Proposed Diversions in the 2012 Master Plan

– Caveats and Questions –

BTNEP
BARATARIA-TERREBONNE
NATIONAL ESTUARY PROGRAM

BTNEP Management Conference

6 February 2014

Expert Panel on Diversion Planning and Implementation

Loretta Battaglia, Southern Illinois University Carbondale
Phil Perke, University of North Carolina
Jim Boyd, Resources for the Future
Linda Deegan, Marine Biological Lab
Bill Espey, RPS Espey Inc.
Liviu Giosan, Woods Hole Oceanographic Institute
Will Graf, University of South Carolina (emeritus)
Matt Kirwan, Virginia Institute of Marine Science
Tom Minello, NOAA Fisheries
Martha Sutula, So. California Coastal Water Research Project
John Teal, Woods Hole Oceanographic Institute (emeritus)
John Wells, Virginia Institute of Marine Science

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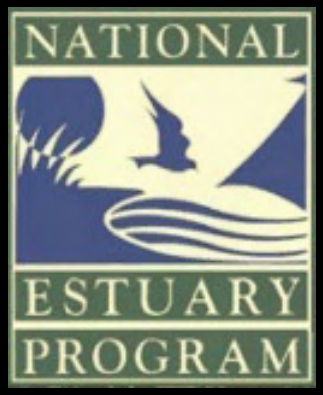
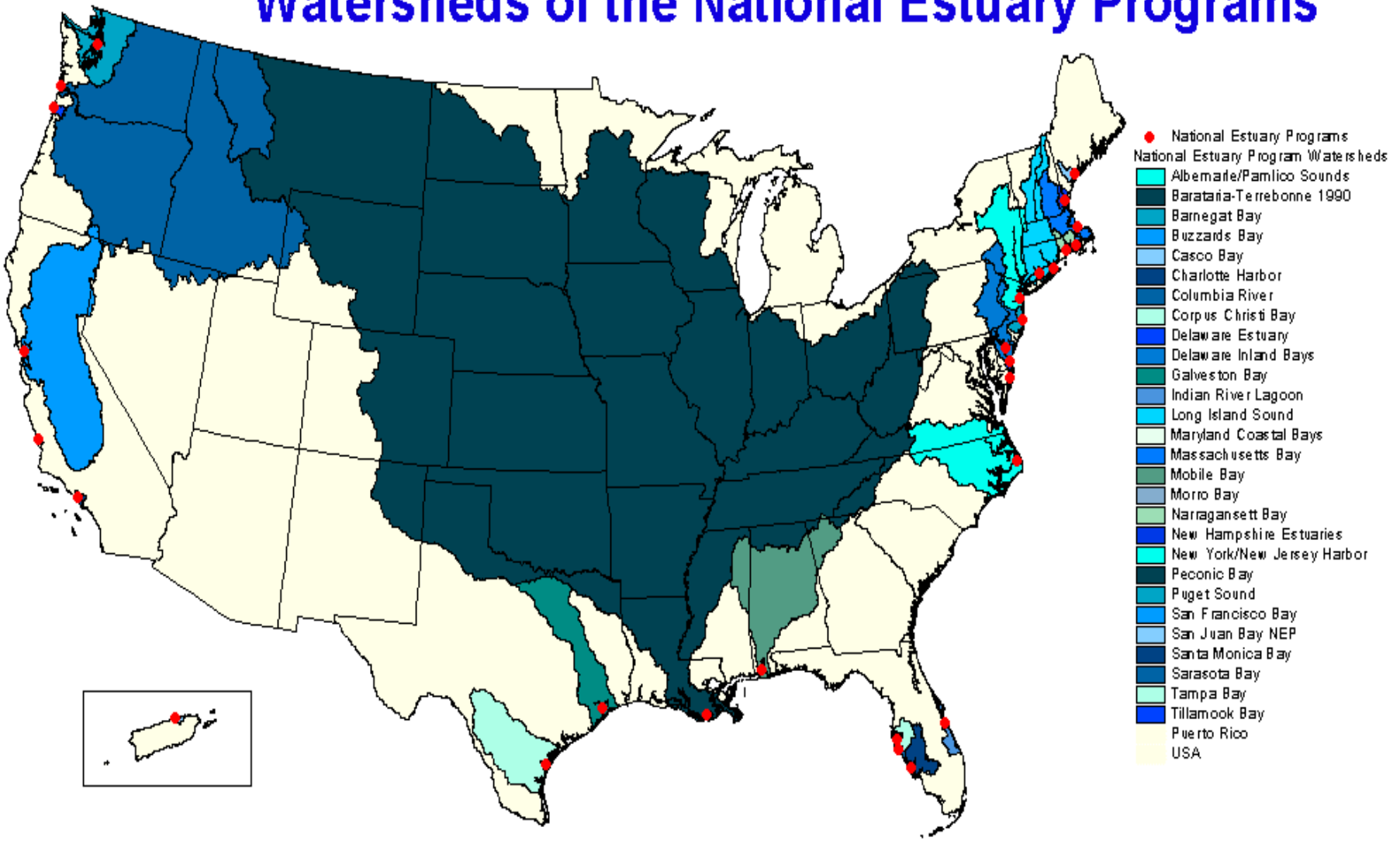
8 January 2014



- **Established in 1987**
- **Sec. 320 of the Clean Water Act**
- **Estuaries "of national importance"**

Watersheds of the National Estuary Programs



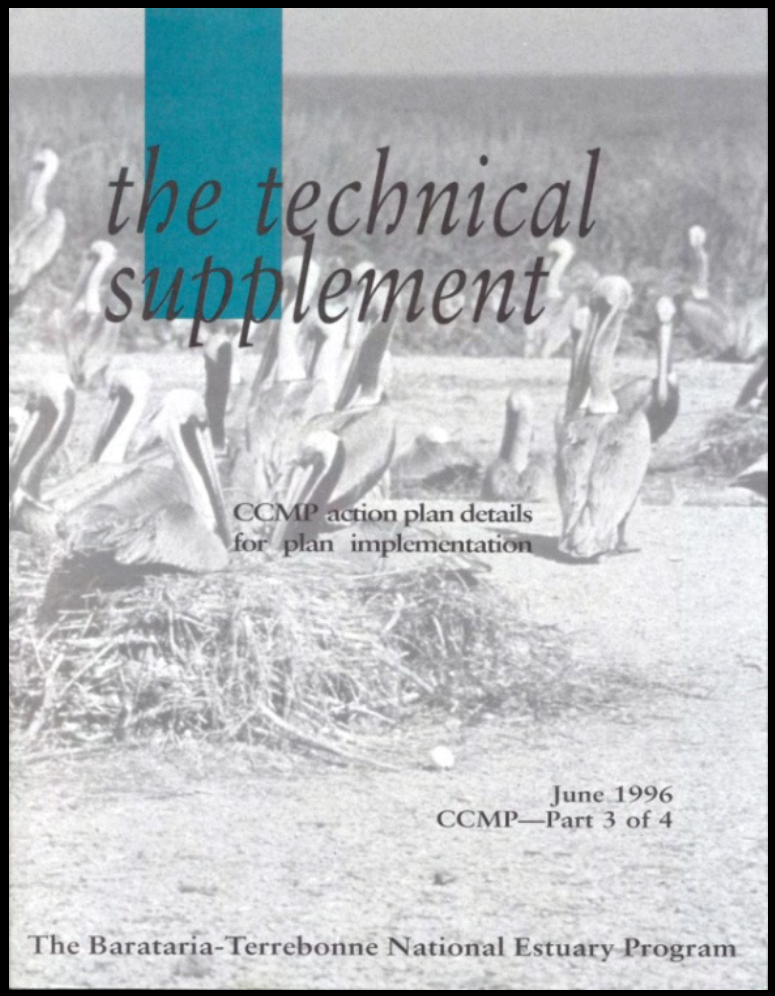
U.S. Environmental Protection Agency, 1999

The Barataria-Terrebonne National Estuary

The B-T Management Conference

US Environmental Protection Agency, EPA
Natural Resources Conservation Service
La Dept. of Environmental Quality
La Dept. of Economic Development
Coalition to Restore Coastal La.
La. Assoc. of Levee Boards
The Nature Conservancy
National Park Service
US Geological Survey
Plaquemines Parish
NOAA Sea Grant
US Coast Guard
Jefferson Parish
La. Science Teachers' Assoc.
South La. Economic Council
American Sugar Cane League
La. Dept. of Natural Resources
Greater Lafourche Port Commission
La. Independent Oil and Gas Assoc.
La. Assoc. of Conservation Districts
NOAA, National Marine Fisheries Service

LA Universities Marine Consortium, LUMCON
La. Dept. of Culture, Recreation and Tourism
La. Dept. of Health and Hospitals
La. Mid-Continent O & G Assoc.
US Army Corps of Engineers
US Fish & Wildlife Service
La. Wildlife Federation
Nicholls State Univ.
Assumption Parish
Lafourche Parish
St Charles Parish
Terrebonne Parish
La. Land Owners' Assoc.
La. Department of Education
La. Oil Spill Coordinators Office
La. Dept. of Wildlife & Fisheries
La. Seafood Management Council
Coastal Conservation Assoc. of La.
La. Dept. of Agriculture & Forestry
Bayou Lafourche Freshwater District
Governor's Office of Coastal Activities
South Central Planning & Development Com.



Comprehensive Conservation and Management Plan

Identified
7 Priority Problems

Proposed
51 Action Plans

ECOLOGICAL MANAGEMENT PLANS FROM THE BTNEP CCMP

EM-1 Hydrologic Restoration

A comprehensive effort will be implemented to use both human-made and natural devices to recreate a more natural water and sediment flow pattern to and across basin wetlands. This plan will help to overcome the various hydrologic modifications (levees, navigational canals, etc.) which have disrupted the estuary's natural hydrology.

EM-2 Freshwater and Sediment Diversions

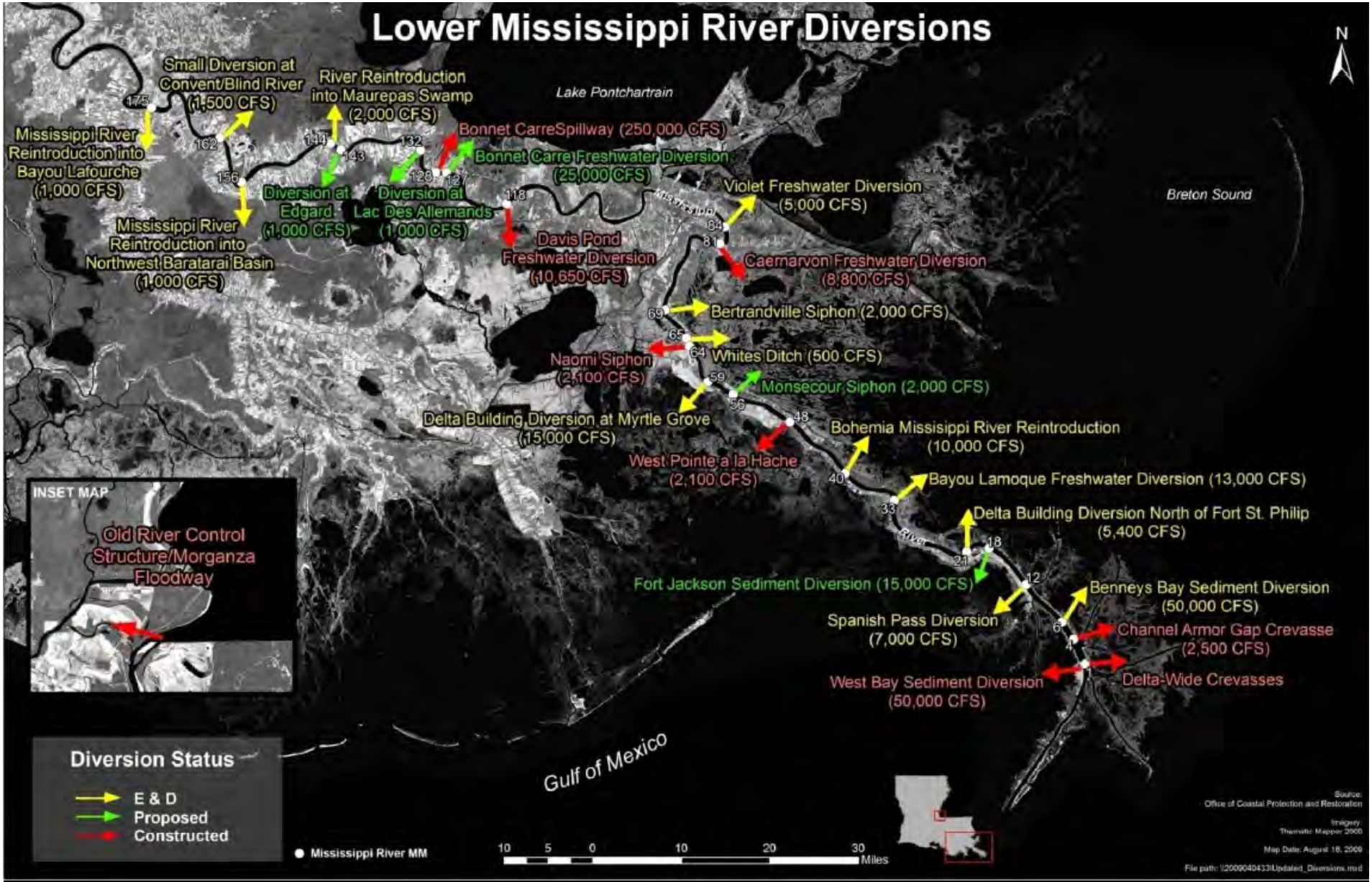
Freshwater and sediment resources from the Mississippi and Atchafalaya Rivers can be used to preserve and create marshes by providing nourishment, controlling salinity levels, and offsetting the impacts of land subsidence. This action will help to create an integrated set of projects that will augment the existing limited system of freshwater and sediment flows into the marshes.

Small to moderately-sized diversions are excellent strategies for long-term sustainability, but:

- **The concept of a big diversion has gotten much bigger**

- **At such large scales there are serious negative impacts**

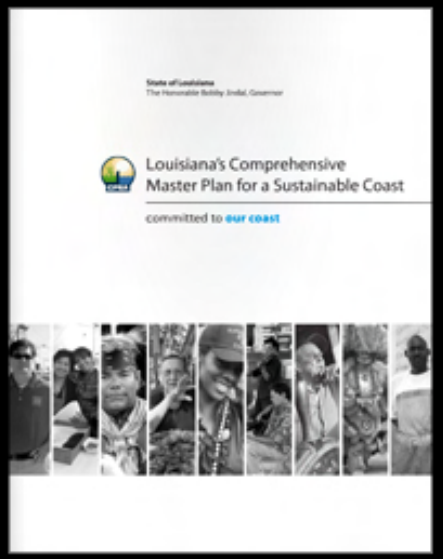
- **Sociopolitical opposition, user conflicts, and other obstacles to implementation generally increase with scale**



Proposed diversions were much smaller in previous plans. OCPR, 2006

CPRA 2012 Master Plan

Ten Diversion Projects



150,000 cfs – Penchant (Atchafalaya)

20,000 cfs – GIWW (Atchafalaya)

50,000 cfs – Lower Barataria (Empire)

250,000 cfs – Mid-Barataria (Myrtle Grove)

5,000 cfs – Mid-Breton (White Ditch)

5,000 cfs – Central Wetlands (Violet)

5,000 cfs – West Maurepas (Convent/Blind River/Hope Canal)

250,000 cfs – Upper Breton (Braithwaite)

50,000 cfs – Lower Breton (Black Bay)

1,000 cfs – Bayou Lafourche

Diversions put nutrients and sediment back into the wetlands, but…

- It takes decades before land-building gives coastal communities any appreciable storm protection

Diversions put nutrients and sediment back into the wetlands, but…

- Abrupt changes to salinity regimes will impact fisheries, especially the oyster fishery

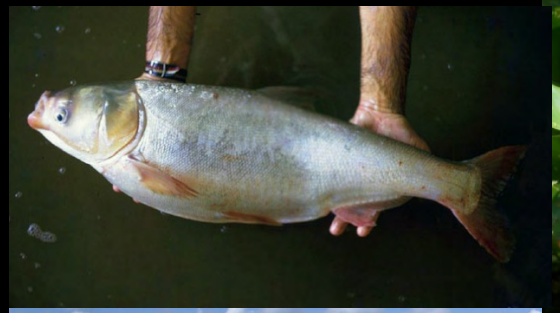
Diversions put nutrients and sediment back into the wetlands, but…

- Excess nutrients may weaken root systems of marsh plants

Diversions put nutrients and sediment back into the wetlands, but…

- They facilitate the spread of invasive species like Asian carp, Rio Grande cichlids, nutria, apple snails, water hyacinth, giant salvinia, and hydrilla

Invasive Species



Diversions put nutrients and sediment back into the wetlands, but…

- Induced shoaling threatened to close the West Bay diversion, and must be accounted for in planning and long-term cost estimates

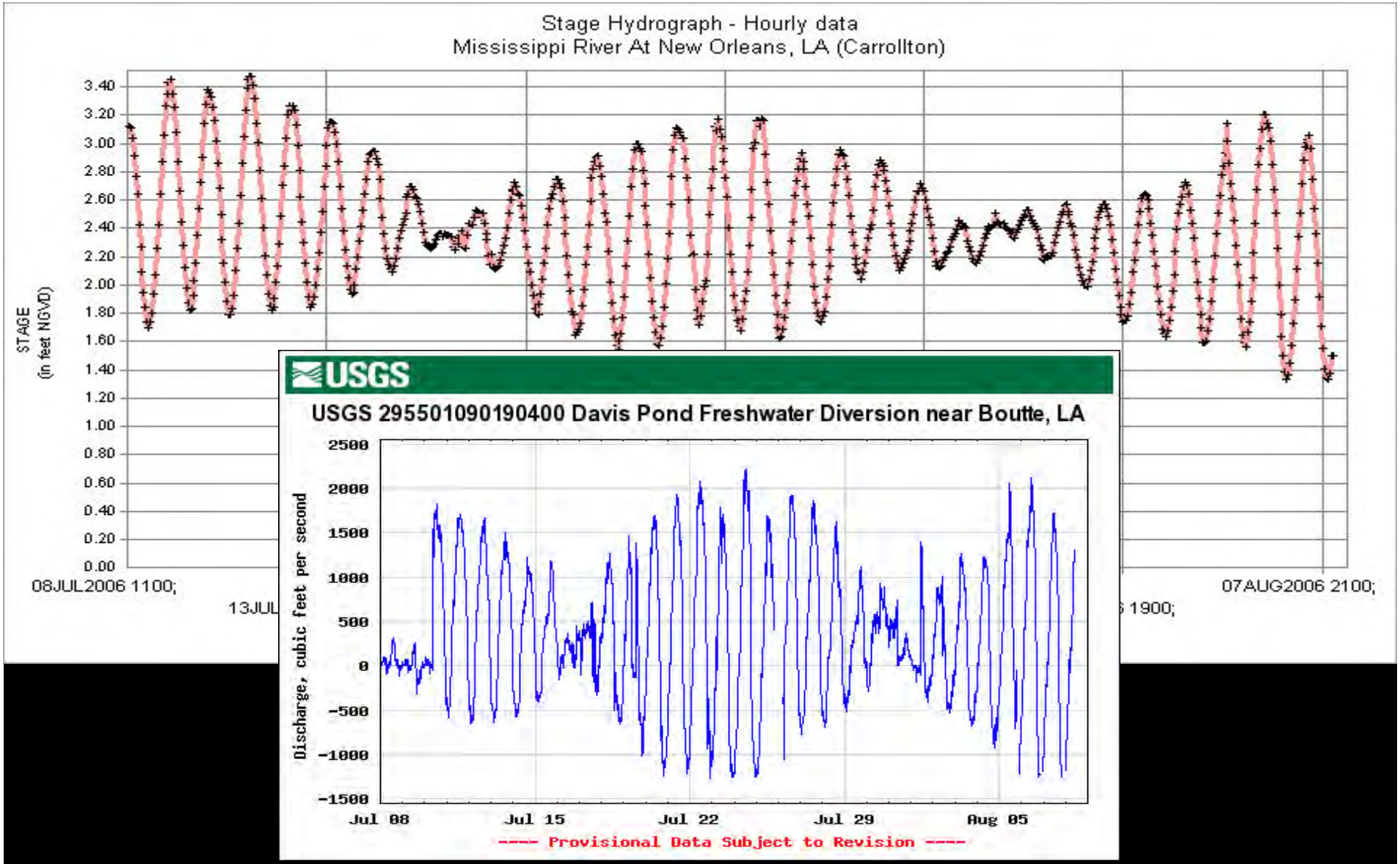
Diversions put nutrients and sediment back into the wetlands, but…

- May increase flood risk to coastal communities like Lafitte, Grand Bayou, and especially in lower Terrebonne and around Morgan City

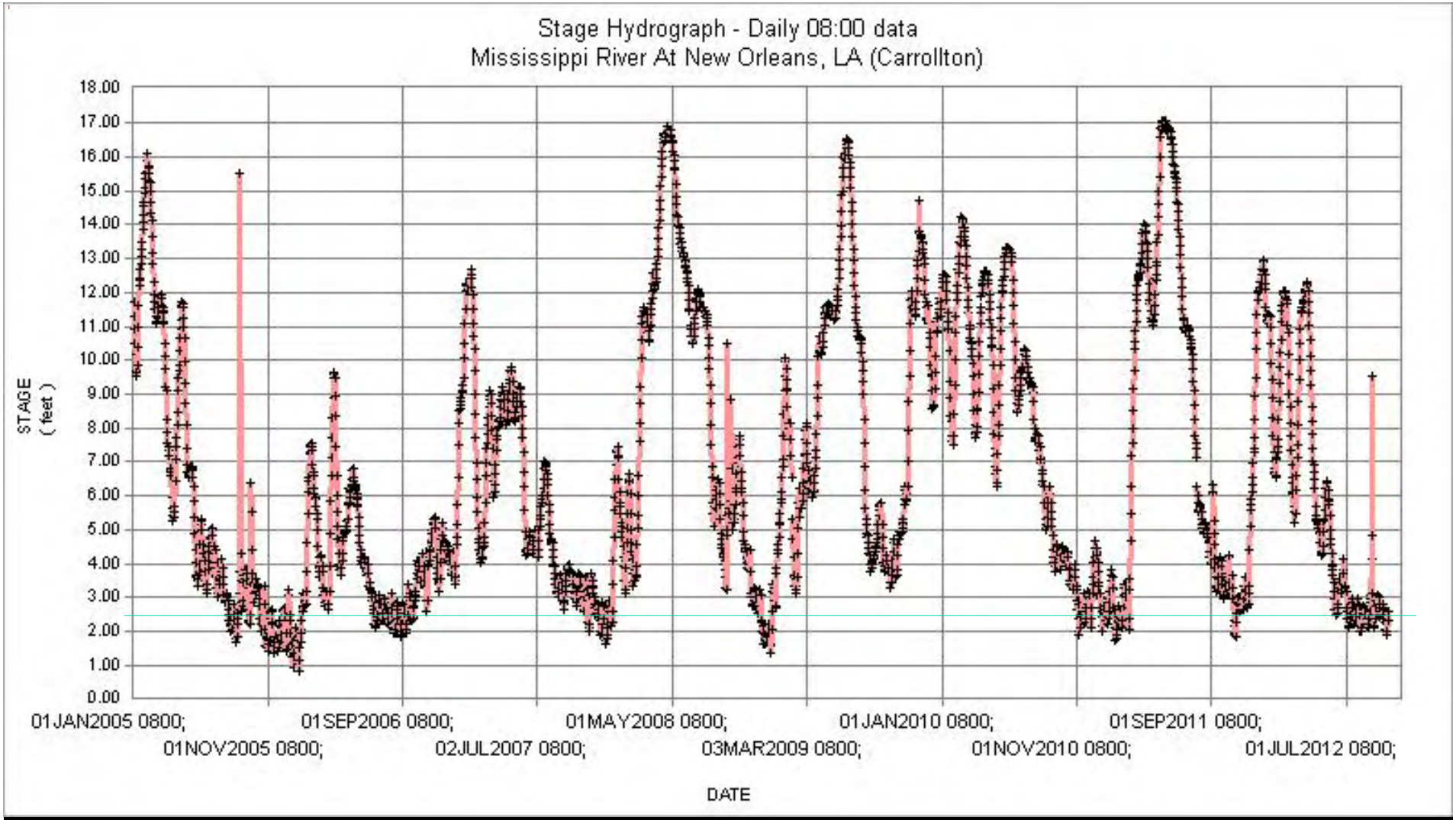
* Costs to mitigate potential increased flood risk were not calculated in the 2012 MP, nor were costs for land, easements, rights-of-way, relocations, or disposals (LERRDs costs)

Diversions put nutrients and sediment back into the wetlands, but…

- Switch habitats to fresh marsh systems that are susceptible to salt damage when diversions can't flow. This happens in late summer and fall when the river is low and it is hurricane season.

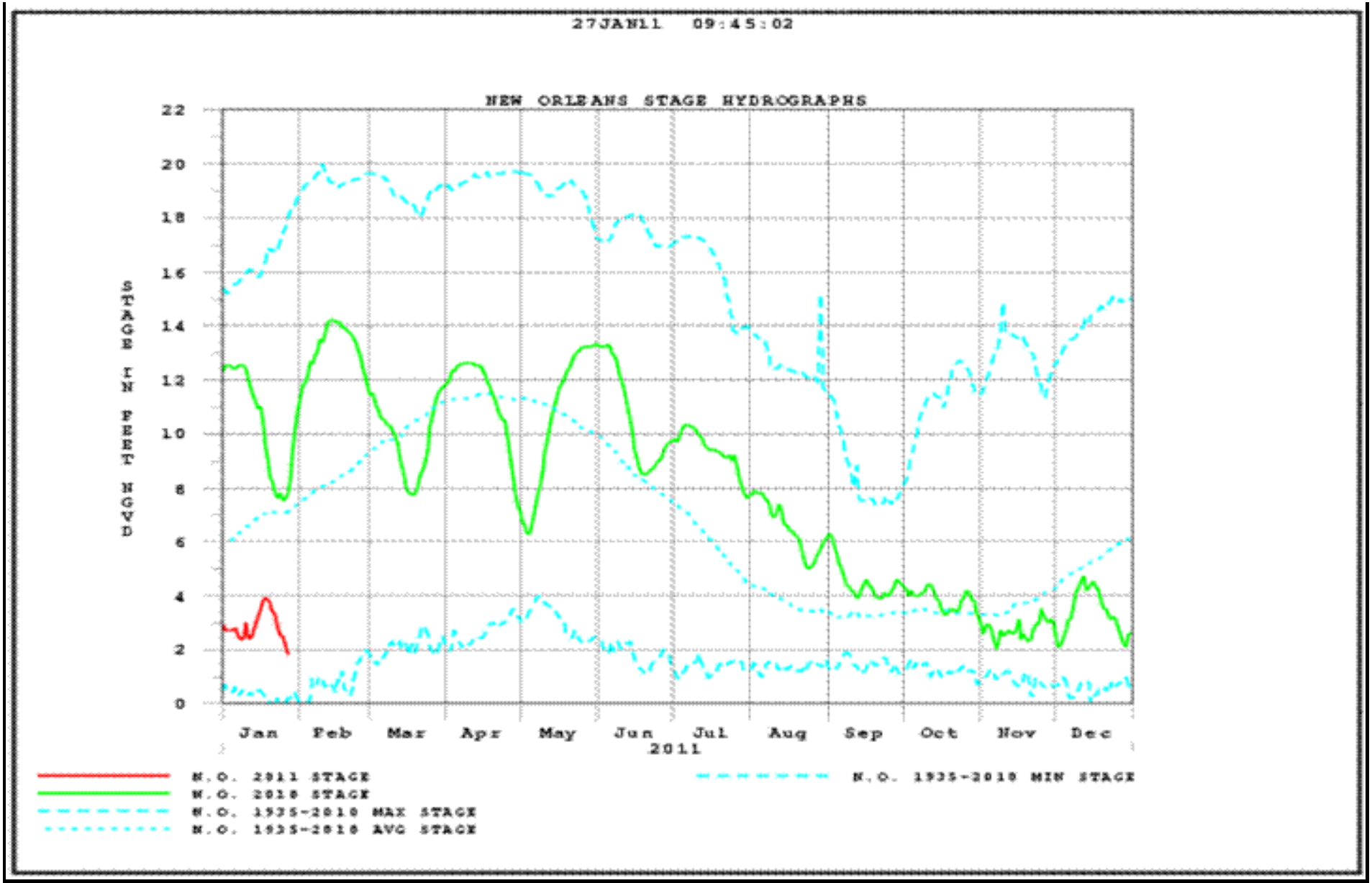


The Davis Pond diversion cannot flow when the river is below ~2.5 ft in New Orleans

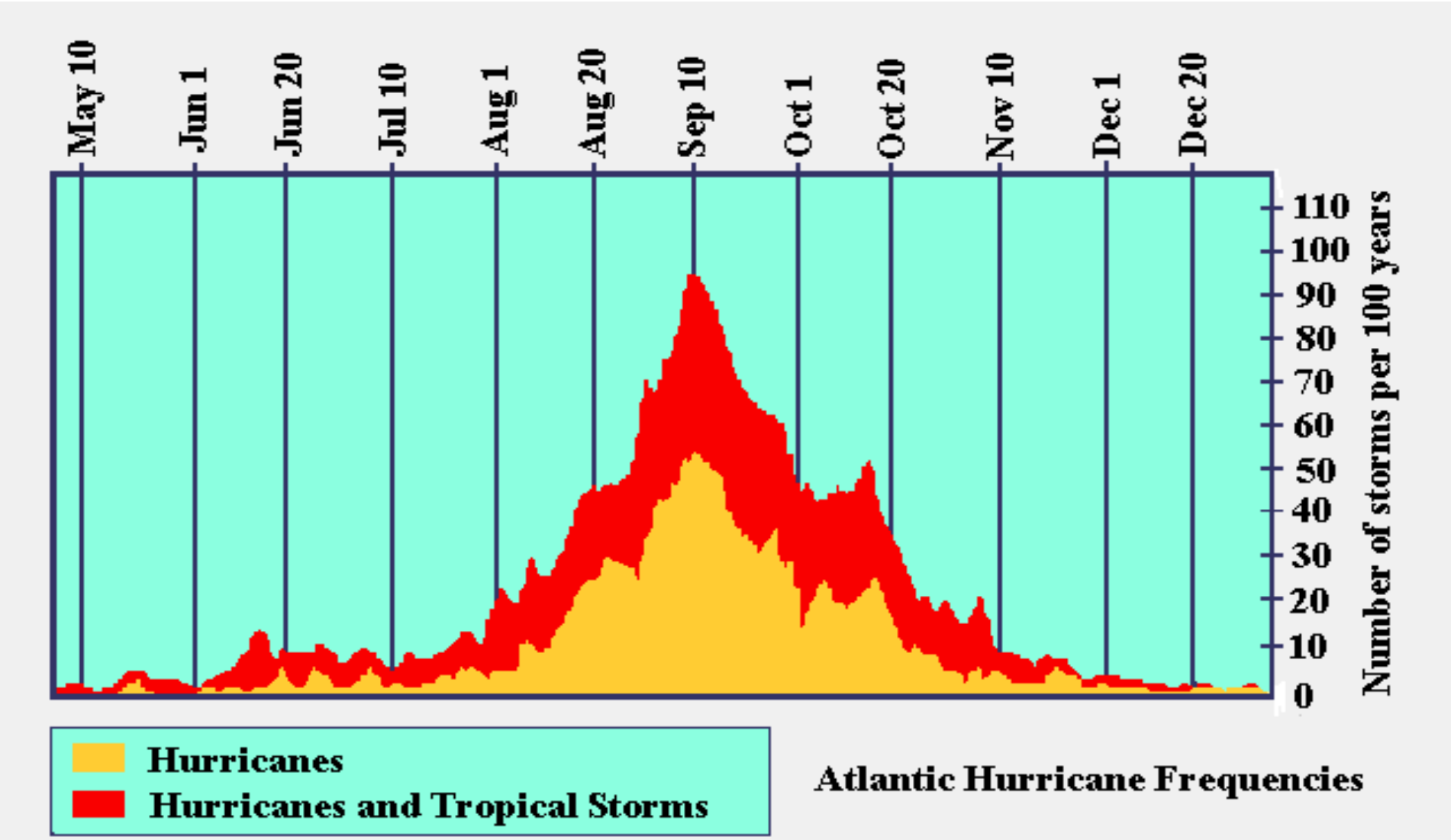


The river drops below 2.5 ft in New Orleans with some regularity.

The six diversions below N.O. would be unable to flow even more often, as head differential decreases as you go downstream.



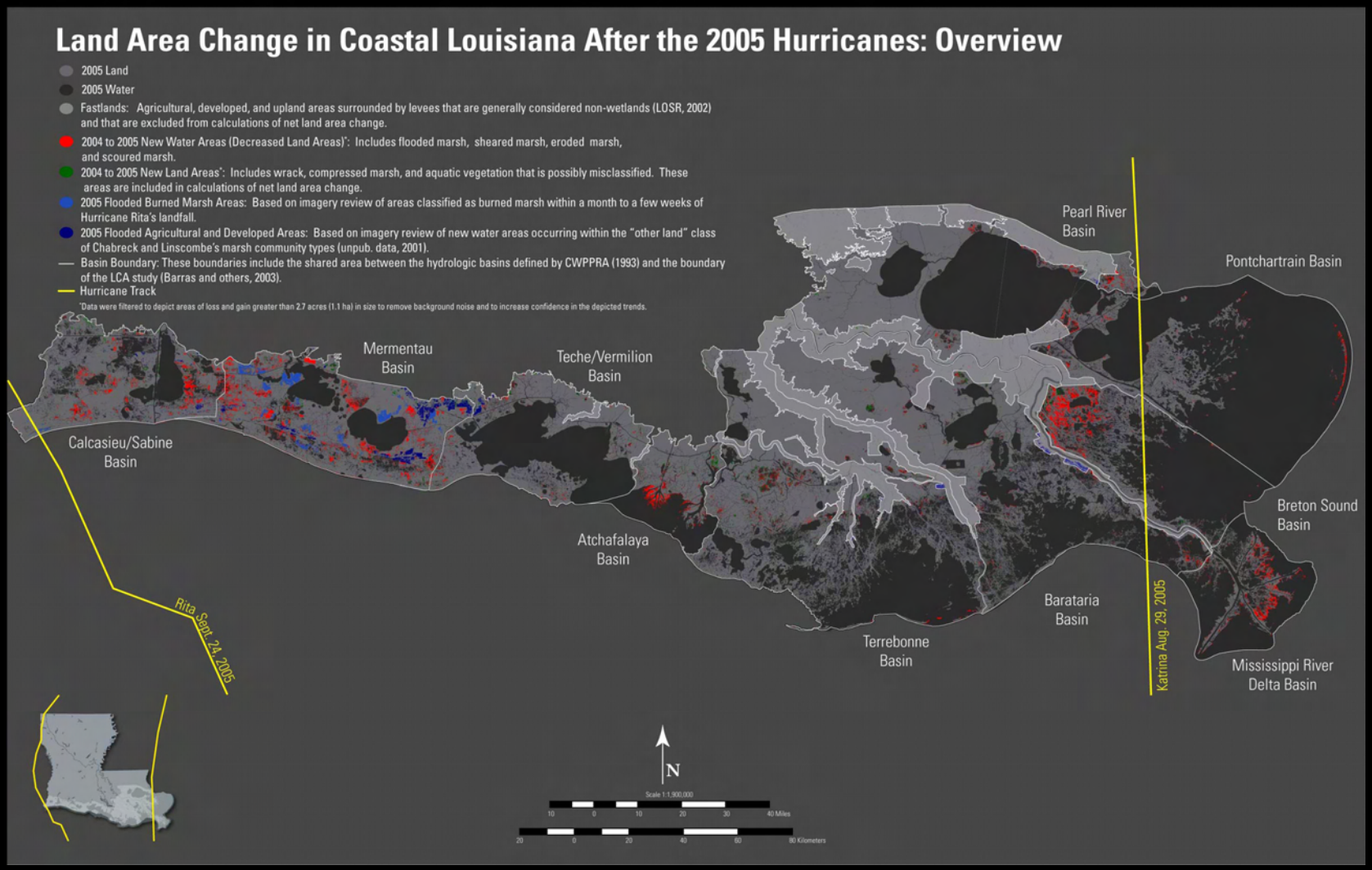
Average stage of river is lowest in late summer and early fall.
(middle dotted blue line)



Low river stages occur at the peak of hurricane season when the coast is most likely to experience saltwater storm surges.

Salt marshes can take fresh water.

Fresh wetlands cannot take salt water.

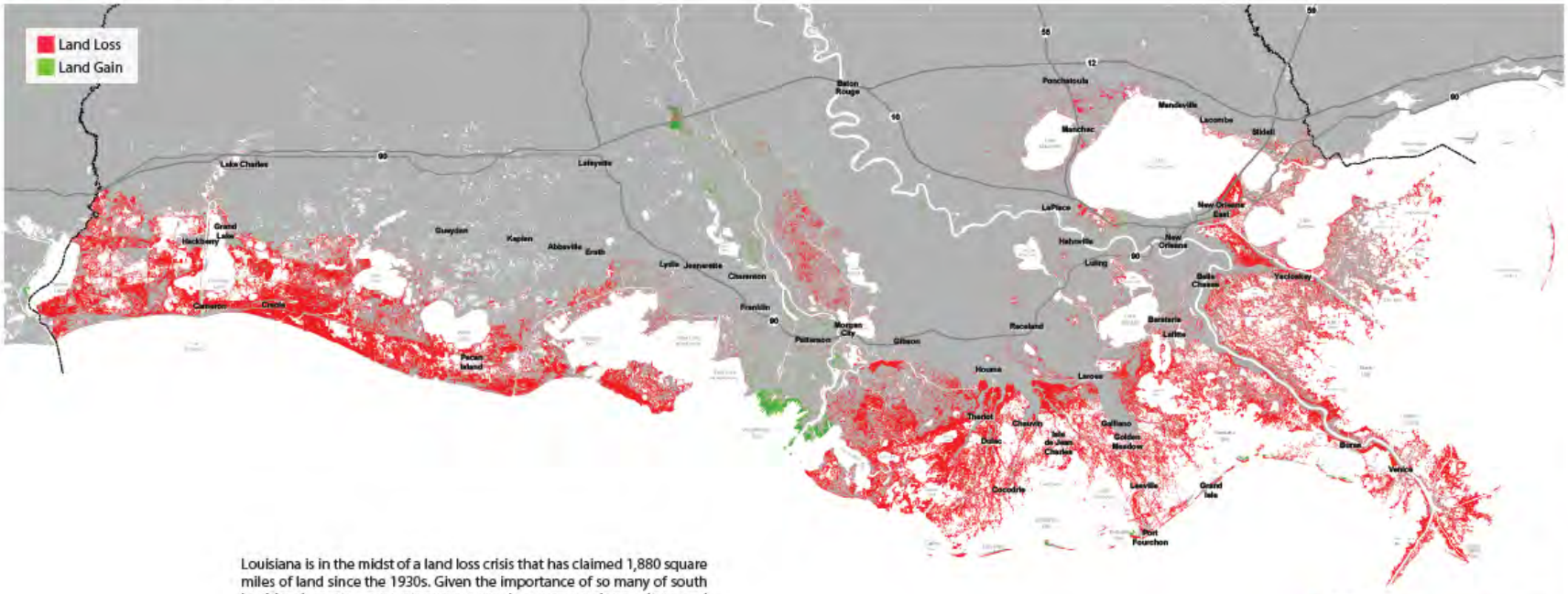


Storm damage was most severe in areas of freshwater input (Wax Lake Delta, Caernarvon Diversion, Birdsfoot Delta). Caernarvon has not recovered as well as the others because freshwater cannot flow consistently.

Introduction

Louisiana is Experiencing a Coastal Crisis

Predicted Land Change over the Next 50 Years



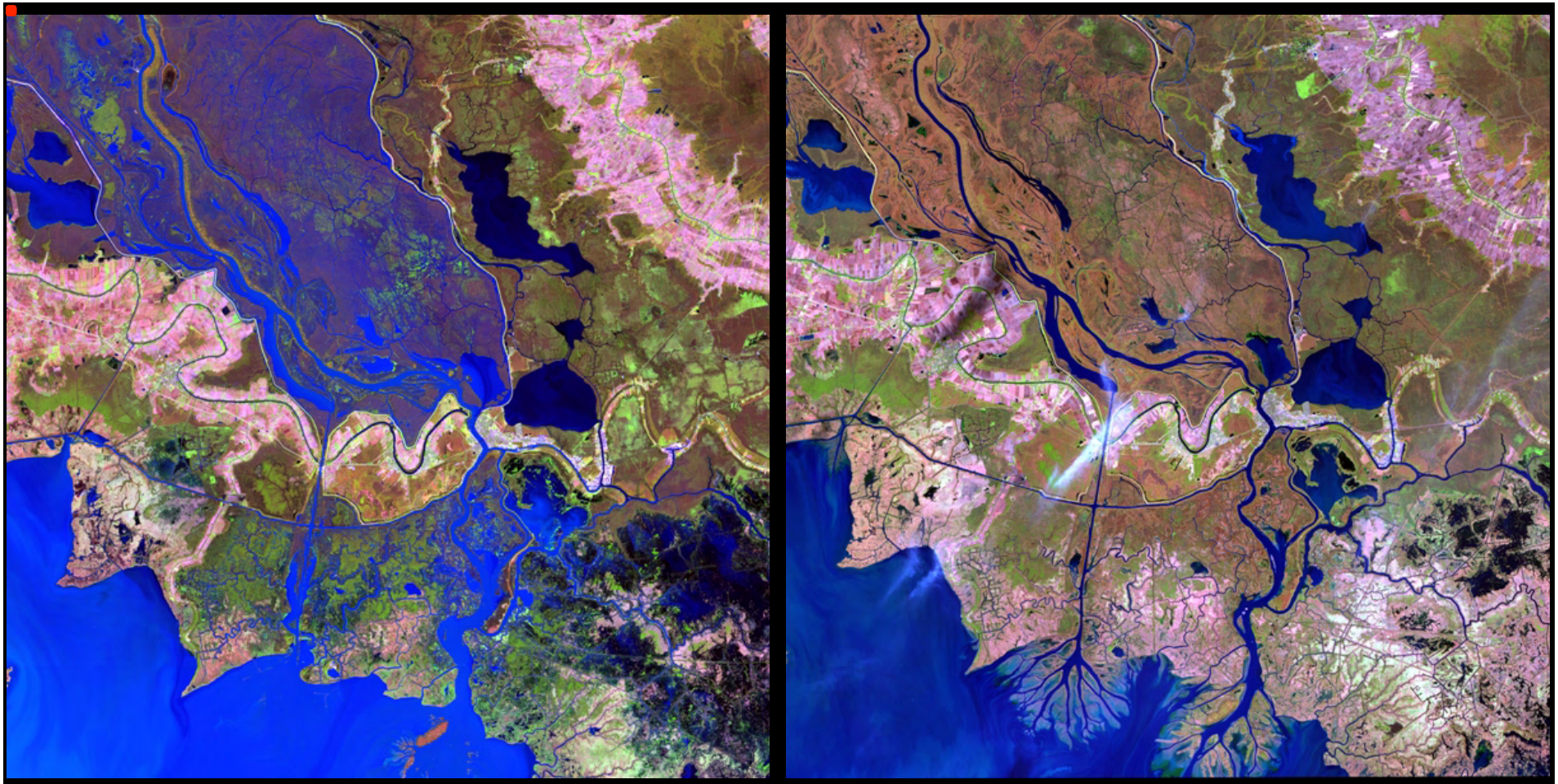
Louisiana is in the midst of a land loss crisis that has claimed 1,880 square miles of land since the 1930s. Given the importance of so many of south Louisiana's assets—our waterways, natural resources, unique culture, and wetlands—this land loss crisis is nothing short of a national emergency.

If we do not aggressively address this crisis, the problem intensifies. Our analysis confirmed that if we do nothing more than what has been done to date, we have the potential to lose up to an additional 1,750 square miles of land. This land loss will increase flooding risk with disastrous effects. Put simply: the status quo cannot be maintained, and we must take bold action now to save our coast. At the same time, our analysis demonstrated that we do have the opportunity, if we continue to build upon current successes, to avert an otherwise bleak future.

Figure 1
Predicted land change along the Louisiana coast over the next 50 years if we do nothing more than we have done to date. Red indicates areas likely to be lost, and green indicates areas of new land. This map is based on assumptions about increases in sea level rise, subsidence, and other factors. (Estimate based on less optimistic scenario of future coastal conditions. See page 82 and Appendix C for more information.)

Wax Lake Outlet and Atchafalaya are accreting deltas, but is this a fair analogy for diversions off the lower Mississippi?

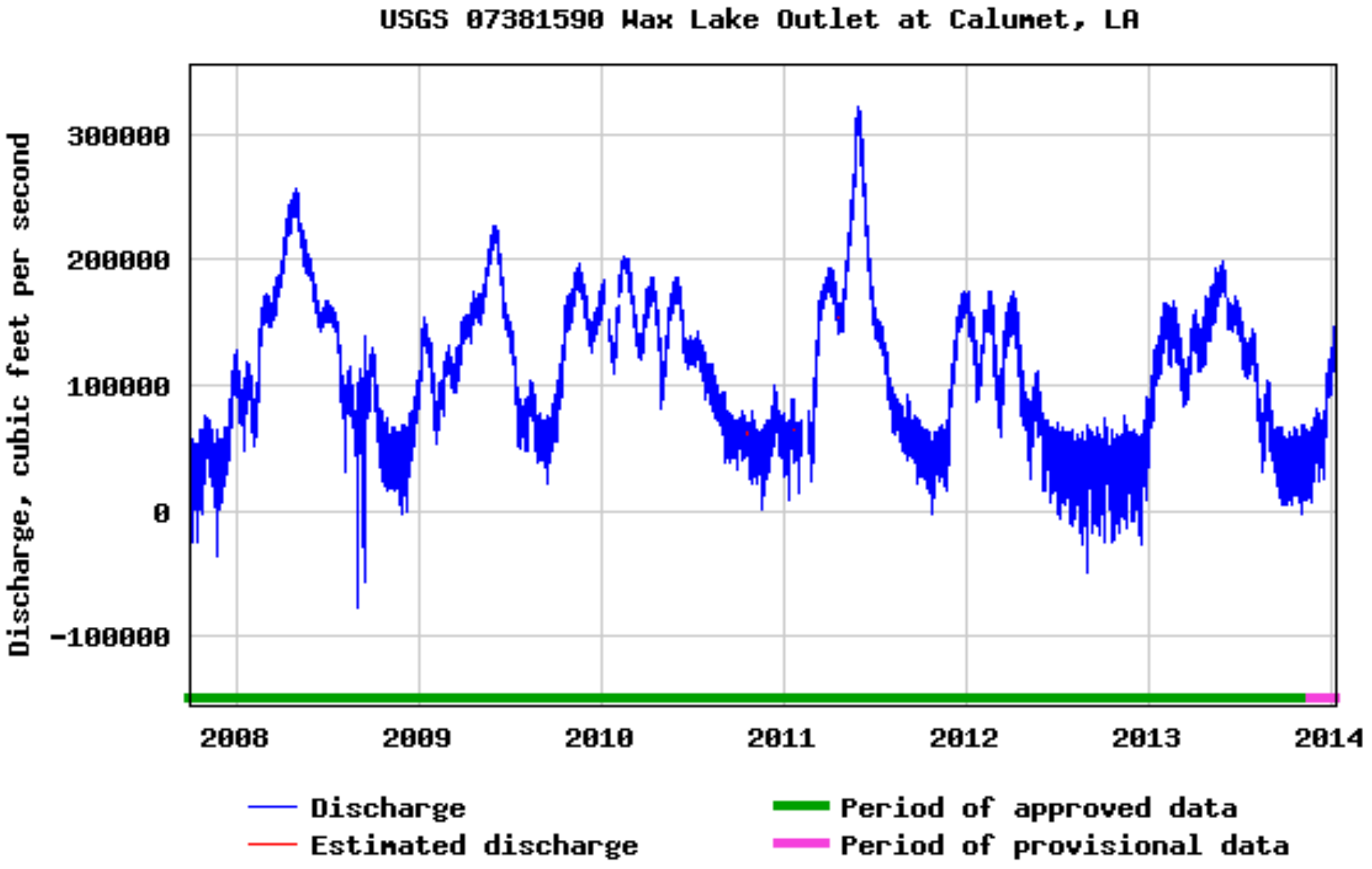
Wax Lake Outlet and Atchafalaya Deltas



WLO channel was created in 1942 to reduce flood risk to Morgan City by diverting 30% of the flow from the Atchafalaya River. New land began to appear after the 1973 flood.

The Wax Lake Outlet Delta is a poor model for diversions off the Lower Mississippi River.

- Was constructed relatively quickly (prior to NEPA and other environmental regs)
- No control structure, so no battles over operations
- No communities to flood
- Few user conflicts or fisheries issues
- WLO receives bedload sediments (sand rolling along the bottom)
- WLO has been flowing continuously for 70 years with very high peak flows



Average annual flow is nearly 100,000 cfs, with peaks well over 200,000 cfs.

Diversions:

- Effectively combat saltwater intrusion
- Freshwater and nutrients alone can sustain marshes
- Sediment input can build new land –

given enough time!

Cons:

- Amount of sediment available in the water column is 50% to 80% less than it was in 1850
- Length of time needed to actually build land is debatable, but measured in decades
- Any land building that does occur is geographically limited to the outfall site
- Freshening of systems can have negative impacts on fisheries
- Nutrients can have negative impacts on marsh plants' root growth
- Legal and sociopolitical difficulties in operating schemes and management
- Diversions do not flow when the river is low, so any fresh areas created are susceptible to salt damage
- Induced shoaling
- Increased flood risk to communities

Sediment Delivery Projects

Wetlands, islands, and ridges can be restored from sediments transported through pipelines with minimal amounts of water.

Diversions vs. Marsh Creation

- An acre today may be better than an acre tomorrow
- An acre here may be better than an acre there
- MC has fewer user conflicts and obstacles to implementation

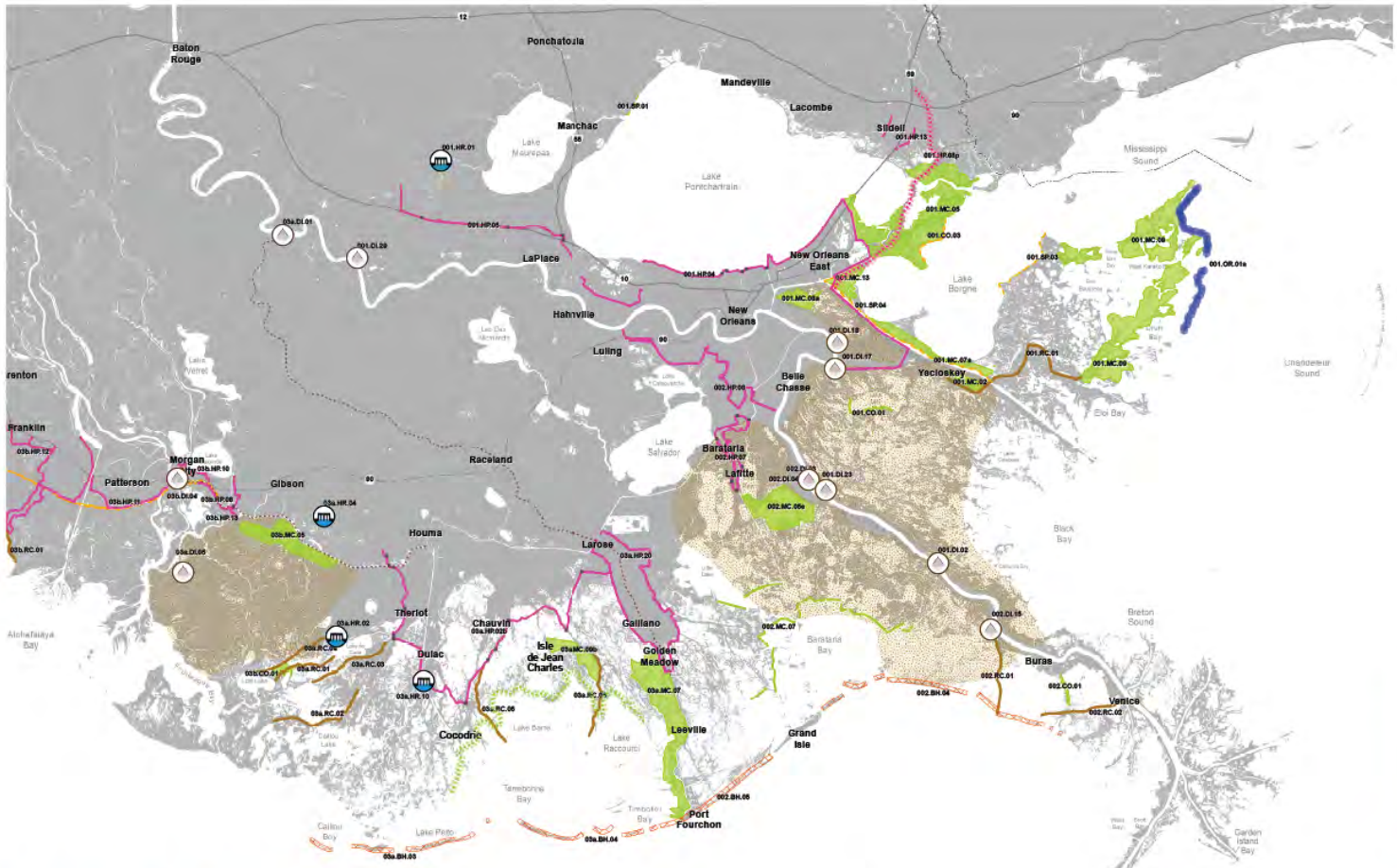
Southeast Coast

Protection

Sustain key levee protection systems, such as Greater New Orleans area and Larose to Golden Meadow. New levees are included for large, densely populated, at risk communities, such as LaPlace, Lafitte, and Slidell. Nonstructural protection measures are included for all parishes in this region.

Restoration

Use sediment and water from the Mississippi River to sustain and rebuild land. Sustain a diversity of coastal habitats including cypress swamps, marshes, barrier islands, and ridges.

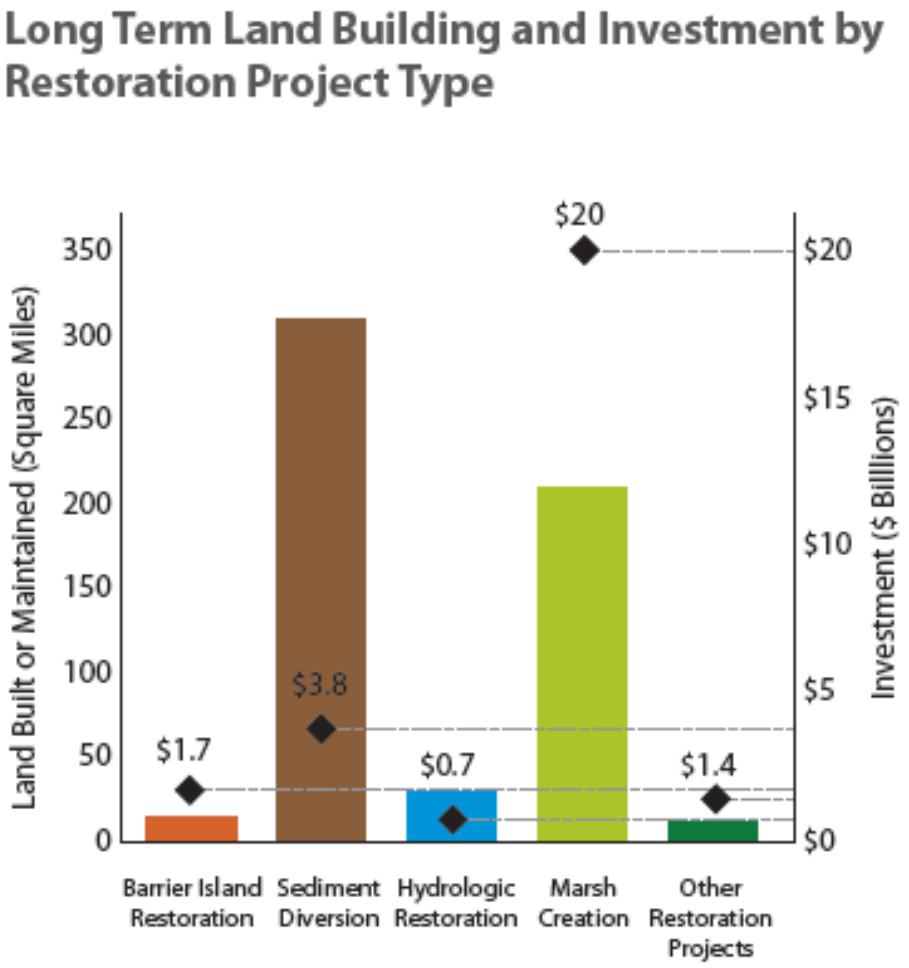


Project Types Included:

Figure 5.6
Southeast Coast Project Map. Note: nonstructural projects are not shown.

Diversions vs. Marsh Creation

Figure 9
Total land building at Year 50 by restoration project type and the investment required to implement projects. (Estimates based on moderate scenario of future coastal conditions.)



- **What is the time to authorization, construction, and operation?**

- **Will actual operations match what is modeled in the plan?**

- **How confident are we in the land-building estimates?**

- **LERRDs costs not considered. What are the true costs?**

Marsh Creation:

- Protective value to adjacent areas not captured
- Sustainability when in areas of diversion influence not captured
- Holistic program of restoration dredging would bring costs down
- 41 MC, BI, and RR projects, each with separate planning, E&D, O&M, mob & demob
- Could net over 400 sq. mi. in 50 years according to CH2MHill Third Delta Phase 2 report, Alternative 3

Questions for 2017:

- How much can we divert without wiping out fishermen or flooding their communities?

- Need better resolution on basin-side water levels, especially in streams, i.e. the GIWW.

- How do we transition Marsh Creation from a series of projects to a strategic program of restoration dredging?

- All habitat types must be restored, not just the freshwater-dependent ones.

- Maintaining healthy salinity regimes allows our fisheries culture to exist.

- Landscape restoration allows coastal communities to exist.

Who are we restoring for?

Michael Massimi

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