

The Gulf of Mexico – Where Economy and Environment Coexist and Contend

Long-Term Monitoring and Ocean Observation is the key to a sustainable Gulf
Why is something so obvious so difficult to achieve?



***Dr. Larry McKinney, Executive Director
Harte Research Institute for Gulf of Mexico Studies
Texas A&M University Corpus Christi***





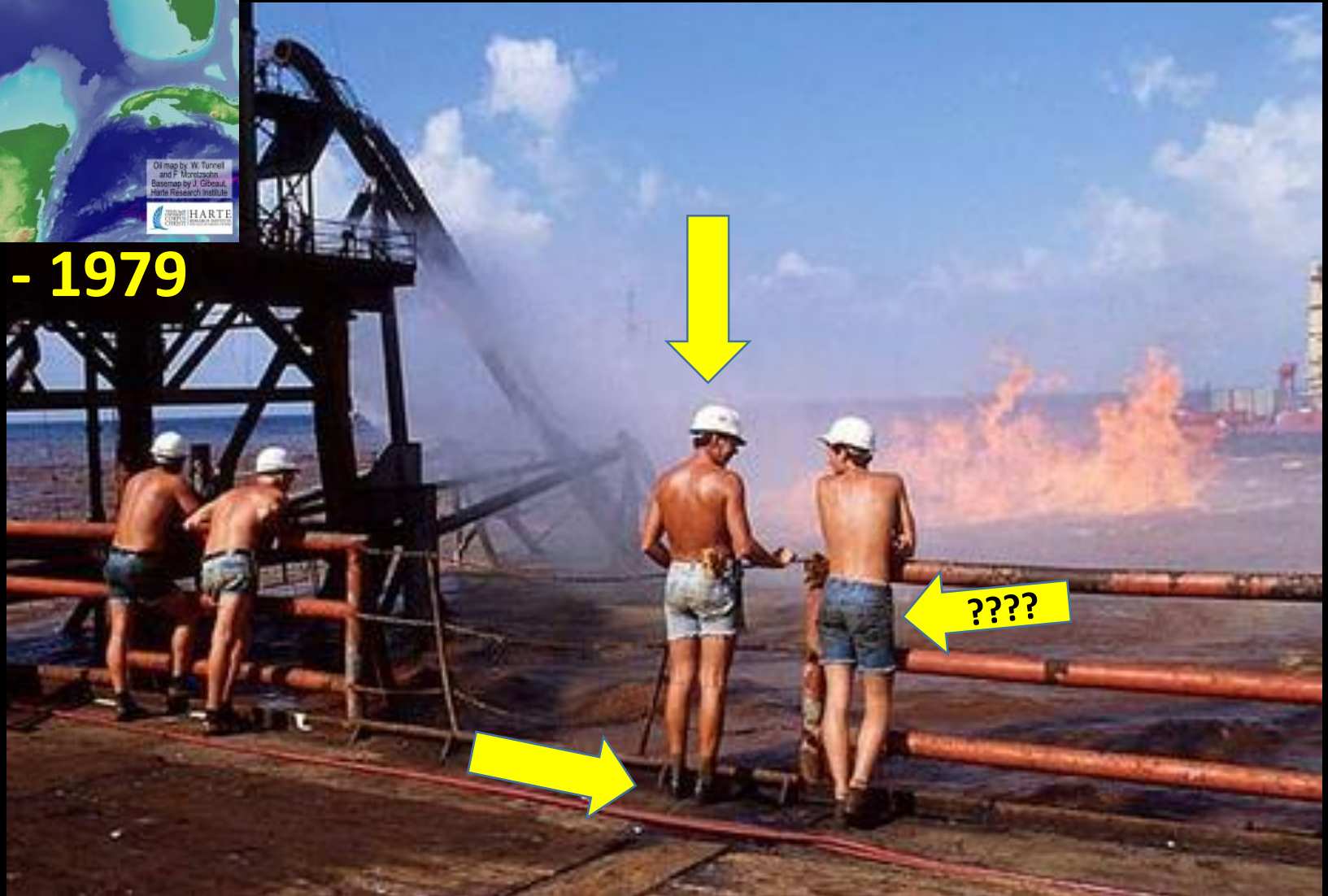


The Future ain't what it used to be

Yogi Berra, circa 1974

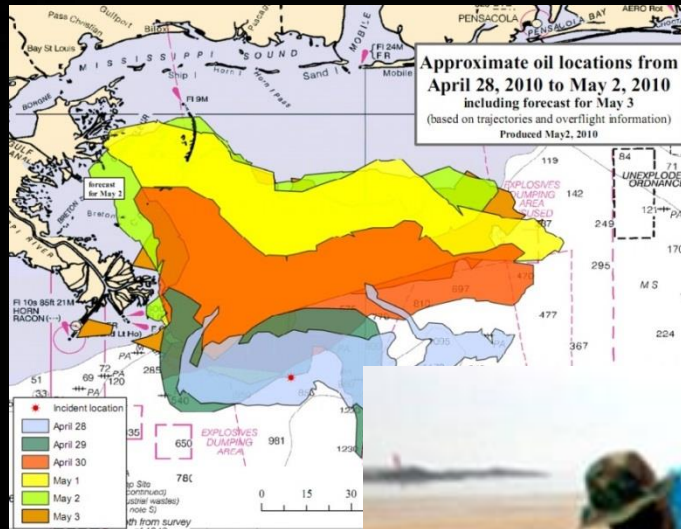


IXTOC - 1979



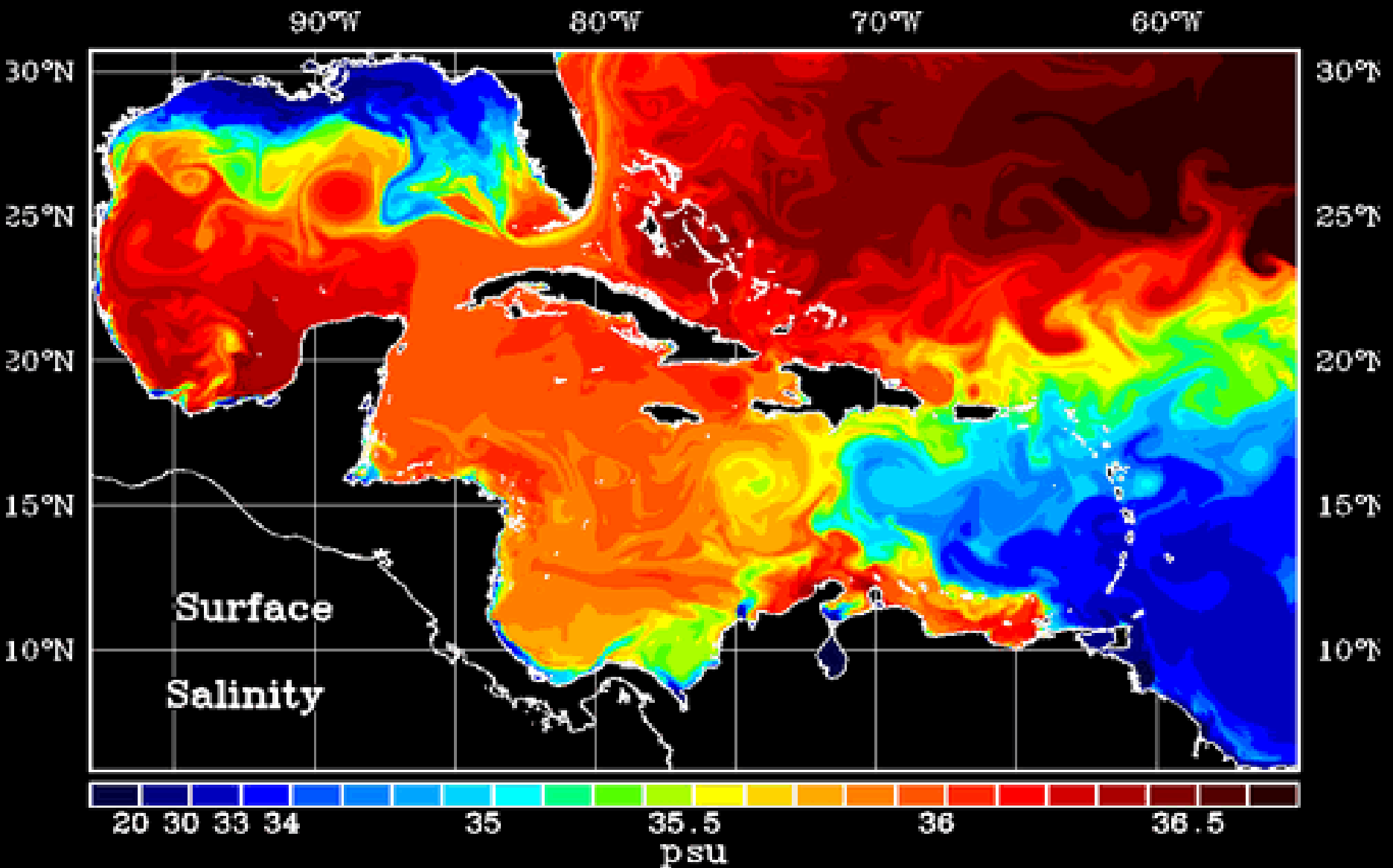
The Future ain't what it used to be

Yogi Berra, circa 1974



**DEEPWATER
HORIZON
2010**

The Gulf of Mexico: Ninth Largest Ocean Waterbody – 600,000 sq. miles

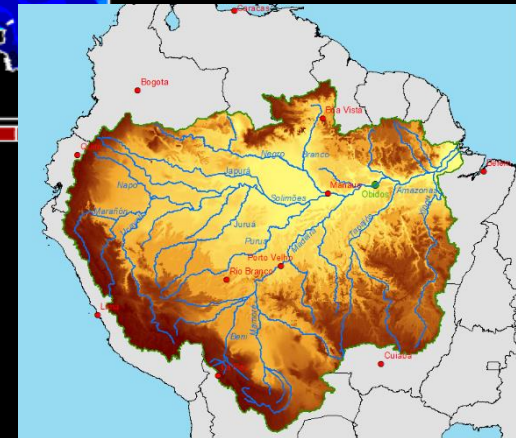
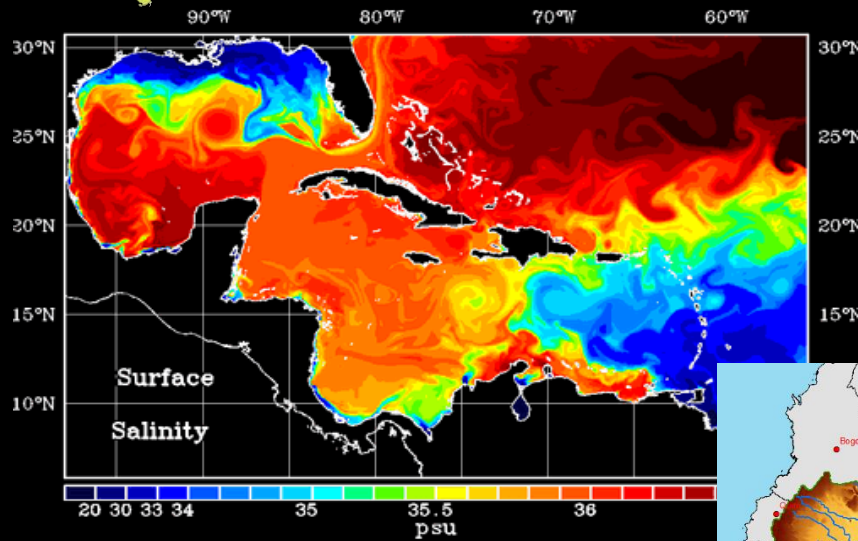


30 DAY LOOP AUGUST - 2011



The world's second and fourth Largest rivers are significant drivers of...

MISSISSIPPI RIVER WATERSHED
Discharge:
0.6 million cu. ft. sec.



AMAZON RIVER WATERSHED
Discharge: 7.4 million cu. ft. sec.

Gulf of Mexico Dynamics....

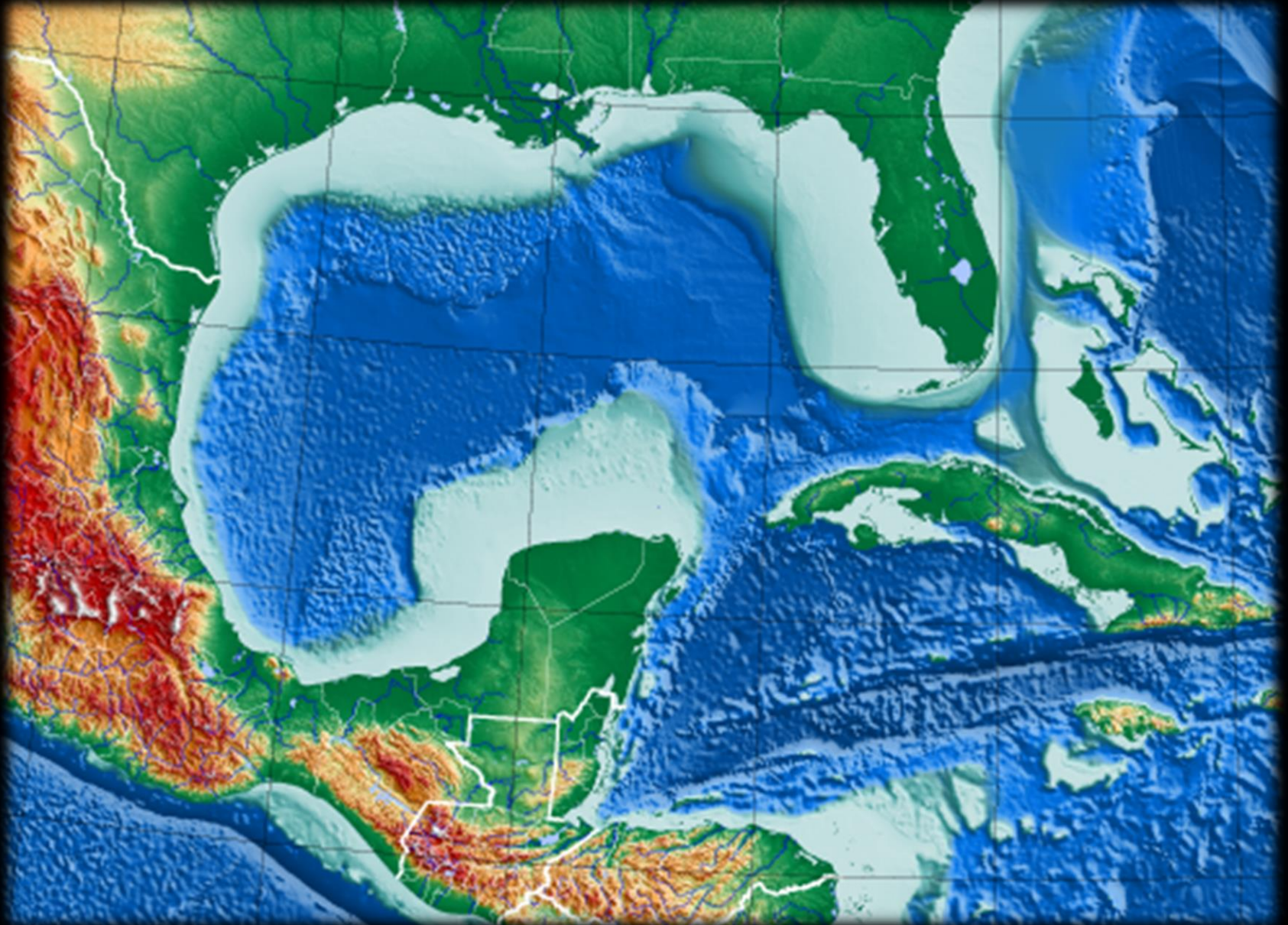
More than 60%
of North America
empties into the Gulf
of Mexico

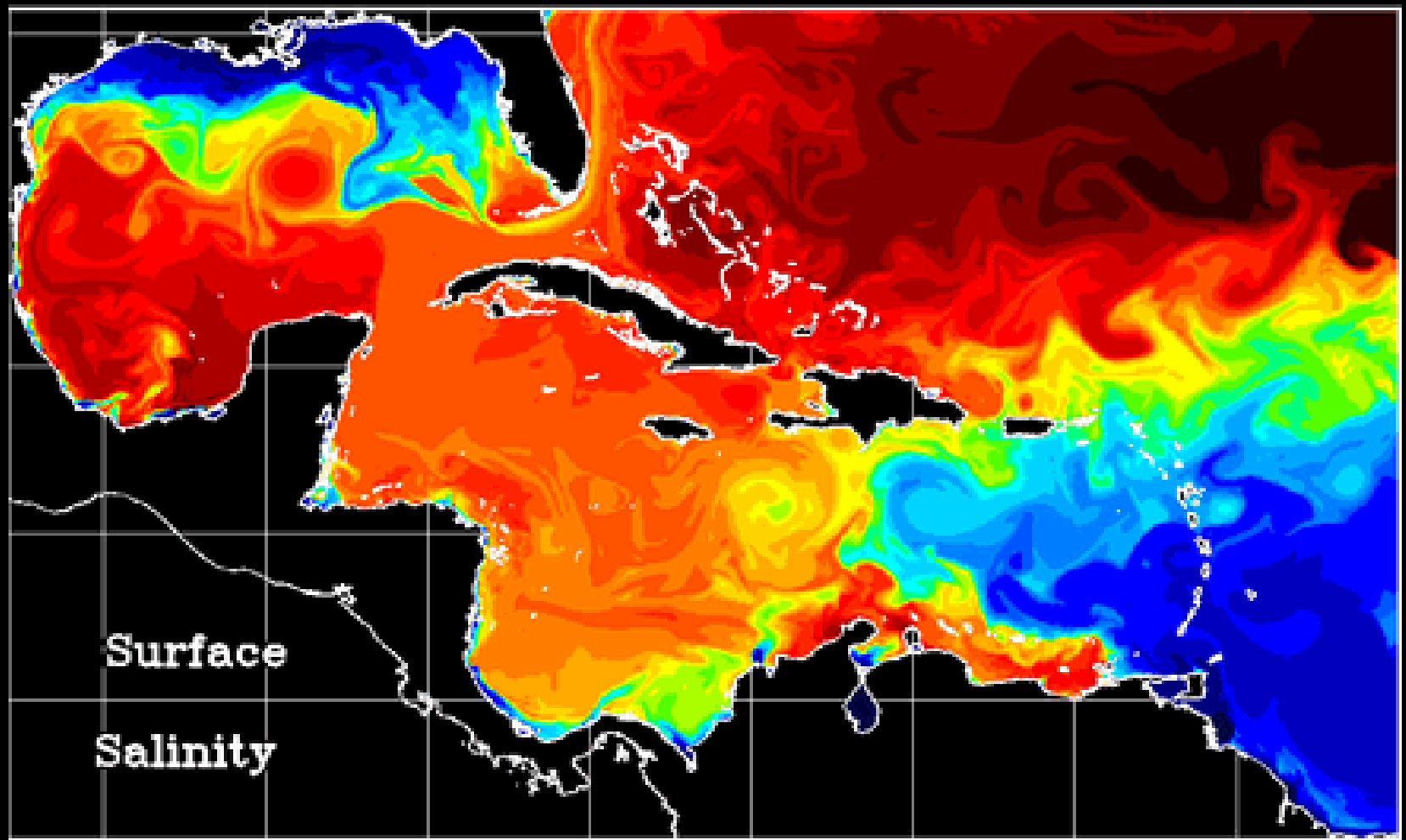
Legend

- Mississippi River Drainage
- Gulf Drainage (non-Mississippi)
- Non Gulf Drainage
- Loop Current
- Bathymetric contours in meters



About half of the Gulf is shallow continental shelf...





*America's Sea**

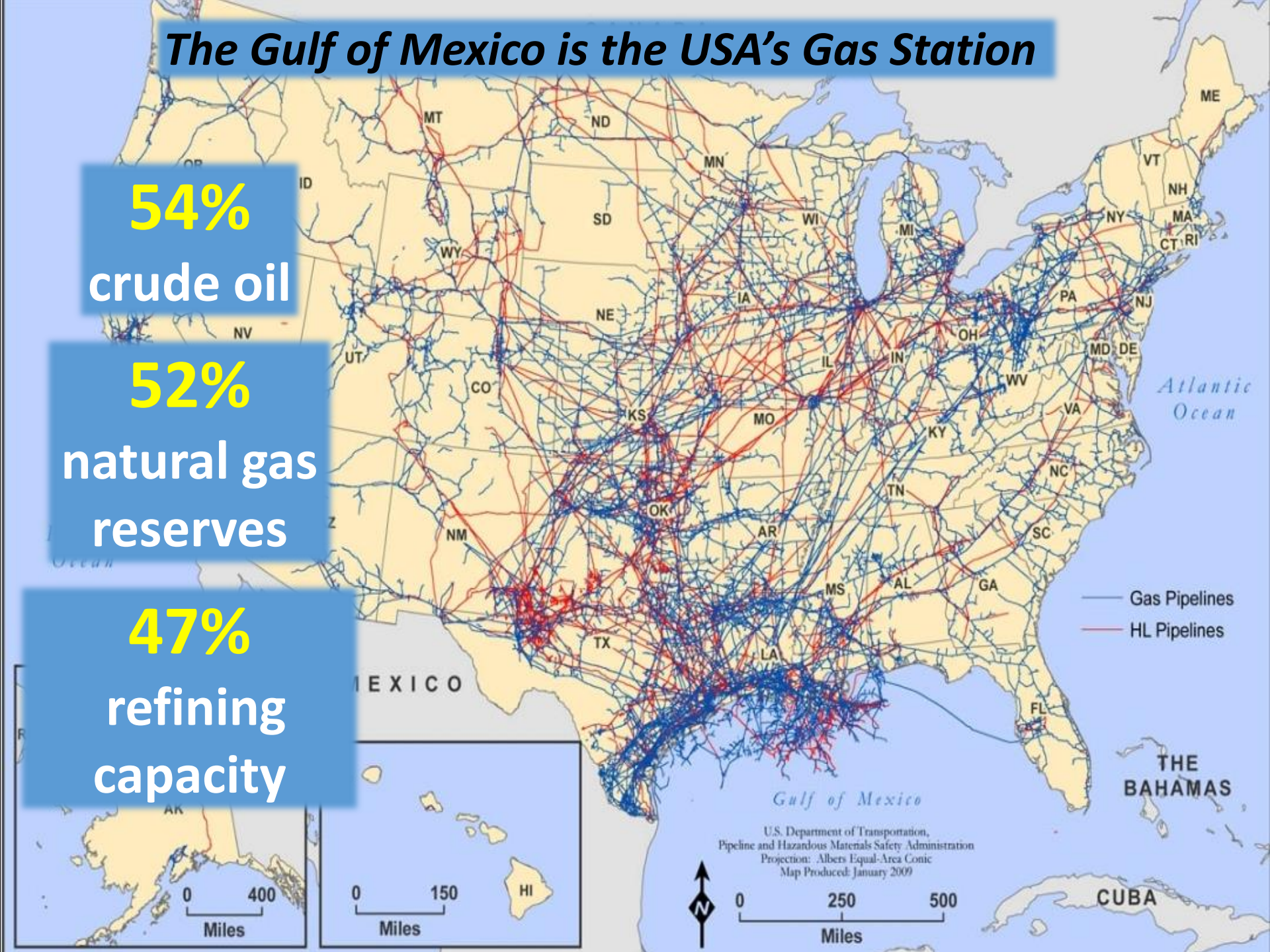
**American Mediterranean
or the Third Coast, or the
Forgotten Coast*

The Gulf of Mexico is the USA's Gas Station

54%
crude oil

52%
natural gas
reserves

47%
refining
capacity



— Gas Pipelines
— HL Pipelines

U.S. Department of Transportation,
Pipeline and Hazardous Materials Safety Administration
Projection: Albers Equal-Area Conic
Map Produced: January 2009



0 250 500
Miles

0 400
Miles

0 150
Miles

The Gulf of Mexico is one of the most productive ecosystems in the world...

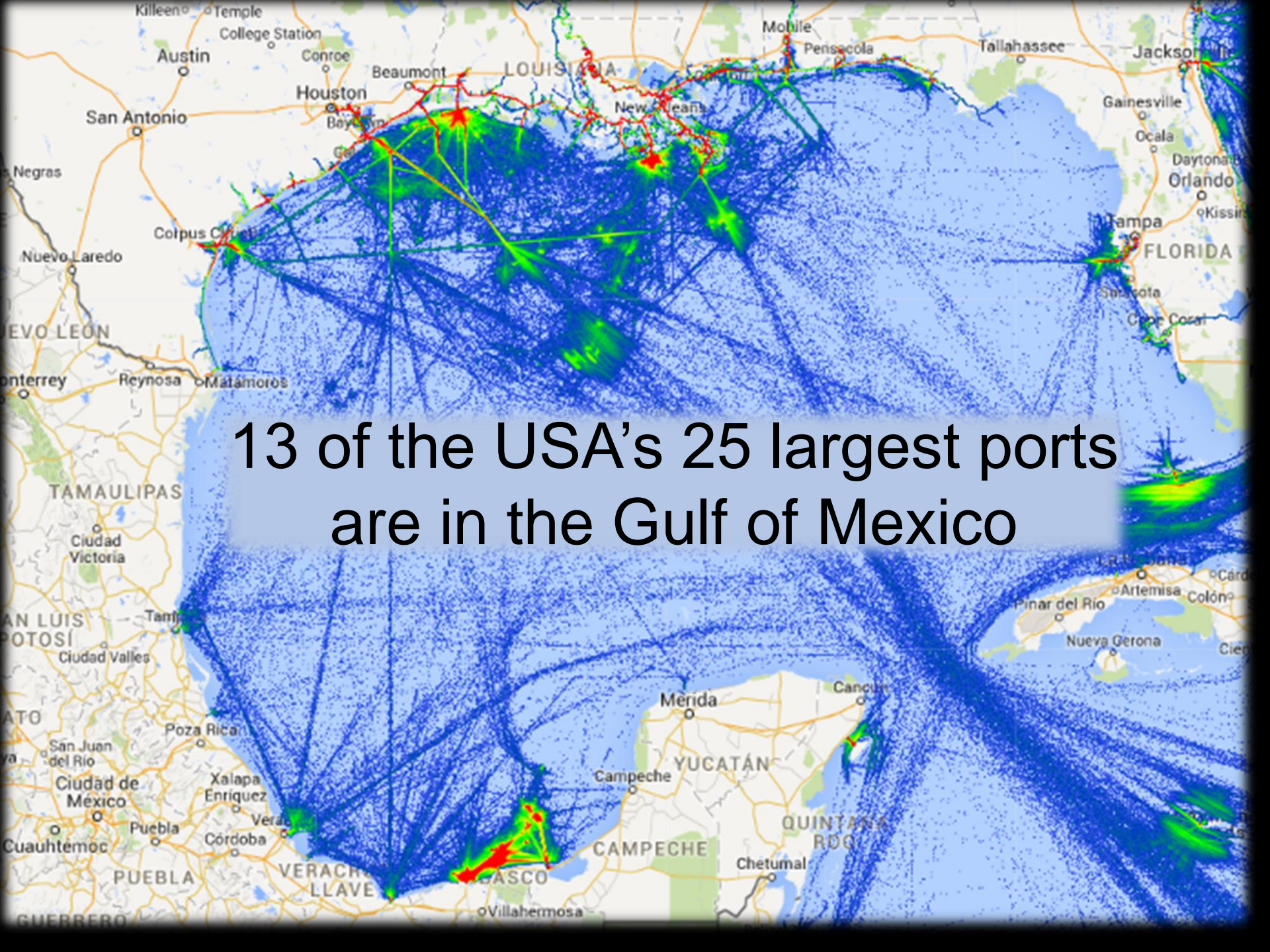
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**2,500,000 acres
(90% USA
seagrass)**

**5,000,000 acres
(50% USA
wetlands)**





13 of the USA's 25 largest ports
are in the Gulf of Mexico

The Gulf of Mexico is also the Nation's Fish Market



1.4 billion pounds of seafood annually

78% of USA shrimp landings

62% of USA oyster landings

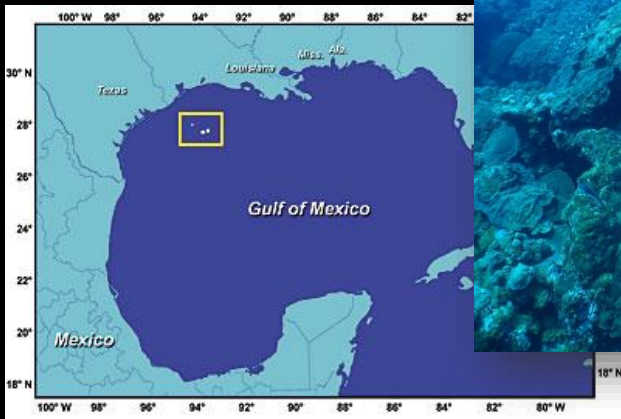
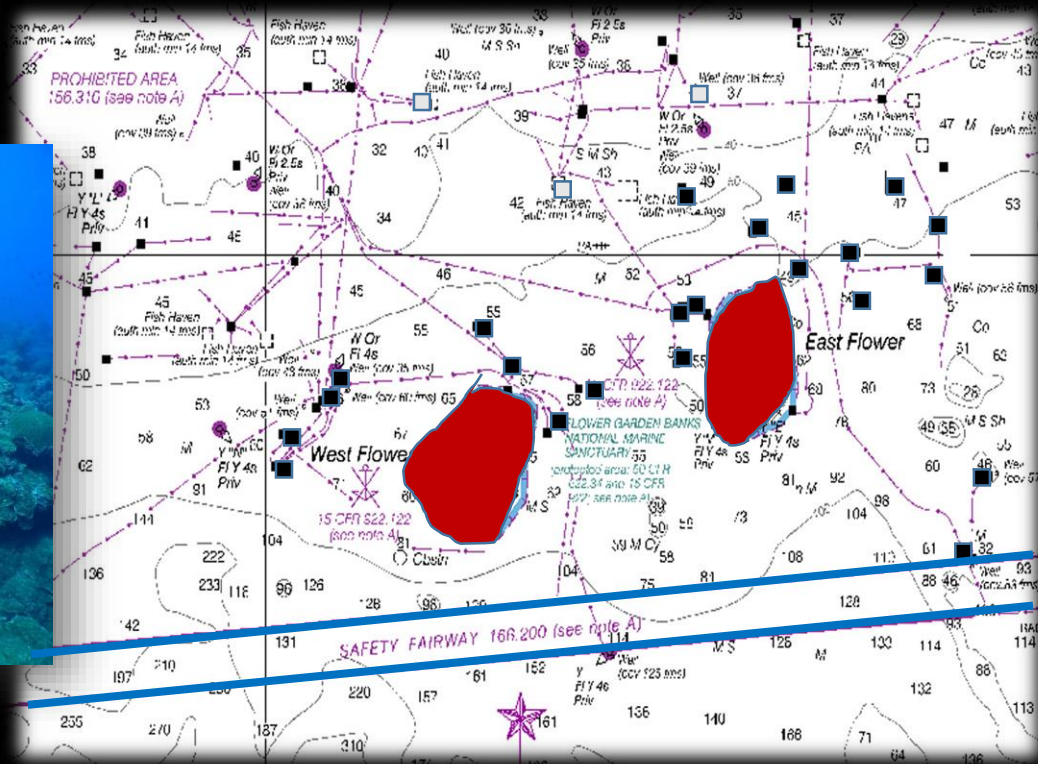


44% of USA recreational fishing - **\$16.2 billion** annually



The Gulf of Mexico is a sea of contrasts...

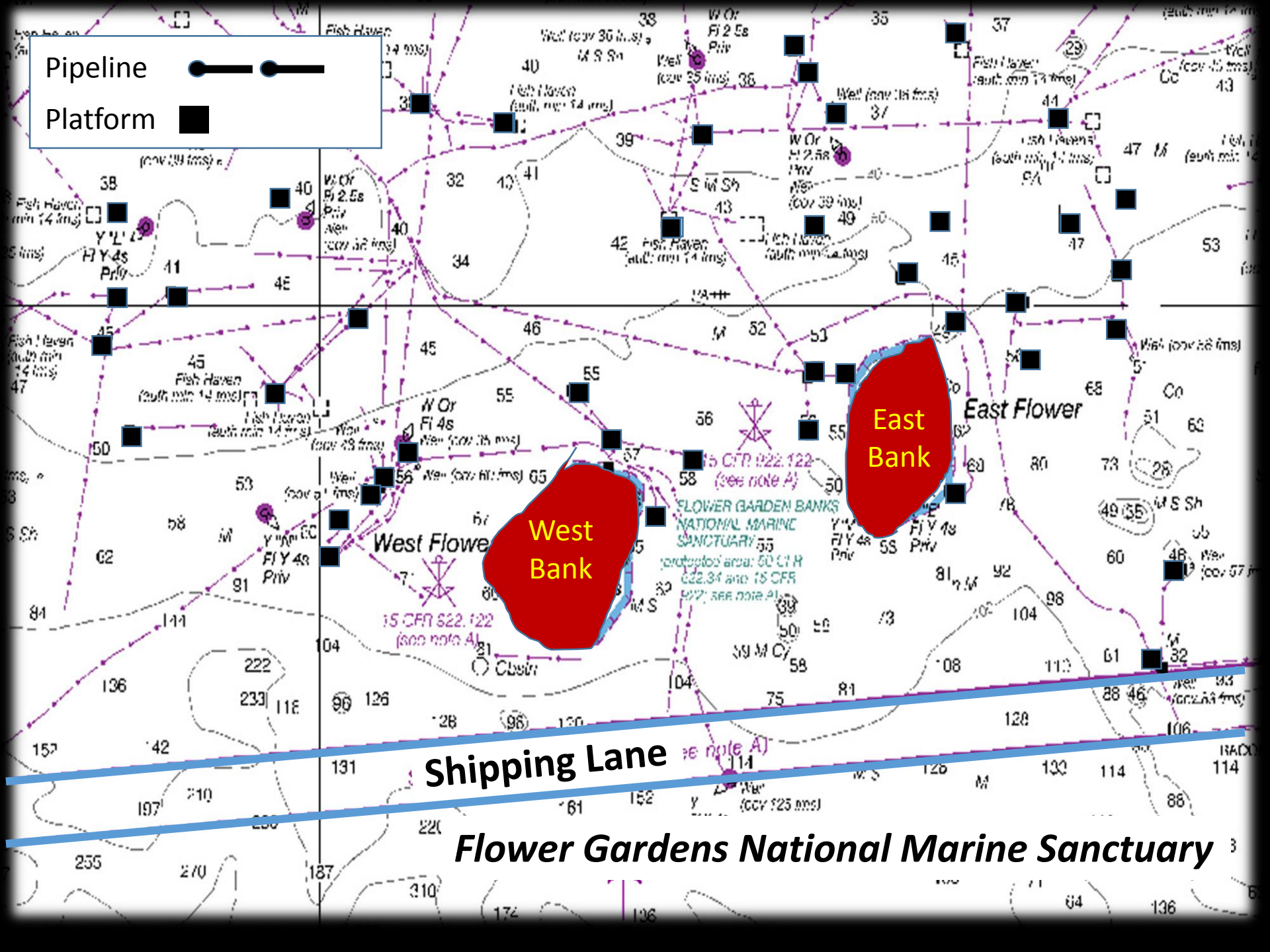
Where a healthy economy
and a healthy environment
both *coexist* and *contend*
with one another



Pipeline



Platform



Harte Research Institute

Directed Research
in focus

Transdisciplinary
by nature



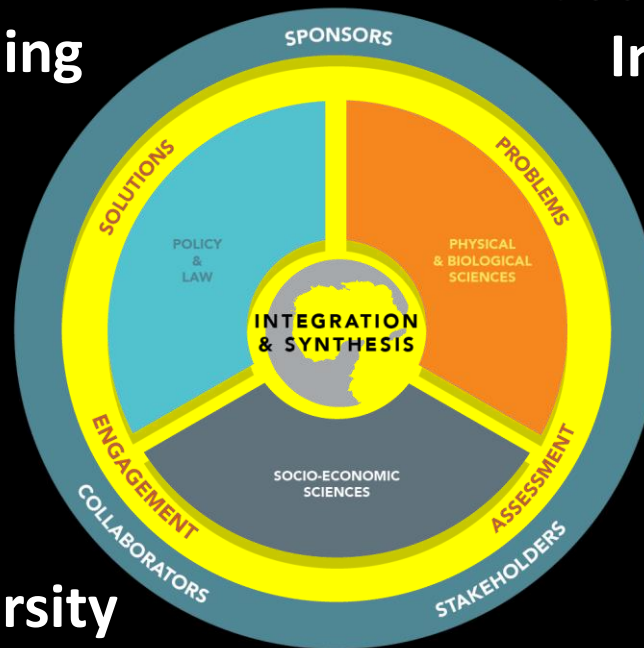
**Ecosystem Studies
And Modeling**

**Geographical
Information
Science**



**Socio
Economics**

**Marine
Policy
and Law**



**Biodiversity
Conservation
Science**


**Fisheries
and Ocean Health**



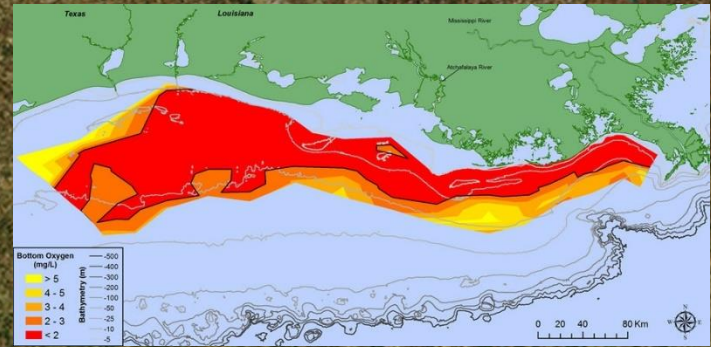
Gulf of Mexico Centered

A satellite-style map of the Gulf of Mexico region, including parts of North America, Central America, and the Caribbean. A large, semi-transparent brown area covers the Gulf of Mexico and extends inland into the United States and Mexico, representing a water quality and quantity issue. A smaller, solid red area is located in the northern part of the Gulf of Mexico, representing a hypoxic (dead) zone. The text 'Water Quality Quantity' is overlaid in large yellow letters, and 'HYPOXIC (DEAD) ZONE' is overlaid in black text with a red arrow pointing to the red area.

Water Quality Quantity


HYPOXIC
(DEAD)
ZONE

2017 Hypoxia “Dead Zone” at 8,776 sq. miles is the largest on record*



<http://www.npr.org/sections/thesalt/2017/08/03/541222717/the-gulf-of-mexicos-dead-zone-is-the-biggest-ever-seen>

**since records began in 1985*

**Gulf
Wetlands**



**50%
lost**

**Gulf
Seagrass**

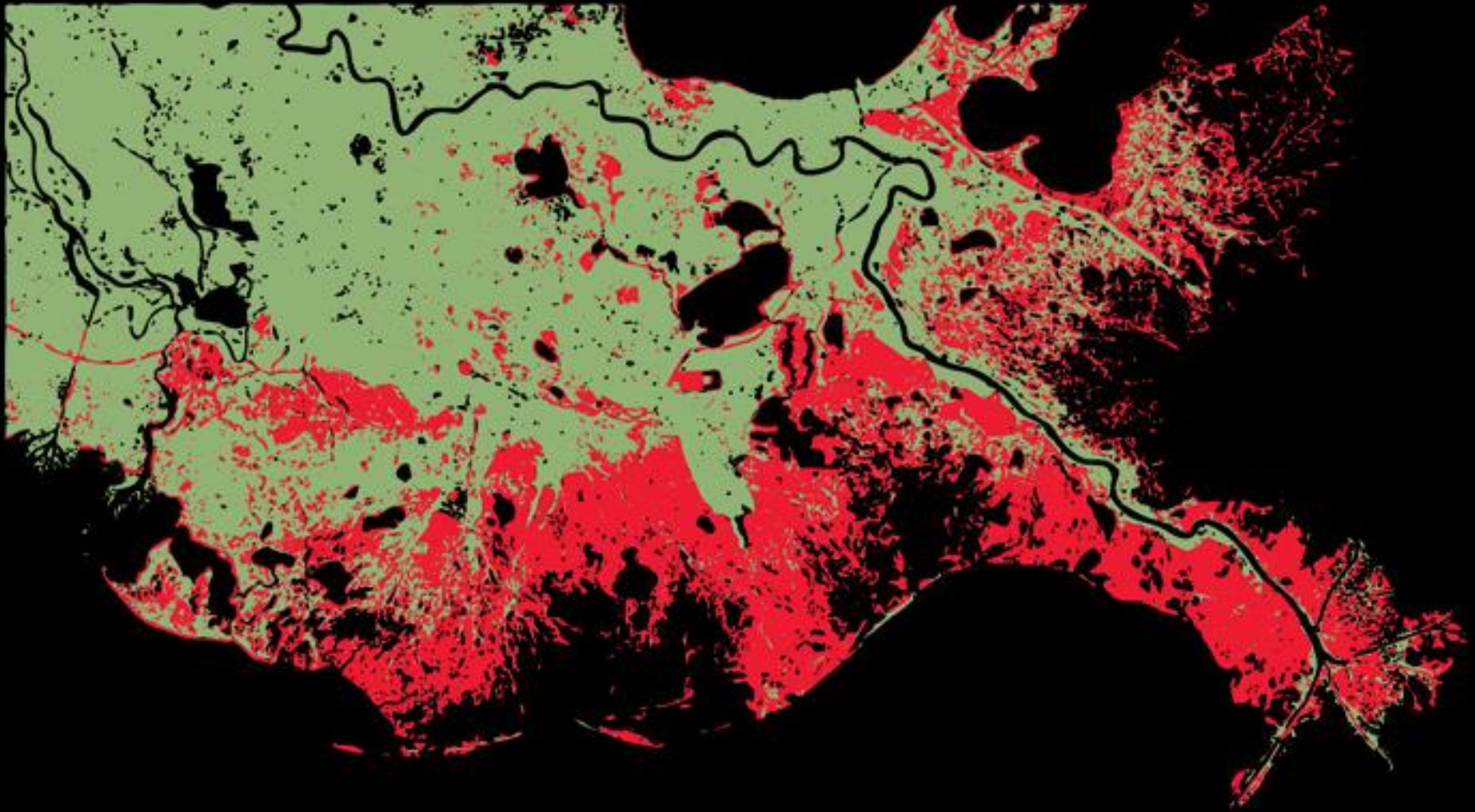


**12% to 66%
lost**
Up to 90% locally

**Gulf
Mangrove**



**25% to
33% lost**
Up to 86% locally



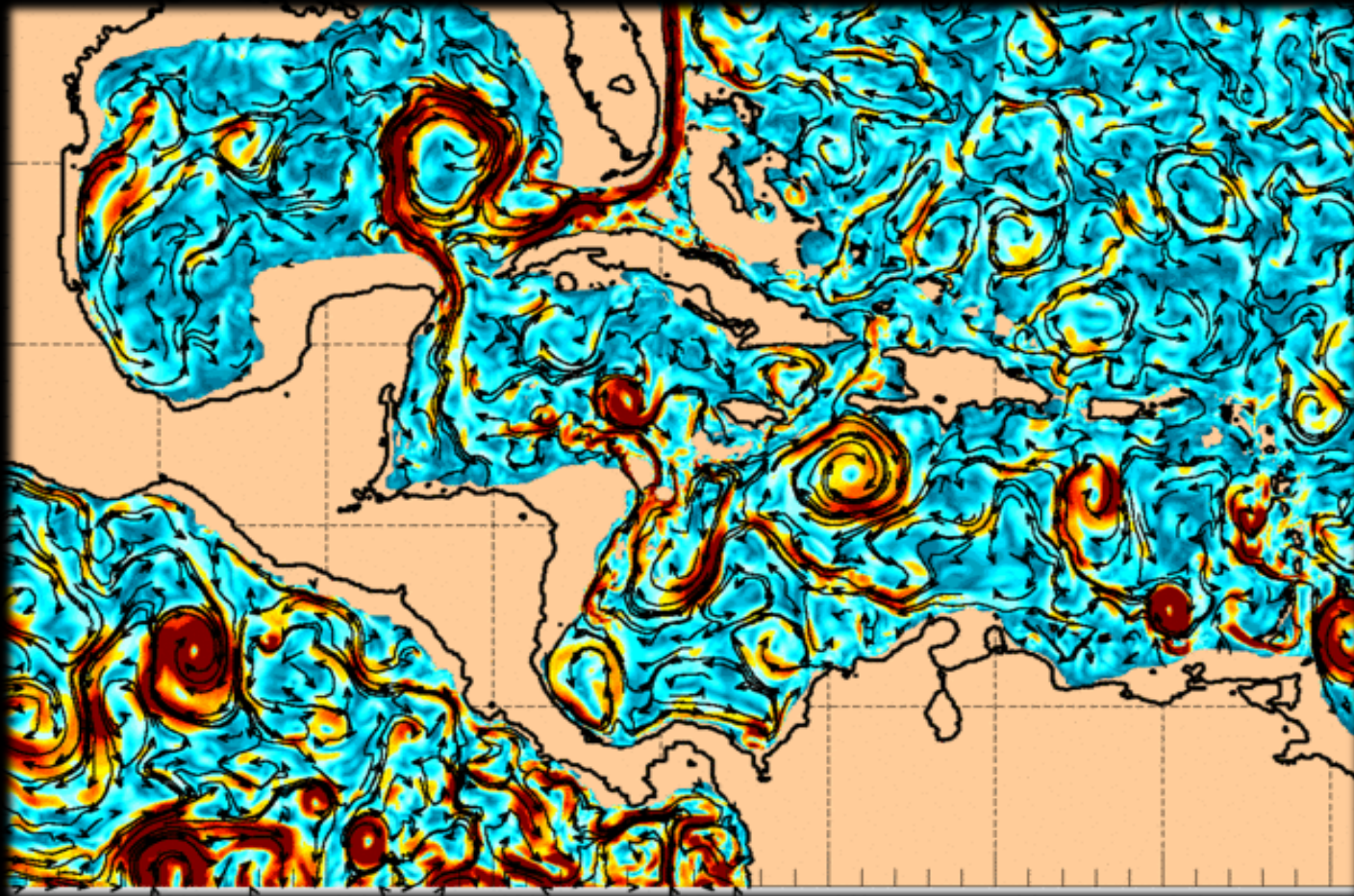
Louisiana Land Loss 1932 to 2050 (projected)

The Gulf is a resilient ecosystem



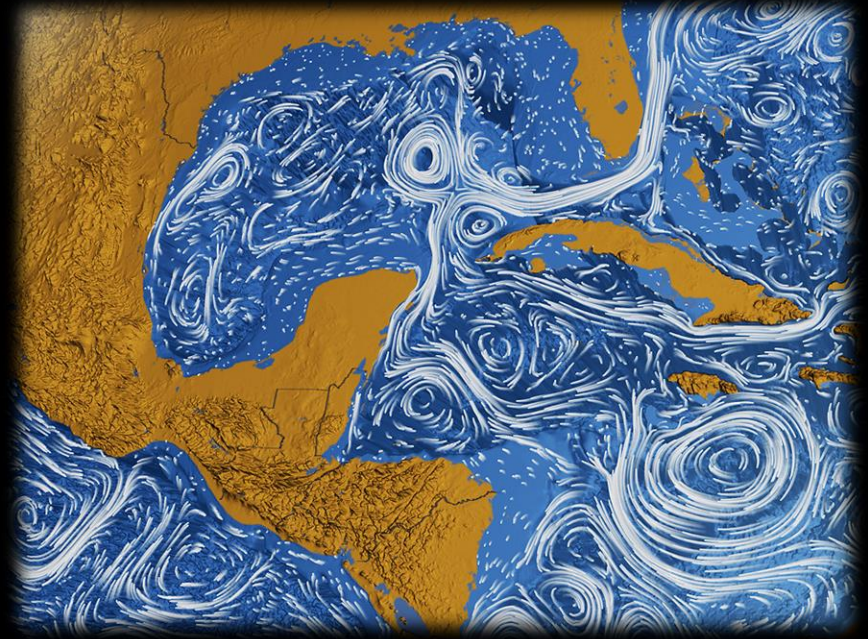
Like a rubber band we hope it continues to snap back

Understanding, managing and living with a resilient, dynamic Gulf of Mexico



Comes only from a robust ocean observing capability

The U.S. Integrated
Ocean Observing System
(IOOS)
and
Gulf Coast Ocean
Observing System
(GOOS)

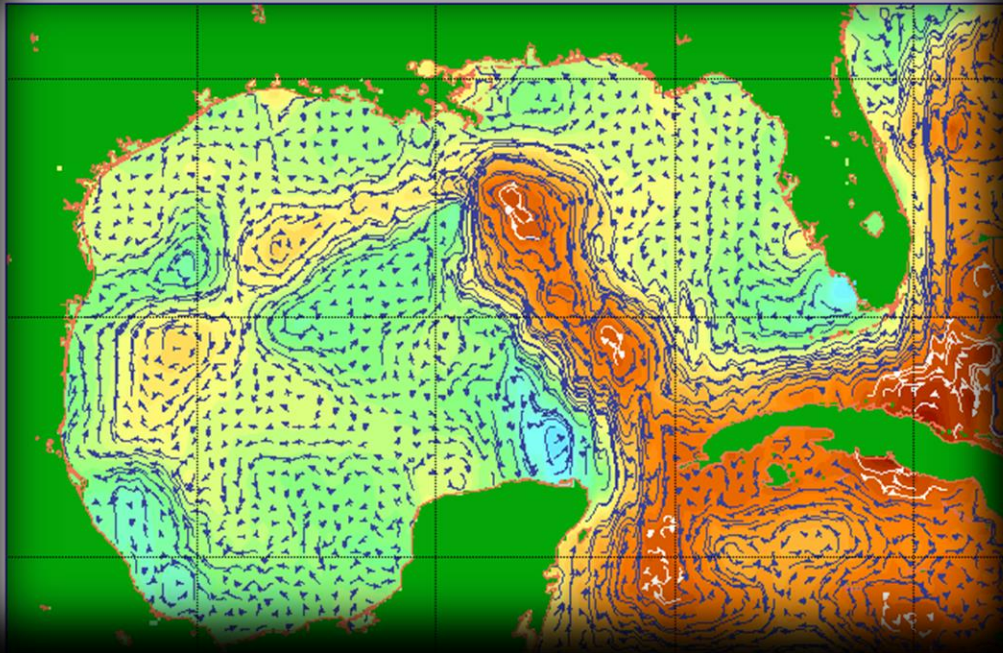


***CRITICAL COASTAL
and OCEAN
INFRASTRUCTURE
ON WHICH THE HEALTH,
WEALTH AND WELL-BEING OF
THE GULF OF MEXICO DEPEND***

Photo credit: Gulf of Mexico Sperm Whale Seismic Study (SWSS) (U.S. Minerals Management Service, 2002).

Ocean observing is the systematic collection of data on ocean variables that coupled with appropriate models allow us to depict its current condition and predict its future state

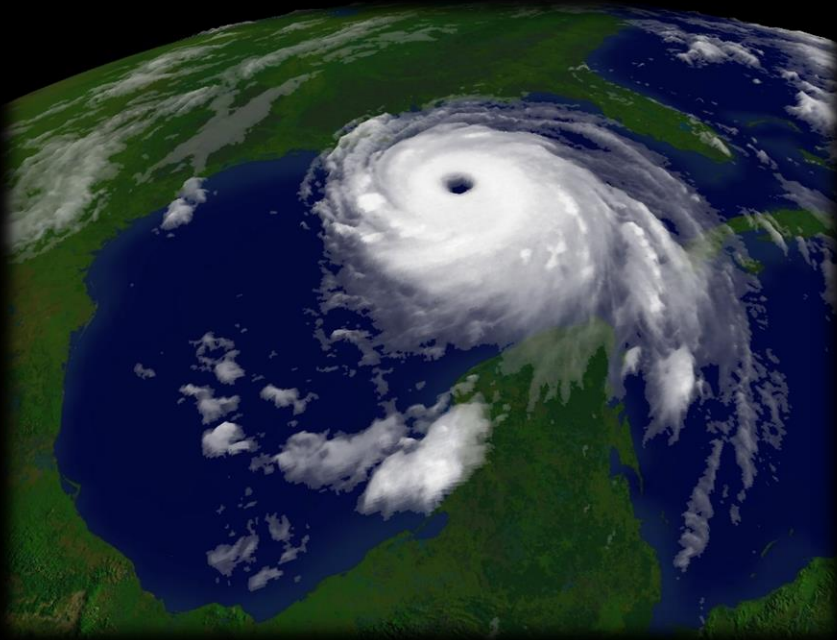
Altimeter/GTS Interface



Other speakers will expand on these themes...



The Case for Robust Ocean Observing Capacity in the Gulf of Mexico



Katrina

August 2005

Category 5



Deepwater Horizon

April 2010

4.9 million barrels

What we do not know about the Gulf of Mexico could kill some one, and has...



Photo credit – St. Petersburg Times, 1980

Freighter rams Sunshine Skyway Bridge - 35 Dead

Capsized: Four fishermen lost at sea and struggle to survive in the Gulf of Mexico

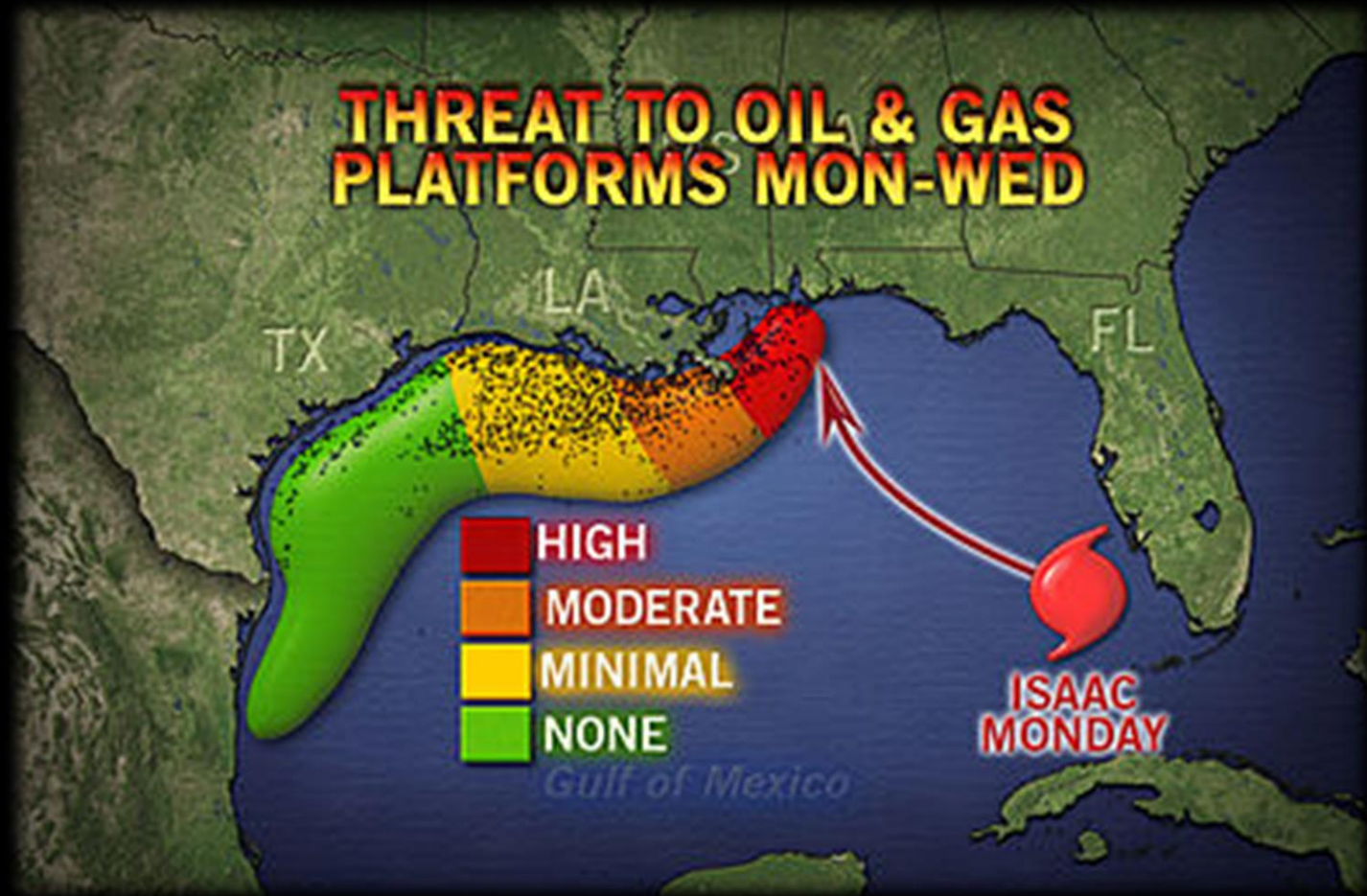


Photo credit – Houston Chronicle, Oct 17, 2016

What we do not know about the Gulf of Mexico is complicating our ability to manage federal fisheries and that is generating divisive political controversy



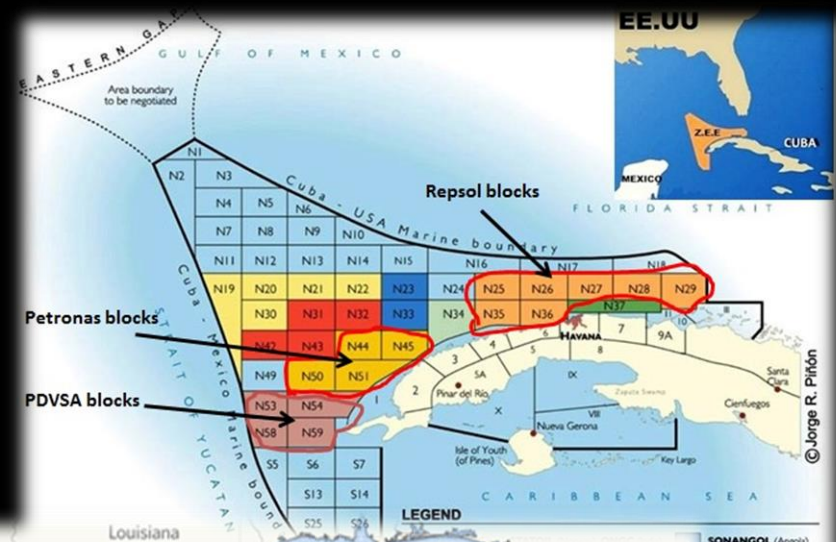
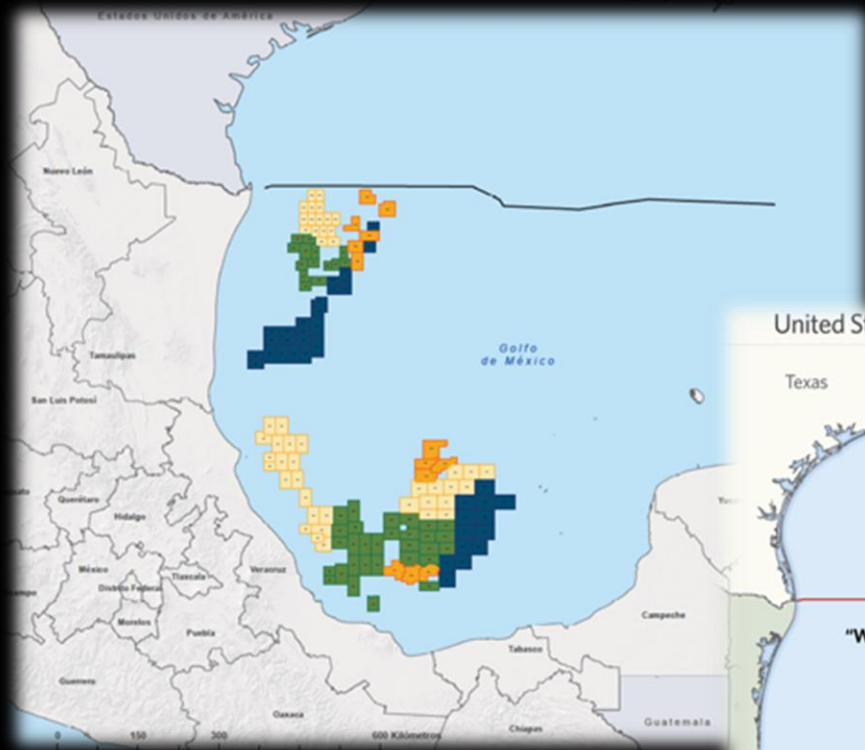
What we do not know about the Gulf of Mexico is costing billions in lost productivity...



August 27, 2012

MAP BY ACCUWEATHER

International developments have increased the urgency for improved ocean observing





Climate Change Adapting to changing ocean conditions Into the future

*Everyone is entitled to their
own opinions, but not their
own facts....*

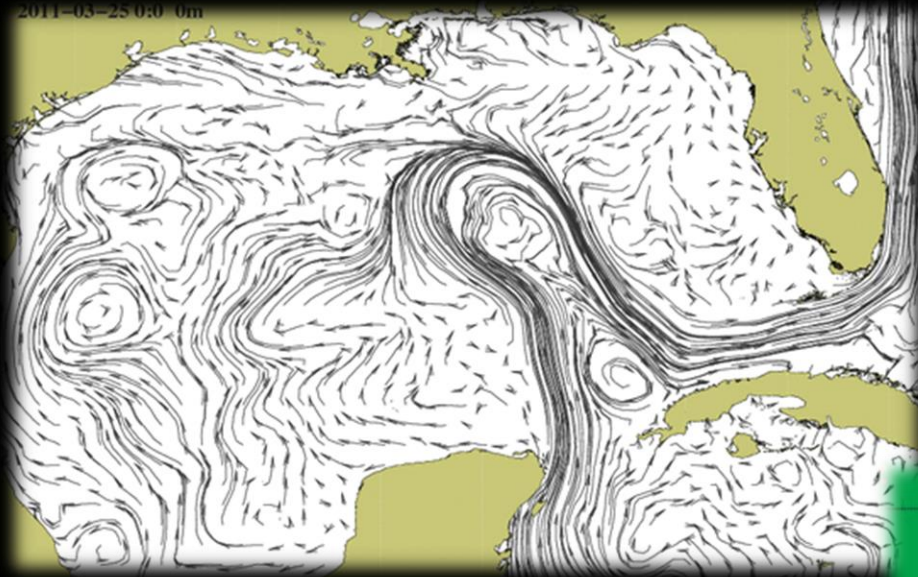
- The oceans are warming
- The sea level is rising
- The oceans are becoming
more acidic



*If you stick your head in the sand too
long be careful... you might drown*

What should we do and what can we do to improve ocean observing in the Gulf of Mexico?

2011-03-25 0:0 0m

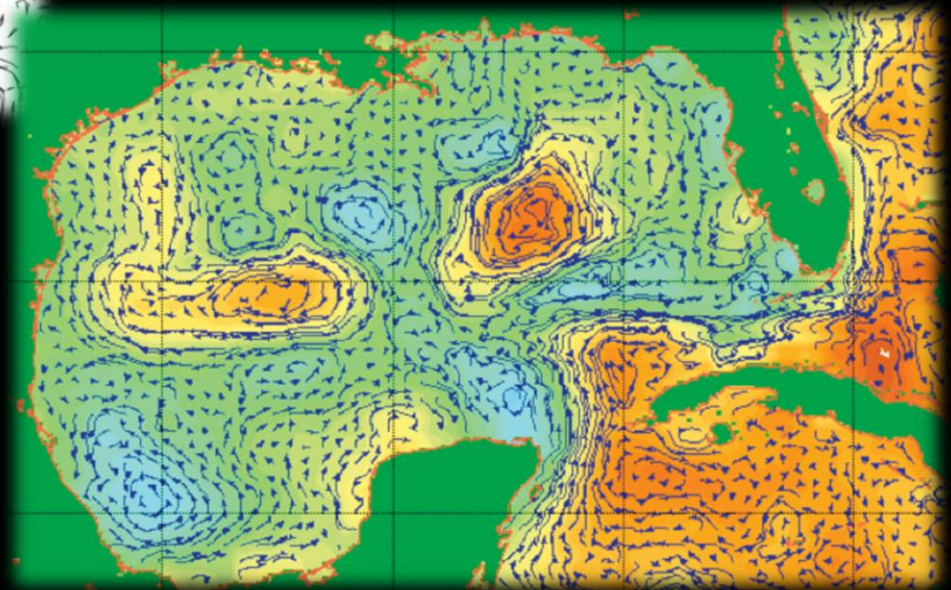


Unfortunately, I am not the person to tell you that.

Fortunately, we have speakers that will

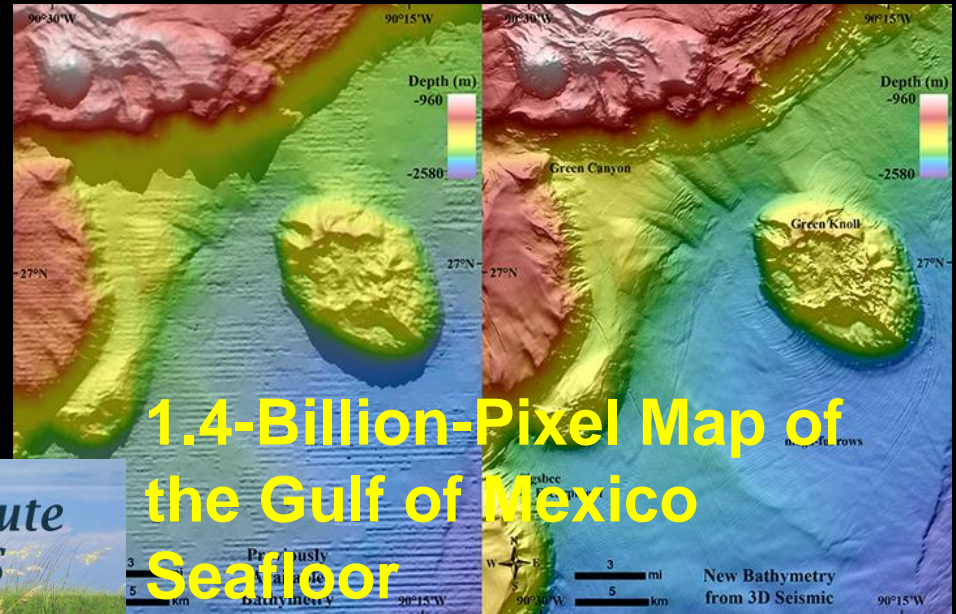
I do recognize how fundamentally important this is to what I do want to accomplish.

My goal is help advance ocean observing capacity where I can...



The State of Ocean Observing Science in the Gulf of Mexico

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1.4-Billion-Pixel Map of the Gulf of Mexico Seafloor



A long History of Ocean Observing Research

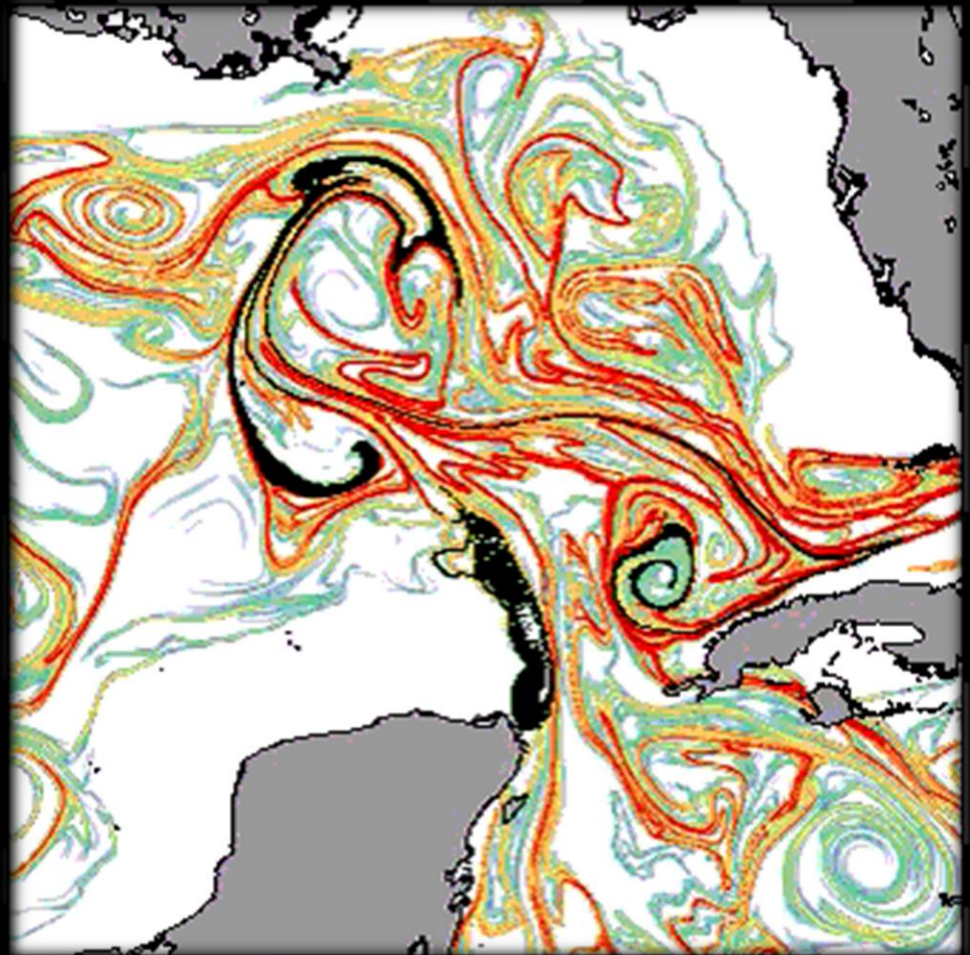
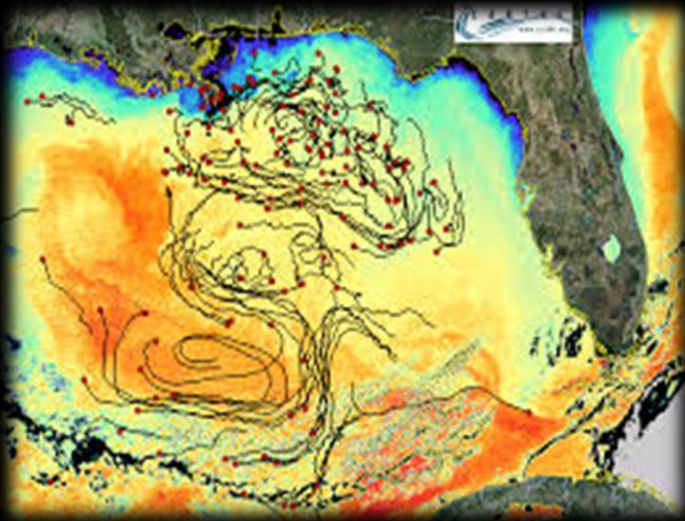




INECC
INSTITUTO NACIONAL
DE ECOLOGÍA
Y CAMBIO CLIMÁTICO

BajaInnova

The Consortium for Study of the Gulf of Mexico (CIGoM), funded by Mexico (\$72 M US) is the most ambitious large studies ever undertaken



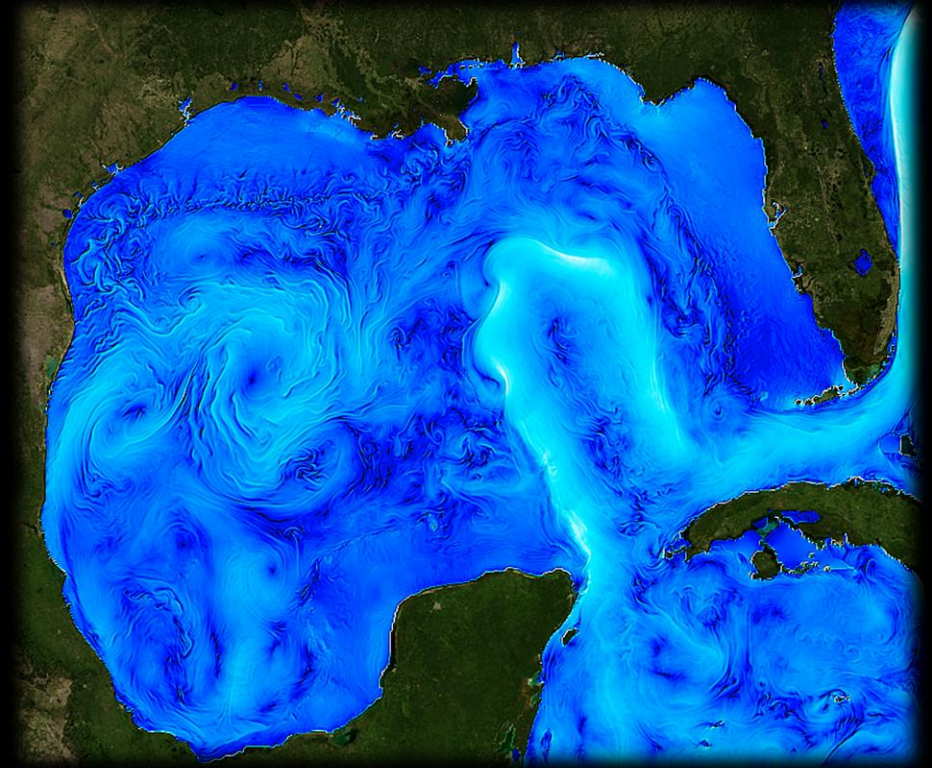
CIGoM Objectives

- Perform physical, chemical, and biological measurements to establish a baseline for the present-state and the natural variability of the greater ecosystem of the Gulf of Mexico
- Use and develop cutting-edge technologies to observe the surface ocean continuously, and in some cases in real-time, that could be used in the case of an oil spill, and which, together with numerical models, allow to estimate its dispersion and possible consequences
- Build physical, biogeochemical, and transport models of hydrocarbons integrating degradation processes, to generate risk maps, arrival times, and estimates impacts in an efficient manner, taking into account the chemical characteristics of the hydrocarbons and the location and depth of possible large hydrocarbon spills

National Academy of Science
Gulf Research Program

Committee on Advancing
Understanding of Gulf of
Mexico
Loop Current Dynamics

Program will launch
campaign 2018/2019

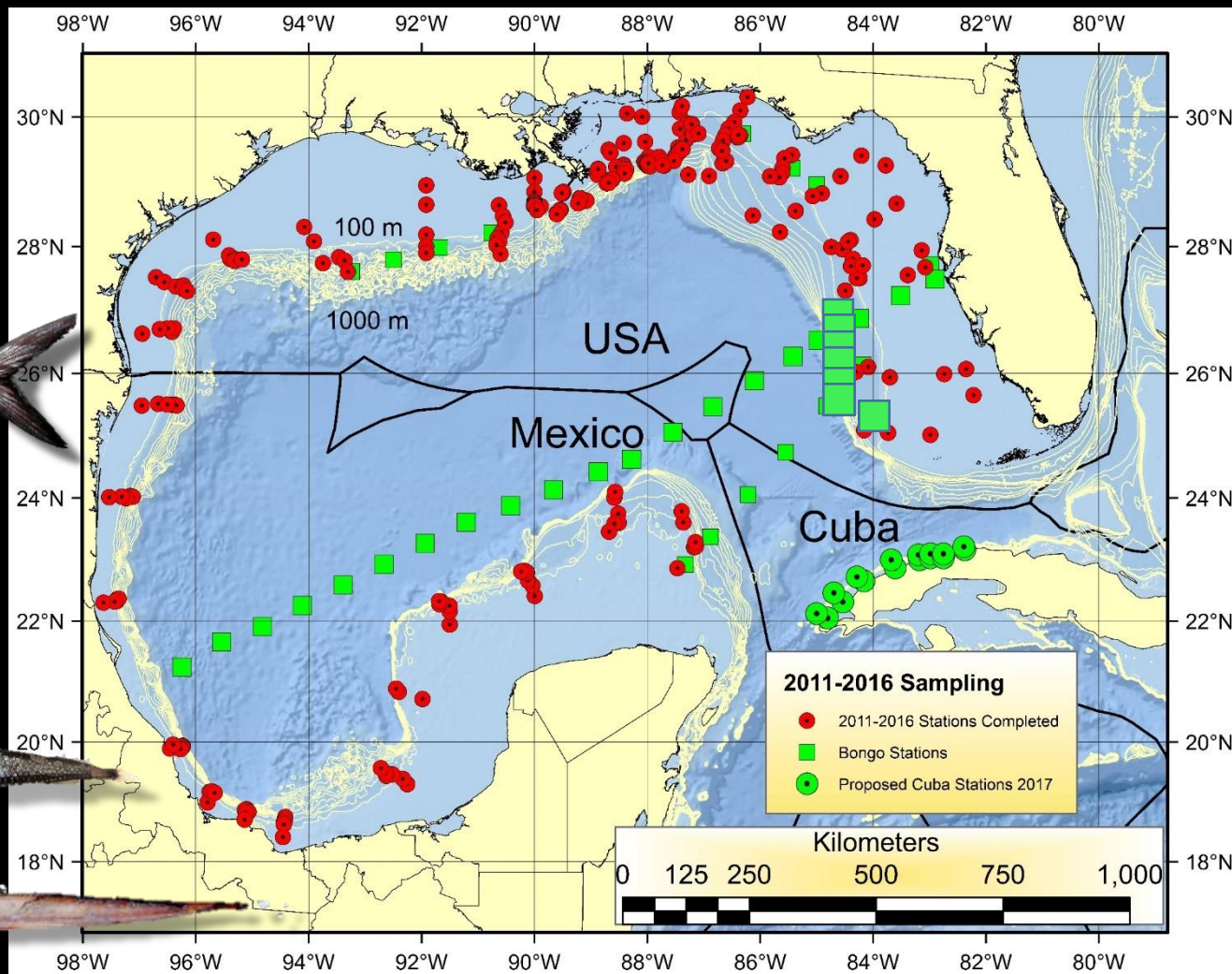


develop recommendations to design a suite of activities—including research, observations, and analyses—needed to characterize Loop Current dynamics and improve the effectiveness of modeling efforts.

GULF OF MEXICO RESEARCH INITIATIVE

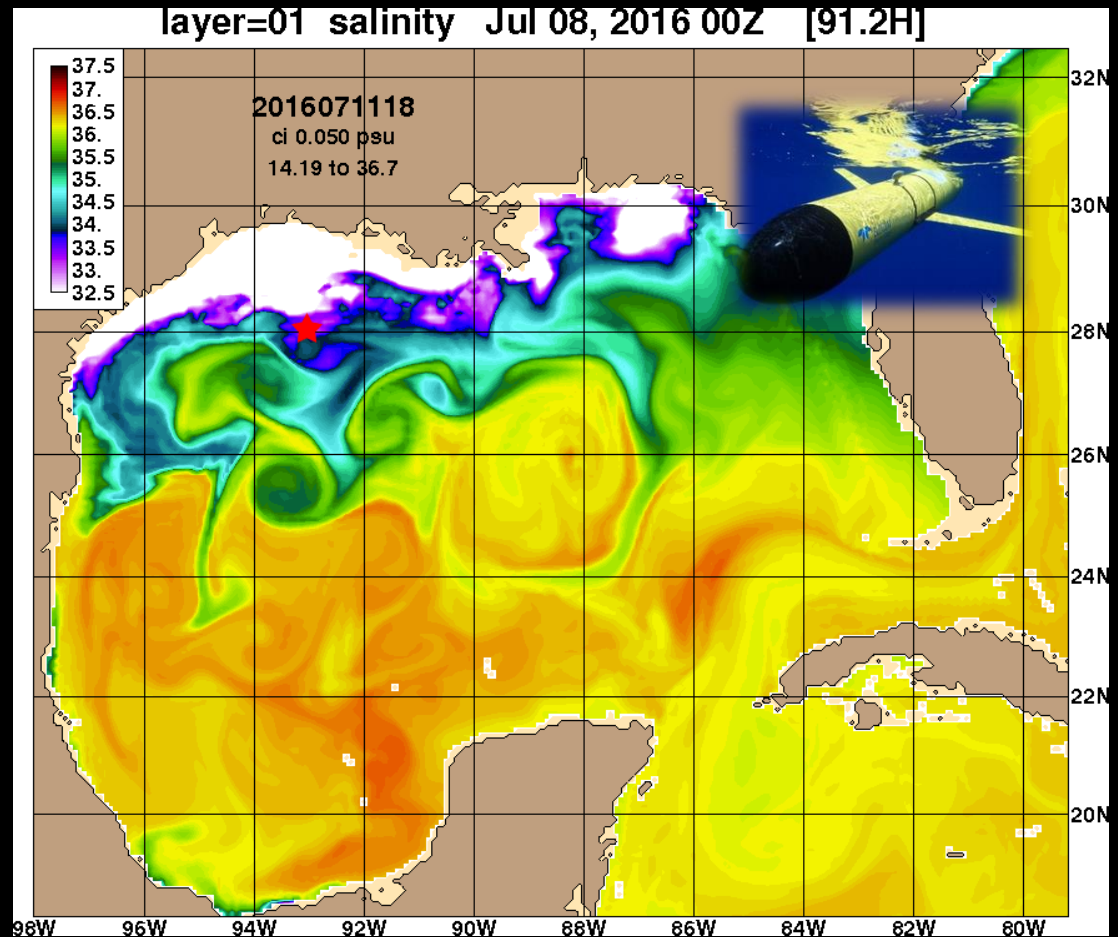


C-IMAGE - II



RESTORE Centers of Excellence

Developing Gliders as coast effective Ocean Observing tools

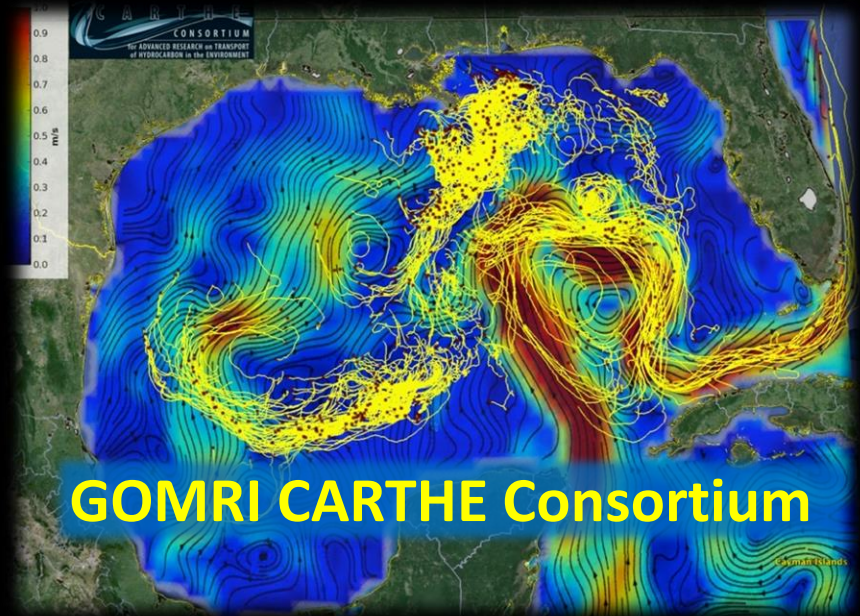
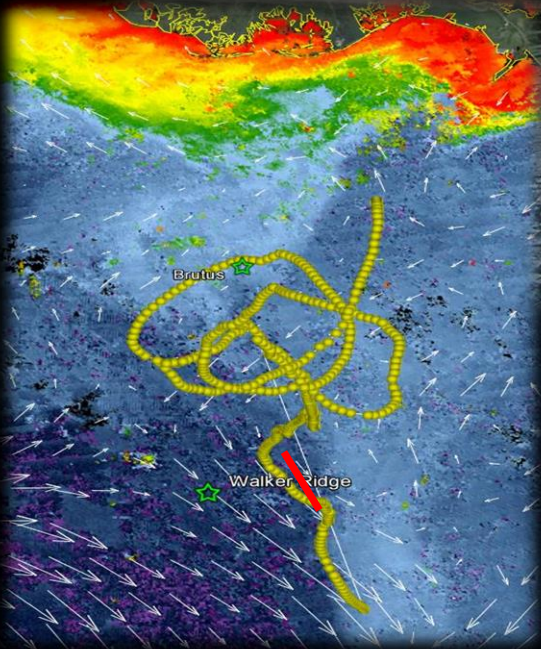


Research - Innovative and Diverse in both Origin and Creativity

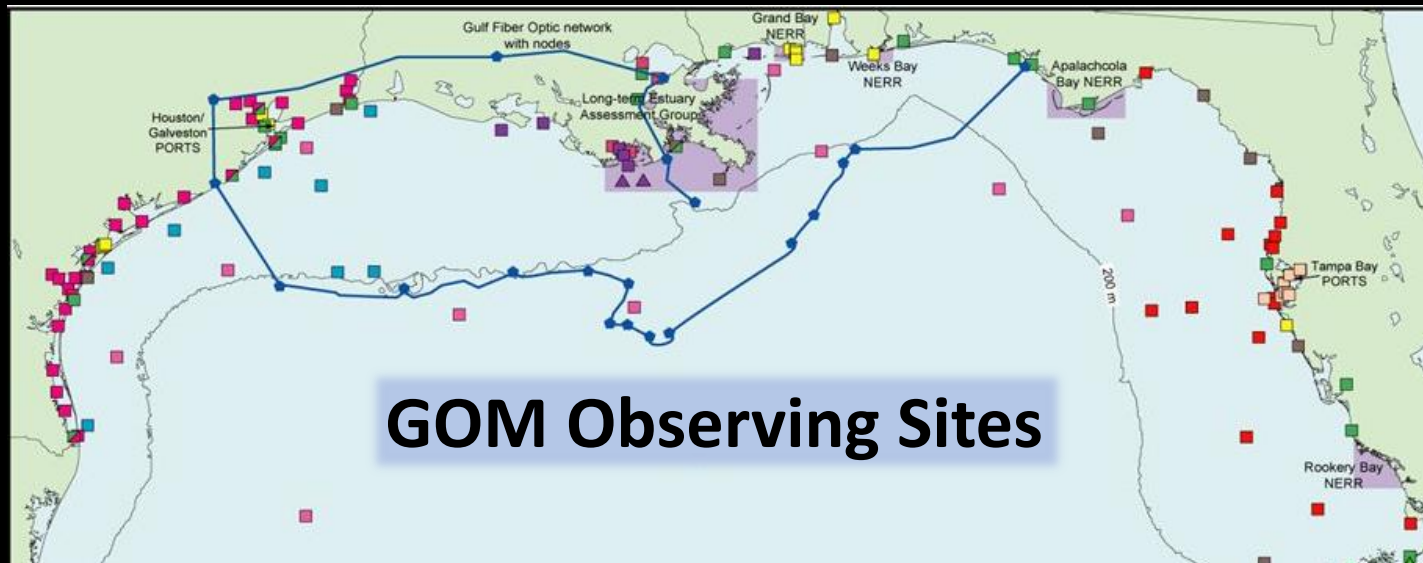
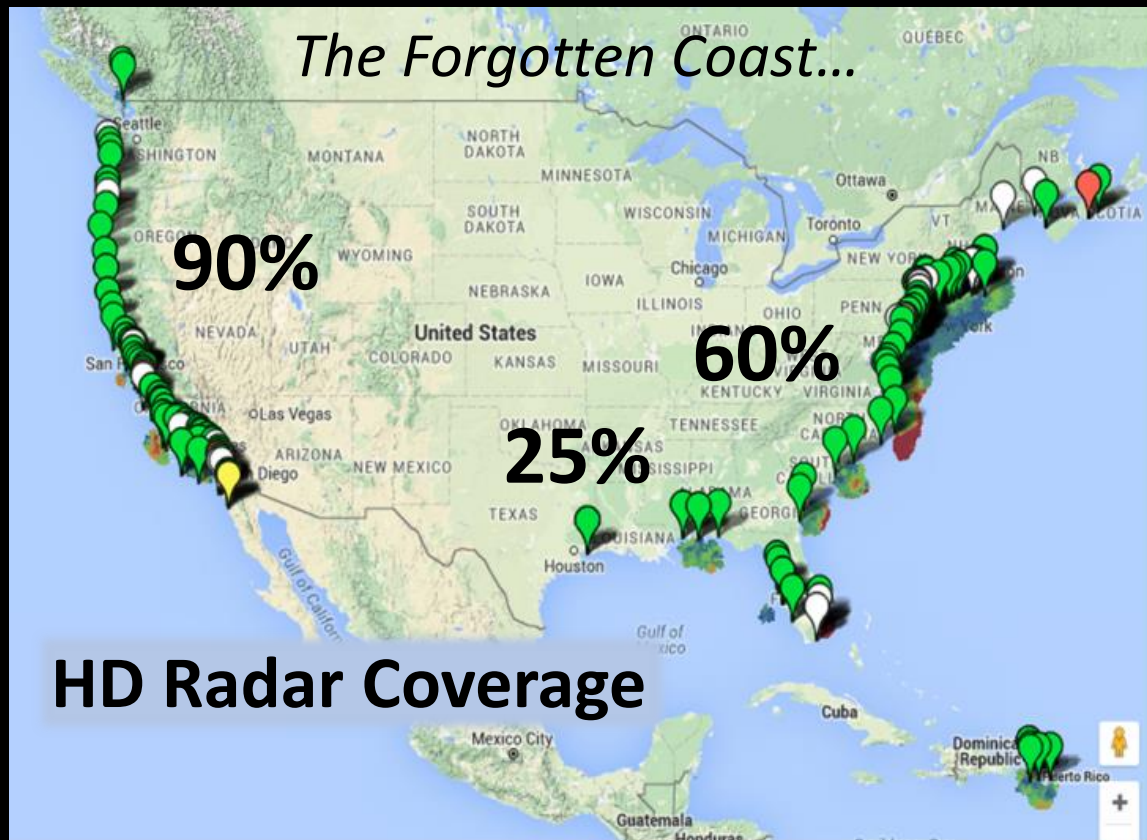
MBRACE - Mississippi RESTORE Center of Excellence



USF Eco-Systems Technology Group

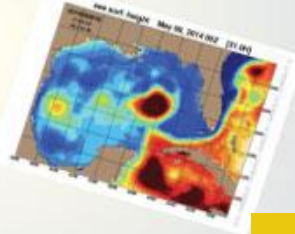


A strong science base but an adequate and sustainable system?





GCOOS Posts Build-out Plan V.2.0



[Click Here to Access the Do](#)



Strategic Plan 2017-2022

SUPPORTING TEXAS ENERGY, ENVIRO

ENERGY

Onshore oil and gas production and production has a \$10.8 billion impact on Texas's economy each year. Understanding and accurately forecasting meteorological and oceanic conditions, especially currents, is critical to safe navigation and efficient operations.

ENVIRONMENT

Coastal erosion is a significant threat to the Gulf of Mexico coastline, covering 21.2 billion square feet of land. The Gulf of Mexico is home to a diverse and rich ecosystem. Understanding and accurately forecasting meteorological and oceanic conditions, especially currents, is critical to safe navigation and efficient operations.

PROTECTING PUBLIC HEALTH, JOBS AND THE ENVIRONMENT

Storm events in Louisiana — from hurricanes like Katrina and Rita and the catastrophic August 2005 oil spill — have had a major impact on the state's economy and on the lives of its citizens. Understanding and accurately forecasting meteorological and oceanic conditions, especially currents, is critical to safe navigation and efficient operations.

PROTECTING PUBLIC HEALTH, THE ECONOMY AND JOBS IN FLORIDA

Florida's coastal waters are a major source of recreation and tourism. Understanding and accurately forecasting meteorological and oceanic conditions, especially currents, is critical to safe navigation and efficient operations.



GOMURC

United by Geography and Purpose



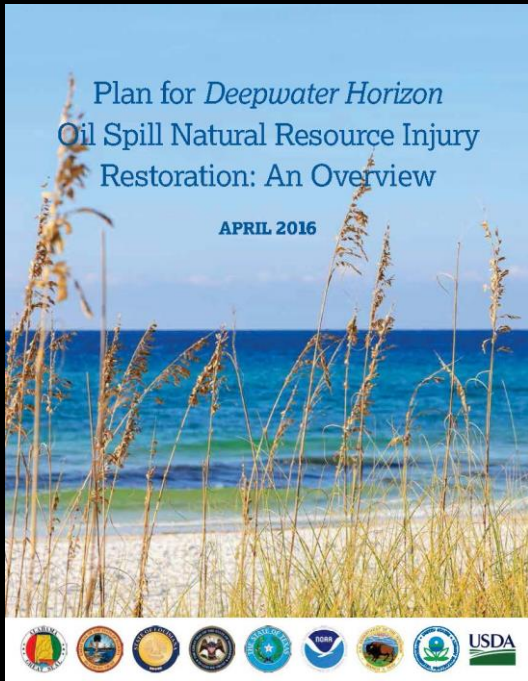
...the Gulf of Mexico — collecting data, safely and accurately before dissemination to the public and technology that help protect public health, safety and the environment. GOMURC has a well-established and safety and decrease economic losses.

...the Gulf of Mexico — collecting data, safely and accurately before dissemination to the public and technology that help protect public health, safety and the environment. GOMURC has a well-established and safety and decrease economic losses.

...the Gulf of Mexico — collecting data, safely and accurately before dissemination to the public and technology that help protect public health, safety and the environment. GOMURC has a well-established and safety and decrease economic losses.



A Role for RESTORE in Ocean Observing?



NRDA Trustees



Centers of Excellence

NOAA RESTORE Act
Science Program

THREE COUNTRIES

STATE OF THE GULF OF MEXICO

ONE
GULF
SUMMIT
2017

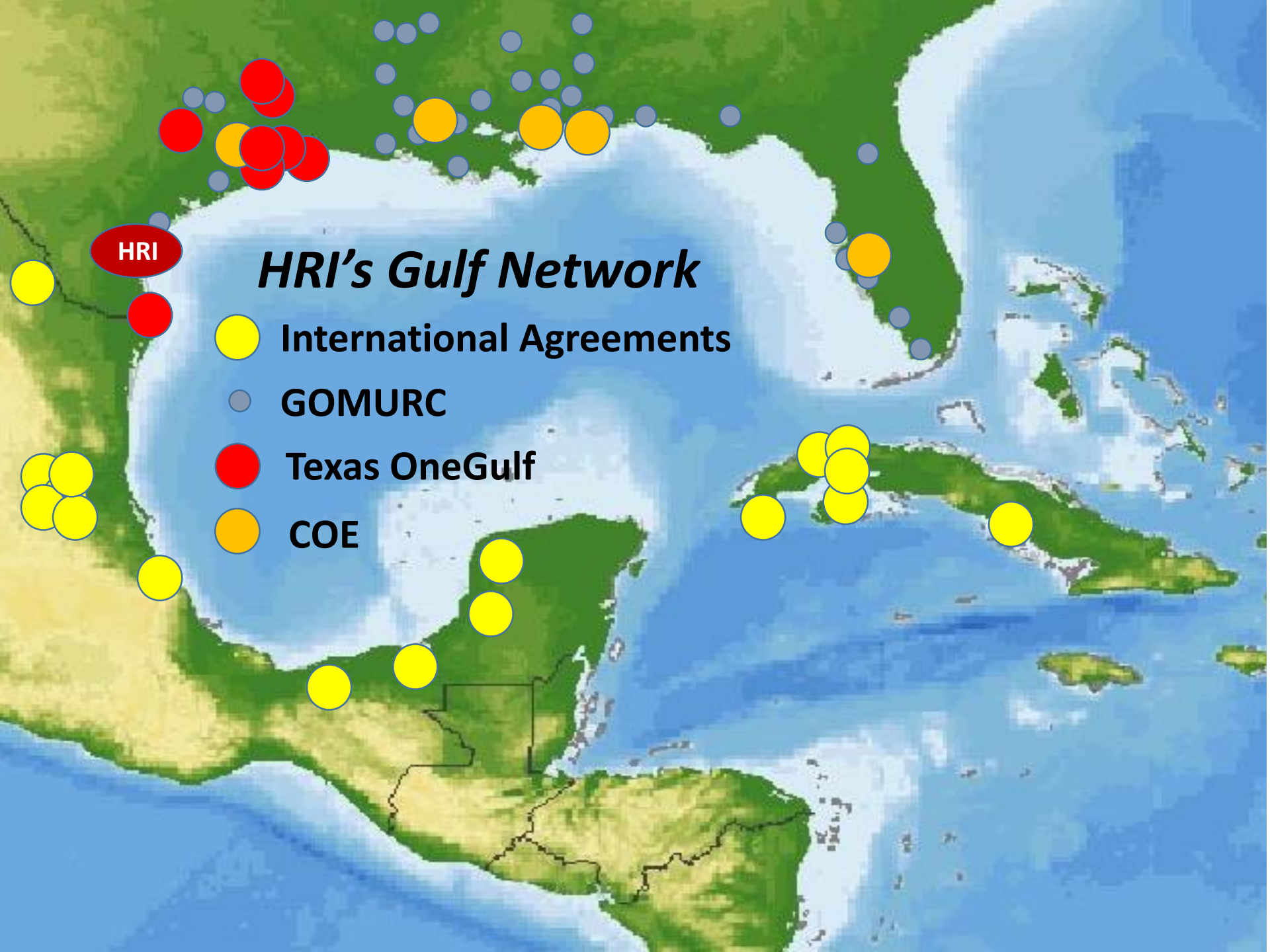


SUMMIT GOALS
Linking Science to Policy to Management for a healthy environment and economy

Metrics for assessing Gulf ecosystem health and productivity

International coordination and cooperation to provide Gulf policy-makers and resource managers the best available science

400 Gulf Leaders
March 27-28 Houston TX



HRI

HRI's Gulf Network

● International Agreements

● GOMURC

● Texas OneGulf

● COE

March
29 -30
2017



Gulf of Mexico Workshop on International Research

HRI

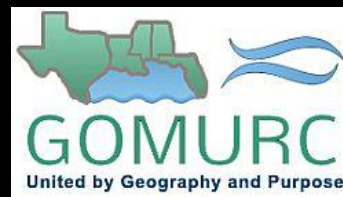
BOEM – Bureau of Ocean Energy Management

NAS GOMP - National Academy of Science Gulf of Mexico
Program

NOAA – National Oceanic and Atmospheric Administration

HRI – Harte Research Institute for Gulf of Mexico Studies

Supporting Partners





Gulf of Mexico Workshop on International Research

HRI

165 invited Gulf scientists the U.S. Mexico and Cuba

Develop an inventory of southern Gulf environmental resources

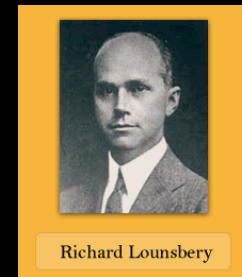
Identify gaps in knowledge and develop research priorities

Synthesize information and results to help guide future research

Establish an international network to pursue priority research

Trinational Ocean Observing Workshop – Havana, Cuba July 8 and 9, 2017

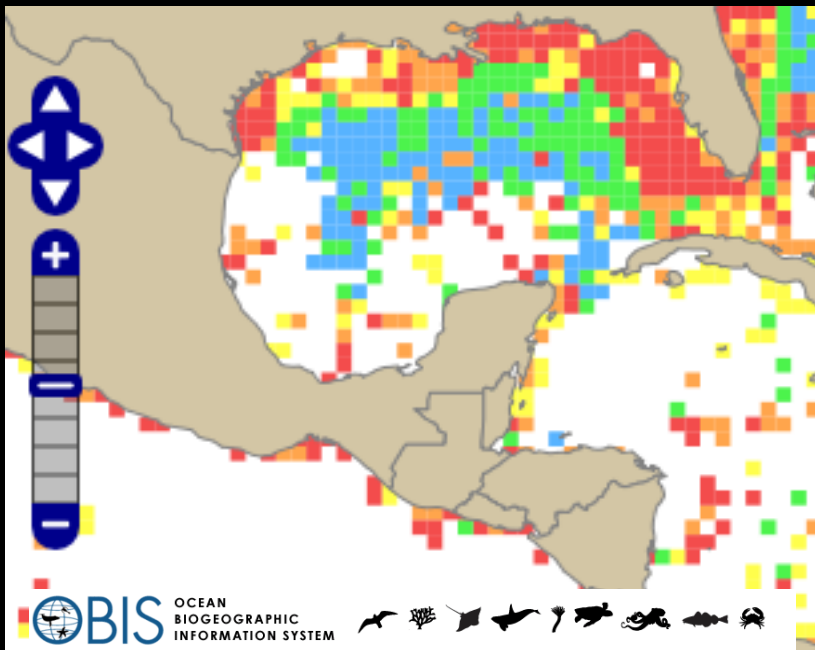
HRI



Richard Lounsbery

Harte
Charitable
Foundation

Robert Lounsbery
Foundation



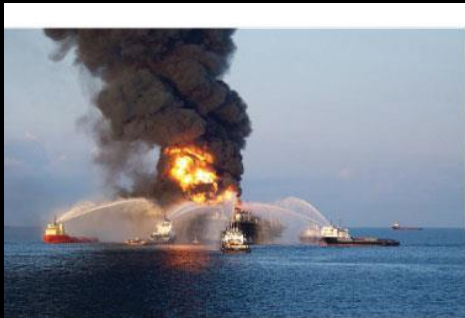
HRI International Endowed Chair - Biodiversity (Mexico)



HRI International Endowed Chair – Conservation (Cuba)

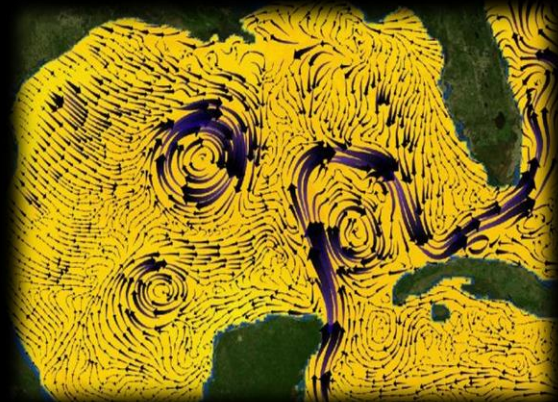


HRI and Ocean Observing



Ocean Observation Tools in the Gulf
Can Help U.S. Prepare for Next Disaster

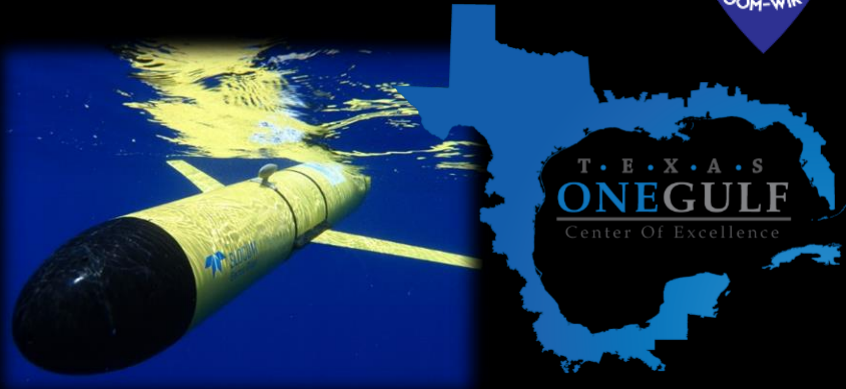
Congressional Briefing by industry,
academia...



CHEER
LEADING



Gulf of Mexico
Workshop on
International Research



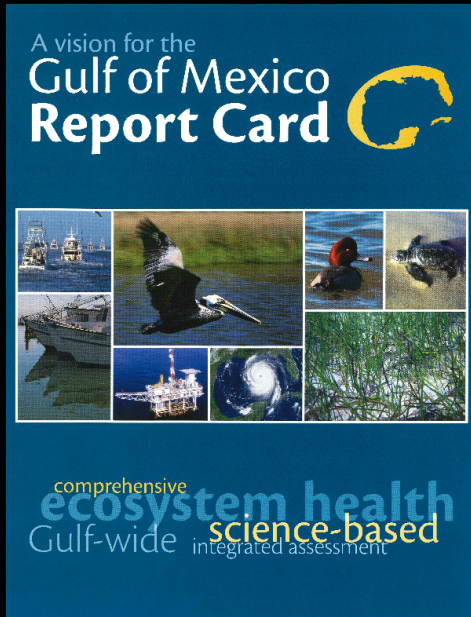
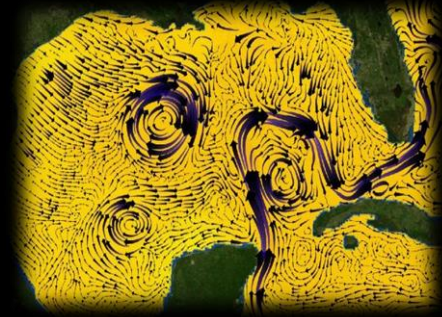
CONVENING



RESEARCH



HRI and Ocean Observing



Mission – Science Driven Solutions To Gulf of Mexico Problems



Vision - A Gulf of Mexico that Is Ecologically and Economically Sustainable

