

New Orleans and Coastal Louisiana: A Review on Sustainability and Vulnerability

Douglas J. Meffert, D. Env., MBA
Eugenie Schwartz Professor for River & Coastal Studies
Deputy Director, Tulane/Xavier Center for Bioenvironmental Research
Co-Chair Sustainability Subcommittee, Bring New Orleans Back Commission

13 March 2007
Cityscope, MIT

What residents care about:

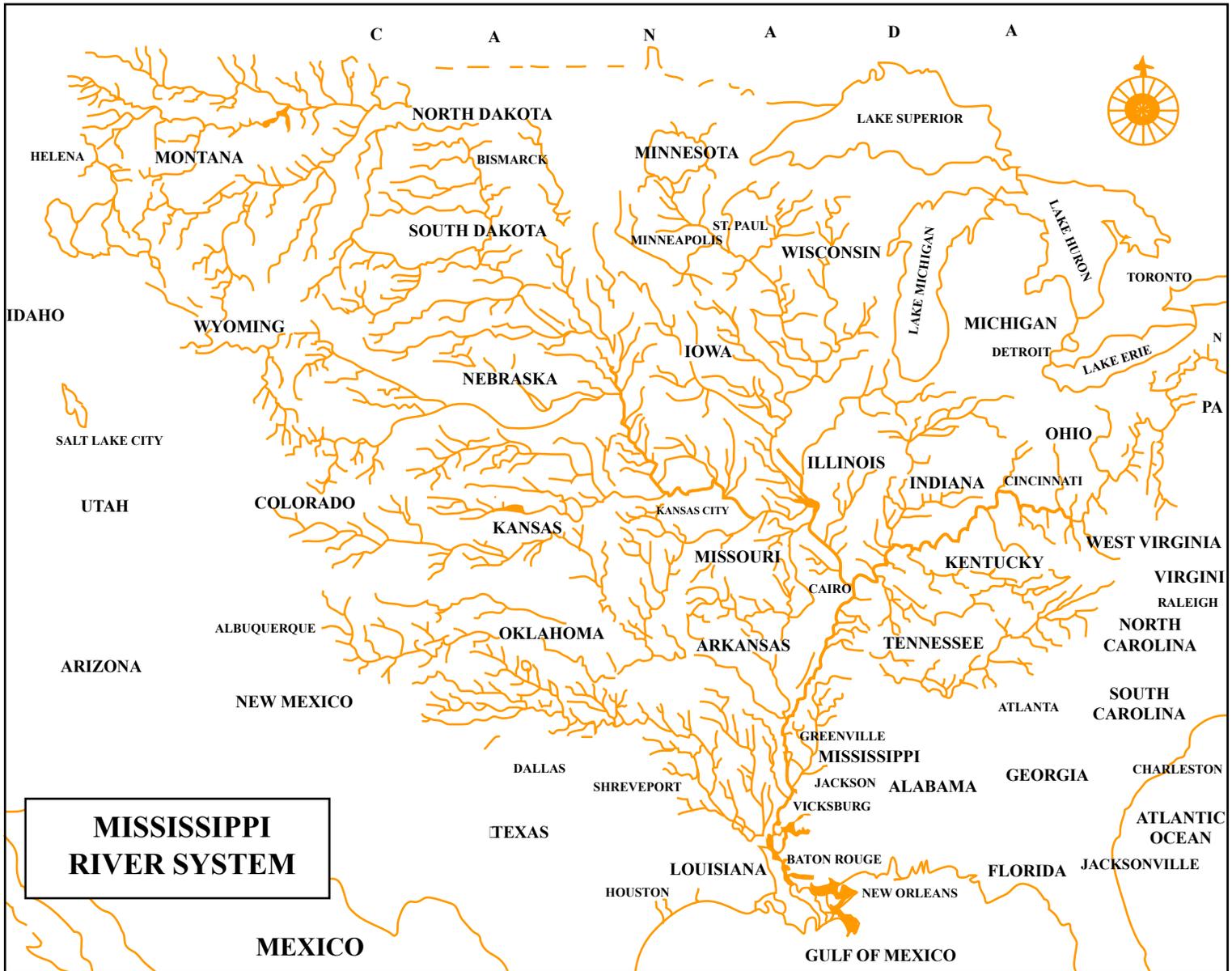
1. Natural Systems
2. Sustainable
Buildings & Infrastructure
3. Public Health
4. Social & Political

“Reinhabiting NOLA” graphic
removed due to copyright restrictions.

A Tulane Community Workshop Held in New Orleans,
November 2005

Sustainability/Recovery Issues

- *Levees and River/Coastal Wetland Restoration*
- *Smart Growth/Urban Ecology*
- Debris Removal and Waste Management
- Sustainable Architecture/Energy Efficiency
- Environmental Health



**MISSISSIPPI
RIVER SYSTEM**

Figure by MIT OCW.



Figure by MIT OCW.

Composite Recent Deltas

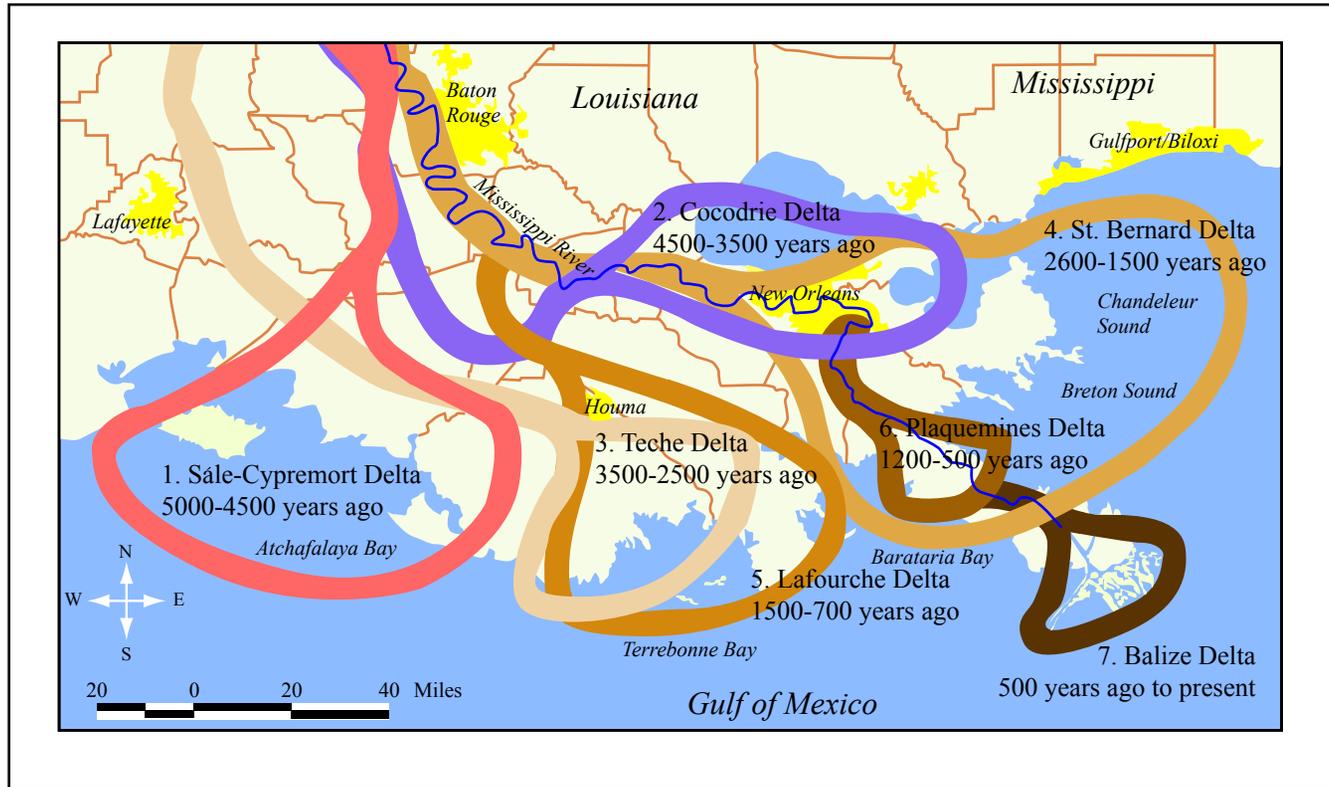


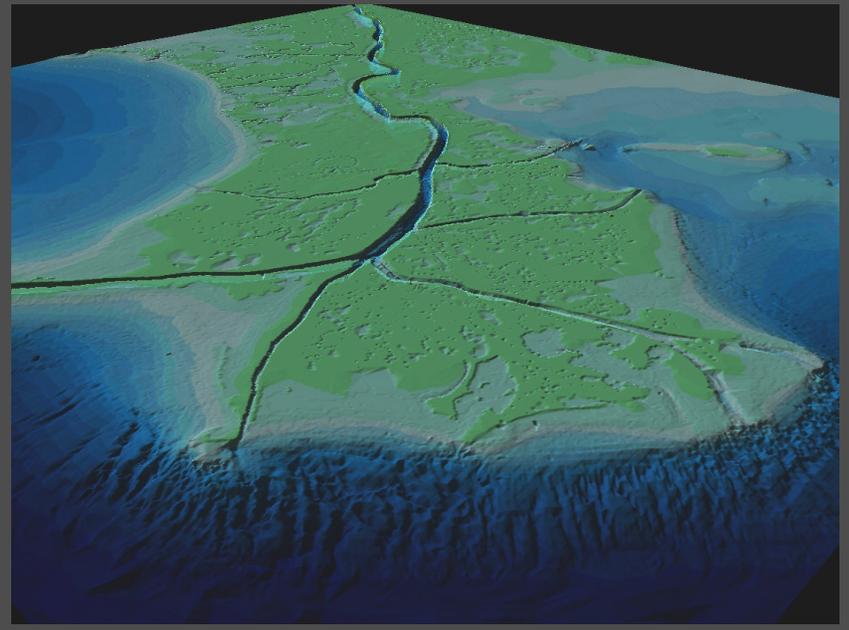
Figure by MIT OCW.

The Great Mississippi River Flood of 1927

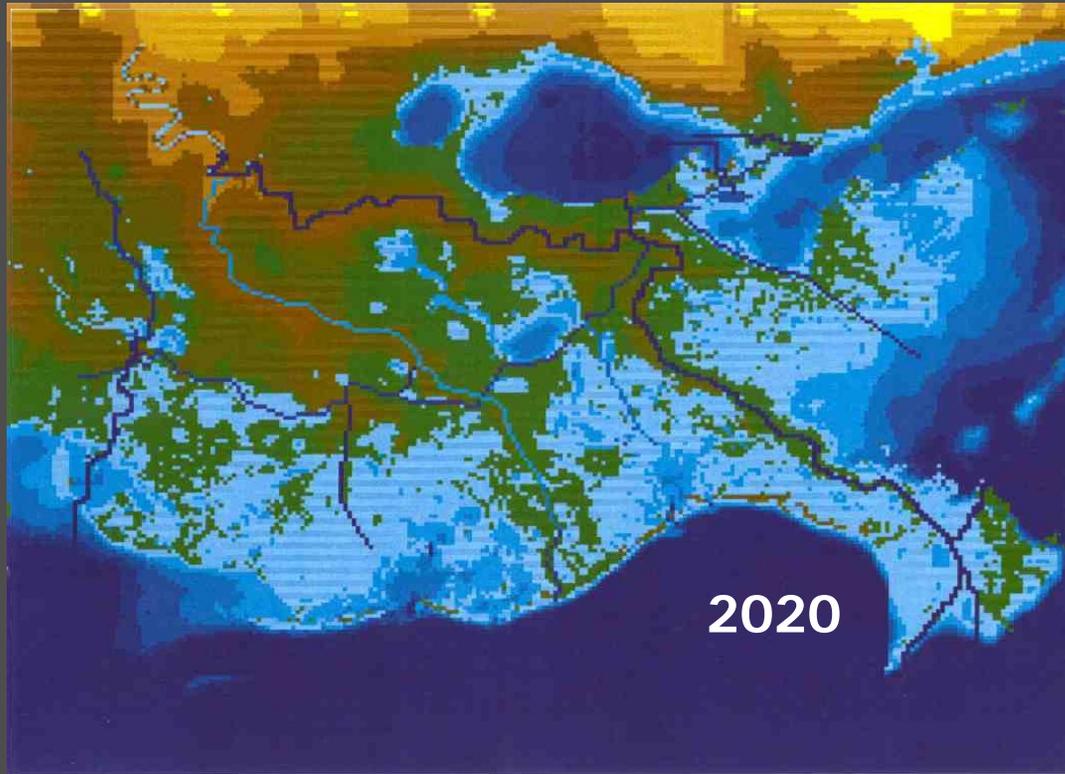
Removed due to copyright restrictions: photograph of people evacuating flooded region, and front cover image of Rising Tide: The Great Mississippi Flood of 1927 and How it Changed America, by John Barry.

Lower Mississippi River Modern Delta

What satellites and sonar tell us

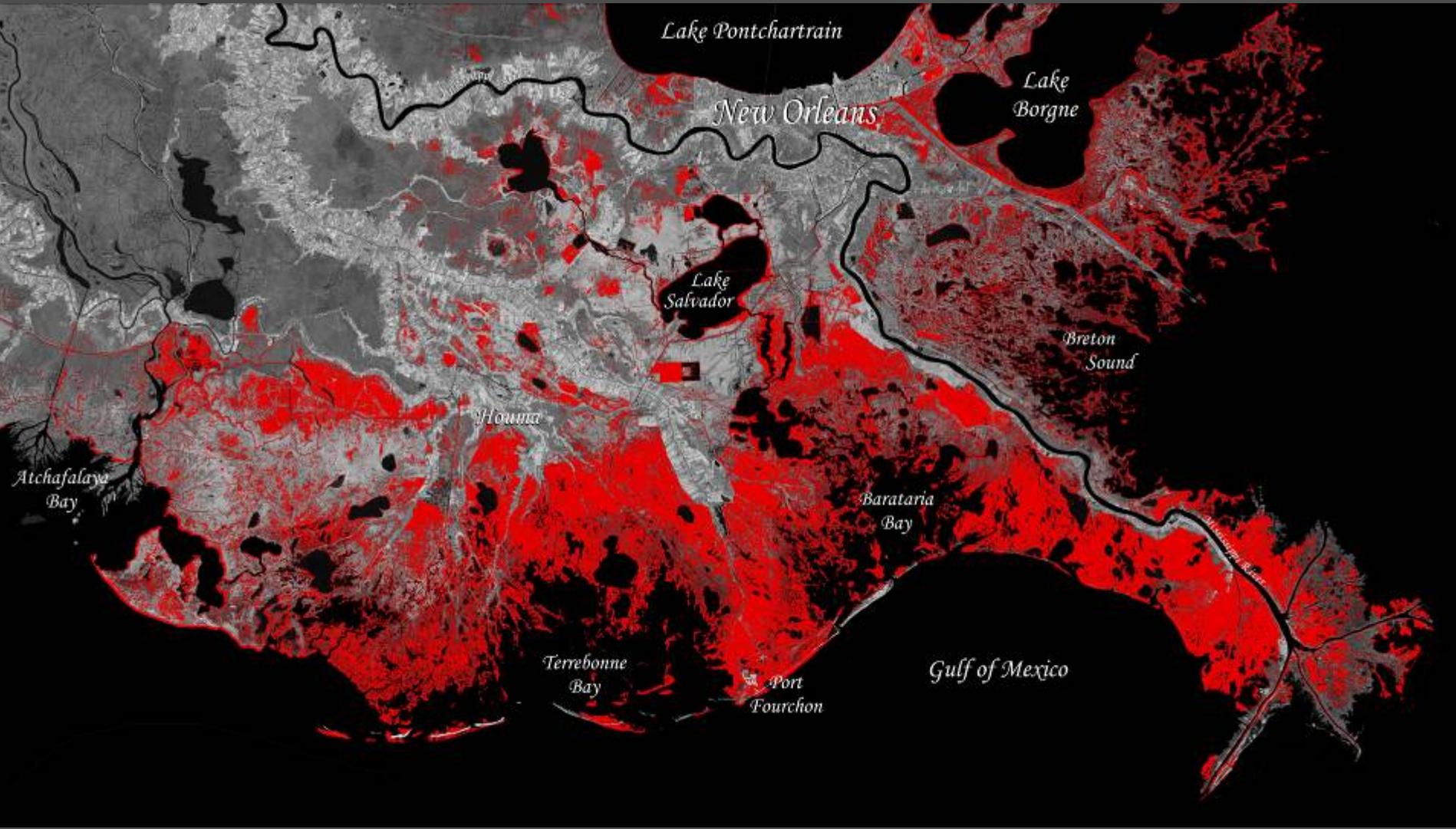


Past and Projected Wetland Loss in Coastal Louisiana (1839 to 2020)



- 25 square miles/year (62 km²/year); 90% of USA loss
- One football field every 38 minutes
- An area the size of U.S. State Rhode Island (1994)
- An area the size of U.S. State Delaware (2006)

Past and future coastal wetland loss in Louisiana



 predicted land loss 1932-2050

Louisiana Coastal Area Ecosystem Restoration Tentatively Selective Plan (TSP) -

Critical restoration features:

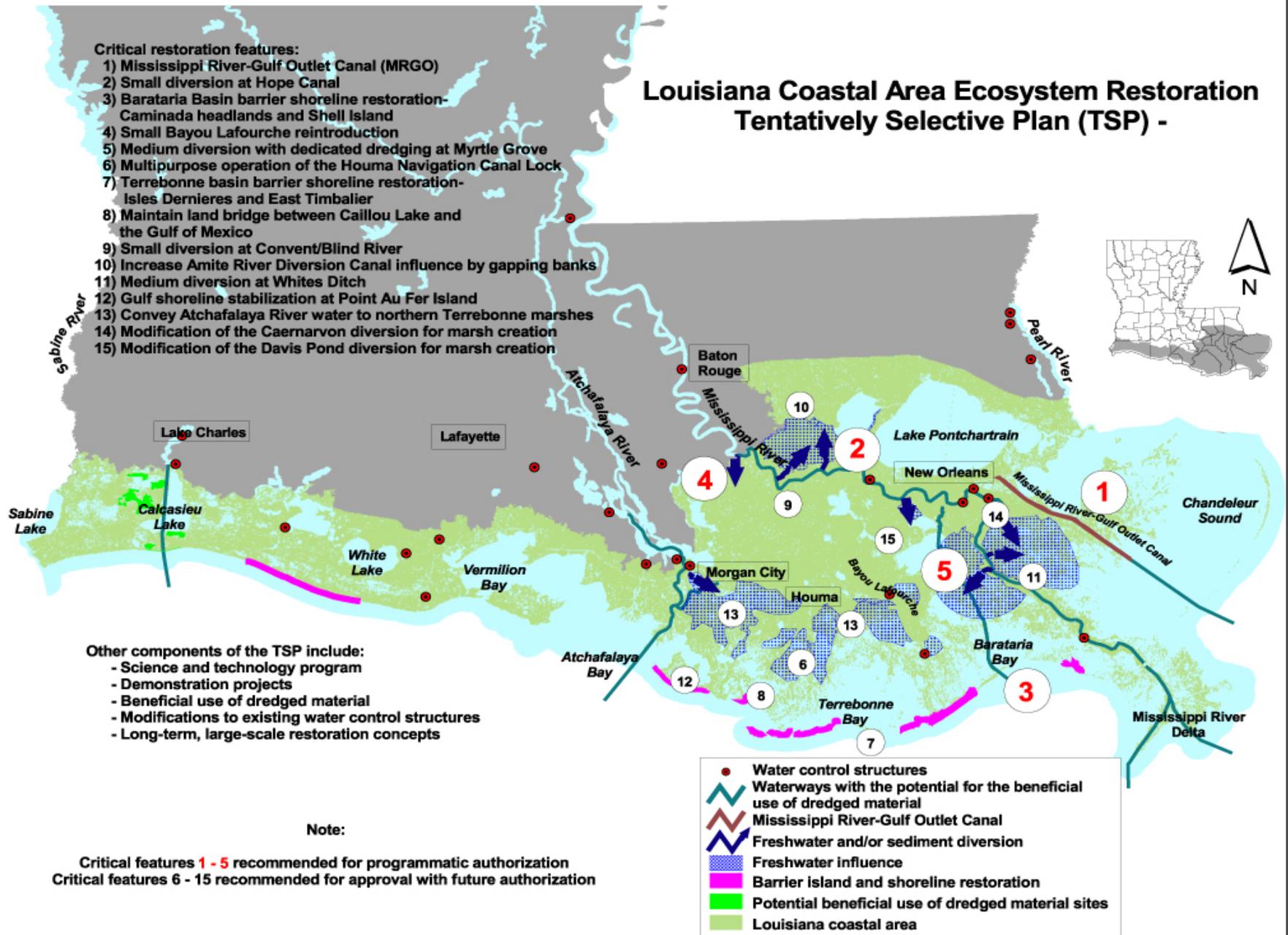
- 1) Mississippi River-Gulf Outlet Canal (MRGO)
- 2) Small diversion at Hope Canal
- 3) Barataria Basin barrier shoreline restoration-Caminada headlands and Shell Island
- 4) Small Bayou Lafourche reintroduction
- 5) Medium diversion with dedicated dredging at Myrtle Grove
- 6) Multipurpose operation of the Houma Navigation Canal Lock
- 7) Terrebonne basin barrier shoreline restoration-Isles Dernieres and East Timbalier
- 8) Maintain land bridge between Caillou Lake and the Gulf of Mexico
- 9) Small diversion at Convent/Blind River
- 10) Increase Amite River Diversion Canal influence by gapping banks
- 11) Medium diversion at Whites Ditch
- 12) Gulf shoreline stabilization at Point Au Fer Island
- 13) Convey Atchafalaya River water to northern Terrebonne marshes
- 14) Modification of the Caernarvon diversion for marsh creation
- 15) Modification of the Davis Pond diversion for marsh creation

Other components of the TSP include:

- Science and technology program
- Demonstration projects
- Beneficial use of dredged material
- Modifications to existing water control structures
- Long-term, large-scale restoration concepts

Note:

Critical features 1 - 5 recommended for programmatic authorization
 Critical features 6 - 15 recommended for approval with future authorization



Louisiana's Coastal Wetland Functional Economic Values

- Valued at more than \$100 billion (insured up to \$170 billion)
- More fishery landings than any other coterminous state (\$750 million/year)
- 21% of U.S. natural gas supply (oil & gas \$30 billion/year)
- Protection for 25% of U.S. exported commodities (\$30 billion/year)
- Agricultural value of \$30 billion/year
- Largest U.S. fur harvest...not worth much these days

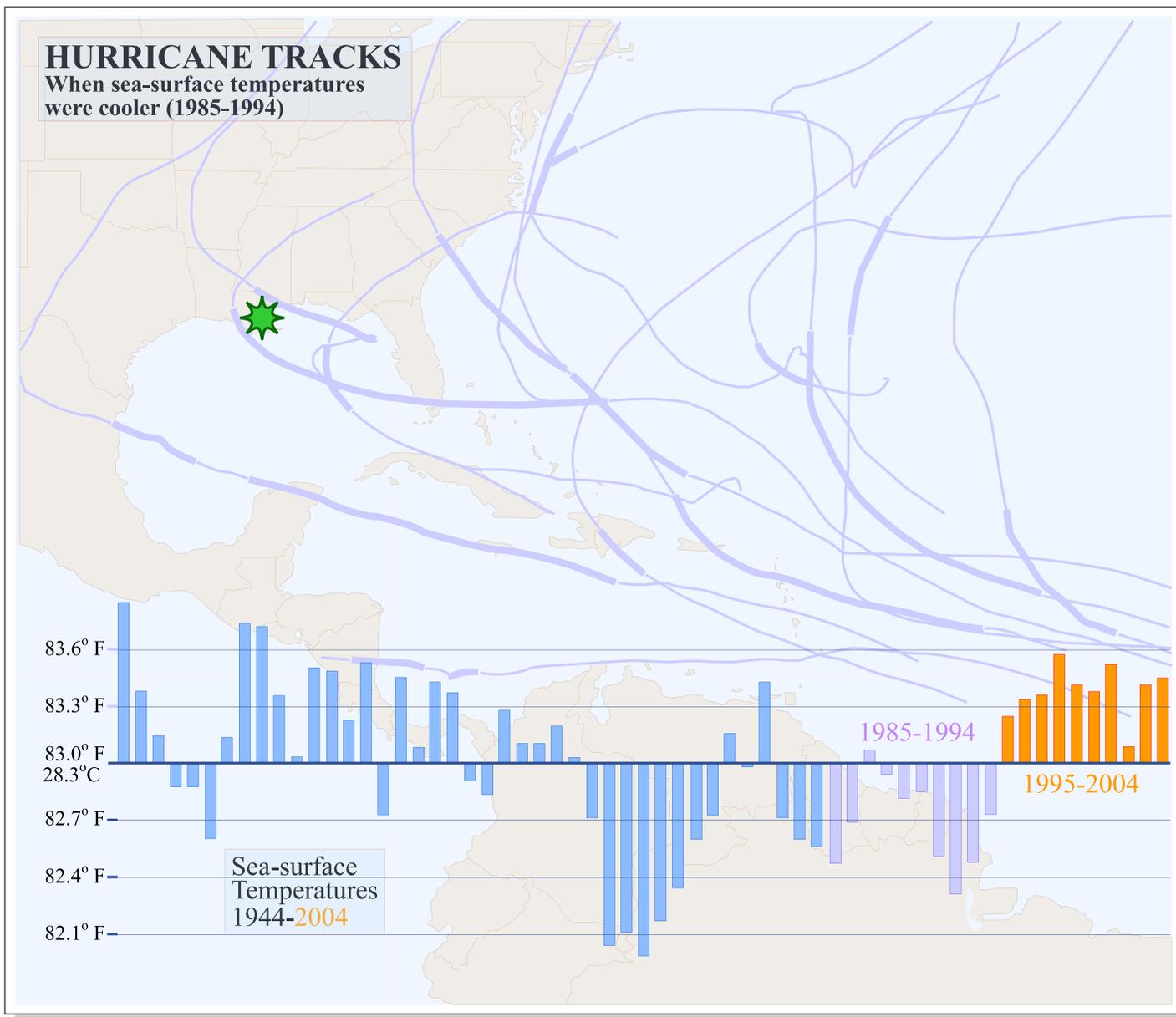


Figure by MIT OCW.

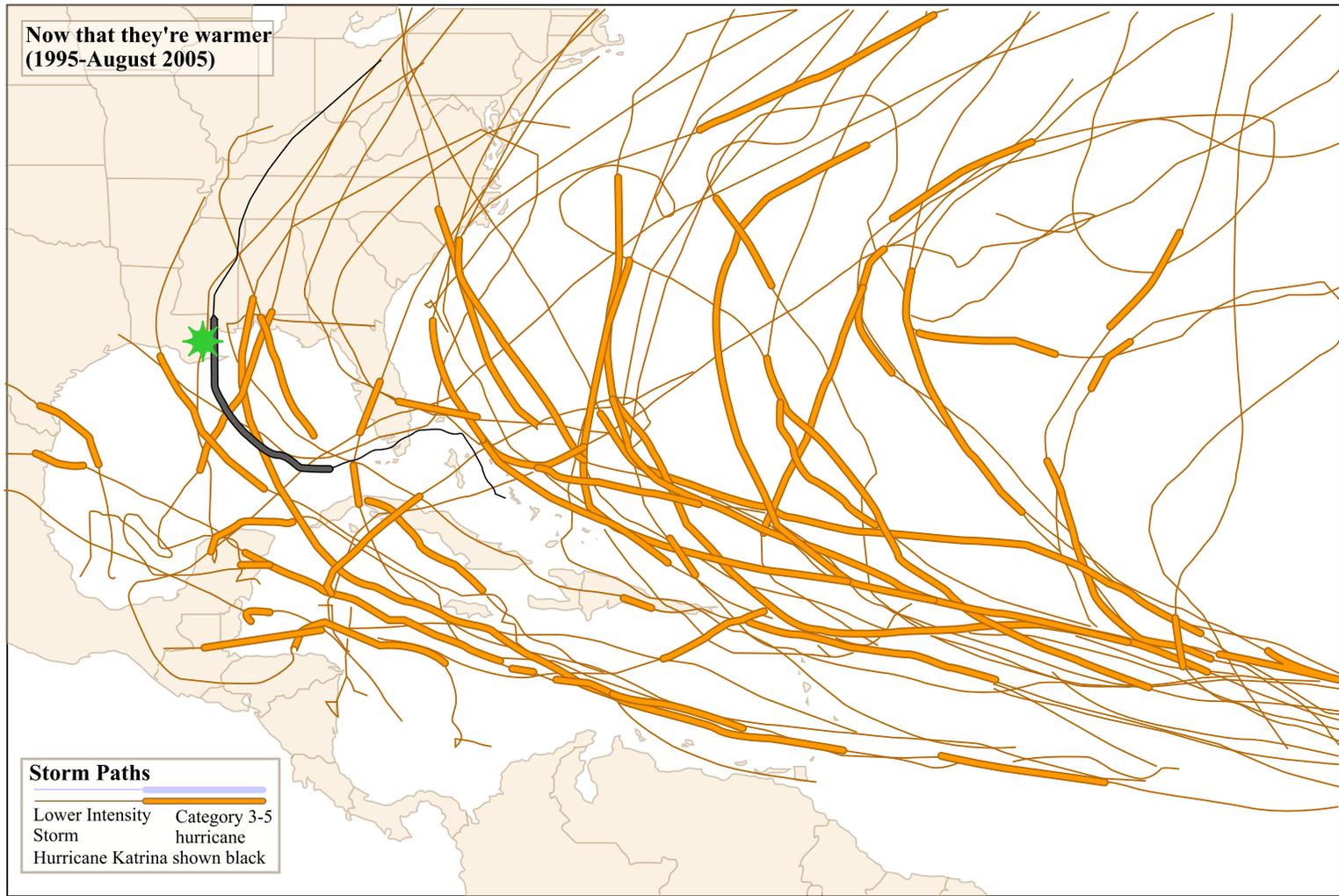


Figure by MIT OCW.



Water Area Changes in Southeastern Louisiana After Hurricanes Katrina and Rita Detected with Landsat Thematic Mapper Satellite Imagery

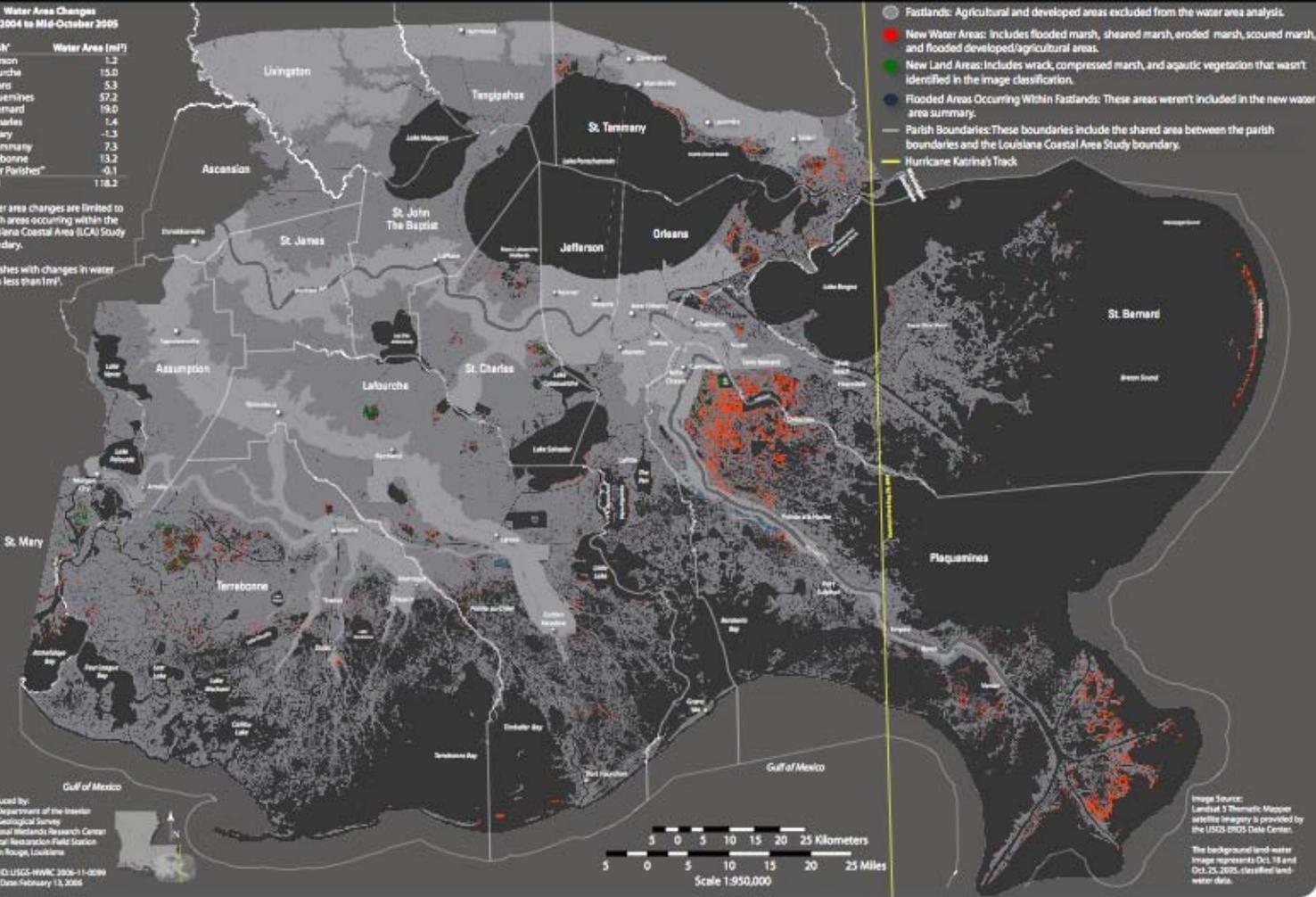
Water Area Changes
Fall 2004 to Mid-October 2005

Parish*	Water Area (mi ²)
Jefferson	1.2
Lafourche	15.0
Orleans	5.3
Plaquemines	57.2
St. Bernard	19.0
St. Charles	1.4
St. Mary	-1.3
St. Tammany	7.3
Terrebonne	13.2
Other Parishes**	-0.1
Total	118.2

*Water area changes are limited to parish areas occurring within the Louisiana Coastal Area (LCA) Study boundary.

**Parishes with changes in water area less than 1mi².

- Fastlands: Agricultural and developed areas excluded from the water area analysis.
- New Water Areas: Includes flooded marsh, sheared marsh, eroded marsh, scoured marsh, and flooded developed/agricultural areas.
- New Land Areas: Includes wrack, compressed marsh, and aquatic vegetation that wasn't identified in the image classification.
- Flooded Areas Occurring Within Fastlands: These areas weren't included in the new water area summary.
- Parish Boundaries: These boundaries include the shared area between the parish boundaries and the Louisiana Coastal Area Study boundary.
- Hurricane Katrina's Track



Produced by:
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Coastal Restoration Field Station
Baton Rouge, Louisiana
Map ID: USGS-HWRC 2006-11-0099
Map Date: February 13, 2006

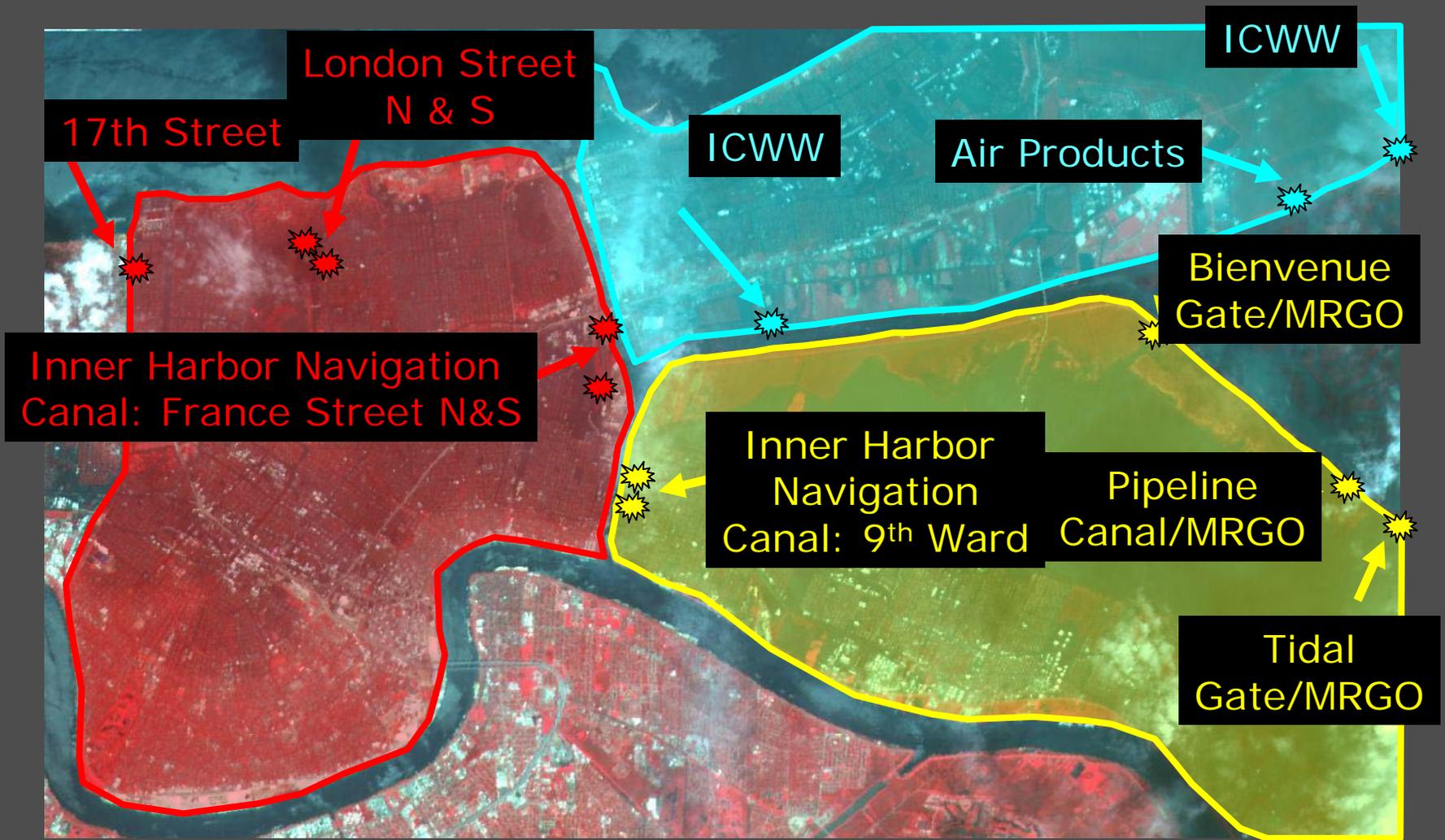
Image Source:
Landsat 3 Thematic Mapper
satellite imagery is provided by
the USGS EROS Data Center.
The background land-water
image represents Oct. 18 and
Oct. 25, 2005, classified land-
water data.

217 square miles (562 km²) of wetland to water conversion
 \$1.1 billion acute loss to commercial fisheries
 \$150 million near-term loss to oyster harvests

Funnel Effect

Photograph of rushing stormwaters removed due to copyright restrictions.

Three Separate Bowls



What Happened?

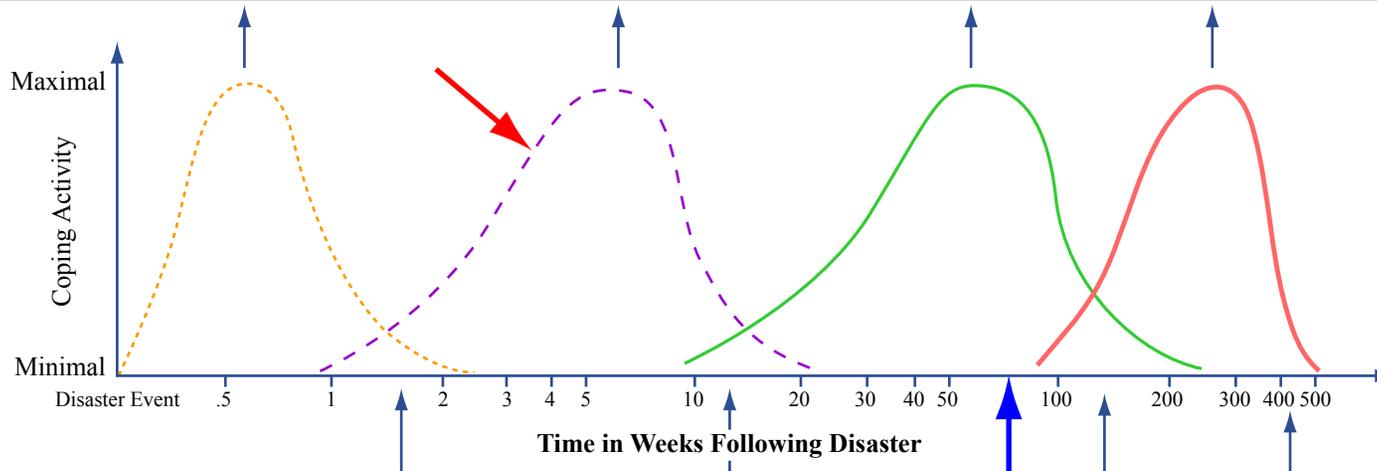
108,731 households had over 4 feet of flood water (50% of all New Orleans households) Source: GCR

90,000 square miles (233,000 km²) flooded

approximately 1,500 Louisiana deaths

Displacement of more than 400,000 people locally - 1.3 million regionally) Source: FEMA

Periods:	<u>Emergency</u>	<u>Restoration</u>	<u>Reconstruction I</u>	<u>Reconstruction II</u>
Capital Stock:	Damaged or Destroyed	Patched	Rebuilt (Replacement)	Major Construction (Commemoration, Betterment, Development)
Normal Activities:	Ceased or Changed	Return and Function	Return at Predisaster Levels or Greater	Improved and Developed



Sample Indicators:	Completion of Search and Rescue	Restoration of Major Urban Services	Attain Predisaster Level of Capital Stock and Activities	Completion of Major Construction Projects
	End of Emergency Shelter or Feeding	Return of Refugees		
	Clearing Rubble from Main Arteries	Rubble Cleared		

Figure by MIT OCW.

A Model of Disaster Recovery Activity

(from Vale and Campanella 2005, redrawn from *Reconstruction Following Disaster*)

Bring New Orleans Back Commission Urban Planning Vision

New Orleans will be a sustainable, environmentally safe, socially equitable community with a vibrant economy.

Its neighborhoods will be planned with its citizens and connect to jobs and the region. Each will preserve and celebrate its heritage of culture, landscape, and architecture.

Courtesy of Peter Coles. Used with permission.



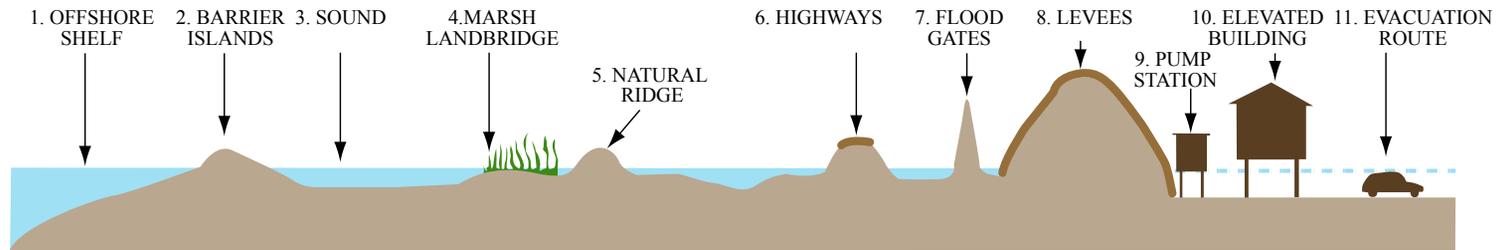
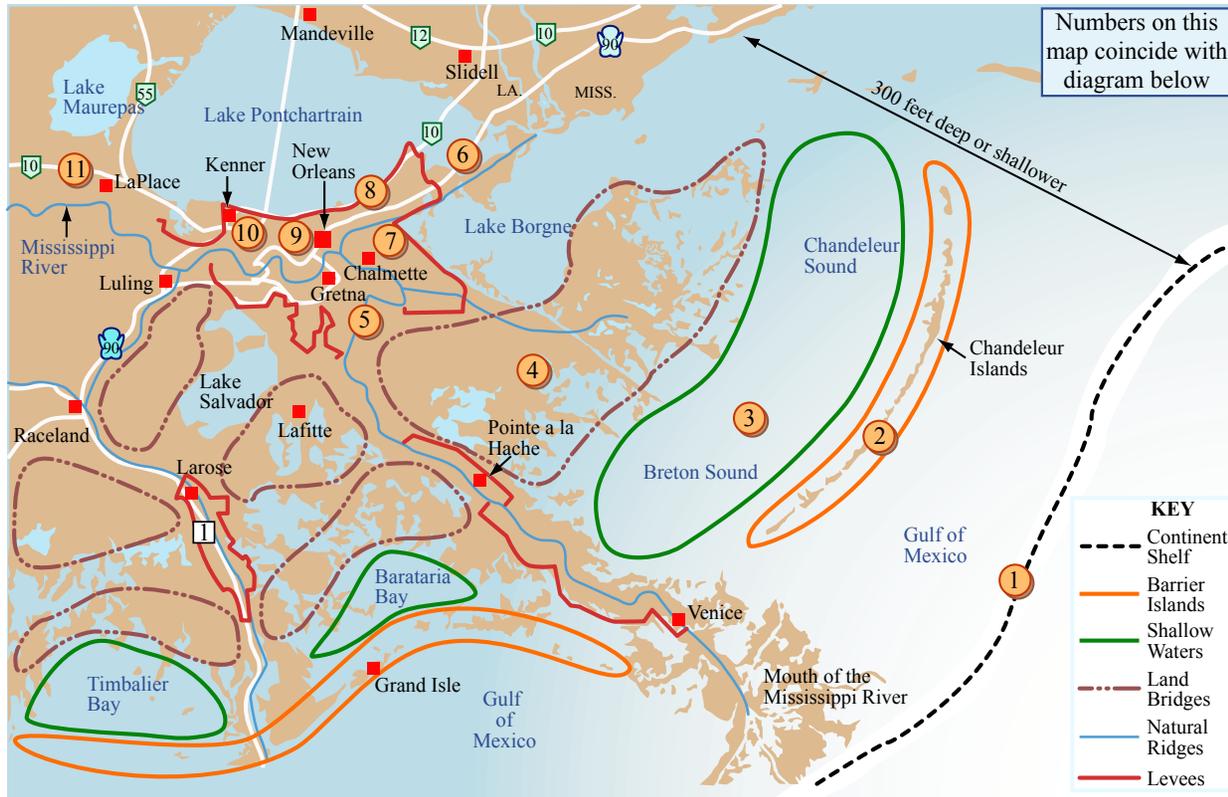
Photos by Peter Coles

Question for Colonized New Orleans:

We always have, are continuing, and always will, in general, live in unsafe, unsustainable conditions?

Multiple Lines of Hurricane Defense

Integrated Coastal Wetland Restoration and Levee Protection



Multiple Lines of Defense Concept (Courtesy of the Lake Pontchartrain Basin Foundation)

Flood and Stormwater Protection Plan: Unified Responsibility

- Single levee district (not 16)
 - Well, ok, how about 2?
- Corps of Engineers responsible for:
 - regional levee/pumping system
 - fund and build
 - maintain and operate
- Local municipalities responsible for local floodwalls and levees.

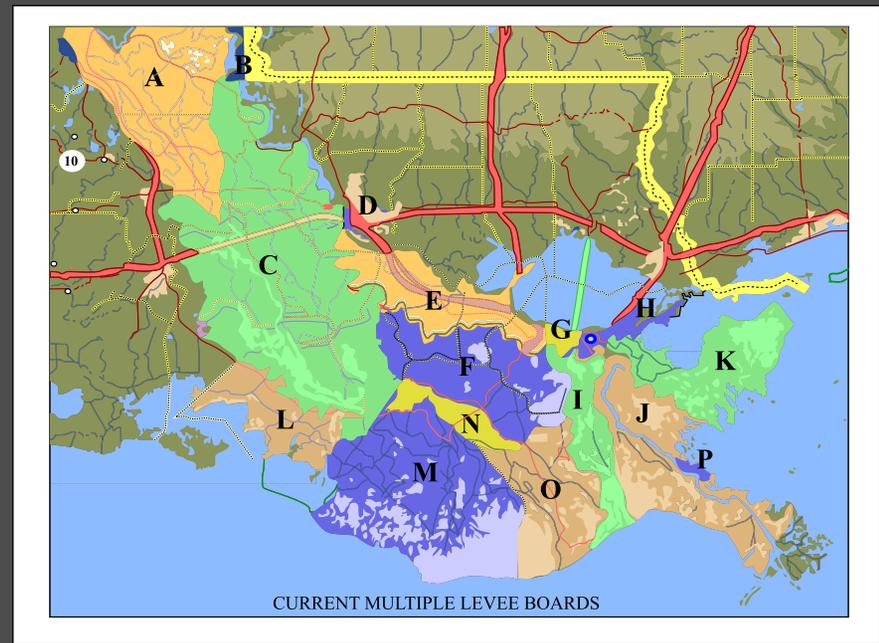
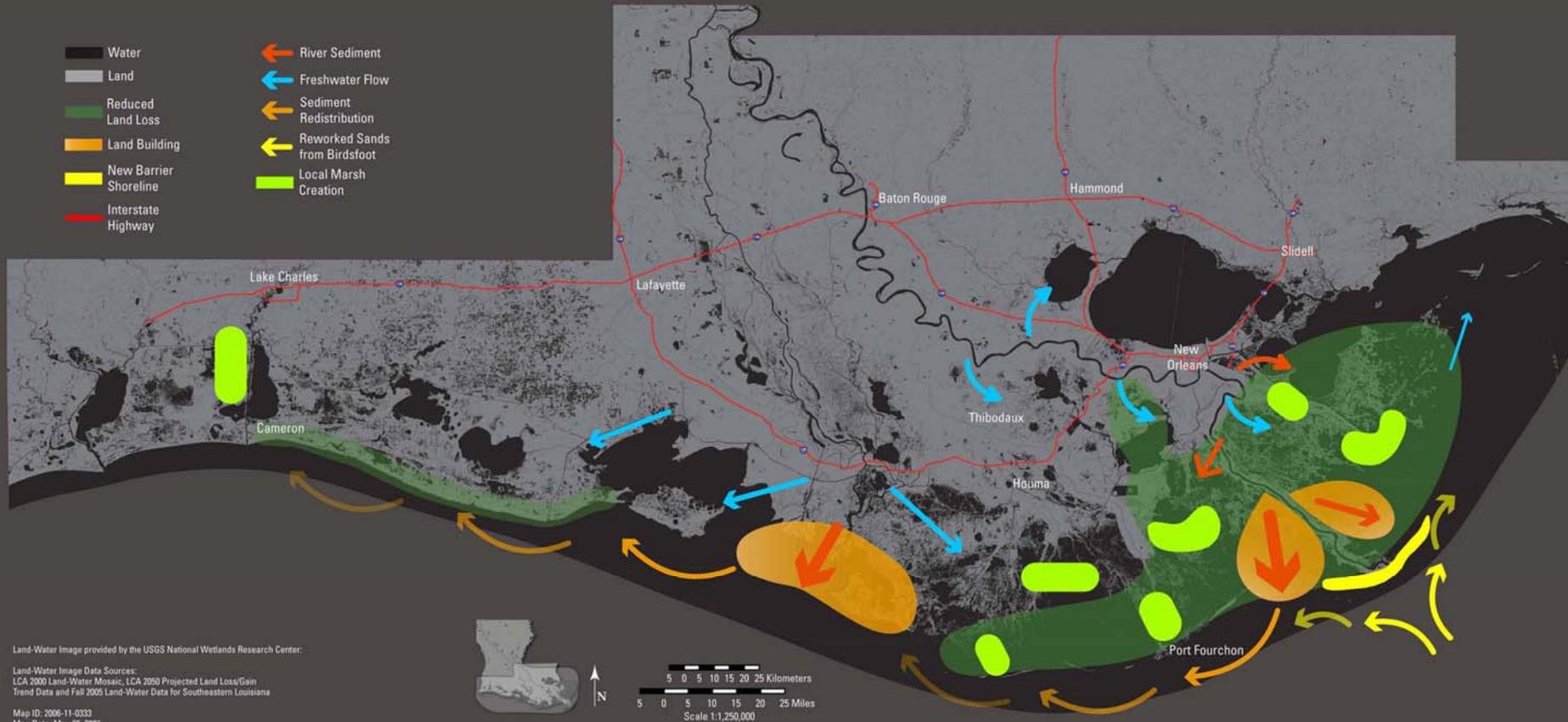


Figure by MIT OCW.

Achieving Sustainability and Addressing Local Restoration Needs

- Water
- Land
- Reduced Land Loss
- Land Building
- New Barrier Shoreline
- Interstate Highway
- River Sediment
- Freshwater Flow
- Sediment Redistribution
- Reworked Sands from Birdfoot
- Local Marsh Creation



Land-Water Image provided by the USGS National Wetlands Research Center.

Land-Water Image Data Sources:
 LCA 2000 Land-Water Mosaic; LCA 2050 Projected Land Loss/Gain
 Trend Data and Fall 2005 Land-Water Data for Southeastern Louisiana

Map ID: 2006-11-0333
 Map Date: May 25, 2006

How will we afford CPRA Master Plan?

Federal oil & gas revenues, Passed U.S. Congress December 2006

- 8.3 million acres in eastern GoM
- Coastal states receive 37.5% of royalties
- \$20M/year until 2016; \$300-\$500/year thereafter

Coastal Impact Assistance to States (Energy Policy Act of 2005)

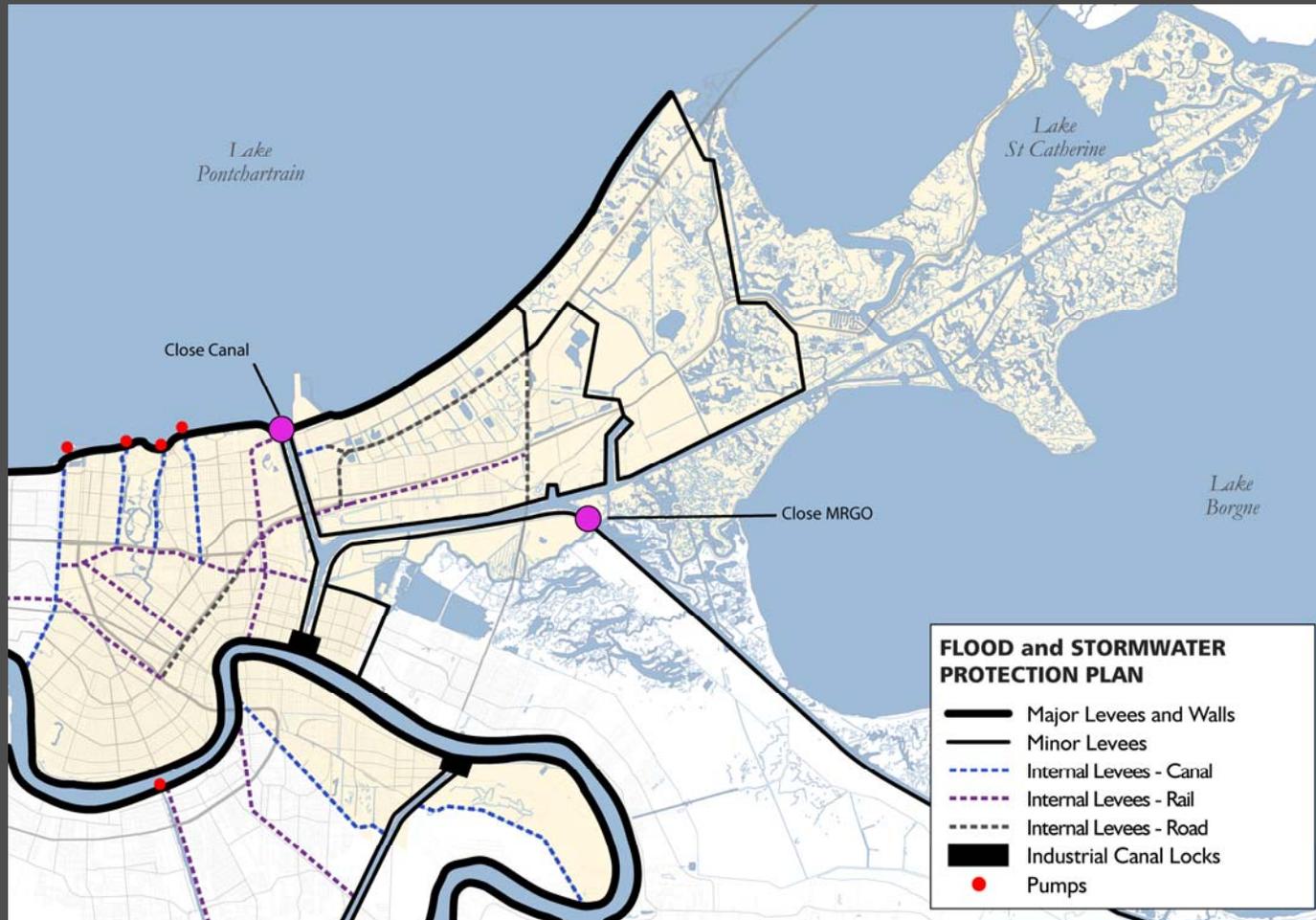
- \$523M 2007-2010; \$2 billion for LA by 2017
- Coastal restoration and infrastructure supporting oil & gas mitigation

Water Resources Development Act

- \$1.2 billion for Louisiana Coastal Area Projects
- \$841 million Morganza to Gulf Levee

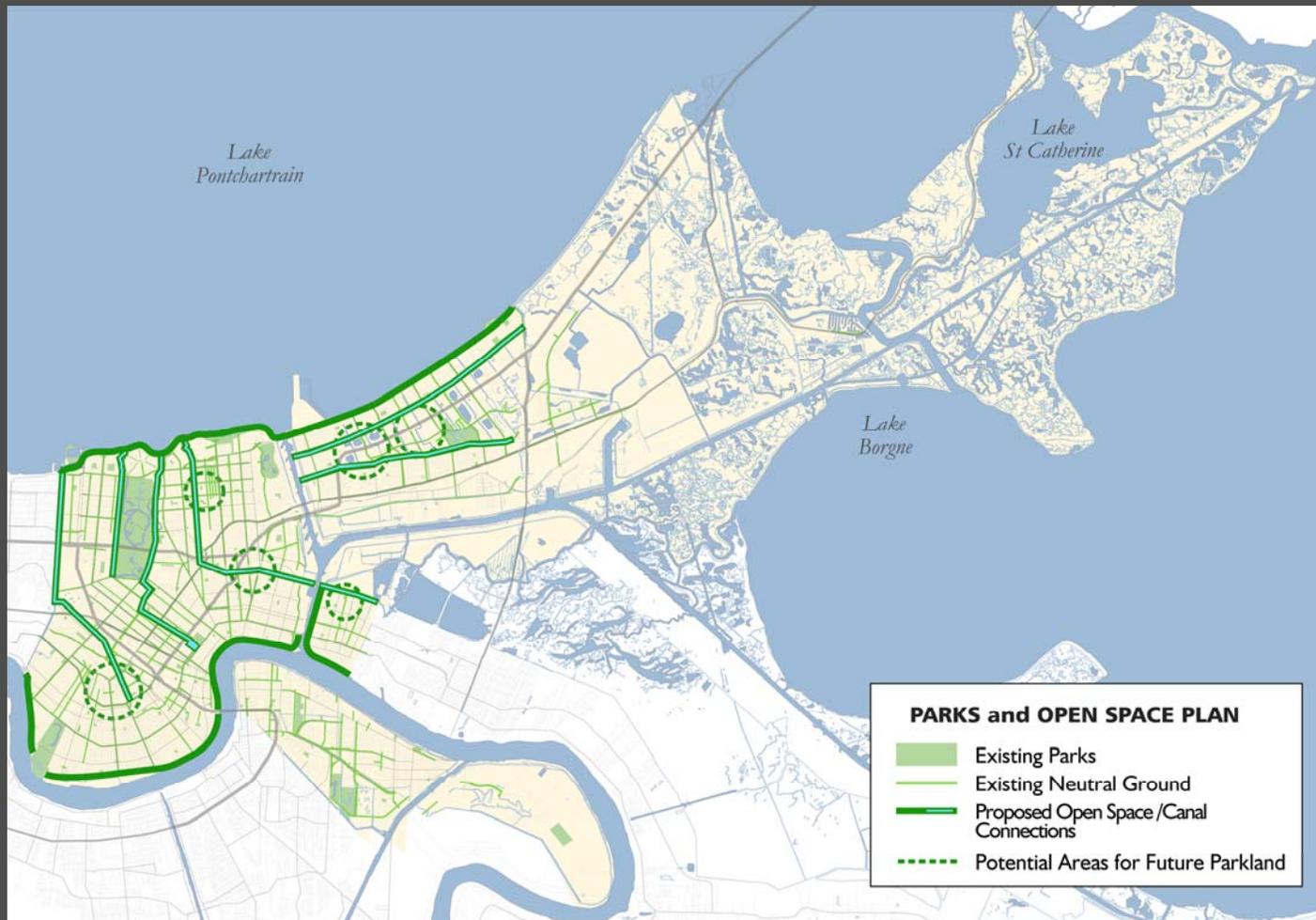
Existing coastal restoration and levee appropriations (\$75M/year)

Flood and Stormwater Protection Plan



BNOB Parks & Open Space Plan

“Greenspace” - the new “four-letter word”



What is New Orleans' Population?

(Lack of affordable housing is biggest constraint)

Estimates of population in New Orleans:

1960:	627,523 (peak)
<i>August 2005 (pre-K):</i>	<i>437,186 (1,292,774 metro)</i>
October 2005:	70,000 (90k daytime)
January 2006:	140,000
June 2006:	171,000 - 210,000
August 2006:	235,000 (1,065,000 metro)
Fall 2008:	250,000 est. (more? less?)

RAISING RULES

Houses with more than 50% damage or new construction recommended to be at least 3 feet above the ground or meet the Base Flood Elevation requirement, whichever is higher.

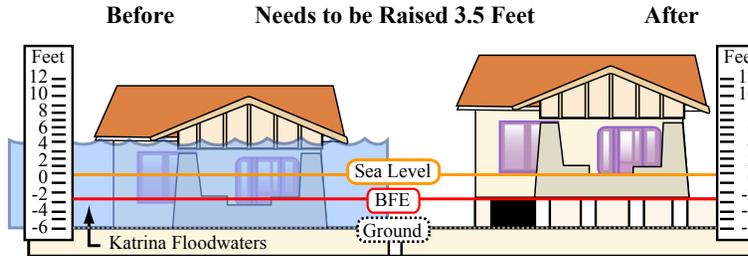
Lakeview

Corner of Filmore Avenue and Colbert Street

Ground level: -6 ft.

BFE: -2.5 ft.

What's advised:
House must meet BFE standard.



9th Ward

Corner of North Johnson and Flood Streets

Ground level: +0.5 ft.

BFE: +0.5 ft.

What's advised:
Though already above BFE, this house on 2 foot piers would need to be elevated another foot to meet the 3-foot rule.



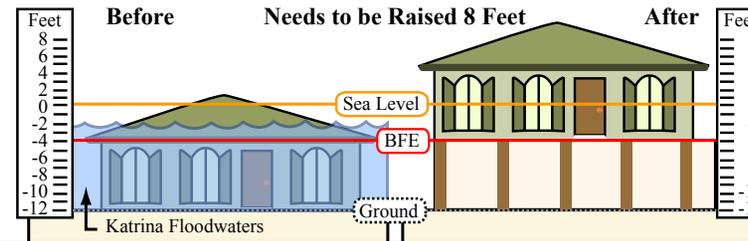
Eastern New Orleans

Near Dwyer Road and Wilson Avenue

Ground level: -12 ft.

BFE: -4 ft.

What's advised:
House must meet BFE standard.



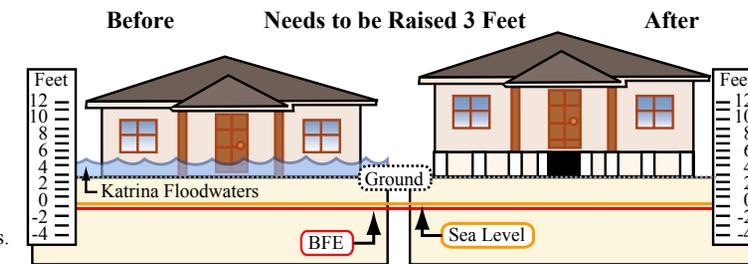
Chalmette

Near Pakenham Drive and Genie Street

Ground level: 3.5 ft.

BFE: 0.5 ft.

What's advised:
Despite being well above BFE, this house still needs to be rebuilt on 3-foot piers.



FEMA Advisory

If 50% > damage, raise house to:

- 1) 1984 BFE or
 - 2) 3 feet,
- whichever is greater.

FEMA Assumptions

- 1) No subsidence or sea level rise since 1984,
- 2) A 100-year flood is still a 100-year flood and
- 2) Floodwalls and levees will hold at "Cat 3".

Encourage Neighborhoods to Live With Water

Lower 9th Ward Bayou Bienvenue Restoration Project



- Historic Habitat & Ecological Services
- Park for Recreation, Research, & Education
- Capture Rain & Stormwater Runoff and Protection
- Water Treatment for Sewerage & Water Board
- Community-driven partnership of agencies, universities, and non-profits

What are the big research and education challenges?

- Application of science to policy and practice of rebuilding and re-inhabiting a city and its coast (the science of rebuilding) that prepare for disaster
- Enhancing the interface of the built and natural environments while protecting from disaster
- Creating resilient, adaptable, and (therefore) sustainable urban ecosystems that serve their communities (*be high or floodable*)
- New Orleans can be a test case for the future of vulnerable port/delta cities worldwide.

Einstein on Sustainable Redevelopment:

- "We can't solve problems by using the same kind of thinking we used when we created them."
- "The eternal mystery of the world is its comprehensibility."

Photograph of a large debris pile removed due to copyright restrictions.

- 25 million cubic yards of “green waste”
- 280,000 tons of steel so far (1.5 NYC World Trade Centers Towers)
- > 100 million cubic yards of construction/demolition waste (22 Superdomes)

MOLDS ARE PREVALENT IN NEW ORLEANS

MOLDS FOUND POST KATRINA

*Aspergillus, Penicillium, Wallemia,
Cladosporium,
Alternaria, Aspergillus, Fusarium,
Trichoderma*

(Trichoderma, a common soil organism was most common.

Stachybotrys, the “sick building” mold was not found)

*Analysis of her own home by Tulane
mycologist, Dr. Joan Bennett in
ANYAS, Jan-Feb 06*

Photograph of mold-covered
furniture removed due to
copyright restrictions.