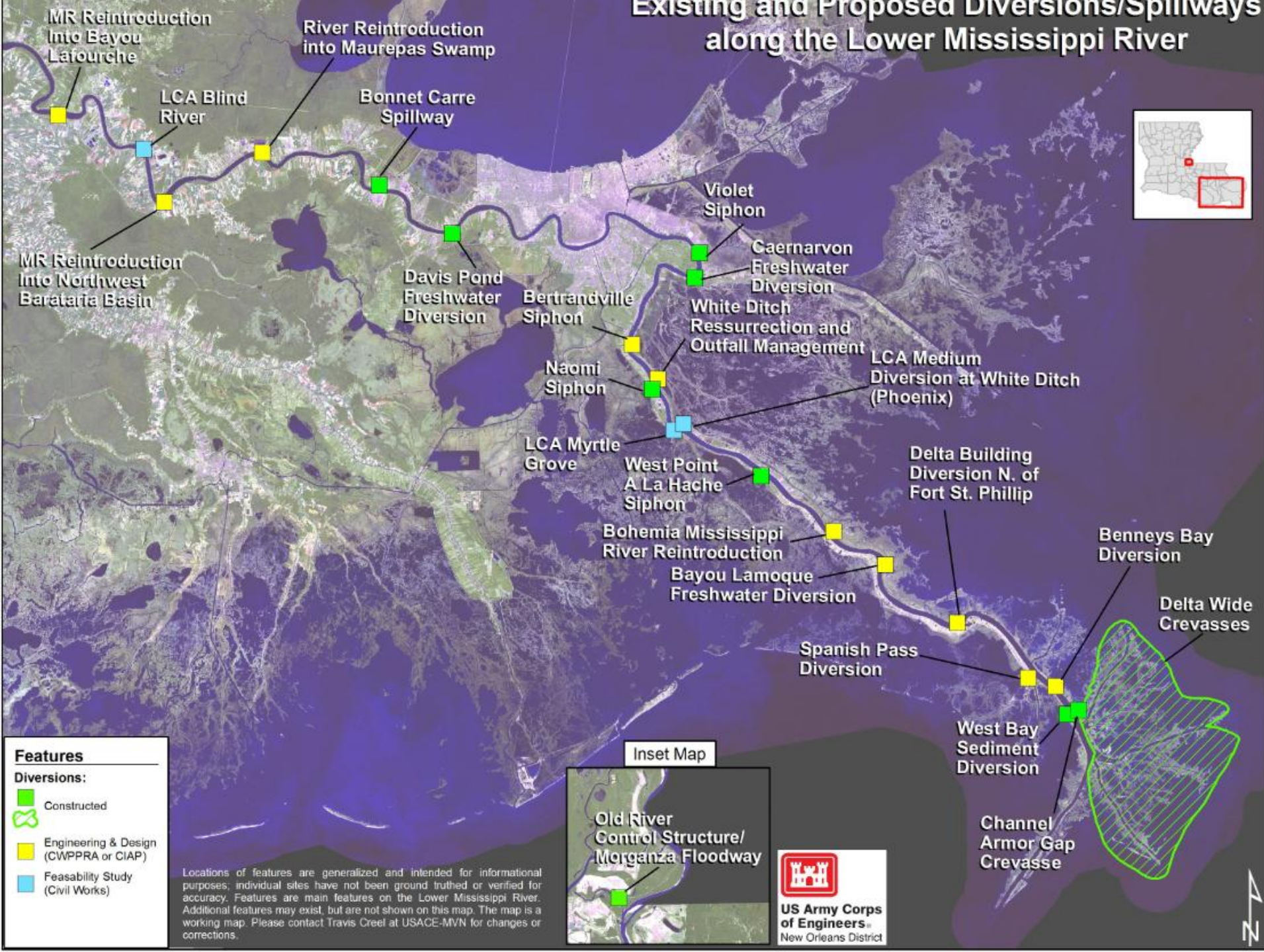
Study Overview

- Assess the current and future operation of the Mississippi River & Tributaries system
 - ▶ Ecosystem restoration
 - ▶ Flood risk reduction
 - ▶ Navigation

- Assess cumulative river impacts of multiple restoration features



Existing and Proposed Diversions/Spillways along the Lower Mississippi River



- Features**
- Diversions:**
- Constructed
 - Engineering & Design (CWPPRA or CIAP)
 - Feasibility Study (Civil Works)

Locations of features are generalized and intended for informational purposes; individual sites have not been ground truthed or verified for accuracy. Features are main features on the Lower Mississippi River. Additional features may exist, but are not shown on this map. The map is a working map. Please contact Travis Creel at USACE-MVN for changes or corrections.



Study Overview

Identify and evaluate features that will promote land building/retention/sustainability and support management of multiple National and local interests in delta areas

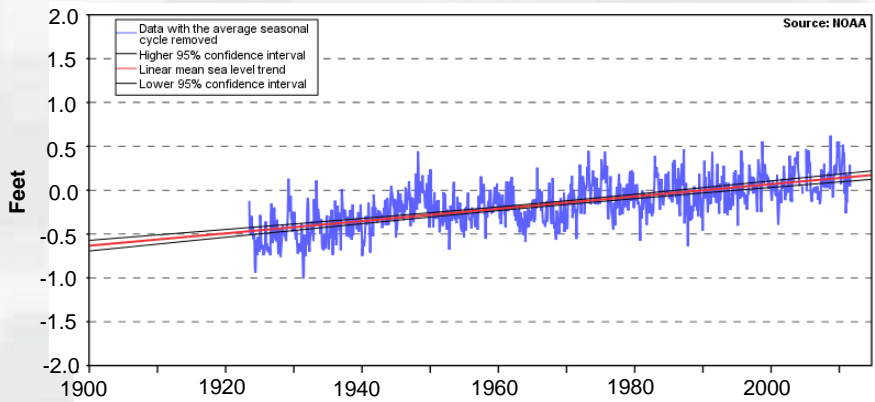
- ▶ Analyze large river diversions (>50,000 cfs)
- ▶ Consider navigational interests, dredging requirements
- ▶ Other restoration measures, e.g. outfall management measures, dedicated dredging, etc.



Sea-Level Rise

*global rise = 0.07
inches/year*

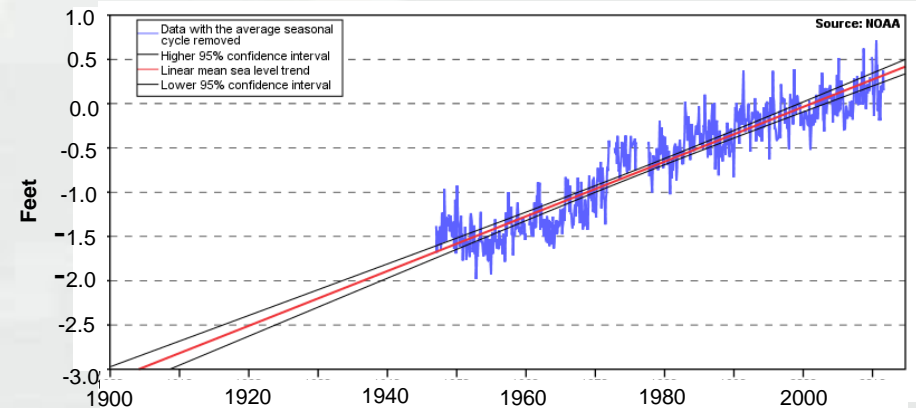
Pensacola, FL (0.08 inches/year)



Relative Sea-Level Rise

global rise + local sinking

Grand Isle, LA (0.4 inches/year)



High subsidence rate + sea-level rise makes wetlands more vulnerable to submergence and erosion.



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Mississippi River Suspended Sand Budget 2008-2010



100% Tarbert Landing

- 61% Above Baton Rouge overbank and channel storage
- 14% Below Baton Rouge channel storage

25% Belle

Chasse

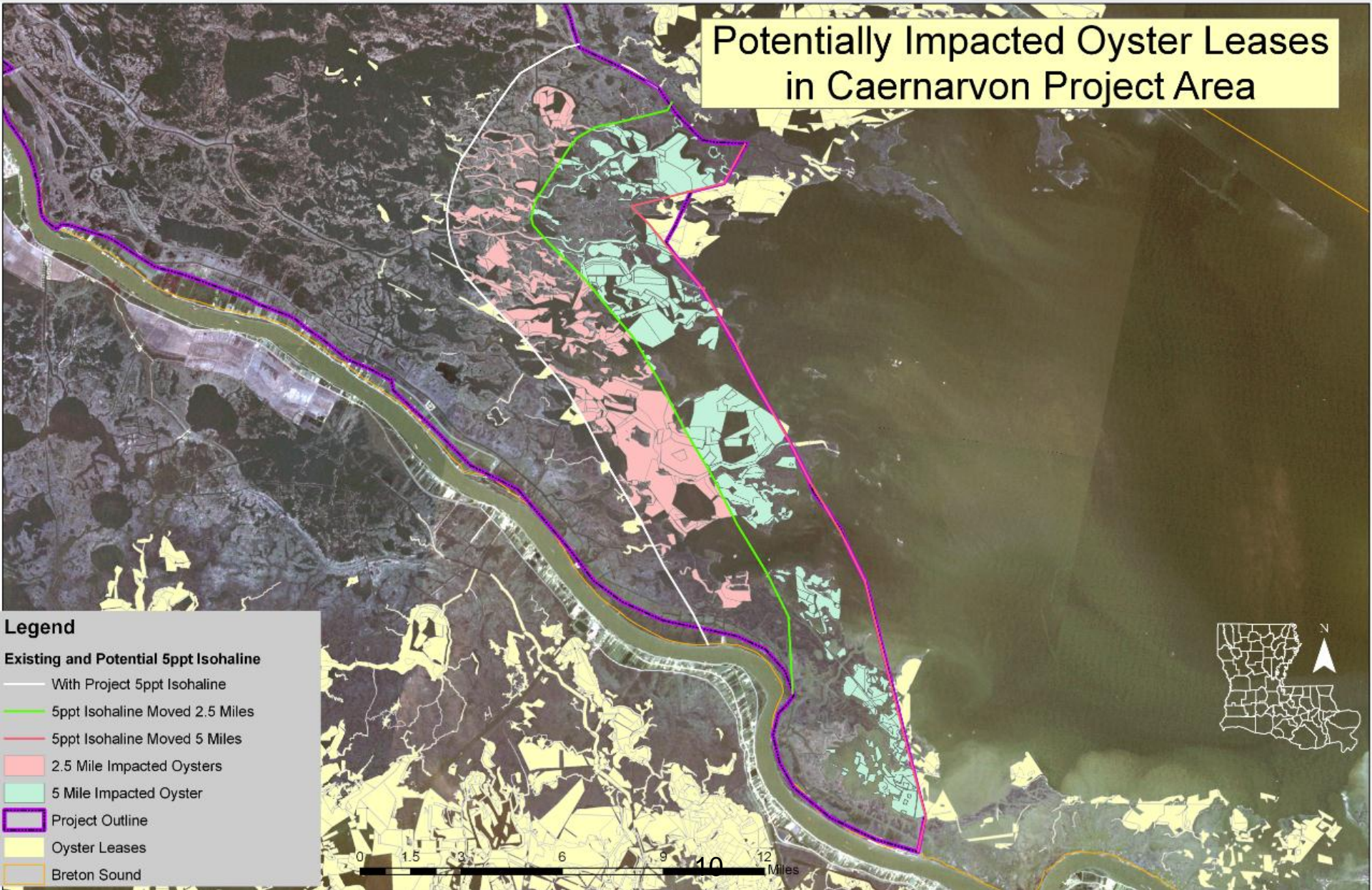
- 5% East Bank Passes
- 12% Channel Storage
- 2% West Bank Passes

3%

- HoP
- SW Pass 2%
- South Pass 0.3%
- 0.3% Pass a Loure



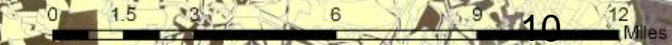
Potentially Impacted Oyster Leases in Caernarvon Project Area



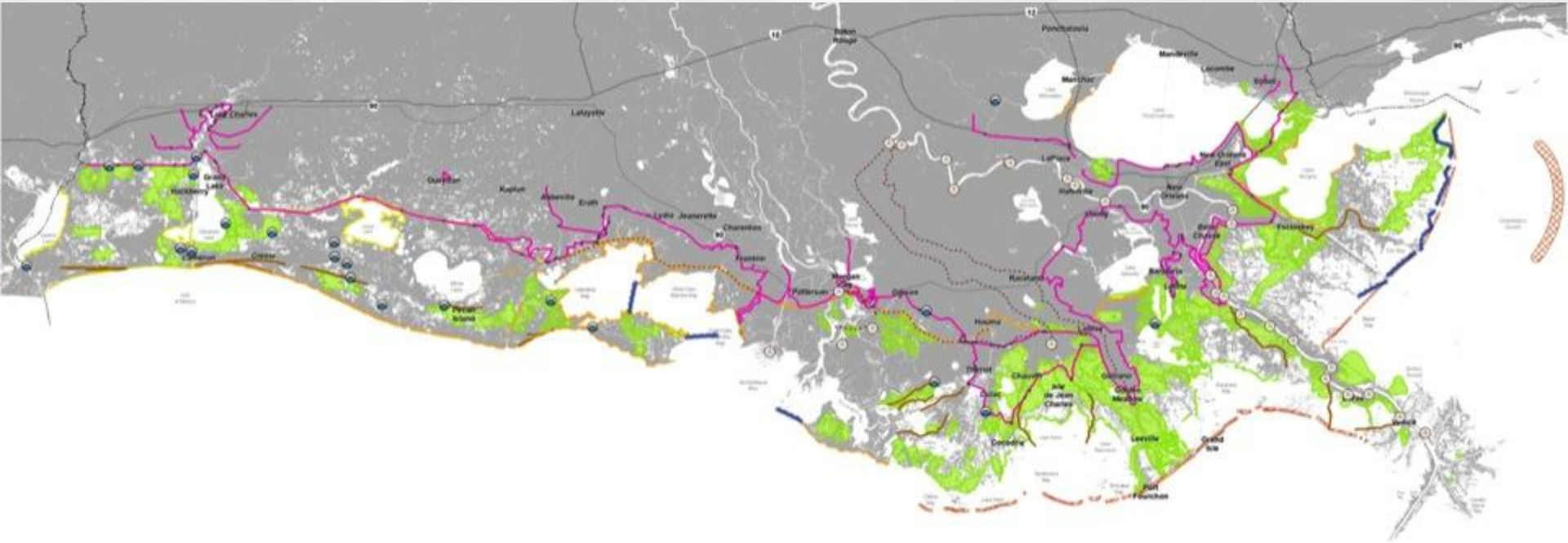
Legend

Existing and Potential 5ppt Isohaline

- With Project 5ppt Isohaline
- 5ppt Isohaline Moved 2.5 Miles
- 5ppt Isohaline Moved 5 Miles
- 2.5 Mile Impacted Oysters
- 5 Mile Impacted Oyster
- Project Outline
- Oyster Leases
- Breton Sound



2012 Master Plan evaluated nearly 400 projects across the coast



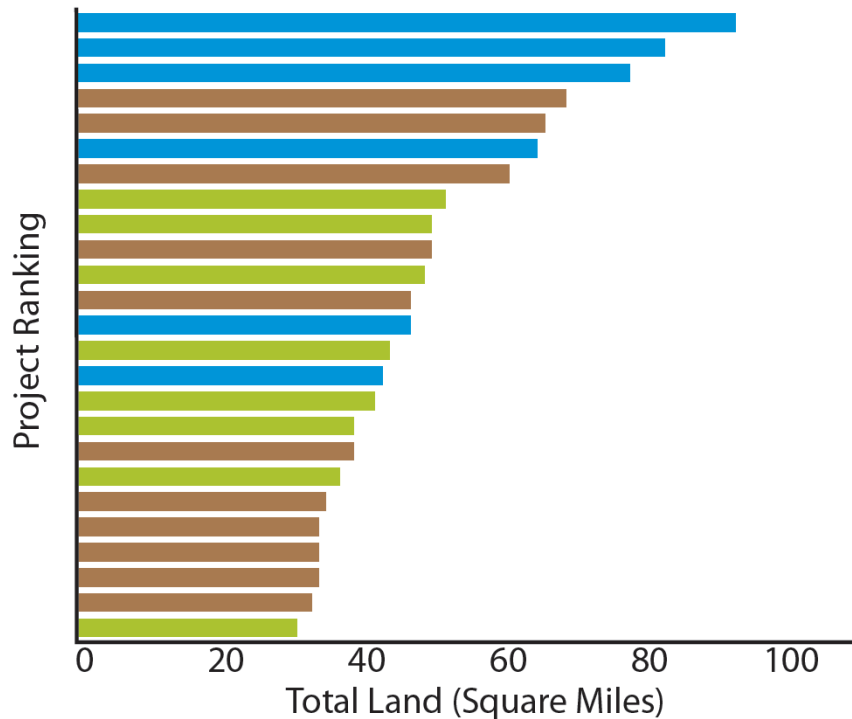
Structural Protection	Bank Stabilization	Oyster Barrier Reef	Ridge Restoration	Shoreline Protection	Barrier Island Restoration	Marsh Creation	Sediment Diversion	Hydrologic Restoration	Channel Realignment
									
									

Nonstructural Measures




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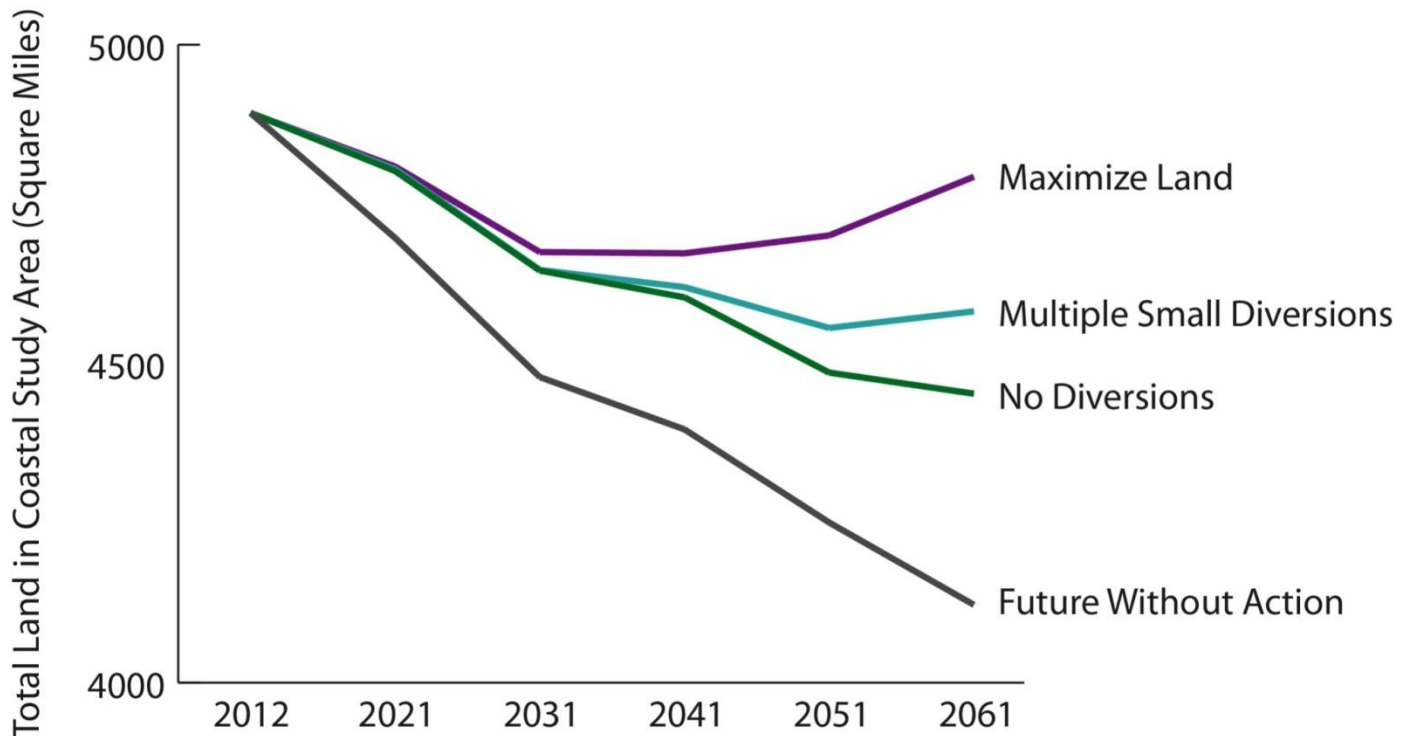
Top 25 Individual Land Building Projects Over Next 50 Years

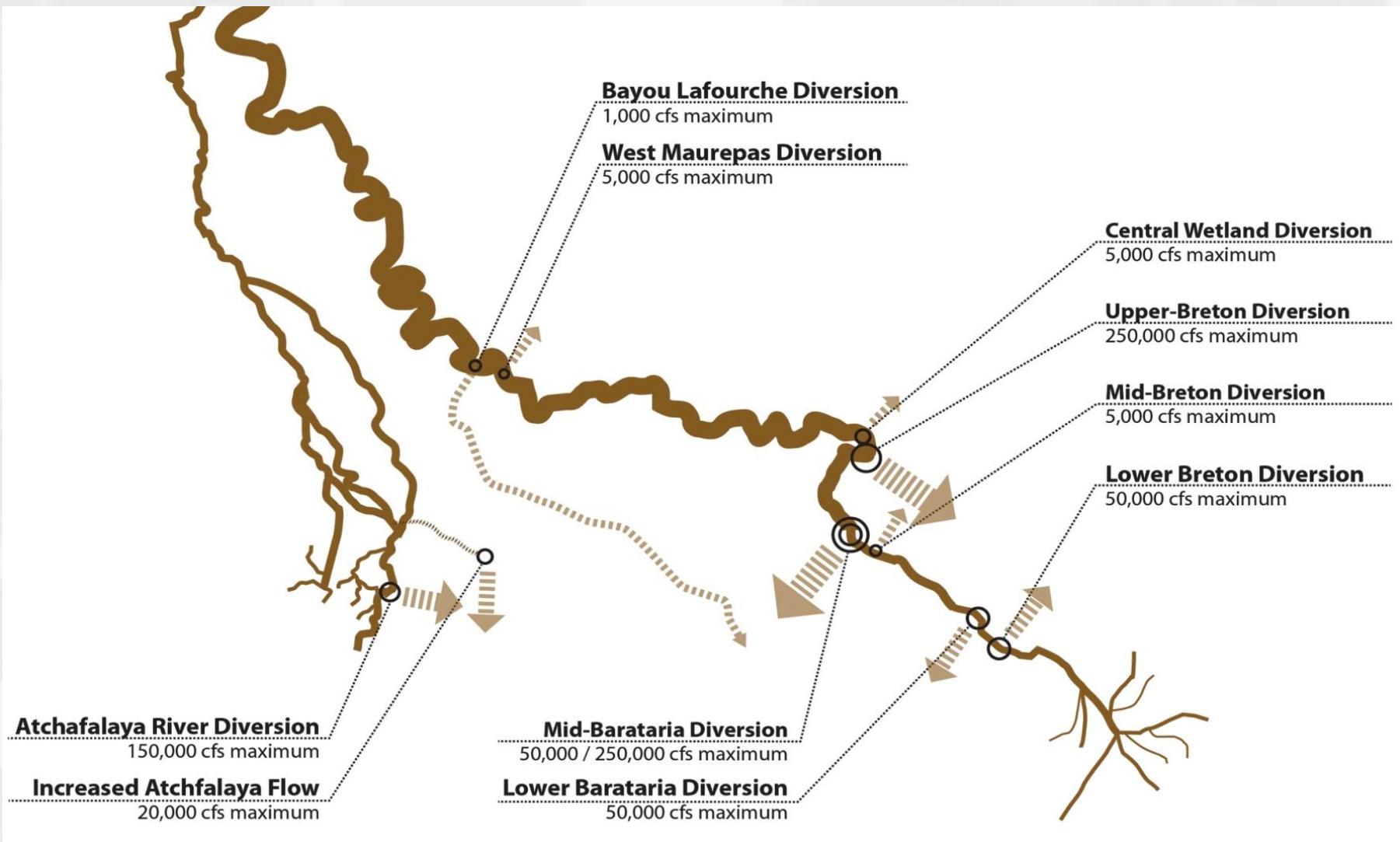


■ Channel Realignment Projects
 ■ Marsh Creation Projects
 ■ Sediment Diversion Projects

Land Building Experiments

Potential Land Area Change Over Next 50 Years
Moderate Scenario





CPRA
Louisiana Coastal Protection
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Timelines

- Feasibility Cost Share Agreement - August 24, 2011
- Public Meetings - April 2012
- River Work Plans Complete/Notice to Proceed – April/May 2012
- Basin Work Plans Complete/Notice to Proceed – December 2012
- Interim 1D River Modeling and Geomorphic Analysis Results – April 2013
- Land Building Estimates – November 2014
- Tentatively Selected Plan – February 2015
- Chief of Engineer's Report – August 2016



River/Basin Work Efforts

- Data Collection and Analysis
- Data Management
- **Geomorphic Assessment - River**
- **One-Dimensional Modeling - River**
- Multi-dimensional Modeling
- Definition of Metrics for Assessing Model Predictive Skill
- **Future Without Project Landscape Assessment -Basin**
- **Land Building Modeling - Basin**
- **Ecological Modeling – Basin**

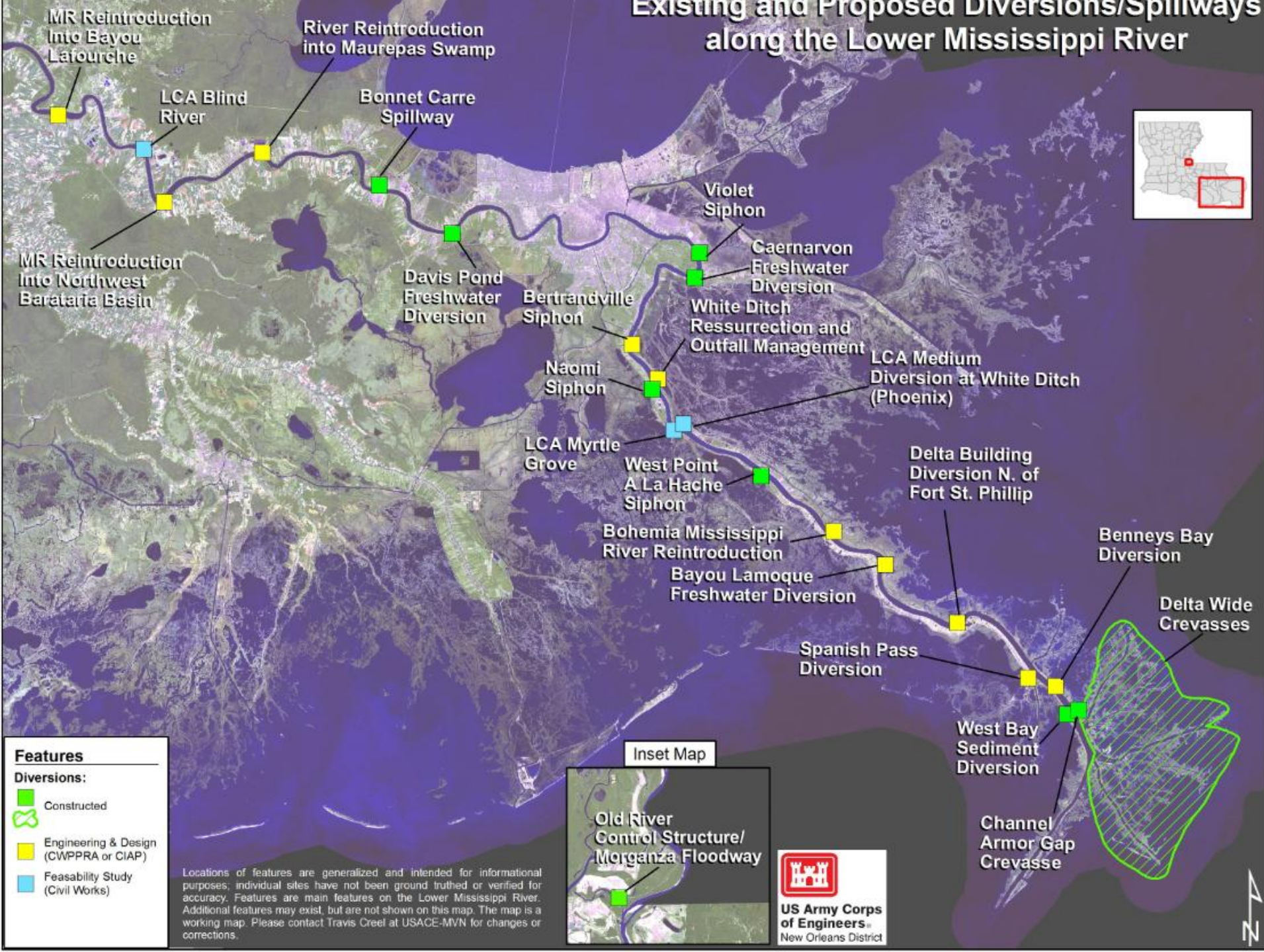
**** Each team is co-lead by a State and Federal representative**



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Existing and Proposed Diversions/Spillways along the Lower Mississippi River



Features

Diversions:

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River Work Efforts



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Geomorphic Assessment

- ▶ **The overall objective is to utilize all available data to document historical trends in hydrology, sedimentation and channel geometry in the lower Mississippi River and to summarize the local changes observed at locations where repetitive datasets exist and at key reaches. The assessment will focus on but not be limited to the time period 1960 to the present.**



Geomorphic Assessment

- **Geometric analysis of historic and current bathymetric surveys**
- **Specific gage analysis – stage elevation and discharge**
- **Dredge records analysis**
- **Sediment data analysis**
- **Natural and Anthropogenic events – Timeline analysis**



Data Collection and Analysis

- ▶ **The overall objective is to utilize existing data and to collect and analyze new data to enhance the understanding of hydrodynamic and sediment processes in the lower MS River in order to support numerical modeling efforts**



Data Collection and Analysis

- **Longitudinal, boat based studies of hydrodynamics, suspended sediment and bed load flux at high and low water discharge events**
- **Reach scale, site specific, boat based studies of hydrodynamics, suspended sediment and bed load flux over a range of water discharges**
- **Boat based studies of salt-wedge dynamics in the estuarine reach during low water discharge periods**
- **Stationary platform data collection of key parameters including stage elevation, turbidity, salinity and water discharge**



One-Dimensional Modeling

- ▶ **Overall objective is to develop a broadly accepted 1D modeling system that will be able to address the long term (decadal) effects of management decisions on the hydrodynamics and sediment transport dynamics in the lower Mississippi River from Vicksburg to the Gulf of Mexico**



One-Dimensional Modeling

- ▶ **Task 1: Initial HEC-6T Demonstration and Application**
 - ▷ Expansion of Model Domain
 - ▷ Update Geo-referenced Cross-section Databases
 - ▷ Model Validation
 - ▷ Scenario Testing

- ▶ **Task 2: HEC-RAS Model Development**
 - ▷ Model Development
 - ▷ Model Validation
 - ▷ Scenario Testing



Multi-dimensional Modeling

- ▶ **Overall objective is to setup and apply a suite of multi-dimensional modeling tools to develop an understanding of, and accurately simulate the hydrodynamic, salinity, temperature and sediment dynamics along critical reaches of the Lower Mississippi River, over shorter time scales than the one-dimensional models.**



Multi-dimensional Modeling

- **ADaptive Hydraulics (ADH) – with SEDLIB**
- **FLOW-3D**
- **DELFT-3D**
- **FVCOM-3D**



Basin Work Efforts



Basin Dynamics

- **Data Collection**
 - Channel/Marsh Topography/Bathymetry
 - Water velocity, discharge and stage
 - Marsh salinities, and tidal salinities
 - Suspended Sediment
 - Bulk Densities/Root Biomass Measurements
 - Habitat Suitability Indices

- **Future Without Project Landscape Assessment**
 - Land change imagery assessment
 - Subsidence and accretion methodologies applied

Basin Dynamics

- Hydrodynamic, Salinity and Sediment Transport Modeling
 - ADH
 - DELFT3D
 - RMA

- Land Building Modeling
 - SAND - Desktop Excel Model
 - DELFT3D – Geomorphology module

- Ecological Modeling – Habitat Switching, Fisheries Trade Offs
 - CASM



Definition of Metrics for Assessing Model Predictive Skill

- ▶ **Overall objective is to develop metrics to assess the predictive performance of the one and multi-dimensional models applied in this study. Separate metrics will be developed for each model type used in the study. The metrics will serve as a quantitative and unified tool to assess the models predictive performance.**

- ▶ **Preliminary Report – outline of preliminary design of metrics**
 - ▷ 1D Numerical Models
 - ▷ 2D Numerical Models
 - ▷ 3D Numerical Models
 - ▷ Workshop



Data Management

- ▶ **All data products generated by the project will be maintained on existing State and Federal systems and archived for future use by Federal, State and outside Technical entities.**
- ▶ **Relevant data will be identified and integrated into data visualization products such as web maps, web charts, and/or 2D-3D visual representations. These products will be made available through State and Federal data portals.**



Expected Outcomes

- Quantities of existing and future river water and sediment available to support sustainable restoration while maintaining navigation and flood risk reduction.
- Programmatic modeling and tools to support the development and evolution of a decision making framework for the river and surrounding basins.
- Forecast long-term sustainability of existing river related systems
- Analysis of river management options and tradeoffs to various areas of Federal and local interest
- System wide plan to target sustainable net positive elevation change in targeted receiving basins.



Collaboration Opportunities

- Tide gages and Gulf-wide fisheries assessment
- Gulf Coast Regional Sediment Management
- Water quality data and assessment (hypoxia)
- Ecological data and assessment
 - ▶ Fisheries impacts to freshening estuaries
- Long-term Maintenance and application of Mississippi River models
- Long-term data collection, including permanent water and sediment gages on the Mississippi River, land change assessment, subsidence and bathymetric measurements



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LOUISIANA COASTAL AREA

Mississippi River Hydrodynamic and Delta Management Study

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Project Description



The Mississippi River Hydrodynamic and Delta Management (MRHDM) Study is the first large-scale, long-term restoration assessment investigated under the LCA Program. This study will identify and evaluate a combination of large-scale management and restoration features to address the long-term sustainability of the lower Mississippi River Deltaic Plain, as authorized under Section 7003 of the Water Resource Development Act (WRDA) 2007. The MRHDM Study area covers the lower Mississippi River and the surrounding deltaic regions. The hydrodynamic study effort will focus on the Mississippi River, while the delta management study effort will focus on the adjacent basins.



[Submit a Comment/Question](#)

Key Documents

Full Document Library

- [MRHDM Study Area Map](#)
- [MRHDM Fact Sheet](#)

Upcoming Events

Project Calendar

- Apr 10** LCA MRHDM Public Scoping Meeting - Baton Rouge
6:00 PM-8:00 PM
- Apr 12** LCA MRHDM Public Scoping Meeting - New Orleans
6:00 PM-8:00 PM
- Apr 17** LCA MRHDM Public Scoping Meeting - Larose
6:00 PM-8:00 PM
- Apr 19** LCA MRHDM Public Scoping Meeting - Boothville-Venice
6:00 PM-8:00 PM

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[New Orleans East Land Bridge \(NOELB\)](#)
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External Links

[LCA Science & Technology \(S&T\) Office](#)
[USACE LA Coastal Protection and Restoration](#)
[Mississippi River Gulf Outlet \(MRGO\)](#)

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Questions?

