CPRA
Coastal Protection and Restoration Authority of Louisiana

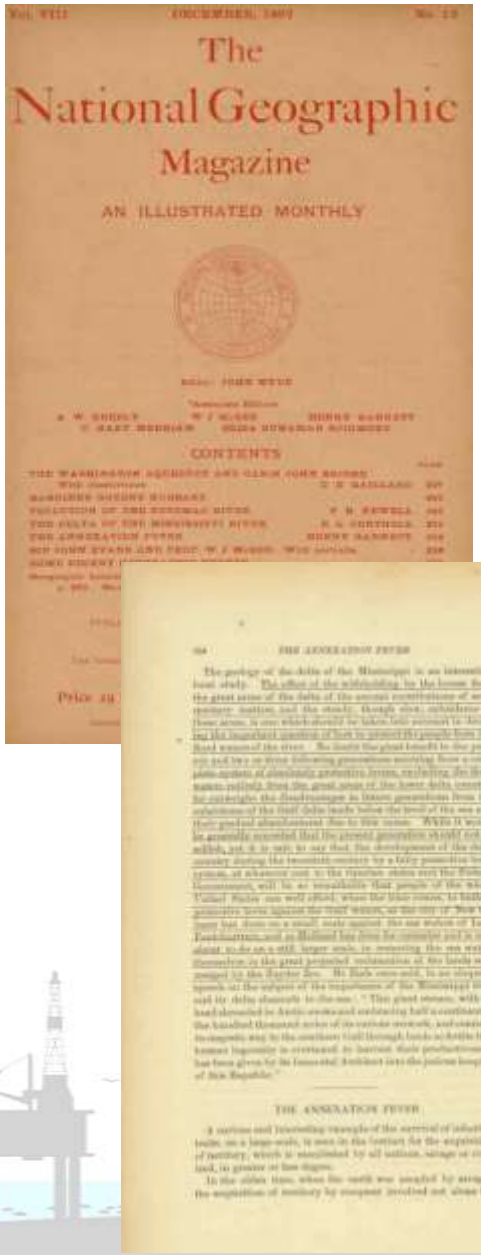
Sediment Diversions: Project Planning, Permitting and Implementation

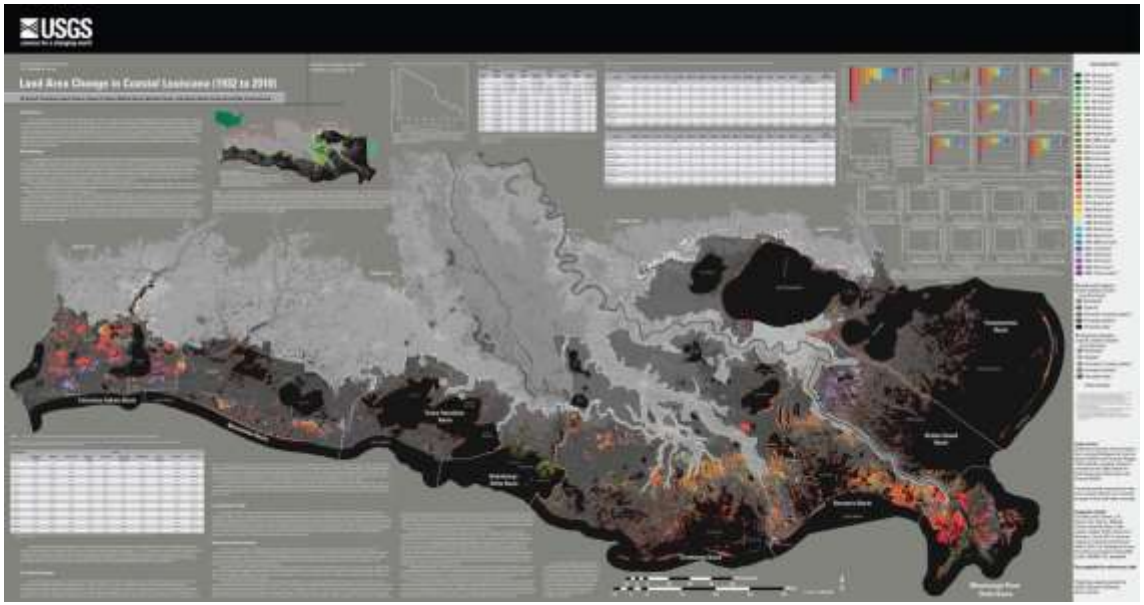
Bren Haase

Governor's Commission Diversion Sub-Committee

July 23, 2014

committed to **our coast**

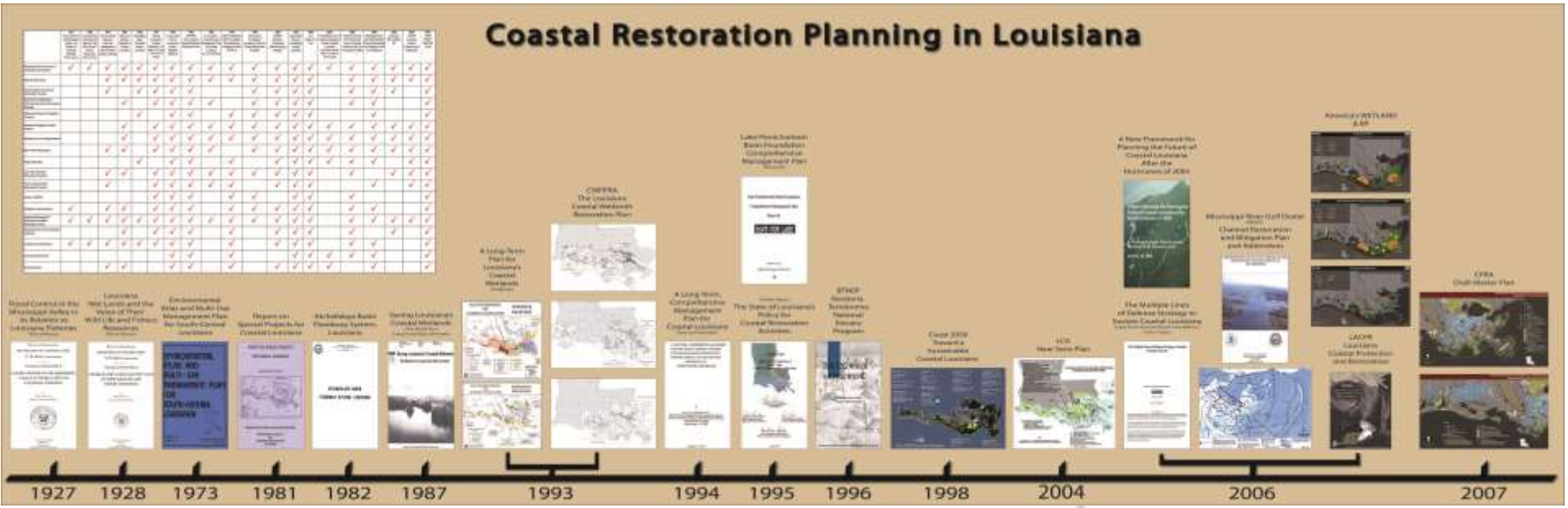




When discussing the Mississippi River Commission 1894 report of survey on the delta to account for the sinking land it was noted:

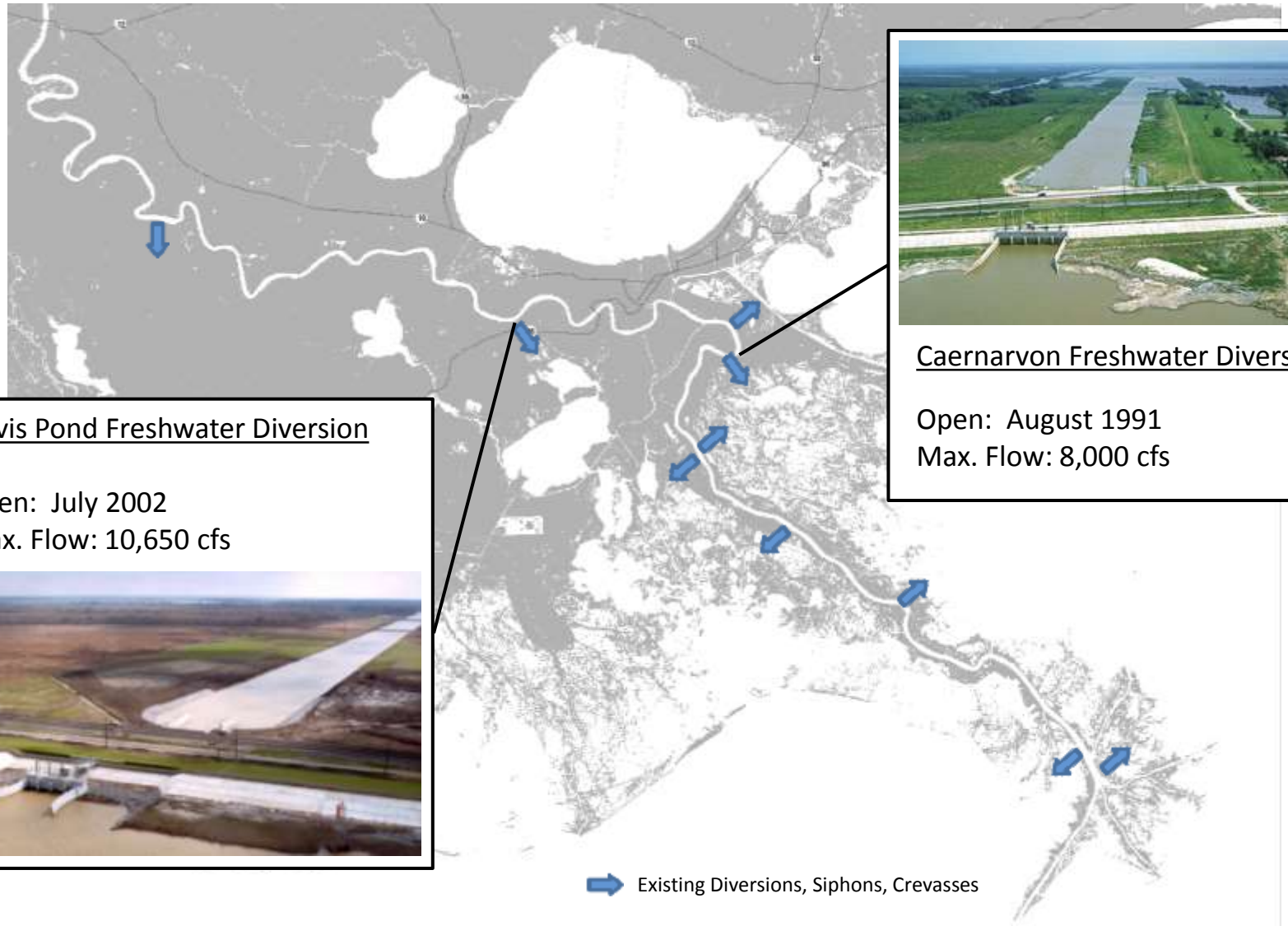
"The conditions are very different now from those existing prior to the existence of levees. There are at present no annual accretions of sedimentary matters from the periodical overflows of the river. These accretions formerly were a little more than equal to the annual subsidence of the lands…"

Long History of Planning…



Diversions are part of all

Existing Diversions



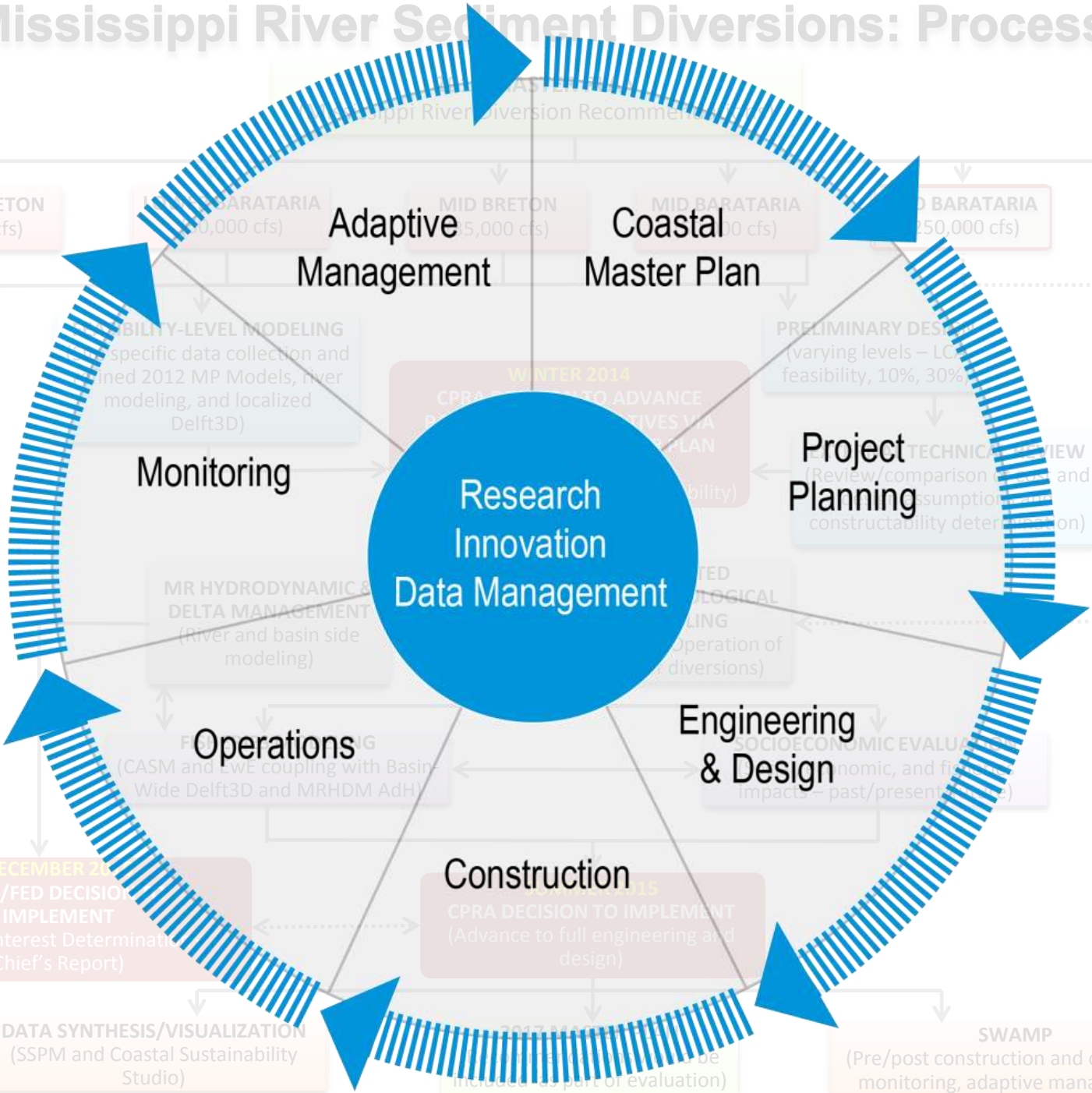
Caernarvon Freshwater Diversion

Open: August 1991
Max. Flow: 8,000 cfs

Davis Pond Freshwater Diversion

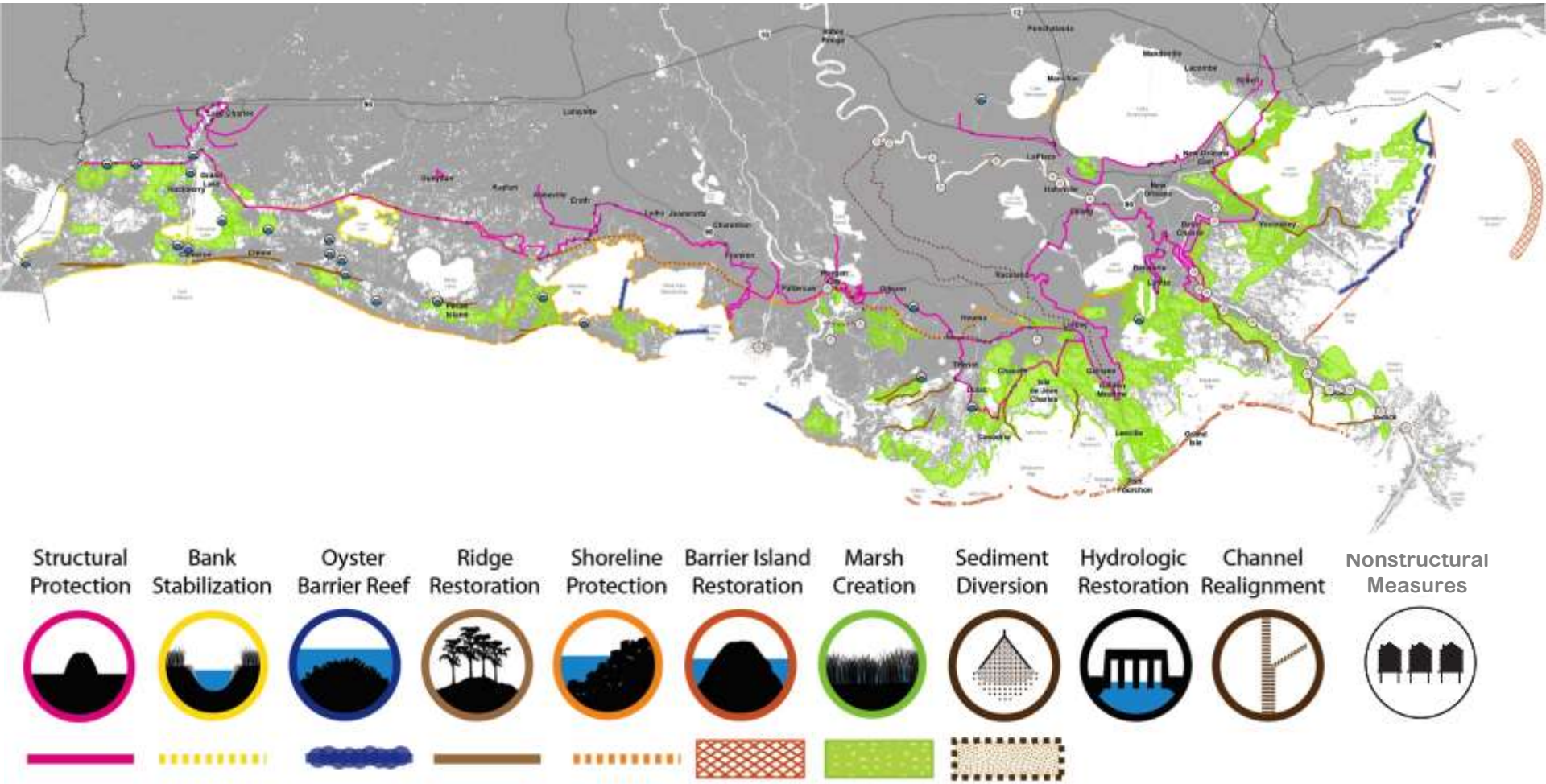
Open: July 2002
Max. Flow: 10,650 cfs

Mississippi River Sediment Diversions: Process



DIVERSIONS ADVISORY PANEL , DIVERSIONS SUB-COMMITTEE & PUBLIC ENGAGEMENT

Project Evaluation



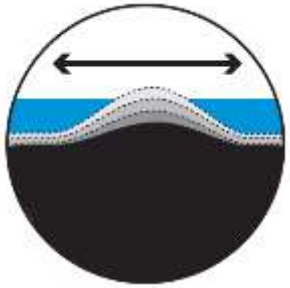
Initial list of 1,500 projects screened with 400 evaluated using the predictive modeling suite.

Grounded in Science

Risk Reduction

Expected Annual Damages

Restoration



Land Area

Decision Criteria and Ecosystem Services

- Distribution of flood risk across socioeconomic groups
- Flood protection of historic properties
- Flood protection of strategic assets
- Operation and maintenance costs
- Sustainability
- Support for navigation
- Use of natural processes
- Support for cultural heritage
- Support for oil & gas

- Oyster
- Shrimp
- Freshwater Availability
- Alligator
- Waterfowl
- Saltwater Fisheries
- Freshwater Fisheries
- Carbon Sequestration
- Nitrogen Removal
- Agriculture/Aquaculture
- Other Coastal Wildlife
- Nature-Based Tourism

- **Decision ultimately made based on land building and risk reduction**

2012 Science and Engineering Board

Ecosystem Science / Coastal Ecology

- William Dennison, PhD, University of Maryland
- Edward Houde, PhD, University of Maryland
- Katherine Ewel, PhD, University of Florida

Engineering

- Robert Dalrymple, PhD, PE, Johns Hopkins University
- Jos Dijkman, MsC, PE, Dijkman Delft

Geosciences

- Charles Groat, PhD, University of Texas at Austin

Social Science and Risk

- Greg Baecher, PhD, PE, University of Maryland
- Philip Berke, PhD, University of North Carolina – Chapel Hill

Climate Change

- Virginia Burkett, PhD, U.S. Geological Survey

Environmental/Natural Resource Economics

- Edward Barbier, PhD, University of Wyoming

2012 Technical Advisory Committees

Predictive Models

- Steve Ashby, PhD, USACE Eng. Res. Dev. Center
- John Callaway, PhD, University of San Francisco
- Fred Sklar, PhD, South Florida Water Mgmt. District
- Si Simenstad, MS, University of Washington

Planning Tool

- John Boland, PhD, PE, John Hopkins
- Ben Hobbs, PhD, John Hopkins
- Len Shabman, PhD, Virginia Tech

Cultural Heritage

- Don Davis, PhD, Louisiana State University
- Maida Owens, LA Dept. of Culture, Recreation, and Tourism
- Carl Brasseaux, PhD, University of Louisiana Lafayette

2012 Framework Development Team

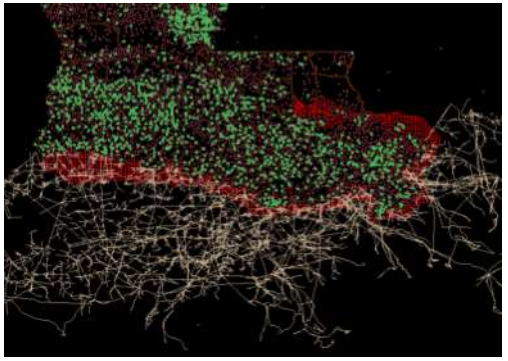





Over 30 Federal, State, NGO, Academic, Community, and Industry Organizations

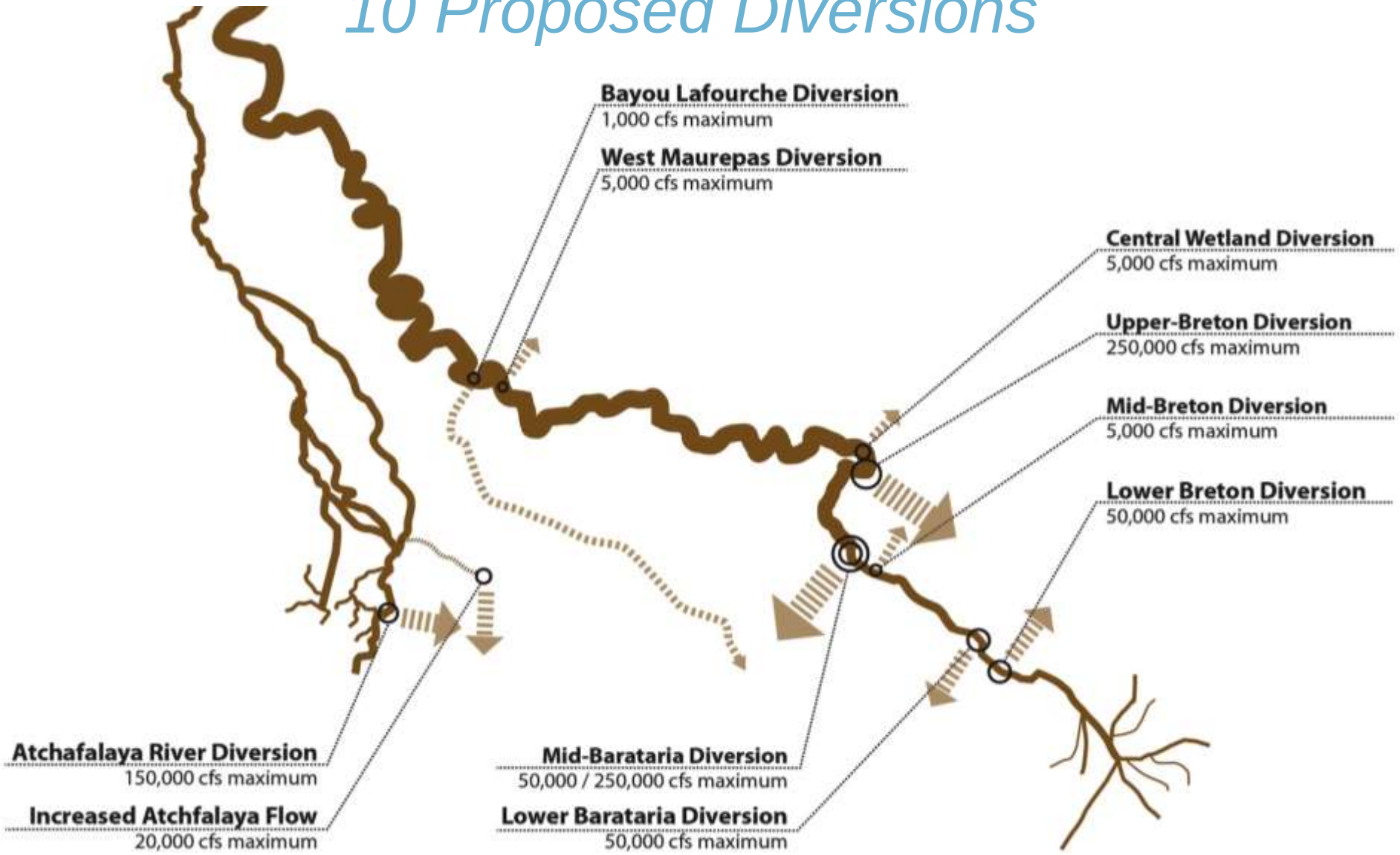
Focus Groups

- Key industries are impacted by land loss and large scale protection and restoration efforts
- Created three focus groups:
  - Navigation
  - Fisheries
  - Oil and Gas
- Expanding membership to:
  - Landowners
  - Community groups



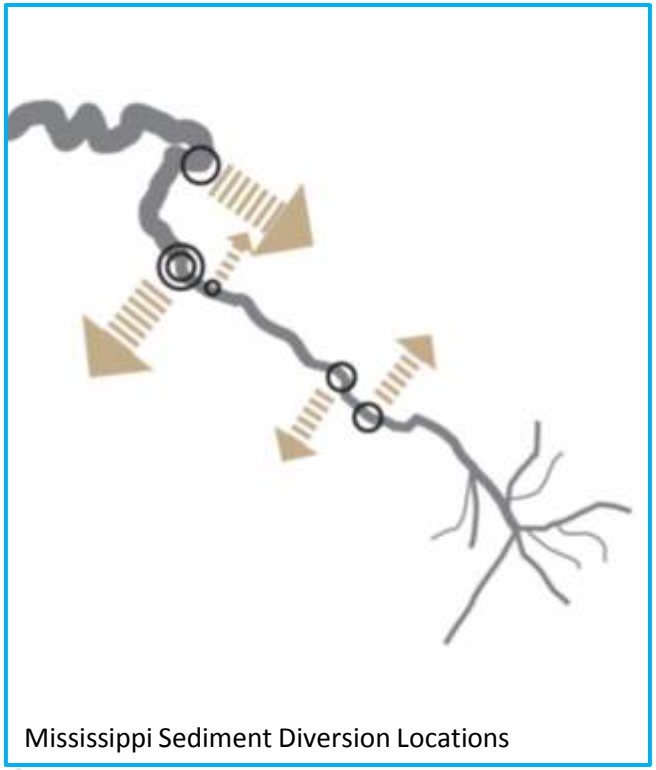
2012 Coastal Master Plan

10 Proposed Diversions



Diversions in the Master Plan

Mississippi Sediment Diversions



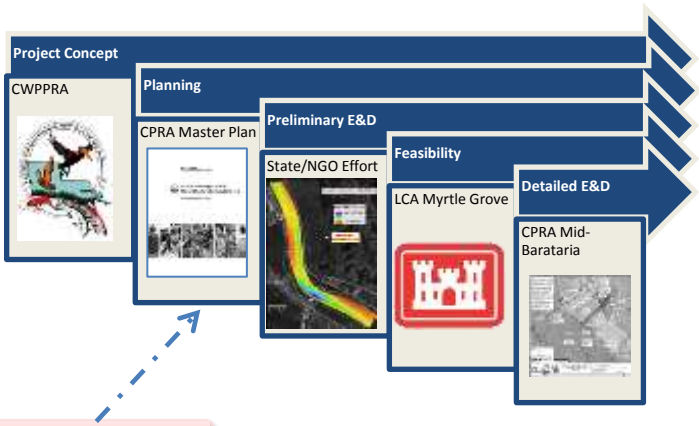
Mississippi Sediment Diversion Locations

Diversion	Size	Status
Mid-Barataria Sediment Diversion*	Up to 75,000 cfs	Project Specific Planning (E&D)
Mid-Breton Sediment Diversion*	Up to 35,000 cfs	Basin Level Planning
Lower Barataria Sediment Diversion	Up to 50,000 cfs	Basin Level Planning
Lower Breton Sediment Diversion	Up to 50,000 cfs	Basin Level Planning
Upper Breton Sediment Diversion	Up to 250,000 cfs	2nd Implementation Period
Mid Barataria Sediment Diversion	Up to 250,000 cfs	2nd Implementation Period

*Diversion capacities have been refined through the LCA projects Myrtle Grove and White's Ditch:

- Mid-Barataria Sediment Diversion capacity has increased from 50,000 cfs in the 2012 Coastal Master Plan to 75,000 cfs to increase sediment capture ratios at the project site.
- Mid-Breton Sediment Diversion - considering operation 5,000 cfs and 35,000 cfs.

Feasibility Level Evaluation of Master Plan Recommendations – 1st Implementation Period



LOWER BRETON
(50,000 cfs)

LOWER BARATARIA
(50,000 cfs)

MID BRETON
(35,000 cfs)

MID BARATARIA
(50,000 cfs)

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

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

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

Lower Breton & Barataria Diversion

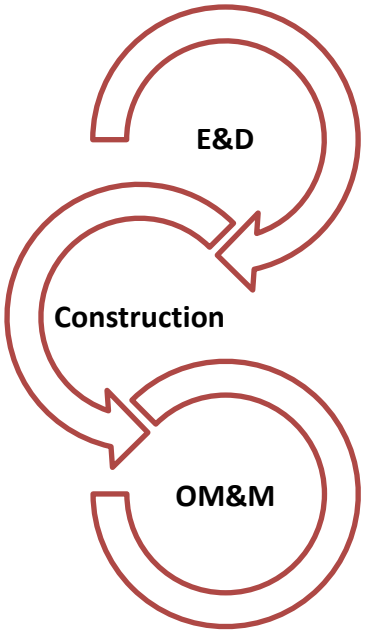
PLANNING

Construct a sediment diversion to transport sediment from the Mississippi River into the Lower Barataria Basin to reestablish deltaic processes in order to build, sustain, and maintain wetlands.

Funding: NFWF

Land Rights

10% Engineering and Design



CPRA Decision to Implement

Feasibility Studies/Alternative Analysis

Data

Site-specific data collection

Model/Tool Types

River
- 3D Hydrodynamic and Sediment Transport

Basin
- 2012 MP Ecohydrology, Vegetation, and Wetland Morphology
  - Site-specific Delft 3D morphological model using West Bay as an analogue

Output Evaluation

River
- Flow, nutrient and sediment load
- Sediment/water ratios
- Impacts to navigation
- River morphology
- Flood stage

Basin
- Long-term assessment (~50 years) of wetland building and projected wetland vegetation
- Guidance for engineering features to stimulate wetland development
- Impacts to sediment delivery

Diversion
- Operations and maintenance of diversion systems
- Long term diversion performance
  - RSLR and subsidence
  - Effects on river morphology

Outreach & Engagement

Periodic meetings with major stakeholder groups

Screening Criteria

Project Delivery Team Decision

Tentatively Selected Plan

Mid-Breton Diversion

PLANNING

Identify the most promising location for the diversion, evaluate the best alignment for the outfall channel, and investigate how variations in the structure's design could affect its ability to capture sediment

Funding: NFWF

Land Rights

10% Engineering and Design

Also evaluated under LCA. Recommended a 35,000 cfs diversion operated for two months each spring.

Feasibility Studies/Alternative Analysis

Data

- Site-specific data collection

Model/Tool Types

River

- 3D Hydrodynamic and sediment transport

Basin

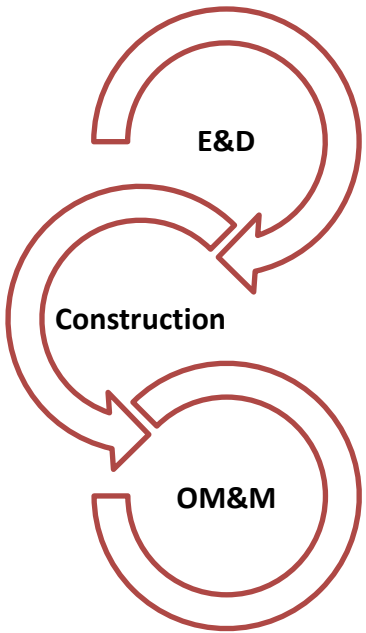
- 2012 MP Ecohydrology, Vegetation, and Wetland Morphology

Output Evaluation

- Sediment, hydrodynamic, and nutrient load into the basin
- Long-term assessment (~50 yrs)
- Preliminary estimates of wetland building
- Future projections of wetland vegetation

Outreach & Engagement

Periodic meetings with major stakeholder groups



CPRA Decision to Implement

Screening Criteria

Project Delivery Team Decision

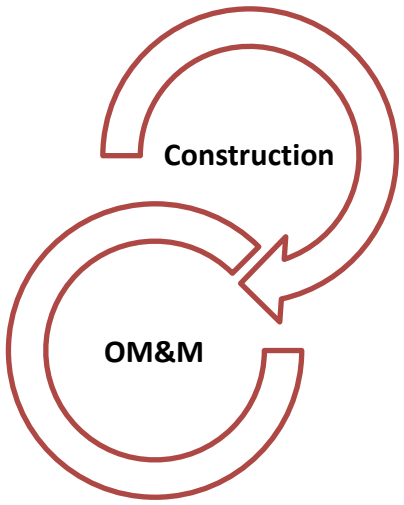
Tentatively Selected Plan

M I D B A R A T A R I A

Engineering & Design

Reintroduce freshwater and sediment from the Mississippi River to the Basin to reestablish deltaic processes in order to build, sustain, maintain wetlands.

- Funding: NFWF
- Permitting
- Land Rights
- 30% Engineering and Design



Project Plans and Specifications: Mississippi River, Diversion Channel, and Outfall

Data Collection

- Lidar, Bathymetric, and Topographic Surveys
- Boring Logs, In-situ and lab measurements
- Geomorphic Assessments
- Material Strengths, Design Loads, Soil Properties

Model/Tool Types

River and Channel

- Multi-Dimensional Models of River, Channel and Outfall
  - Delft 3D, Flow3D, HEC RAS
- Ship Simulation
- Gate Hydraulic Models

Basin/Outfall)

- Hydrodynamic, Sediment Transport, and Morphological
  - Delft 3D
  - 2012 MP Ecohydrology, Vegetation, and Wetland Morphology

Output Evaluation

River and Channel

- Site characteristics
- Channel size and location
- Channel dimensions
- Intake and outfall configuration
- Sediment to water ratio
- Sediment transport
- Flow characteristics
- Effects on navigating ships
- Guide levees
- Tie-in structures
- Flood gates or back levee structures
- Water surface elevation

Basin/Outfall)

- Long-term assessment (50 yrs) of wetland building, projected wetland vegetation, and nutrient dynamics
- Impacts to rail and road
- Drainage Studies
- Water surface elevation

Outreach & Engagement

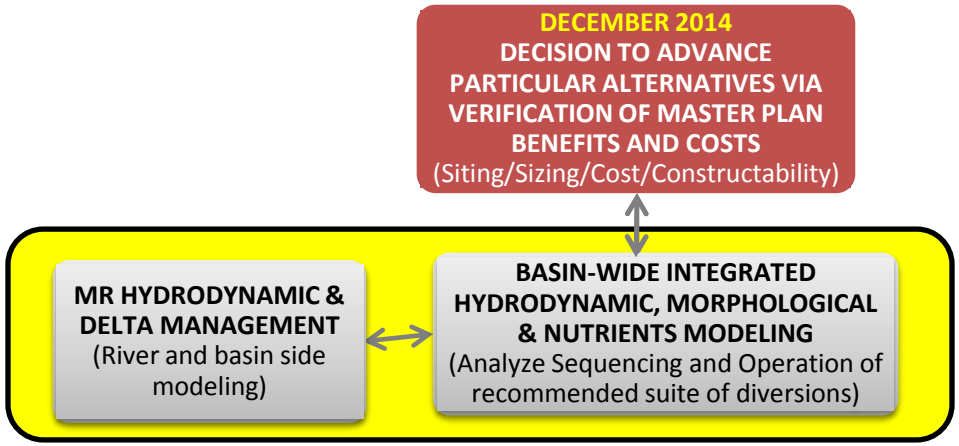
Periodic meetings with major stakeholder groups and public scoping for EIS

Screening Criteria

Final Selected Plan

CPRA Decision to Implement

Basin Wide Model Development and Evaluation



Mississippi River Hydrodynamic and Delta Management Study

PLANNING

- Programmatic Study for Management of the Lower Mississippi River
- 50/50 Cost Share State and Corps of Engineers
- Land Rights
- 10% Engineering and Design

Feasibility Studies/Alternatives Analysis

Data Collection/ Data Management

River
- Bathymetry
- Sediment Concentration
- Velocities
- Geomorphic Assessment

Basin
- Geophysical
- Nutrient

Model/Tool Types

River
- HEC-6T
- HEC-RAS
- Delft 3D
- AdH
- FVCOM
- Flow3D

Basin
- Hydrodynamic, Sediment Transport, and Morphological Models
  - AdH
  - Delft 3D
- Fisheries Models
  - EwE w/ Trosim
  - CASM

Small Scale Physical Model

Output Evaluation

River
- Water and sediment:
  - available for restoration
  - transport and retention
  - Nutrients and pollutants
  - water level and flood control
  - maintenance and navigation

Basin
- Land Building/maintenance
- Elevation
- vegetation/ habitat
- Water movement and water level
- Water quality and nutrients
- Water temperature variability
- Salinity
- Fisheries abundance, distribution
- Uncertainties such as subsidence and sea level rise

Outreach and Engagement

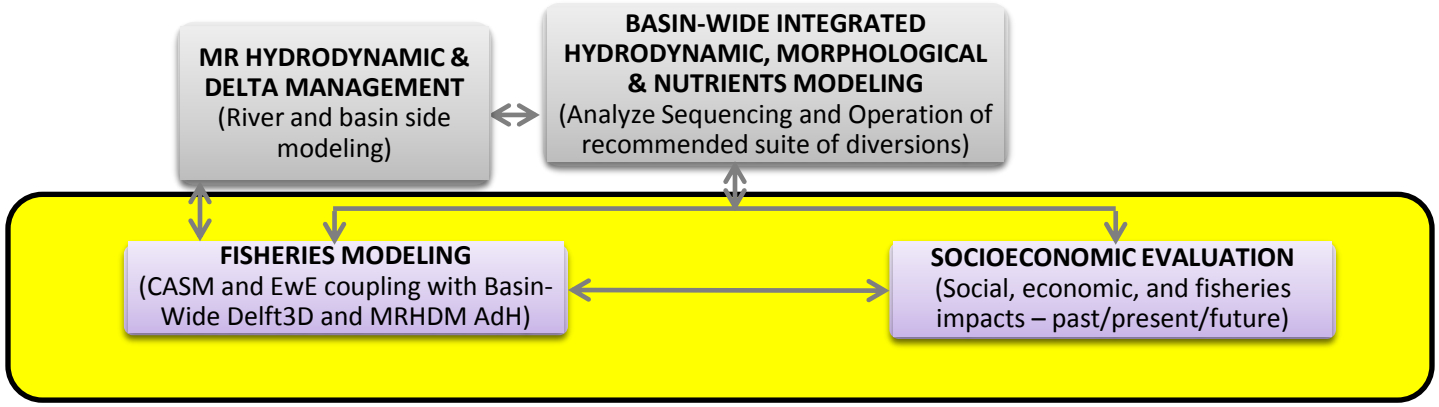
- Scoping Meetings
- Periodic meetings with major stakeholder groups

Project-Level E&D, Construction, and OM&M

CPRA/FED Decision to Implement

- Screening Criteria
- Project Delivery Team Decision
- Tentatively Selected Plan

Basin Wide Fisheries and Socioeconomic Evaluation



Fisheries Modeling/Studies

- Overview of model types with benefits and constraints
  - Prepared by Dr. Kenny Rose and Dr. Shaye Sable
  - Included an expert panel – Rob Bourgeois/Harry Blanchet (LDWF), Don DeAngelis (USGS), Ed Houde (UMD), Wim Kimmerer (SFSU), Bryan Piazza (TNC), Lawrence Rozas (NOAA)
- Recommended 10 steps to select best model
- Developed a path forward to improve HSI models and ecosystem modeling EwE w/ Trosim
- CASM and EwE w/ Trosim being developed under the LCA MRHDMS Study.

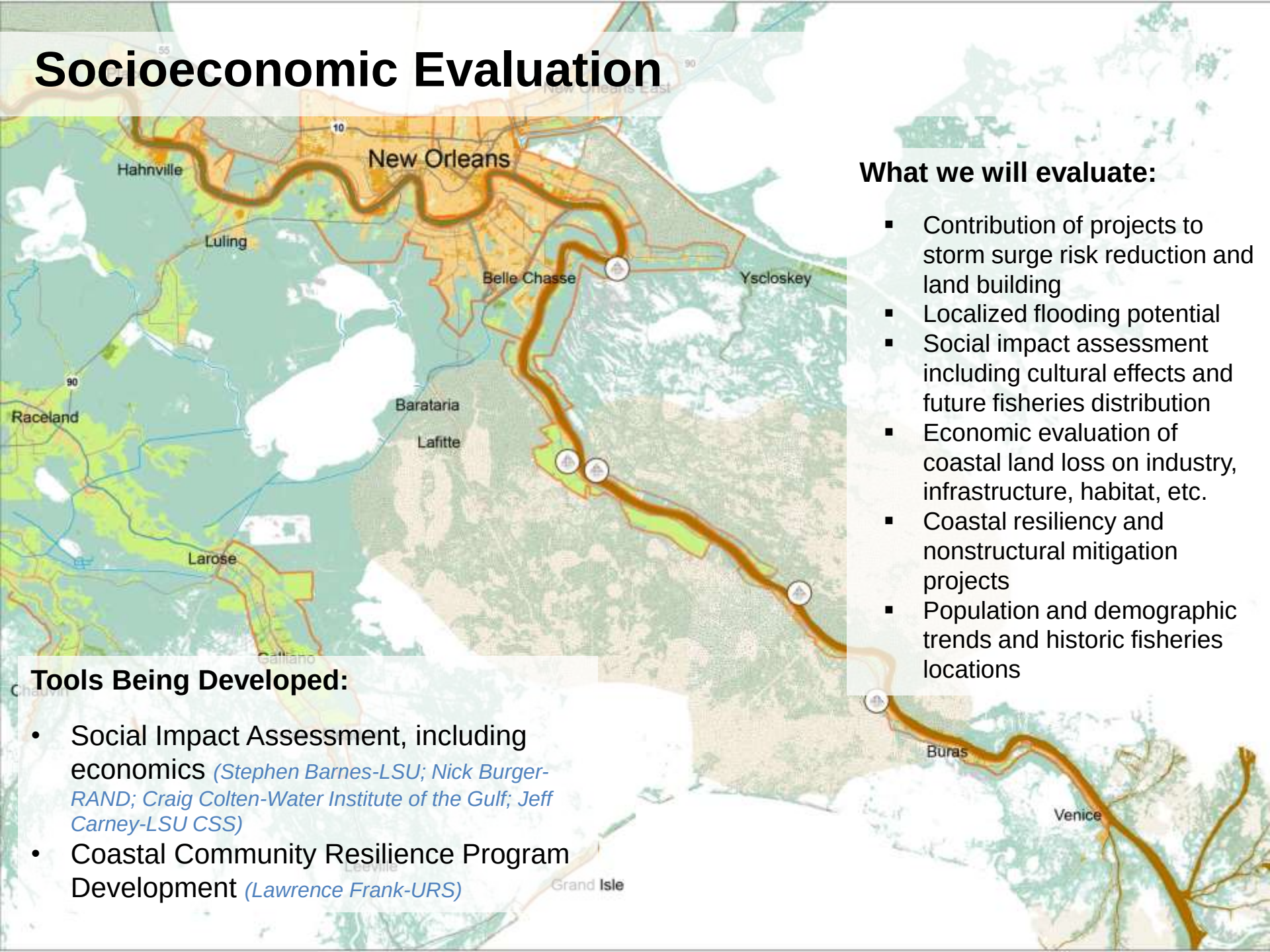
Socio-Economic Analysis

- The first phase of this project will take a systematic approach to assess the historic, current, and predicted future social, economic and fisheries related impacts of coastal restoration projects in the Barataria, Breton, and Terrebonne areas.

- The second phase of this project will build on the socio-economic analysis conducted for the three basins and include coast wide socio-economic projections based on the 2017 Master Plan analysis.

The duration of the project is approximately two years and begins in July 2014. Phase 1 is expected to be complete in July 2015 and Phase 2 in May 2016.

Socioeconomic Evaluation



What we will evaluate:

- Contribution of projects to storm surge risk reduction and land building
- Localized flooding potential
- Social impact assessment including cultural effects and future fisheries distribution
- Economic evaluation of coastal land loss on industry, infrastructure, habitat, etc.
- Coastal resiliency and nonstructural mitigation projects
- Population and demographic trends and historic fisheries locations

Tools Being Developed:

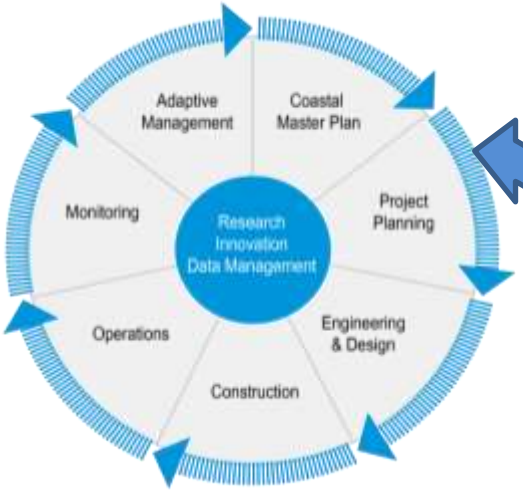
- Social Impact Assessment, including economics *(Stephen Barnes-LSU; Nick Burger-RAND; Craig Colten-Water Institute of the Gulf; Jeff Carney-LSU CSS)*
- Coastal Community Resilience Program Development *(Lawrence Frank-URS)*

Diversion Path Forward

Three Outcomes:

1) Engineering and Design

2) Construction



How do we achieve?

3) Not Feasible

DECEMBER 2016
DECISION TO IMPLEMENT
(Federal Interest Determination – Chief's Report)

SUMMER 2015
DECISION TO IMPLEMENT
(Advance to full engineering and design)

DATA SYNTHESIS/VISUALIZATION
(SSPM and Coastal Sustainability Studio)

2017 MASTER PLAN
(Include projects in E&D as existing condition)

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

Section 10/404

ABOUT SECTION 10:

Section 10 of the Rivers and Harbors Act of 1899 requires authorization for the **construction of any structure in or over any navigable water** of the United States.

ABOUT SECTION 404:

Requires a permit for any category of activities involving **discharges of dredged or fill material into waters of the United States**, including wetlands.

STATUS and NEXT STEPS:

- Submitted in July 2013
- Awaiting Public Interest Review

Section 408

ABOUT:

Section 408, authorized in the Rivers and Harbors Act of 1899 and as amended in 1985 to include “public works”, allows the Secretary of the Army to grant permission to **alter completed federal public works projects** so long as the alteration does not impair the usefulness of the project and is not injurious to the public interest.

Examples: Levees, weirs, dams, etc.

STATUS and NEXT STEPS:

- Awaiting USACE Guidance

Environmental Impact Statement

ABOUT :

An Environmental Impact Statement (EIS) is an environmental document required by the National Environmental Policy Act (NEPA) for actions that **significantly affect the quality of the human environment** (42 USC §4332).

STATUS and NEXT STEPS:

- Negotiating 3rd Party Contractor Scope with USACE
- Scoping Meetings

Environmental Review

- Endangered Species Act Informal Consultation—30 days for consultation
- Endangered Species Act Formal Consultation—90 days for consultation, 45 days following completion of consultation for issuance of Biological Opinion
- Migratory Bird Treaty Act Consultation—45 days
- Section 106 Consultation with SHPO on Project Effects—30 days

QUESTIONS?