Marsh Building Diversion at Myrtle Grove

Presented By: Alisha Renfro, Ph.D.
National Wildlife Federation

OFFICE OF Coastal Protection and Restoration

Audubon

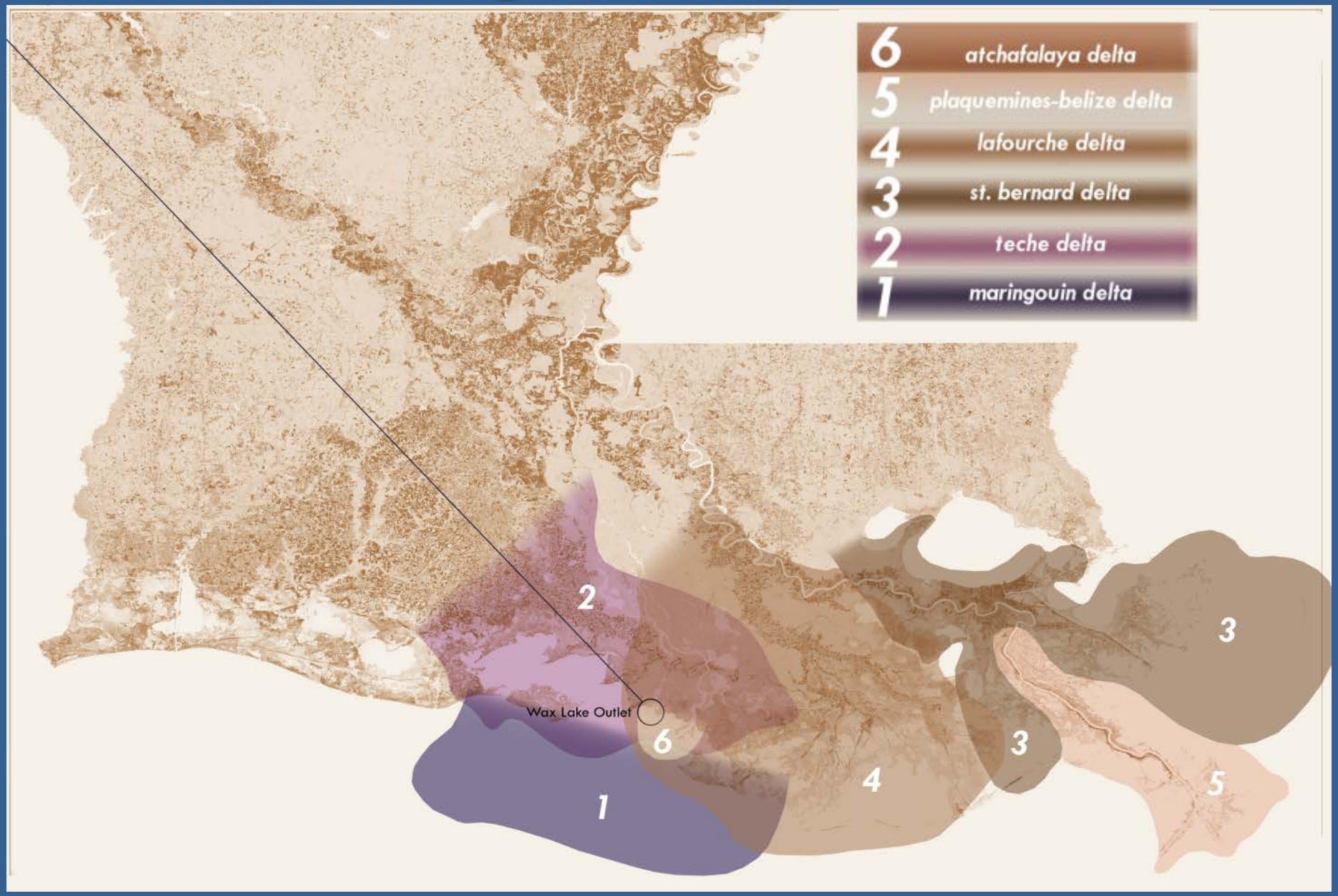
NATIONAL WILDLIFE FEDERATION

EDF ENVIRONMENTAL DEFENSE FUND Finding the ways that work

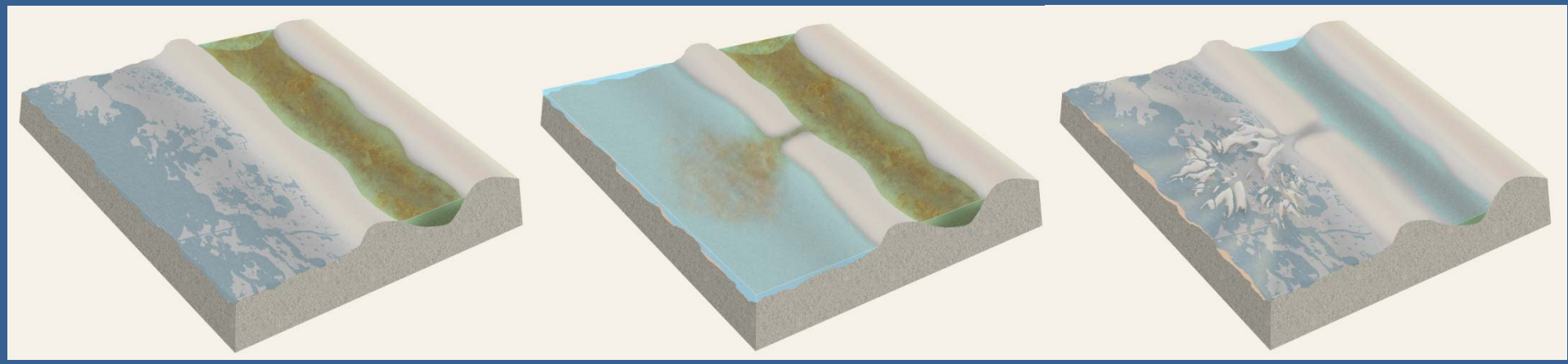
LAKE PONTCHARTRAIN BASIN FOUNDATION SAVE OUR COAST SAVE OUR LAKE

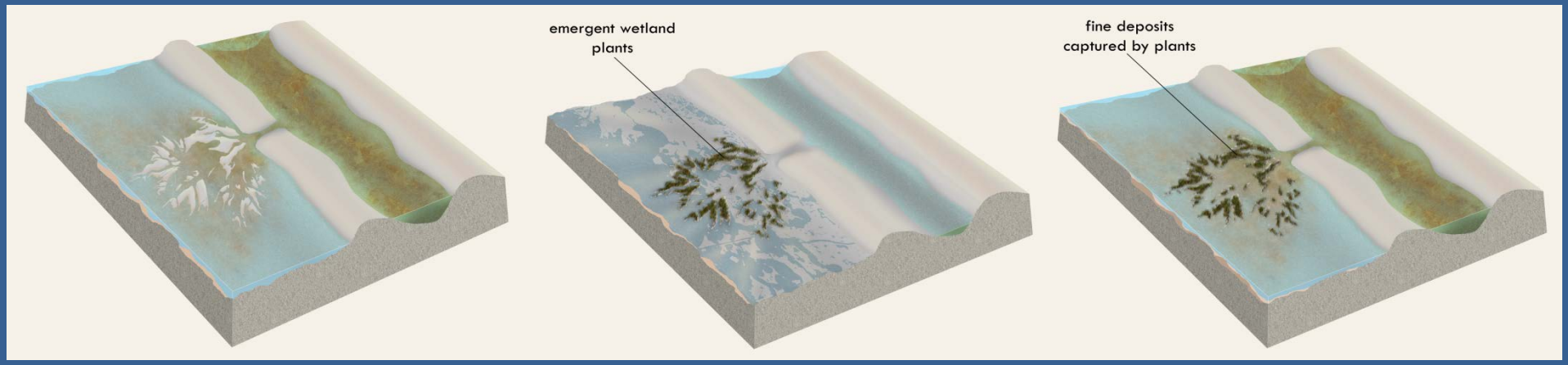
Coalition to Restore Coastal Louisiana

Building the Delta Plain

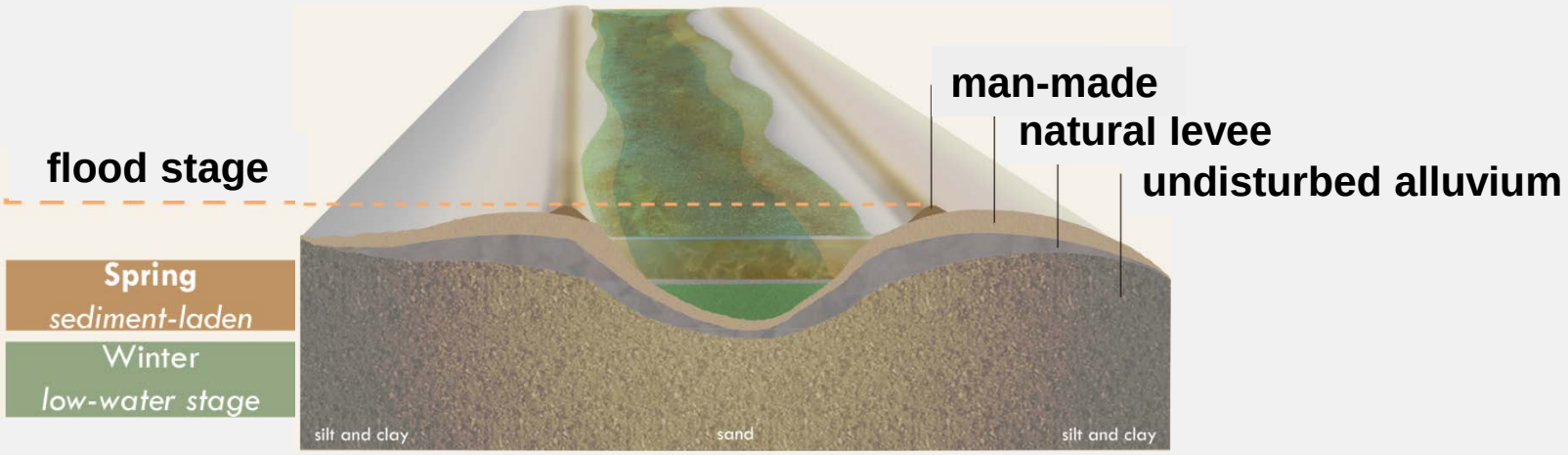


How the River Builds a Marsh





The River Today



The Louisiana Coastline in 2000

Figure modified from Blum and Roberts, 2009

The Louisiana Coastline in 2100?

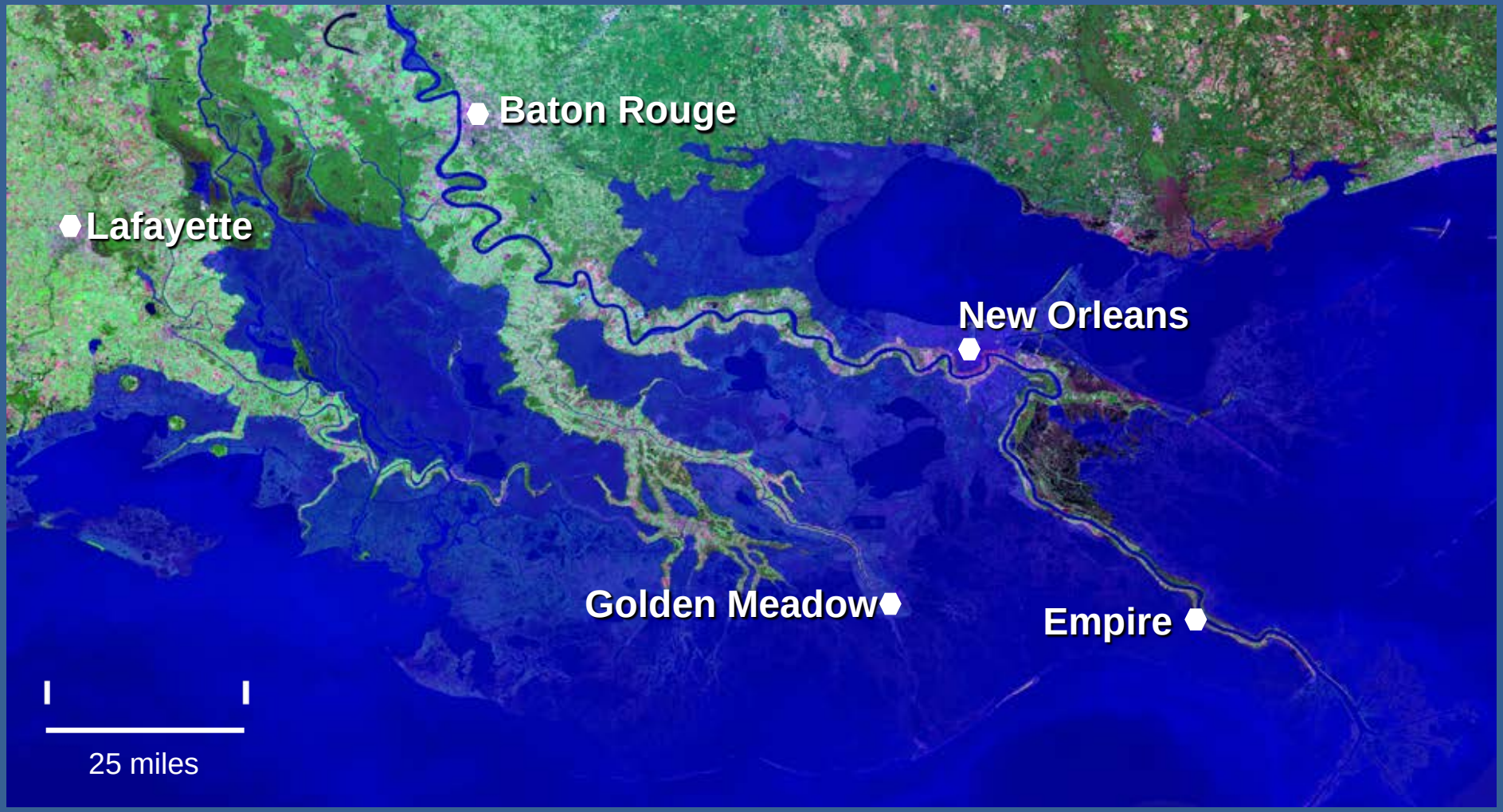


Figure modified from Blum and Roberts, 2009

Types of River Diversions

Freshwater Diversion

- Caernarvon
- Davis Pond

Marsh Building Diversion

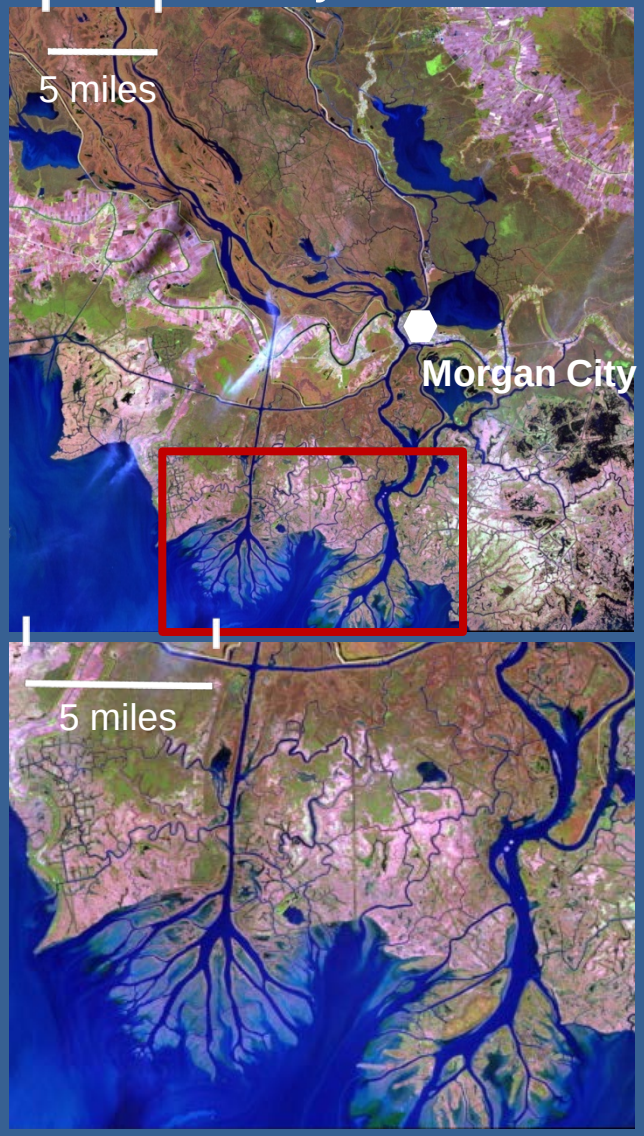
- Myrtle Grove

USACE New Orleans District

Wax Lake Delta

January 13, 1983

January 2, 2011



USGS Landsat Image (http://geography.usgs.gov/feature/description.php?id=199)

How to Build the Best Marsh Building Diversion

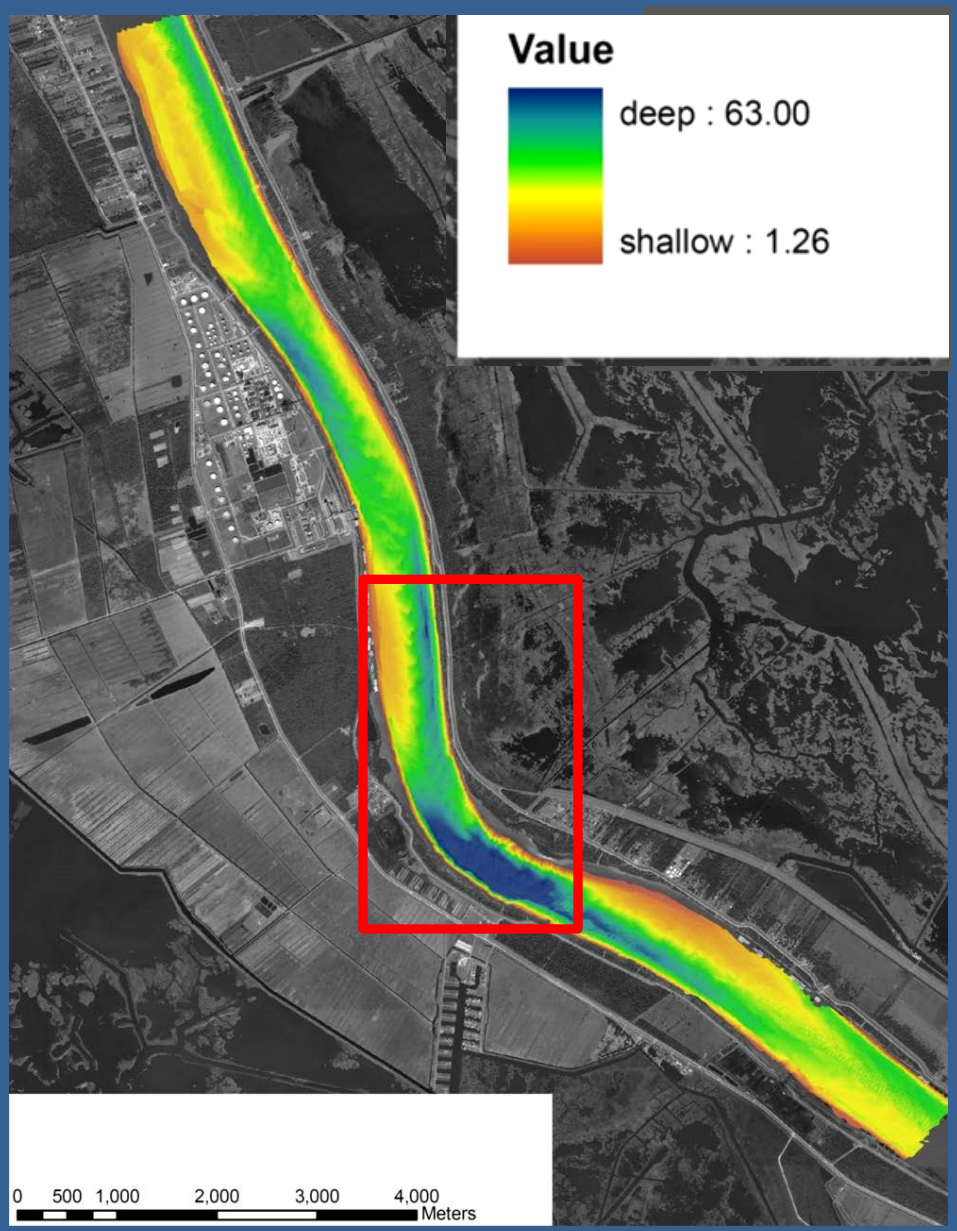
- Determine Optimal Location of Structure
  - Sediment Availability and Capture
  - Downstream Effects on River
- Design and Alignment of the Structure
- Examine Capacity and Sediment Transport
- Evaluate Changes in the Basin
  - Land-Building
  - Salinity and Water Level

Myrtle Grove Field Data Program

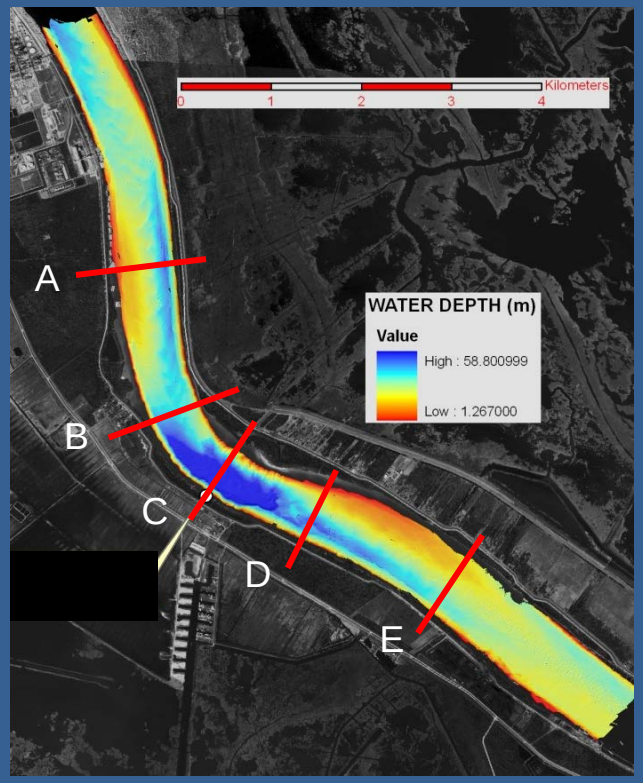
Dr. Mead Allison
University of Texas
at Austin

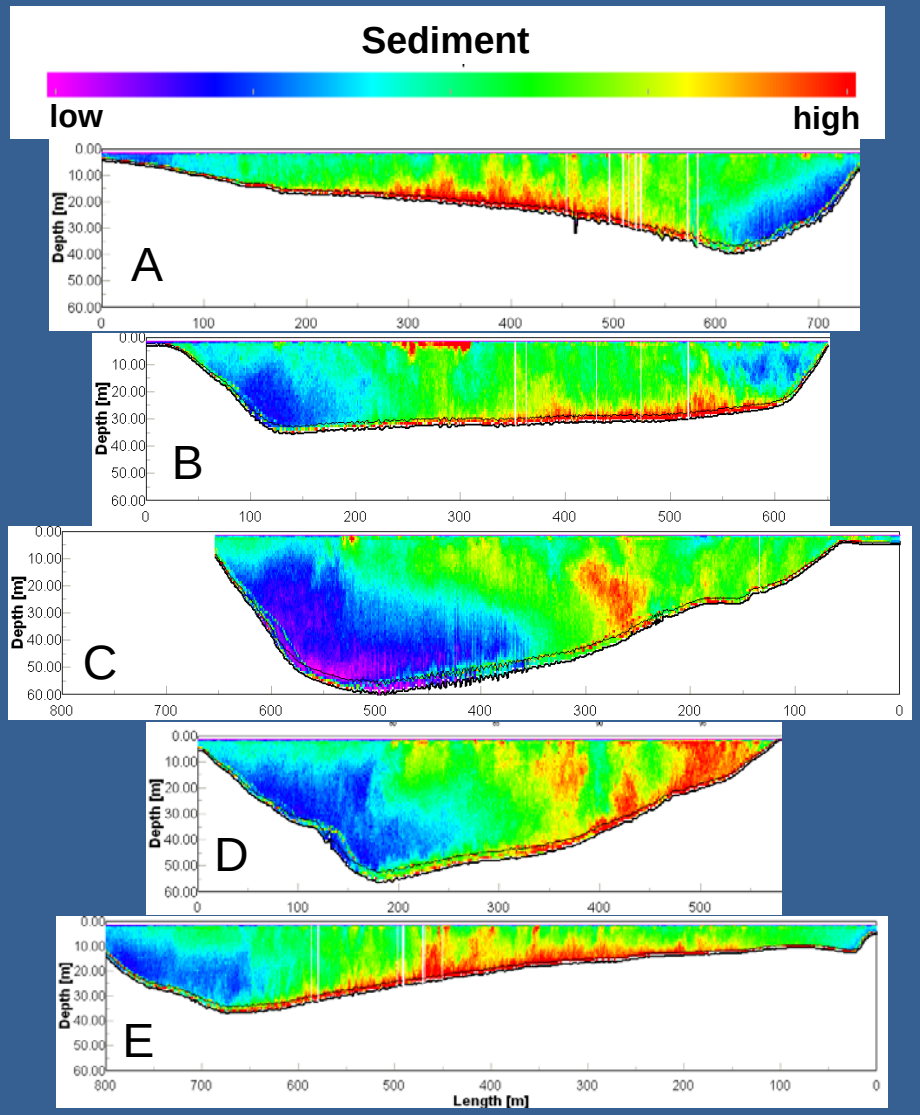
- High-resolution Bathymetry (multibeam)
- Water Discharge (ADCP)
- Bottom Currents (ADCP)
- Suspended Load (ADCP, optical and isokinetic samples)
- Bedload transport (repeat multibeam bathymetry)
- Suspended Grain Size (isokinetic and LISST)
- Bed material Grain Size (bottom grab)

Results: Multibeam Bathymetry



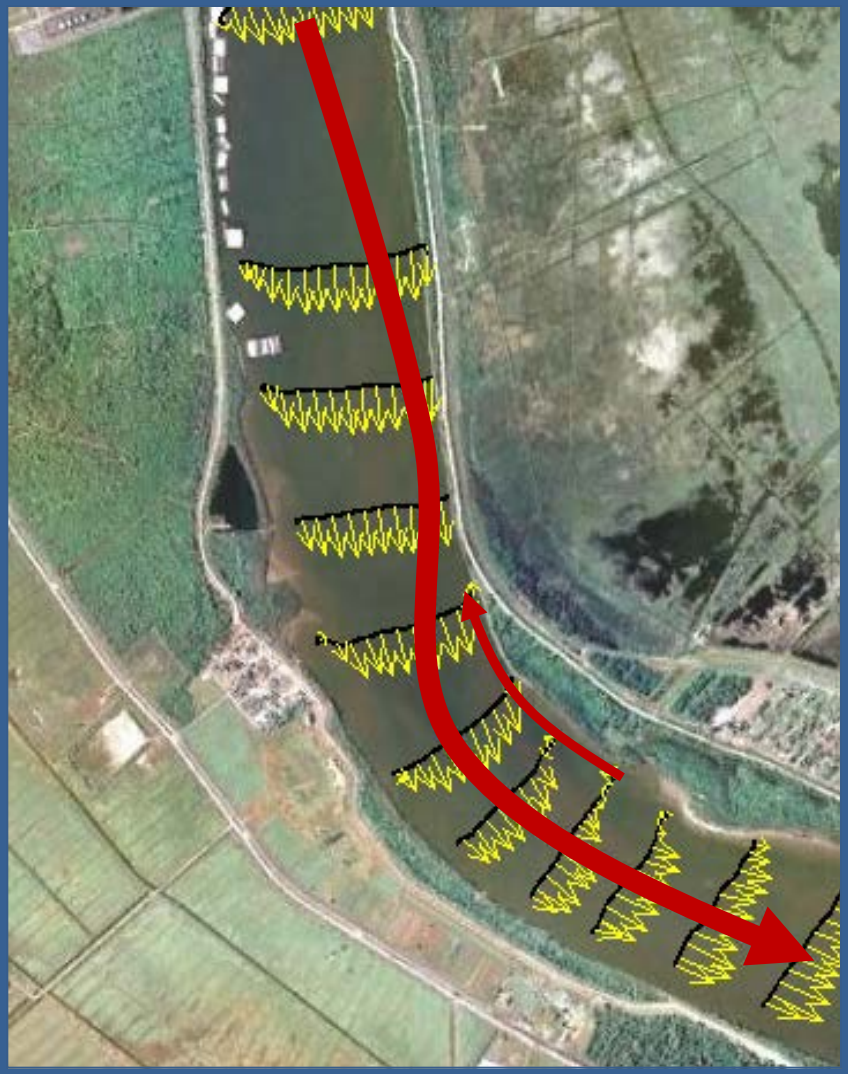
Sediment in the River

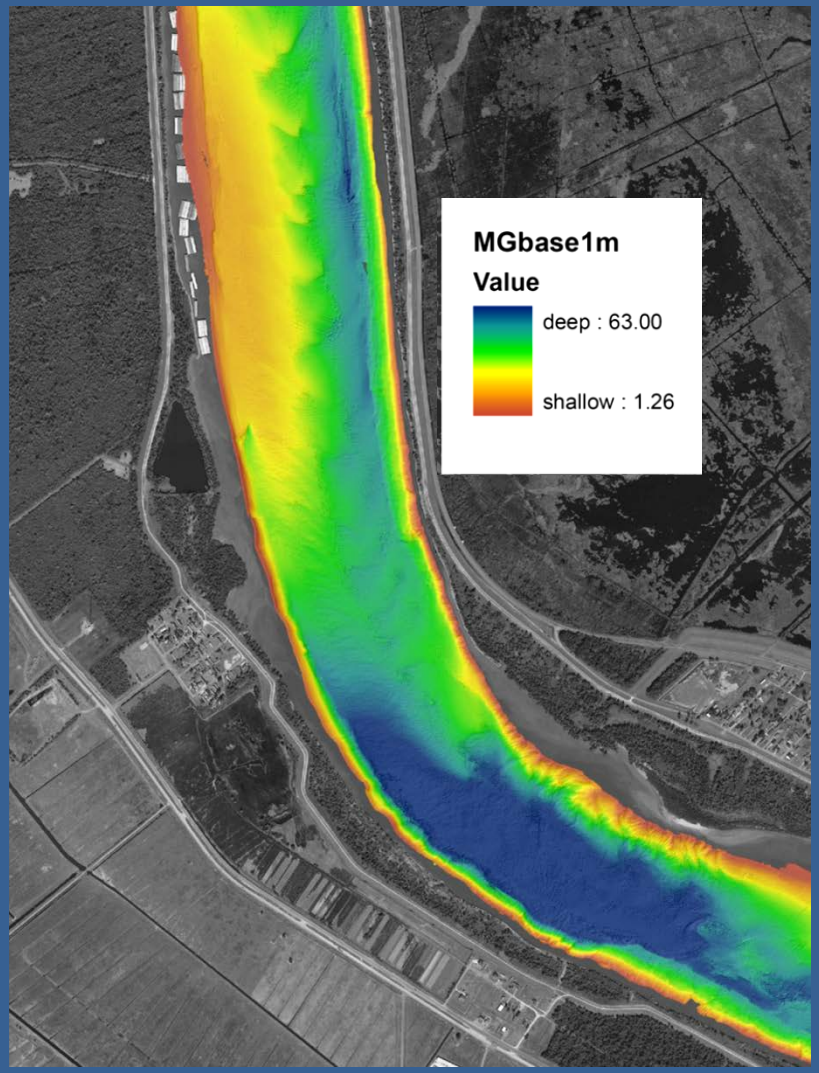




- April-2009 Data
- Discharge ~ 700,000 cfs

Water Flow Direction, Magnitude, and Bottom Depth





Sediment and River Discharge

~380,000 cfs
September-2009

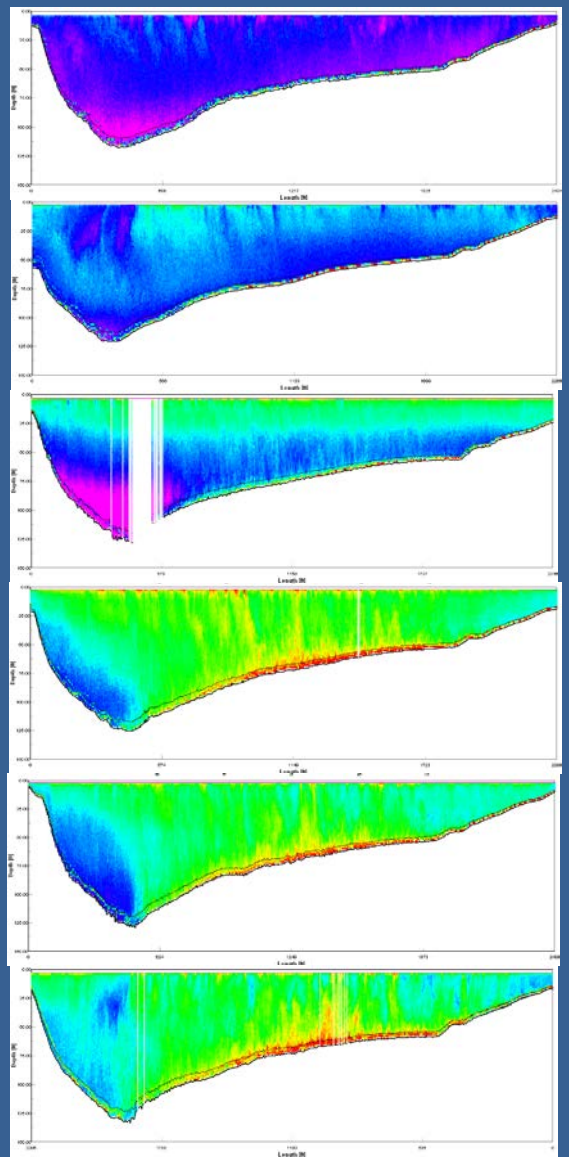
~400,000 cfs
October-2008

~660,000 cfs
May-2010

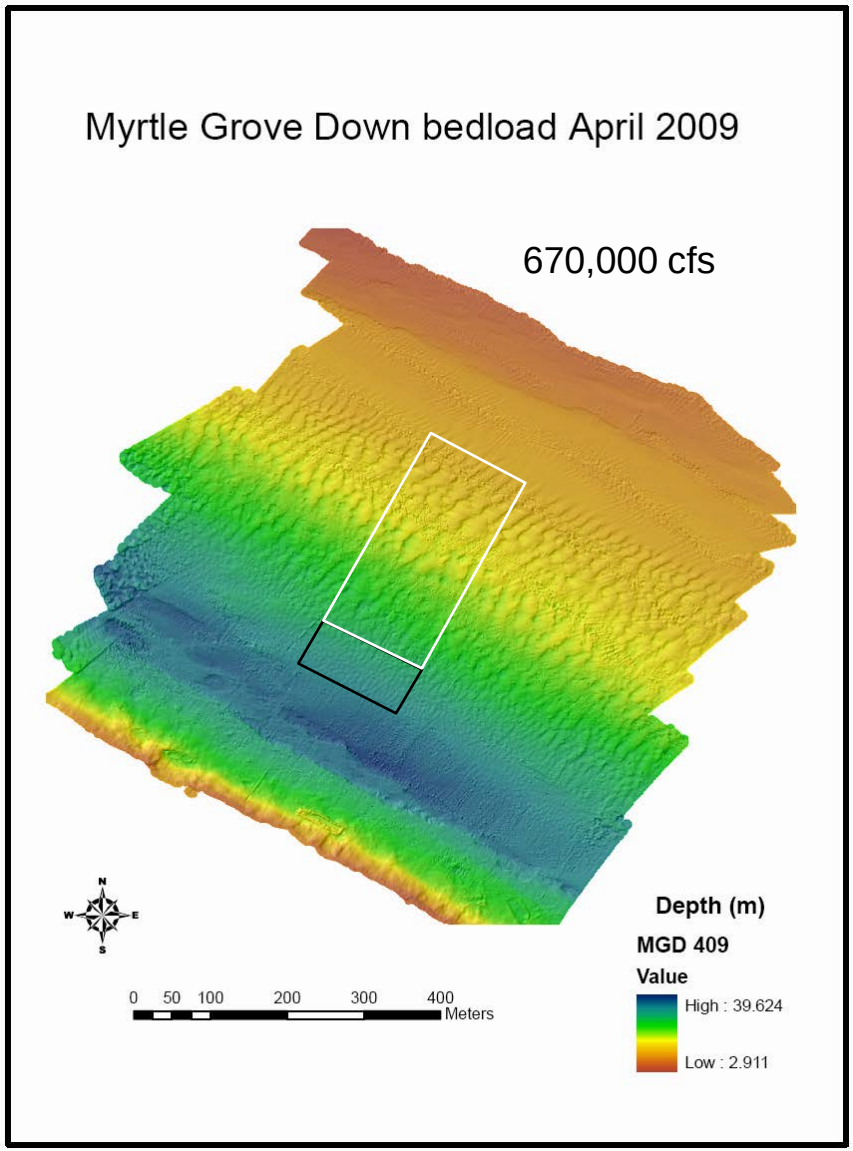
~700,000 cfs
April-2009

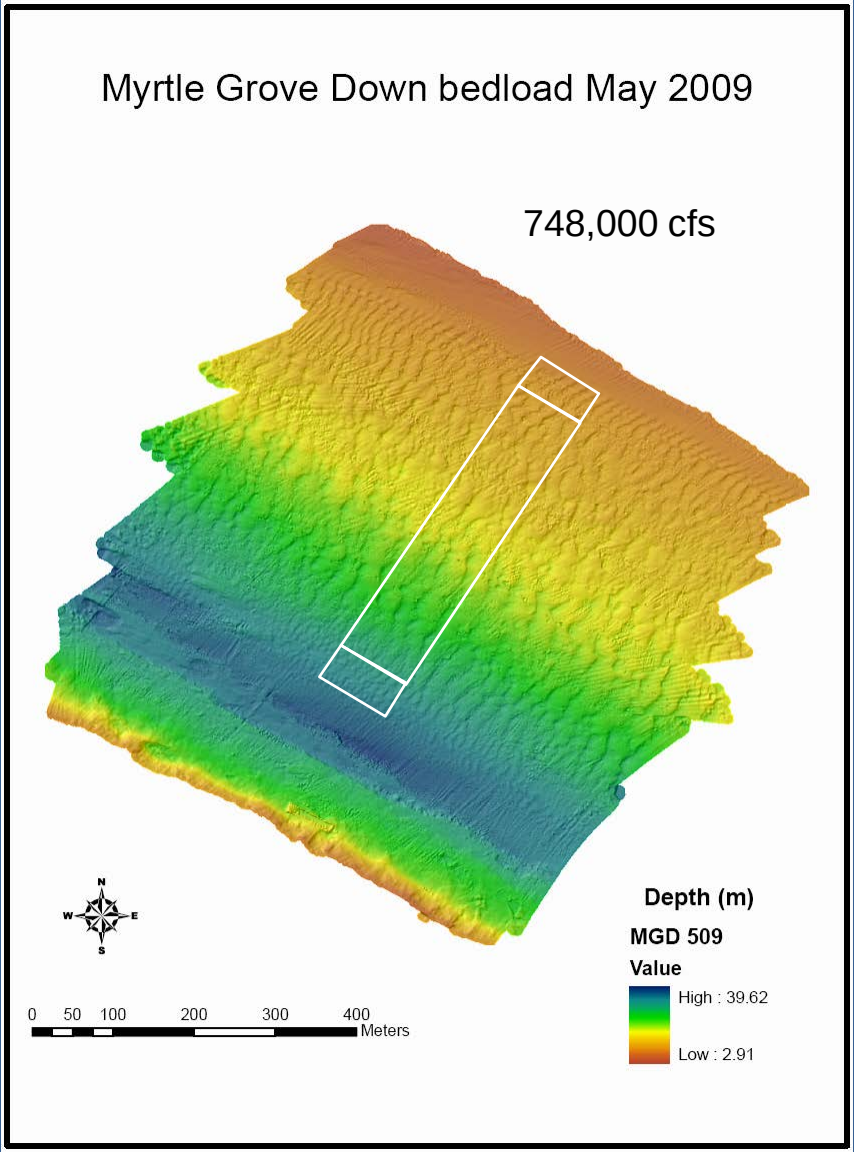
~760,000 cfs
May-2009

~875,000 cfs
April-2010



Sand Movement at the River Bed



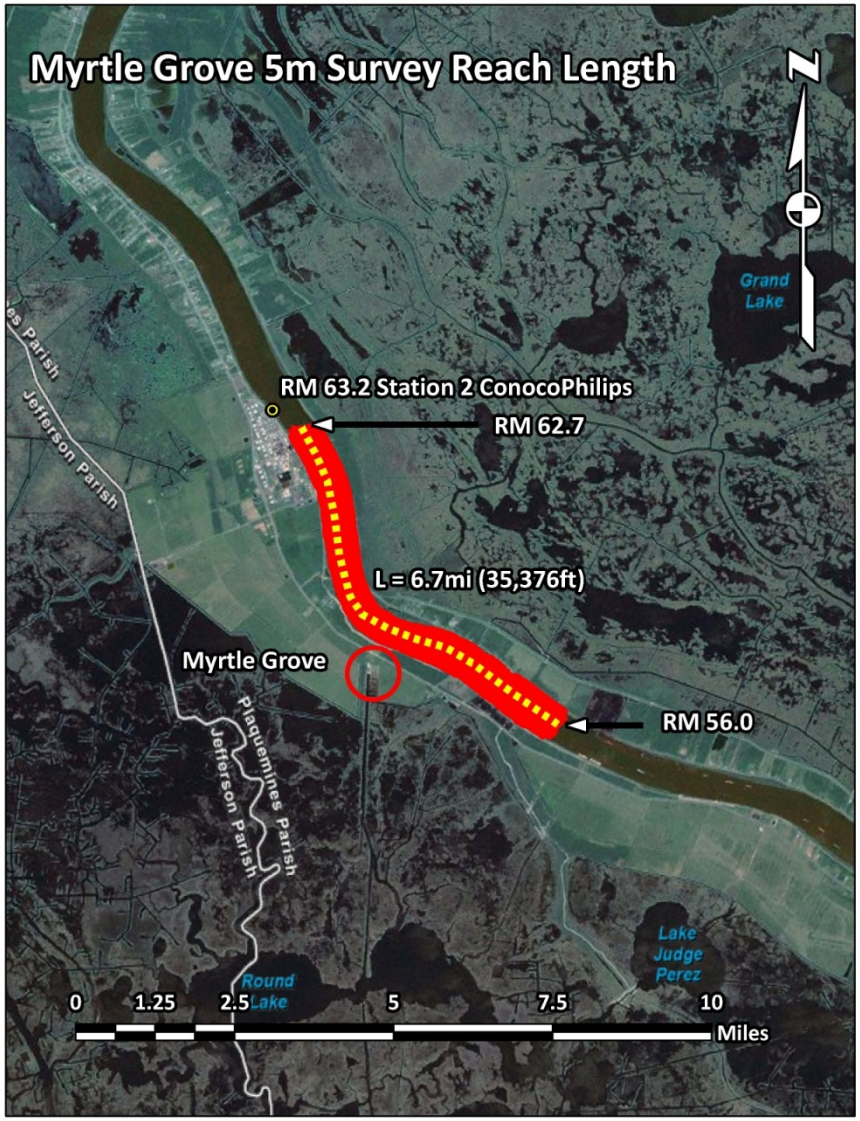


3D Mississippi River Modeling

Dr. Ehab Meselhe
University of Louisiana at Lafayette

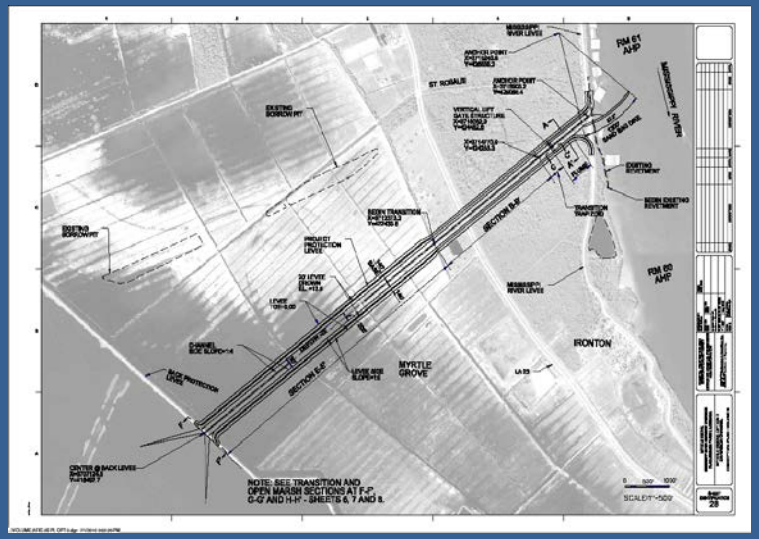
- Bathymetry data collected in the river are an input into the model

- Agreement between Model and Field Data:
  flow and circulation predicted by model and the data collected in the river indicate the model is a good representation of the river

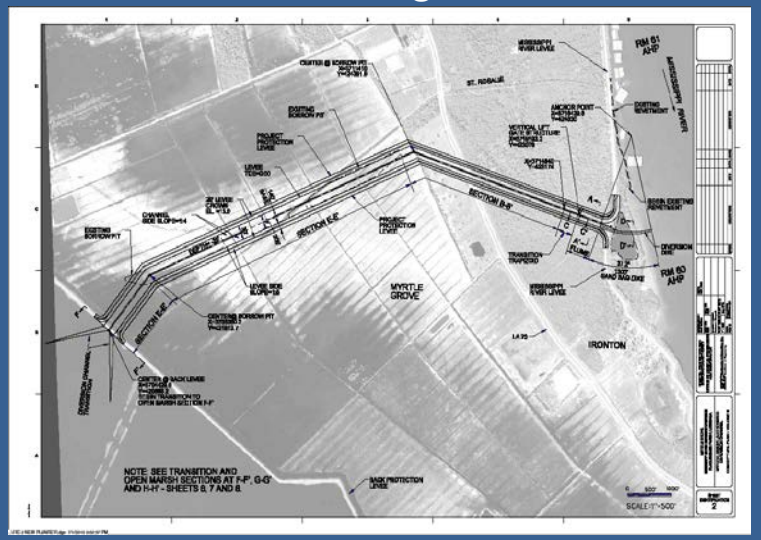


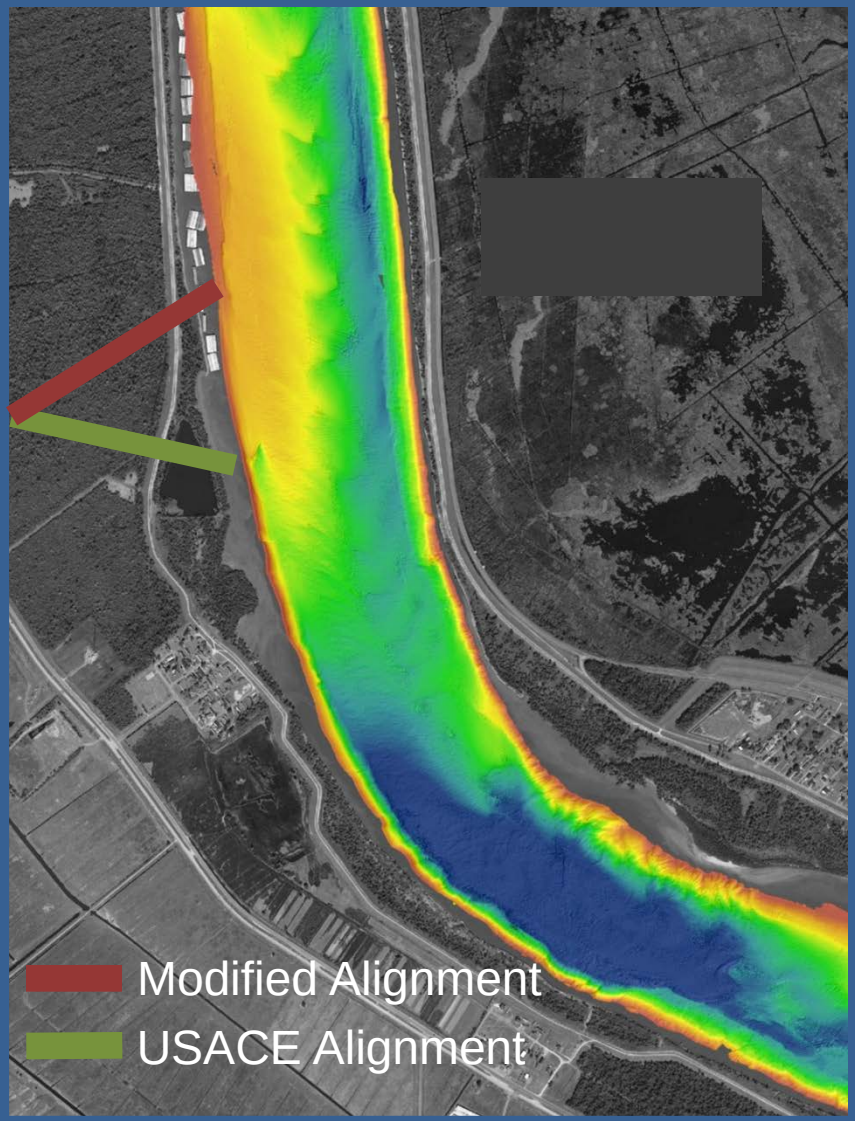
Myrtle Grove Diversion Alignment

Modified Alignment



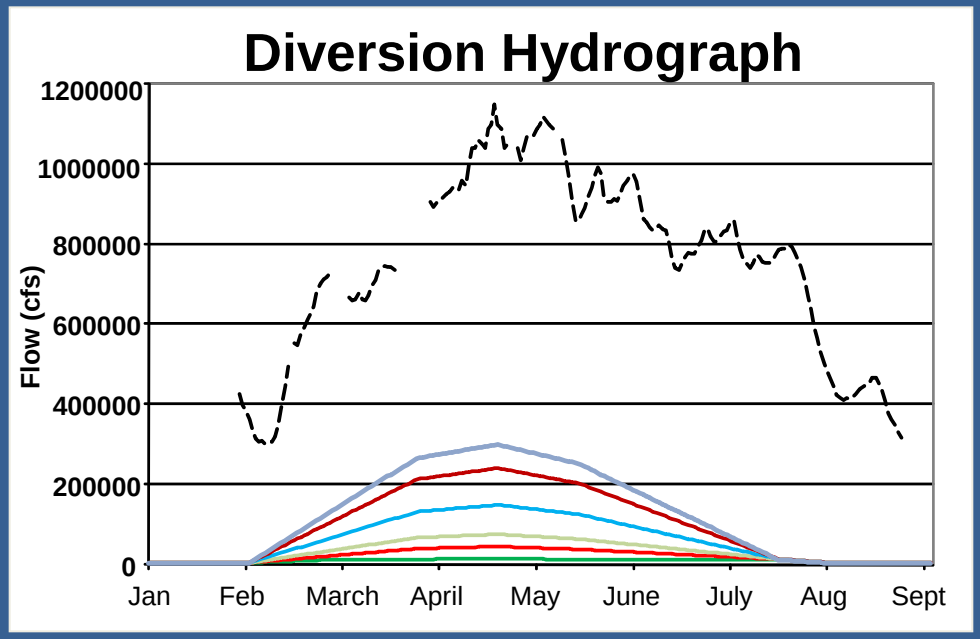
USACE Alignment

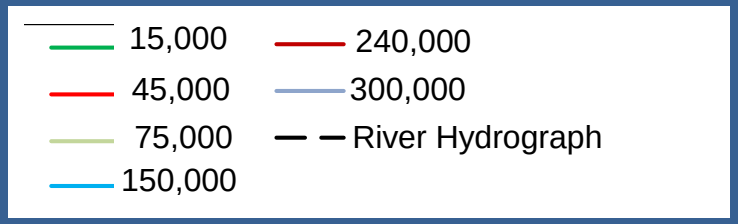




Evaluating Changes in the Basin: Water Elevation - Screening Model

Modeling Done by : Moffatt & Nichol





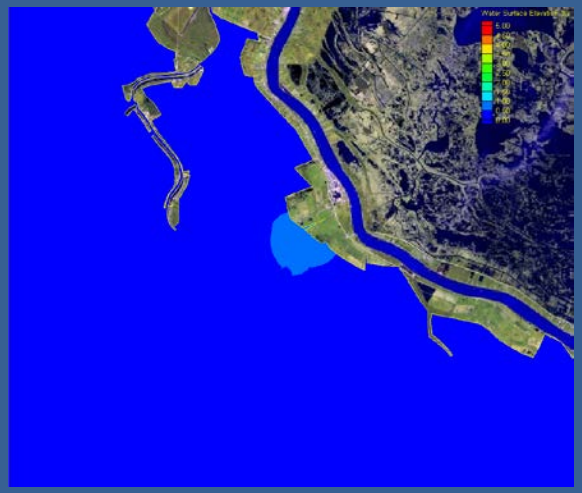
- Used an Existing Barataria Basin Model
- Does not include wind or precipitation
- Six Potential Diversion Magnitudes

15,000 cfs	**150,000 cfs**
45,000 cfs	**240,000 cfs**
75,000 cfs	**300,000 cfs**

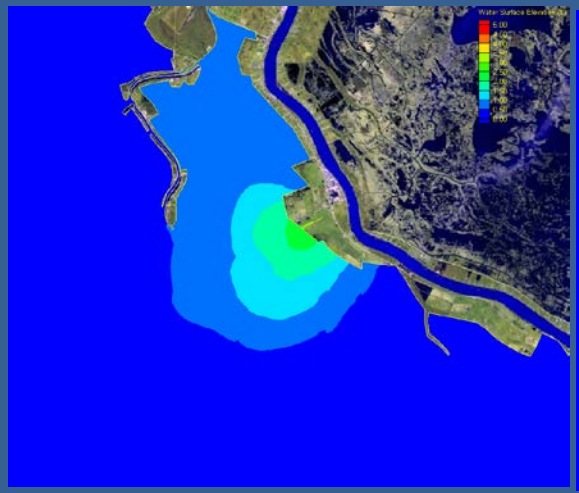
- Extracted Results For:
  - **Water Surface Elevations**

Maximum Water Elevation in April

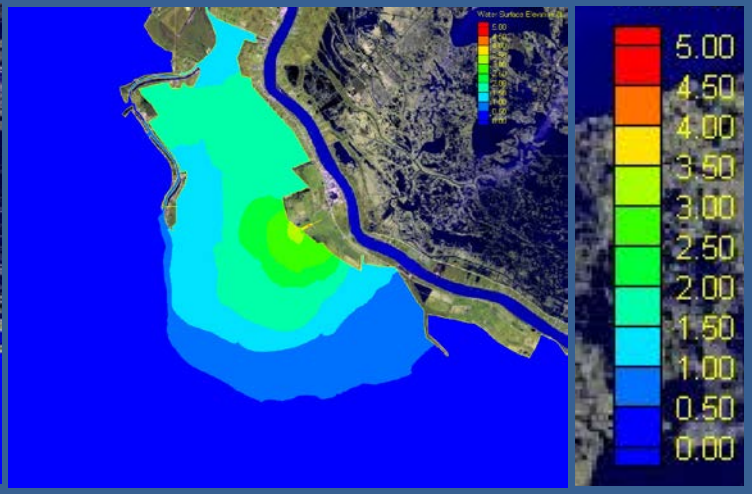
15,000 cfs



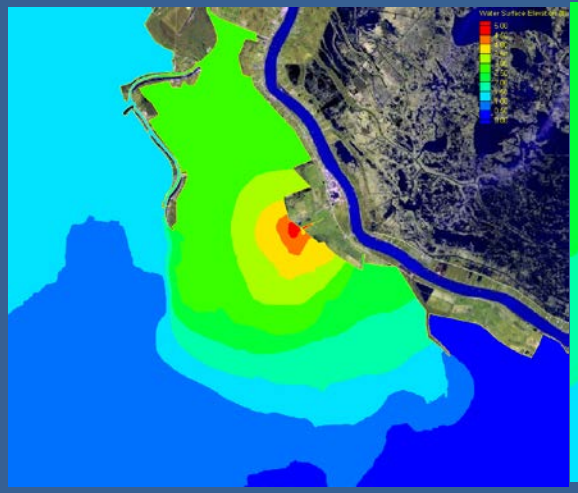
45,000 cfs



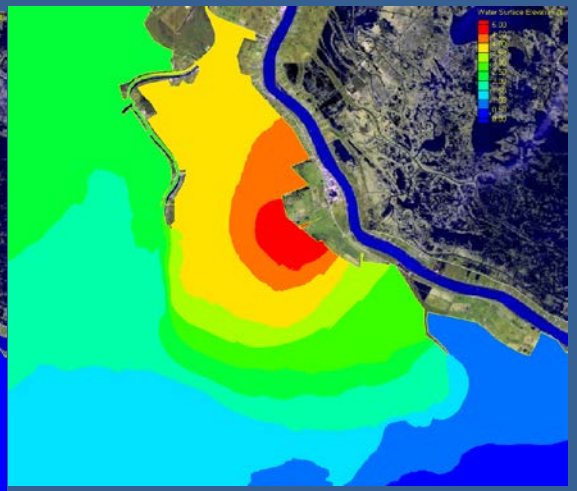
75,000 cfs



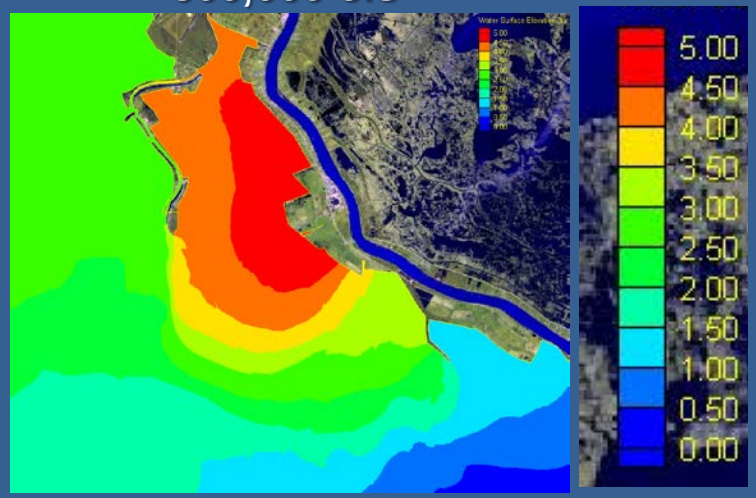
150,000 cfs



240,000 cfs

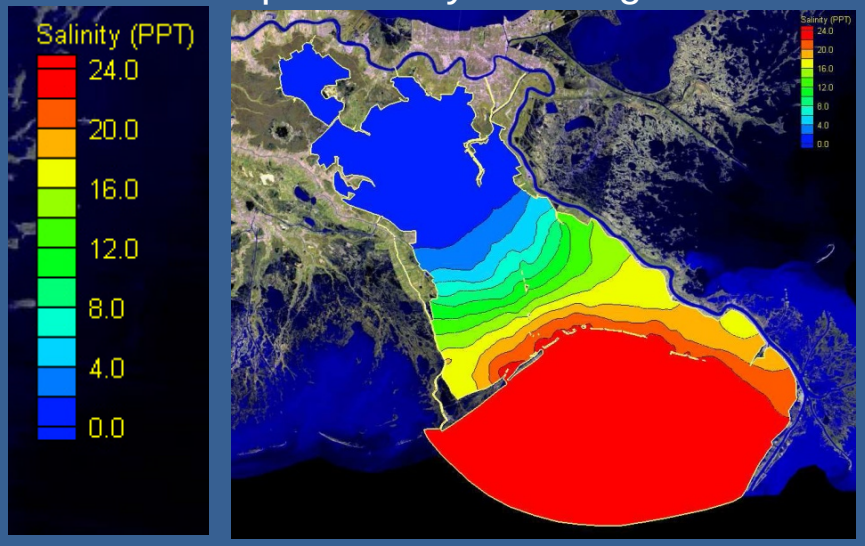


300,000 cfs

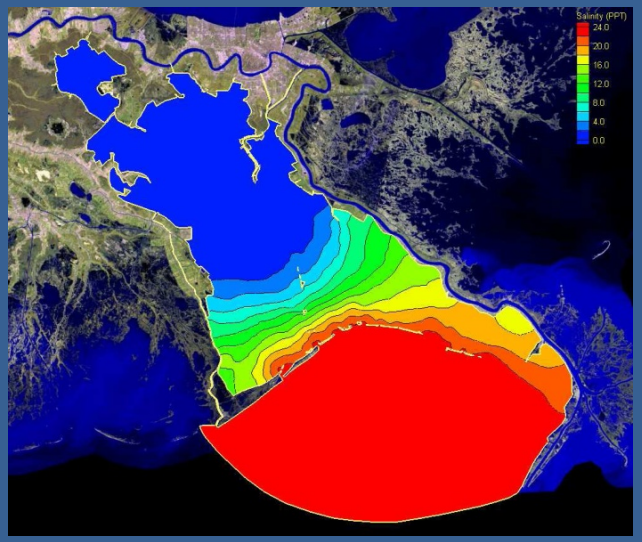


Evaluating Changes in the Basin: Salinity in April

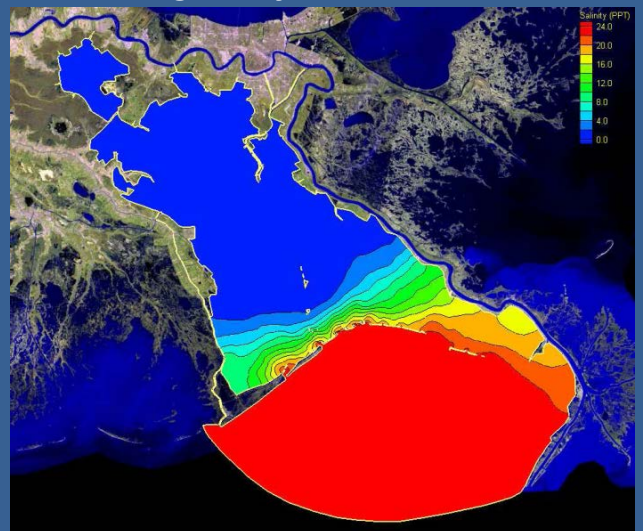
April Salinity “Existing Conditions”



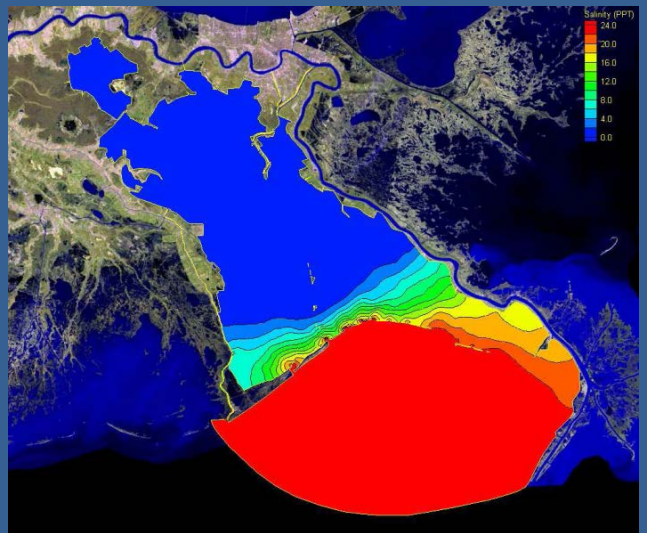
Davis Pond High ~ 10,000 cfs



Davis Pond High, Myrtle Grove ~ 20,000 cfs



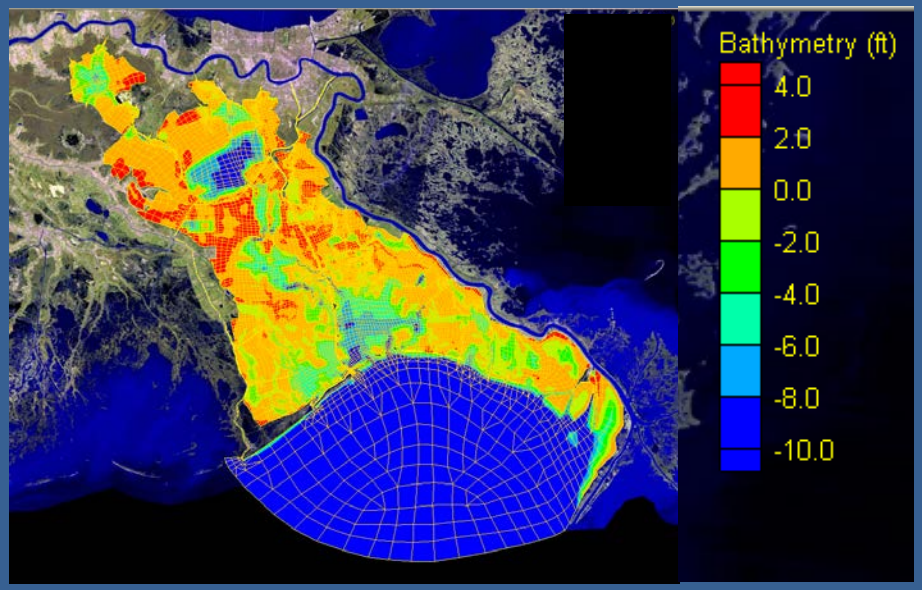
Davis Pond High, Myrtle Grove ~ 39,000 cfs



Evaluating Changes in the Basin: Marsh Building

- Includes 3 sediment sizes:
  - fine sand, very fine sand and silt
- Scenarios run to date:
  - 15,000 cfs USACE alignment with sediment consolidation
  - 45,000 cfs Modified alignment with sediment consolidation

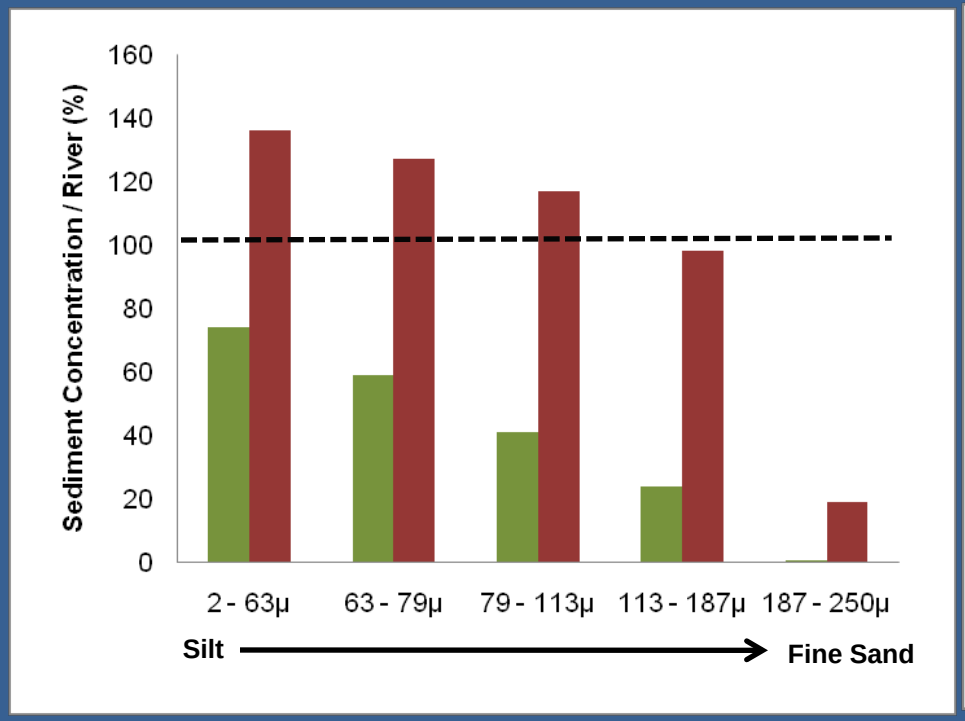
Model Grid



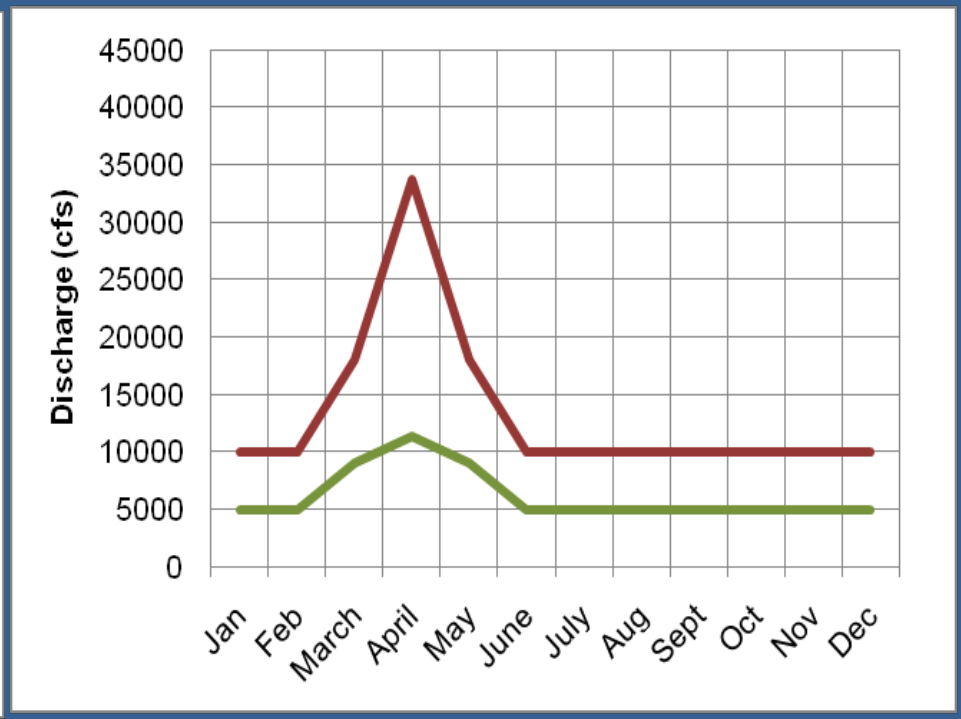
Model Input Parameters

USACE Alignment	1.6% (River = 700,000 cfs, Diversion = 11,369 cfs)
Modified Alignment	4.8% (River = 700,000 cfs, Diversion = 33,735)

Sediment Concentration in the Diversion / Sediment Concentration in the River (%)



Modeled Diversion Discharge During the Year

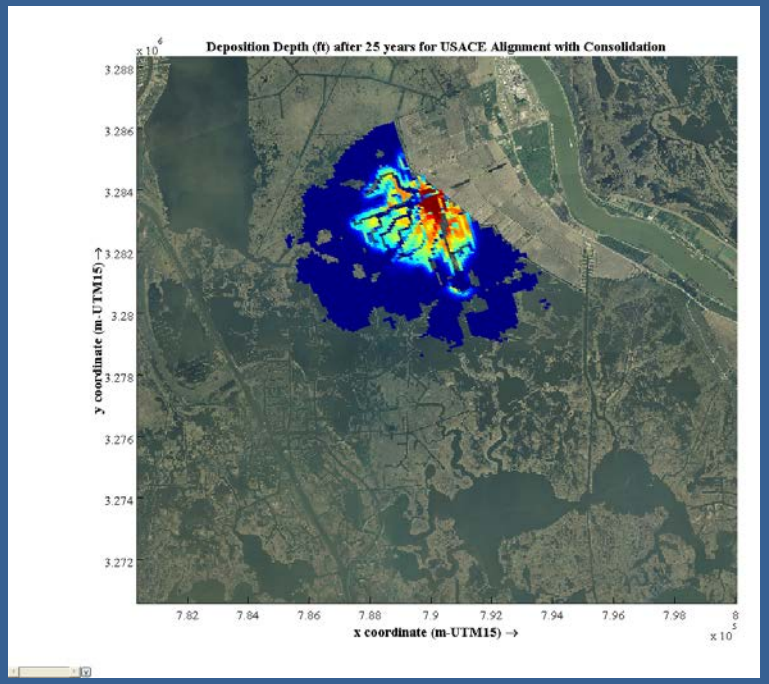


Marsh Building Potential – 25 Years

USACE Alignment (15,000 cfs)

	Sediment Volume (yd^3)
TOTAL	7,857,352

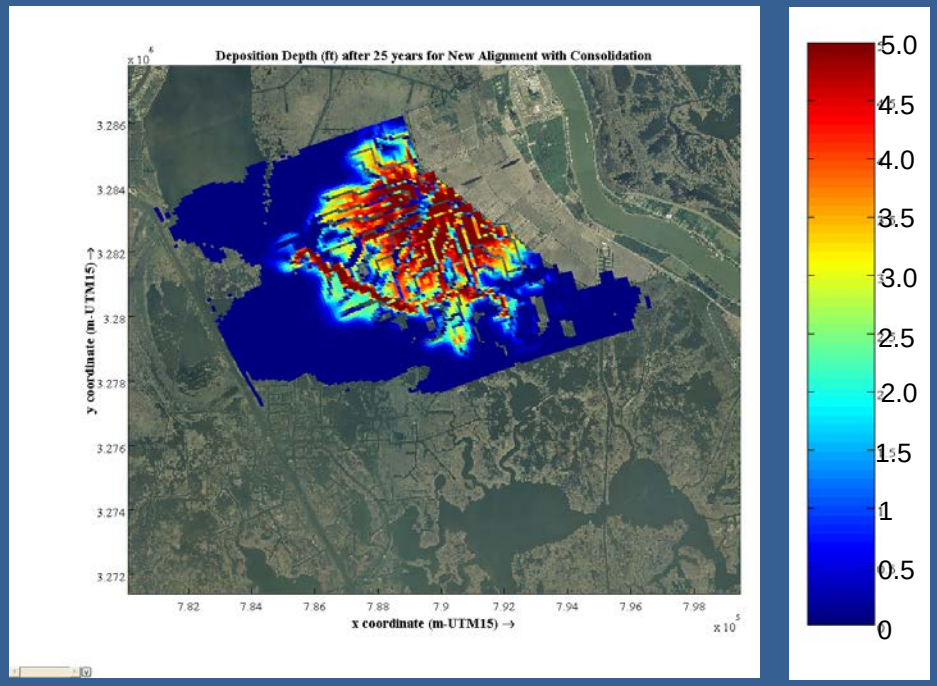
Deposition Depth (ft) After 25 years for USACE Alignment (with Sediment Consolidation)



Modified Alignment (45,000 cfs)

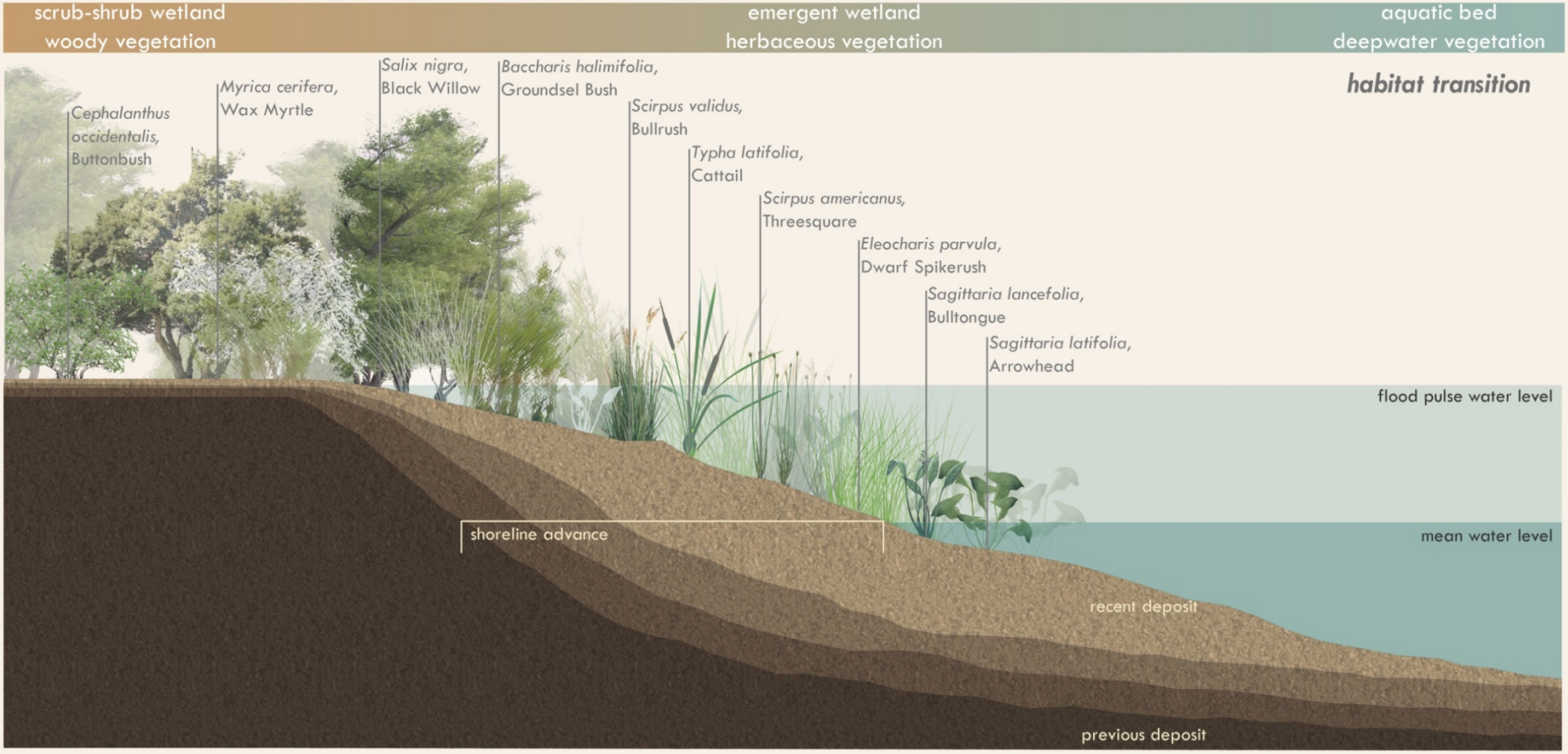
	Sediment Volume (yd^3)
TOTAL	32,010,488

Deposition Depth (ft) After 25 years for New Alignment (with Sediment Consolidation)



Vegetation and Marsh Building

Wetland plant communities are pivotal in the land building process



Sediment Pipeline

Images from: Chris Pulaski

Tradeoffs

Bayou Dupont

Image from: Chris Pulaski

Wax Lake Delta

Image from: Dr. Karen Westphal

Projected Land Loss by 2100 If No Action is Taken

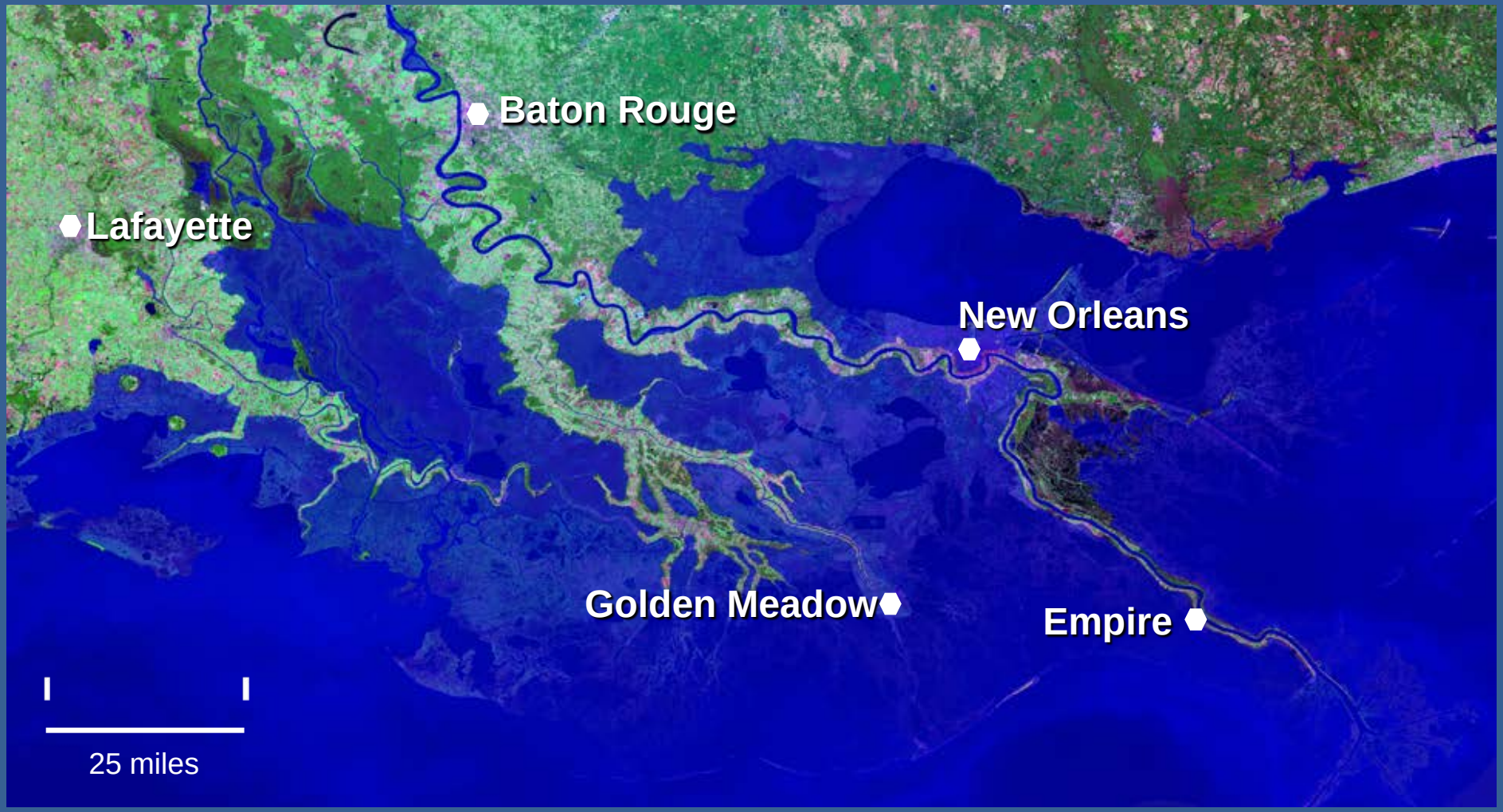
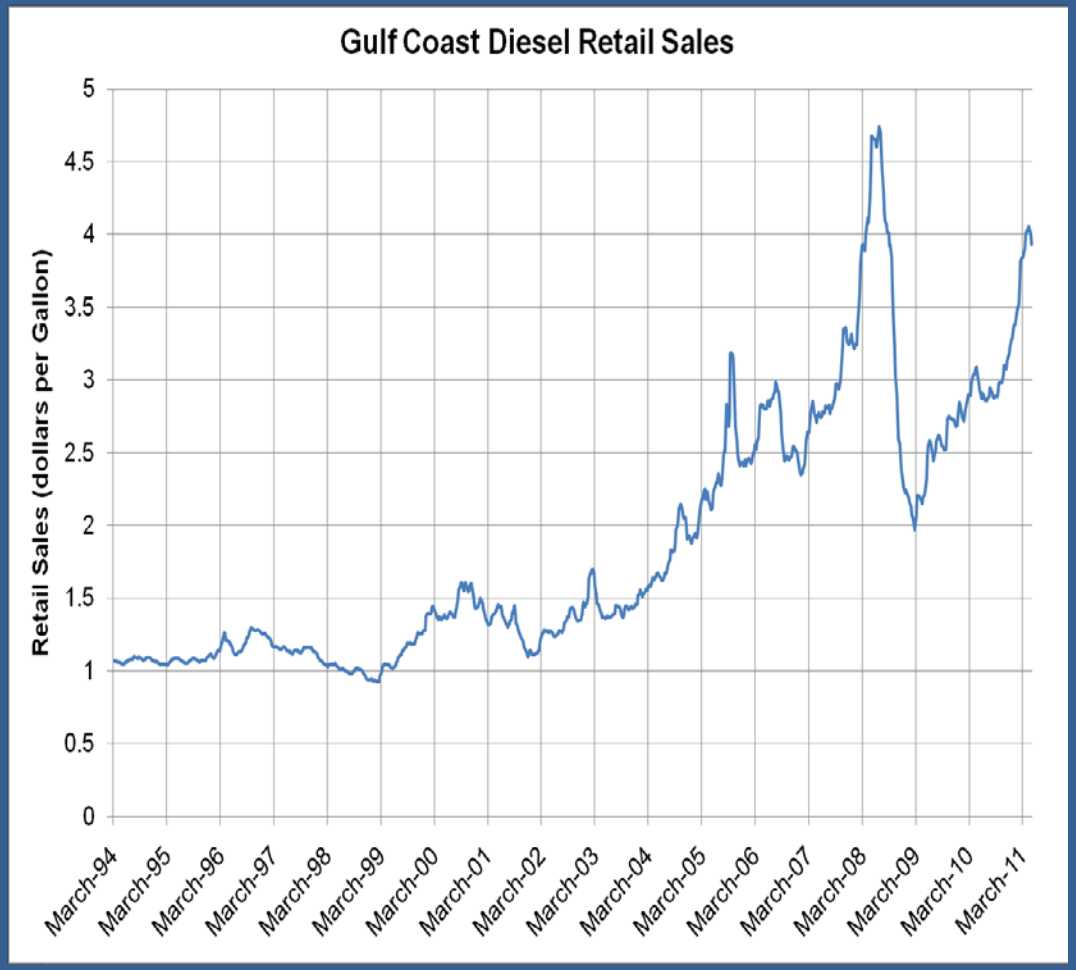


Figure modified from Blum and Roberts, 2009

The Rising Price of Diesel



Data from the Energy Information Administration