



Coastal Protection and  
Restoration Authority of Louisiana

# Diversions Update

Bren Haase, CPRA

Presentation to Expert Panel on  
Diversion Planning and Implementation  
Meeting #5

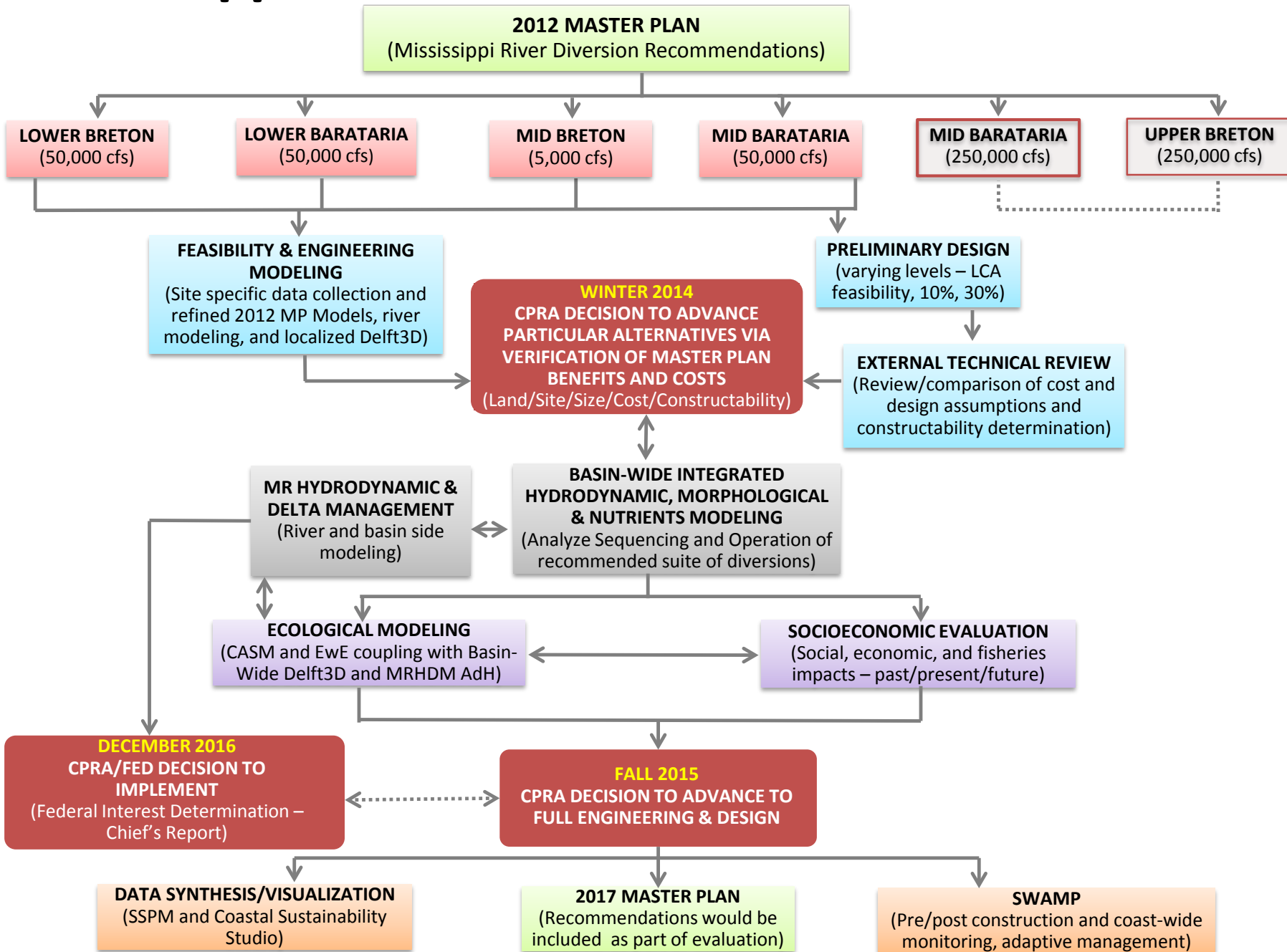
August 4, 2015



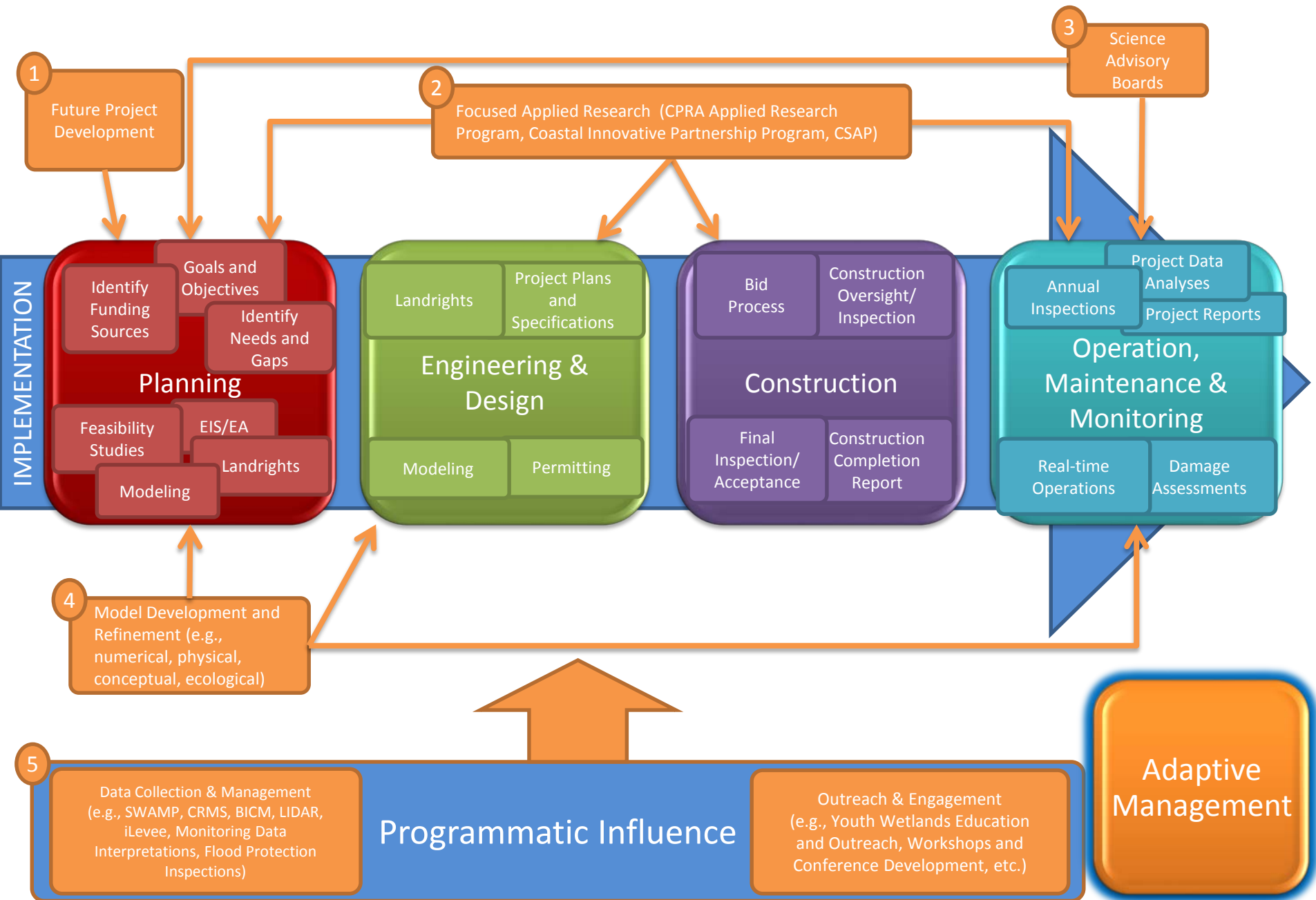
committed to our coast

# Mississippi River Sediment Diversions: Process

DIVERSIONS ADVISORY PANEL, DIVERSIONS SUB-COMMITTEE & PUBLIC ENGAGEMENT



# CPRA Program Implementation



# Feasibility & Preliminary Engineering

## *Lower Barataria, Lower Breton, Mid Breton, and Mid Barataria*

- Where we've been  
Selected location, size, alignment, conceptual level engineering and designs, value engineering
- Where we are  
Basin-wide, ecological modeling and socioeconomic evaluation
- Where we're going  
Fall 2015 decision on whether to advance to full engineering and design



# Basin-Wide Model Development (Delft 3D)

Model Domain of Integrated Hydrodynamic, Morphological, and Nutrient Dynamics

- Where we've been  
Set up and development, integration of components, validation and calibration
- Where we are  
FWOP and production runs underway
- Where we're going  
Complete runs, evaluate outputs



# Mississippi River Hydrodynamic and Delta Management Study

- Where we've been

Initial array of alternatives screened to final array using decision criteria based on the study's goals, objectives, and constraints

- Where we are

Production runs, team evaluating final array of alternatives based on model results

- Where we're going

Choose Tentatively Selected Plan



# Ecological Modeling

- Where we've been  
Development and calibration of EwE and CASM models
- Where we are  
Preparation for production runs using Delft 3D outputs
- Where we're going  
Complete runs, evaluate alternatives



# Basin-wide Socio-economic Analysis

- Where we've been  
Literature review, ID of data gaps, initial data collection complete, draft model output reviewed
- Where we are  
Framework and scope that outlines methodology for assessing socio-economic effects of diversion activities
- Where we're going  
Application of methodology, and evaluation of results





# Four Recommendations from Panel Report #4

- **#1: Expand current conceptual model of sediment diversion planning process, greater detail on modeling and socioeconomic studies and respective linkages.**
- **#2: Use refined conceptual model and detailed description of the socio-economic valuation approach to communicate with stakeholders over the next 6 months and solicit their feedback.**



# Four Recommendations from Panel Report #4

- **#3: Provide for review of monitoring and modeling efforts by independent subject matter experts and make results of the reviews available.**
- **#4: Design Basin-Wide Socioeconomic study so operational decisions can be compared in terms of socioeconomic outcomes, and apportion available resources to support this work over other more descriptive studies.**



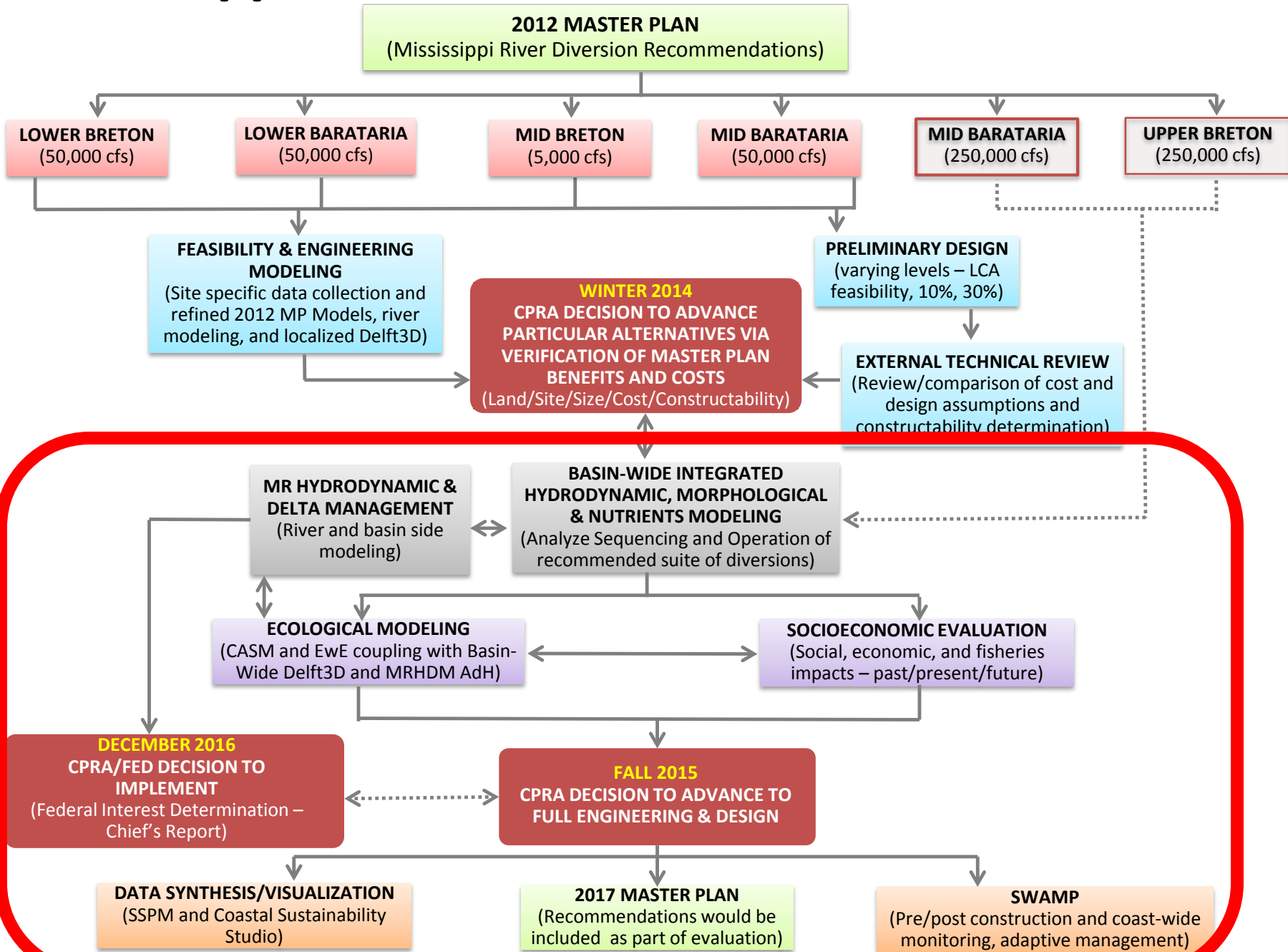
# Recommendation #1

- **#1: Expand current conceptual model of sediment diversion planning process, greater detail on modeling and socioeconomic studies and respective linkages.**



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DIVERSIONS ADVISORY PANEL, DIVERSIONS SUB-COMMITTEE & PUBLIC ENGAGEMENT



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

**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 Model)

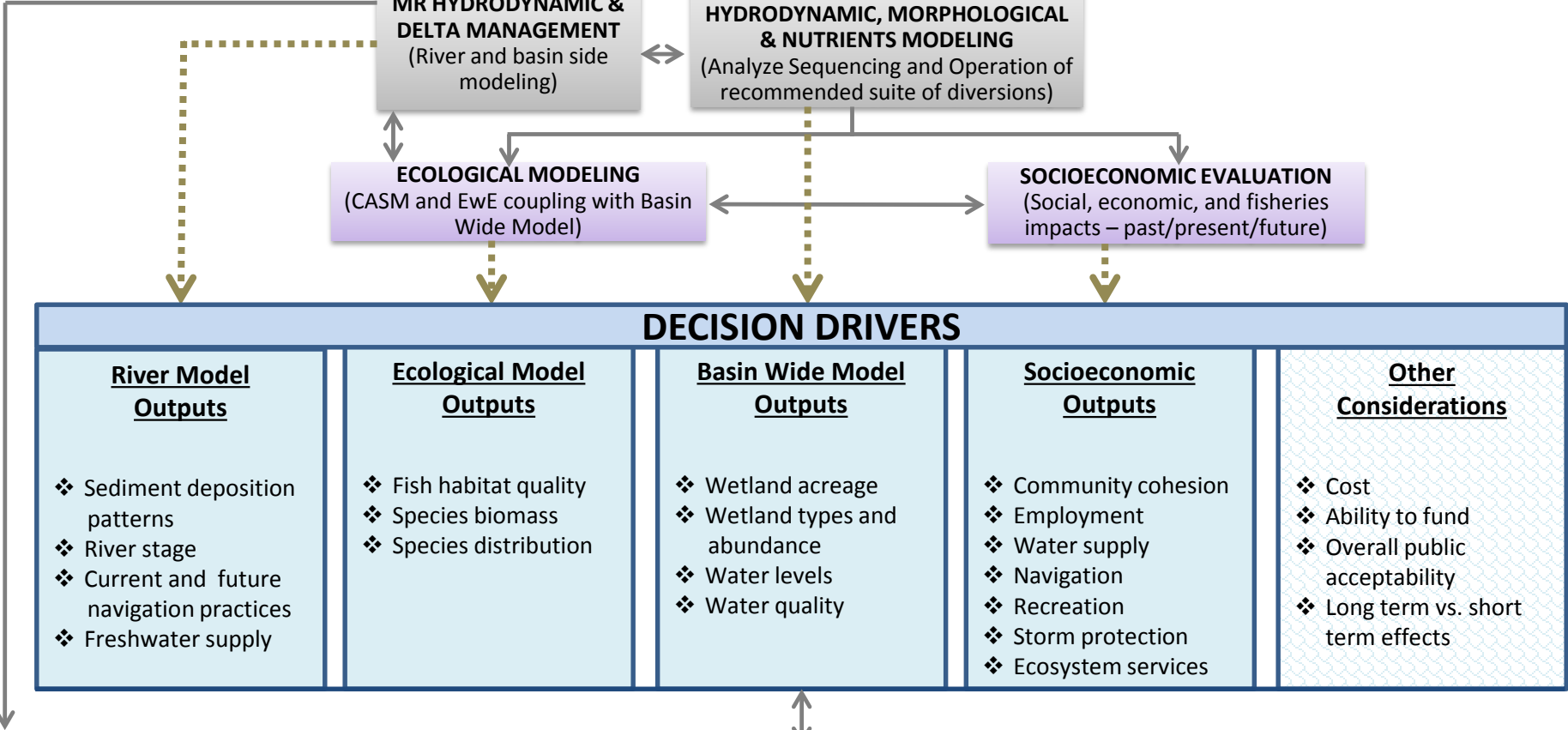
**SOCIOECONOMIC EVALUATION**  
 (Social, economic, and fisheries impacts – past/present/future)

**DECISION DRIVERS**

<u>River Model Outputs</u>	<u>Ecological Model Outputs</u>	<u>Basin Wide Model Outputs</u>	<u>Socioeconomic Outputs</u>	<u>Other Considerations</u>
<ul style="list-style-type: none"> <li>❖ Sediment deposition patterns</li> <li>❖ River stage</li> <li>❖ Current and future navigation practices</li> <li>❖ Freshwater supply</li> </ul>	<ul style="list-style-type: none"> <li>❖ Fish habitat quality</li> <li>❖ Species biomass</li> <li>❖ Species distribution</li> </ul>	<ul style="list-style-type: none"> <li>❖ Wetland acreage</li> <li>❖ Wetland types and abundance</li> <li>❖ Water levels</li> <li>❖ Water quality</li> </ul>	<ul style="list-style-type: none"> <li>❖ Community cohesion</li> <li>❖ Employment</li> <li>❖ Water supply</li> <li>❖ Navigation</li> <li>❖ Recreation</li> <li>❖ Storm protection</li> <li>❖ Ecosystem services</li> </ul>	<ul style="list-style-type: none"> <li>❖ Cost</li> <li>❖ Ability to fund</li> <li>❖ Overall public acceptability</li> <li>❖ Long term vs. short term effects</li> </ul>

**DECEMBER 2016**  
**CPR/FED DECISION TO IMPLEMENT**  
 (Federal Interest Determination – Chief’s Report and Recommended Plan)

**FALL 2015**  
**CPRA DECISION TO ADVANCE TO FULL ENGINEERING AND DESIGN**



# Decision Drivers

## River Model Outputs

- ❖ Sediment deposition patterns
- ❖ River stage
- ❖ Current and future navigation practices
- ❖ Freshwater supply

## Ecological Model Outputs

- ❖ Fish habitat quality
- ❖ Species biomass
- ❖ Species distribution



# Decision Drivers

## Basin Wide Model Outputs

- ❖ Wetland acreage
- ❖ Wetland types and abundance
- ❖ Water levels
- ❖ Water quality

## Socioeconomic Outputs

- ❖ Community cohesion
- ❖ Employment
- ❖ Water supply
- ❖ Navigation

Recreation

Storm protection

Ecosystem services

# Decision Drivers

## Other Considerations

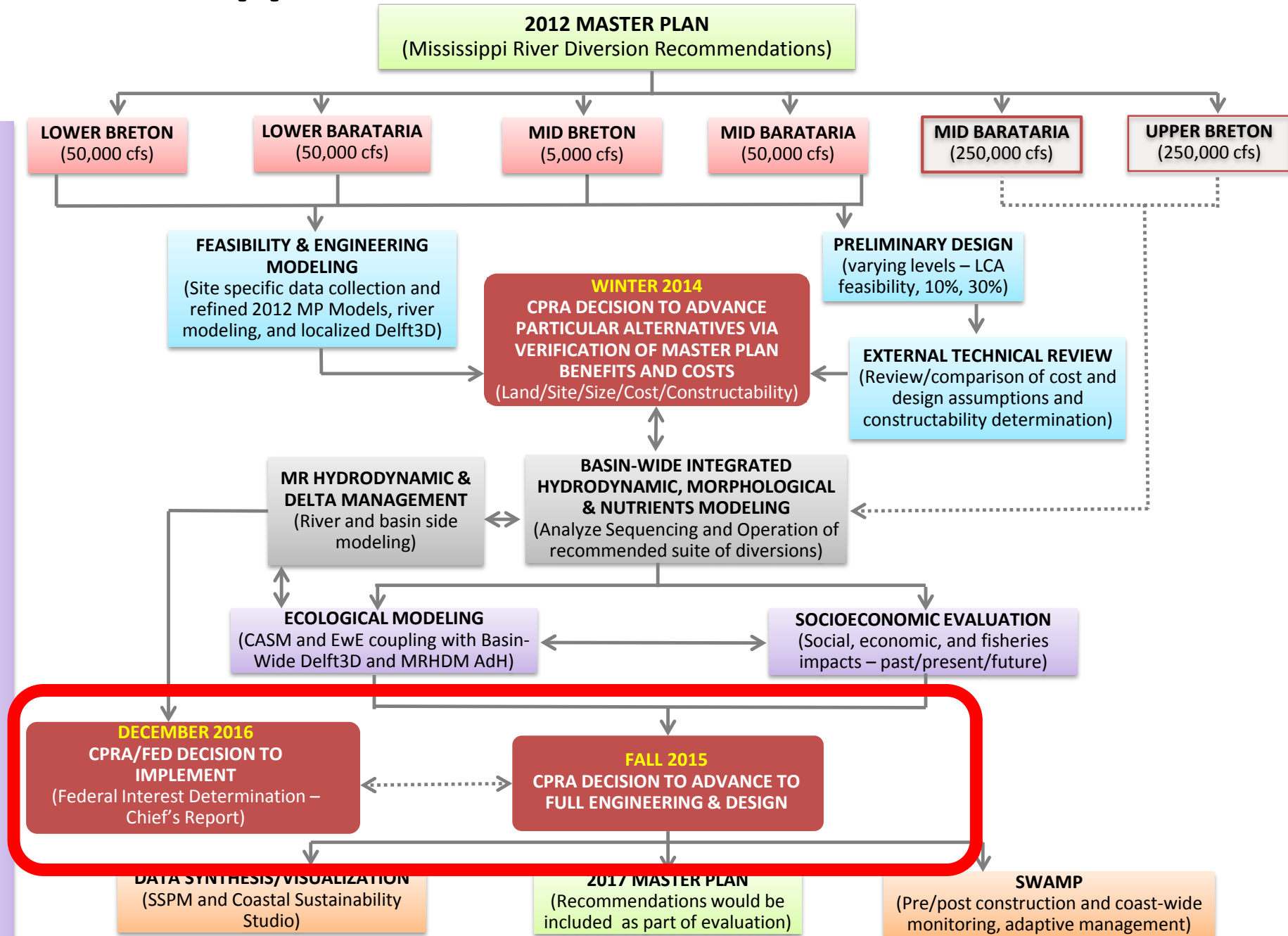
- ❖ Cost
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# Mississippi River Sediment Diversions: Process

DIVERSIONS ADVISORY PANEL, DIVERSIONS SUB-COMMITTEE & PUBLIC ENGAGEMENT



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### ADDITIONAL EVALUATION (OPTIMIZATION)

#### WHAT WILL WE DO?

##### DESIGN CONSIDERATIONS

- ❖ Detailed Hydraulics Analysis
- ❖ Detailed Geotechnical Investigation, Analysis, and Design
- ❖ Analyze Impacts to Utilities and Oil/Gas Facilities
- ❖ Analyze Impacts to Transportation and Drainage Infrastructure
- ❖ Determine Construction Methodology (e.g., Construction in wet vs. dry, etc.)
- ❖ Develop Structure and Channel Geometry
- ❖ Develop Construction Sequencing and Project Implementation Plan
- ❖ Determine Real Estate Requirements
- ❖ Contractual Approach (e.g., Early contractor involvement, design/build, design/bid/build, etc.)
- ❖ Refine Opinion of Probable Construction Cost Estimate

OPERATIONS

BENEFITS

COSTS

#### HOW WILL IT BE DONE?

##### POLICY, MANAGEMENT & OTHER CONSIDERATIONS

- ❖ Monitoring (SWAMP)
- ❖ Adaptive Management (also a design consideration)
- ❖ Operations and Maintenance (also a design consideration)
- ❖ Emergency Management
- ❖ Flexibility of Construction Methodology
- ❖ Procurement Alternatives
- ❖ River Sediment Dynamics (e.g., sediment retention/deposition and dredging requirements).

#### PERMISSION TO DO IT

##### PERMIT CONSIDERATIONS

- ❖ Environmental Impact Statement
  - Purpose and Need
  - Alternatives Analysis
  - Affected Environment
  - Environmental Consequences
  - Permits, Mitigation, and Commitments
  - Public Involvement and Stakeholder Coordination
  - Coordination Letters
  - Public Comments
- ❖ 408 Permit Requirements
  - Section 214 Agreement
- ❖ 404 Permit Requirements
  - Public Interest Review

DATA SYNTHESIS/VISUALIZATION  
(SSPM and Coastal Sustainability  
Studio)

2017 MASTER PLAN  
(Recommendations would be  
included as part of evaluation)

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

FALL 2017

CPRA DECISION TO ADVANCE TO  
CONSTRUCTION

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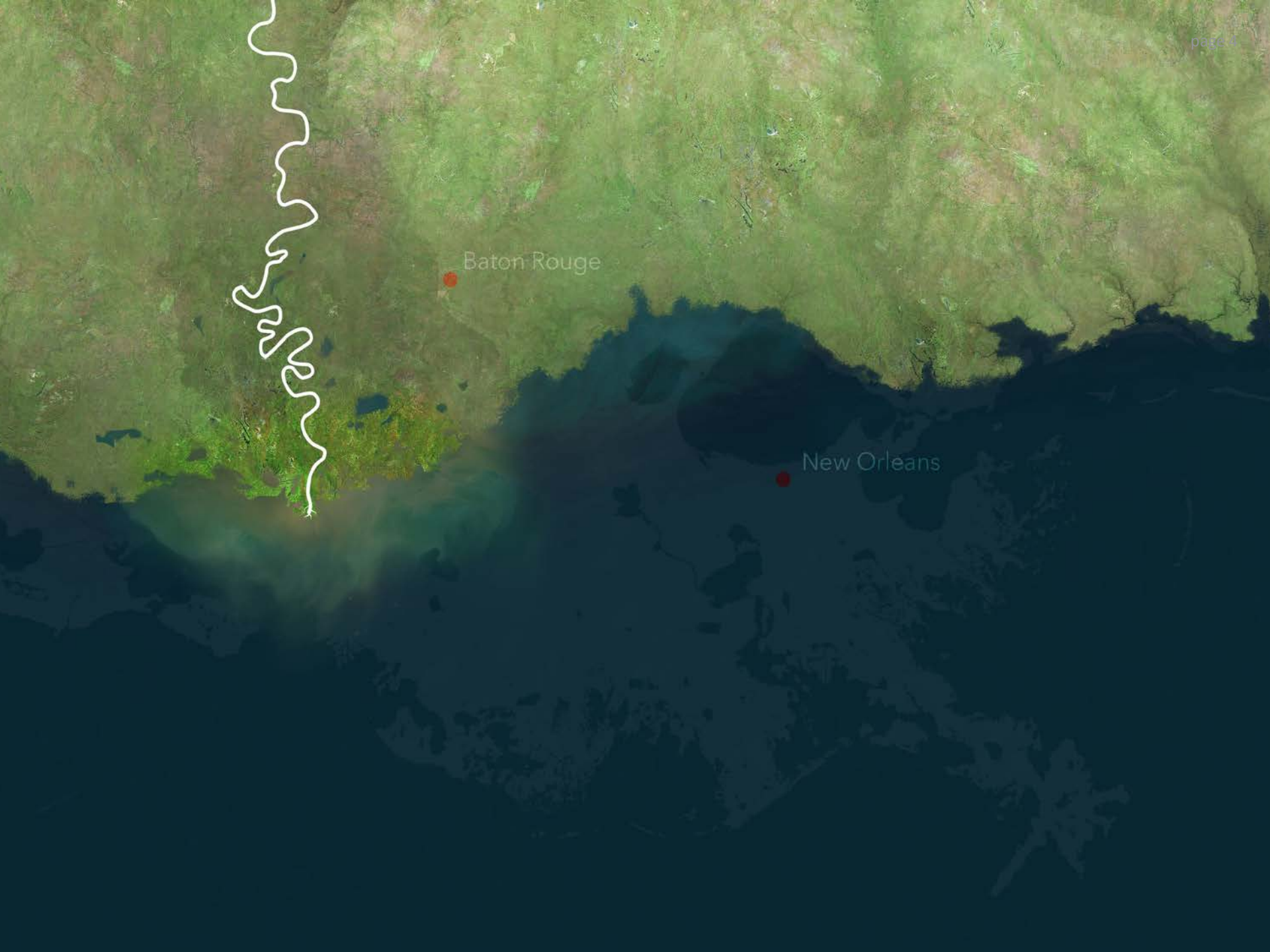
SWAMP  
(Pre/post construction and coast-wide  
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FALL 2017

CPRA DECISION TO ADVANCE TO  
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## Recommendation #2

- **#2: Use refined conceptual model and detailed description of the socio-economic valuation approach to communicate with stakeholders over the next 6 months and solicit their feedback.**
  - St. Bernard Public Meeting
  - Coastal Conservation Association
  - Coastal Communities Consulting
  - CPRA Board Meetings
  - Governor's Advisory Commission Meetings
  - Boil for the Bayou
  - Mississippi Flyway Council



Baton Rouge

New Orleans





Baton Rouge

New Orleans



Baton Rouge

New Orleans



Baton Rouge

New Orleans



Baton Rouge

New Orleans



Baton Rouge

New Orleans



Baton Rouge

New Orleans



Baton Rouge

New Orleans

# Marsh Productivity

**#1 Producer:**  
shrimp, oysters, crawfish,  
blue crabs

**20% of the continental  
water bird population  
overwinters in Louisiana  
every year**

Wetland density > 40%  
Wetland density < 40%

To South America

DRAFT

**40%** of the coastal wetlands located in Louisiana in the continental US

**97%** (by weight) of the commercial fish harvested in the **Gulf of Mexico** are species that depend on coastal wetlands for reproduction, hatching, growth, or development

**26%** (by weight) of the commercial fish and shellfish in the continental US are harvested in Louisiana's waters.



# Oil and Gas Infrastructure

**#1 Producer**  
of oil in the U. S.

**#2 Producer**  
of natural gas in the U. S.

**Nearly 1/3 of the of the U. S. oil and gas supply** is produced or transported in and around Louisiana's Gulf Coast.

**DRAFT**

**125,000** miles of oil and natural gas pipelines pass through the marshes of coastal Louisiana.

**90%** of the offshore drilling operations in the Gulf of Mexico are supported by Port Fourchon, in coastal Louisiana.

**9** interstate pipelines have their nexus at Henry Hub in Erath, Louisiana on the coast.

# Commercial page 38 Infrastructure

**5 of the 15 largest ports**  
in the U.S. are in Louisiana

**20% of the U. S.**  
**waterborne commerce**  
(by tonnage) was accounted  
for by the Louisiana's ports  
in 2009

**DRAFT**





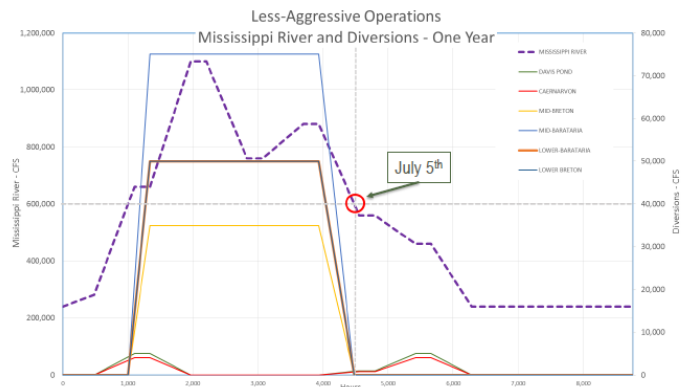
## Recommendation #3

- **#3: Provide for review of monitoring and modeling efforts by independent subject matter experts and make results of the reviews available.**
- SWAMP subject matter experts
- LCA Mississippi River Hydrodynamic Study: Independent External Peer Review
- LCA Mississippi River Delta Management Study: Independent External Peer Review
- LCA Mississippi River Delta Management Study: EwE and CASM input by subject matter experts

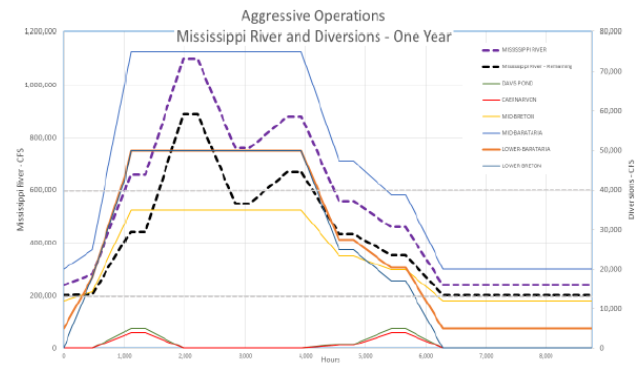
# Recommendation #4

- #4: Design Basin-Wide Socioeconomic study so operational decisions can be compared in terms of socioeconomic outcomes, and apportion available resources to support this work over other more descriptive studies.**

**OPERATION PLAN – LESS AGGRESSIVE**



**OPERATION PLAN – AGGRESSIVE**





Coastal Protection and  
Restoration Authority of Louisiana

**WWW.Coastal.LA.Gov**

# Thank You!

[Bren.Haase@la.gov](mailto:Bren.Haase@la.gov)

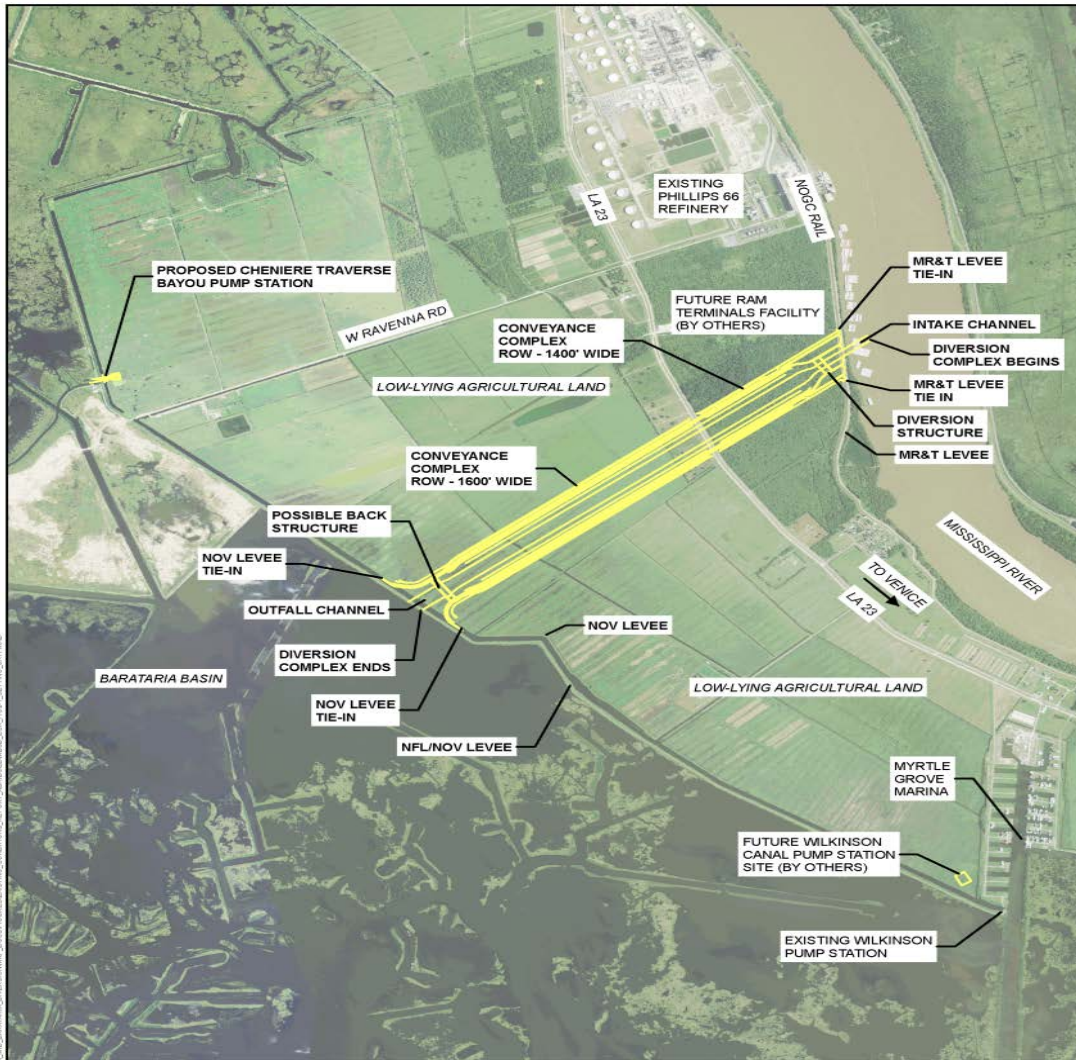


Coastal Protection and Restoration  
Authority of Louisiana

# Extra slides



# MBSD Project Design



- River Structure
- Rail
- Bridge
- Utilities
- Pipeline
- Back Structure
- MR&T
- NOV
- Pump Station
- Conveyance Channel
- River and Basin Modeling

ARCH: C:\WORK\040314\040314\BARATARIA\_DIVERSION\MAP\_DOCUMENTS\040314\_SETTING\_CONDITIONS.DWG

<p>HDR Engineering, Inc. 201 AND 1000 AVENUE, SUITE 110 LAHAYETTE, LOUISIANA 70003 (504) 484-1800</p>	<p>COASTAL PROTECTION AND RESTORATION AUTHORITY</p>	<p>COASTAL PROTECTION &amp; RESTORATION AUTHORITY ENGINEERING DIVISION 450 LAUREL STREET BATON ROUGE, LOUISIANA 70801</p>	<p>MID-BARATARIA SEDIMENT DIVERSION PLAQUEMINES AND JEFFERSON PARISHES, LOUISIANA STATE PROJECT NUMBER: BA-153 FEDERAL PROJECT NUMBER: BA-153</p>	<p>PROPOSED MBSD SETTING EXISTING CONDITIONS REPORT DATE: FEBRUARY 2014</p>
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# Mid-Barataria Sediment Diversion

## *Next Steps*

- Winter 2014/Spring 2015
  - Conduct refined Master Plan runs on E&D Value Engineering alternatives (runs complete, report being generated and results analyzed)
- Spring/Summer 2015
  - Tools available to compare benefits/effects of alternatives using basin-wide Delft models and tools for assessing fish, nutrient, and socio-economic effects
- Summer 2015
  - Prioritize next steps based on available information



# Preliminary Engineering

## *Lower Barataria, Lower Breton, Mid Breton, and Mid Barataria*

### Lower Breton & Lower Barataria

- 10% conceptual design ongoing
- Investigation of optimum siting with relation to costing
- 50,000 cfs structure
- Verification of Master Plan cost assumptions
- Constructability determination

### Mid Breton

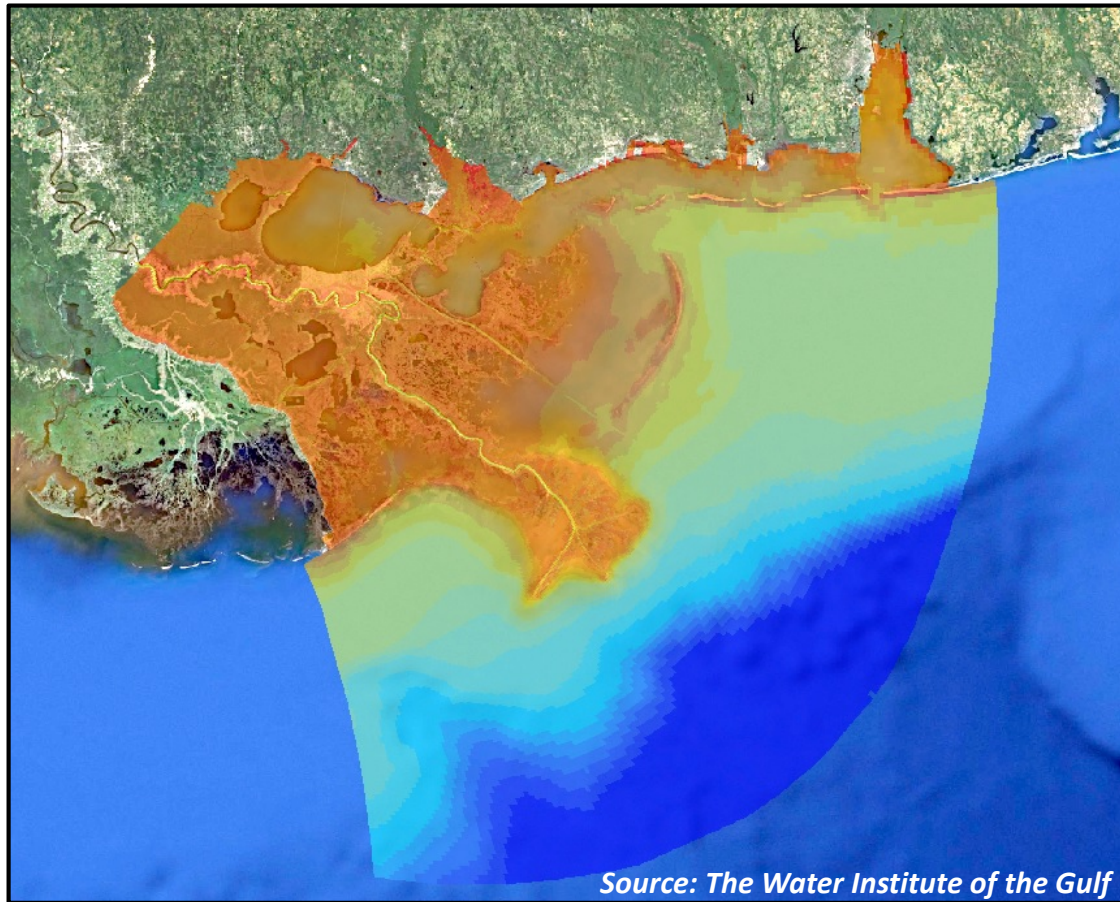
- Feasibility level design completed (LCA White Ditch)
- Entered into a Design Agreement
  - Preliminary effort resulted in identification of optimal siting for sediment capture
- 35,000 cfs structure at a total cost of \$387.6M
- Feasibility modeling to determine size and operation

### Mid Barataria

- 10+ years of planning
- 30% design and Value Engineering completed
- Preferred site of intake structure identified
- Structure ranging in size from 35,000-75,000 cfs
- Verification of Master Plan cost assumptions
- Determine ability to construct, operate and maintain

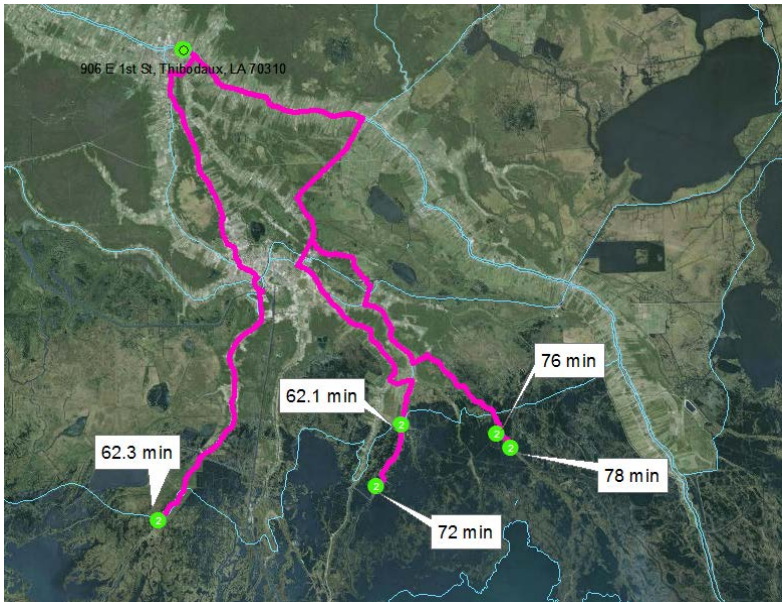
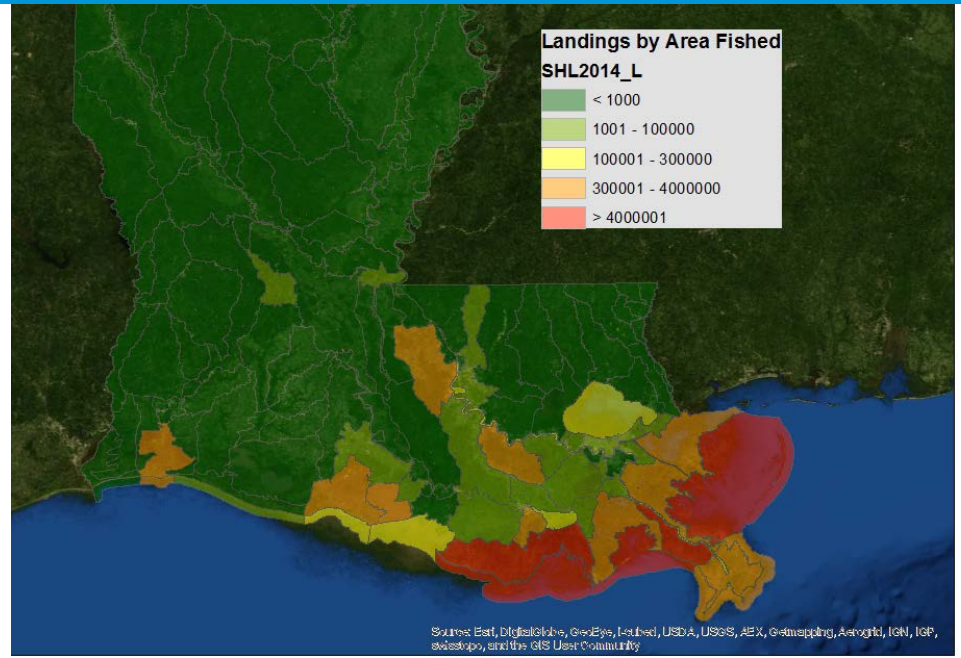
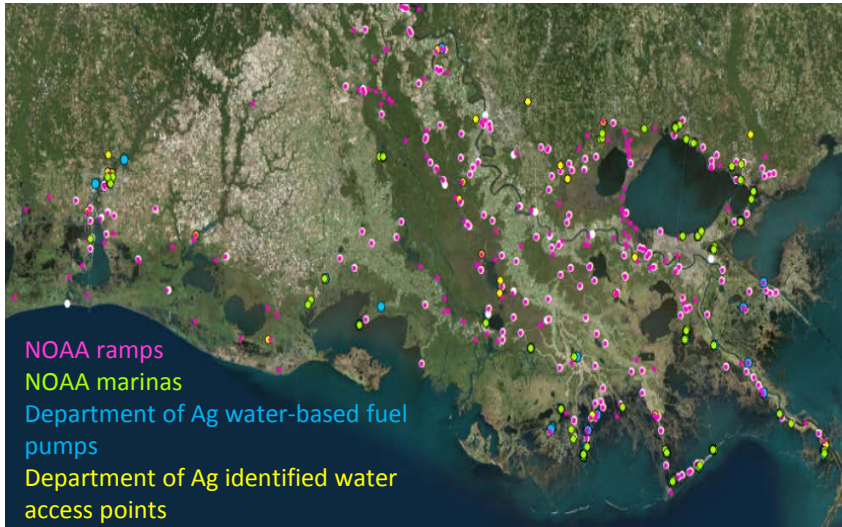
# Basin-Wide Model Development (Delft 3D)

Model Domain of Integrated Hydrodynamic, Morphological, and Nutrient Dynamics

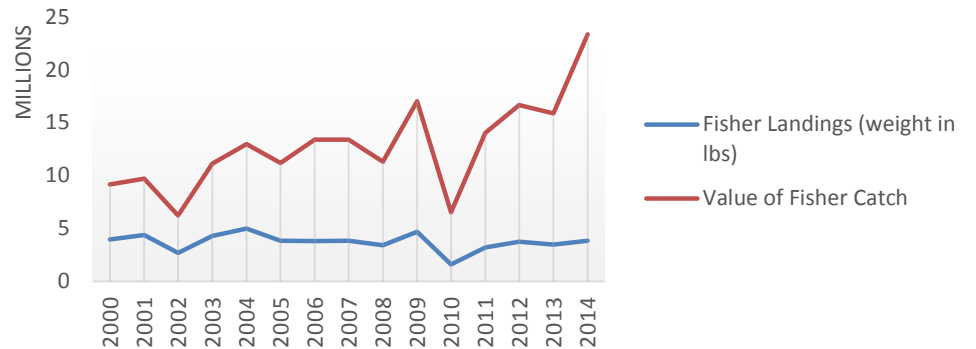


**Outcome Indicators:** Water level, velocity, salinity, water temperature, suspended sediment, sediment deposition, sediment erosion, bed-level changes, **aboveground and belowground biomass, wetland vegetation type (7 species), nitrogen, phosphorous, silicate, chlorophyll-a, dissolved oxygen**

# Fishing Data Analysis



2000-2014 Average Oyster Landings and Value of Commercial Fishing License Holders in Plaquemines Parish



# Mississippi River Hydrodynamic and Delta Management Study

## What we will evaluate:

- Water and sediment resources available for restoration
- Effects on navigation
- Sedimentation and effects on river maintenance
- Reduced transport in the river
- Effects on river flood control
- Nutrients and harmful pollutants in the river

## Tools Being Developed:

### River Models:

- One-Dimensional Models
  - HEC-6T (*Ronnie Heath-USACE/ERDC, Tony Thomas, Ike Mayer and Mike Trawle-BCG*)
- Multi-Dimensional Models
  - ADH-SedLib Multi-D Model (*Gary Brown-USACE/ERDC*)
  - Delft 3D Multi-D Model (*Alex McCorquodale-UNO, Steve Ayres-USACE/MVN, and Ehab Meselhe-Water Institute of the Gulf*)
  - FVCOM Multi-D Model (*Ioannis Georgiou-UNO*)
  - Flow3D Multi-D Model (*Ehab Meselhe-Water Institute of the Gulf*)
- Small Scale Physical Model (*BCG, Cecil Soileau-BCG/Dewberry Joint Venture and Alden Research Laboratory*)

Geomorphic Assessment (*David Biedenharn-Biedenharn Group and Charlie Little-USACE/ERDC*)

Data Collection (*Mead Allison-Water Institute of the Gulf and Thad Pratt-USACE/ERDC*)

Data Management (*Christina Hunnicutt and Craig Conzelmann-USGS; Melany Larenas and Beth Forrest-CB&I*)

# Fisheries Modeling/Studies

Following recommended dual model approach (Sable and Rose, 2013)

1. Improved Habitat Suitability Indices (HSIs)
  - Develop polynomial regressions that relate fish and shellfish abundance to key environmental variables
2. Development of a community-level food web model
  - Evaluate how food web dynamics affect species response to change in environmental conditions, and show changes in species biomass over time
    - EcoPath and EcoSim and EcoSpace (EwE)
    - Trophic Simulation Model (TroSim) to capture lower trophic levels / oysters
    - Comprehensive Aquatic Systems Model (CASM)

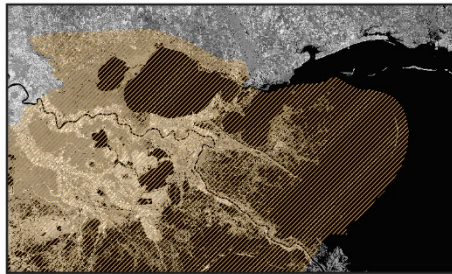
**Outcome Indicators:** Fish and shellfish habitat quality, food web responses over time, changes in species biomass over time, changes in species distribution over time

# BASINWIDE SOCIO-ECONOMIC ANALYSIS

*[Past - Present - Future]*

**GOALS:** *Further analyze the potential effects to communities, fisheries, and the economy from continued land loss and the implementation of sediment diversion projects recommended in the 2012 Coastal Master Plan.*

**SCALE:**



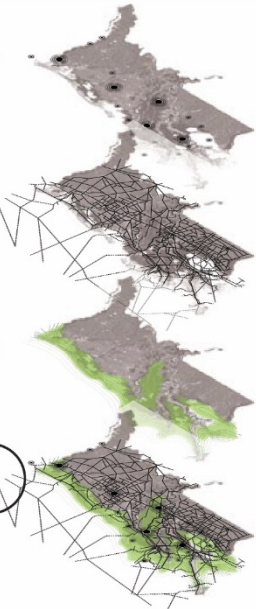
Regional

community ●

economy ●

environment ●

Coastal Louisiana ●



**TIMEFRAME:**

2014

Summer

Fall

2015

Winter

Spring

Summer

Fall

2016

Winter

Historic Coastal Atlas

Review of Commercial Fisheries

LSU/RAND Economic Study

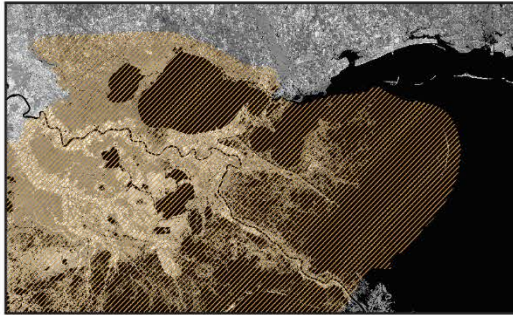
Diversion Feasibility Modeling

Socio-Economic Analysis

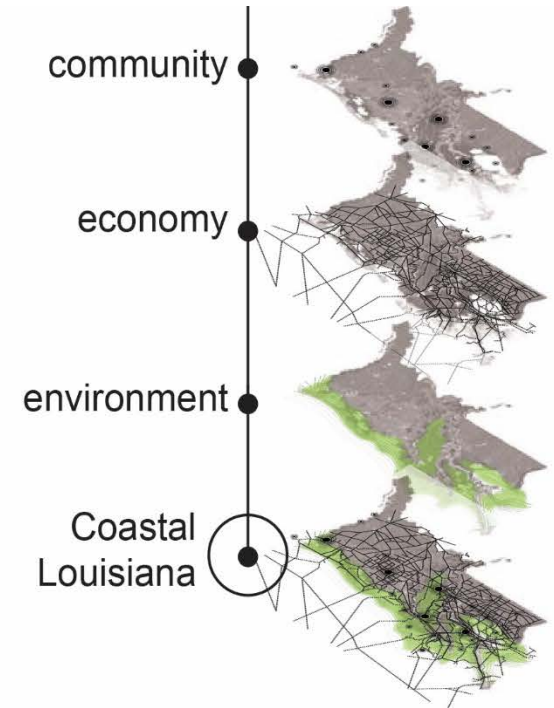
# Coastal Communities

**GOALS:** *Further analyze the potential effects to communities, fisheries, and the economy from continued land loss and the implementation of sediment diversion projects recommended in the 2012 Coastal Master Plan.*

**SCALE:**



Regional



**TIMEFRAME:**

