



Earthquakes ★ Floods ★ Hurricanes ★ Landslides ★ Tsunamis ★ Volcanoes ★ Wildfires

Natural Barriers: to Serve and Protect

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1 November 2005

Overview



Chandeleur Islands

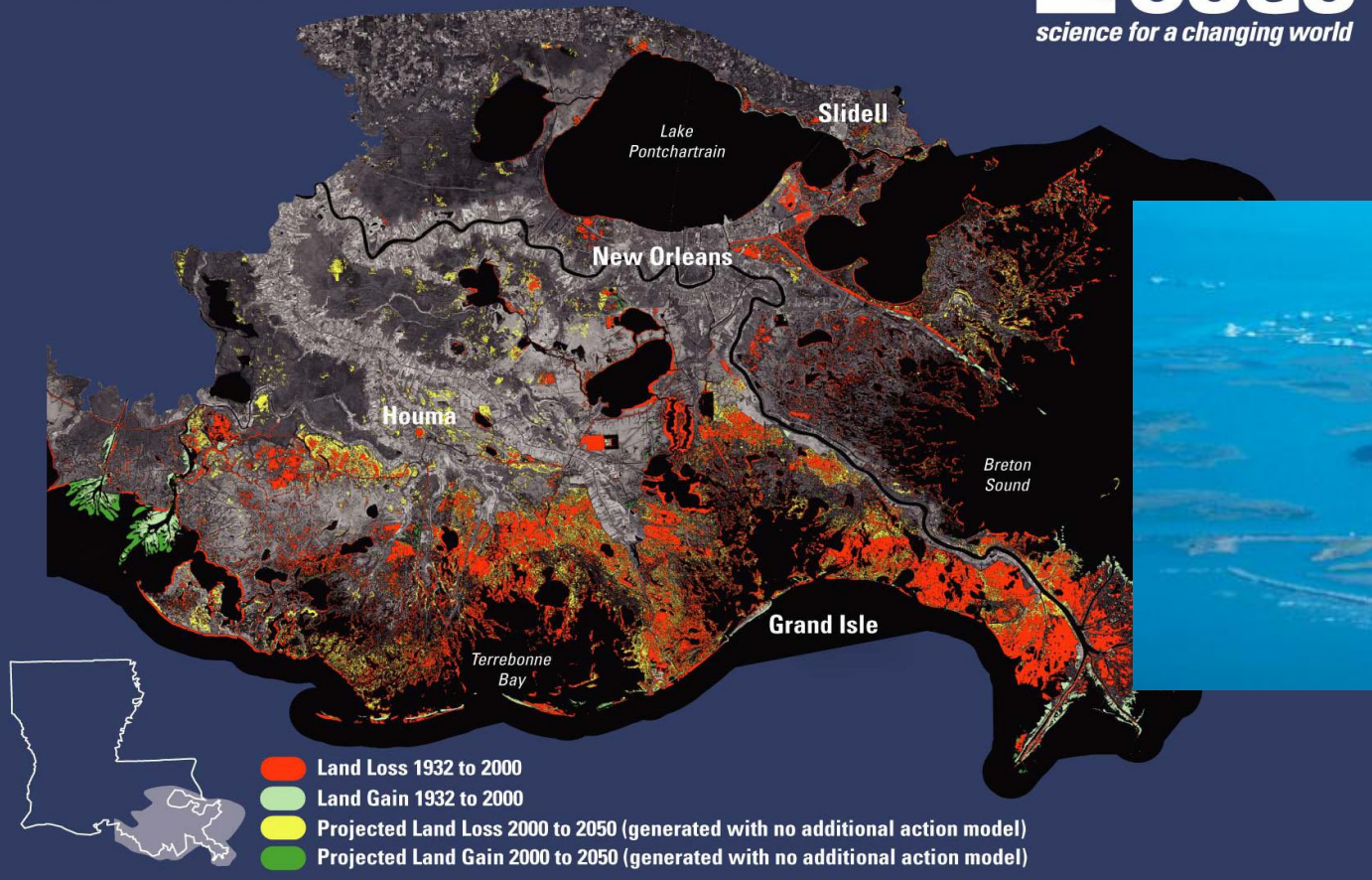
- Role of natural coastal barrier islands and wetlands in reducing coastal flooding
- Effectiveness of coastal barrier protection and restoration programs



- Flood water retention is an important ecological function of wetlands
- The connection between “barrier” islands and wave energy are intuitive

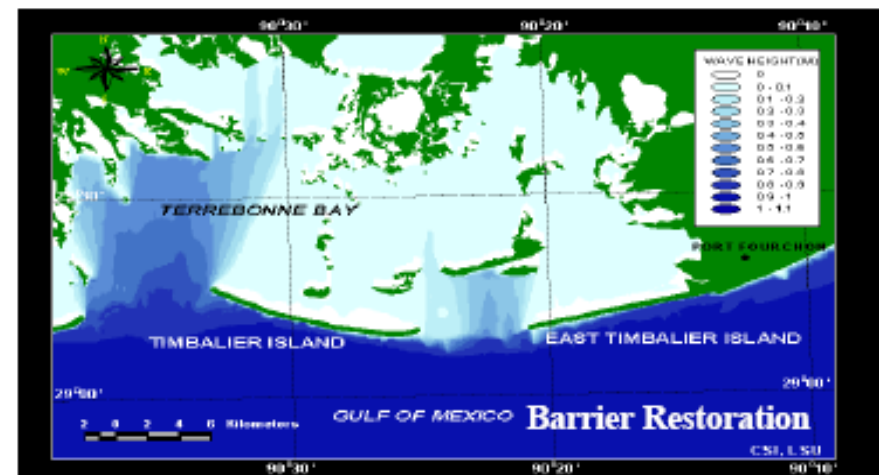
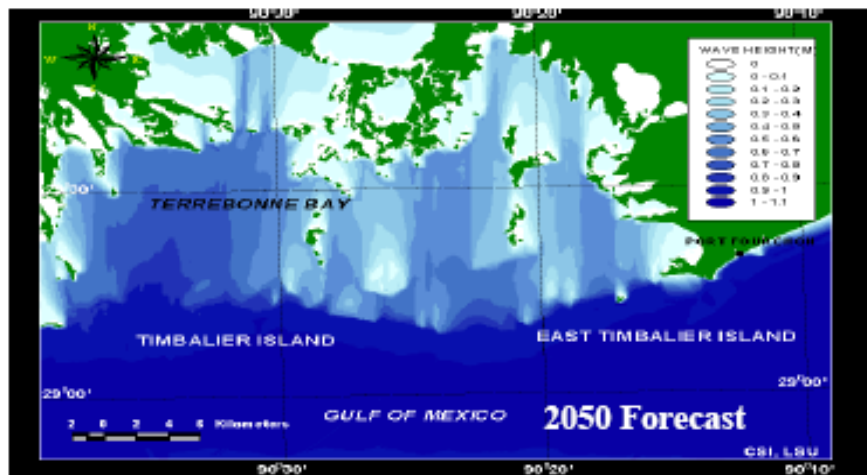
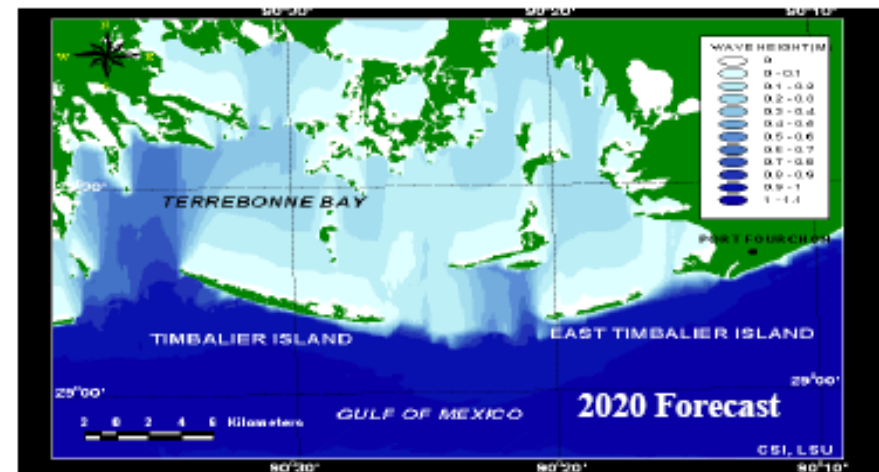
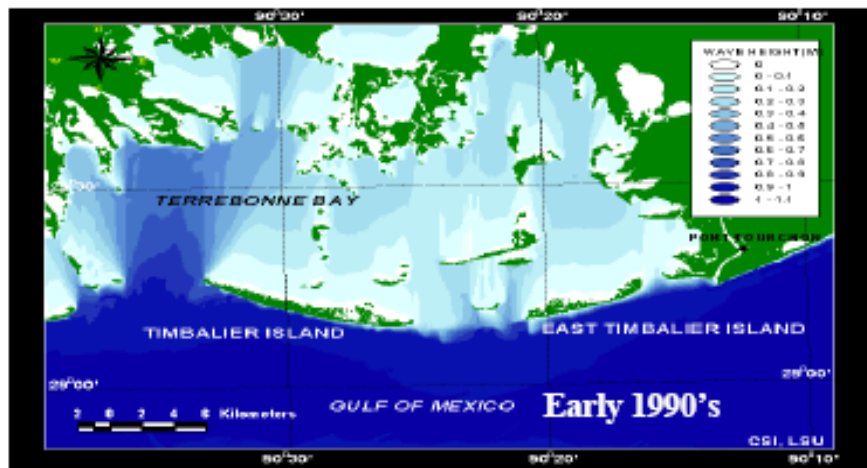


Coastal Louisiana Land Loss



Recent studies have quantified the role of coastal barriers in reducing wave energy and storm surge

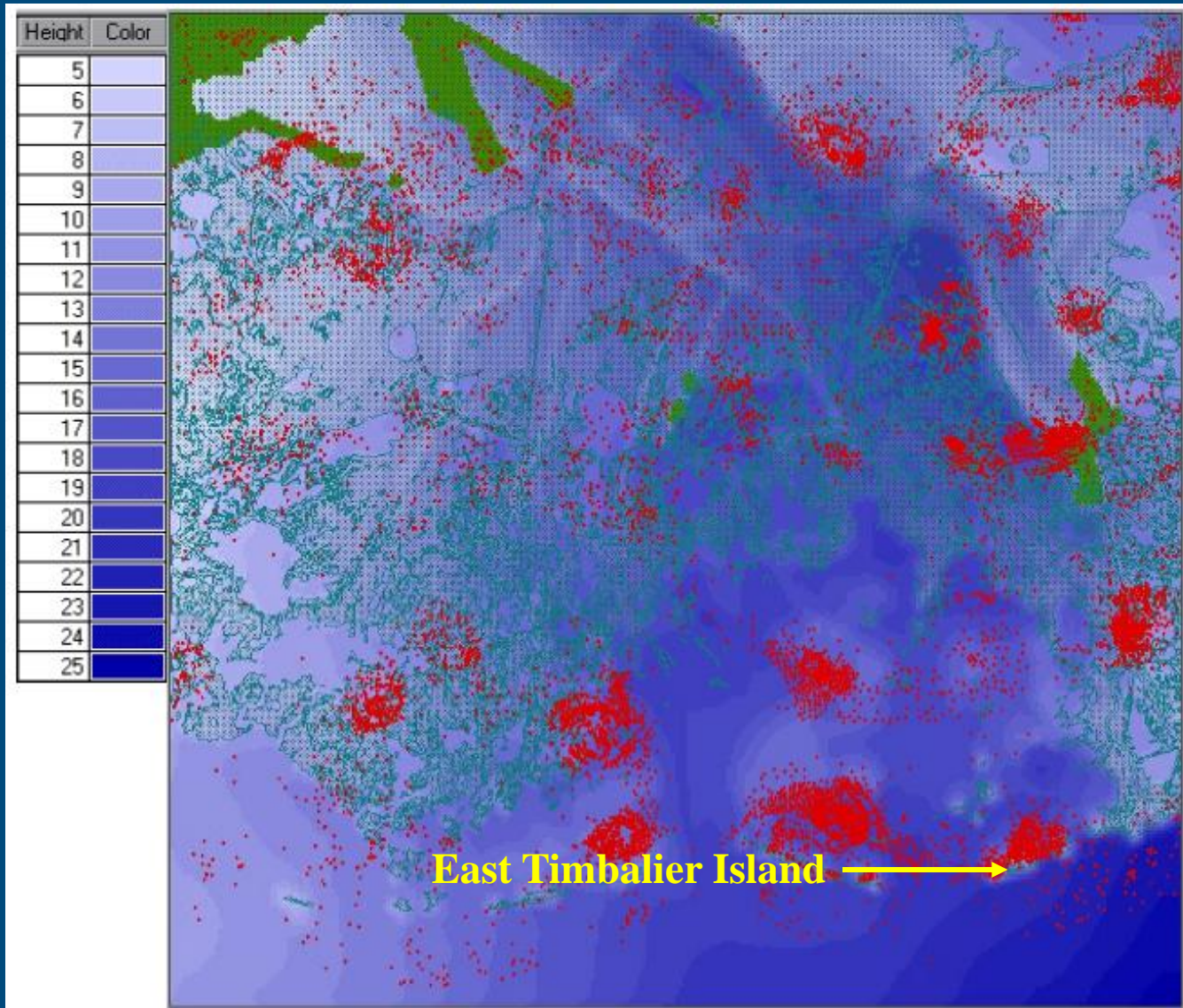
Change in Wave Height



(From Stone *et al*, 2003)

8'-10' Change in Storm Surge, 1950-1990

Roughly 4900 oilfield platforms at risk.



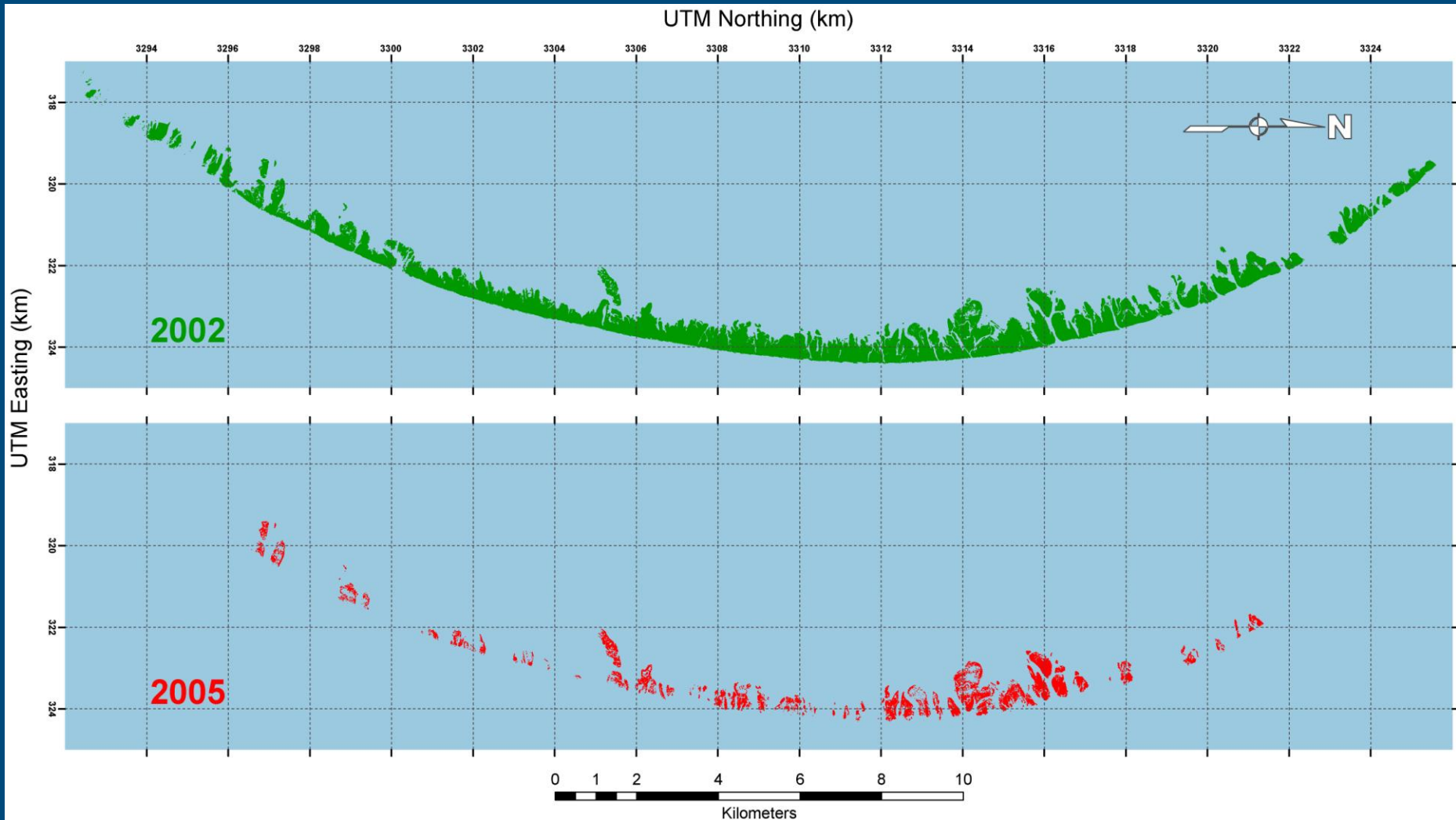
Red dots are oilfield platform sites. (Stone *et al.* 2003)

As coastal barriers deteriorate...

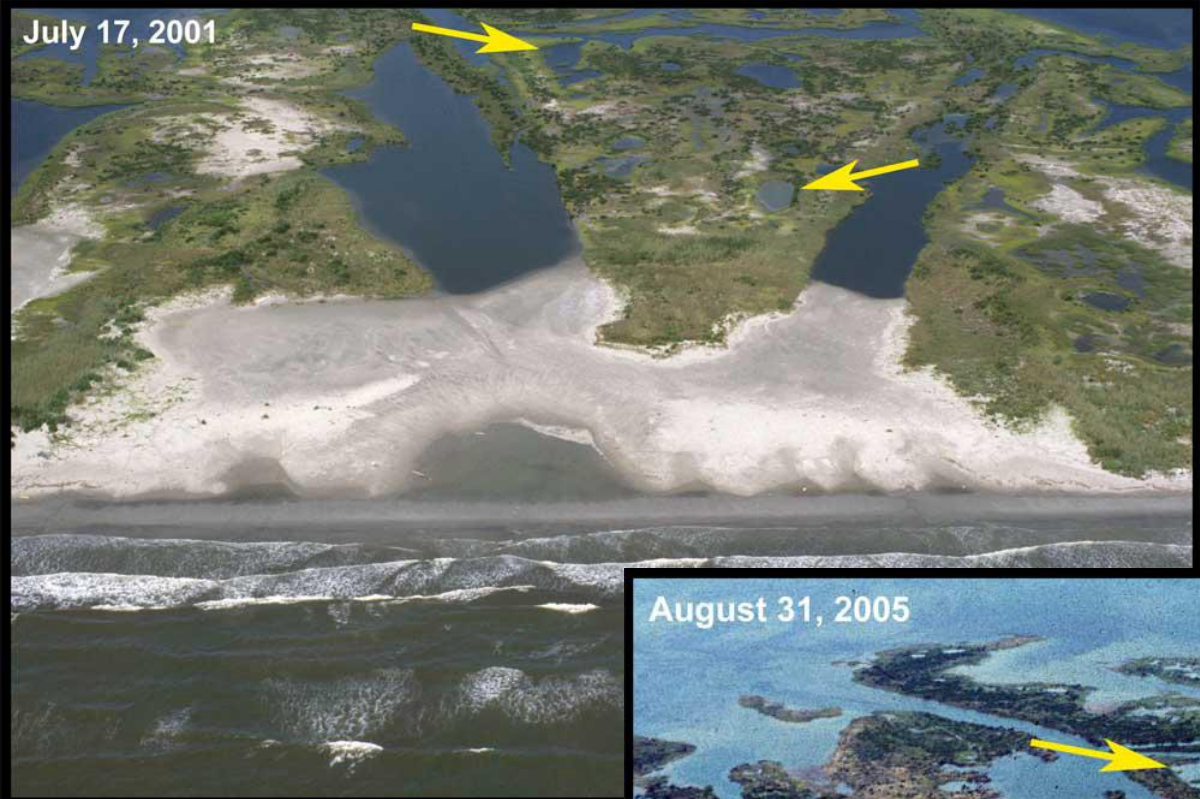
- Tidal influence and salinity increases in bays and estuaries
- Erosion on bay shorelines and wetlands increase
- Mainland environments become more prone to inundation during frontal passages and tropical storms



Chandeleur Islands



July 17, 2001



Pre Katrina

August 31, 2005



Post Katrina

May 2004 (Pre Ivan)

A

Mississippi
Sound

Gulf of
Mexico

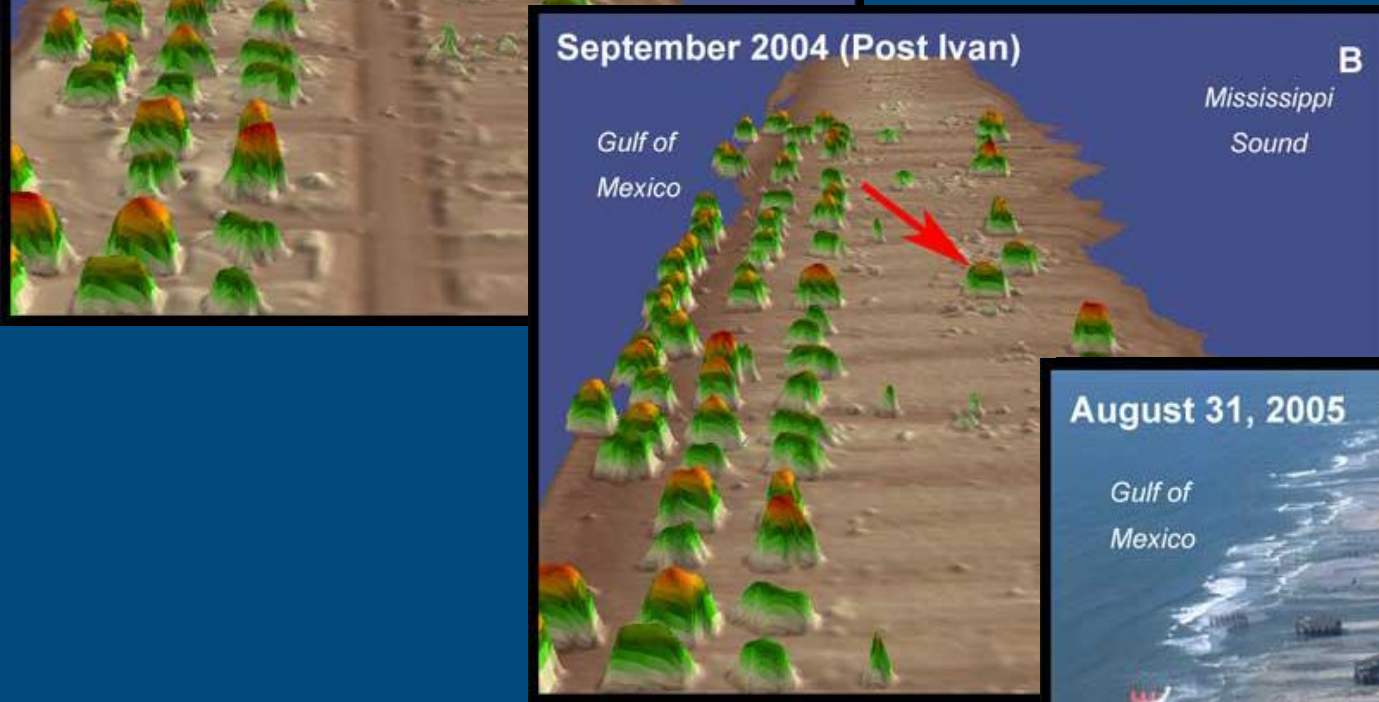


September 2004 (Post Ivan)

B

Mississippi
Sound

Gulf of
Mexico



August 31, 2005

D

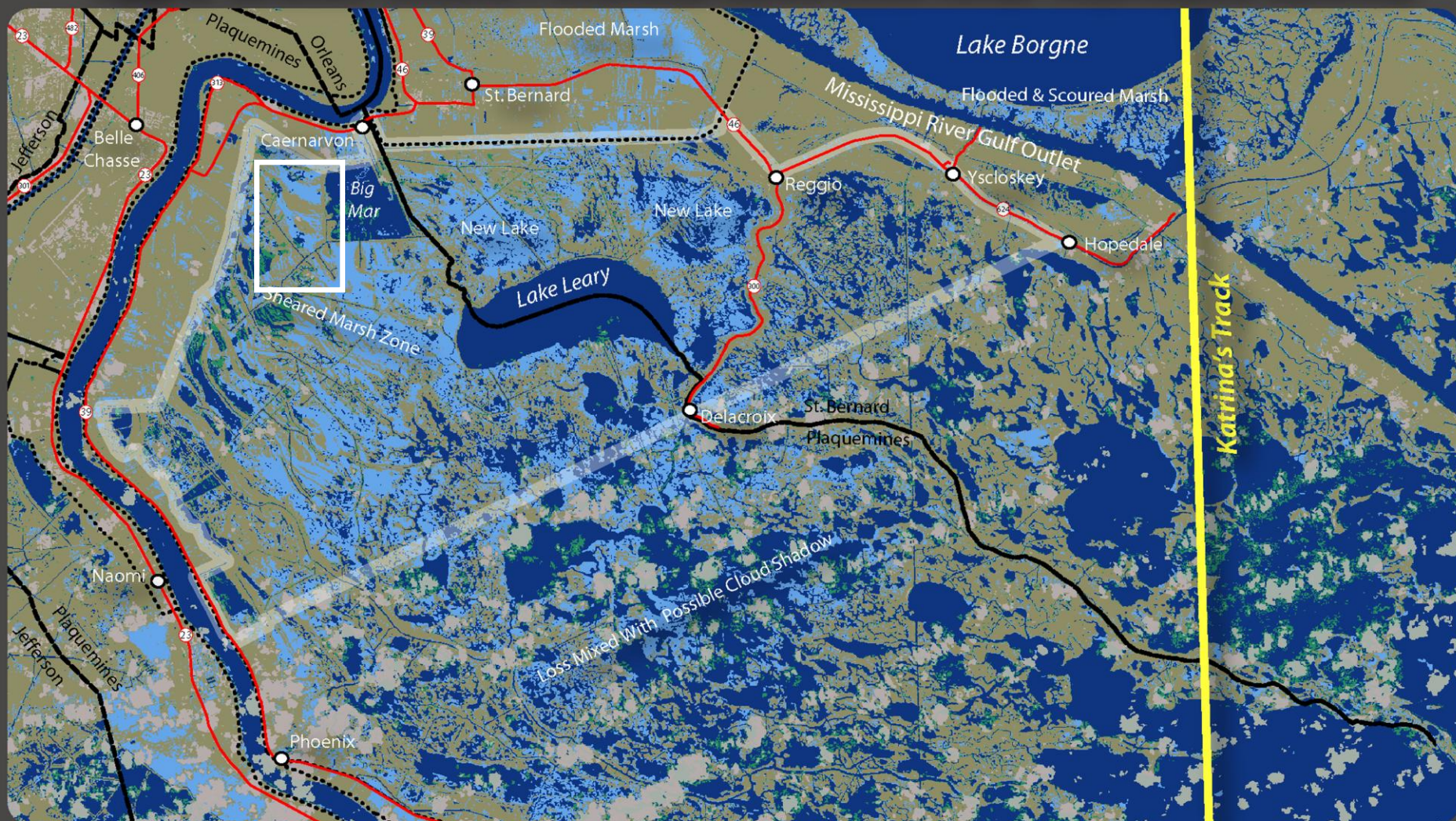
Mississippi
Sound

Gulf of
Mexico



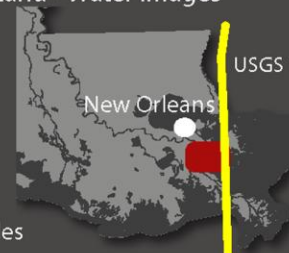
Dauphin Island, AL

Upper Breton Sound Potential Land Loss After Hurricane Katrina



Change Map November 7, 2004 to September 7, 2005 Based on Classified Landsat Thematic Mapper 5 Satellite Land - Water Images

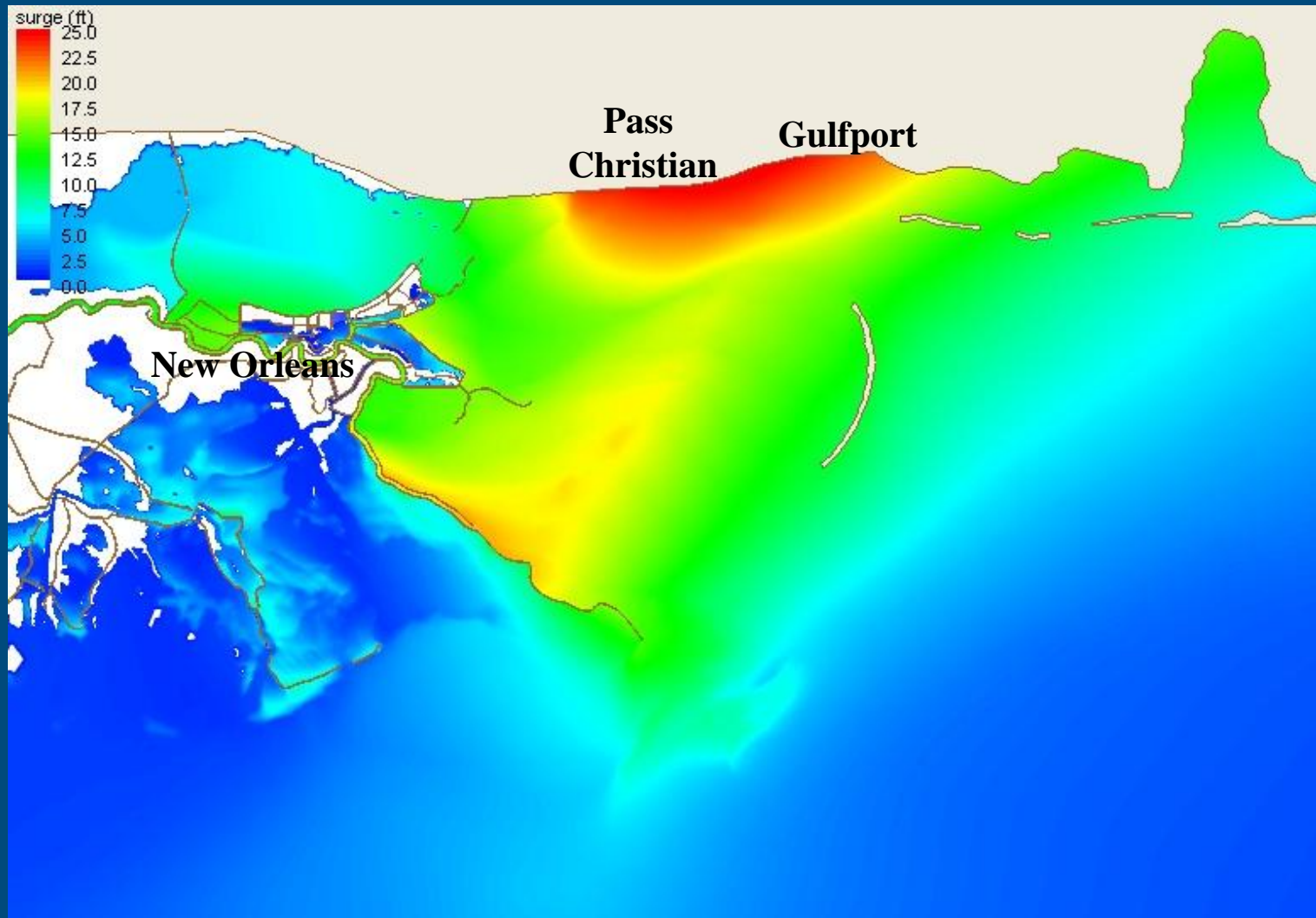
- Trend Area
- Land
- Water
- Potential Land Loss - Includes flooded marsh, sheared/eroded marsh, and scoured marsh
- Land Gain or Clouds
- Unvegetated Area and Clouds
- Main Levees
- Parish Boundary
- Towns
- State Highways



USGS National Wetlands Research Center
Coastal Restoration Field Station
Draft: September 13, 2005



Times Picayune photo



Hurricane Katrina Hindcast
Source: Hassan Mashriqui, LSU Hurricane Center

How to protect and restore natural coastal defenses

Examples of protection:

- Reduce stresses on natural systems that create and maintain them
- Prohibit alterations that directly or indirectly affect the integrity of the barriers
- Set back zones for development to allow migration as sea level rises



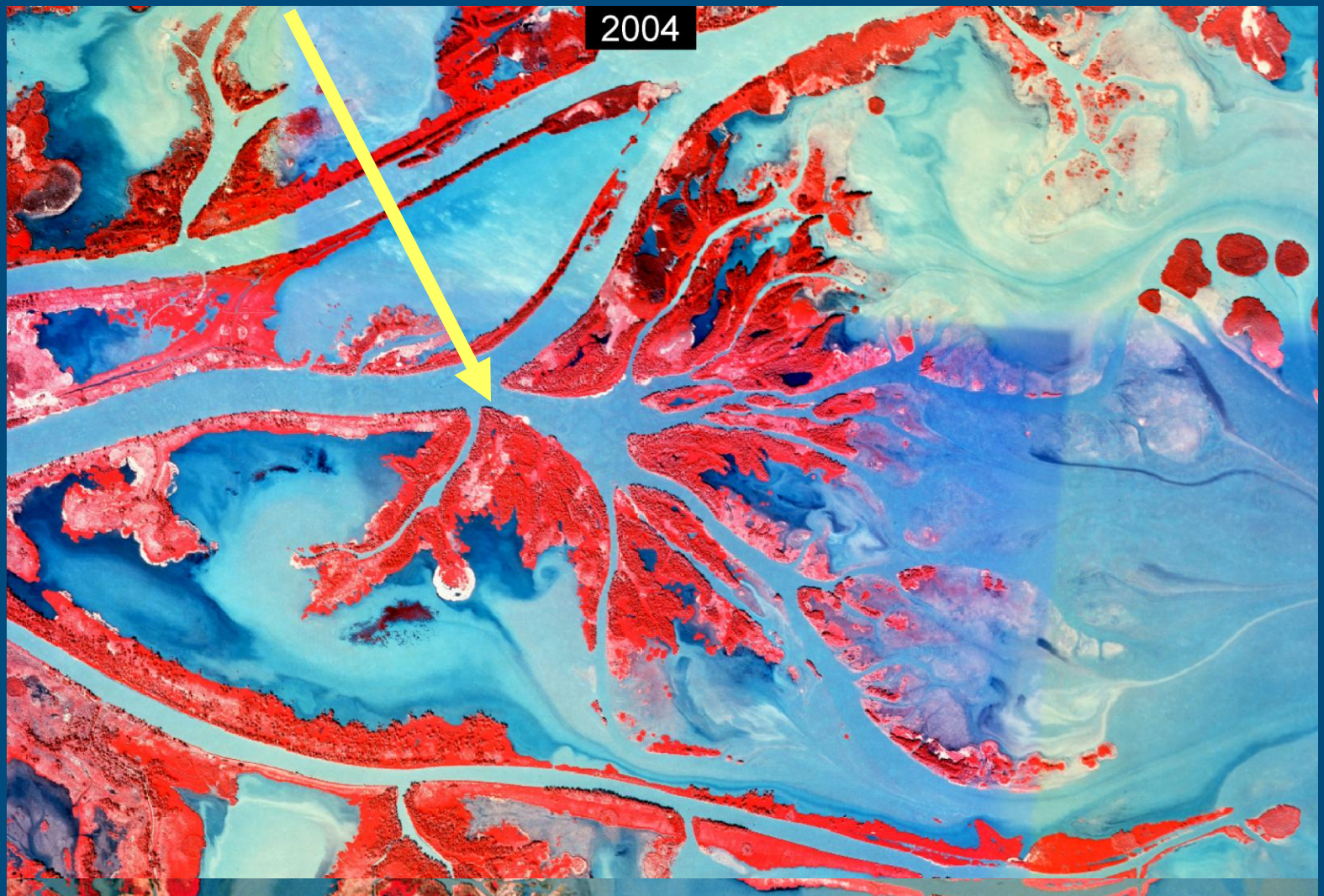
How to protect and restore natural coastal defenses



Examples of restoration:

- Beach nourishment
- Use of vegetation to create dunes or stabilize marsh sediments
- Beneficial use of dredged spoil
- Removal/construction of hard structures to prevent erosion
- Restore natural hydrology

Crevasse in Mississippi River



How effective, costly and timely are these methods?



- Restoration that mimics natural processes is more effective.
- Change is inherent in nature's

