

RESTORE

THE MISSISSIPPI RIVER DELTA

Historical Overview:
Common Bottlenose Dolphins
in the
Mississippi River Delta

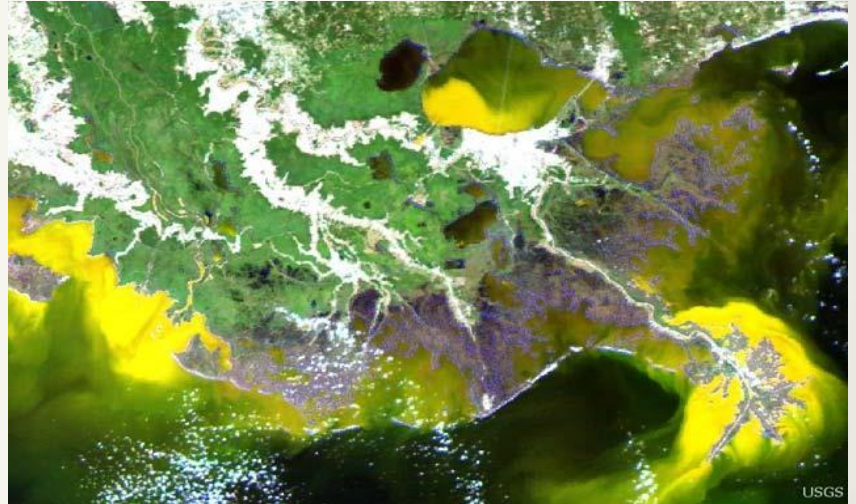
David Muth
National Wildlife Federation



Dolphins and Diversions: The Issue

In a September 3, 2015 letter to Major General Wehr, Commander, Mississippi Valley Division, Corps of Engineers, from the office of Regional Administrator Roy Crabtree, commenting on the upcoming Tentatively Selected Plan for the Hydro-Delta Management Feasibility Study, NOAA wrote:

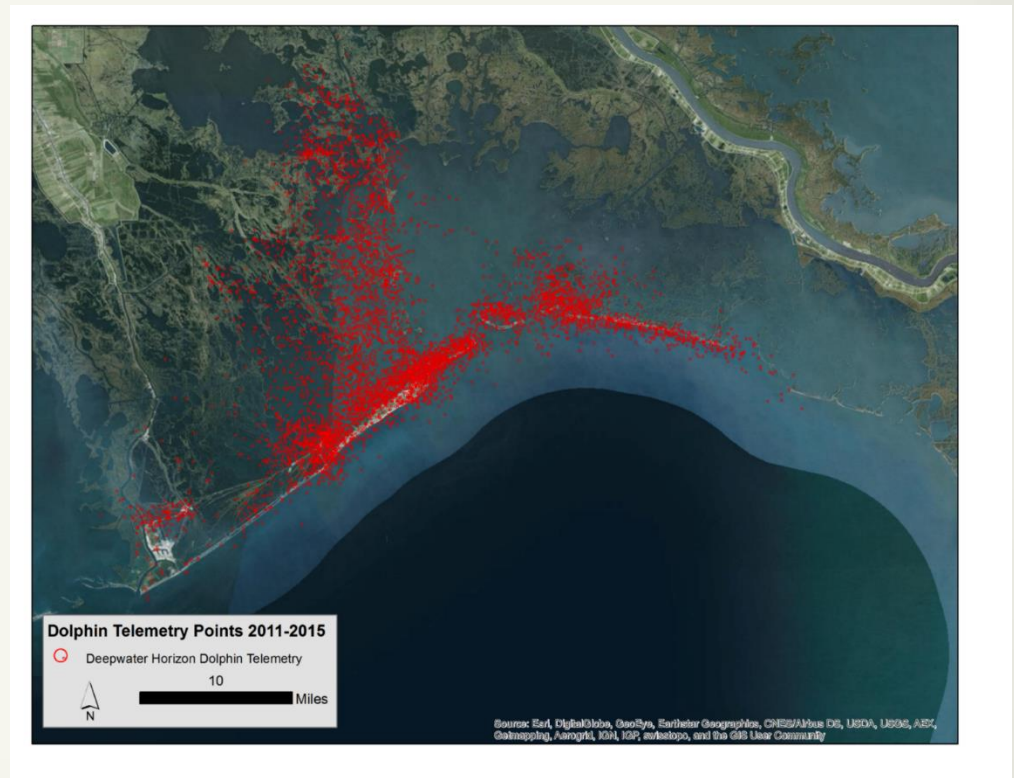
preliminary analyses indicate all the Mississippi River diversion alternatives being considered in the feasibility study will adversely impact resident bottlenose dolphin populations in the Barataria Bay and Breton Sound basins by eliminating suitable estuarine and nearshore coastal habitats (Crabtree 2015).



Dolphins and Diversions: The Issue

Resident Dolphins Stocks

- Studies indicate that some dolphins are resident in defined geographic areas.
- A study in 2003 indicated that many of the dolphins in Barataria Bay are sedentary.
- After the BP disaster, further studies documented limited movement by dolphins in Barataria Bay.
- (Miller 2003, DWH MMIQT 2015)



Dolphins and Diversions: The Issue

Lake Pontchartrain Dolphin Mortality

- In 2007 a group of dolphins was discovered in Lake Pontchartrain.
- They began showing skin lesions after exposure to low salinities.
- In the spring of 2010, after exposure to low salinities and low temperatures, 26 dolphins stranded and died.
- In 2013, an additional 23 dolphins stranded and died.
- Are dolphins incapable of responding to low salinities?
- (Barry *et al.* 2008, Venn-Watson *et al.* 2015, Mullin *et al.* 2015.)



Dolphins and Diversions: The Issue

Lake Pontchartrain is a poor geographical and ecological analogy for Barataria Bay.

Dolphins are resident in the bay, and the bay is geologically young, only a few hundred years old.

It has only become predominantly brackish in the last 150 years.

Breton Sound has actually become fresher over the last century.

Both experience wide salinity fluctuations even today.

But even if dolphins can respond to reduced salinities, is causing migration in and of itself harassment?

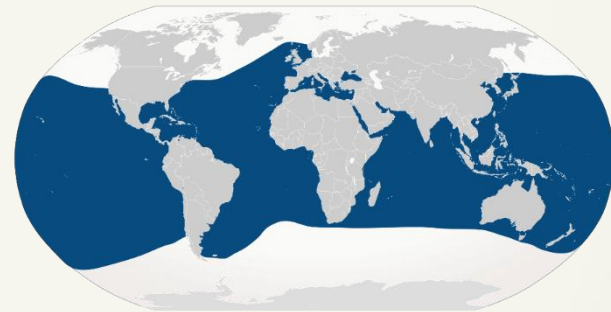
Should restoring natural processes to an ecosystem be treated as a potential form of legal “take”?



Marine Mammal Protection Act (MMPA)

Findings and Declaration of Congress:

- ↗ •Marine Mammals are resources of great international significance
- ↗ •Marine mammals **should not be permitted to diminish** beyond the point at which they cease to be significant functioning element of the ecosystem
- ↗ •Primary objective of their management should be maintain health and stability of marine mammals **and their ecosystem**
- ↗ •In particular, efforts should be made to protect essential habitats, including rookeries, mating grounds, and areas of similar significance
- ↗ •**Prohibits the taking (e.g., harassment, injury, or killing) of marine mammals unless exempted by the MMPA or authorized under a permit:**
 - incidental take authorizations



Range of Common Bottlenose Dolphin. [Wikipedia](#)

Modified from Harrison, NOAA-Fisheries

Marine Mammal Protection Act

Sections 101(a)(5)(A) and (D) allow for the authorization of the incidental taking of marine mammals that occurs during *otherwise lawful activities*.

NMFS issues incidental take authorizations for diverse activities such as:

- ↗ • Military training and testing (active sonar and explosives)
 - ↗ • Oil and Gas exploration, development, and decommissioning (seismic exploration, drilling, rig removal)
 - ↗ • Highway bridge and port construction
 - ↗ • Offshore alternative energy development
 - ↗ • Rocket launches
 - ↗ • Scientific research in areas where marine mammals are present
- Wide range of spatial scales
 - Wide range of temporal scales



Modified from Harrison, NOAA-Fisheries

Marine Mammal Protection Act

Sections 101(a)(5)(A) and (D)

- ↗ **Take** – To **harass**, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal
- ↗ **Harassment** (for all but “military readiness activities”) – any act of pursuit, torment, or **annoyance** which – (i) has the potential to injure a marine mammal stock in the wild (Level A harassment) or (ii) **has the potential to disturb a marine mammal stock in the wild** by causing disruption of behavioral patterns, including, but not limited to, **migration**, breathing, nursing, breeding, feeding, or sheltering (Level B harassment)
 - **Negligible Impact** – *An impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through annual rates of recruitment or survival*
 - **Small Numbers** – means a portion of a marine mammal species or stock whose taking would have a negligible impact [*This is a circular definition – court invalidated. So, instead we look at whether the total taking will be small relative to the estimated population size and relevant to the behavior, physiology, and life history of the species or stock*]



Hayden's Animal Facts: Online

Modified from Harrison,
NOAA-Fisheries

Definition of a “Population Stock”

↗ A group of marine mammals of the same species or smaller taxa in a common spatial arrangement that interbreed when mature.”

↗ {16 U.S.C.S 1362 (11)}

Functional Groups delineated by a very low rate of genetic exchange

- ↗ Groups that are essentially demographically separate (management groups experience differential risks)
- ↗ Uniquely adapted to specific area/region they inhabit.
- ↗ Therefore, not easily replaced by individuals from adjacent areas.

Modified from Mullen and Rosel, NOAA PowerPoint

↗ 3

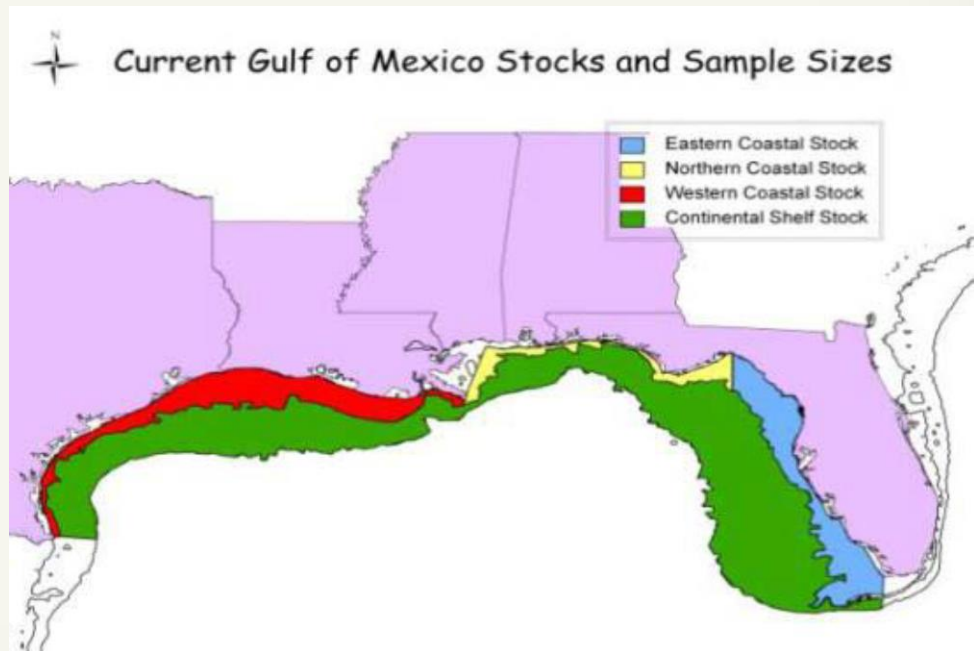


<http://petsgu.com/>

Bottlenose Dolphins in the Gulf of Mexico

- ↗ Oceanic waters (>200m; 1 stock)
- ↗ Continental shelf (20–200m; 1 stock)
- ↗ Coastal waters (0–20m; 3 stocks)
- ↗ **Bay, sound and estuary (32 stocks)**
 - NOAA recognizes BSE stocks in
 - Barataria Bay
 - Breton-Chandeleur Sound

Gulf of Mexico Coastal and Continental Shelf Stocks

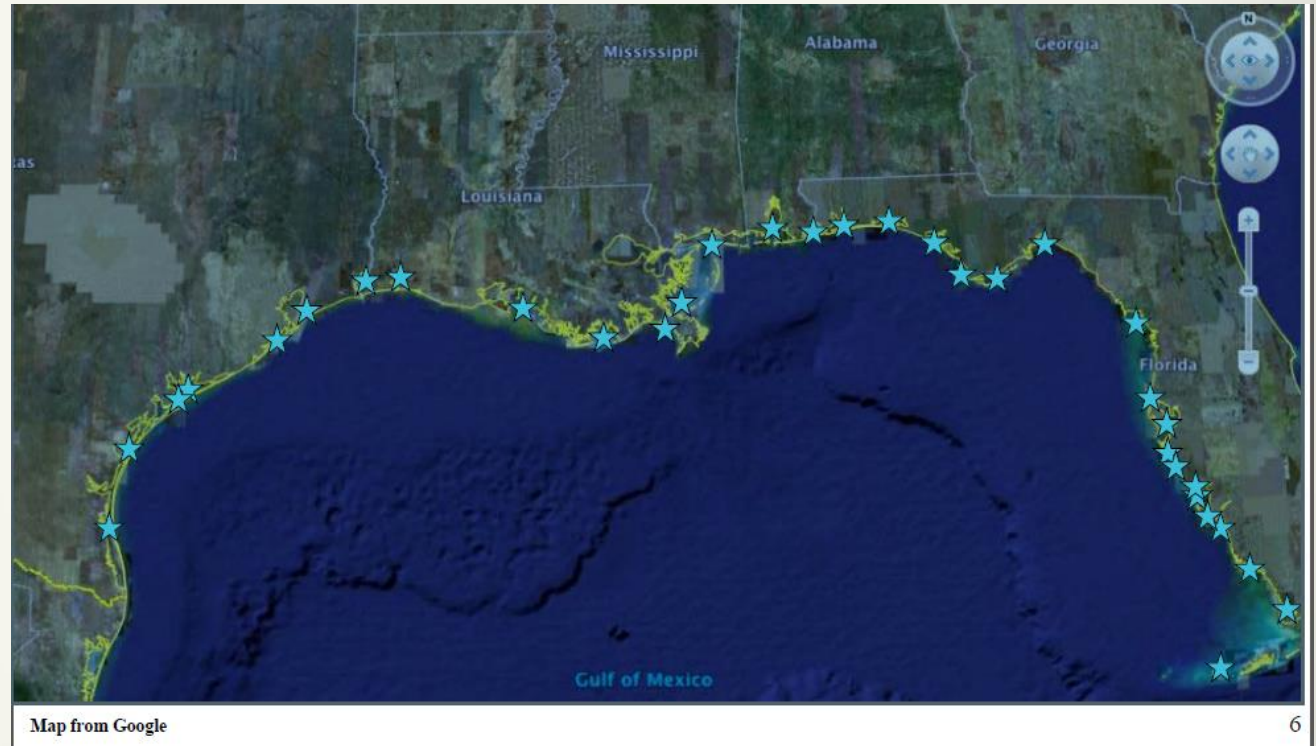


Modified from Mullen and Rosel, NOAA PowerPoint

Courtesy of N. Vollmer

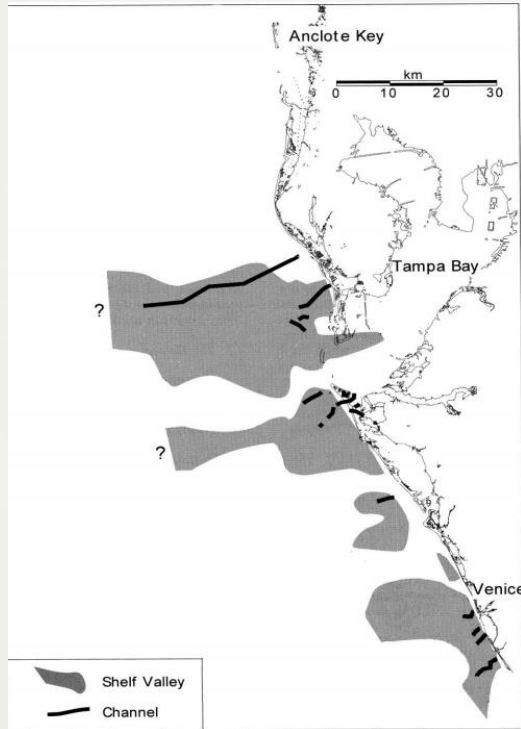
Bay Sound and Estuary Stocks

The 32 BSE stocks are of special concern because in many cases individual dolphins are resident to small areas (i.e., occur there at least 50% of the time).

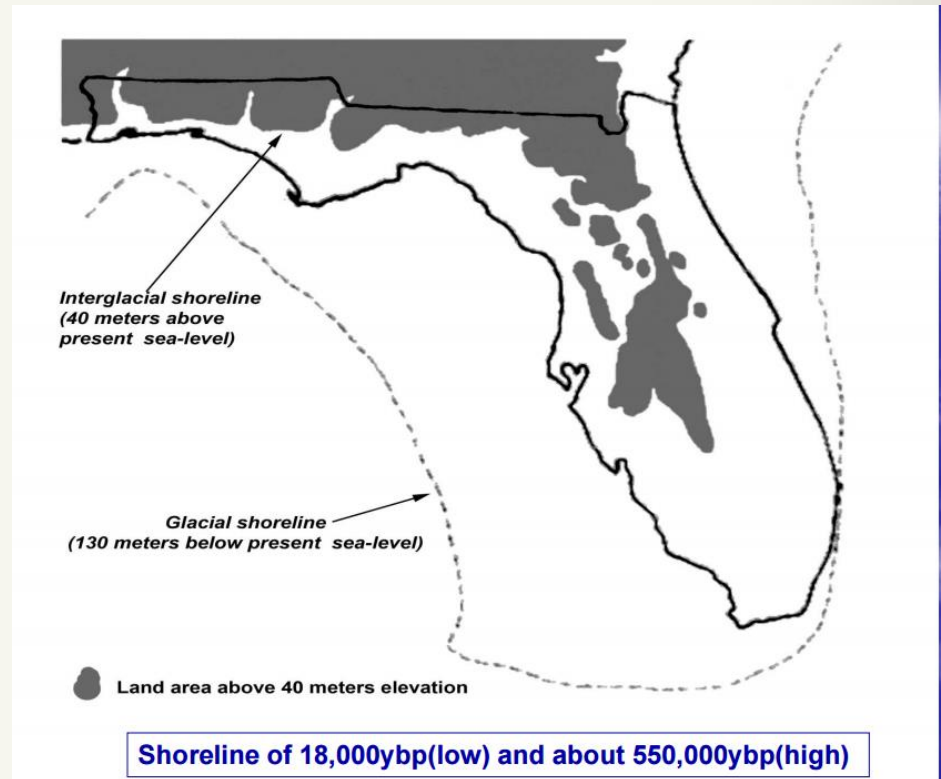


Modified from Mullen and Rosel, NOAA PowerPoint

Sea Level Changes Gulf of Mexico



Paleo-channels and shelf valleys on the west coast of Florida (from Locker et al, 2003)



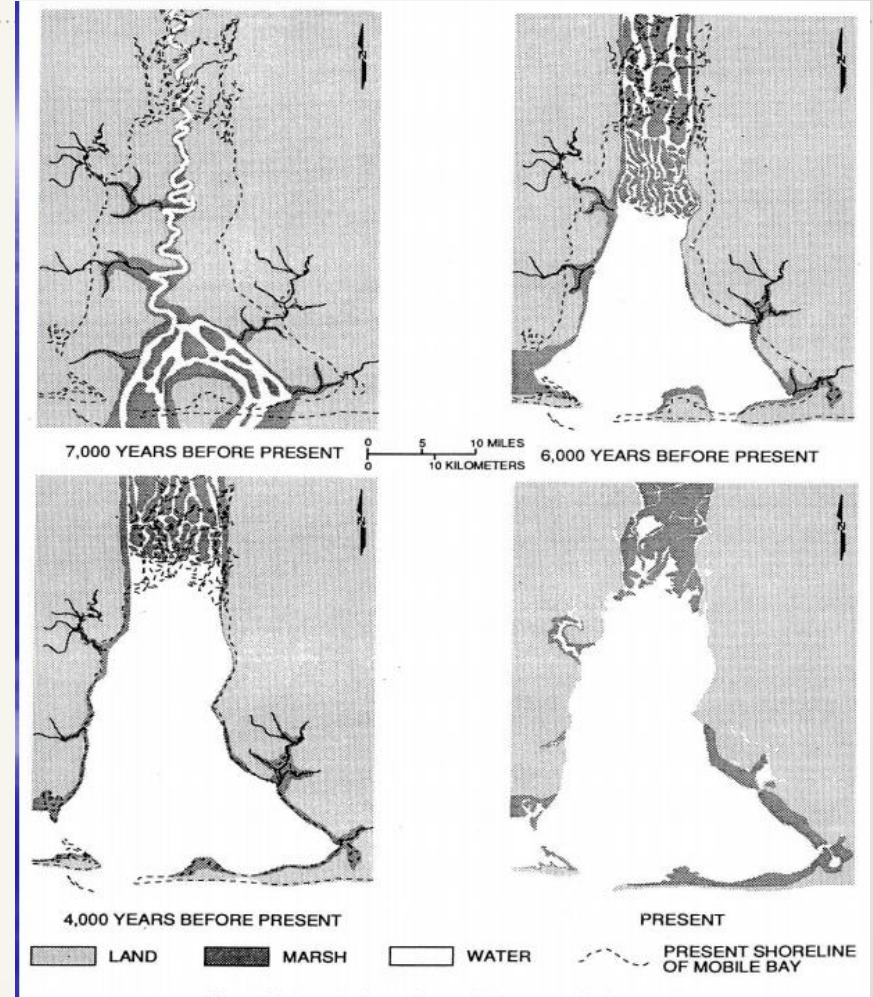
Davis Jr., R.A., 2011

Mobile Bay

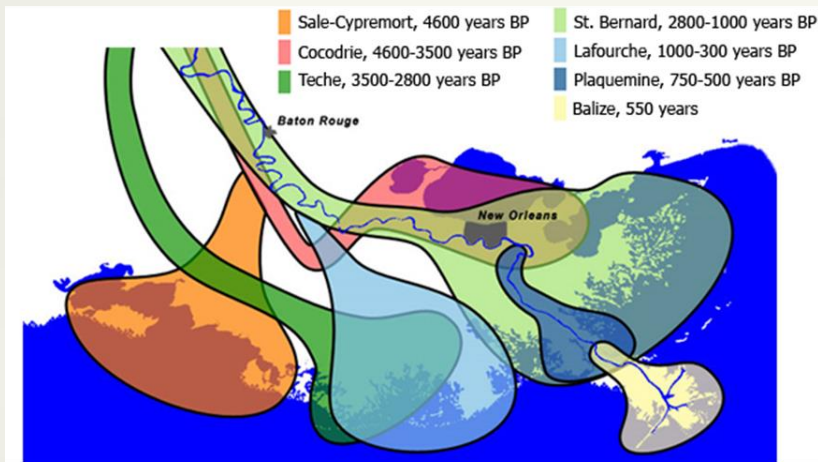
Development of Mobile Bay, AL as sea level rose over the past 7000 years.

This is **typical** of how estuaries developed along the northern Gulf Coast. (from Ala. Geol. Survey)

Davis Jr., R.A., 2011



Delta Formation



Modified from Wicander and Monroe, 1993.

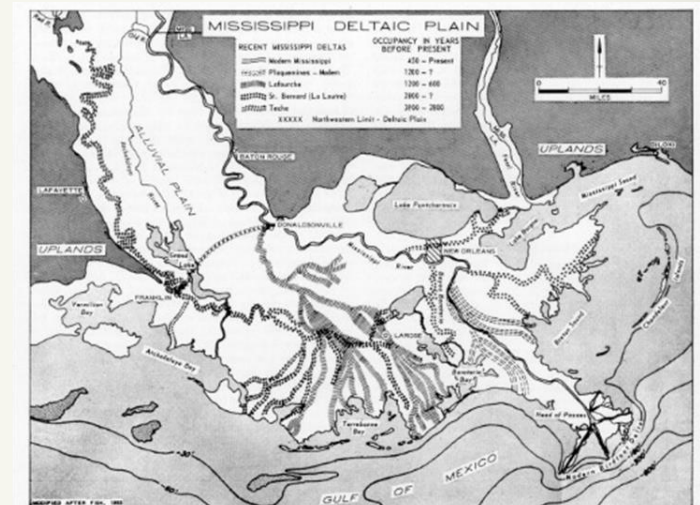


Figure 2. The Mississippi deltaic plain showing Recent sub-deltas and associated river and distributary courses.

Modified from Fisk, 1956.

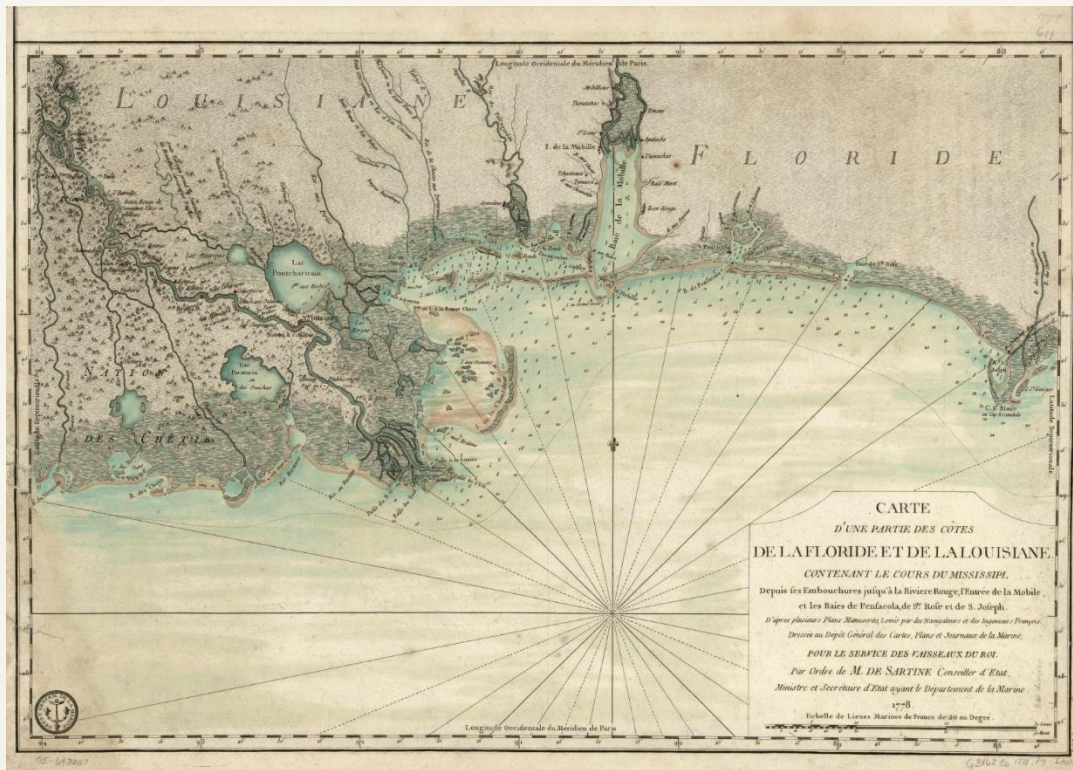
Formation of Barataria Bay



English Version of the 1720 de la Tour Map

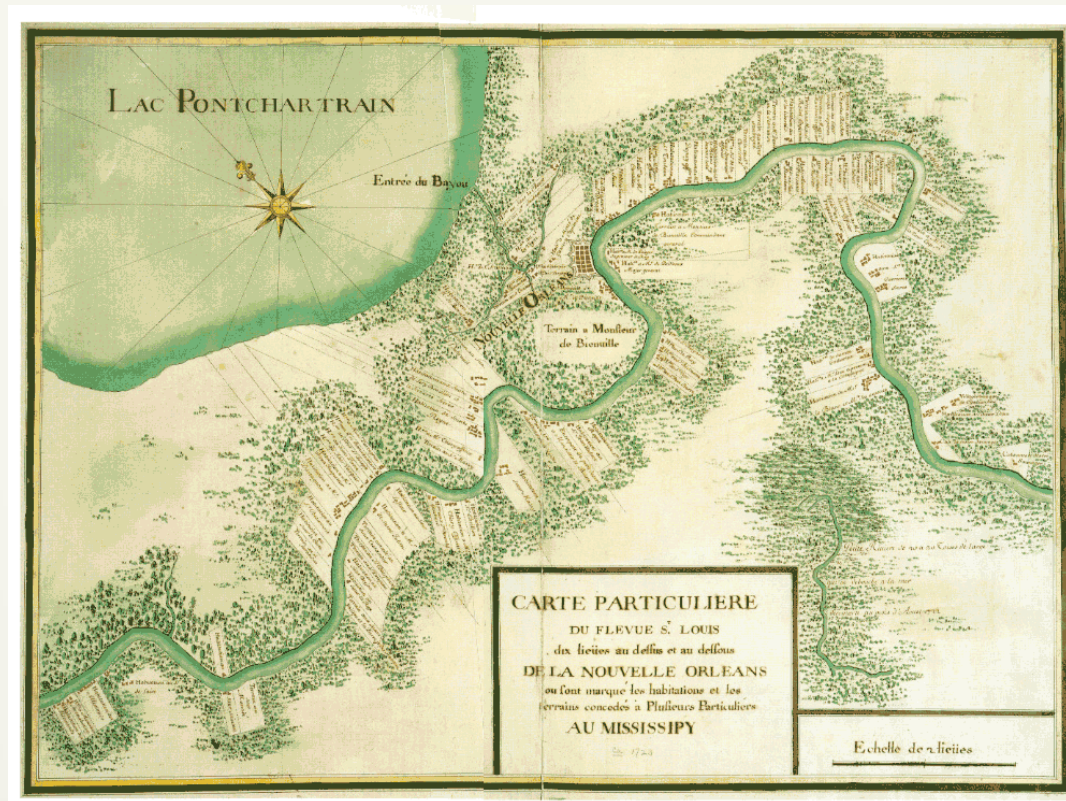
Ellis, courtesy of
ian Society

Formation of Barataria Bay

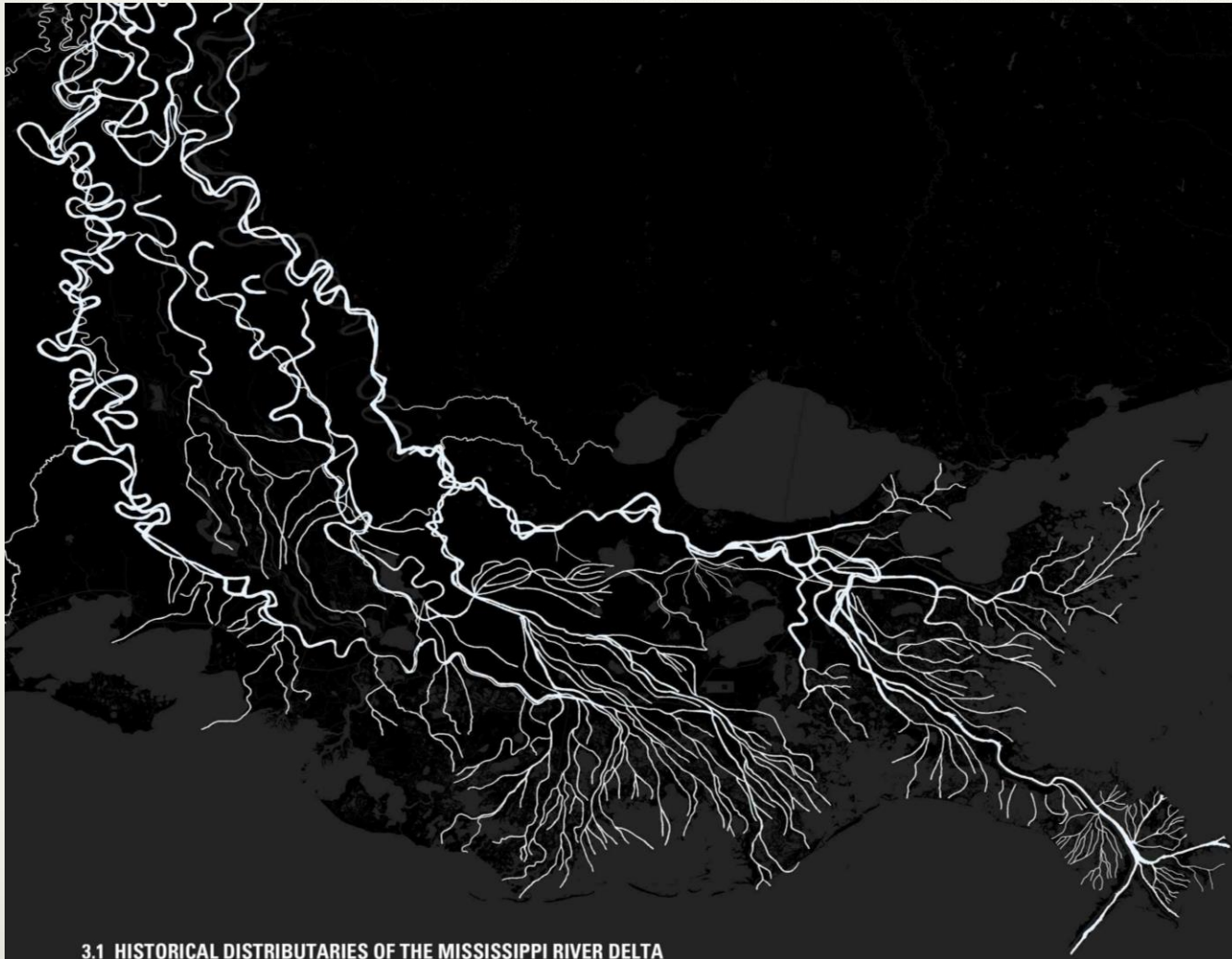


Sartine Map, 1778 (after Bellin 1764)

Levee Building: Constricting the River ca. 1730



Distributary Closure

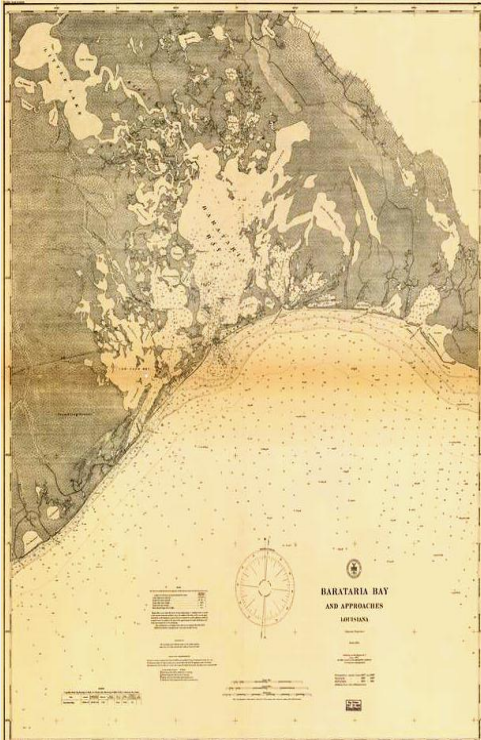


3.1 HISTORICAL DISTRIBUTARIES OF THE MISSISSIPPI RIVER DELTA

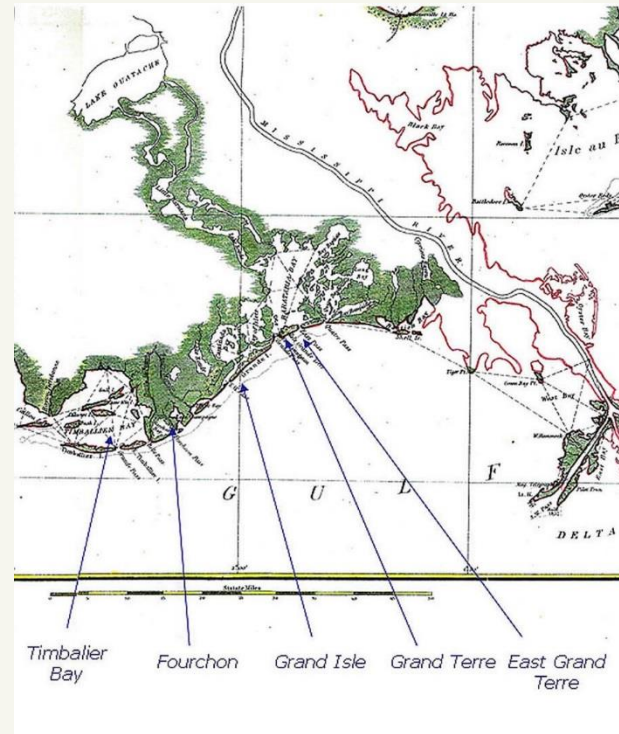
Southwest Pass: The Road to Nowhere for Fine Sediment



Evolution of Barataria Bay

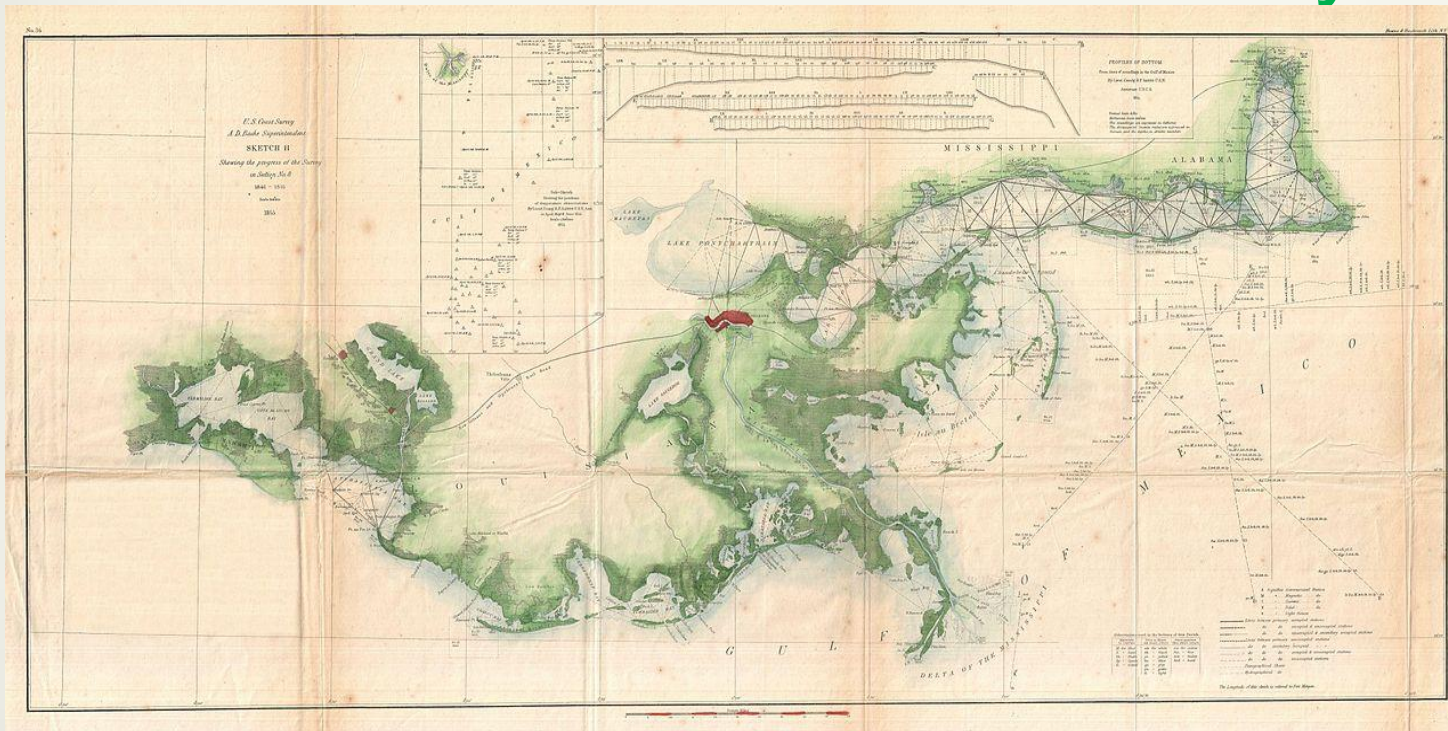


NOAA, Barataria Bay and Approaches, 1853.



Modified from NOAA, 2016 (Osborne). Barataria Bay and vicinity circa 1860.

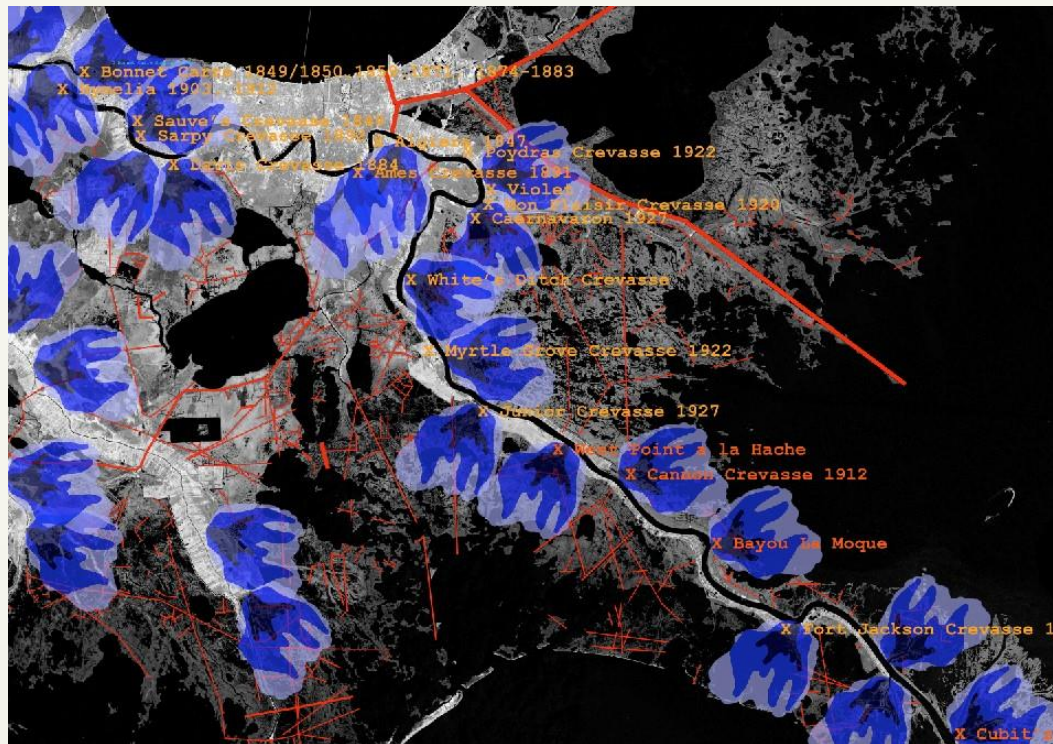
Evolution of Barataria Bay



U.S. Coast and Geodetic Survey, 1855

Map of Louisiana Bay of National Audubon Society

Post-Levee Construction Crevassing until 1927



Day, John W., based on Davis, D.W.

Evolution of Barataria Bay

Since 1928, with the passage of the Mississippi River and Tributaries Act, the Corps has maintained the levee system without a single crevasse into Barataria Bay.

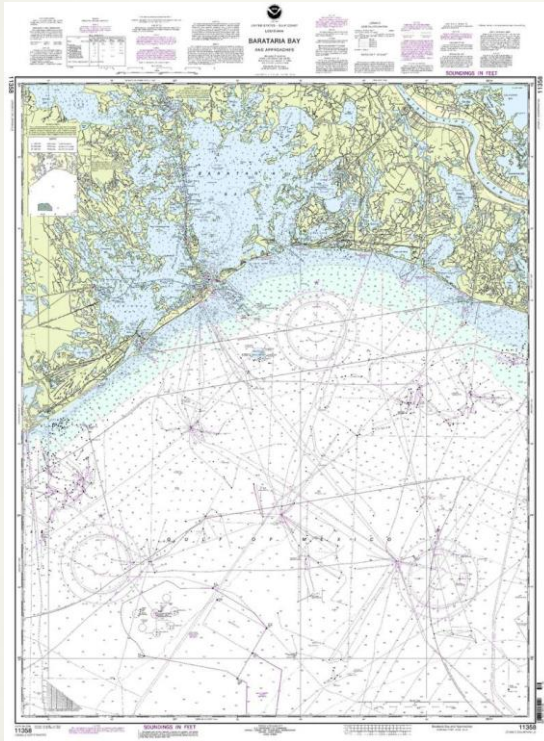
In a real sense, modern Barataria Bay was born in 1928.



1927 Junior crevasse after ship struck levee.



Evolution of Barataria Bay

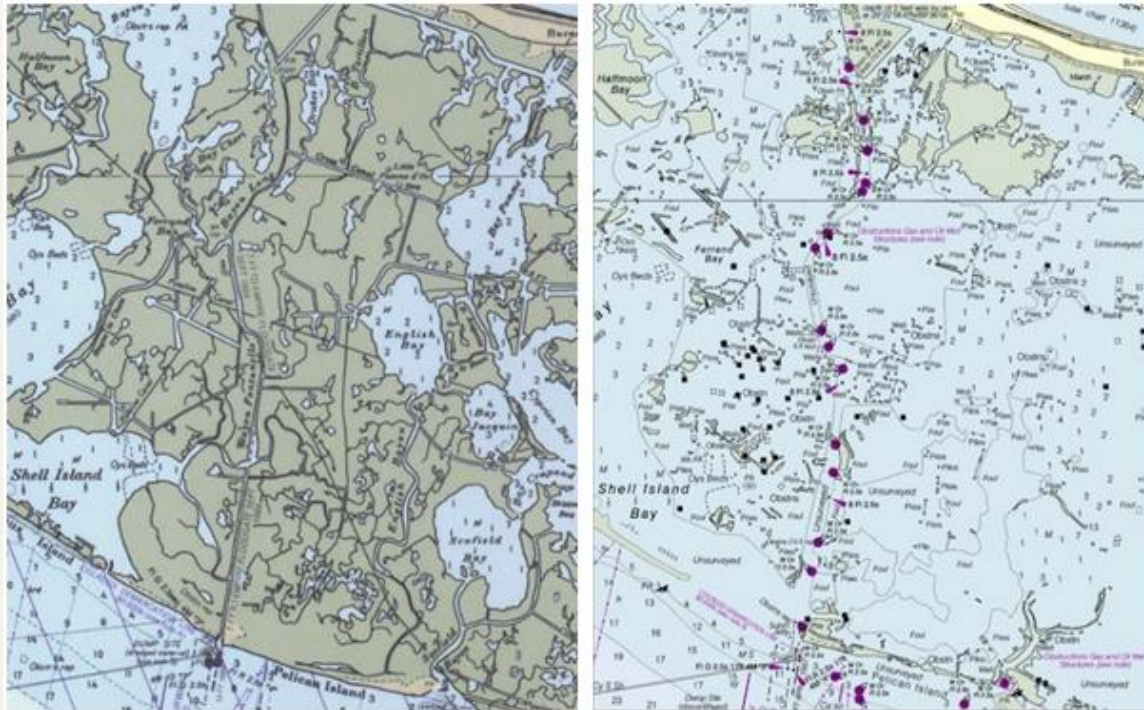


NOAA, Barataria Bay and Approaches, 1965.



NOAA, Barataria Bay and Approaches, 2013.

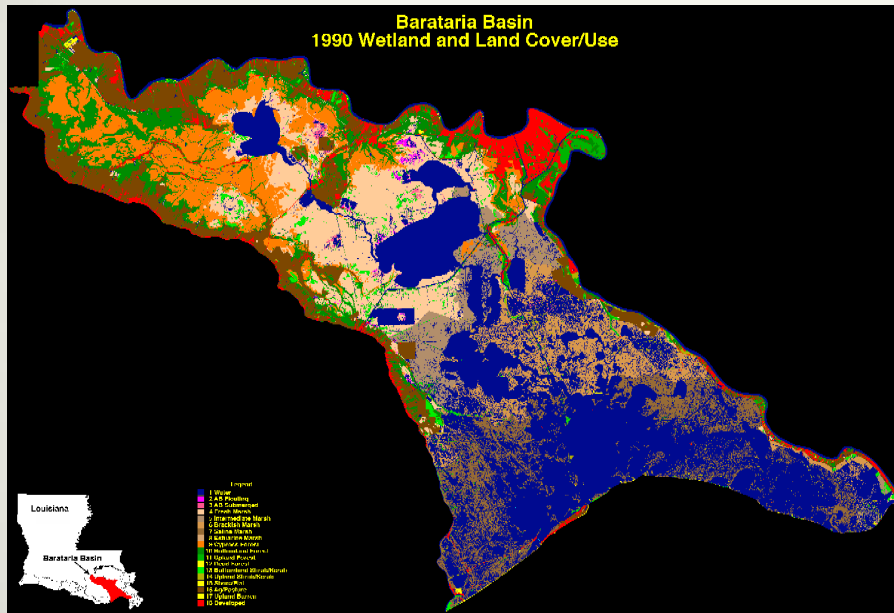
Evolution of Barataria Bay



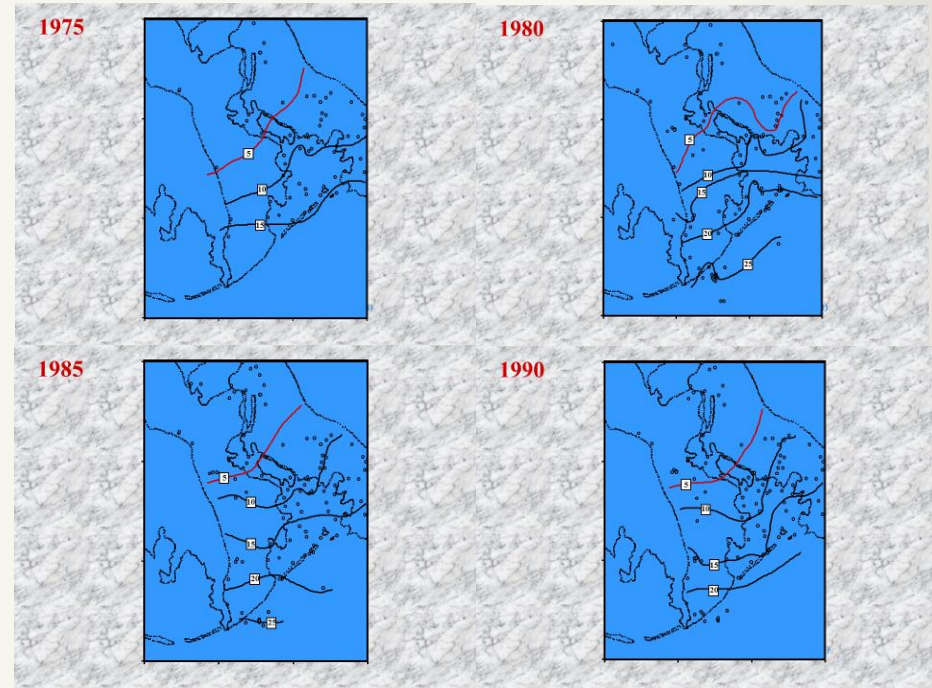
Detail, NOAA, Barataria Bay and Approaches, 1965 and 2013.

by Gerry Ellis, courtesy of
National Audubon Society

Salinities in Barataria Bay



CWPRA 1990



National Audubon Society

Modified from Swenson 1998. Salinity Isohalines, annualized averages at five year increments, 1975-1990

Salinities in Barataria Bay



Davis Pond (2002)



March 28, 2015 MODIS true color image from LSU Earth Scan Laboratory

Future Actions: Monitoring



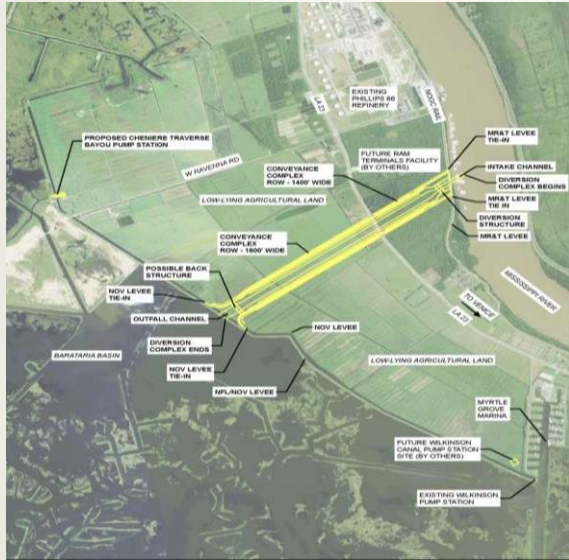
- Aerial Surveys
- Line Transects
- Capture Re-capture
- Photo-Identification
- Biopsy Sampling



Photo by Gerry Ellis, courtesy of National Audubon Society

Modified from Mullin and Rosel

Adaptive Management: Operational Strategies



CPRA: Conceptual

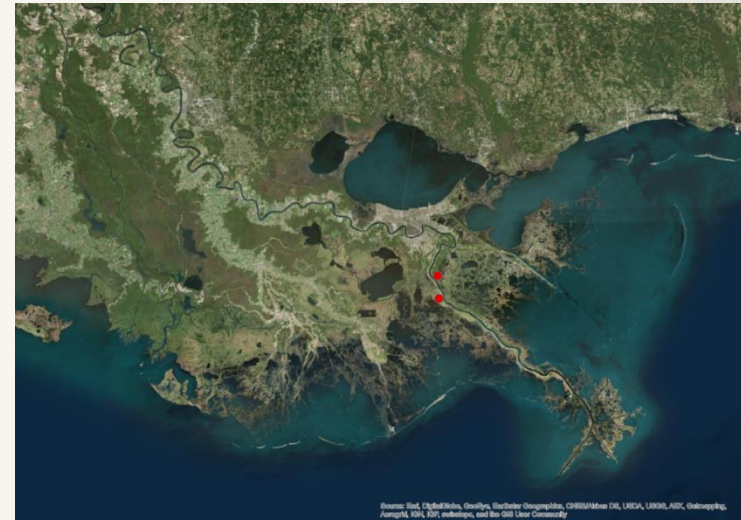
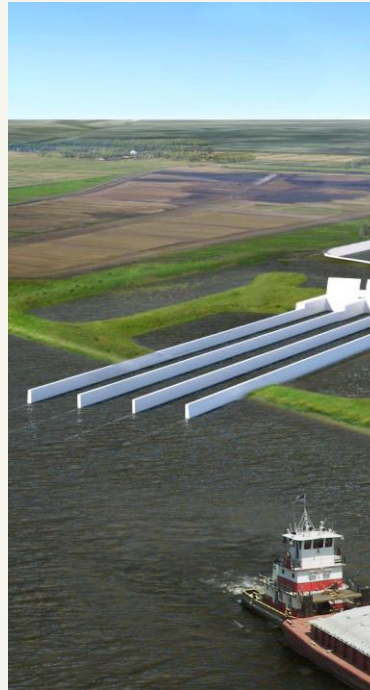


Photo by Gerry Ellis, courtesy of National Audubon Society

Location of Proposed Mid-Barataria and Mid-Breton Diversions

This Dolphin is Not Laughing at Us

PREDICTED LAND CHANGE FUTURE WITHOUT ACTION
YEAR 50, HIGH SCENARIO



DRAFT

2017 Coastal Master Plan



National Aquarium

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Photo by Gerry Ellis, courtesy of National Audubon Society