

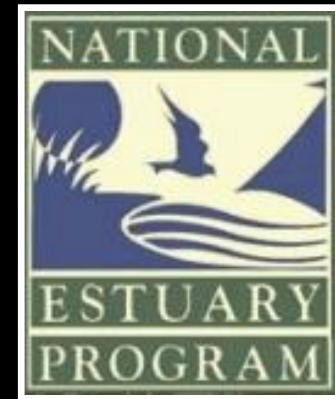
Proposed Diversions in the 2012 Master Plan

– Caveats and Questions –



Expert Panel on Diversion Planning and Implementation

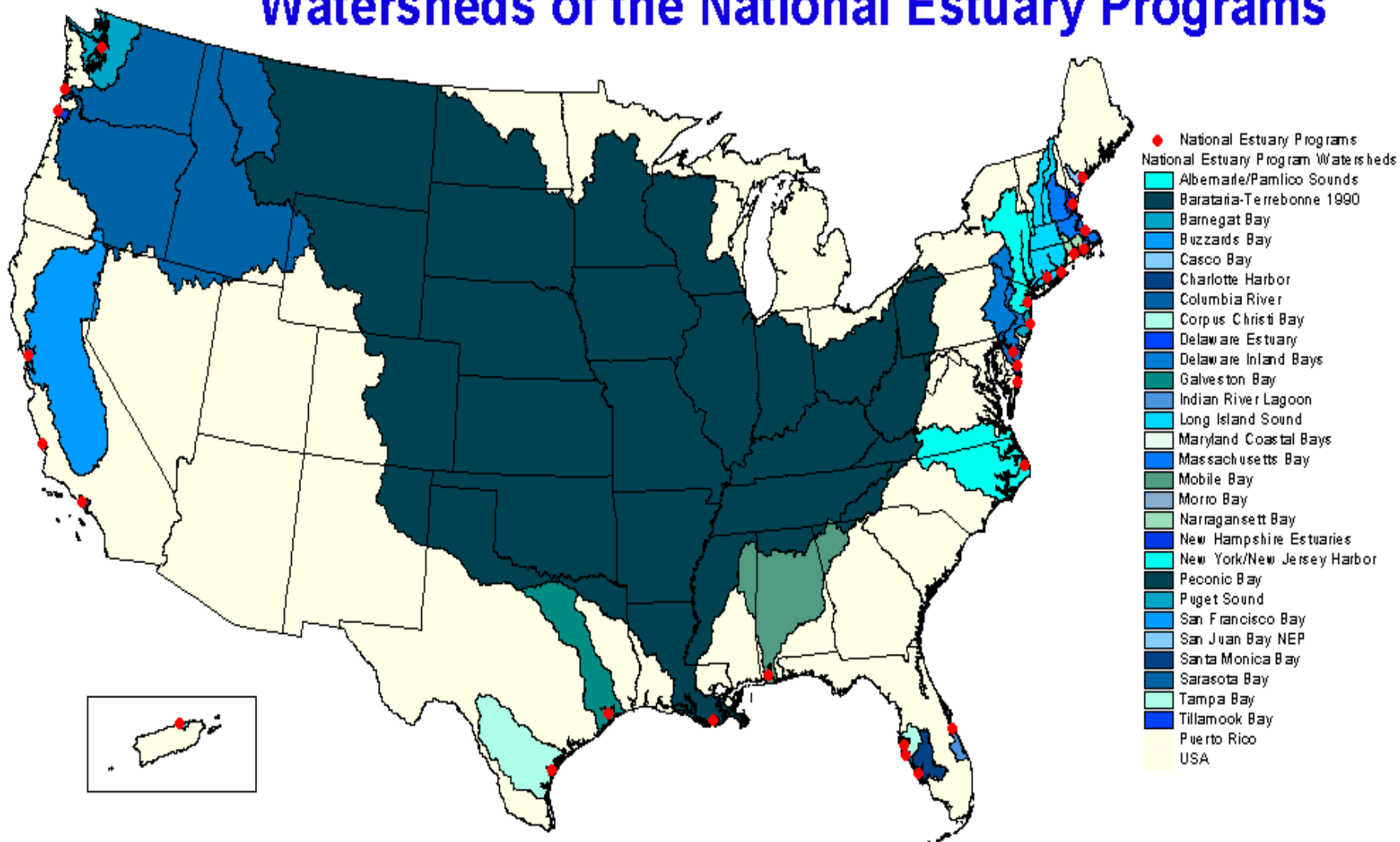
8 January 2014



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

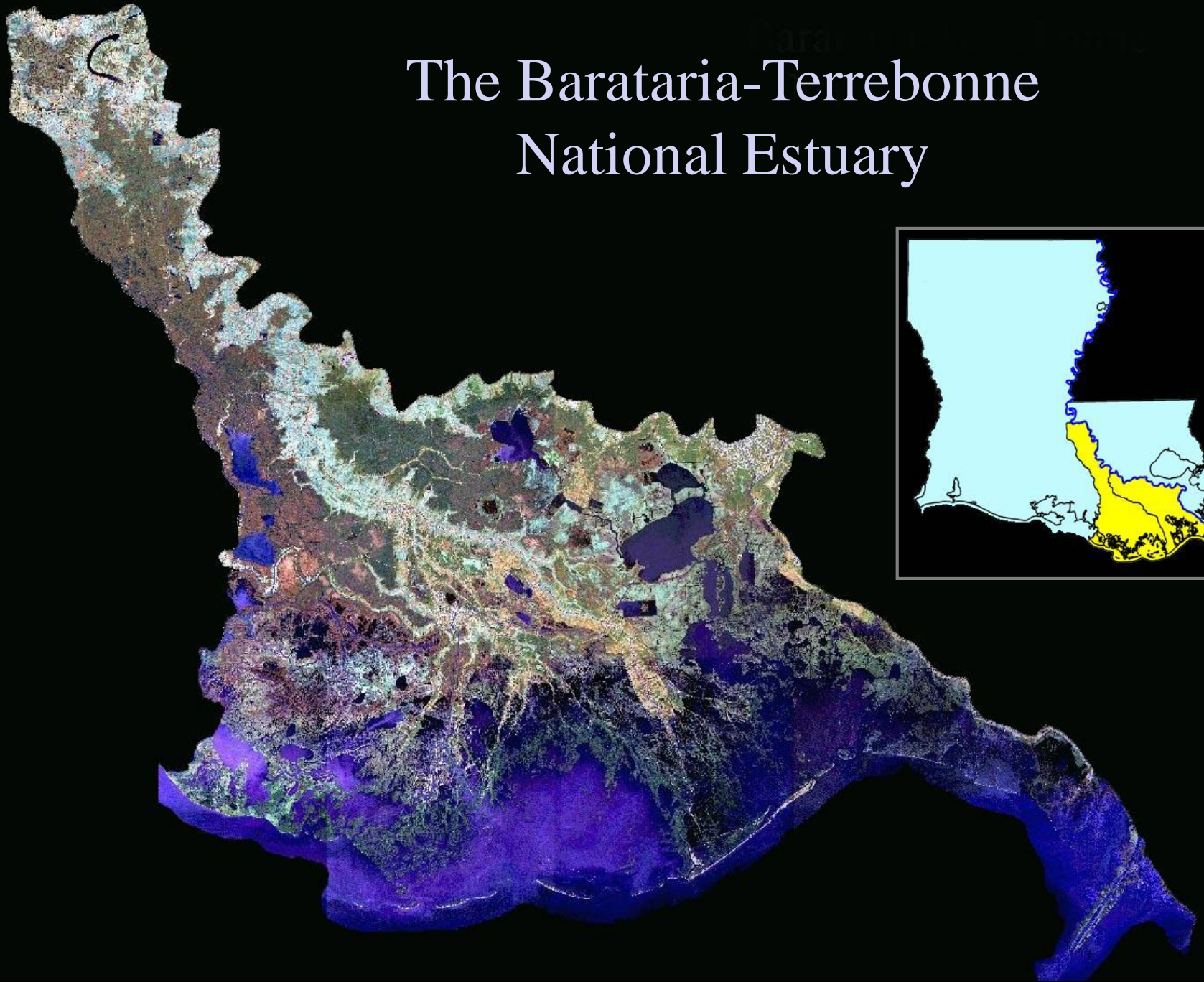


Watersheds of the National Estuary Programs

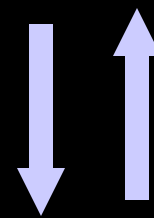
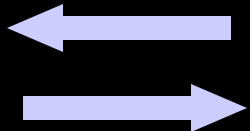
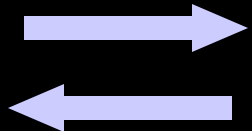
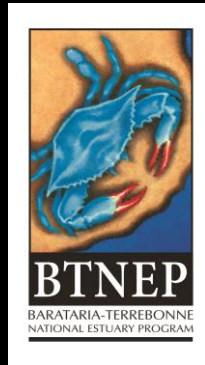


U.S. Environmental Protection Agency, 1999

The Barataria-Terrebonne National Estuary

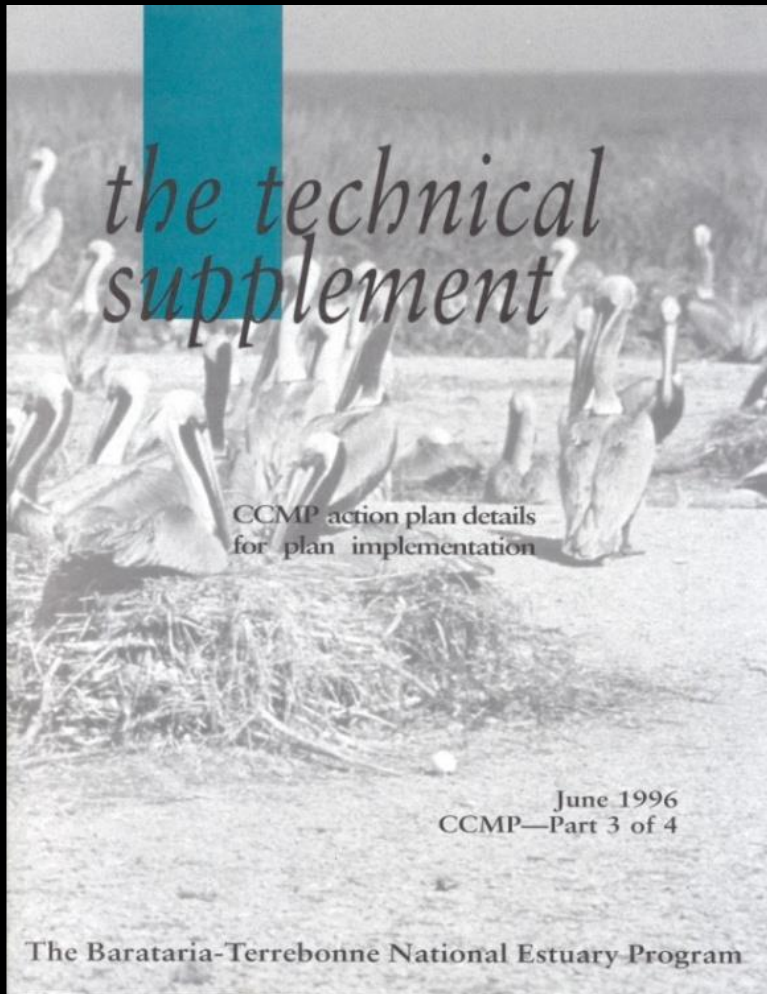


The B-T Management Conference



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.

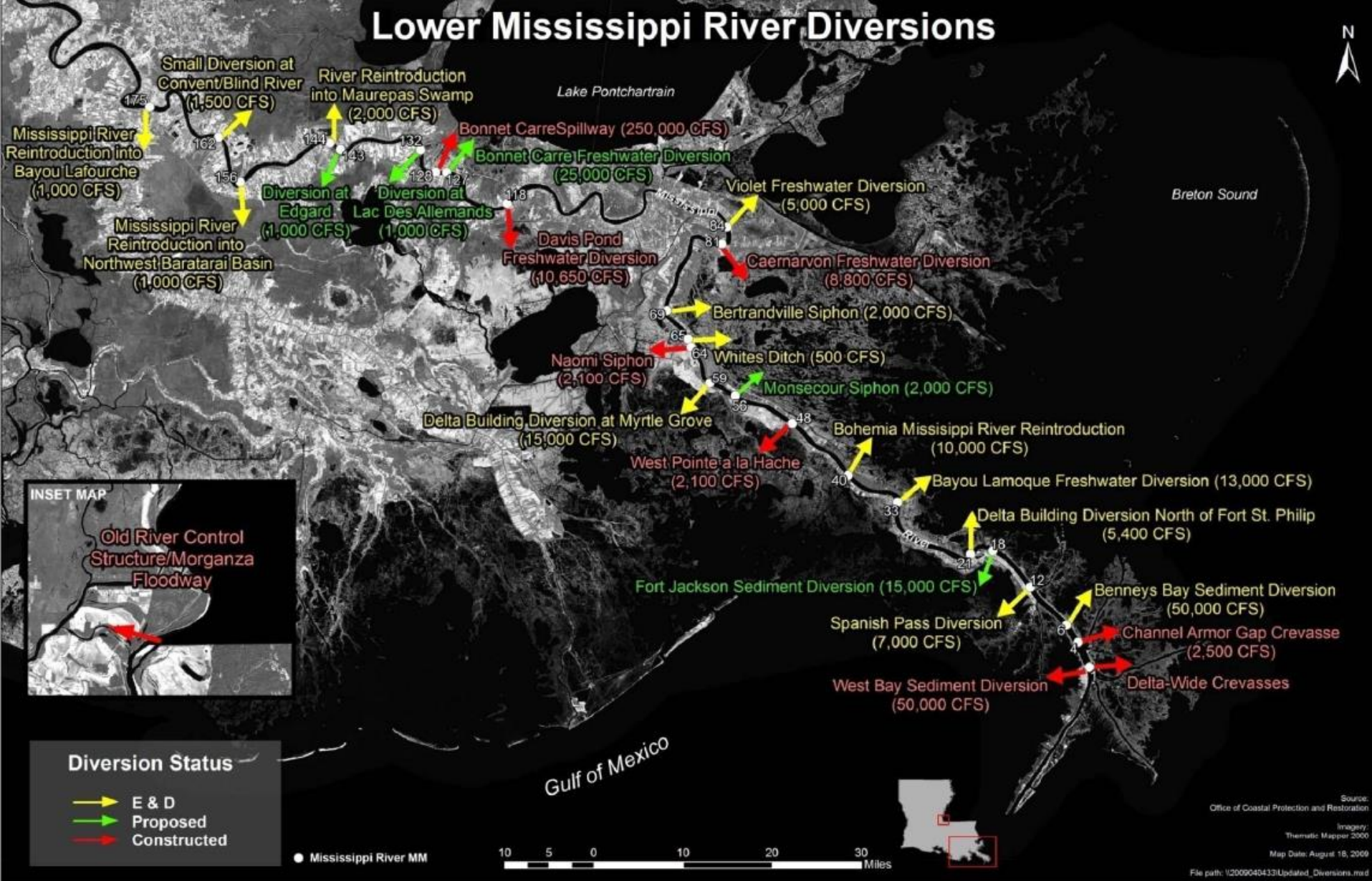
EM-2 Freshwater and Sediment Diversions

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**

Lower Mississippi River Diversions

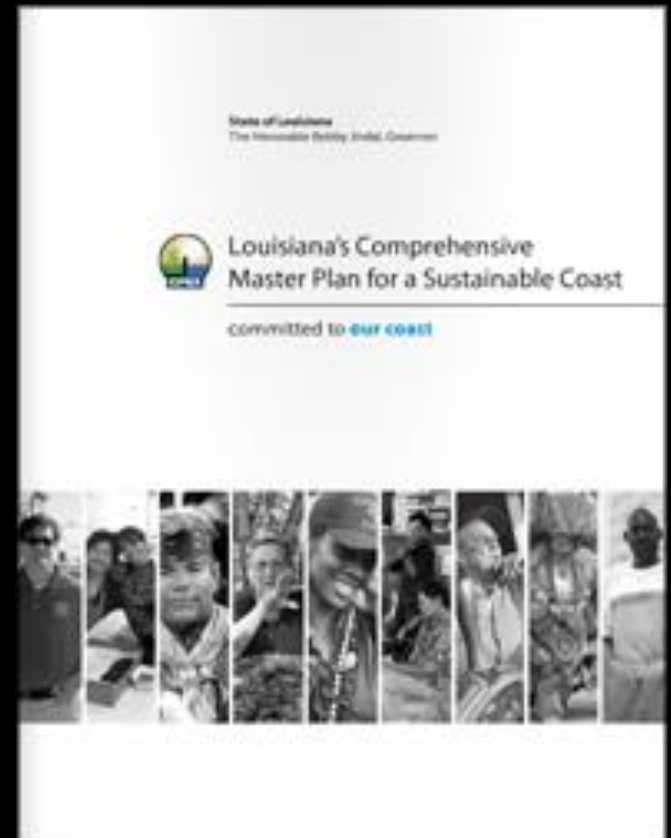


Proposed diversions were much smaller in previous plans. O CPR, 2006

CPRA 2012 Master Plan

Ten Diversion Projects

150,000 cfs	5,000 cfs
20,000 cfs	5,000 cfs
50,000 cfs	250,000 cfs
250,000 cfs	50,000 cfs
5,000 cfs	1,000 cfs



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



Photo by Rob Cosgriff
Illinois Natural History Survey
Great Rivers Field Station

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...

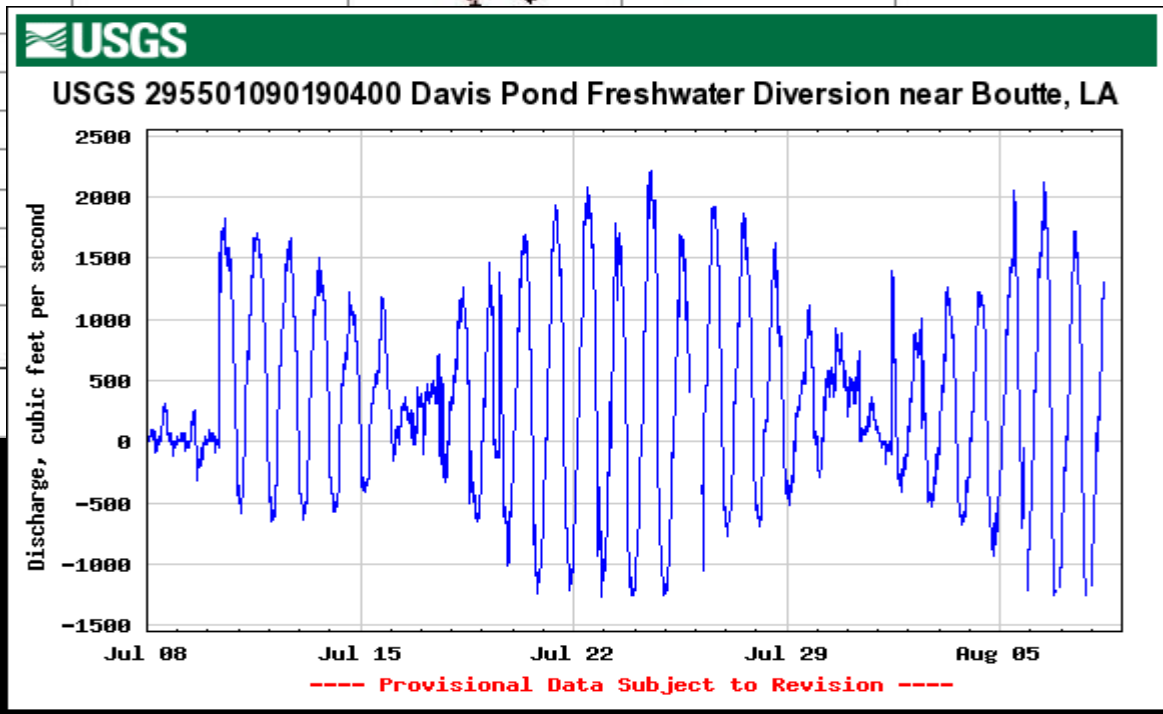
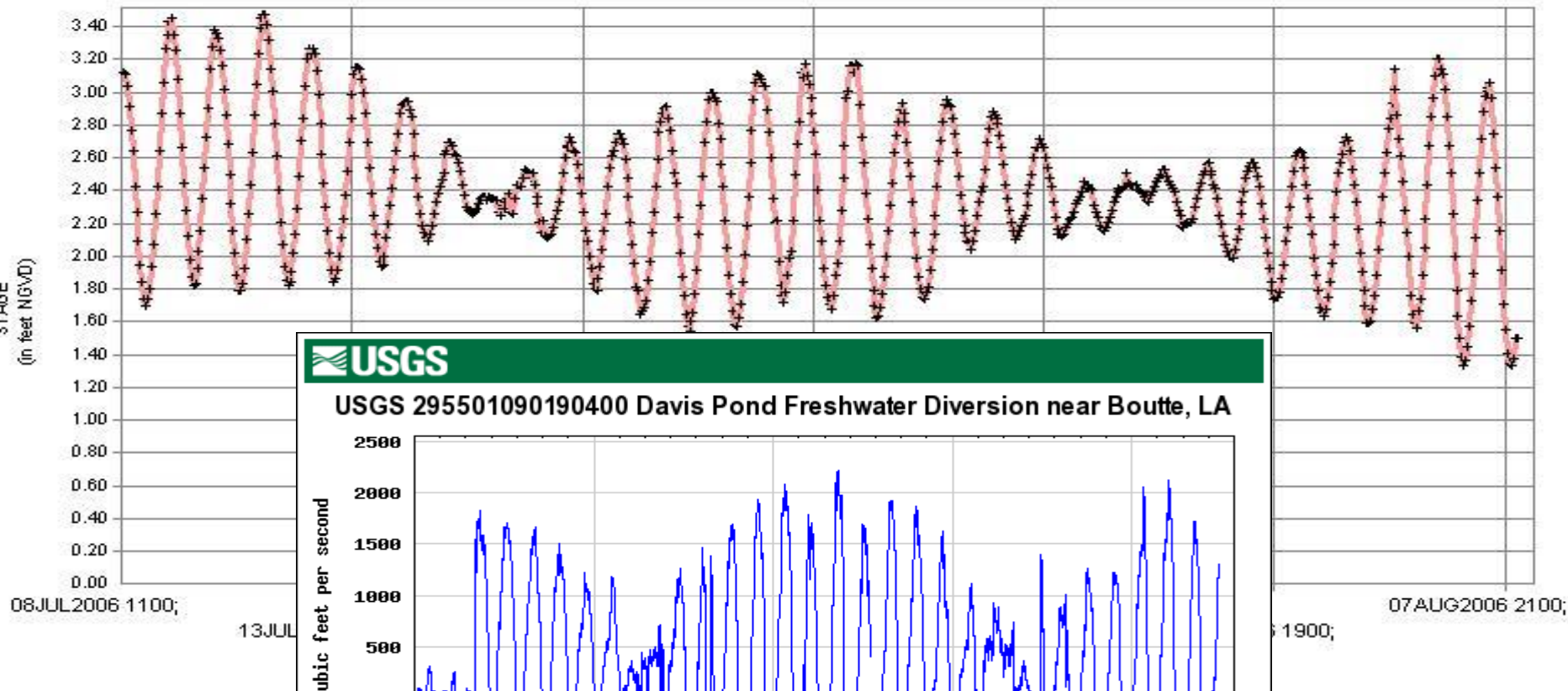
- May increase flood risk to coastal communities like Lafitte, Grand Bayou, and especially in lower Terrebonne and around Morgan City

* 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...

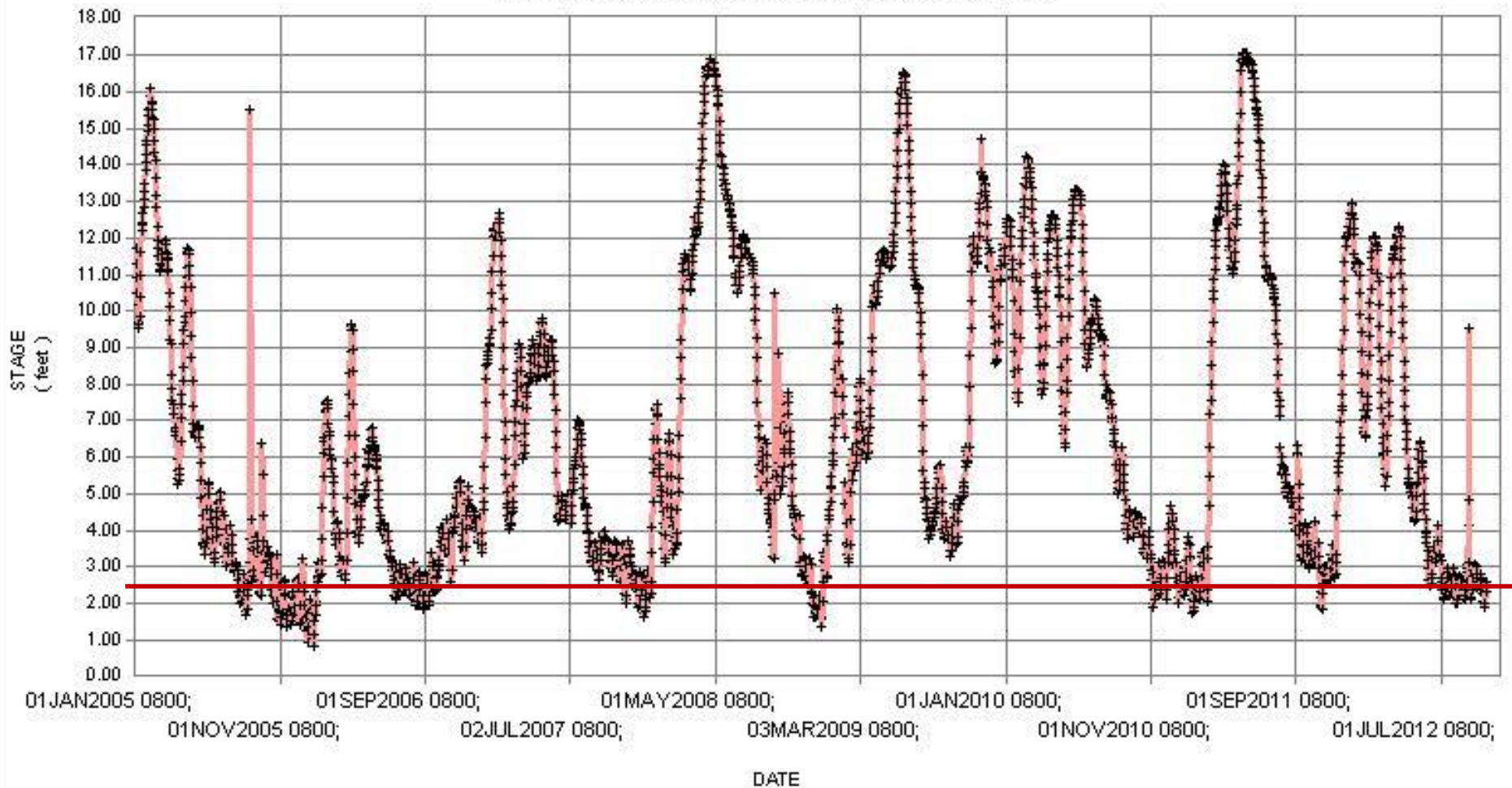
- Switch habitats to fresh marsh systems that are susceptible to salt damage when diversions can't flow. This happens in late summer and fall when the river is low and it is hurricane season.

Stage Hydrograph - Hourly data
Mississippi River At New Orleans, LA (Carrollton)



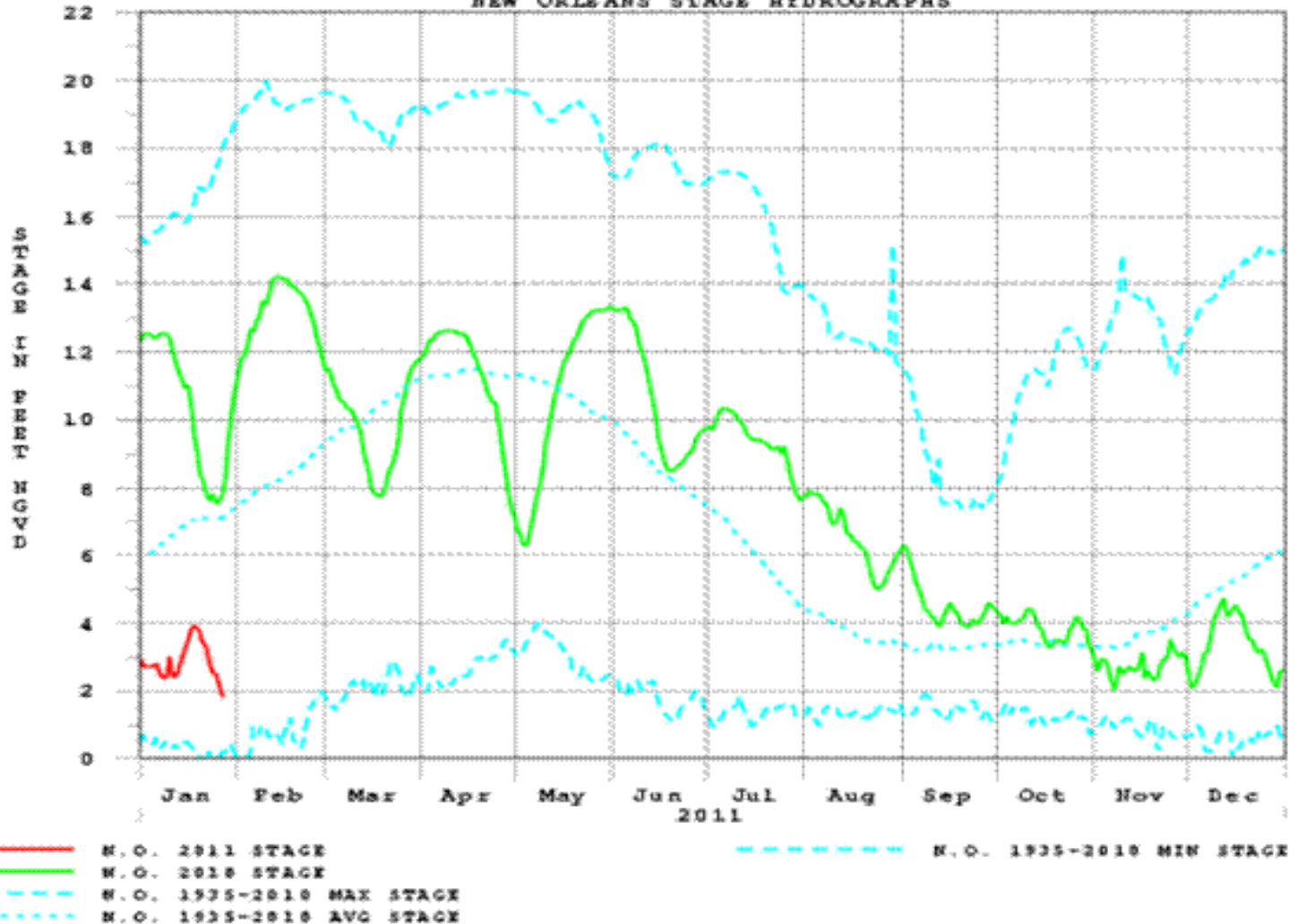
The Davis Pond diversion cannot flow when the river is below ~2.5 ft in New Orleans

Stage Hydrograph - Daily 08:00 data
Mississippi River At New Orleans, LA (Carrollton)

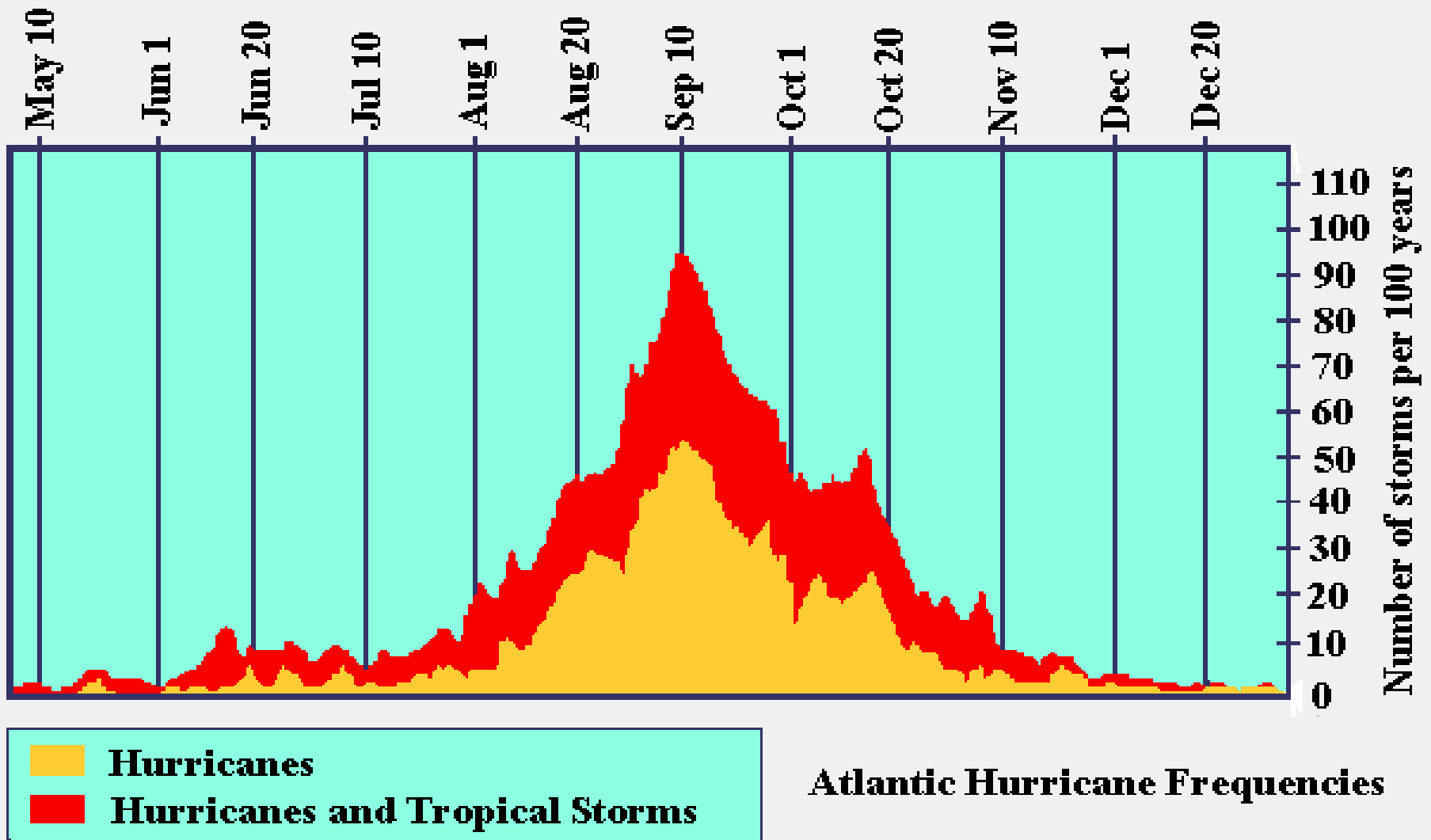


The river drops below 2.5 ft in New Orleans with some regularity. The six diversions below N.O. would be unable to flow even more often, as head differential decreases as you go downstream.

NEW ORLEANS STAGE HYDROGRAPHS



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.

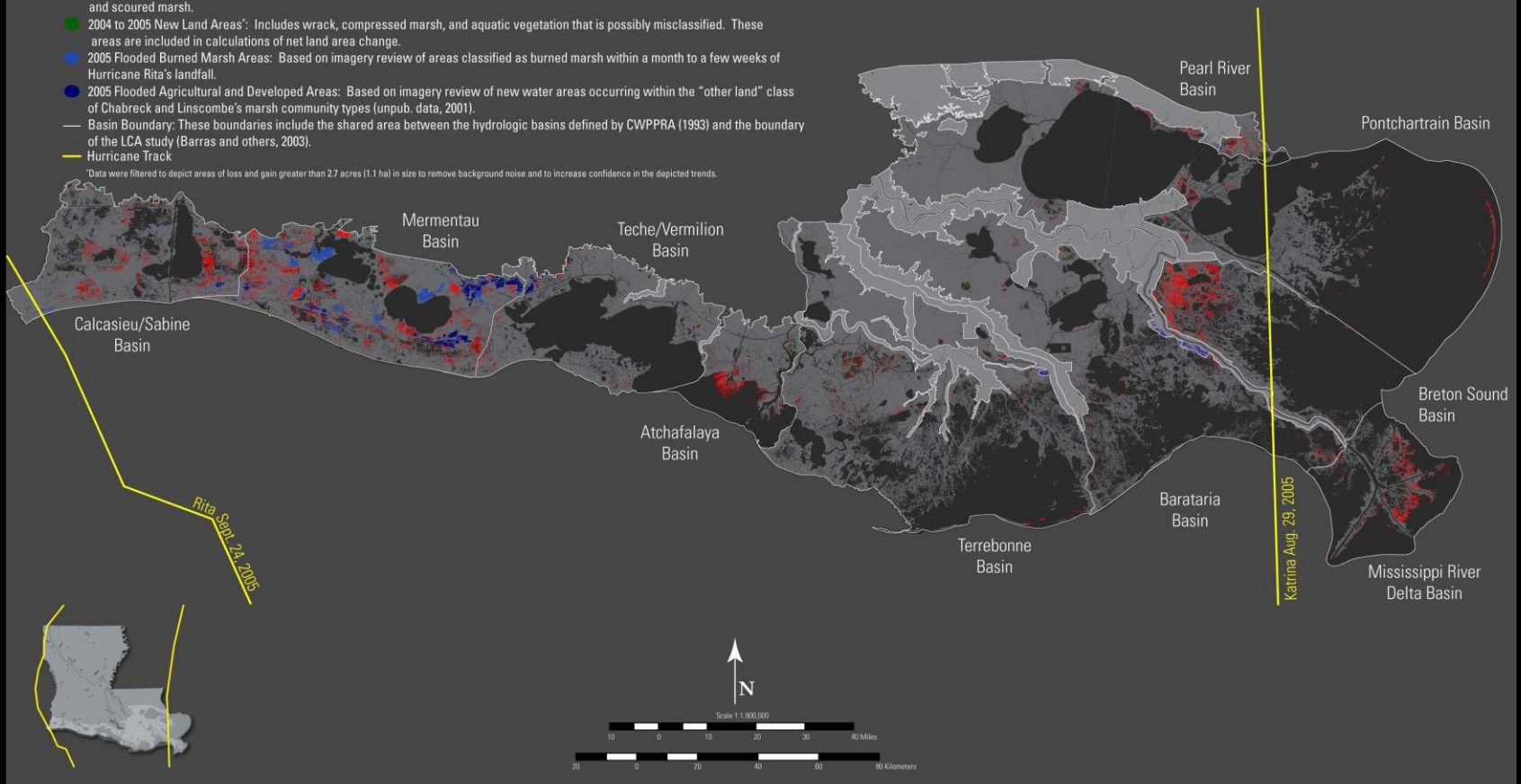


Fresh wetlands cannot take salt water.

Land Area Change in Coastal Louisiana After the 2005 Hurricanes: Overview

- 2005 Land
- 2005 Water
- Fastlands: Agricultural, developed, and upland areas surrounded by levees that are generally considered non-wetlands (LOSR, 2002) and that are excluded from calculations of net land area change.
- 2004 to 2005 New Water Areas (Decreased Land Areas): Includes flooded marsh, sheared marsh, eroded marsh, and scoured marsh.
- 2004 to 2005 New Land Areas: Includes wrack, compressed marsh, and aquatic vegetation that is possibly misclassified. These areas are included in calculations of net land area change.
- 2005 Flooded Burned Marsh Areas: Based on imagery review of areas classified as burned marsh within a month to a few weeks of Hurricane Rita's landfall.
- 2005 Flooded Agricultural and Developed Areas: Based on imagery review of new water areas occurring within the "other land" class of Chabreck and Linscombe's marsh community types (unpub. data, 2001).
- Basin Boundary: These boundaries include the shared area between the hydrologic basins defined by CWPPRA (1993) and the boundary of the LCA study (Barras and others, 2003).
- Hurricane Track

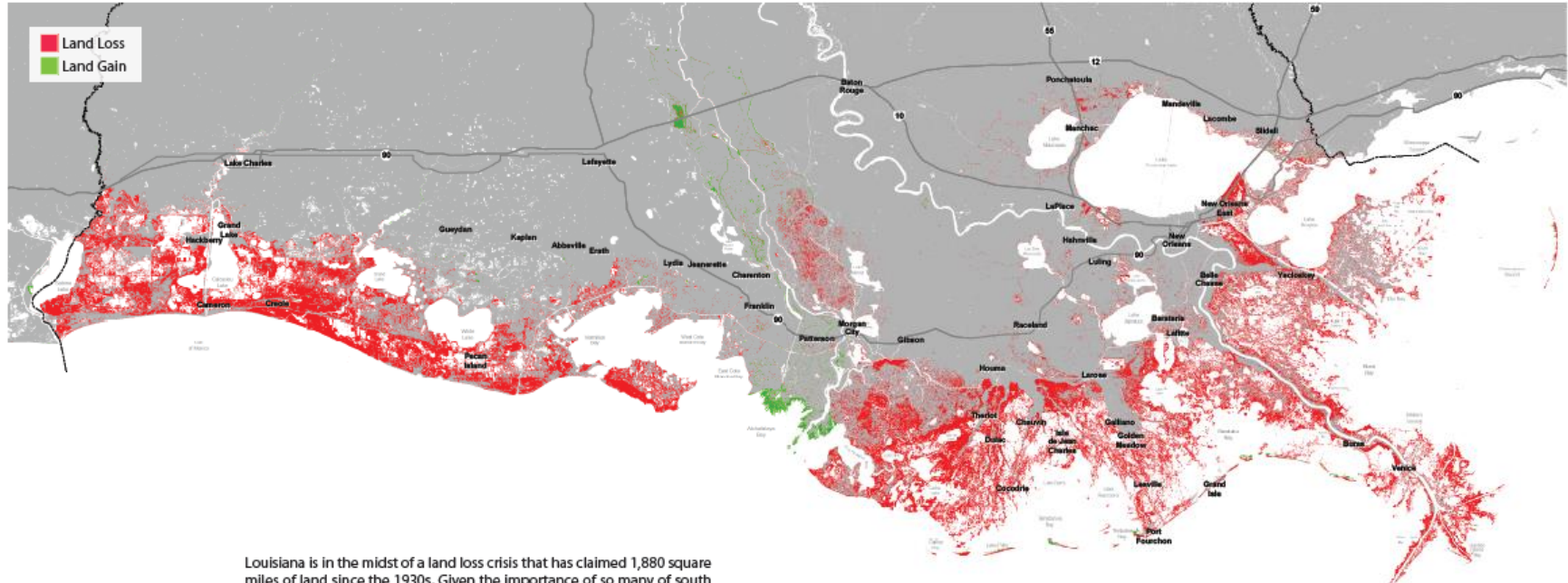
*Data were filtered to depict areas of loss and gain greater than 2.7 acres (1.1 ha) in size to remove background noise and to increase confidence in the depicted trends.



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.

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.

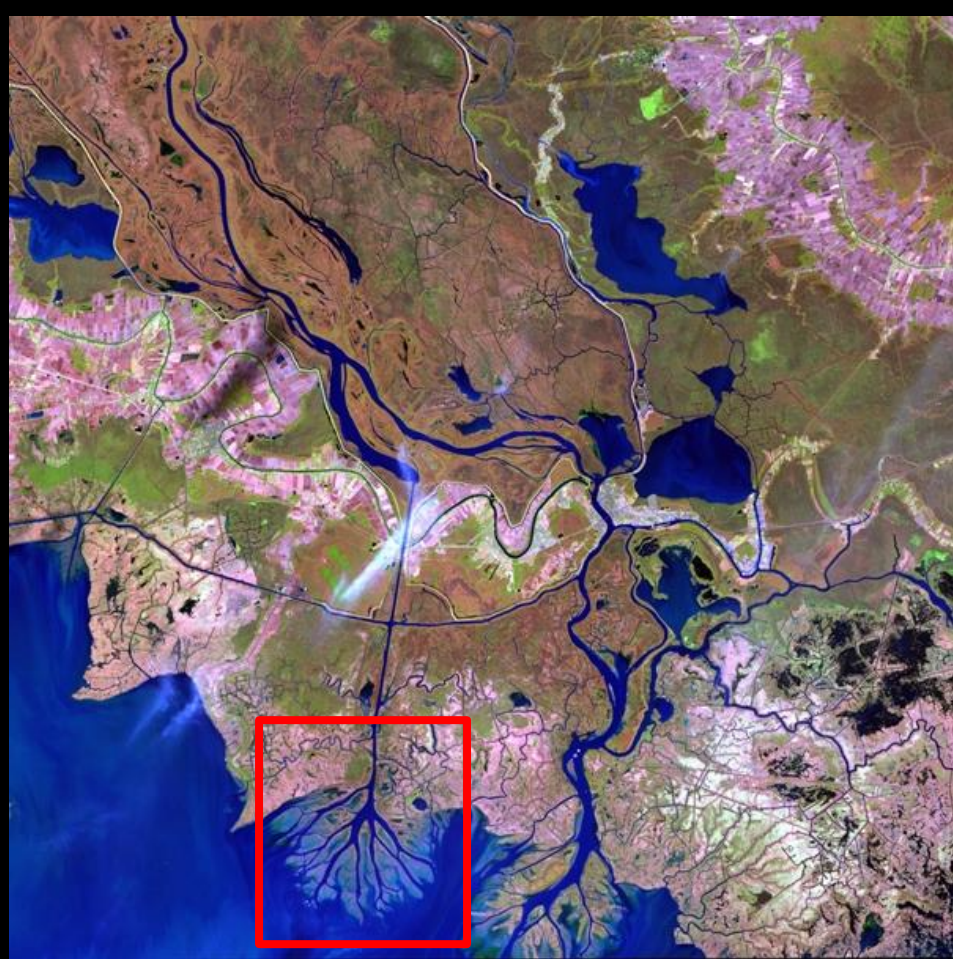
If we do not aggressively address this crisis, the problem intensifies. Our analysis confirmed that if we do nothing more than what has been done to date, we have the potential to lose up to an additional 1,750 square miles of land. This land loss will increase flooding risk with disastrous effects. 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

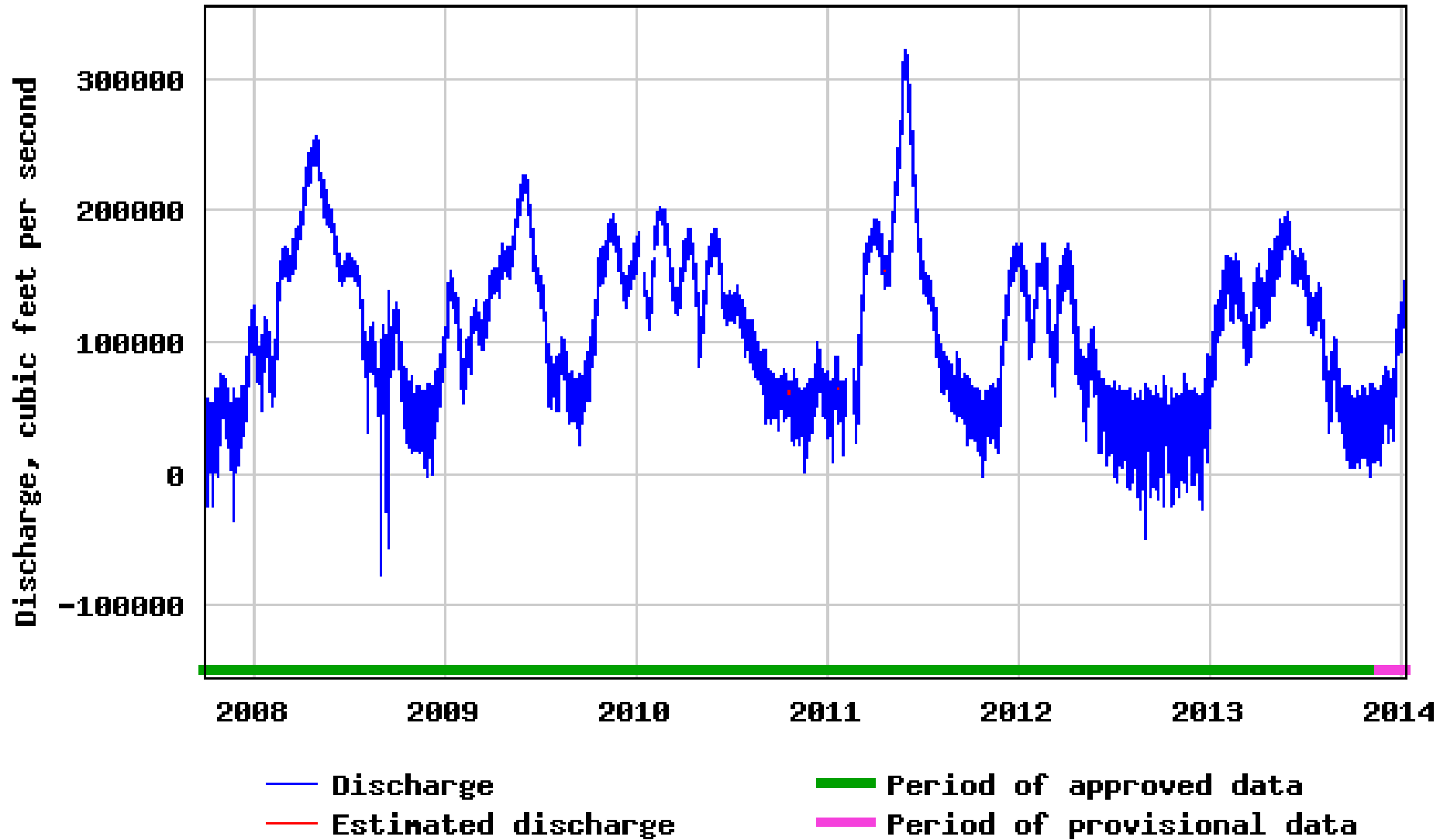


WLO channel was created in 1942 to reduce flood risk to Morgan City by diverting 30% of the flow from the Atchafalaya River. New land began to appear after the 1973 flood.

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

USGS 07381590 Max Lake Outlet at Calumet, LA



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



Timbalier Island June 2004



Timbalier Island January 2005





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

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?
- Can the Penchant diversion really work?

- 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?



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