Tulane Engineering Forum 2003
Friday, September 26, 2003
New Orleans Hilton Riverside and Towers

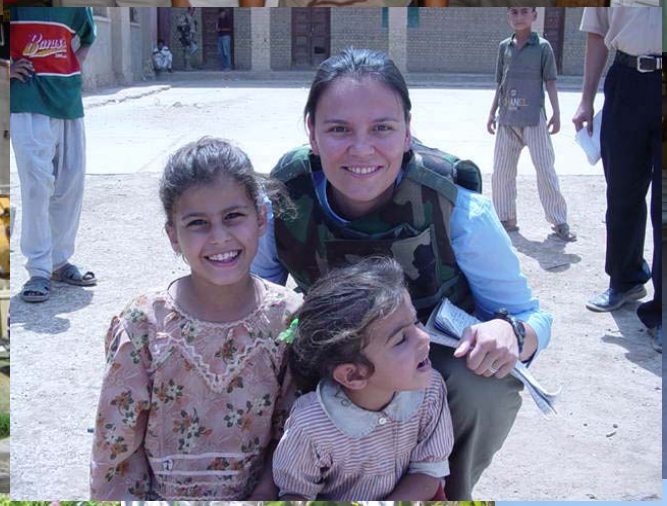
Session B – Infrastructure (10:45):
Infrastructure Requirements of the Mississippi River

US Army Corps
of Engineers®
New Orleans District

Infrastructure Requirements of the Mississippi River

Walter O. Baumy, Jr. P.E.
New Orleans District
September 26, 2003


U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS
DISTRICT
SERVING THE ARMY...SERVING THE NATION

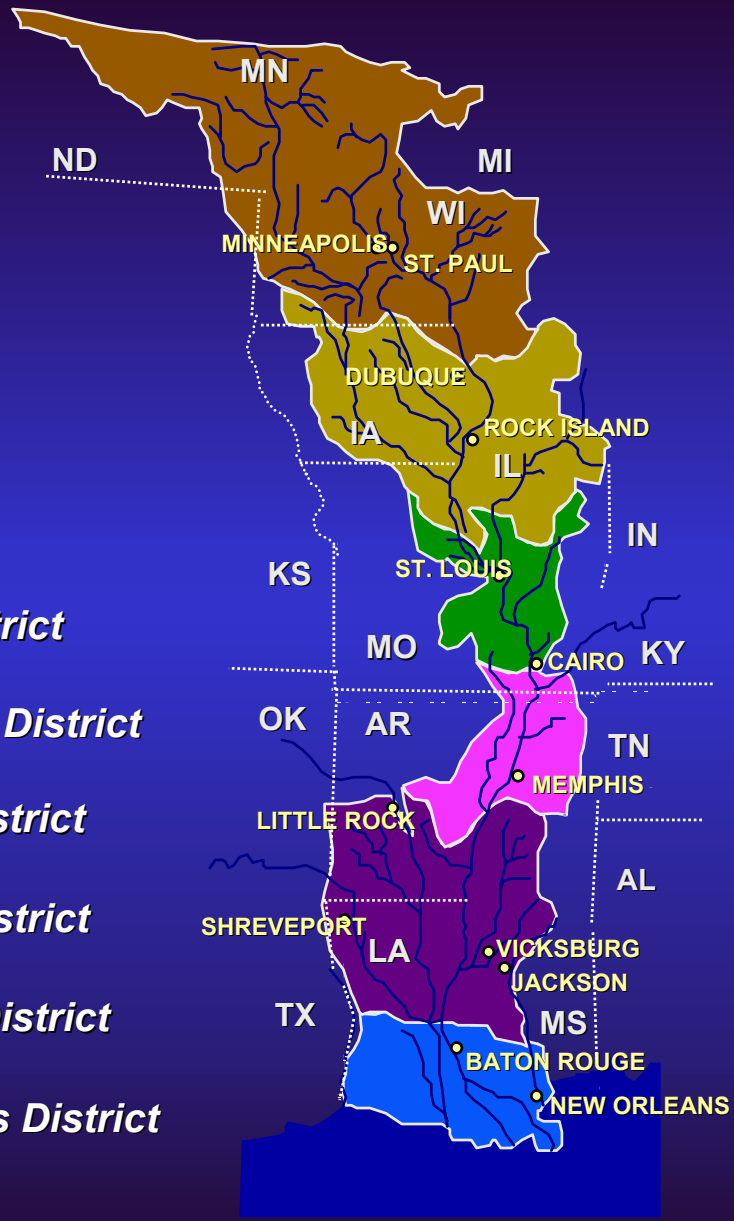


Serving Our Nation

US Army Corps of Engineers®
New Orleans District

Mississippi Valley Division

- *St. Paul District*
- *Rock Island District*
- *St. Louis District*
- *Memphis District*
- *Vicksburg District*
- *New Orleans District*



Mississippi River Drainage Basin

Basin Facts

- Drains 41% of continental U.S.
- Includes 31 states & 2 Canadian provinces
- Total area drained between 1.7 million square miles

Our Mission

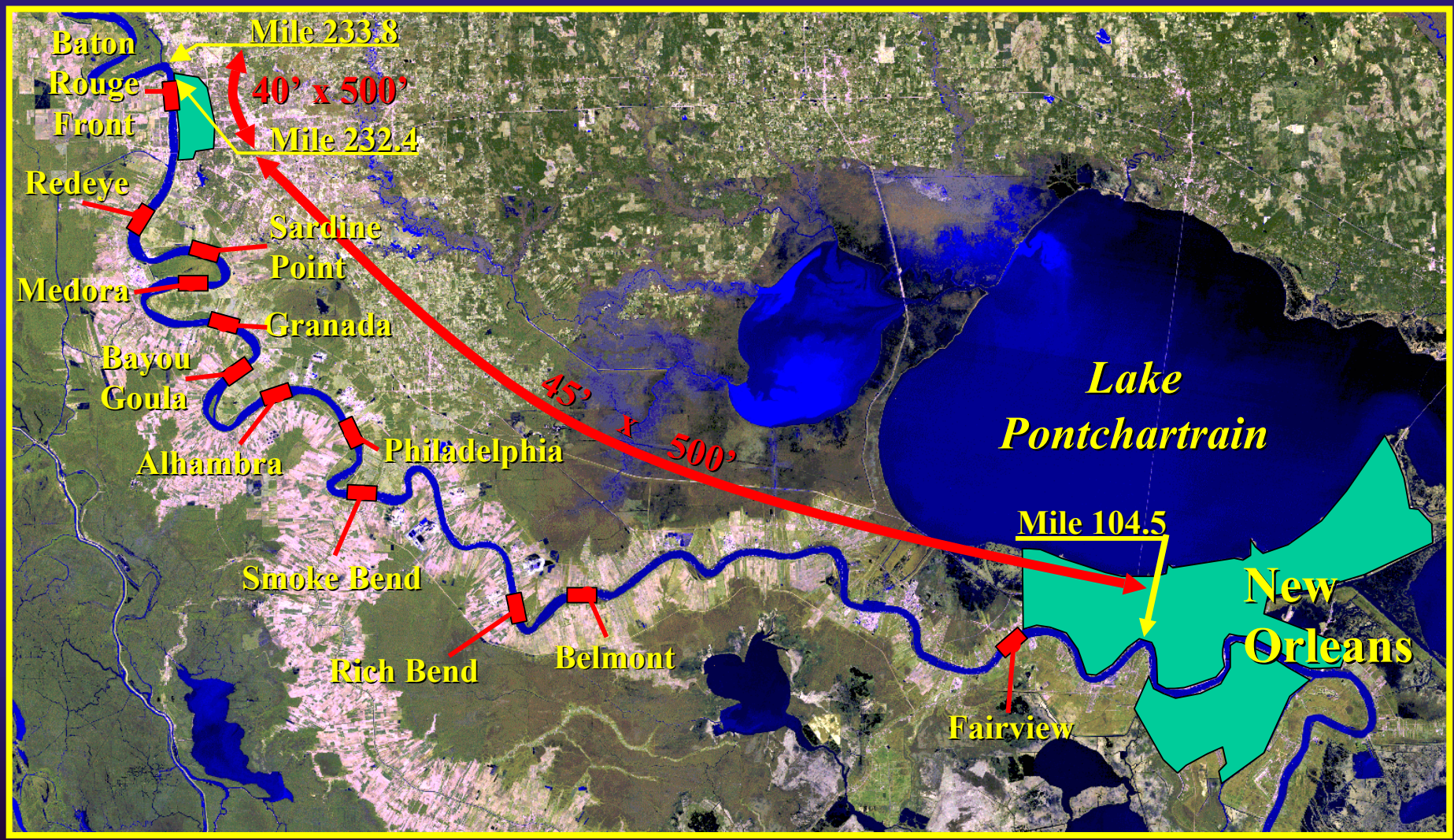
The New Orleans District, through partnering, provides for navigation, flood and hurricane protection, environmental stewardship, and other water resource needs to benefit the people of southern Louisiana and the nation.

Dredging

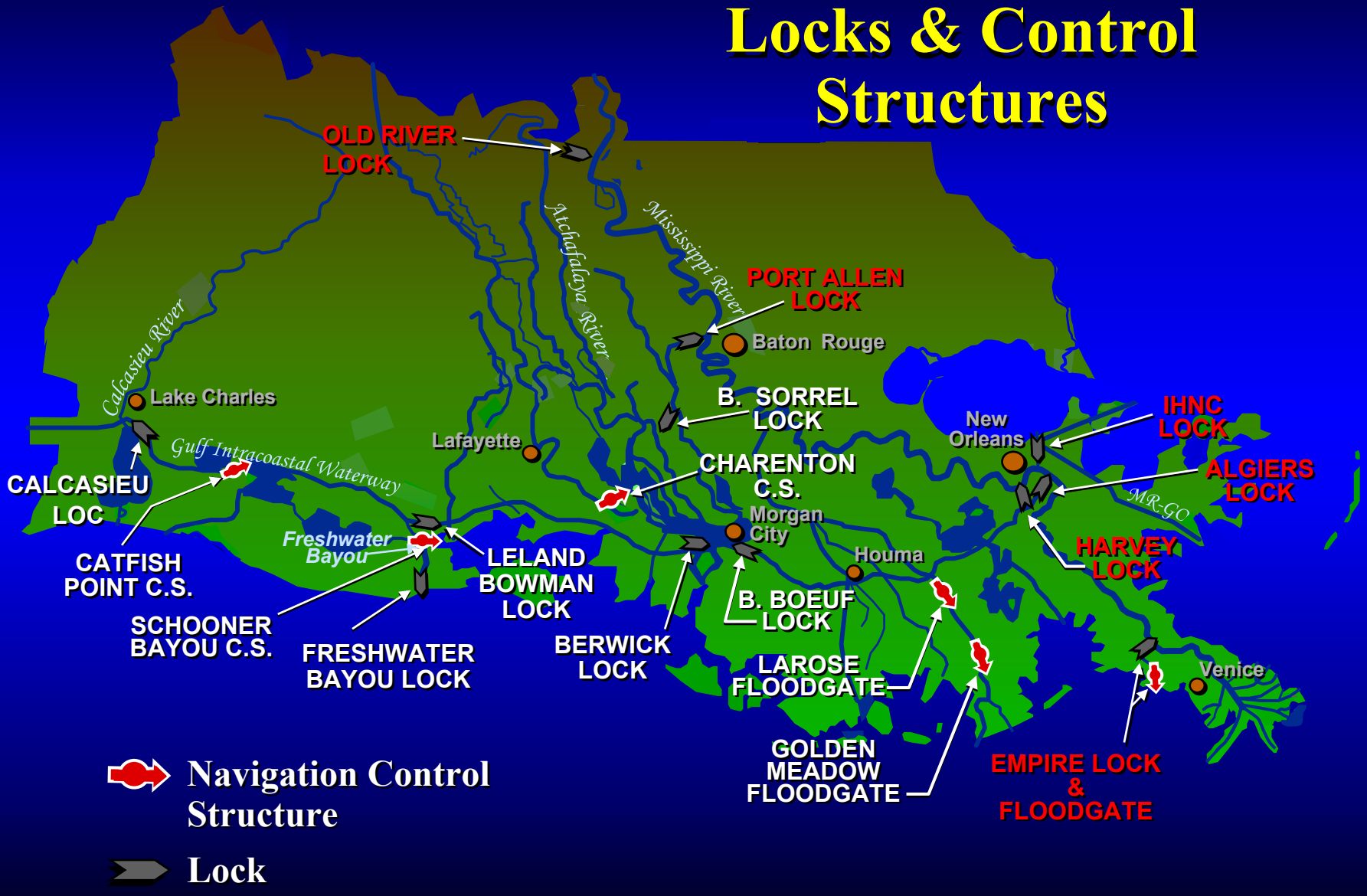
- Dredging is essential to maintain project depths.
- 268.9 million cubic yards material.
- On average, 37 million cubic yards of material removed from the 12 Mississippi River Crossings, the New Orleans Harbor, and Southwest Pass.

Mississippi River, Baton Rouge to the Gulf of Mexico, LA

Mississippi River Deep Draft Crossings



New Orleans District Locks & Control Structures



Corps Facts

- **12,000 miles** of navigable waterways are maintained.
- **2,000 miles** of navigable waterways in Louisiana, supporting 1000 port facilities.
- In 2003, the Mississippi River stage had three peaks of 10, 13, and 14 feet

Tonnage on Mississippi River Ports

1st Port of South Louisiana

4th Port of New Orleans

7th Port of Baton Rouge

8th Port of Plaquemines, LA

17th Port of Los Angeles

20th Port of Seattle

Comparing Modes of Transportation

Equivalent Units

One 15 Barge Tow

2 1/4, 100 Car Trains

900 Large Semi Trucks

Source: Iowa Department of Transportation

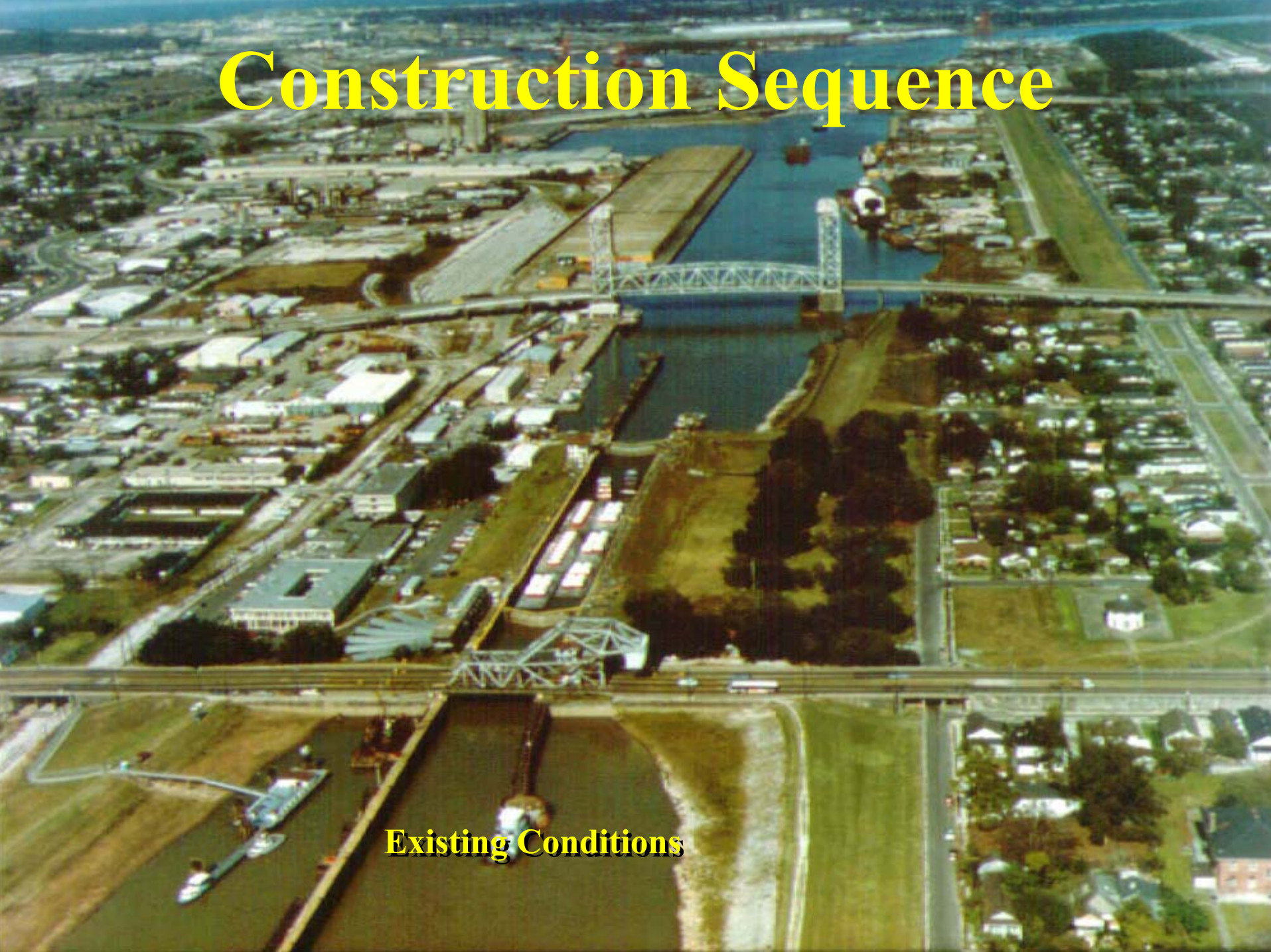
Mississippi River Infrastructure

- Would you like to have a new 8-lane super highway built in your neighborhood?
- Or a new railroad line?
- Or maybe a new airport runway?

Inner Harbor Navigation Canal Lock Replacement Project

March 2003

Construction Sequence



Construction of New Lock – lock sections floated in


Construction of New Lock is complete. Levee tie-ins.
Claiborne Ave. Bridge is replaced with 2 week closure to vehicles.


Existing Lock is demolished.


New St. Claude Bridge is built. Mooring facilities built.
Project Complete.

Technology / Innovation

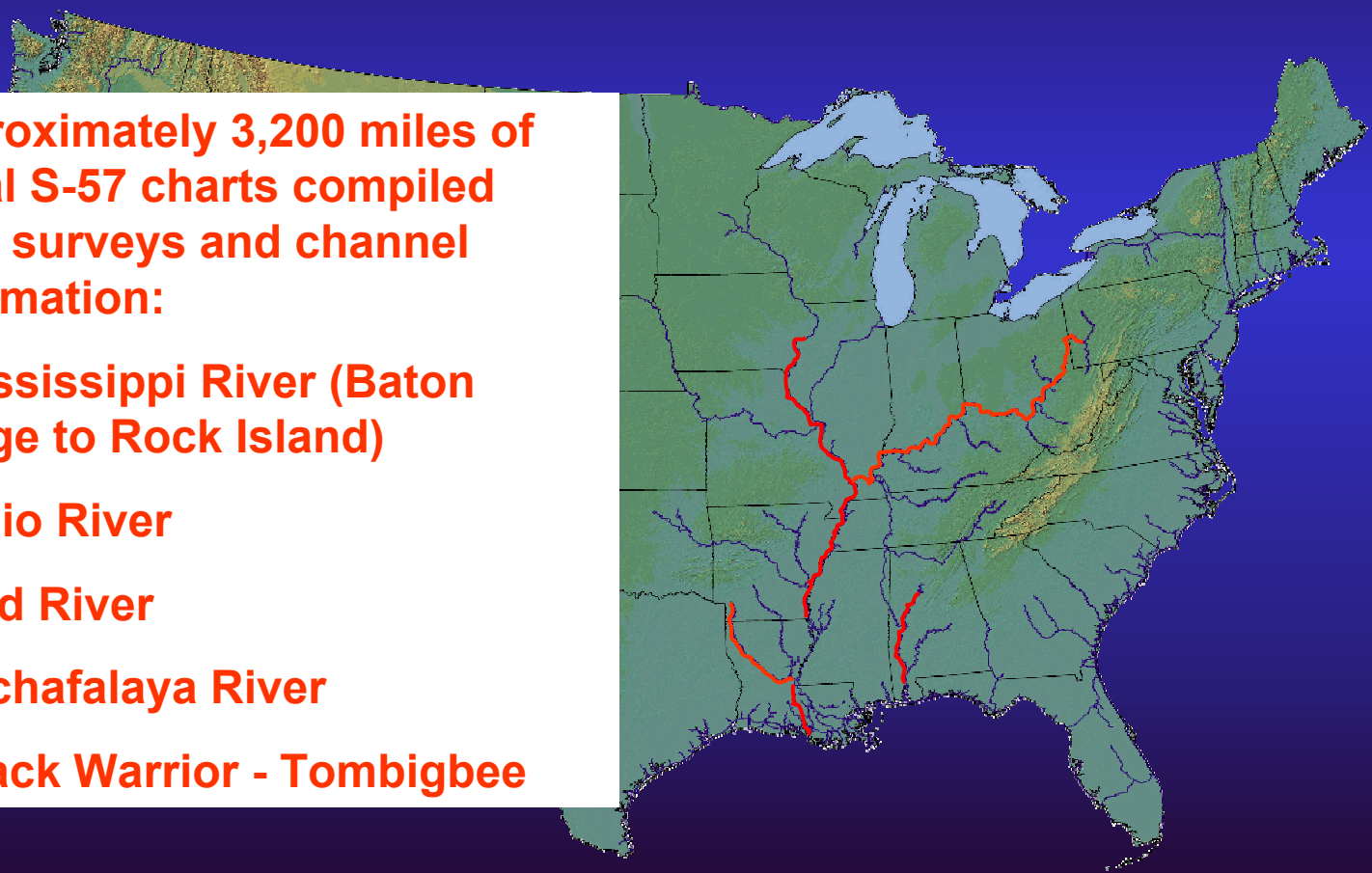
Making use of modern technology has enabled us to better:

- Monitor channel conditions
- Locate obstructions
- Locate scour holes and steep banks
- Study land loss rates
- Provide unique engineering solutions

Early Mississippi River Navigation

1800s, the average life span of a steamboat was only 18 months

2002 Inland Electronic Navigational Chart (IENC) Development



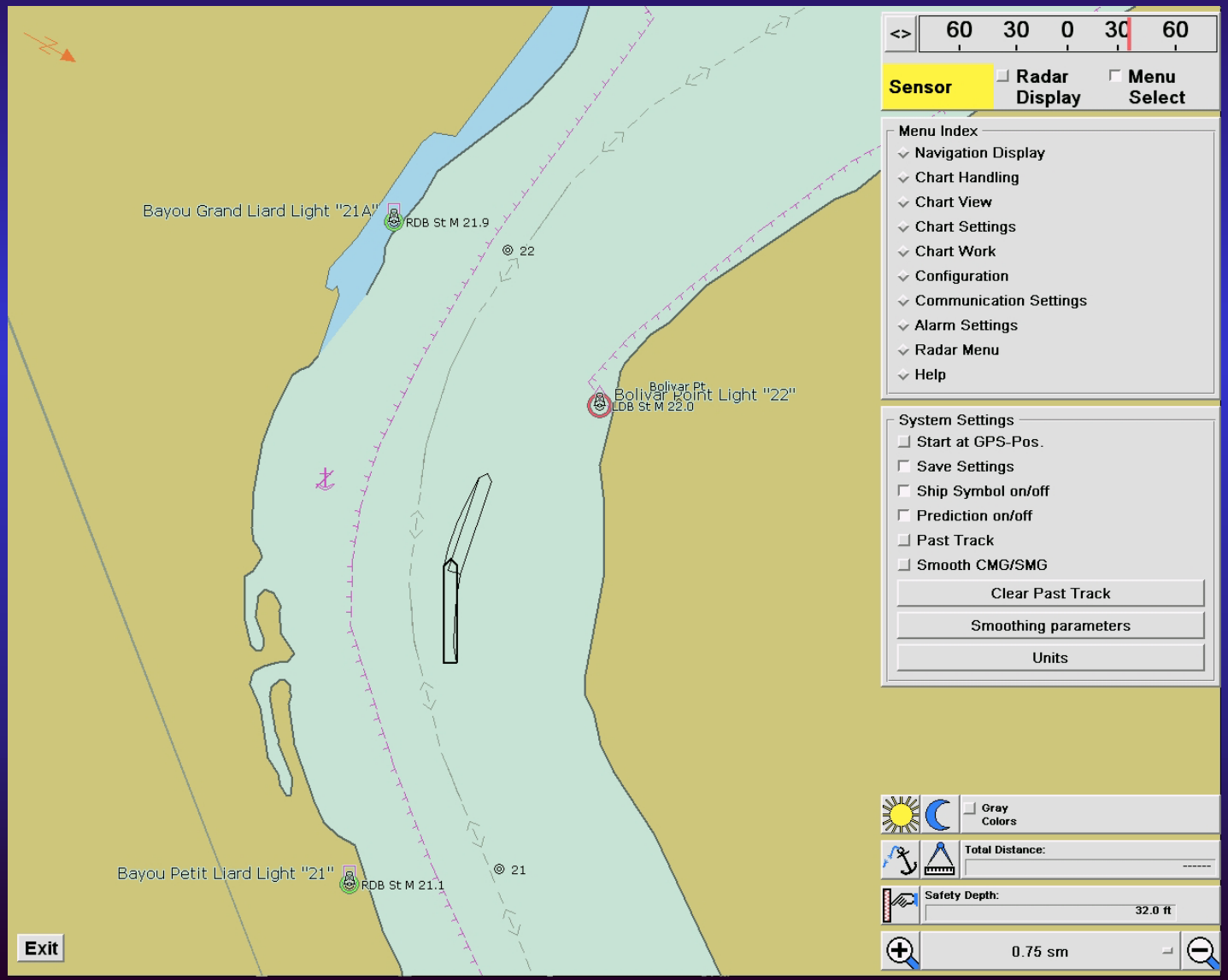
Approximately 3,200 miles of initial S-57 charts compiled from surveys and channel information:

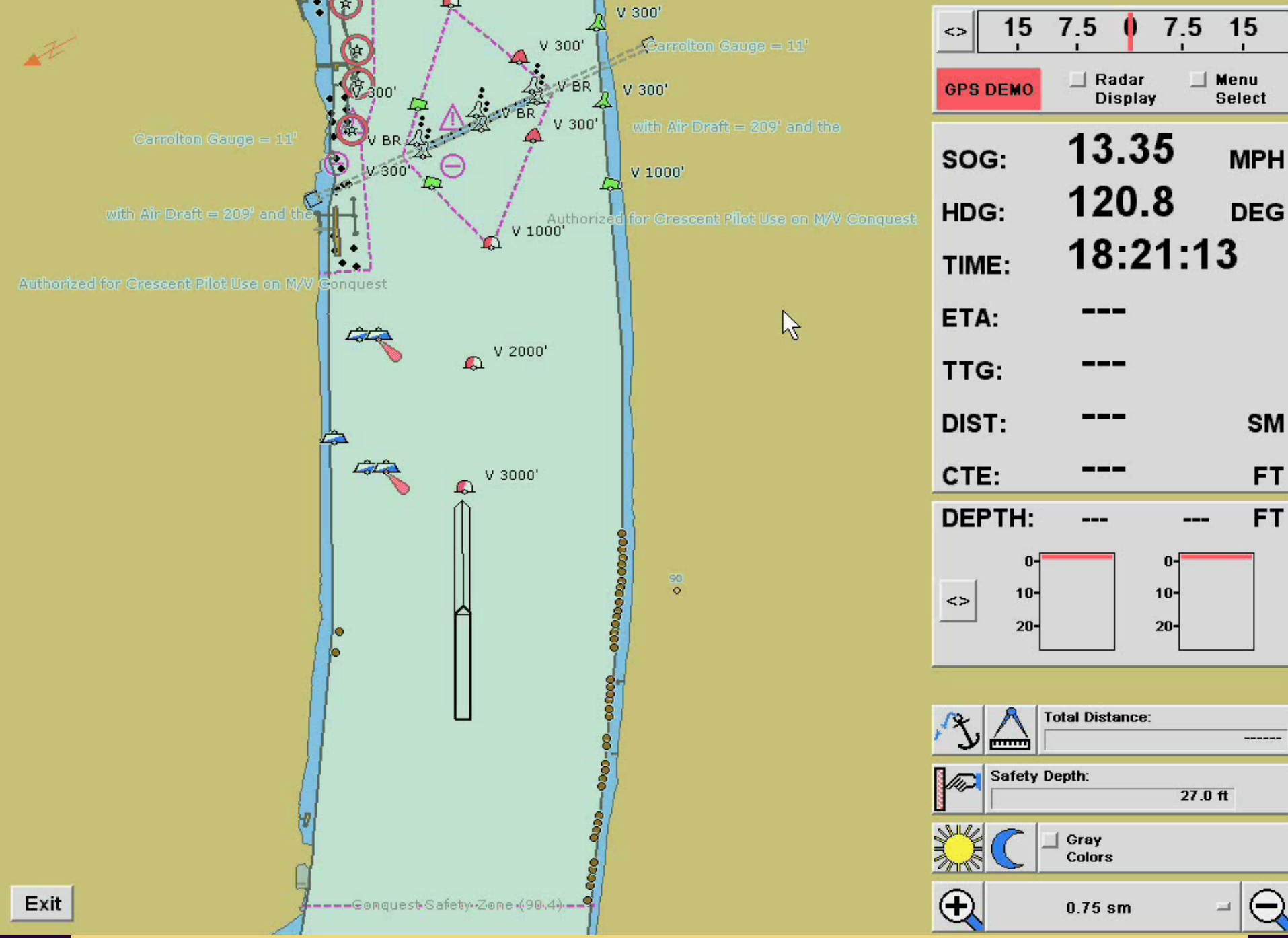
- **Mississippi River (Baton Rouge to Rock Island)**
- **Ohio River**
- **Red River**
- **Atchafalaya River**
- **Black Warrior - Tombigbee**

IENC – Inland Electronic Navigational Chart

Varying Scale – Varying Coverage Area

A Real-Time Navigation Positioning Solution





<> 15 7.5 0 7.5 15

GPS DEMO | Radar Display | Menu Select

SOG:	13.35	MPH
HDG:	120.8	DEG
TIME:	18:21:13	
ETA:	---	
TTG:	---	
DIST:	---	SM
CTE:	---	FT

DEPTH: --- --- FT

<> 0 10 20 0 10 20

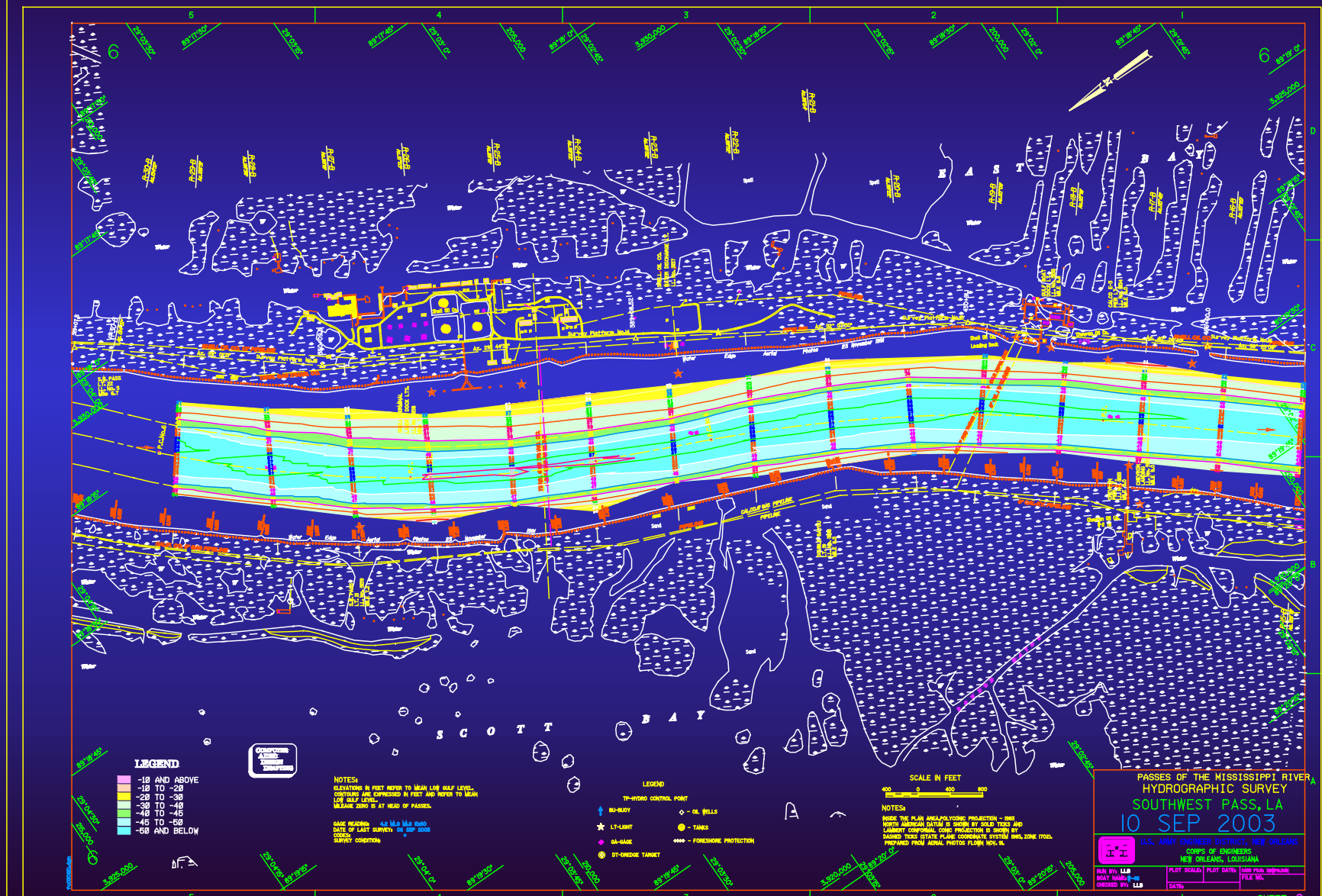
Total Distance: ------

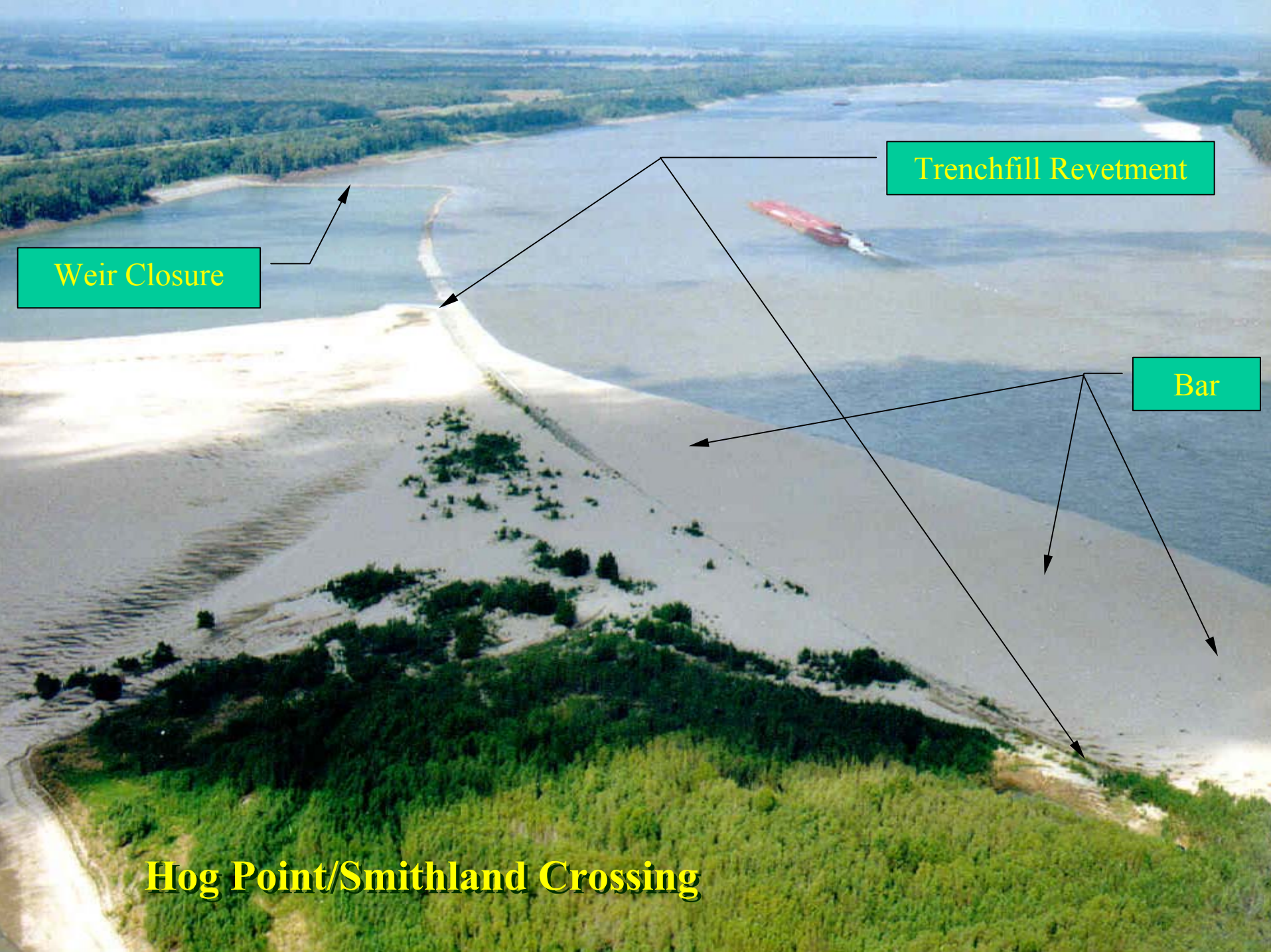
Safety Depth: 27.0 ft

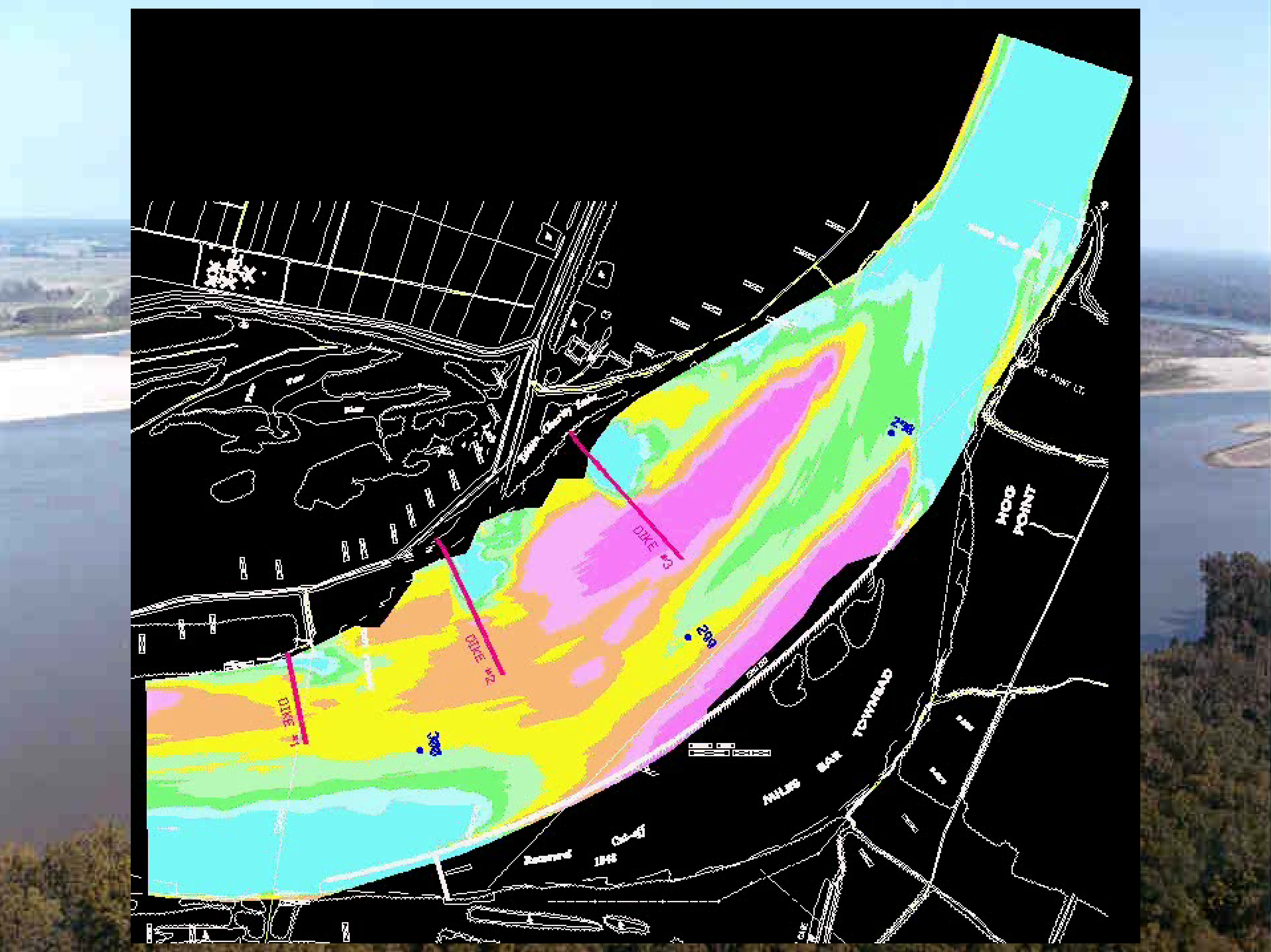
Gray Colors

0.75 sm

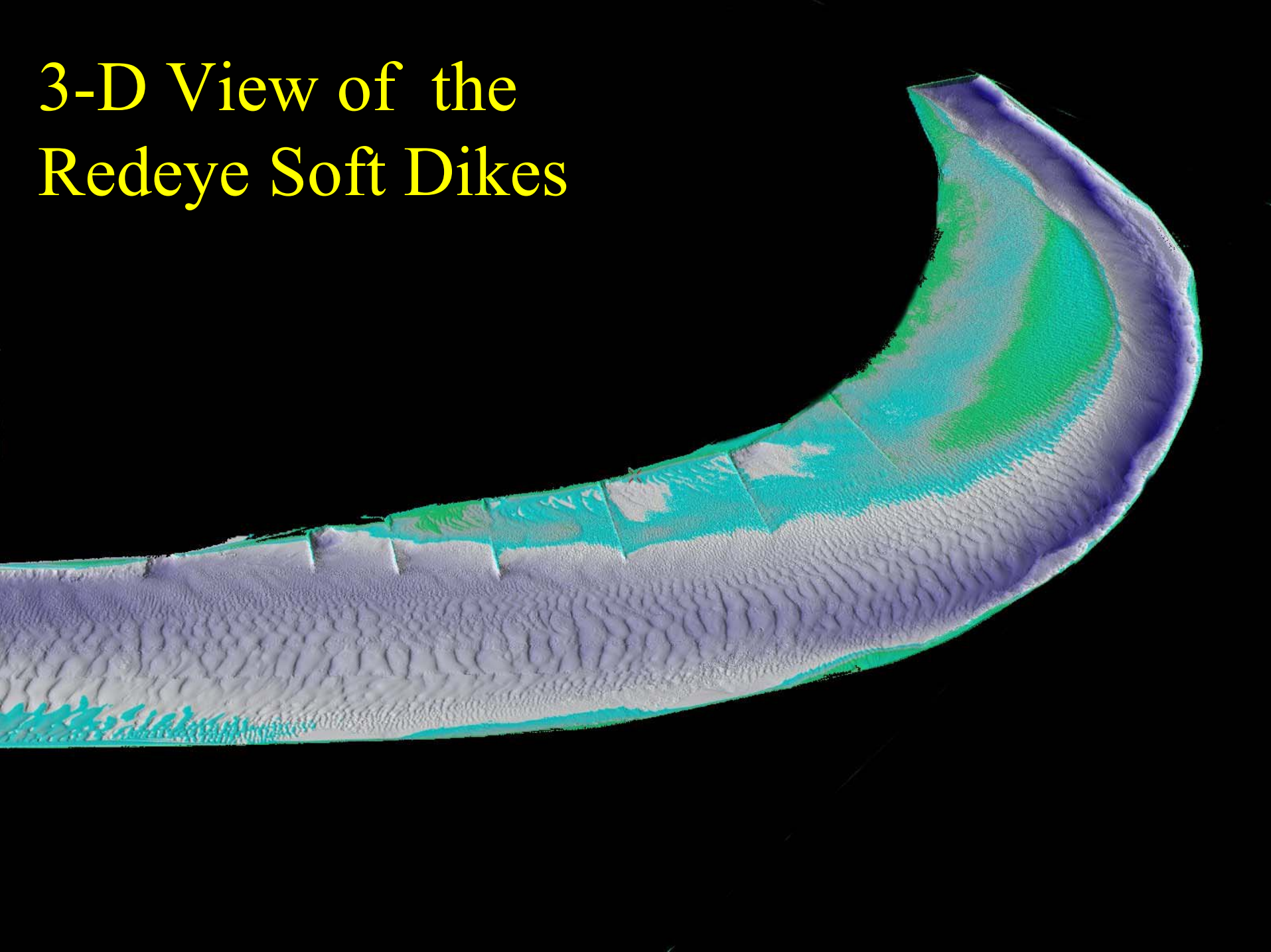
Data Collection and Analysis



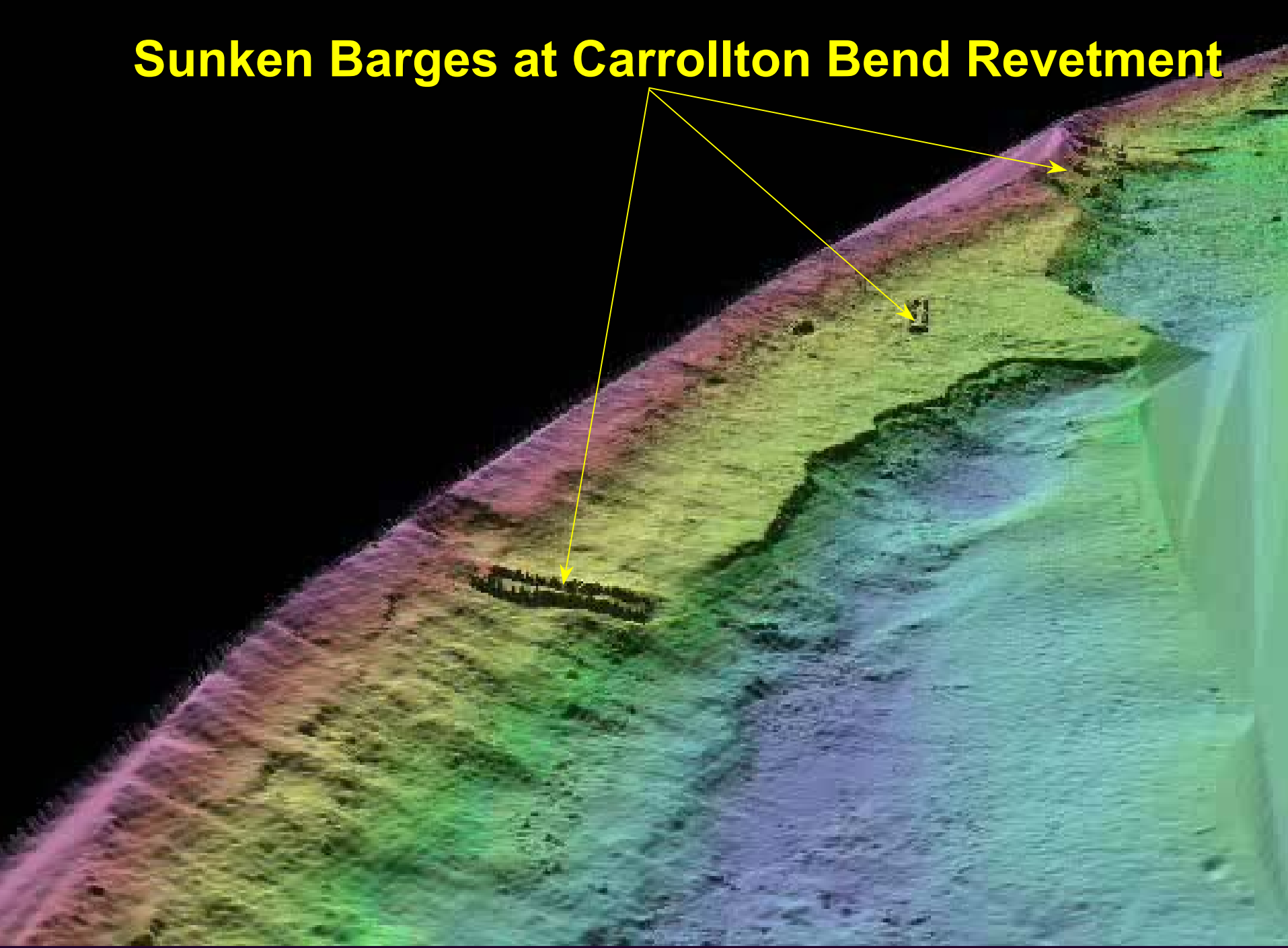

Trenchfill Revetment
Weir Closure
Bar
Hog Point/Smithland Crossing

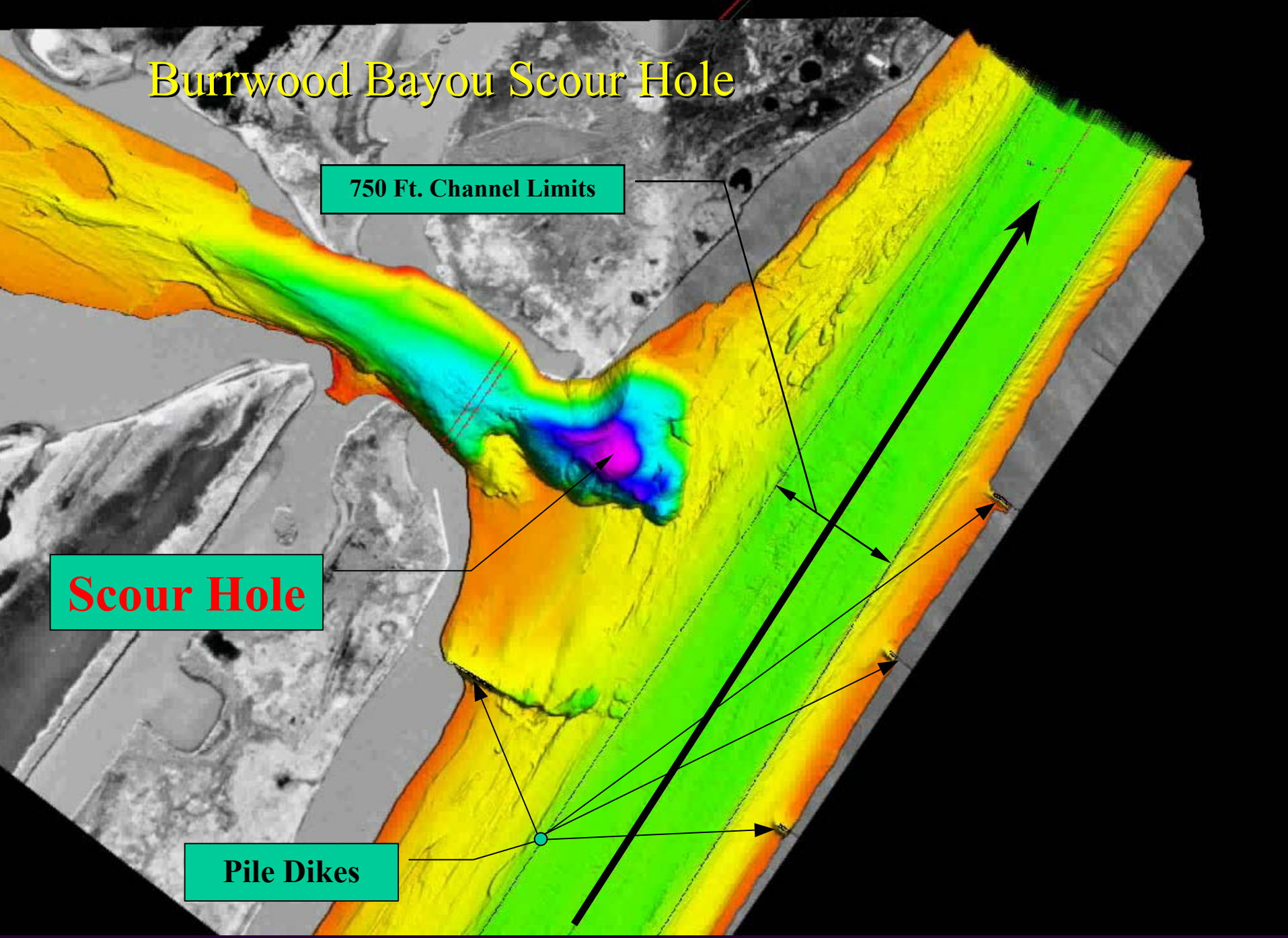

DIKE #1
DIKE #2
DIKE #3
HOG POINT
MILES BAR TOWHEAD

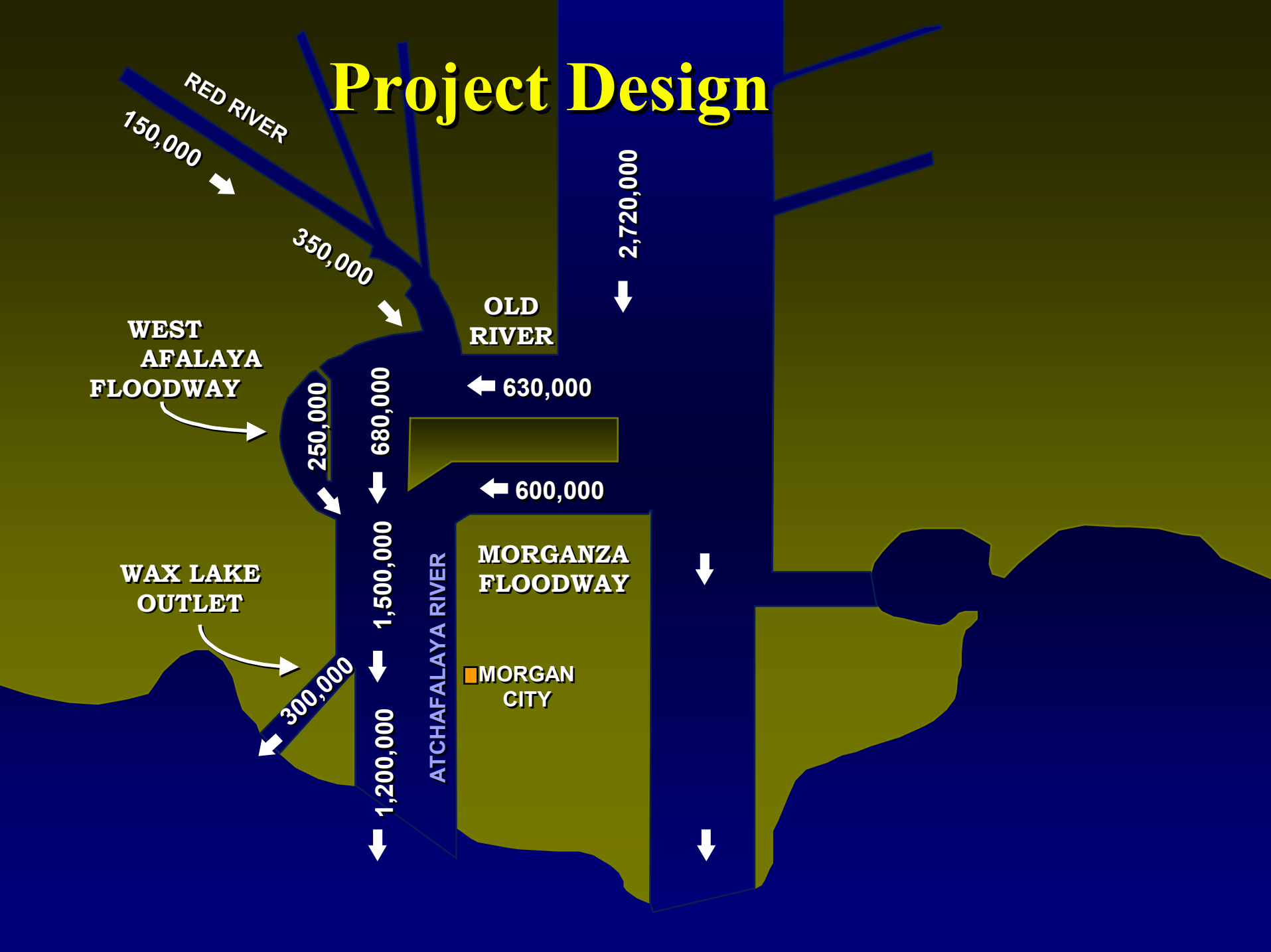
3-D View of the Redeye Soft Dikes



Sunken Barges at Carrollton Bend Revetment



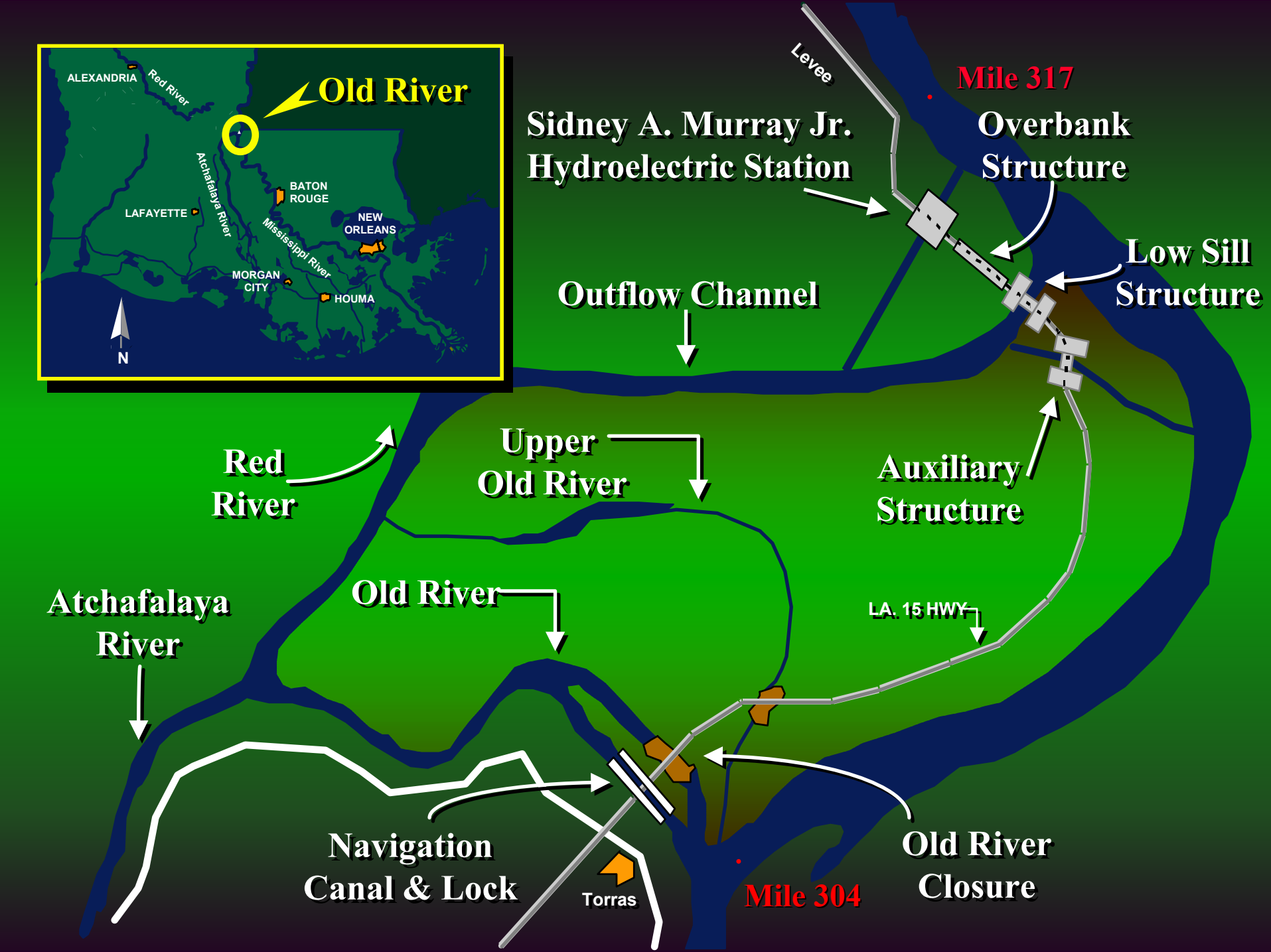

Burrwood Bayou Scour Hole
750 Ft. Channel Limits
Scour Hole
Pile Dikes


Project Design
RED RIVER
150,000
350,000
2,720,000
OLD RIVER
630,000
WEST AFALAYA FLOODWAY
250,000
680,000
600,000
MORGANZA FLOODWAY
WAX LAKE OUTLET
1,500,000
ATCHAFALAYA RIVER
MORGAN CITY
300,000
1,200,000

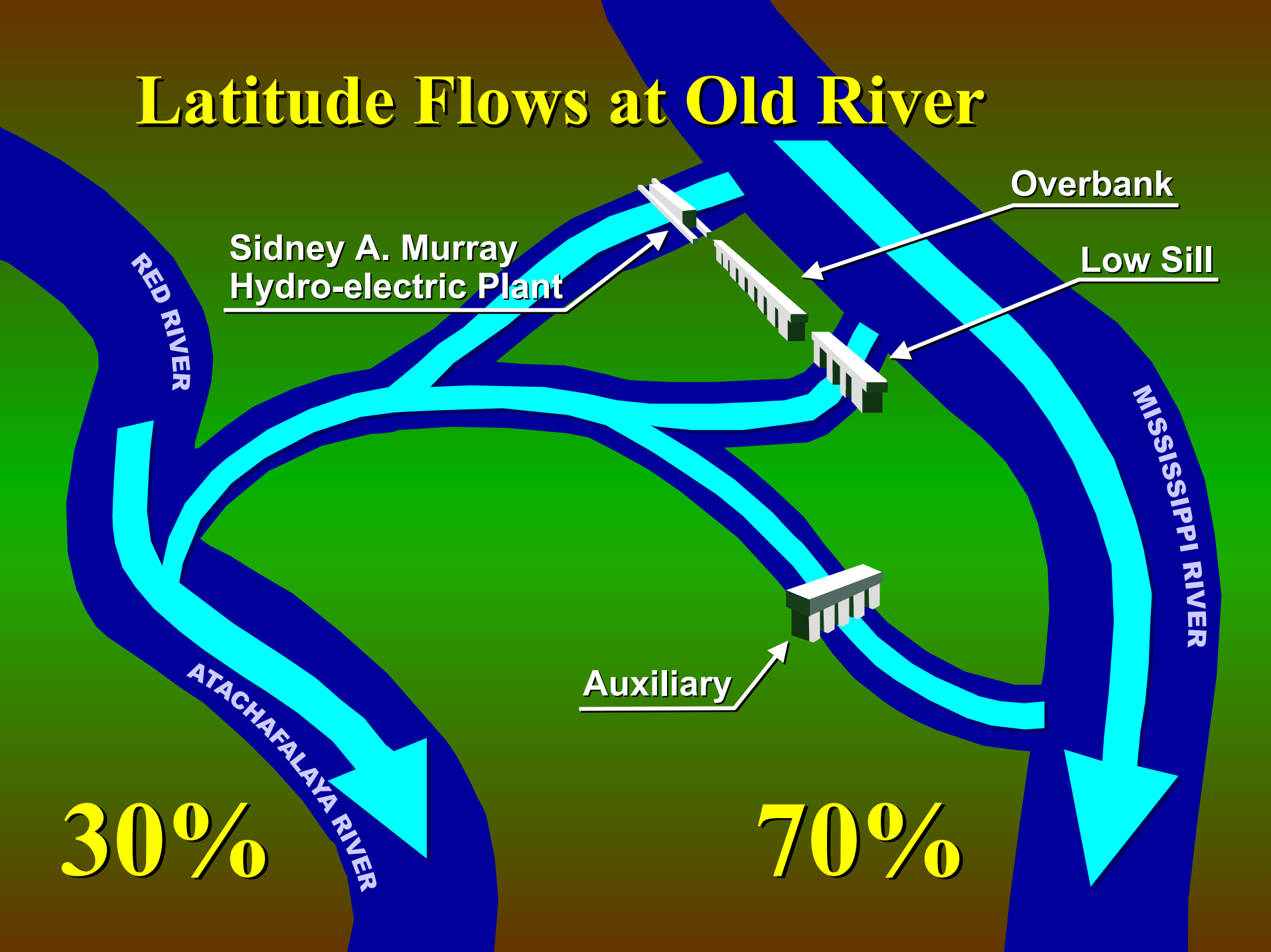
U.S. Army Corps of Engineers
Lower Mississippi River

- Avg. Annual Flow 534,000 cfs
- Lowest Flow at N.O. 49,000 cfs (1939)
- Lowest Stage at N.O. -1.6 ft (1872)
- Highest Flow at N.O. 1,557,000* cfs (1927)
- Highest Stage at N.O. 21.27 ft (1922)

- *Currently regulated to 1,250,000 cfs


ALEXANDRIA
Red River
Old River
Atchafalaya River
BATON ROUGE
LAFAYETTE
NEW ORLEANS
Mississippi River
MORGAN CITY
HOUMA
N
Levee
Mile 317
Sidney A. Murray Jr. Hydroelectric Station
Overbank Structure
Low Sill Structure
Outflow Channel
Red River
Upper Old River
Auxiliary Structure
Atchafalaya River
Old River
LA. 15 HWY
Navigation Canal & Lock
Torras
Mile 304
Old River Closure

Latitude Flows at Old River

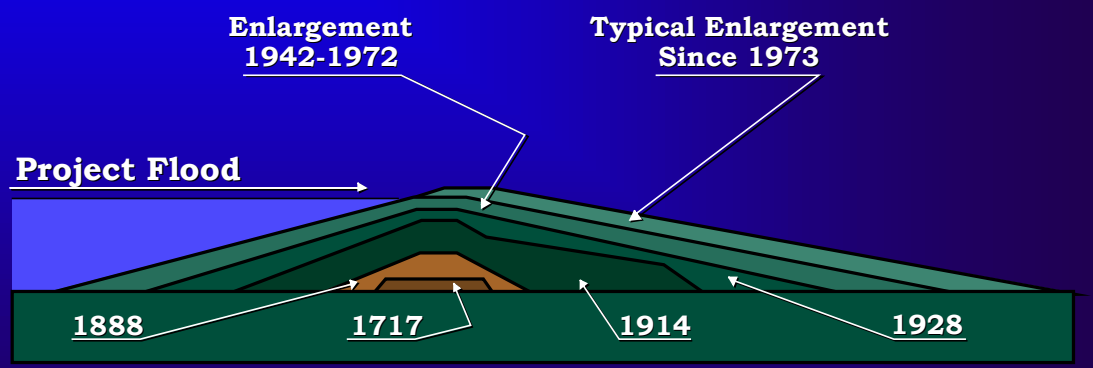


Old River Structures

Mississippi River Levee/Bank Monitoring

- The New Orleans District, partnered with the state levee boards, maintains 486 miles of levee along the Mississippi River (511 miles including the floodwalls).
- 84 existing revetment sites comprise approximately 360 miles of revetment.

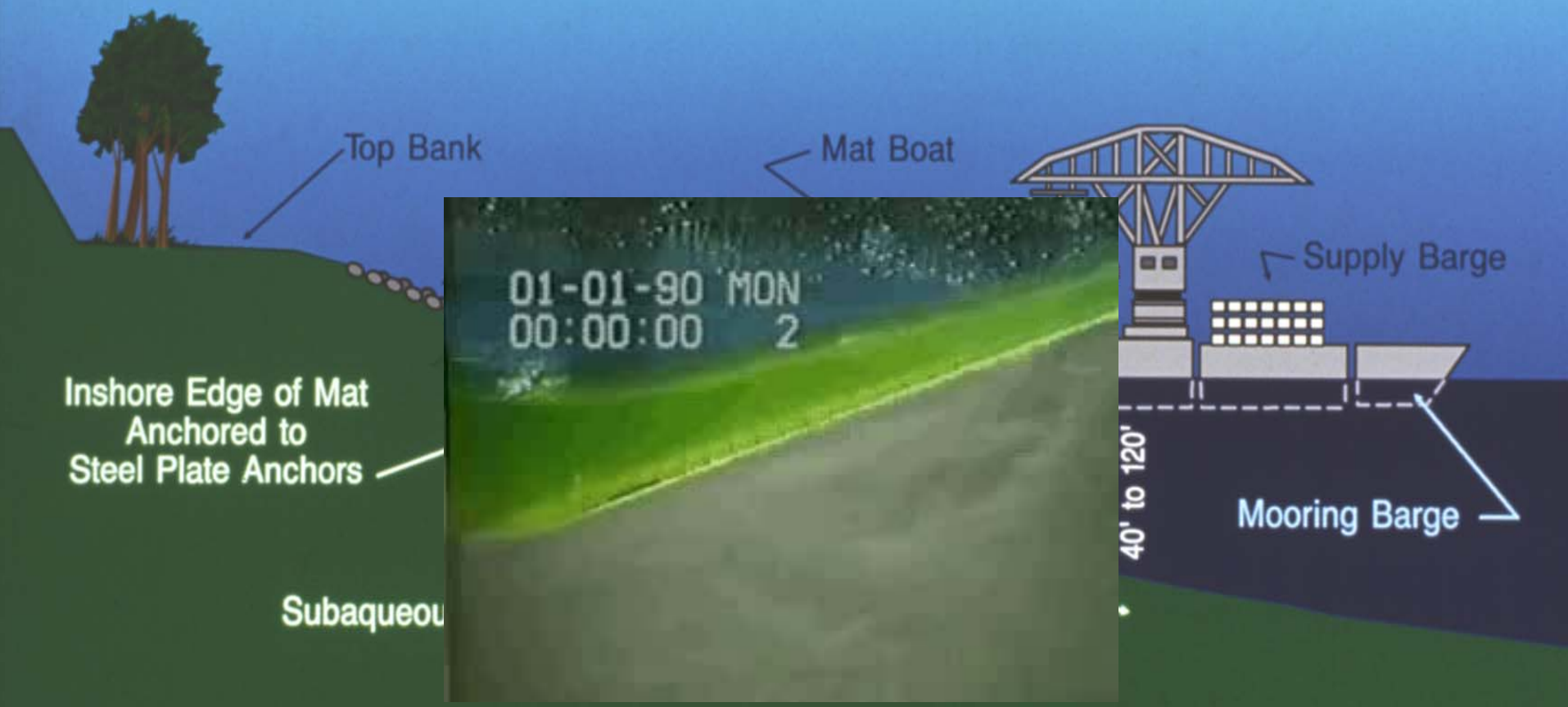
Evolution Of Mississippi River Levees



Maintaining the levee system and providing sufficient draft for navigation requires a continuous river monitoring effort.

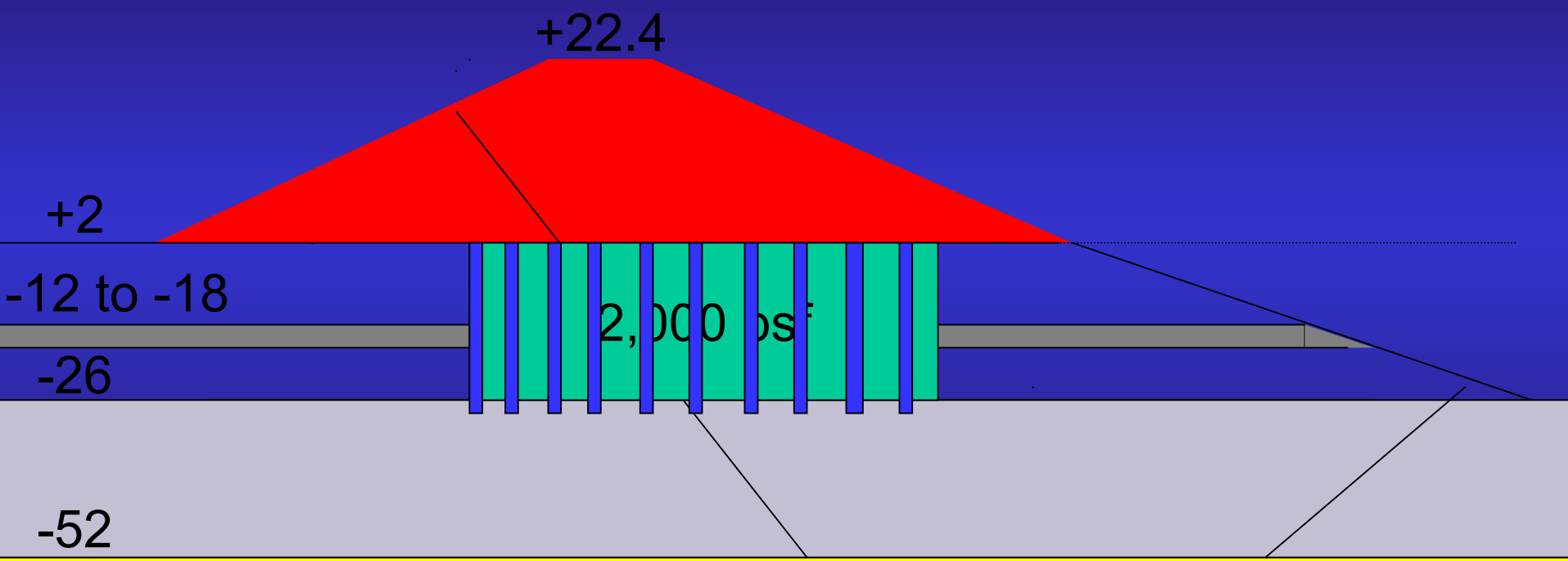

Marchand to Darrow

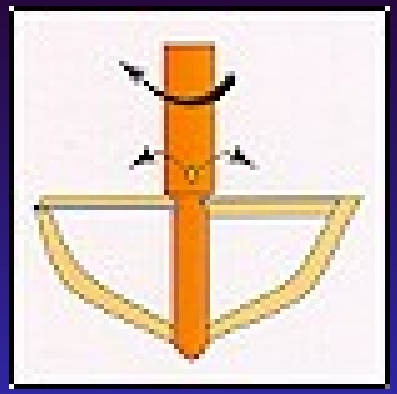
Revetment Operation

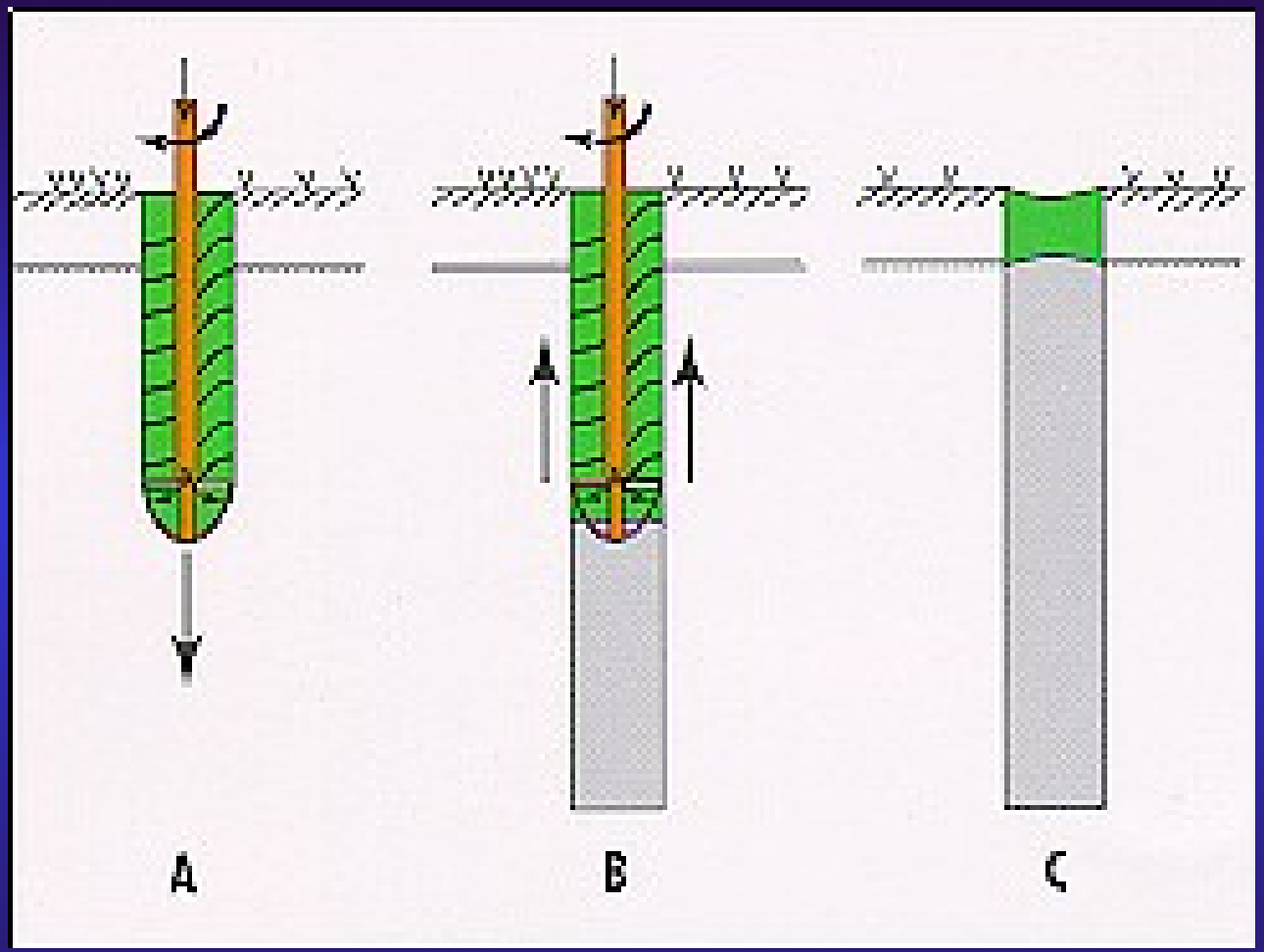



New levee supported by lime cement columns

To achieve SF = 1.30; Foundation improved from 260 psf to 2000 psf





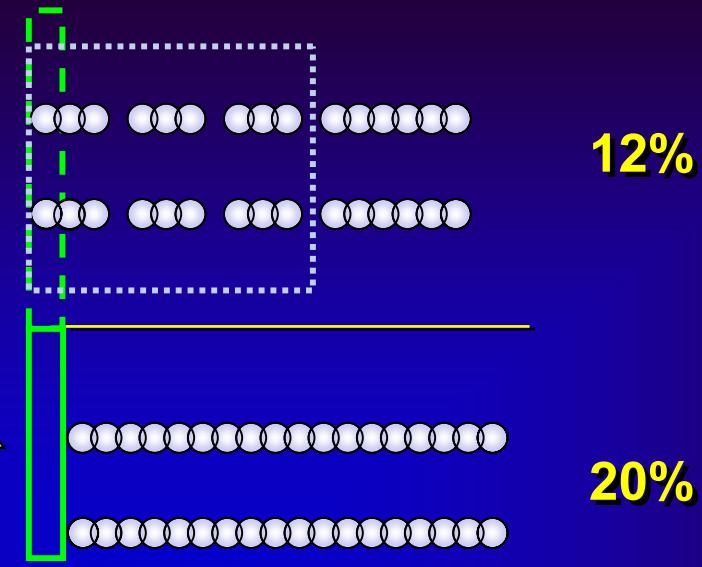

A
B
C


24
24
24

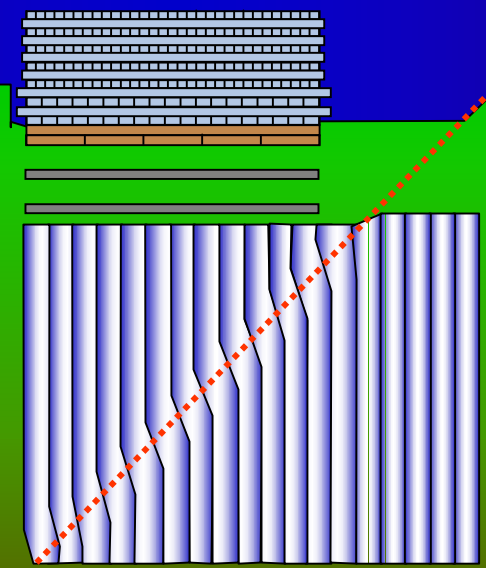
Failure

2 foot wide trench cut to bottom of columns

Plan View



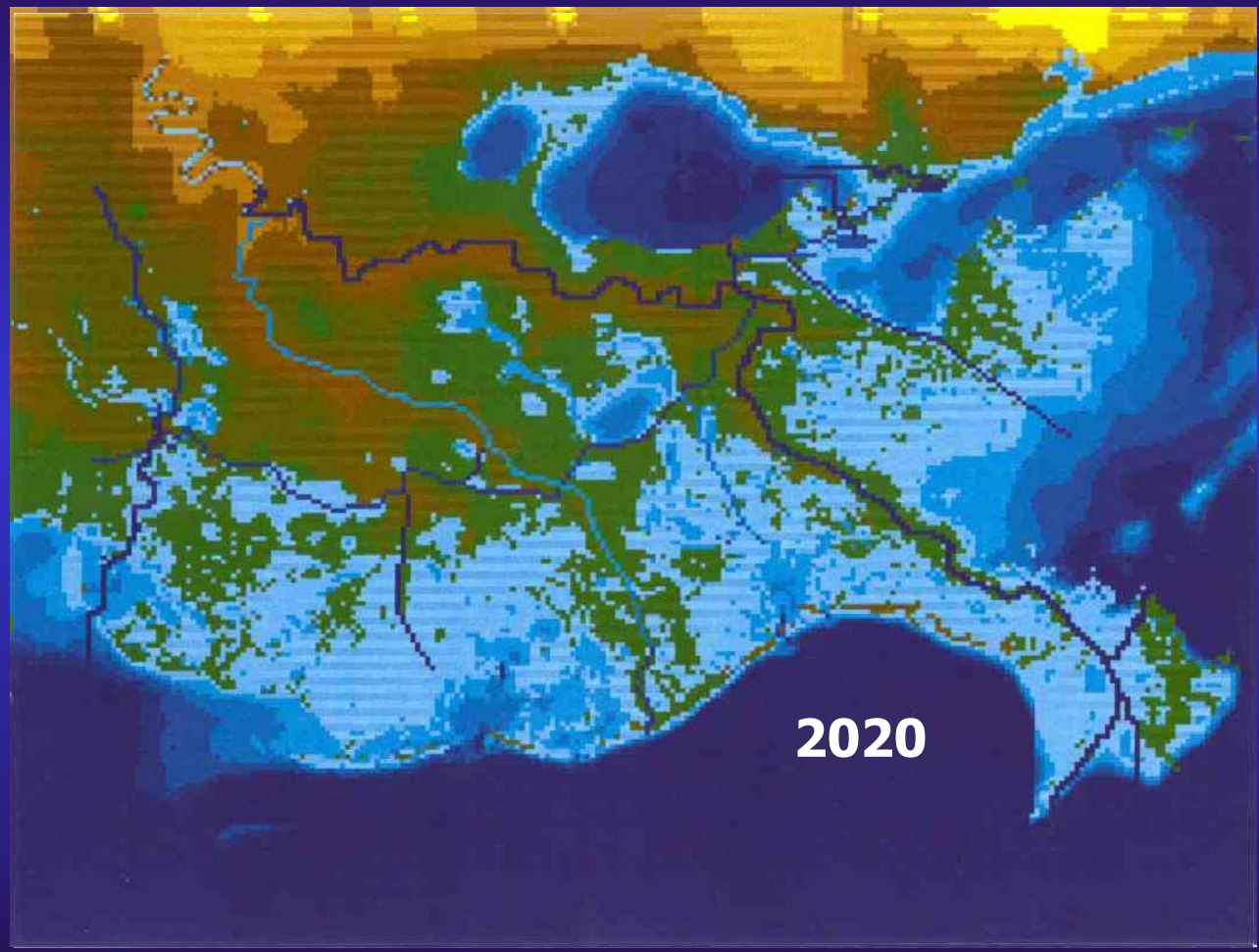
Side View



Freshwater Diversion Goals

- Reduce saltwater intrusion
- Re-establish favorable salinities
- Reduce the rate of land loss, and
- Improve fish and wildlife habitat

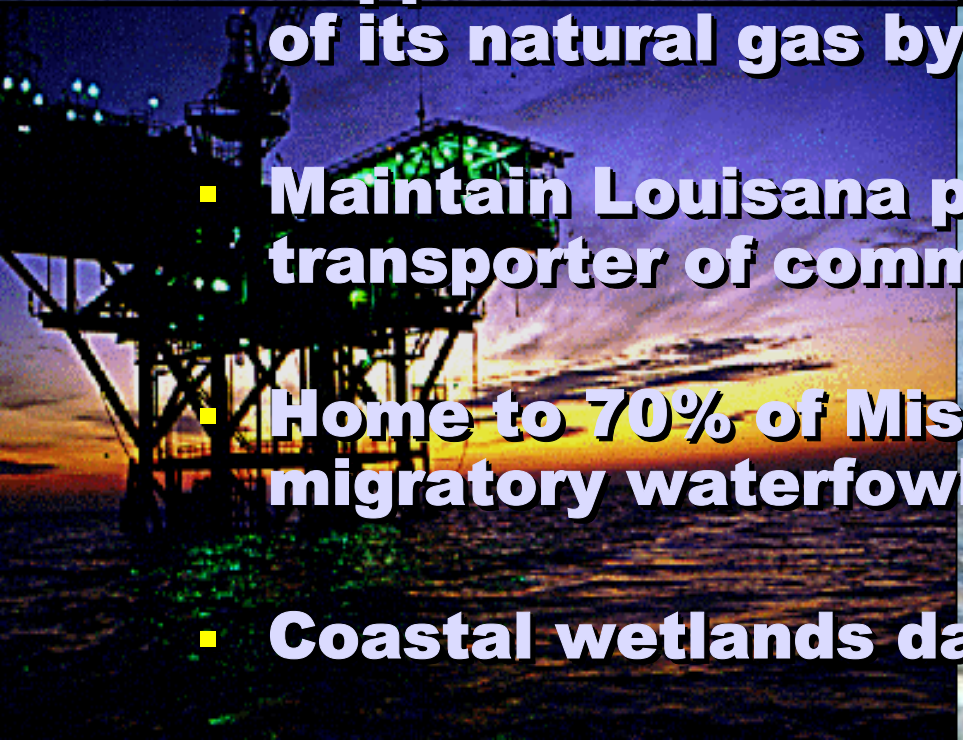
Past and Projected Wetland Loss in the BTNEP (1839 to 2020)



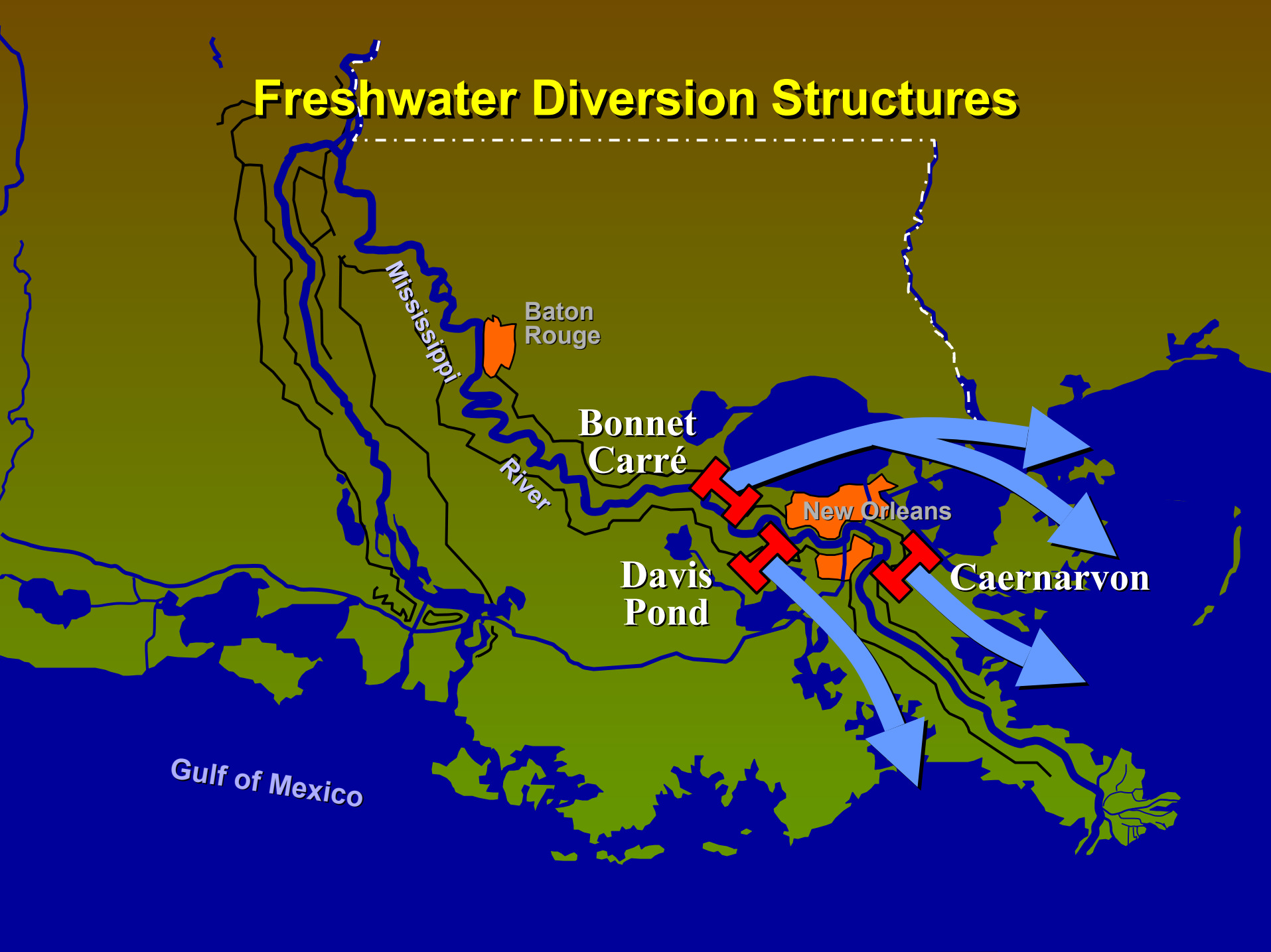

Change 1992-2002
Landsat TM 1992

Importance of Coastal Louisiana to the Nation

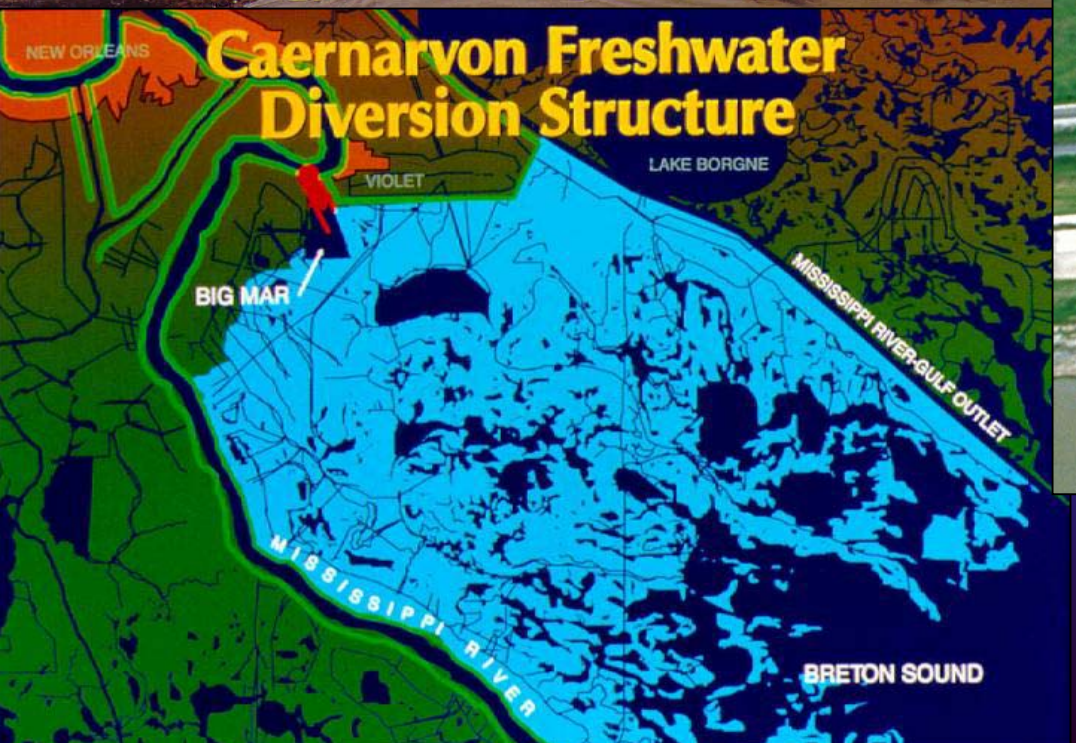
- Home to 35% of U.S. commercial fisheries
- Supplies U.S. with 27% of its oil and 32% of its natural gas by its infrastructure



- Maintain Louisana ports role as a primary transporter of commerce
- Home to 70% of Mississippi River Valley's migratory waterfowl
- Coastal wetlands dampen hurricane surge


Freshwater Diversion Structures
Mississippi River
Baton Rouge
Bonnet Carré
New Orleans
Davis Pond
Caernarvon
Gulf of Mexico

Caernarvon Freshwater Diversion Structure



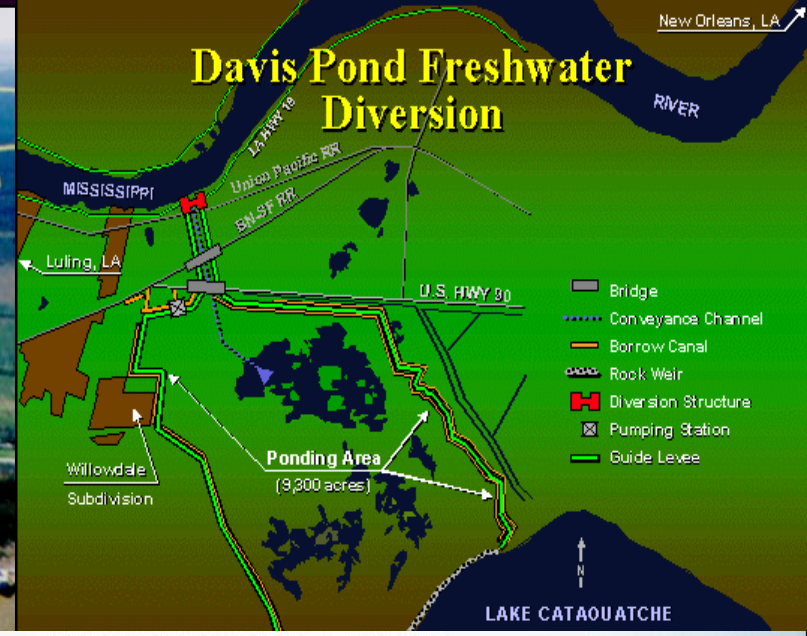
Caernarvon Freshwater Diversion Structure

Changes in habitat 1988-1997

1988

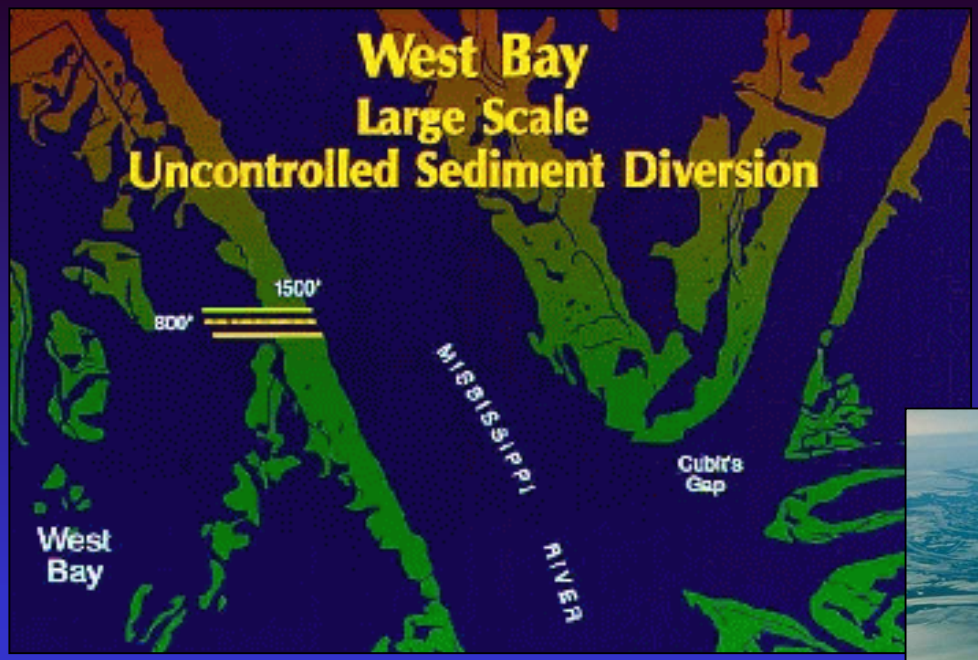
1997

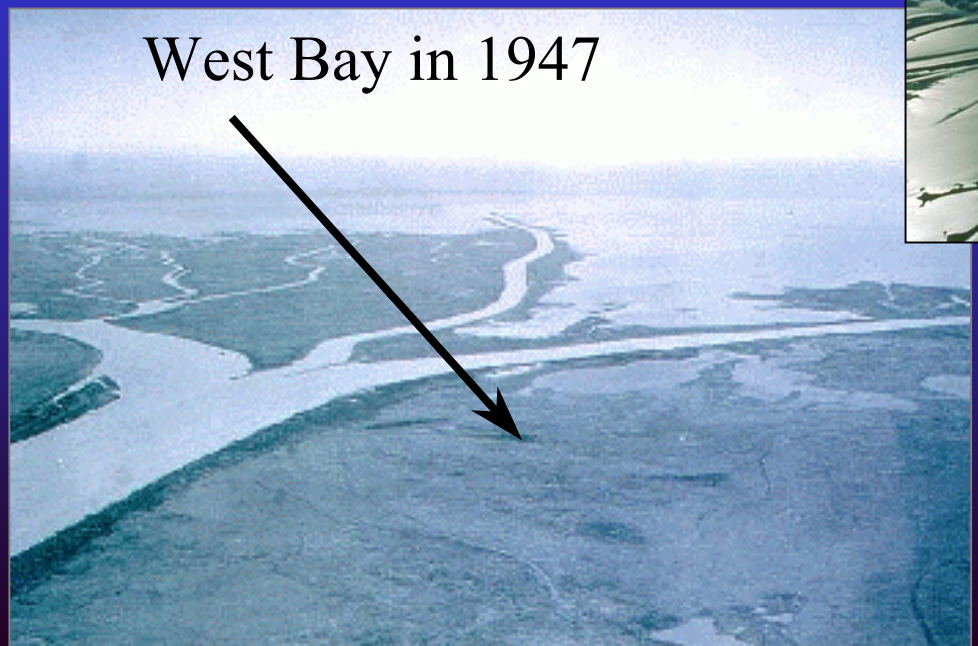

U. S. HWY. 90
BURLINGTON NORTHERN SANTA FE RR
PUMPING STATION
LEVEE
LEVEE
UNION PACIFIC RR
HWY. 18


Davis Pond Freshwater Diversion
New Orleans, LA
RIVER
MISSISSIPPI
LA HWY 18
Union Pacific RR
SP-SF RR
Luling, LA
U.S. HWY 90
Bridge
Conveyance Channel
Borrow Canal
Rock Weir
Diversion Structure
Pumping Station
Guide Levee
Willowdale
Subdivision
Ponding Area
(9,300 acres)
N
LAKE CATAOUATCHE


NEW ORLEANS
LAKE PONTCHARTRAIN
LAKE BALVADOR
MISSISSIPPI RIVER
GIWW
BAYOU LAFOURCHE
BARATARIA BAY
TERREBONNE BAY
TIMBALIER BAY
GULF OF MEXICO

West Bay Sediment Diversion (MR-03)





West Bay today


GeoNACE Hurricane Simulation
Thu Sep 01 09:00:00 2005 (+ 2.00 (hrs))
Stage 0.154

Mississippi River & Tributaries Project

- **Federal Expenditures:**
  $11.5 Billion Invested
  (1928 - 2002)

- **Flood Damages:**
  $274.8 Billion Prevented
  (1928 - 2002)

Conclusion

- The Mississippi River is the thoroughfare to the largest port complex in the world
- Over 50 seagoing vessels traverse this channel per day
- Utilizing the most up-to-date technology and methods to maintain Mississippi River Infrastructure is crucial to the economy, credibility, and reliability of our ports and local navigation
- The Corps contributes to our Nation's Inland Navigation

Briefing by:
Walter O. Baumy, Jr. P.E.
Chief of Engineering Division
US Army Corps of Engineers
New Orleans District

http://www.mvn.usace.army.mil


SERVICE TO THE PUBLIC
Navigation
River Flood Control
Hurricane Flood Control
Environmental Enhancement
Wetlands Restoration
Support for Others