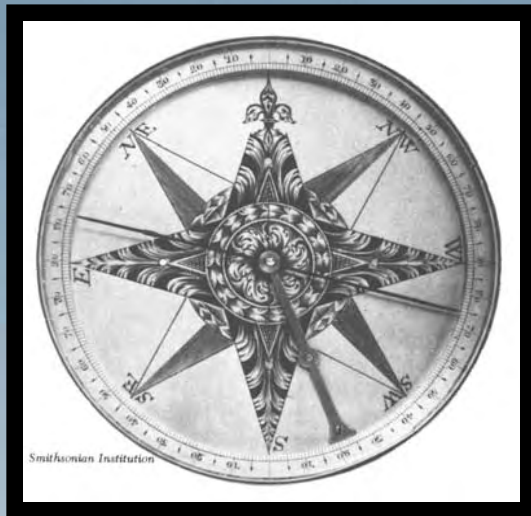


NOAA's Integrated Response to Hazards: A Navigation Services Perspective

Captain Steve Barnum, NOAA
January 25, 2006

Overview



- Introduction to NOAA's Mission Goal, Commerce and Transportation
- NOAA Navigation Services before, during, and after a hazardous event
- Assessing NOAA's Navigation Services response activities
- Planning for the future

The NOAA Big Picture

NOAA Headquarters

Oceanic and
Atmospheric
Research

National
Environmental
Satellite, Data
and Information

National Ocean
Service

National
Weather
Service

Program
Planning
and Integration

NOAA Marine
and Aviation
Operations

National Marine
Fisheries
Service

Ecosystem Goal Team

Climate Goal Team

Weather and Water Goal Team

Commerce and Transportation Goal Team

NOAA Commerce and Transportation

- Marine Transportation System (MTS)
- Geodesy
- Aviation Weather
- Marine Weather
- Surface Weather
- Emergency Response



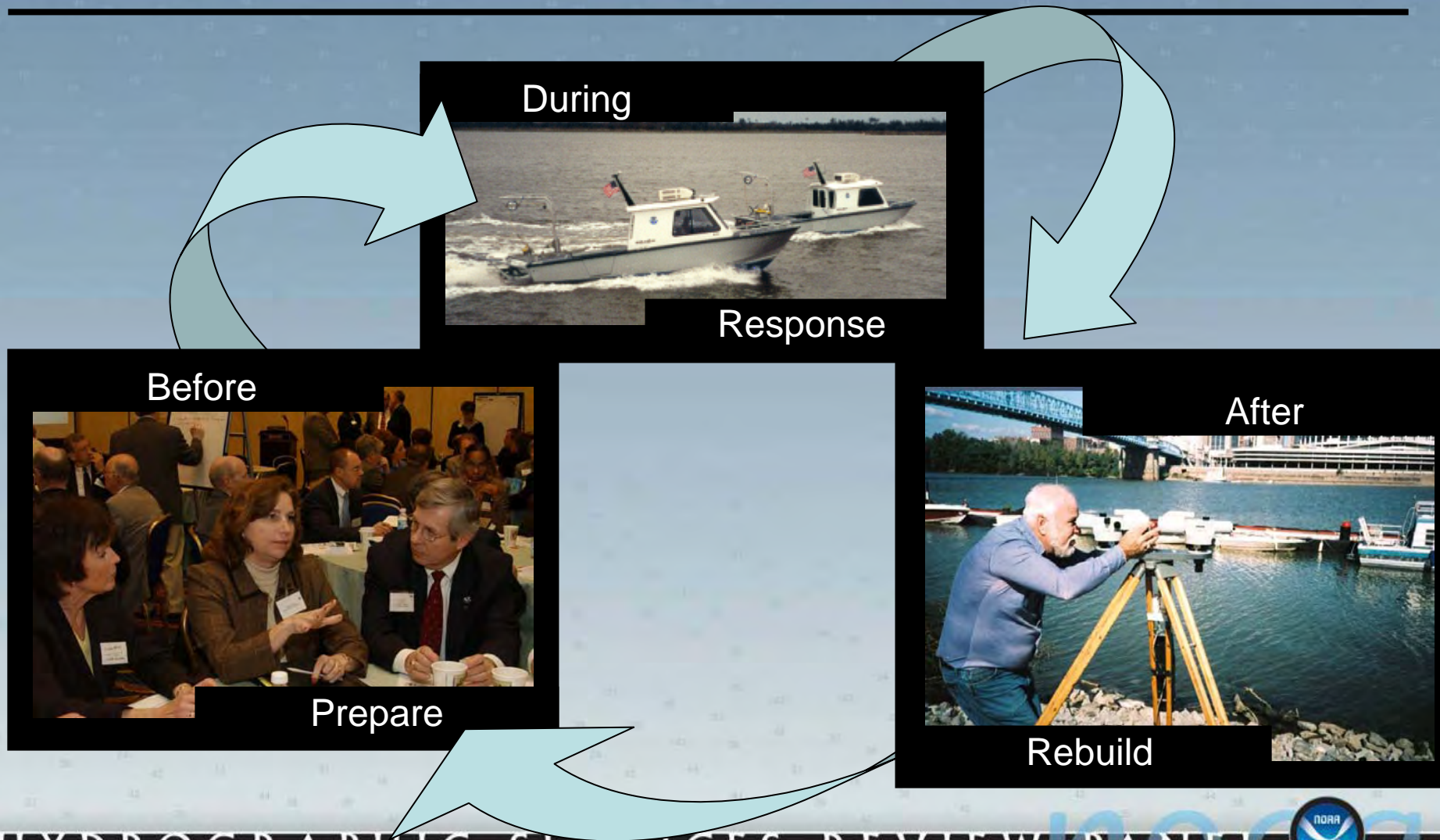
C&T Overview

Information that Moves America



- NOAA has enhanced the American Public's ability to:
 - Know where they are
 - Get where they are going safely and efficiently
 - Make appropriate decisions for a safe, secure, efficient, and environmentally sound transportation network.
- NOAA's essential services are uninterrupted and available during emergencies and critical events

NOAA & Hazards



Prepare

Strong local partnerships ensure an integrated response to hazards



A NOAA Wide Approach



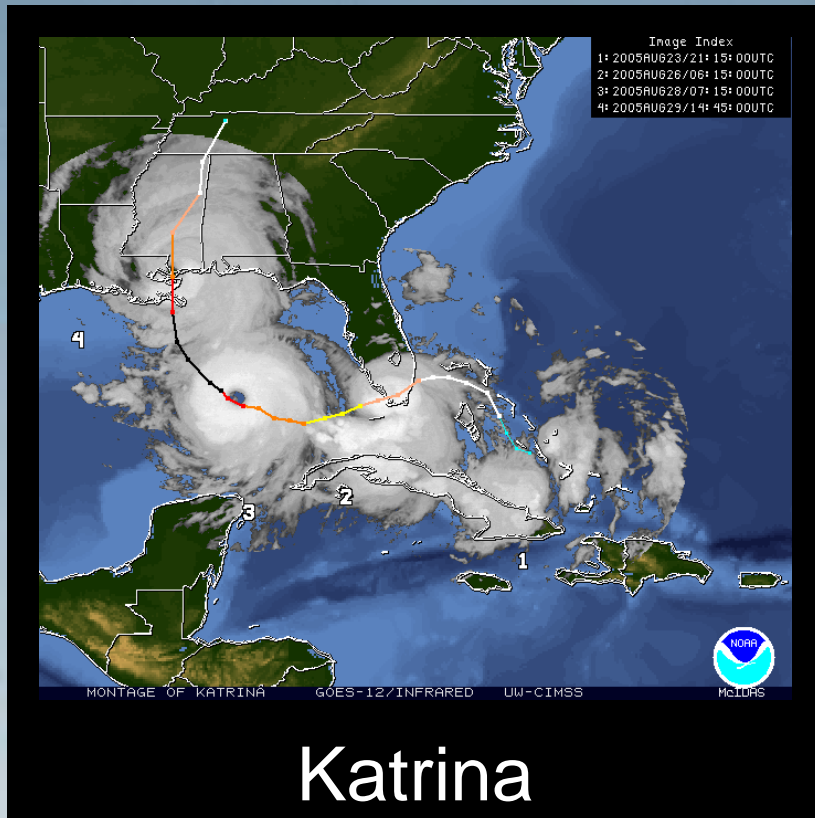
- National Response Plan
 - Emergency Support Function (e.g., #10 - Oil and Hazardous Materials Response)
- NOAA Incident Coordination Center
- Homeland Security Operations Center (HSOC)

NOAA's support of the Marine Transportation System



- Nautical Charts
- Hydrographic Surveys
- Spatial Reference Network (Horizontal and Vertical)
- Water Level and Current Data, PORTS®
- Marine weather information and models
- Shoreline data
- Regional liaisons to the local community

Hurricanes Katrina and Rita



Two situations that highlight
NOAA's readiness and response abilities

The Response Team

Team NOAA

- NWS
- NESDIS
- OAR
- NOS
- NMAO
- CIO

The Larger Team

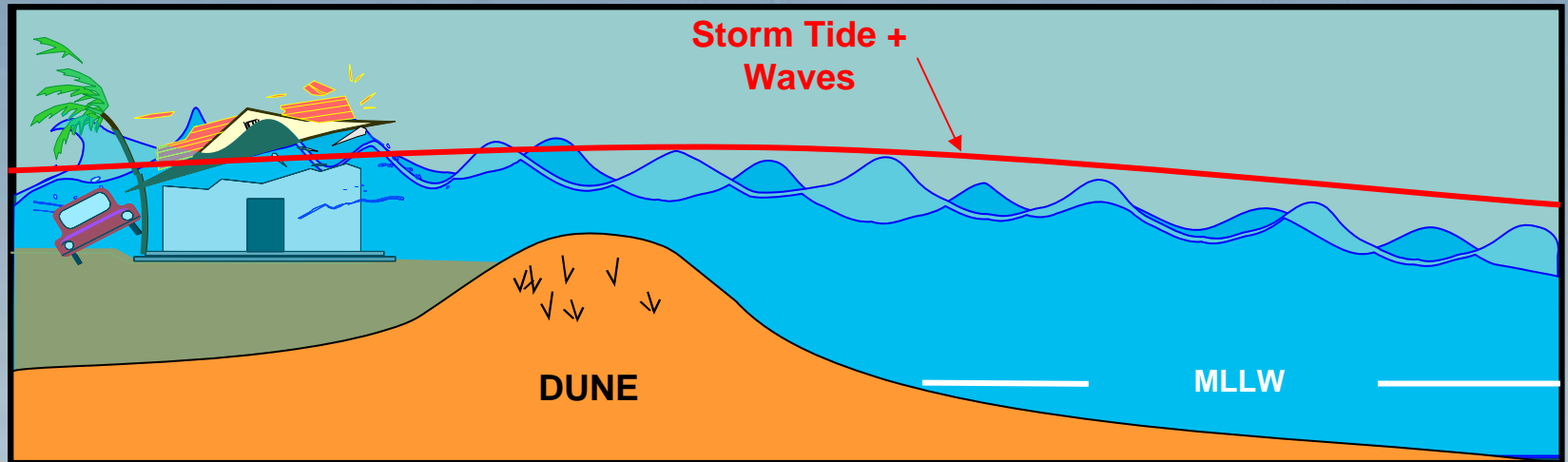
- USCG, USACE, USN, USAF
- Maritime Pilots
- Port Authorities
- Private Sector
- Federal, State, and Local Emergency Managers

Navigation Services Response



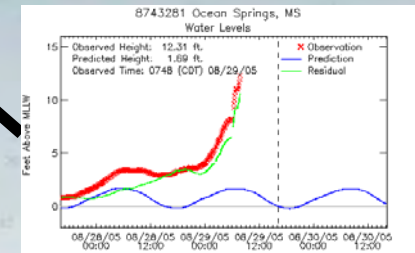
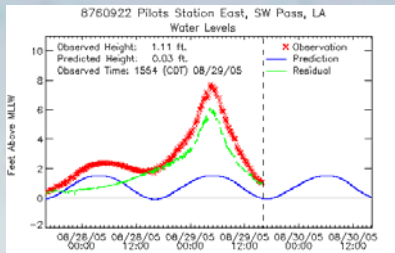
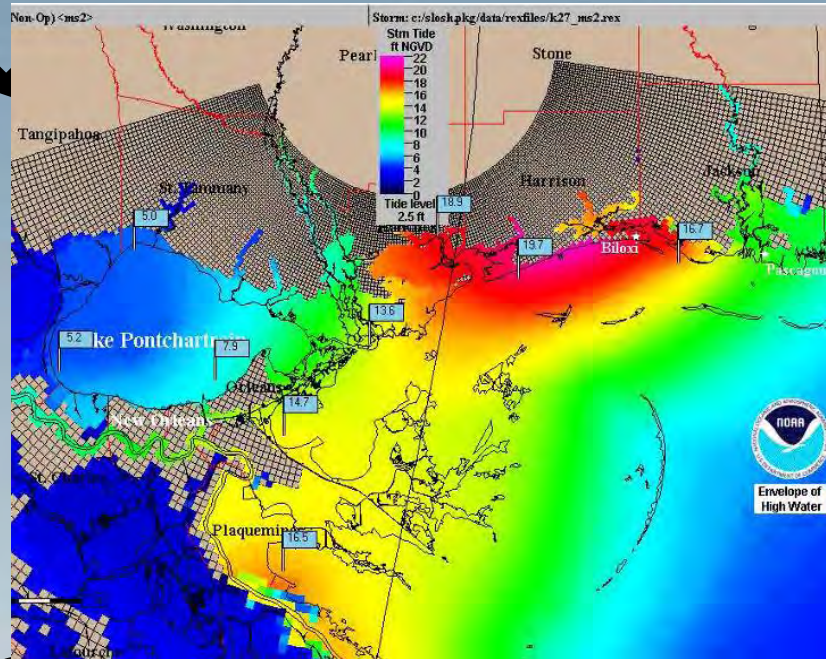
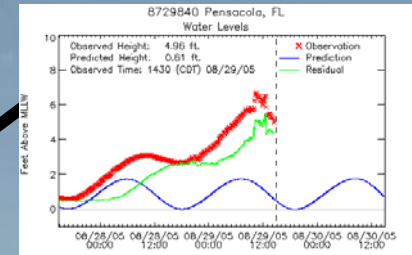
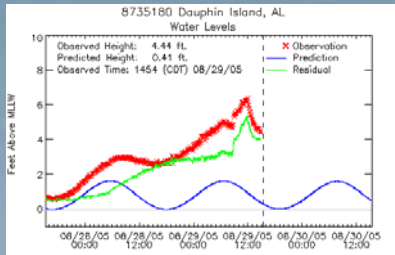
- Surge Models
- Navigation Surveys
- Aerial Photography
- Water Levels and PORTS®
- National Spatial Reference System (CORS)
- Hazardous Materials Response

NOAA Hurricane Storm Tide



National Hurricane Center Utilization of Real-Time Storm Tide data

Storm Surge Forecast



SLOSH Model



Navigation Surveys

- Surveys allowed critical ports and harbors to open to commercial and emergency vessel traffic sooner
- Navigation Response Teams, NOAA Ships Nancy Foster and Thomas Jefferson, and private sector contract survey companies surveyed rivers and ports to ensure waterways were clear of hazards





NOAA Hurricane Katrina and Rita Response: Emergency Hydrographic Surveys

In Support of Reopening Ports and Waterways

Office of Coast Survey and Office of Marine and Aviation Operations

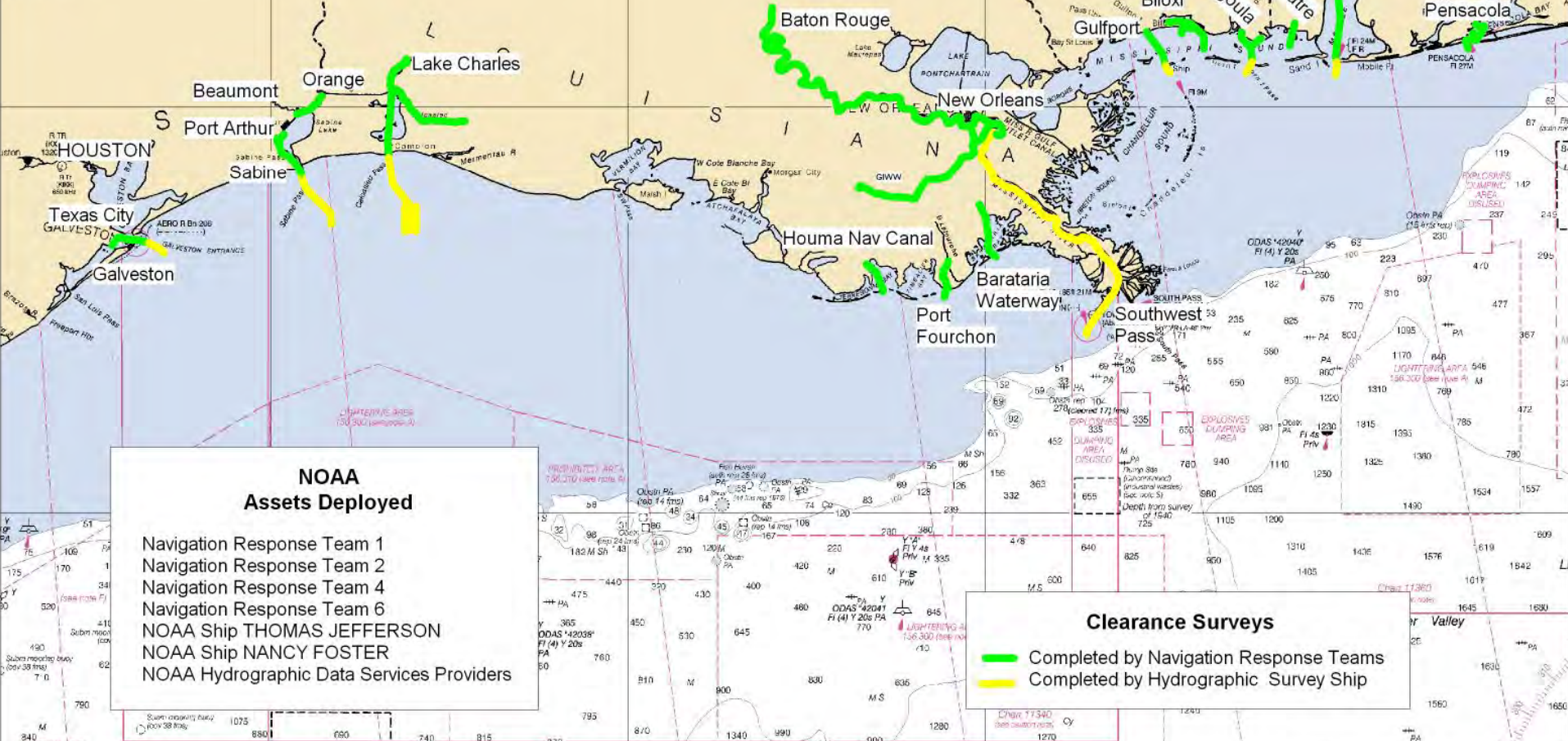
charts issued by the National
Oceanic and Atmospheric Administration
U.S. Department of Commerce
National Geographical Society.

charts issued by the National
Oceanic and Atmospheric Administration
U.S. Department of Commerce
National Geographical Society.

COPYRIGHT
No copyright is claimed by the United States Government
under Title 17, U.S.C. However, other nations may claim
intellectual property rights on the compilation of data depicting
the foreign waters shown on this chart.

Chart No.	Chart Name	Scale	Year
1132	East of Fowey Rocks (5 stations)	3 h	00 m
1133	South of Rebecca Shoal (5 stations)	3 h	40 m
1134	Between Yucatan and Cuba (5 stations)	3 h	24 m

charts issued by the National
Oceanic and Atmospheric Administration
U.S. Department of Commerce
National Geographical Society.



NOAA Assets Deployed

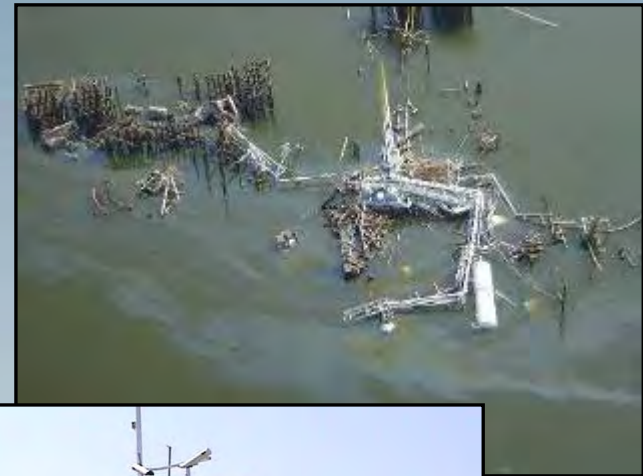
- Navigation Response Team 1
- Navigation Response Team 2
- Navigation Response Team 4
- Navigation Response Team 6
- NOAA Ship THOMAS JEFFERSON
- NOAA Ship NANCY FOSTER
- NOAA Hydrographic Data Services Providers

Clearance Surveys

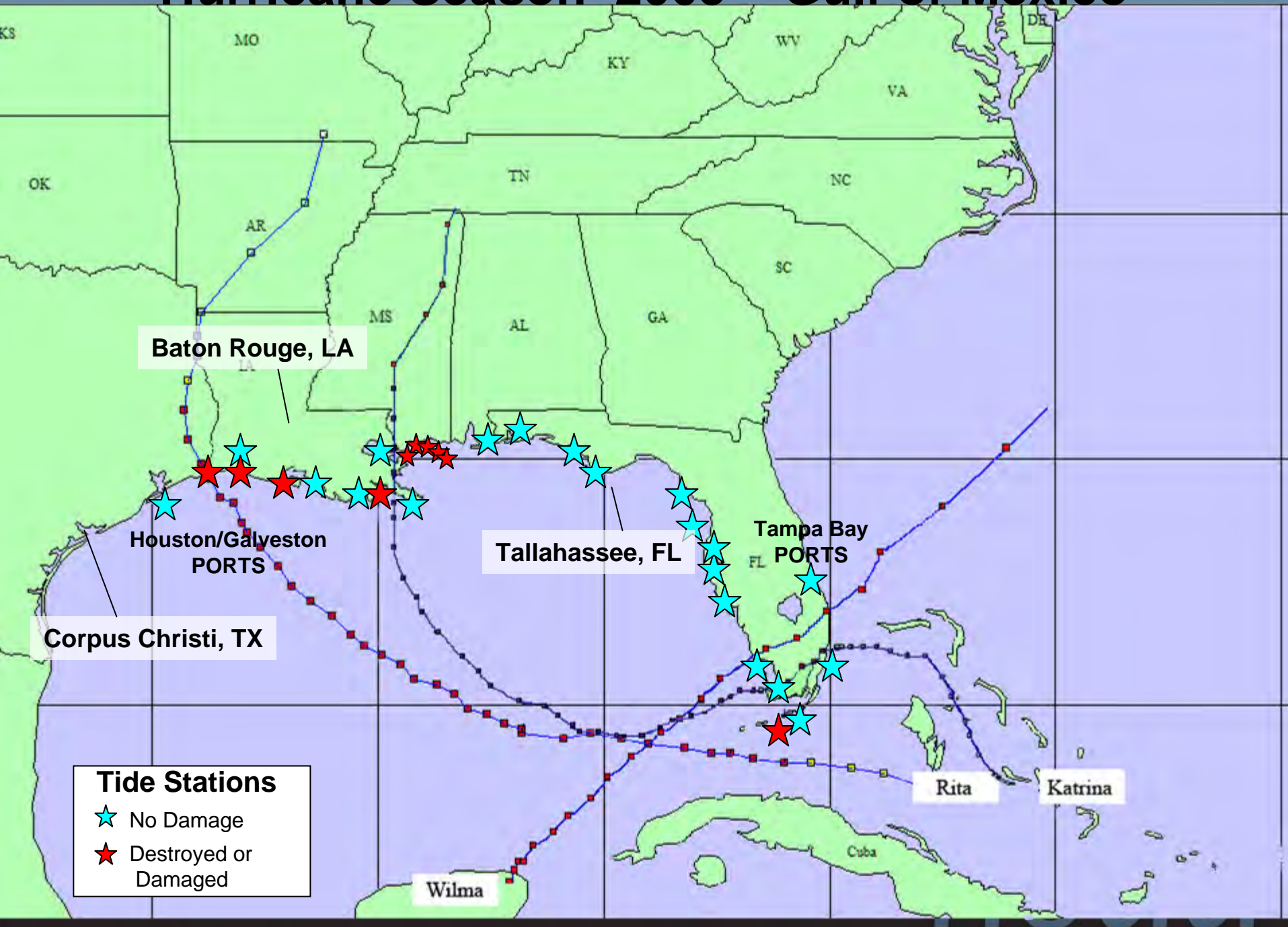
- █ Completed by Navigation Response Teams
- █ Completed by Hydrographic Survey Ship

Water Level Support of Hydrographic Surveying

The rapid restoration of water level gauges was essential to hydrographic survey operations by Coast Survey supporting restoration of shipping in damaged ports.



Hurricane Season 2005 – Gulf of Mexico



Baton Rouge, LA

Houston/Galveston PORTS

Corpus Christi, TX

Tallahassee, FL

Tampa Bay PORTS

Wilma

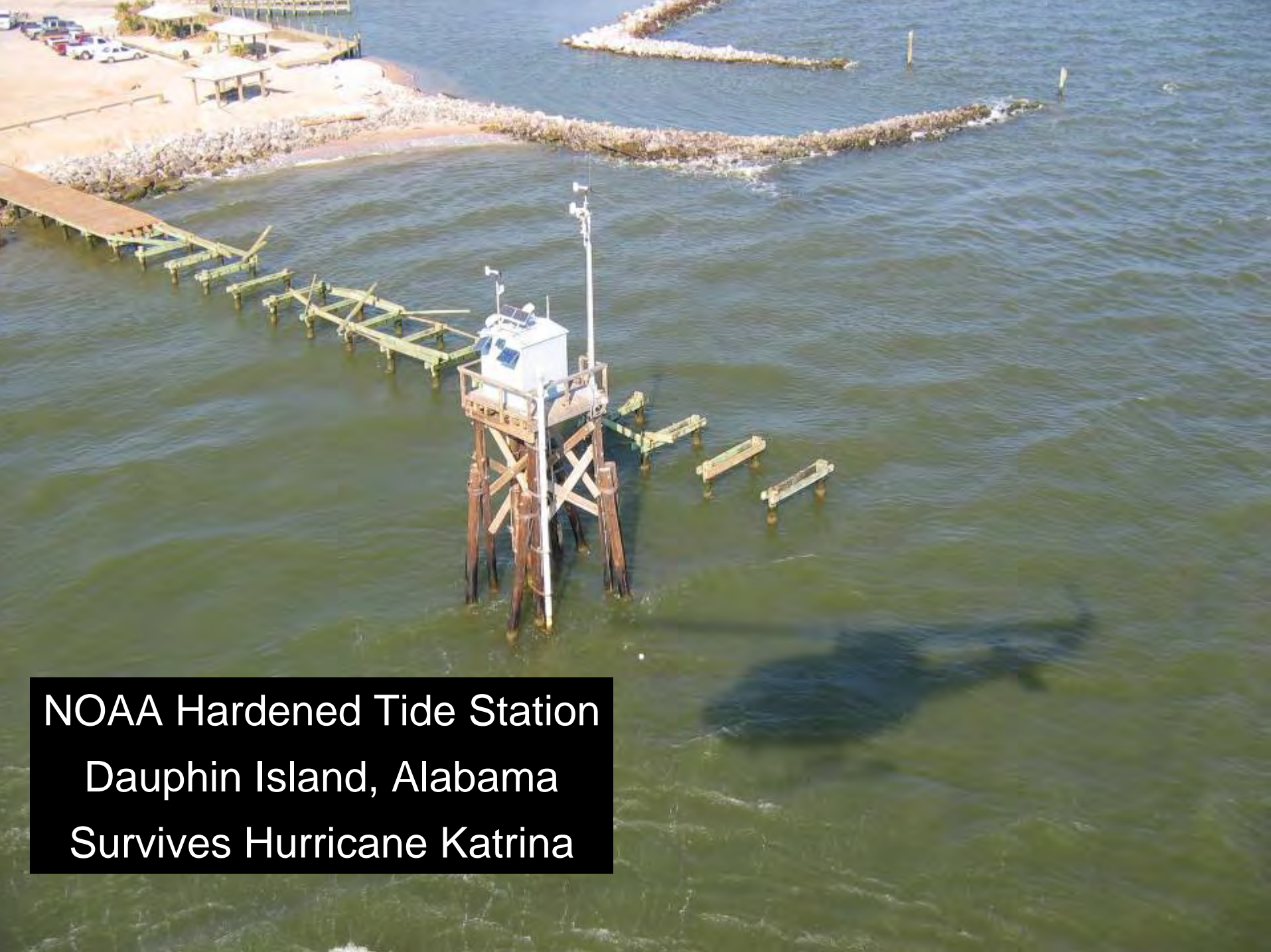
Rita

Katrina

Cuba

Tide Stations

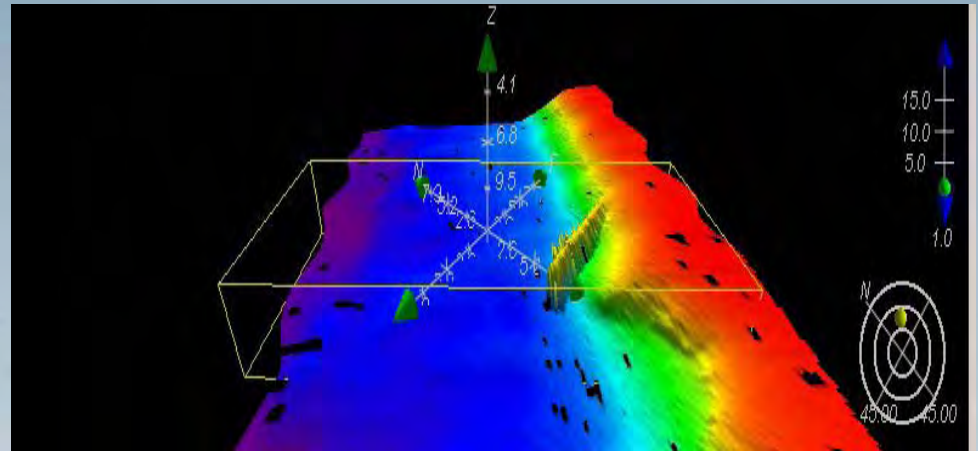
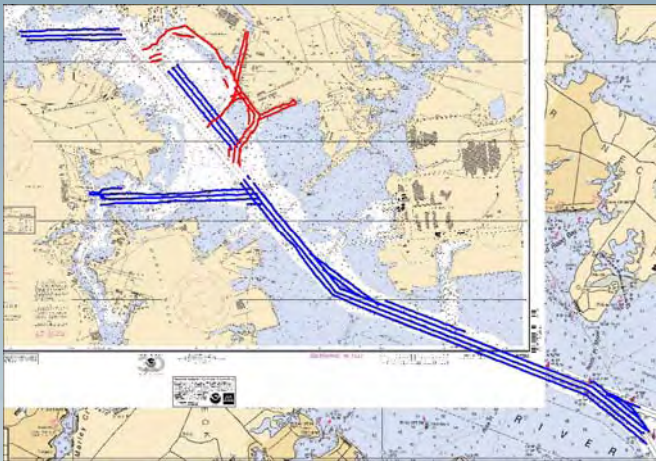
- ★ No Damage
- ★ Destroyed or Damaged



NOAA Hardened Tide Station
Dauphin Island, Alabama
Survives Hurricane Katrina

Obstructions and Salvage

NOAA coordinates closely with USACE and USN to identify and remove navigationally hazardous obstructions



Aerial Photography

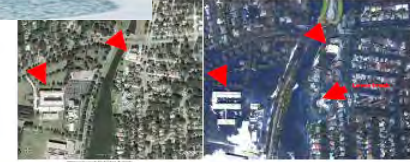
- Collected 10,000 digital aerial images and partnered with private industry to make images available to the public
- Used for
 - damage assessments
 - public information
 - spill response prioritization
 - search & rescue
 - access routes for Navigation Response Teams



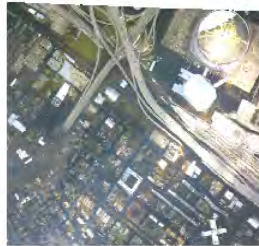
ans, Louisiana



NOAA Damage Assessment Imagery of Hurricane Katrina



New Orleans, Louisiana



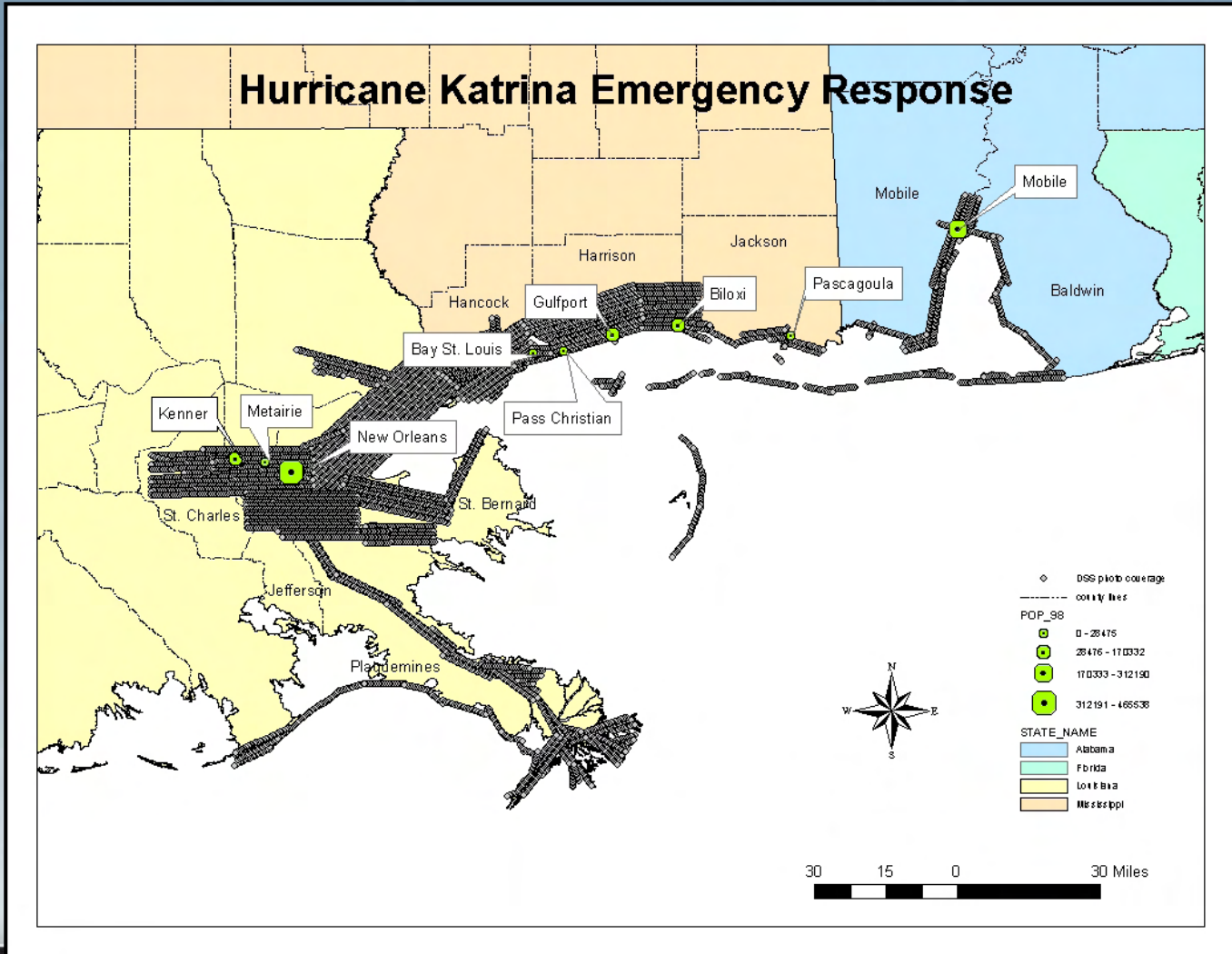
Biloxi, Mississippi



East of Bay St. Louis, Mississippi



Aerial Coverage Map



9 Days

19 Flights

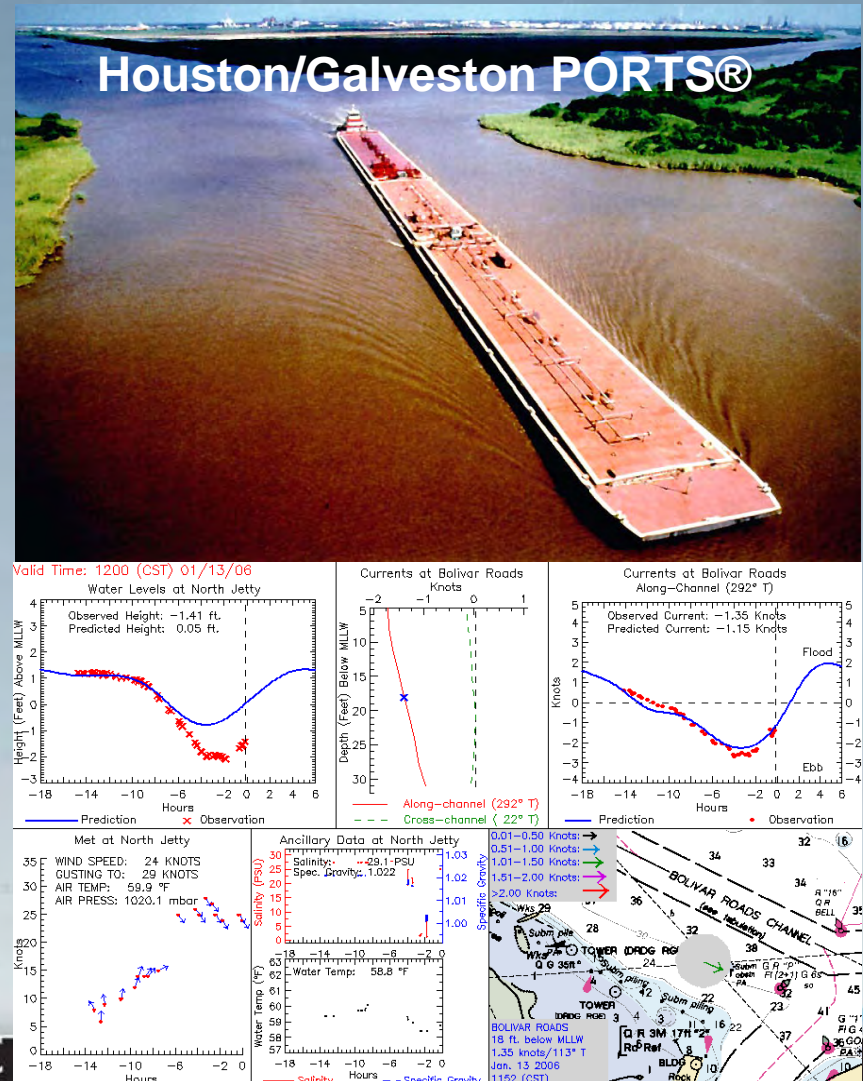
8327 images

**40 Terabytes
downloaded**



PORTS[®] Operations Following Hurricane Rita

- Physical Oceanographic Real-Time Systems (PORTS[®]) was important to the rapid restoration of shipping operations in Houston and Galveston.



Water Levels and PORTS®

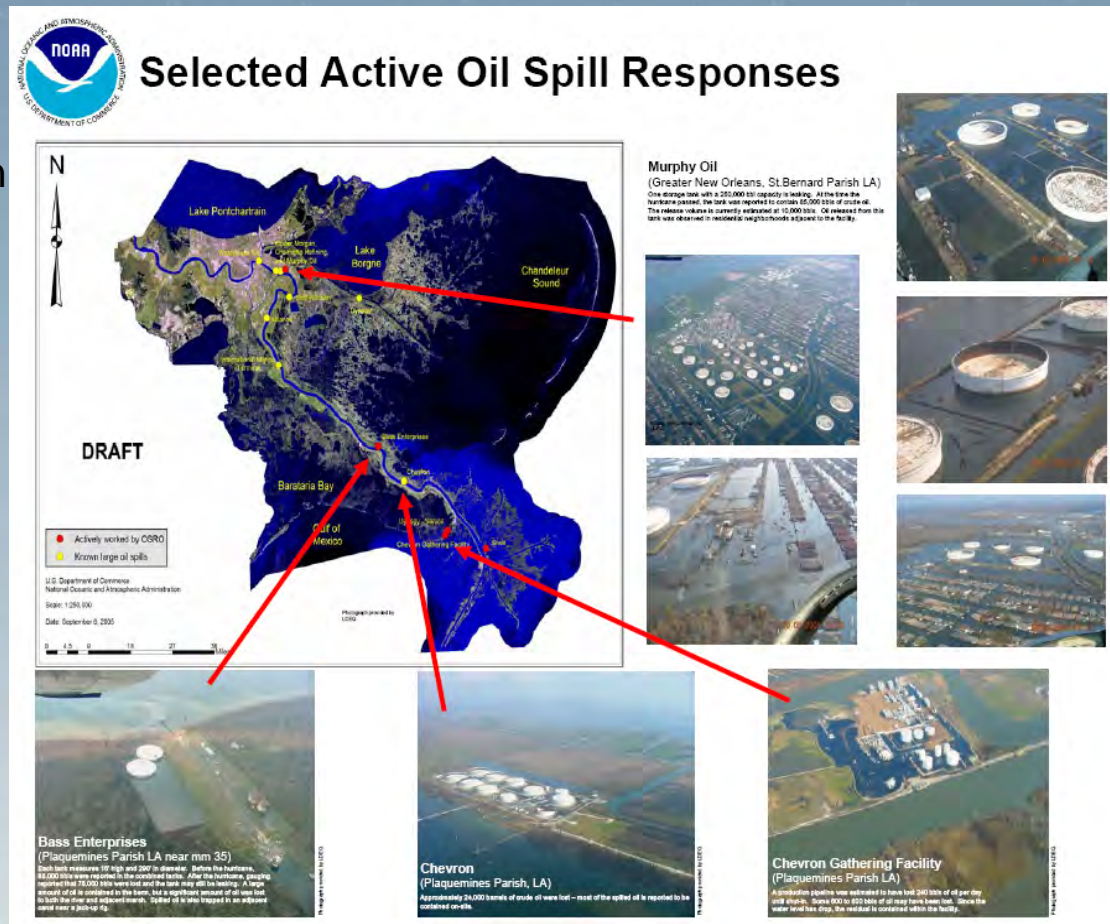


17th Street Canal Breach

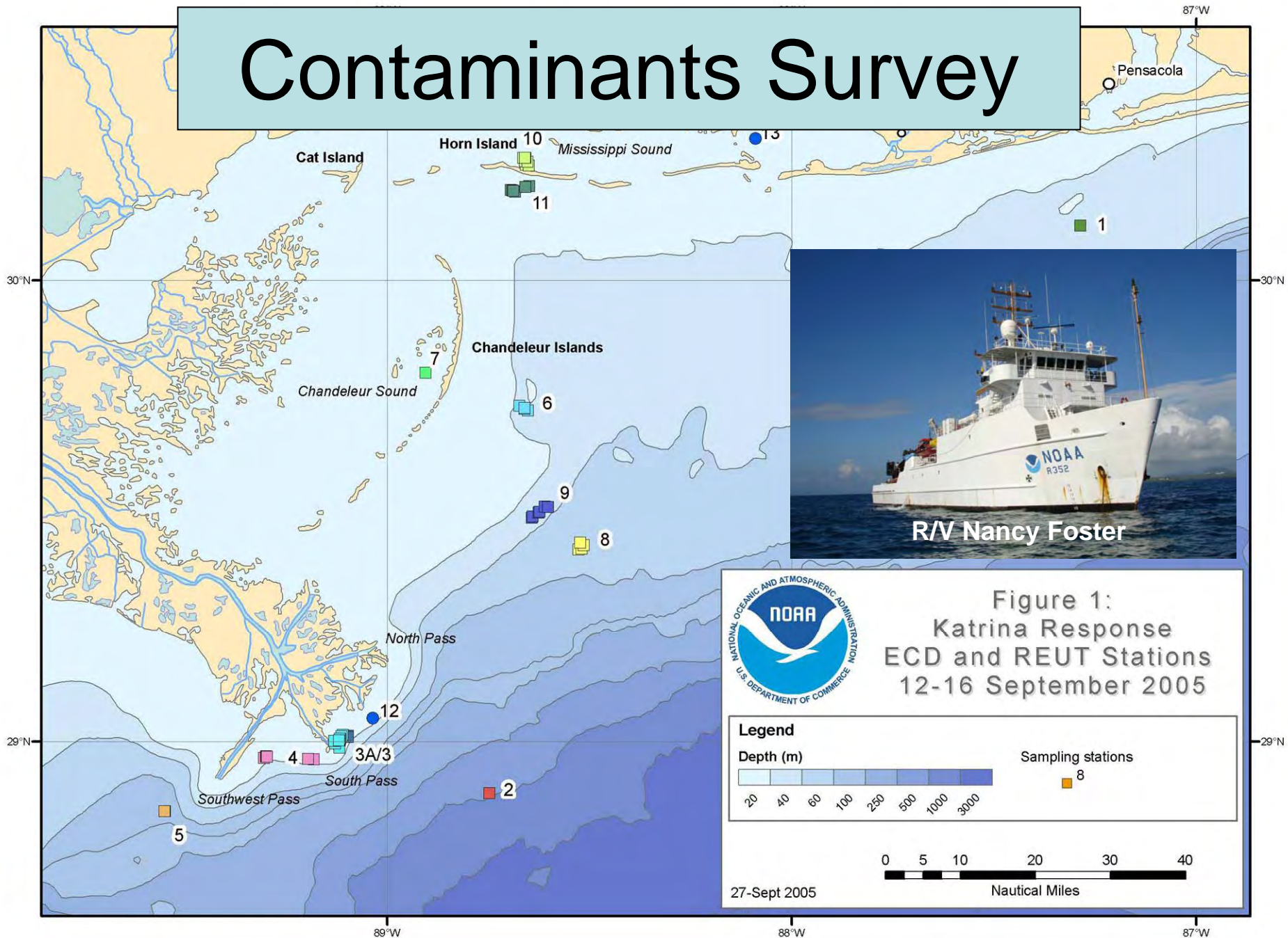
- Water level measurements, forecasts, and PORTS® data used
 - to support NWS storm surge models
 - to support NOAA Hydrographic Survey operations supporting restoration of shipping in damaged ports
 - U.S. Army Corps of Engineers plans to rebuild New Orleans levees

Hazardous Materials

- NOAA information products used for planning and response operations throughout impact region
- Working with Federal, State, and local agencies to identify, assess, prioritize, and mitigate oil and hazardous material spills
- Providing guidance on vessel salvage, conducting shoreline cleanup assessments, and collecting information to assess impacts to natural resource from spills



Contaminants Survey



NOAA Private Sector Partnerships



- Private contract support allows NGS, OCS, CO-OPS to accomplish the missions
 - Survey Support
 - Aerial Photography
 - Observations
 - Infrastructure Support (e.g., PORTS®)

Rebuild

- Critical Issues
 - Navigation Chart Updates
 - Spatial Reference System
 - Water levels and PORTS®
 - Critical data for accurate surge models

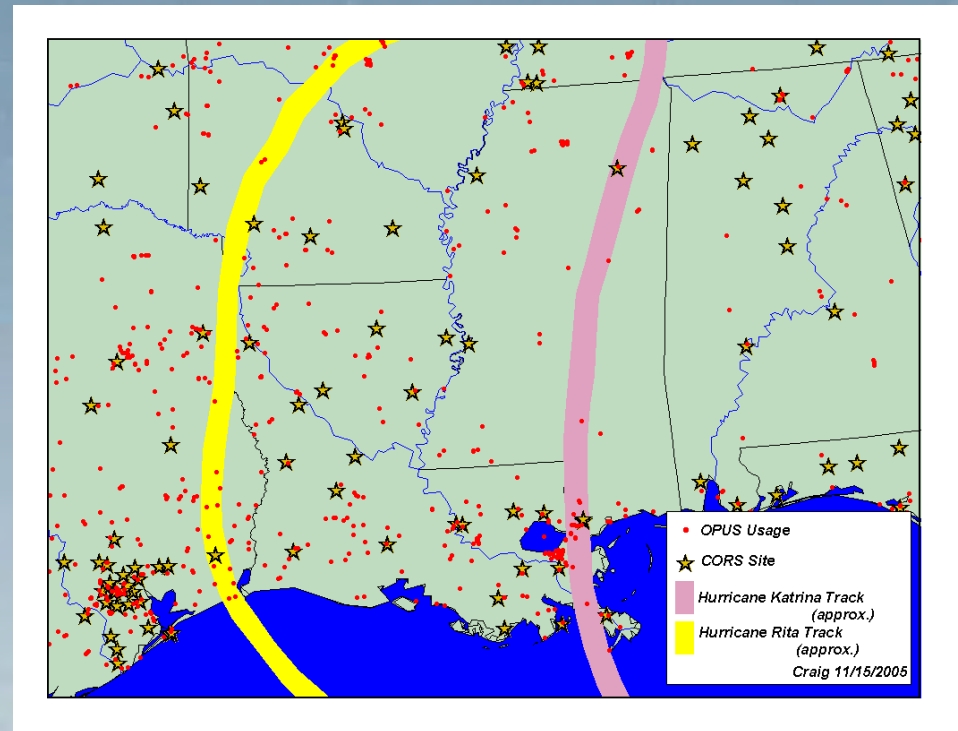


Nautical Chart Updates

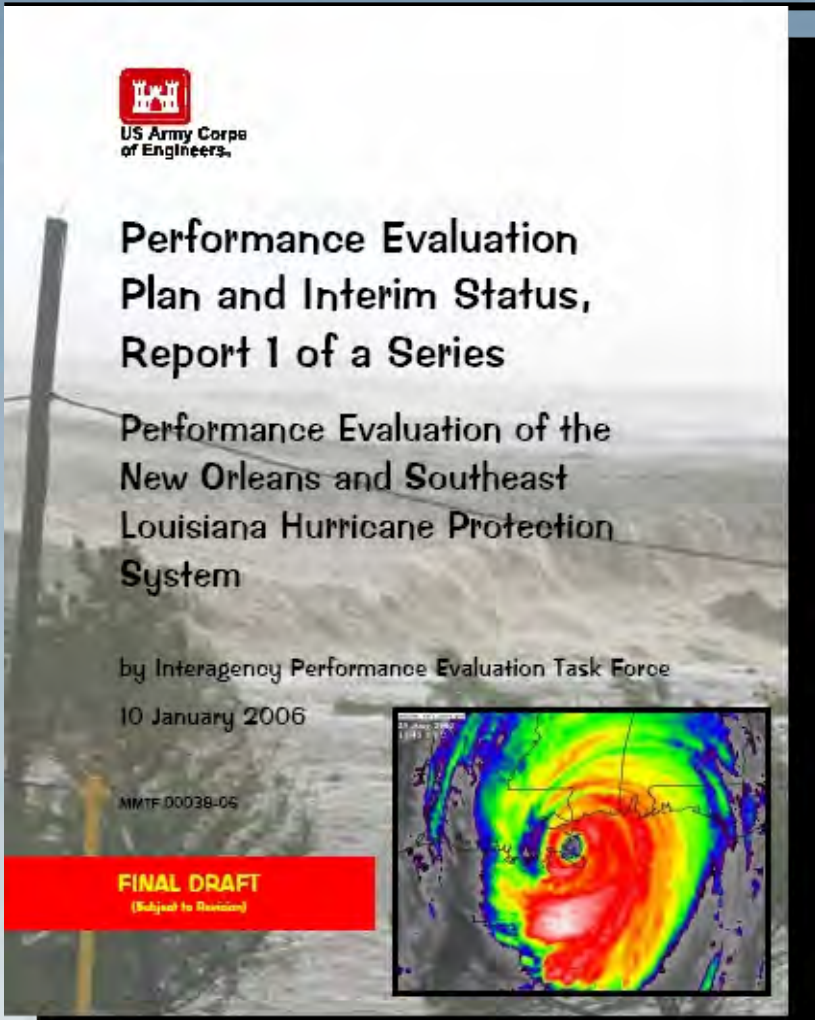
- Priorities
 - Critical Areas (Ports, Waterways)
 - Requested Surveys (FEMA, USACE)
- 500K of Square Nautical Miles
 - 70,000 Gulf of Mexico
 - 300,000 Alaska


National Spatial Reference System

- Stars indicate local Continuously Operating Reference Stations (CORS) sites, which accurately track the aircraft that obtain aerial imagery.
- Dots indicate locations whose positions were computed by the On-line Positioning User Service following hurricane landfalls.



Water Levels and Elevation Data




US Army Corps
of Engineers

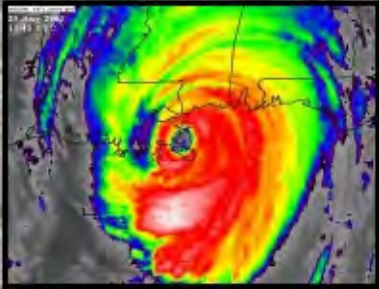
Performance Evaluation Plan and Interim Status, Report 1 of a Series

Performance Evaluation of the
New Orleans and Southeast
Louisiana Hurricane Protection
System

by Interagency Performance Evaluation Task Force
10 January 2006

MIMTF 00038-05

FINAL DRAFT
(Subject to Revision)

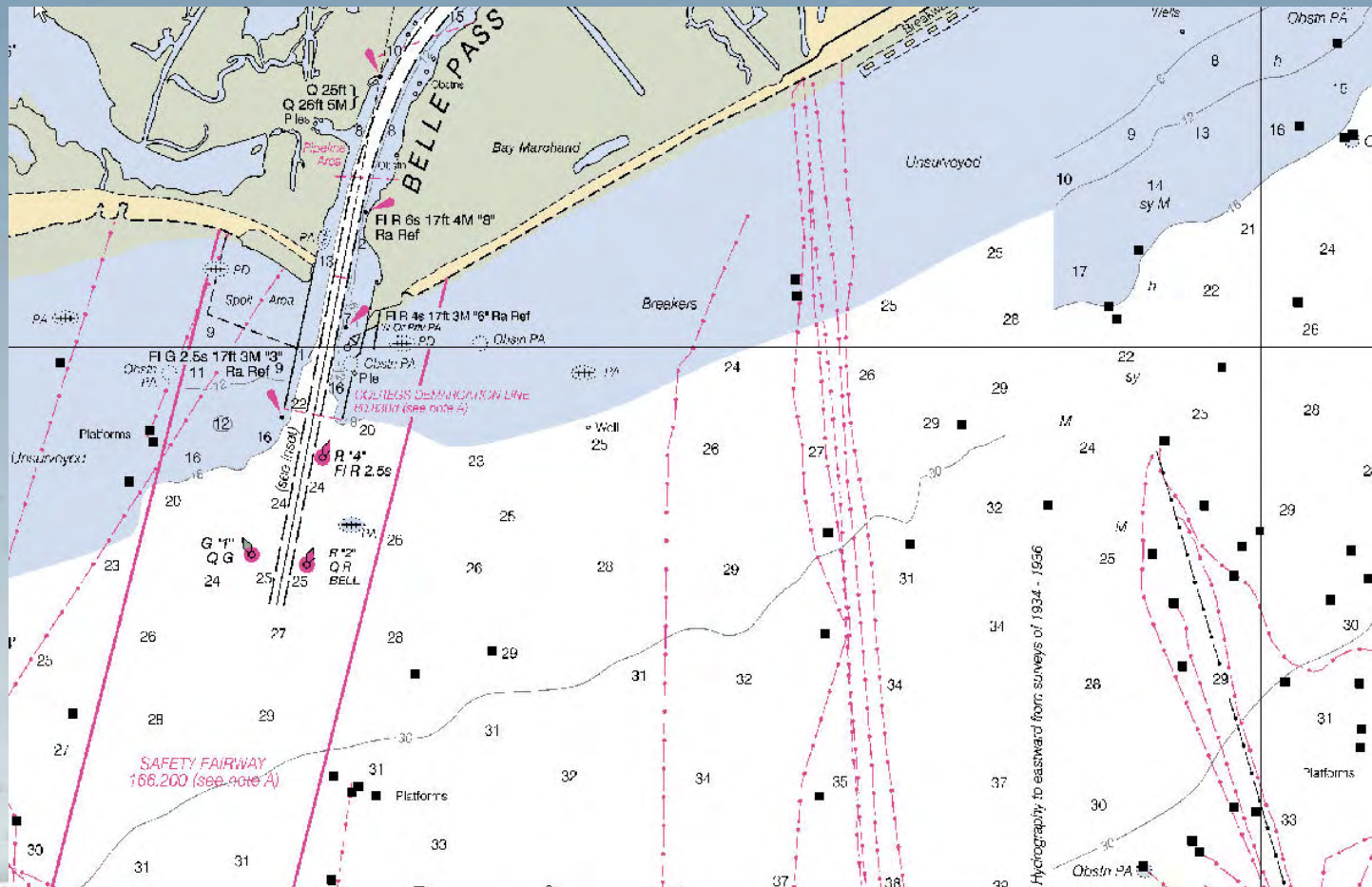


NOAA is Providing Water Level and Elevation Data to support the rebuilding of the hurricane protection systems and the transportation infrastructure

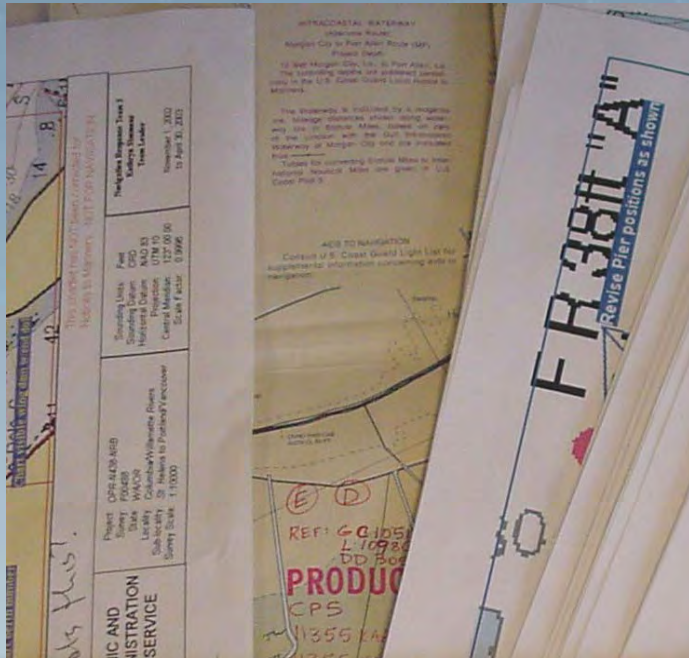


Critical Storm Surge Data

Elevation and Bathymetric Data



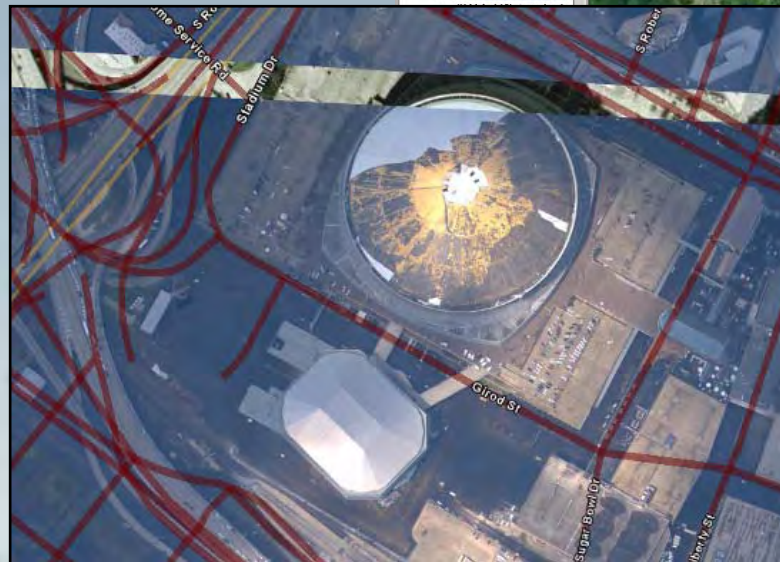
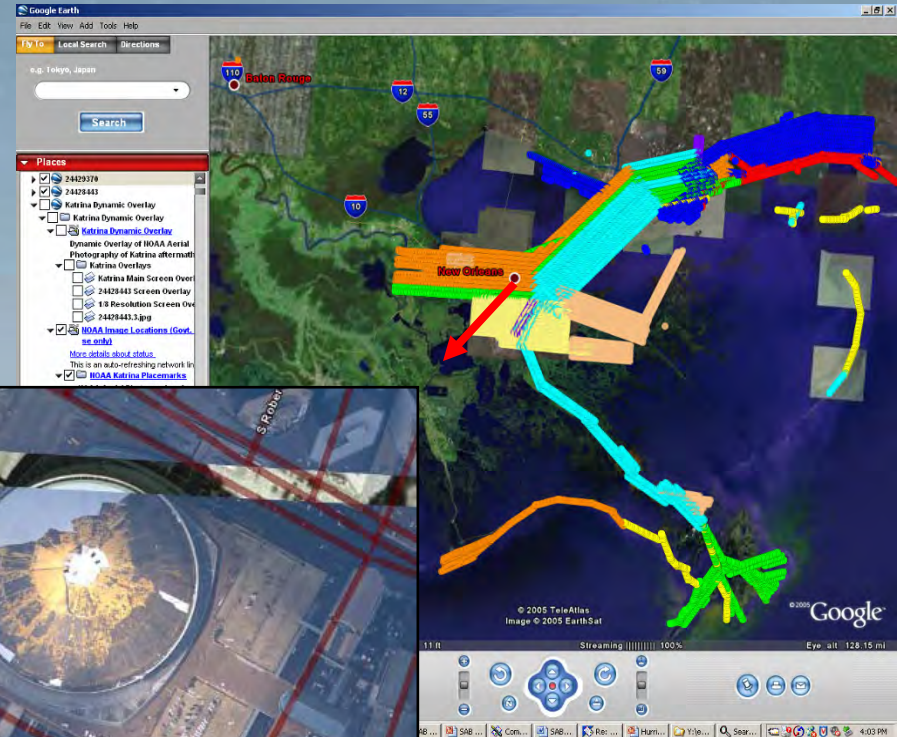
Next Steps



- Initial Assessment
- Assessment Activities
- Improvements Needed
- Future challenges

Initial Assessment

- Strong pre-existing relationships improve response effectiveness
- Flexibility and collaboration is essential
- NOAA needs to increase the depth of our essential capabilities



Assessment Activities

- Conducting a NOAA-wide Review of Operations and Services during Hurricanes Katrina and Rita
 - Review activities before, during, and after events
 - Emphasize perspective of customers and partners
 - Focus on readiness, communication, coordination, continuity of operations, and recovery

Accomplishments

The federal response "moved quickly and effectively to help save lives, restore services and keep supplies and commerce moving. Without the help of the public port authorities and agencies such as the Coast Guard and the Corps, NOAA and MARAD, the crucial services needed in times of crisis and the goods we depend on in our everyday lives may not be available with the timeliness that consumers and manufacturers require."

– Kurt Nagle, President/CEO of American Association of Port Authorities
September 13, 2005

"Less than two weeks after Katrina made landfall, ports along the Gulf coast and channels on the Mississippi River are once again navigational and safe for ship traffic. The National Oceanic and Atmospheric Administration, the federal agency responsible for providing the nation's nautical charts, has played a key role in a major interagency effort to ensure that navigational areas affected by Hurricane Katrina are clear of obstructions and debris."

– MarineLink.com, September 26, 2005

Improvements Needed

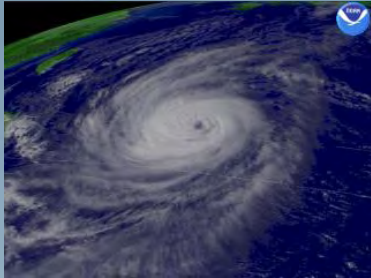
- Improving Capabilities
 - NRT 7 & 8
 - Hardening of Tide Gauges
- Storm Surge Forecast Models
 - VDatum Tool
 - Near Shore Bathymetry
 - Vertical Datum improvements (Height Modernization)
 - Water level measurements
 - Topographic data
- Fleet
 - Construction and Delivery of SWATH vessel not assured

Improvements Needed cont.

- Survey Technology Improvements
 - Multibeam Sonars
 - Light weight high resolution side scan sonar
 - Navigation Systems
 - Satellite Data Transmission
- Data Access
 - Alternate systems for disruption of land-based communications
 - Additional "bandwidth" to enhance NOAA's Internet delivery of imagery



Future Challenges



- Address Survey Backlog
- Complete and maintain Electronic Navigation Charts suite
- Increasing demand for PORTS[®] stations
- Densification of water level stations
- Complete the National height modernization effort
- Ability to respond to two simultaneous spills of national significance (SONS)

Conclusion

Hurricane 2006 Season starts in less than five months

- Partnerships were critical in helping NOAA respond to the Hurricane 2005 Season
- In the future, NOAA's success will depend upon its ability to prepare, respond, and rebuild



Alberto?

Beryl?

Chris?