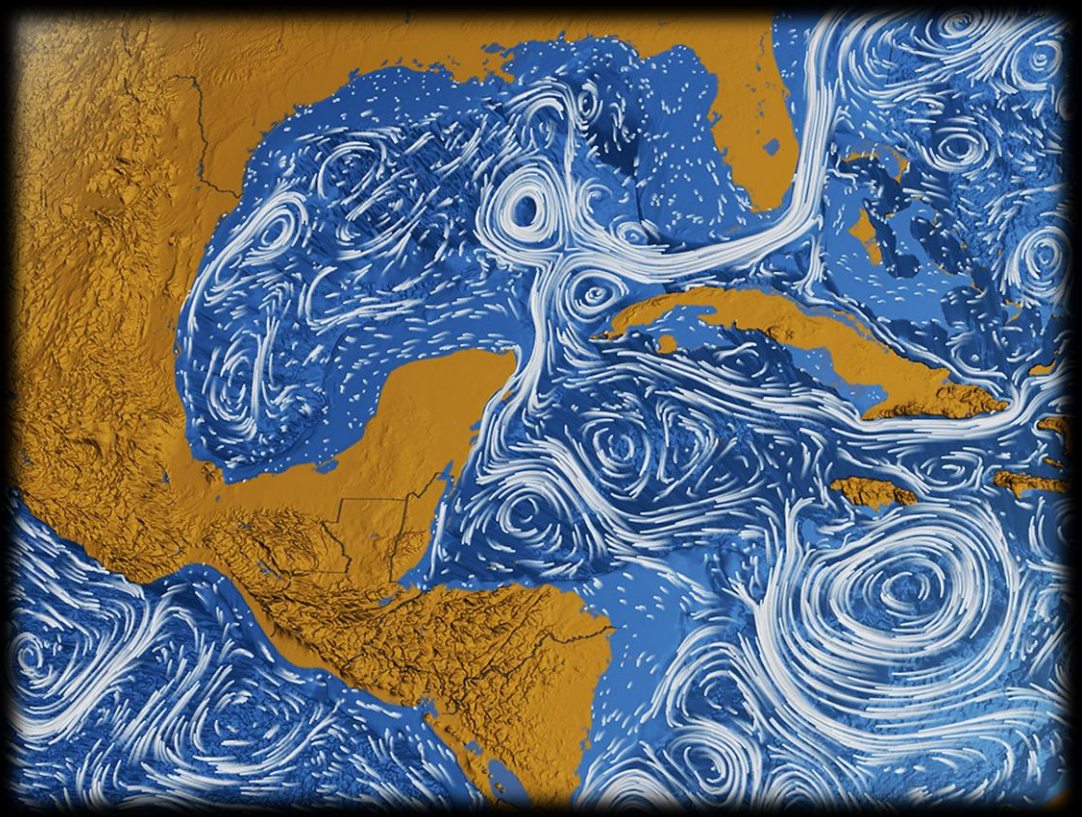
The Gulf of Mexico – Where Economy and Environment Coexist and Contend

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


sea quest


© Jesse Cancelmo


VAITT

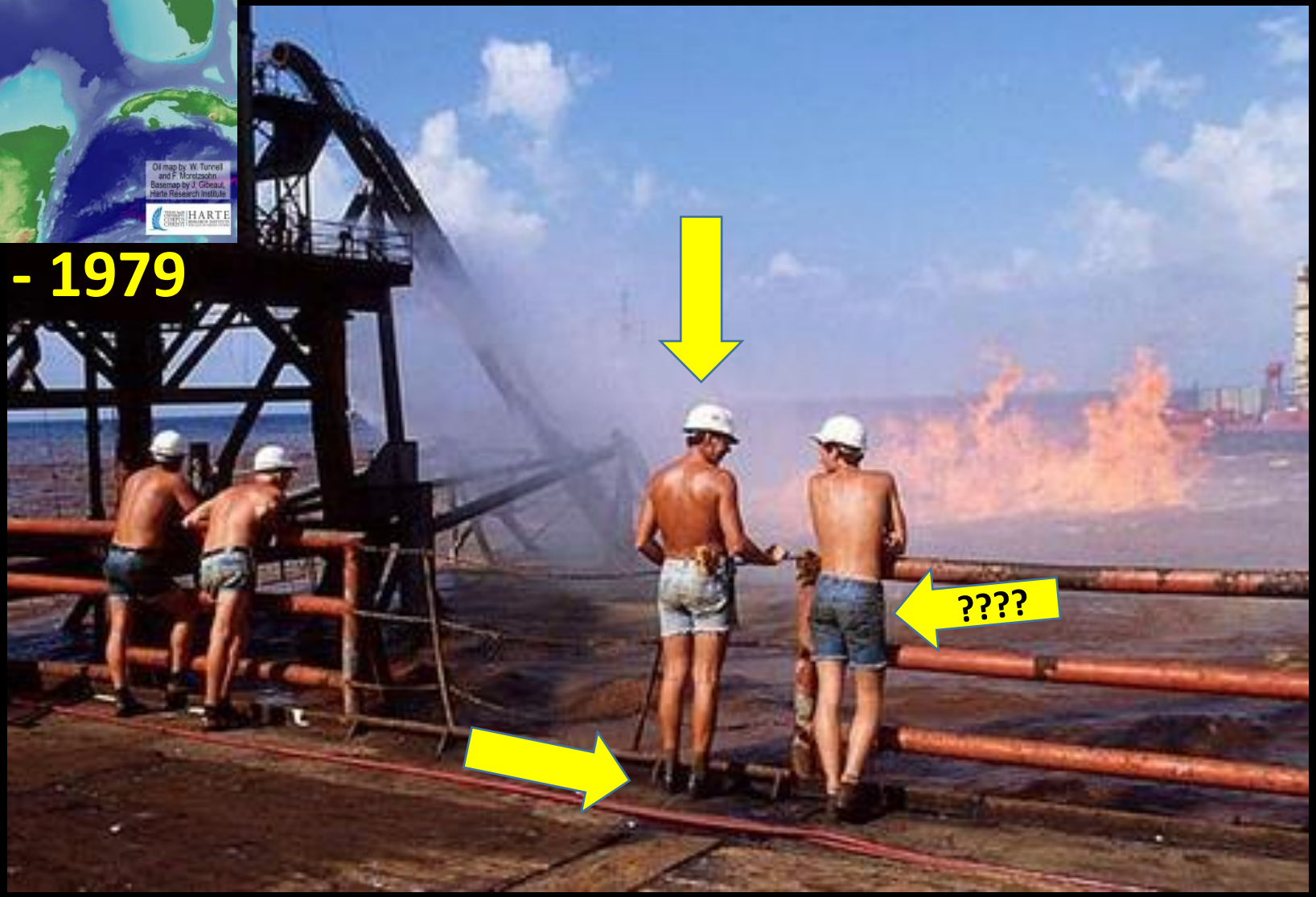

VAITT
ORCA


HARTE

The Future ain't what it used to be

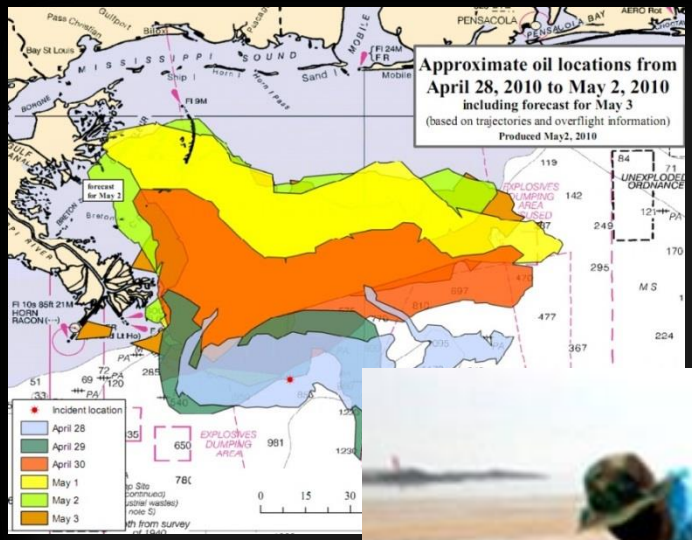
Yogi Berra, circa 1974

IXTOC - 1979



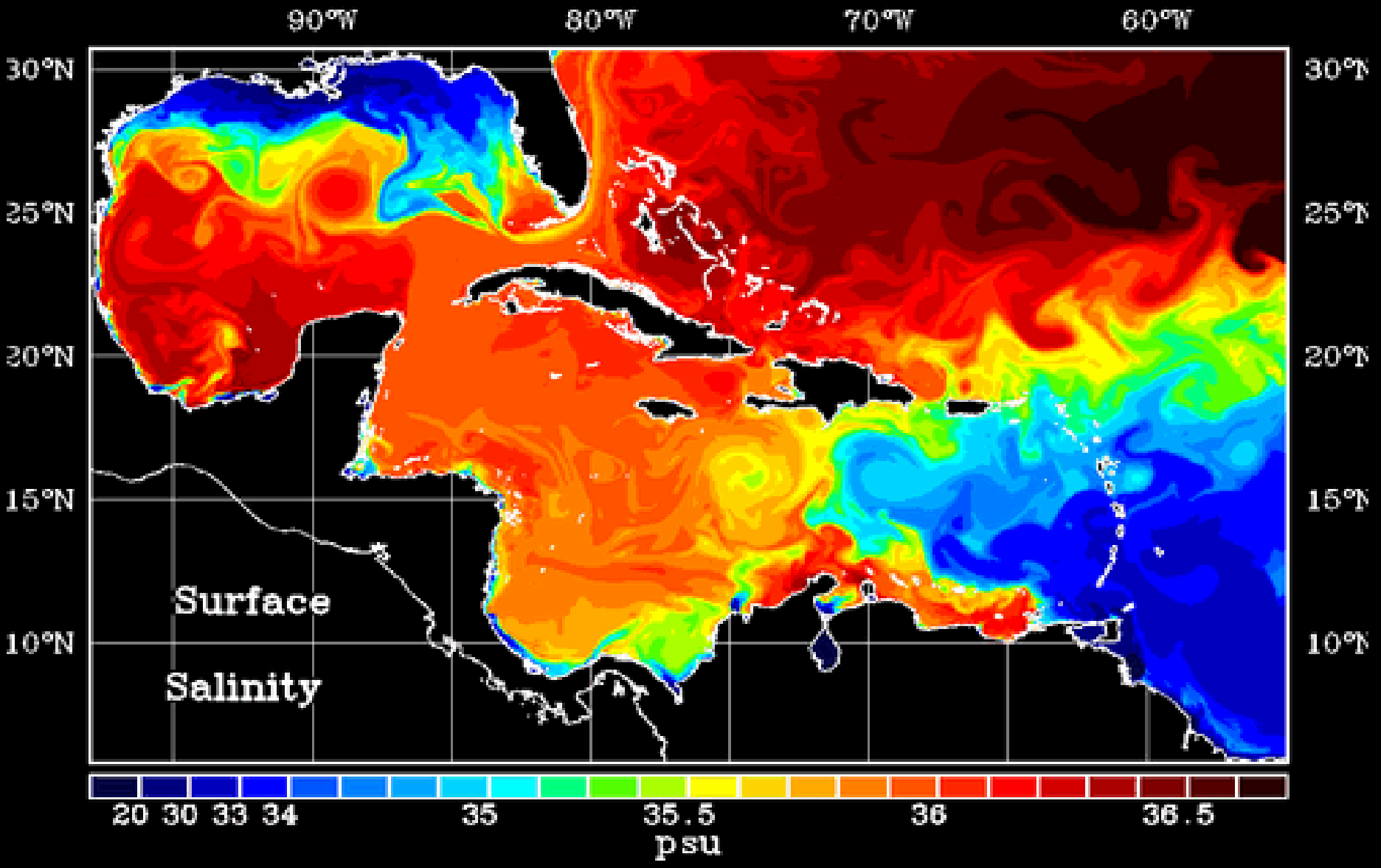
The Future ain't what it used to be

Yogi Berra, circa 1974



DEEPWATER HORIZON 2010

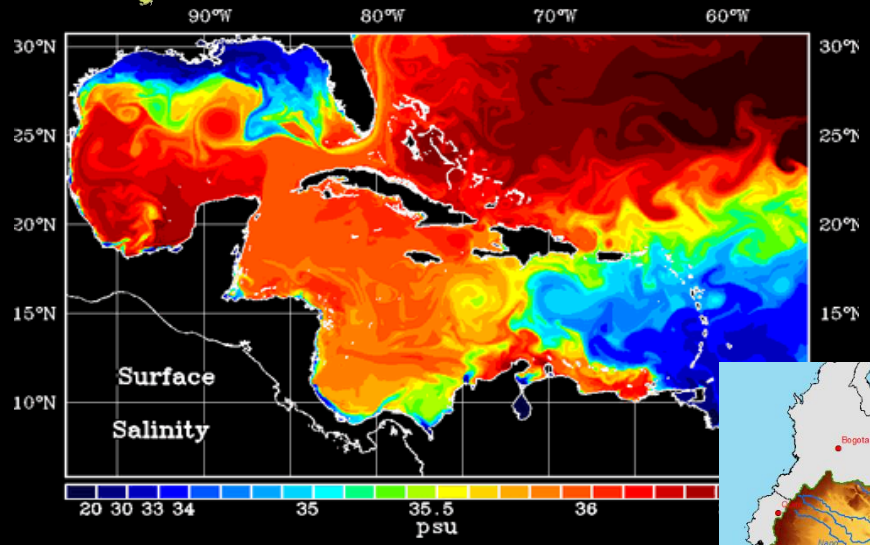
The Gulf of Mexico: Ninth Largest Ocean Waterbody – 600,000 sq. miles

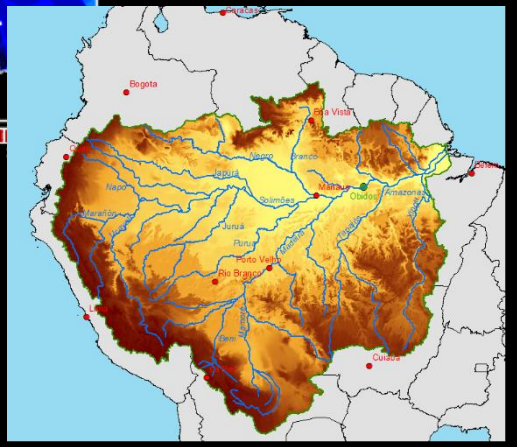


30 DAY LOOP AUGUST - 2011

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

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



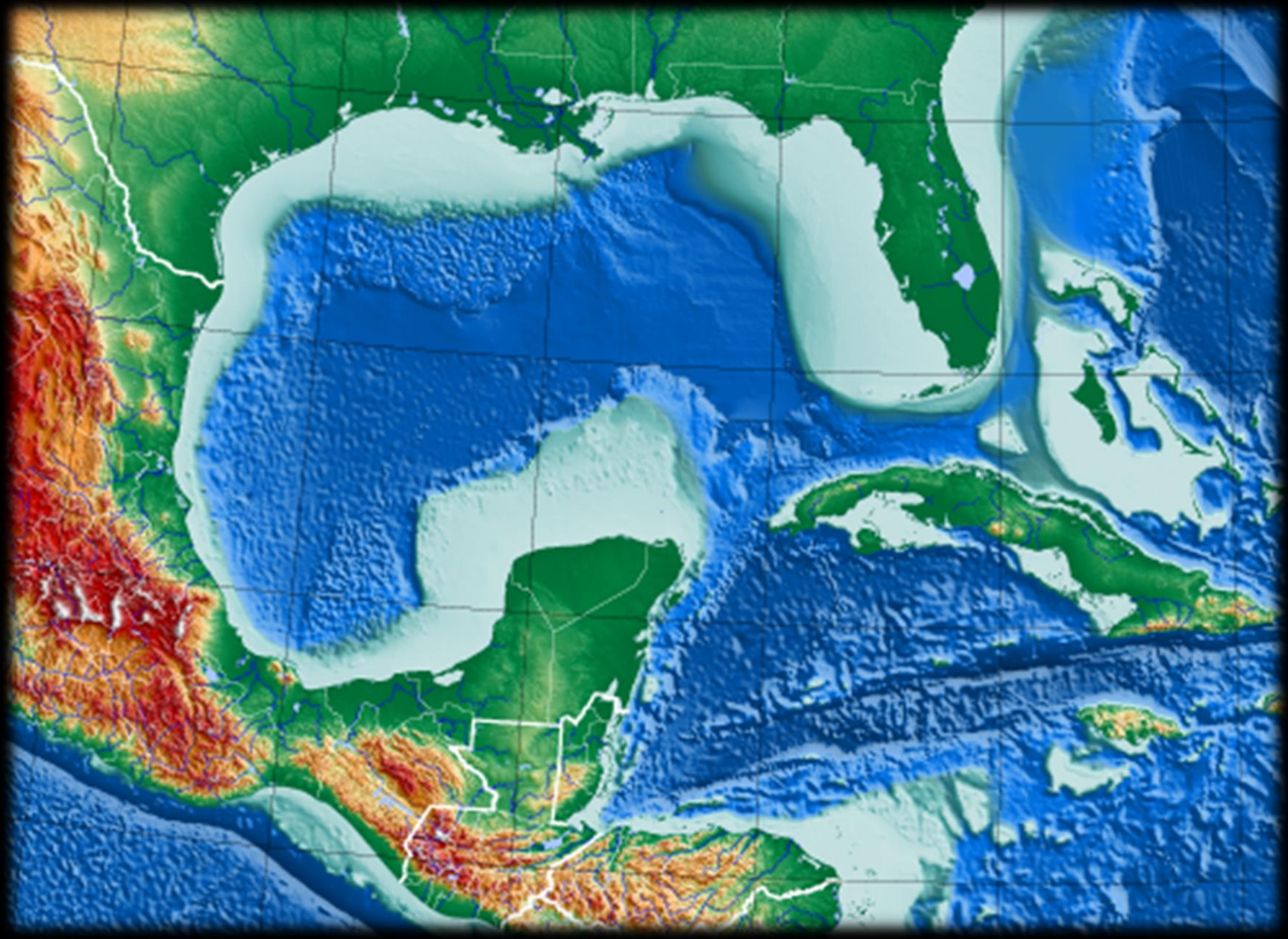


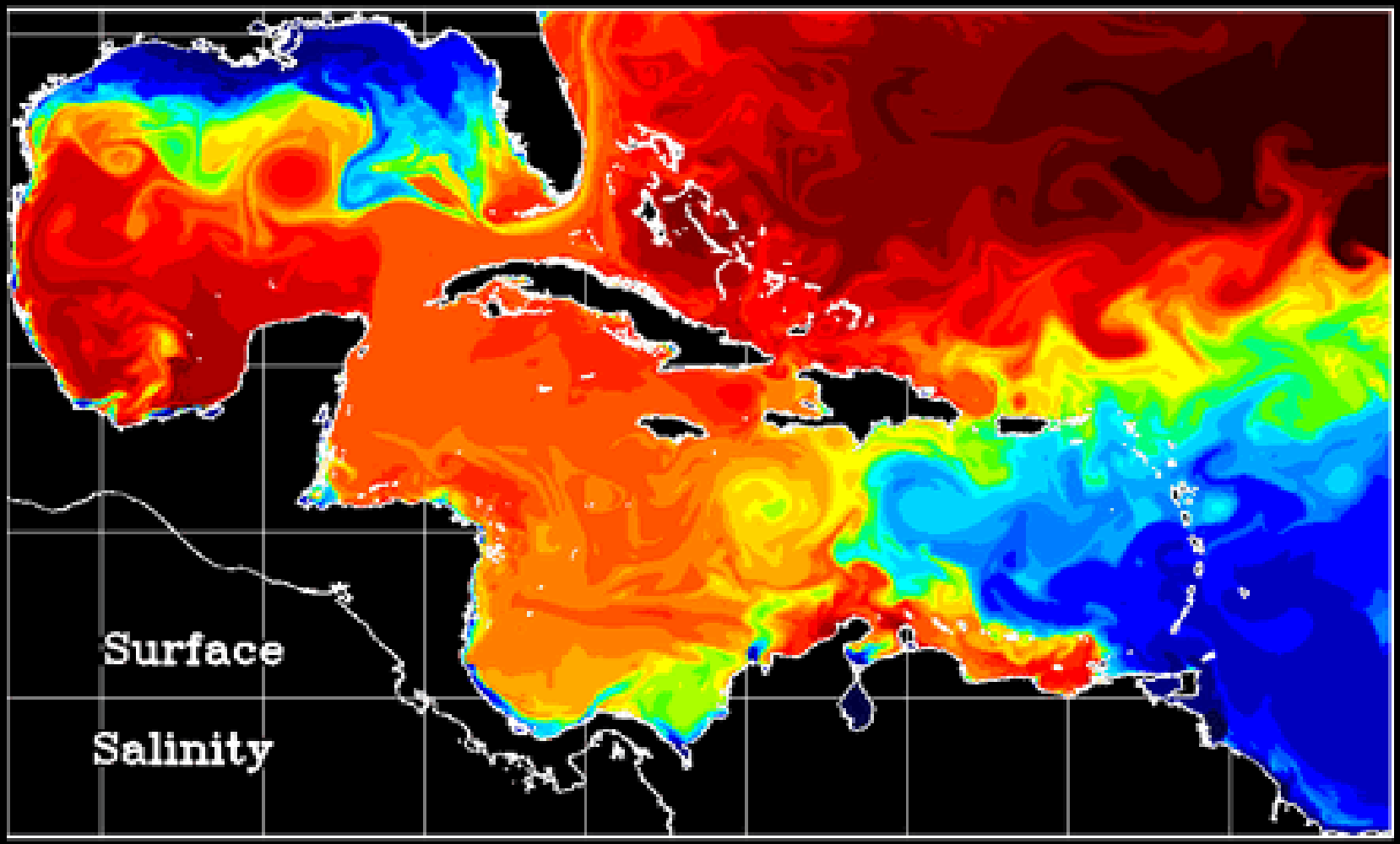
AMAZON RIVER WATERSHED
Discharge: 7.4 million cu. ft. sec.

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
0
842
1264
1685

About half of the Gulf is shallow continental shelf…




Surface
Salinity

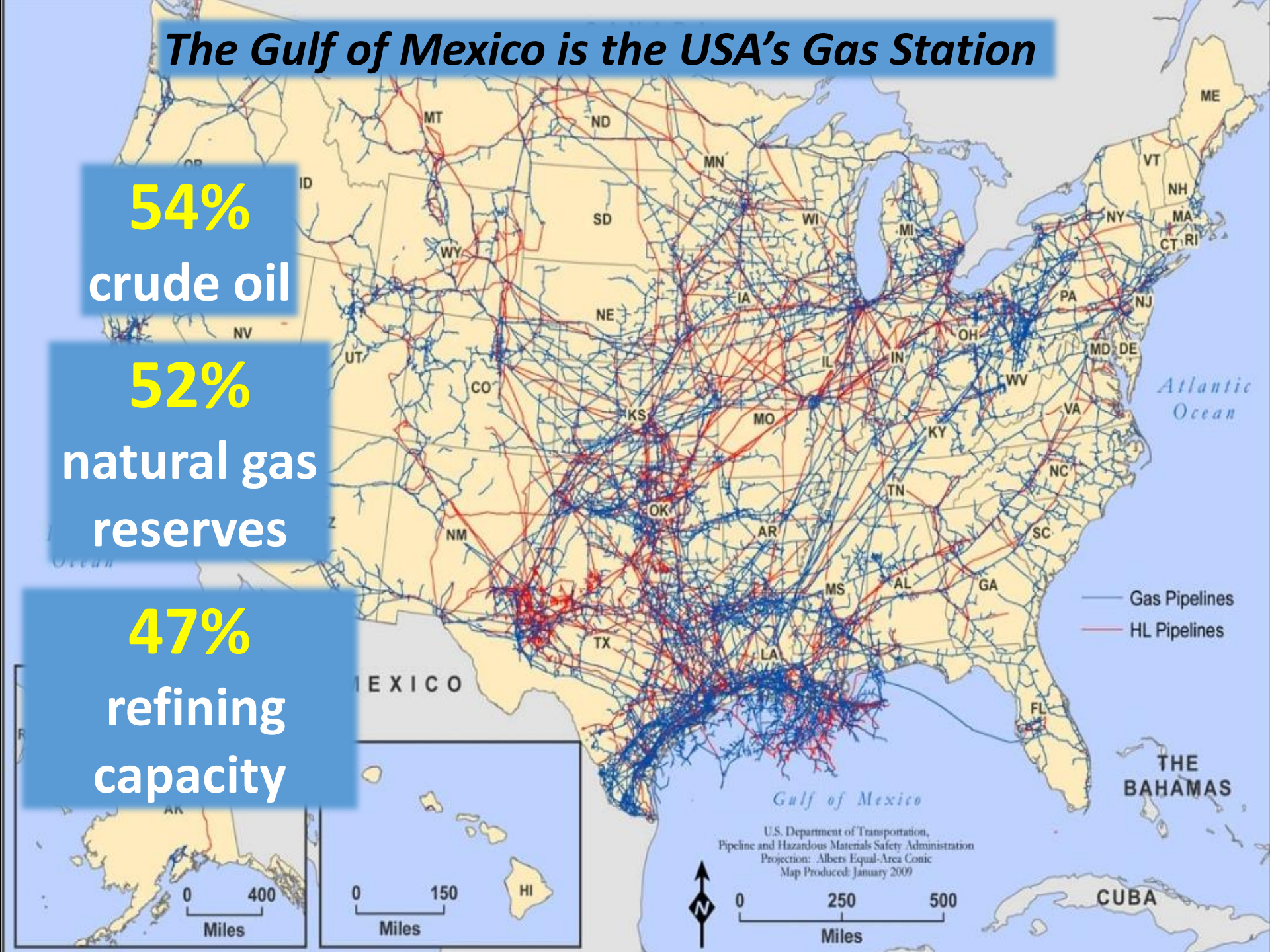

America's Sea*
*American Mediterranean
or the Third Coast, or the
Forgotten Coast

The Gulf of Mexico is the USA's Gas Station

54%
crude oil

52%
natural gas reserves

47%
refining capacity

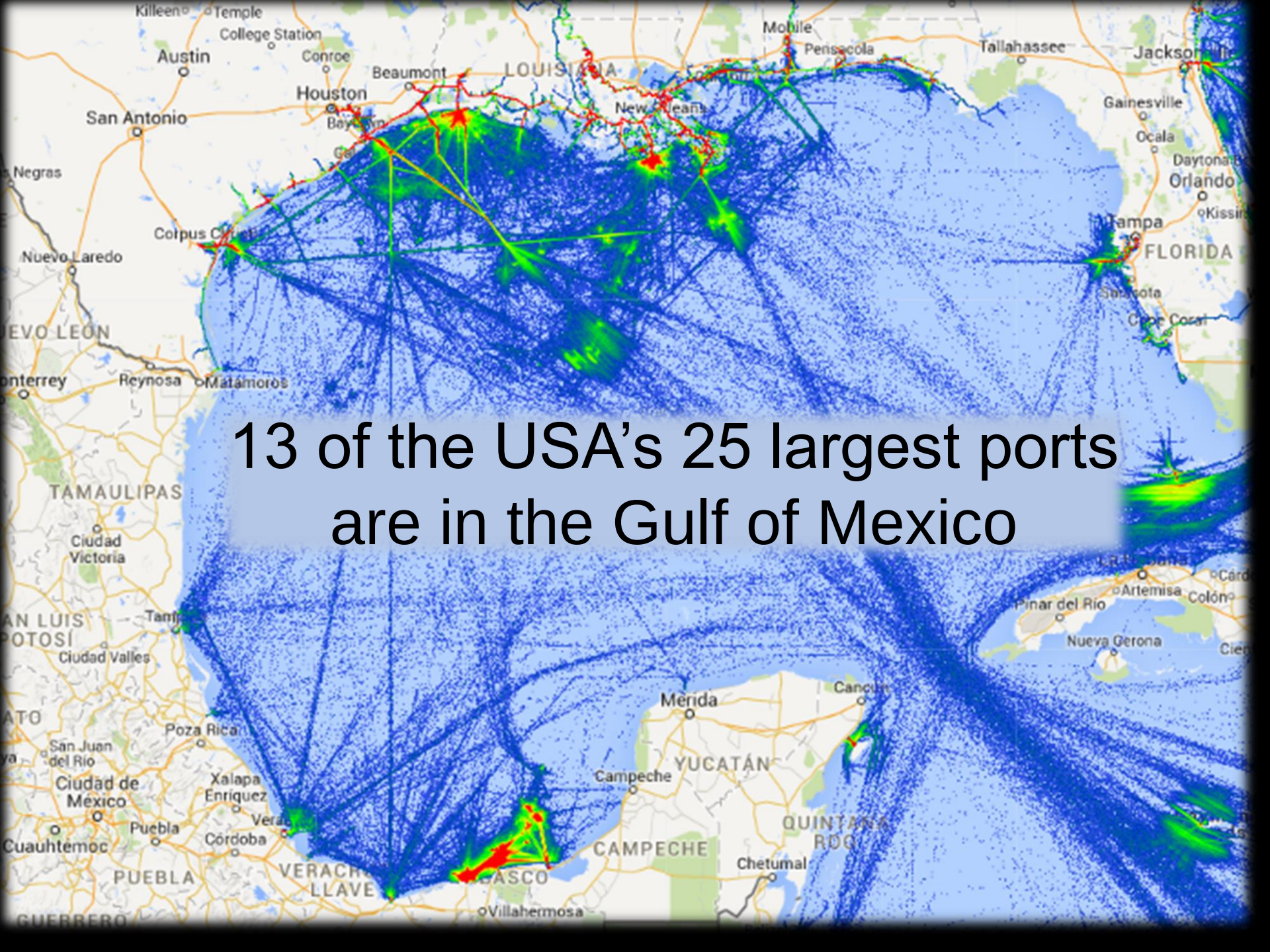


The Gulf of Mexico is one of the most productive ecosystems in the world…

HRI

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
Killeen
Temple
College Station
Austin
Conroe
Beaumont
LOUISIANA
Houston
Mobile
Pensacola
Tallahassee
Jacksonville
San Antonio
New Orleans
Gainesville
Ocala
Daytona Beach
Orlando
Negras
Corpus Christi
Tampa
FLORIDA
Nuevo Laredo
Sarasota
Cape Coral
NUEVO LEON
Monterrey
Reynosa
Matamoros
TAMAULIPAS
Ciudad Victoria
Artemisa
Pinar del Río
Colón
Nueva Gerona
SAN LUIS POTOSÍ
Ciudad Valles
Tampico
Mérida
Cancún
Poza Rica
San Juan del Río
YUCATÁN
Campeche
Ciudad de México
Xalapa Enríquez
Veracruz
Puebla
Córdoba
Cuauhtémoc
QUINTANA ROO
CAMPECHE
Chetumal
PUEBLA
VERACRUZ
TABASCO
Villahermosa
GUERRERO

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

1.4 billion pounds of seafood annually

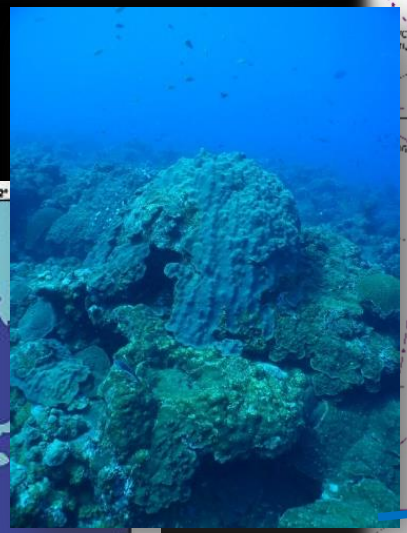
78% of USA shrimp landings

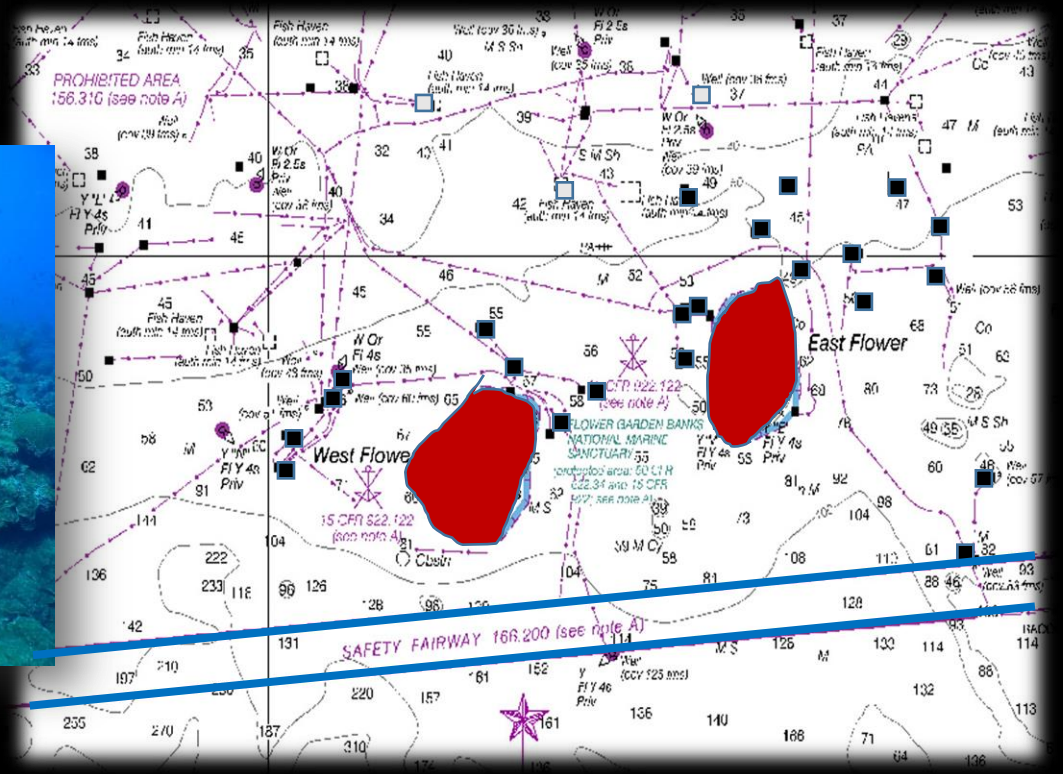
62% of USA oyster landings

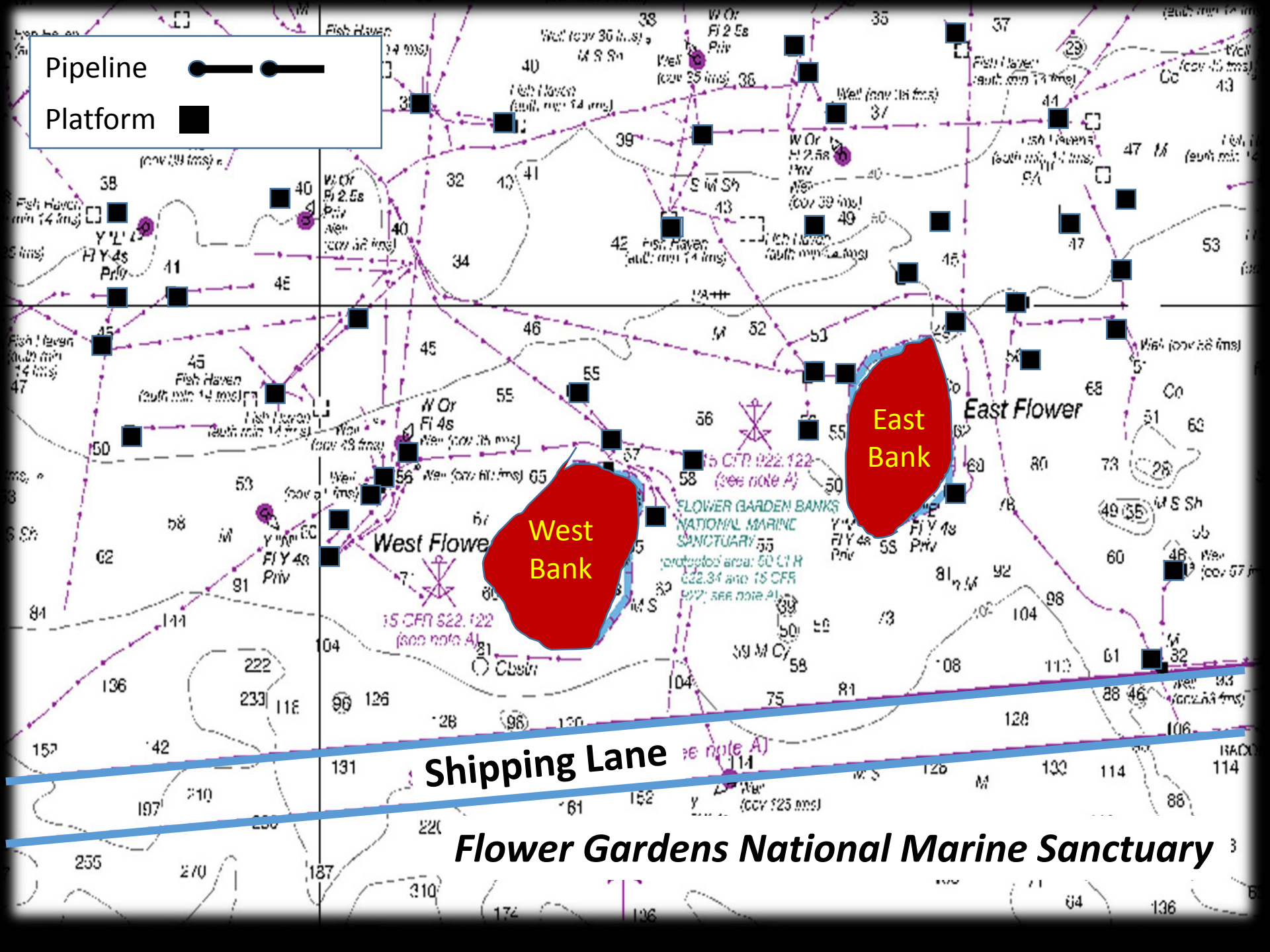
44% of USA recreational fishing - **$16.2 billion** annually

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
West Bank
East Bank
East Flower
West Flower
FLOWER GARDEN BANKS NATIONAL MARINE SANCTUARY
Shipping Lane
Flower Gardens National Marine Sanctuary

Harte Research Institute

Directed Research in focus

Transdisciplinary by nature

Ecosystem Studies And Modeling

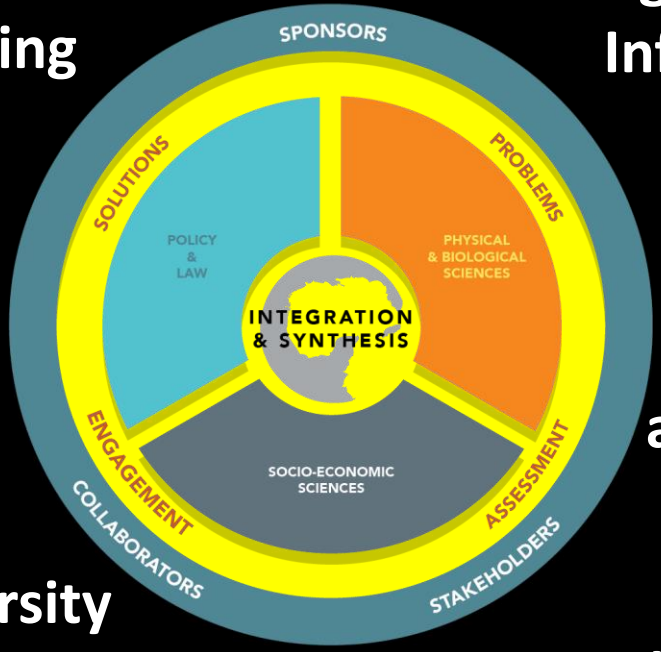
Geographical Information Science

Socio Economics

Marine Policy and Law

Biodiversity Conservation Science

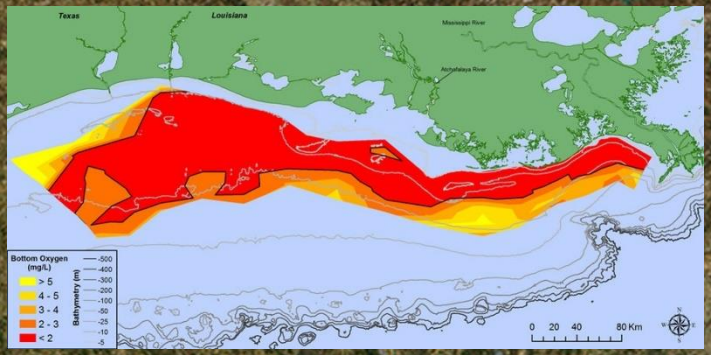
Fisheries and Ocean Health



Gulf of Mexico Centered


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

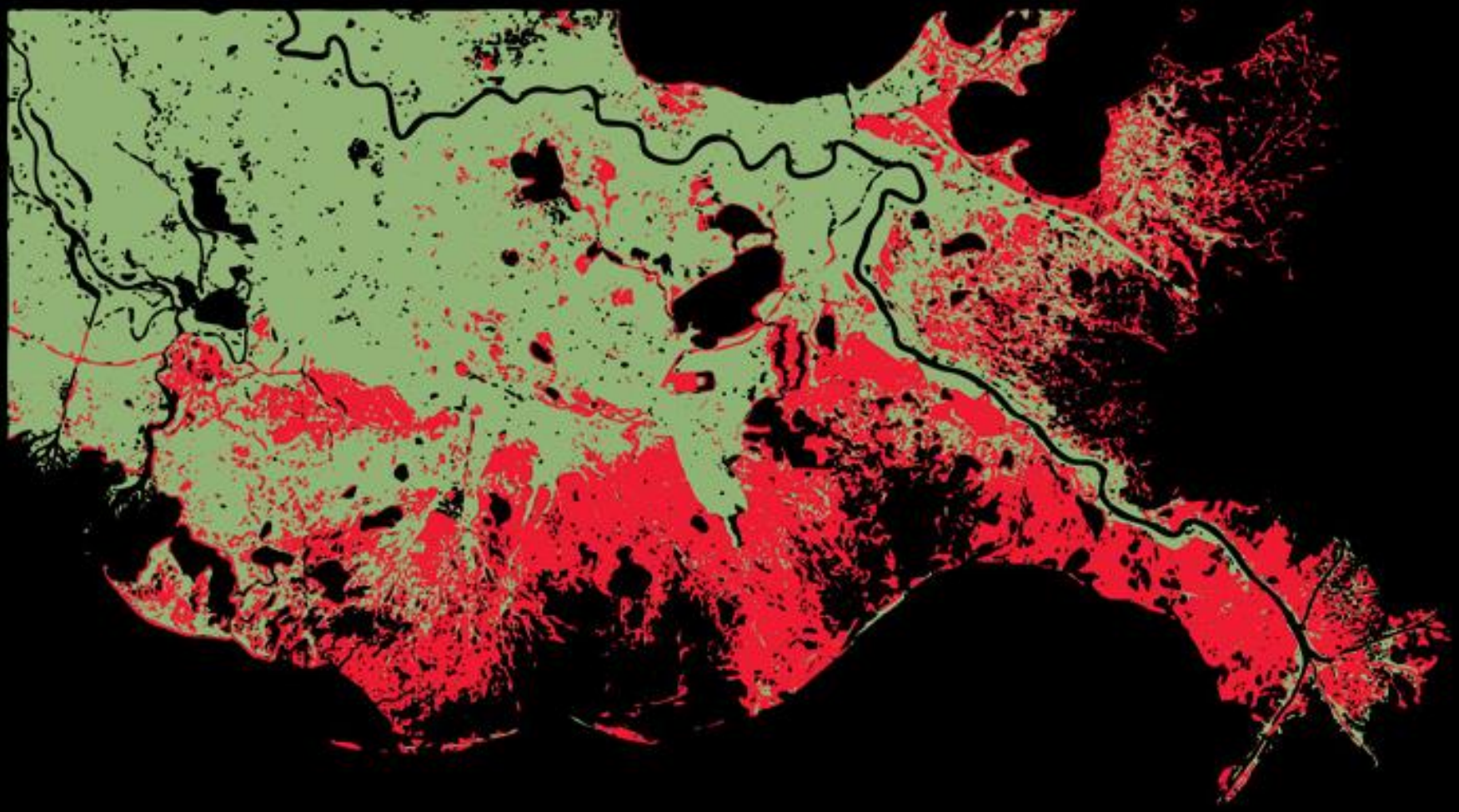
12% to 66% lost

Up to 90% locally

Gulf Mangrove

25% to 33% lost

Up to 86% locally



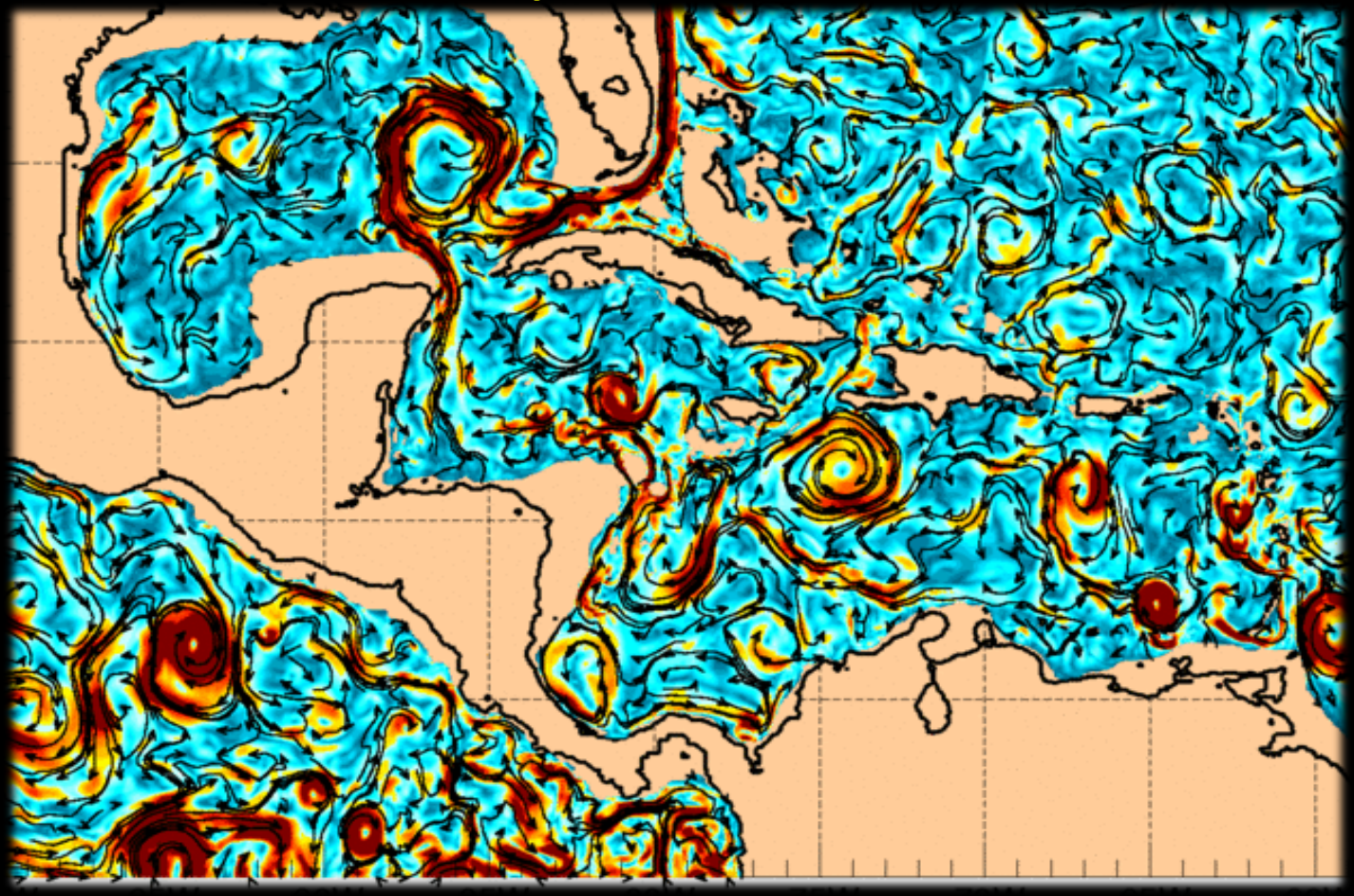
Louisiana Land Loss
1932 to 2050 (projected)

http://www.southwings.org/our-work/gulf-ecosystem-restoration/

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)

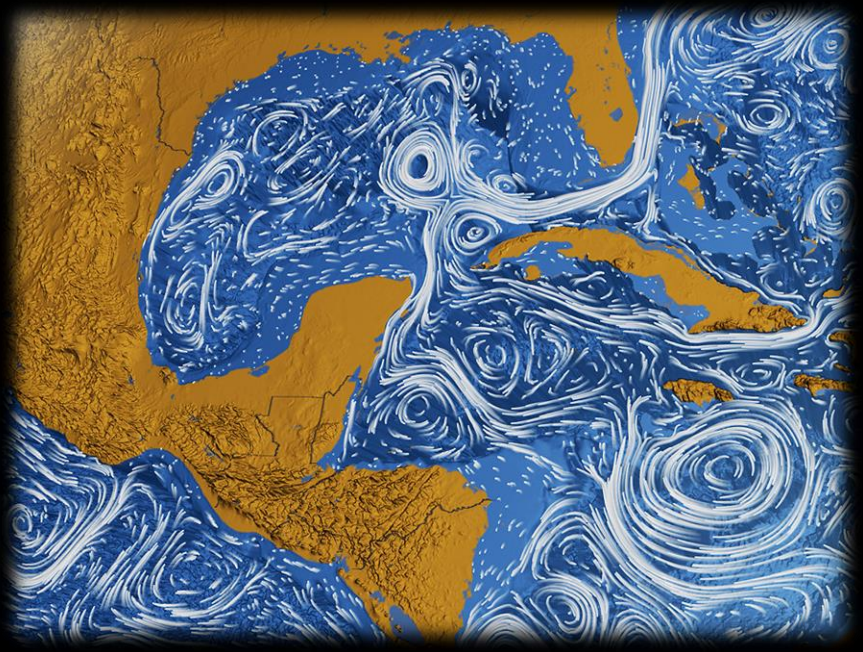
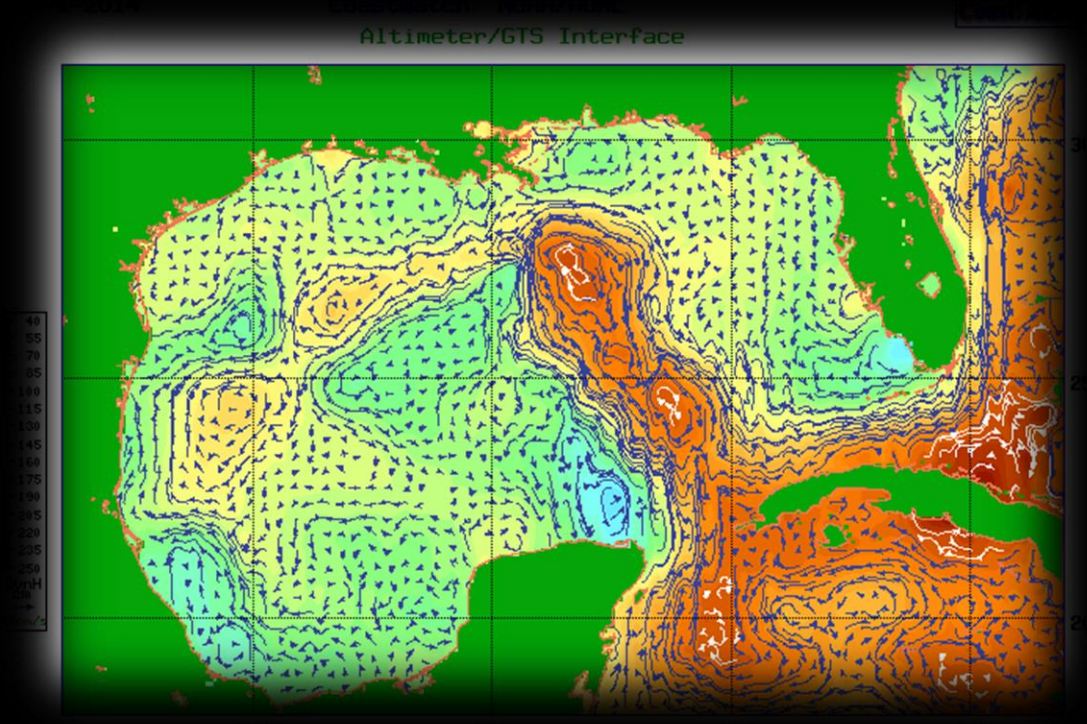


Photo credit: Gulf of Mexico Sperm Whale Seismic Study (SWSS) (U.S. Minerals Management Service, 2002).

CRITICAL COASTAL and OCEAN INFRASTRUCTURE

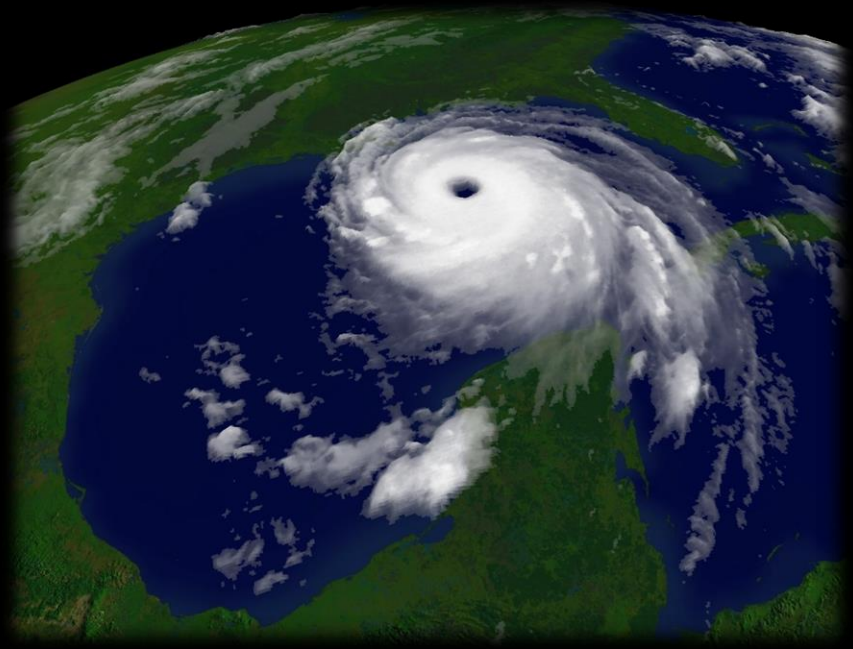
ON WHICH THE HEALTH, WEALTH AND WELL-BEING OF THE GULF OF MEXICO DEPEND

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



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

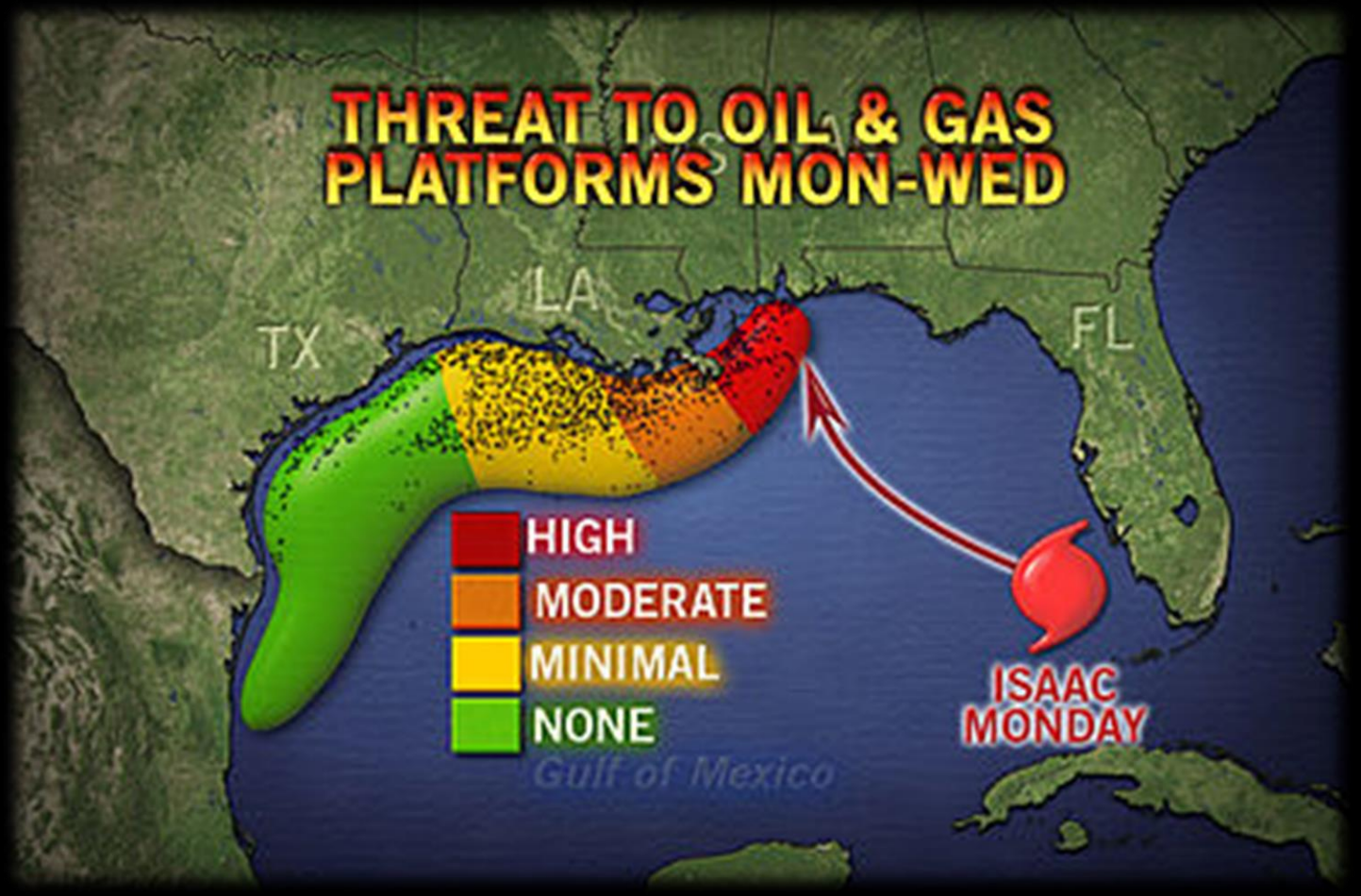
Freighter rams Sunshine Skyway Bridge - 35 Dead

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

Photo credit – Houston Chronicle, Oct 17, 2016

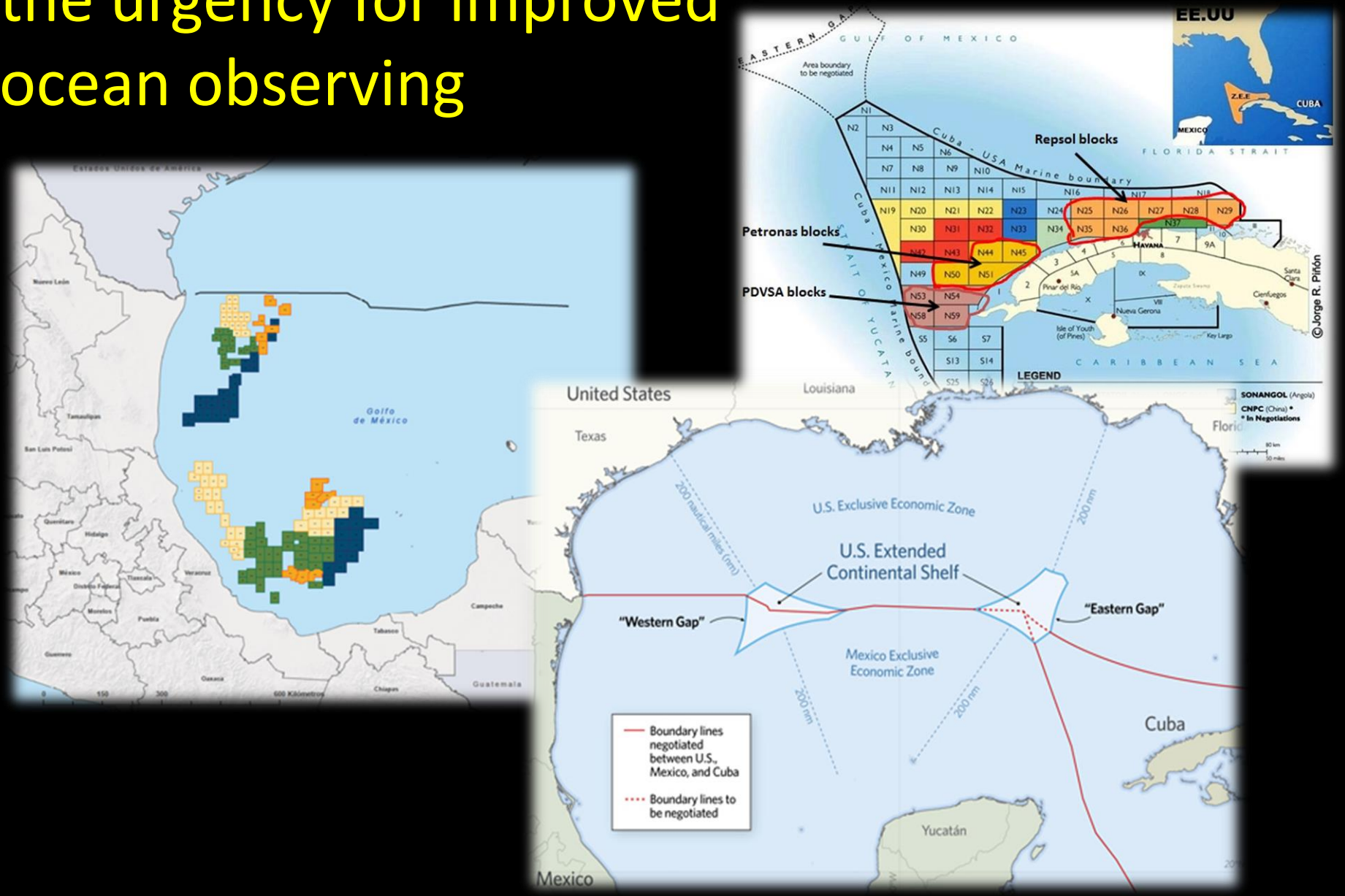
What we do not know about the Gulf of Mexico is complicating our ability to manage federal fisheries and that is generating divisive political controversy

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



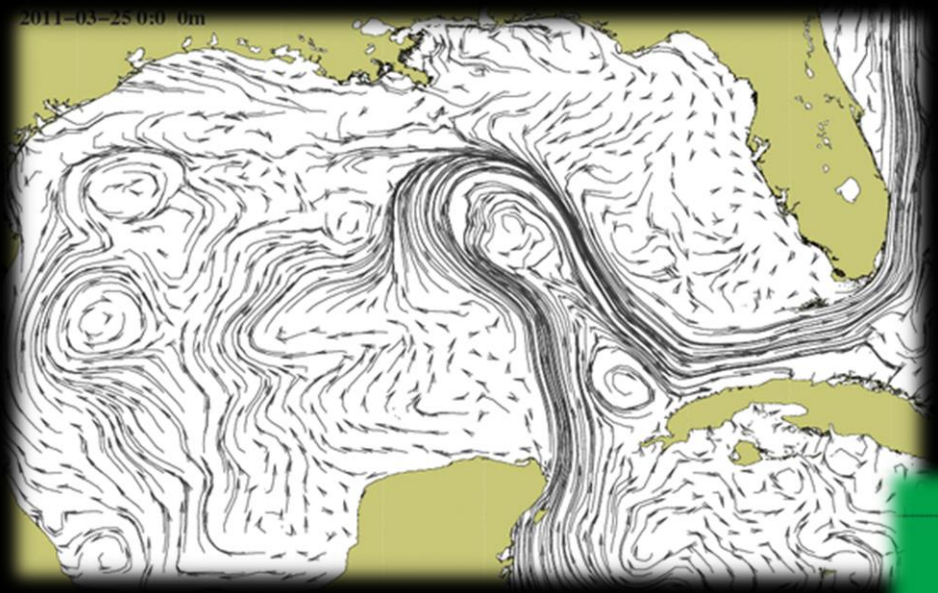
Climate Change
Adapting to changing ocean conditions Into the future

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

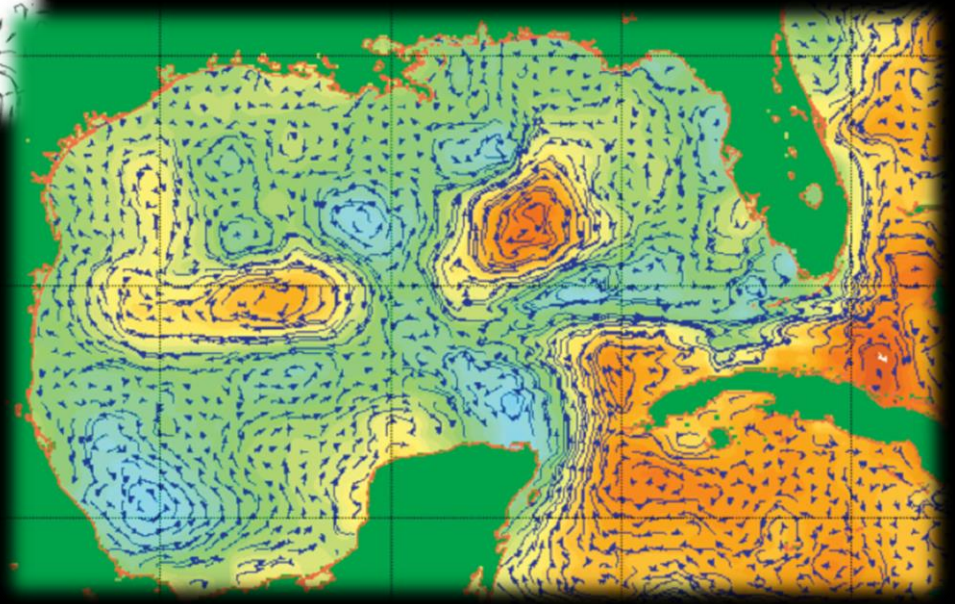
If you stick your head in the sand too long be careful… you might drown

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



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.

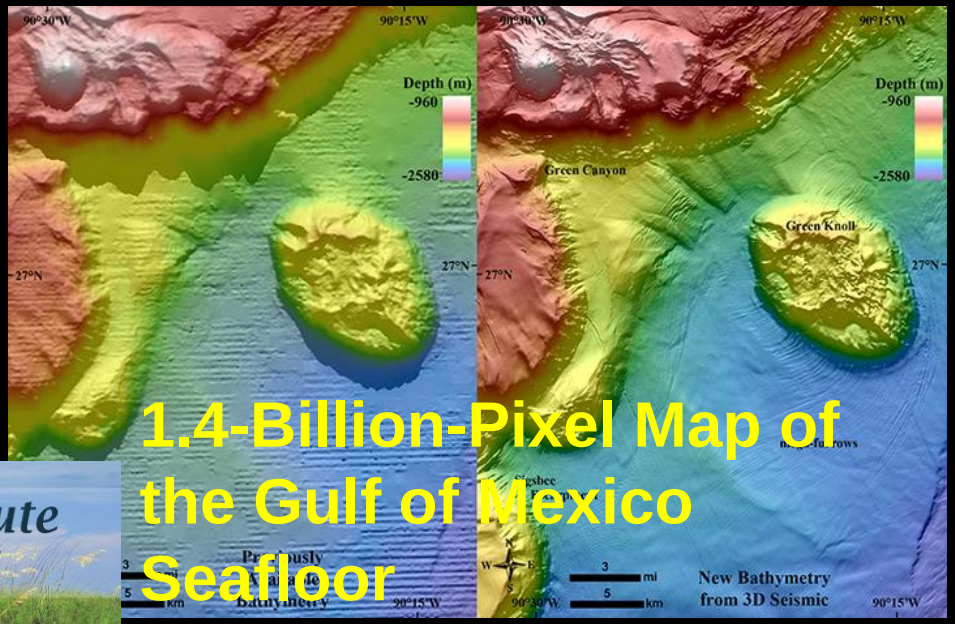
My goal is help advance ocean observing capacity where I can…

The State of Ocean Observing Science in the Gulf of Mexico

HRI

BOEM

Bureau of Ocean Energy Management



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

A long History of Ocean Observing Research

U.S. Department of the Interior · Minerals Management Service · Mineral Revenues · Offshore Minerals · Stewardship

CIGoM
Consorcio de Investigación del Golfo de México

CICESE

Cinvestav UNIDAD MERIDA

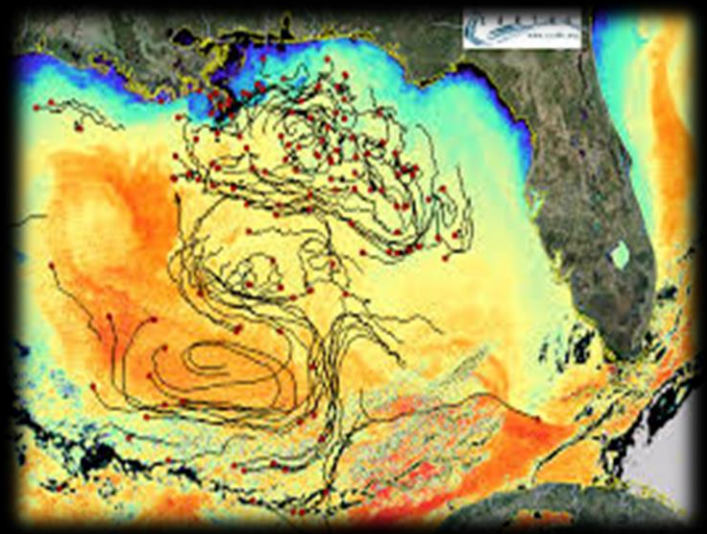
UABC

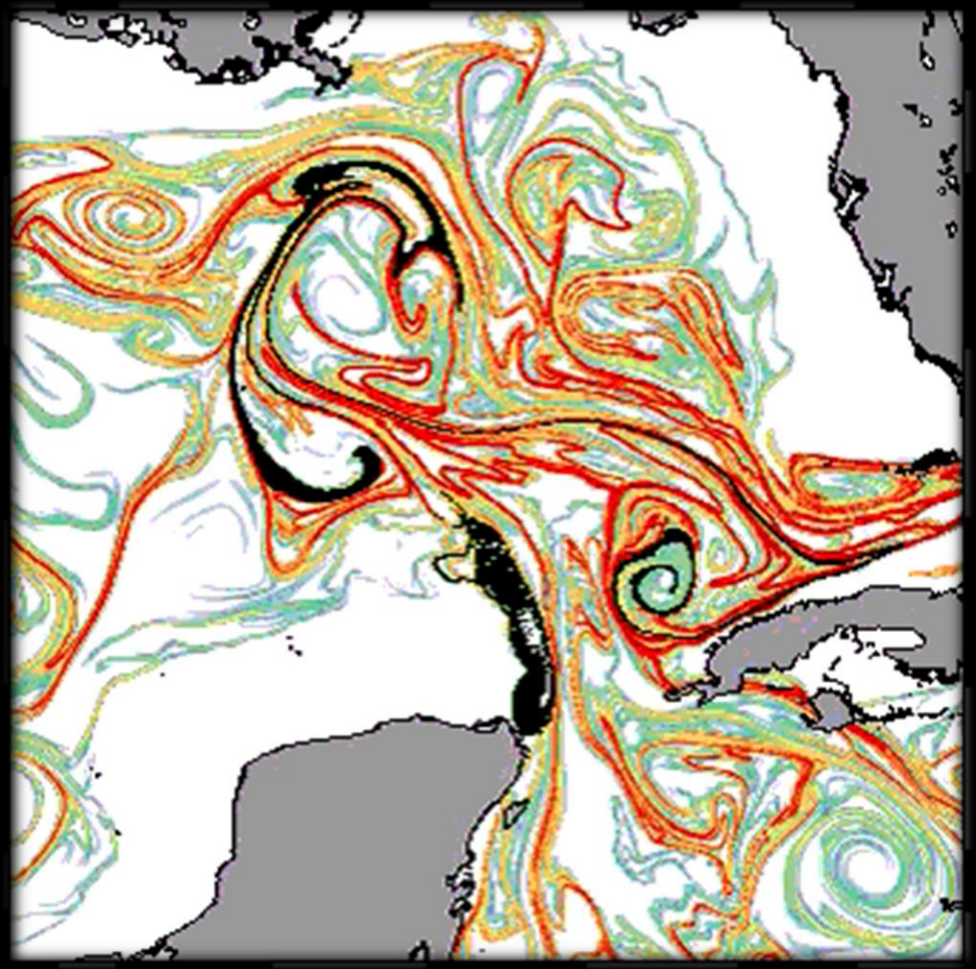
CIDESI

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

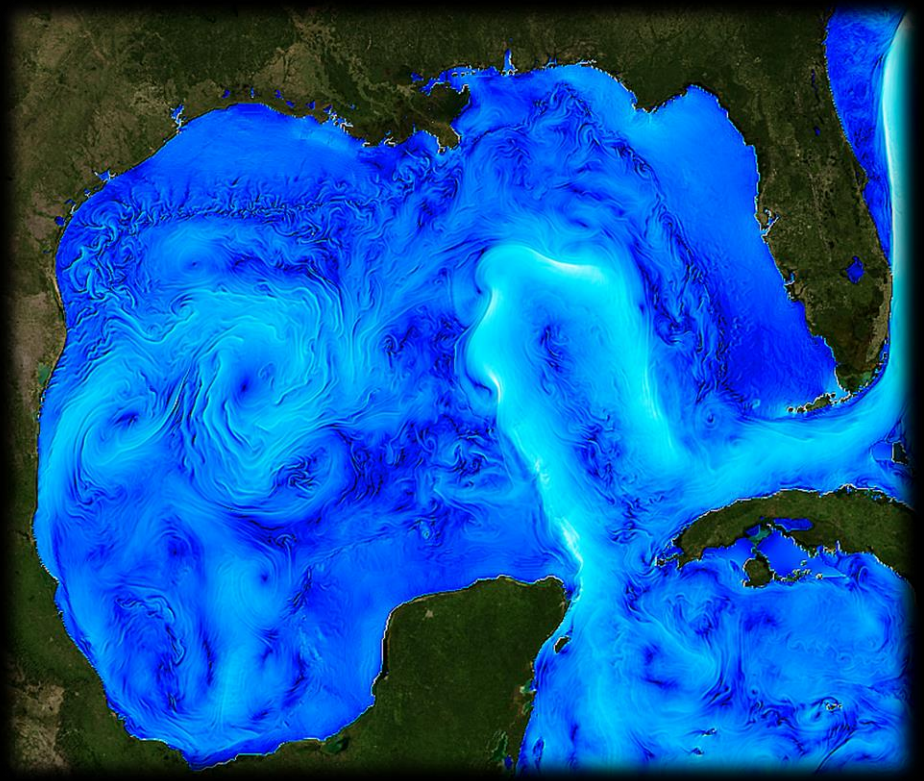
- Perform physical, chemical, and biological measurements to establish a baseline for the present-state and the natural variability of the greater ecosystem of the Gulf of Mexico

- Use and develop cutting-edge technologies to observe the surface ocean continuously, and in a 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

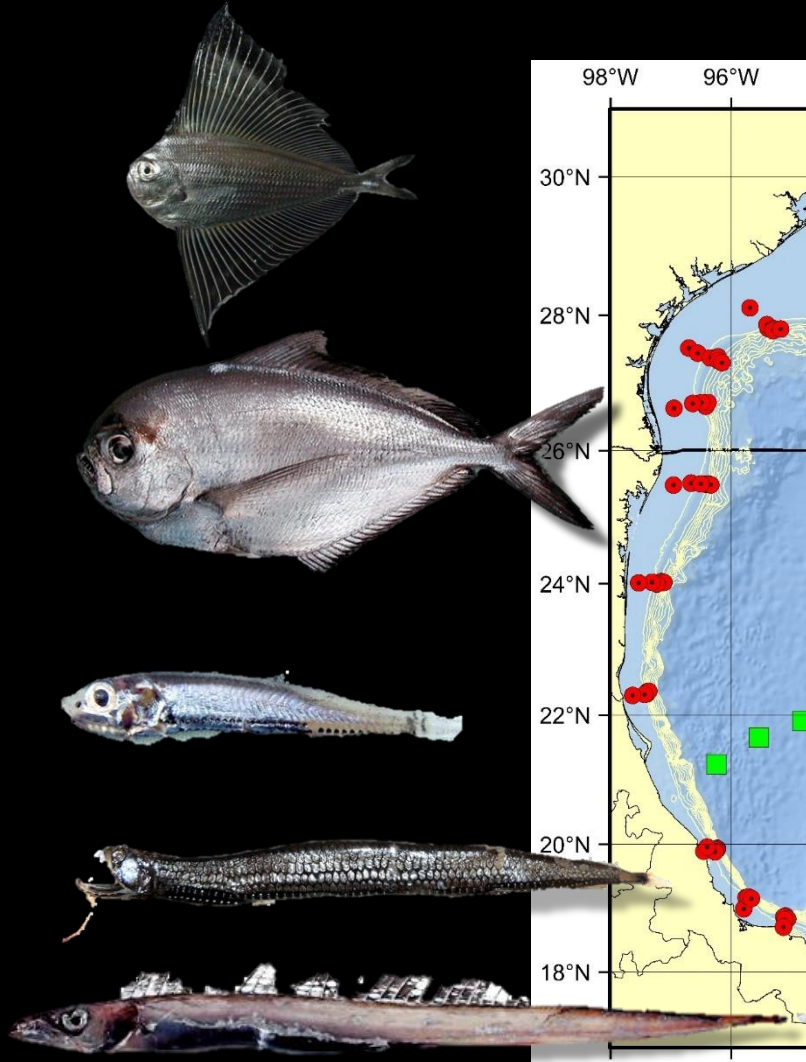


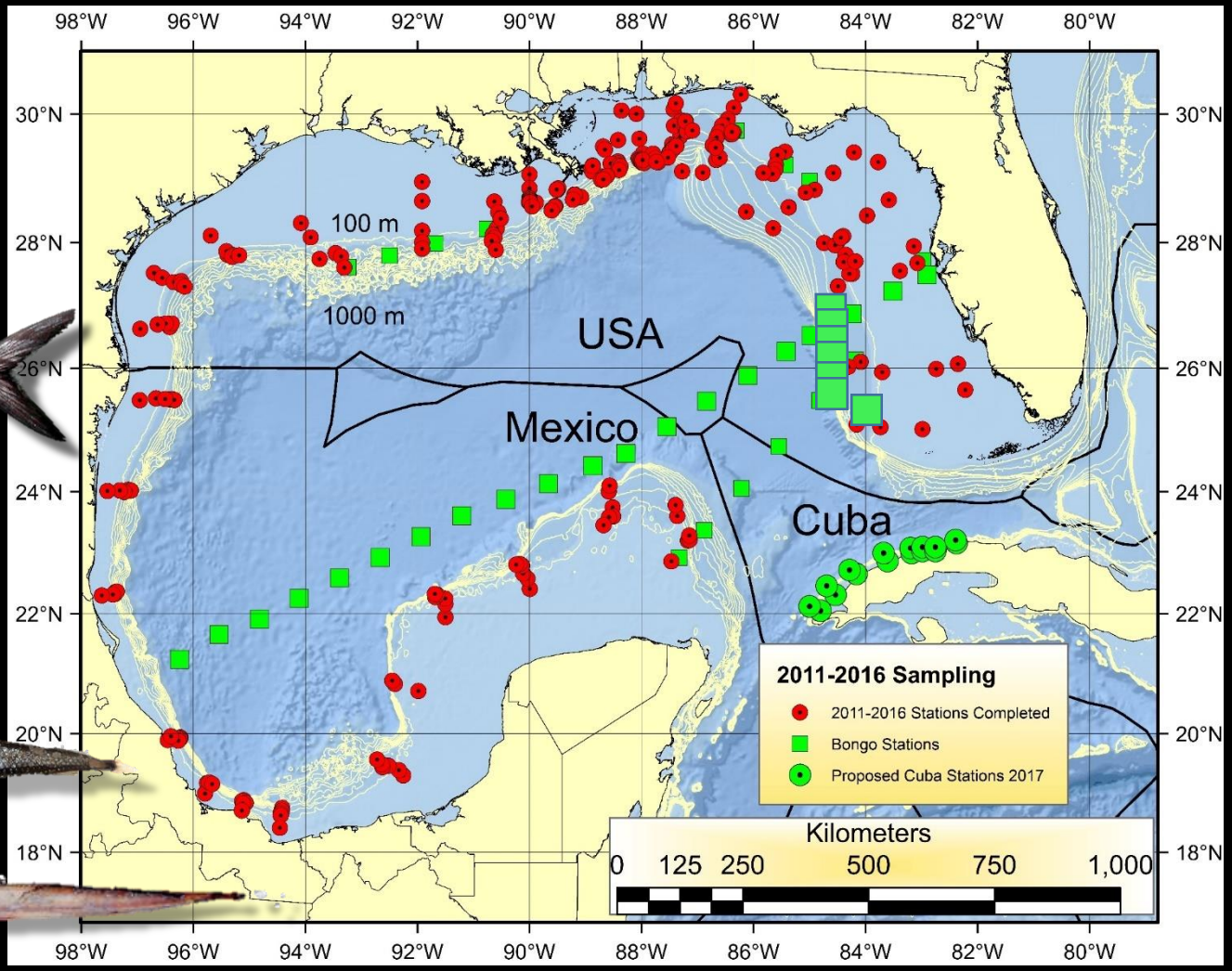
Program will launch campaign 2018/2019

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



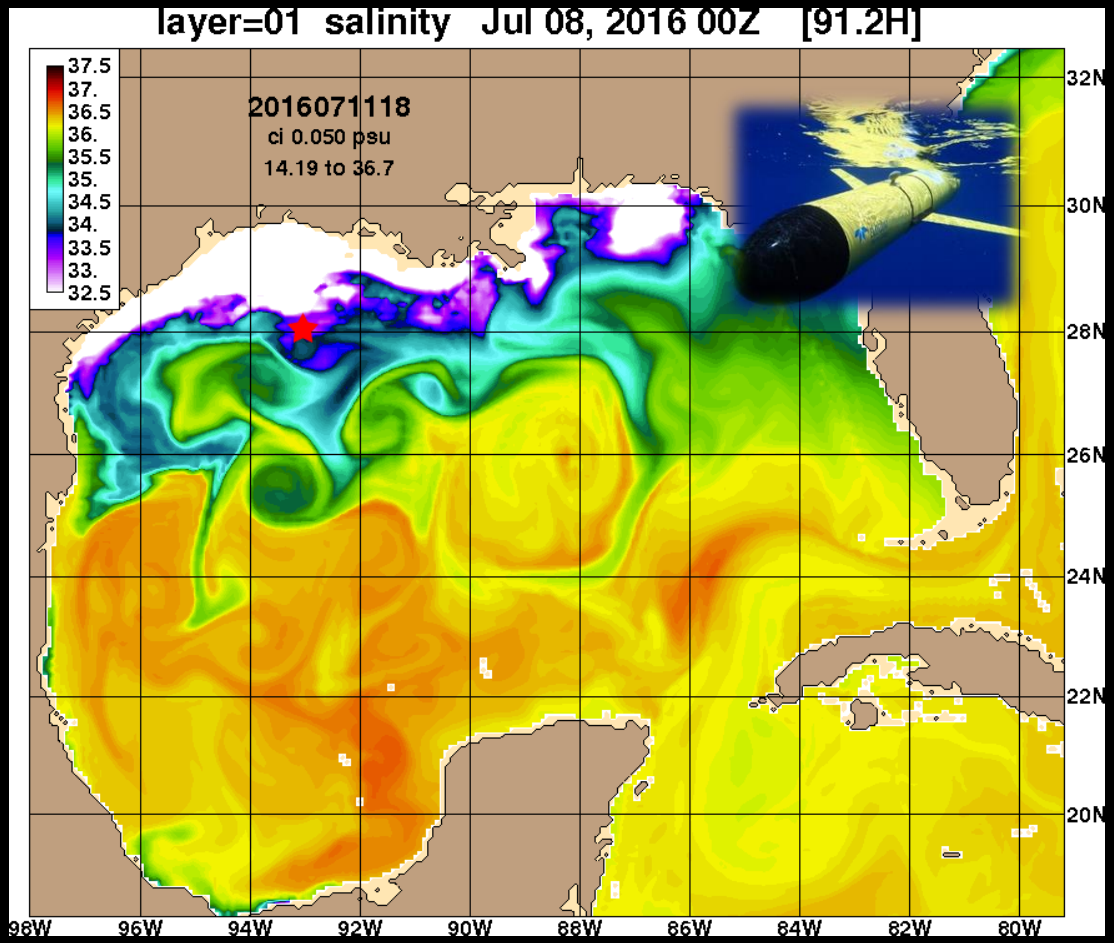


RESTORE Centers of Excellence

Developing Gliders as coast effective Ocean Observing tools

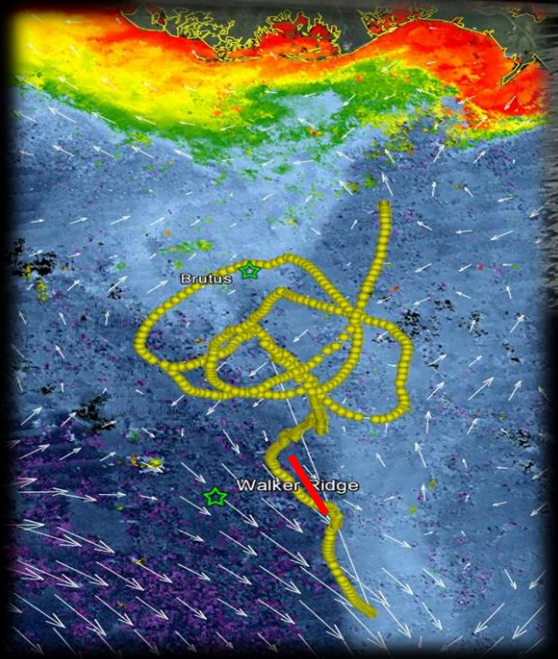
T·E·X·A·S
ONEGULF
Center Of Excellence

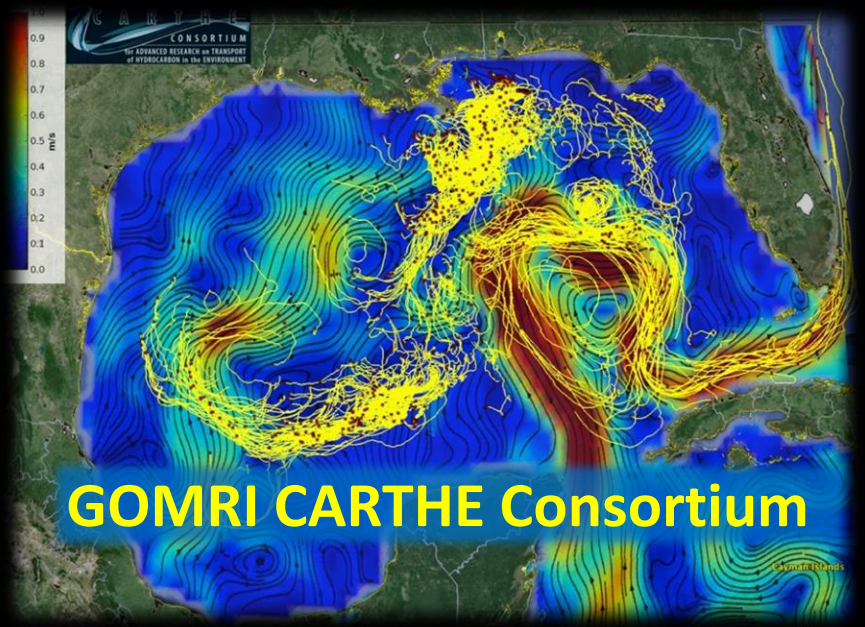
GERG
GEOCHEMICAL & ENVIRONMENTAL RESEARCH GROUP
College of Geosciences
Texas A&M University



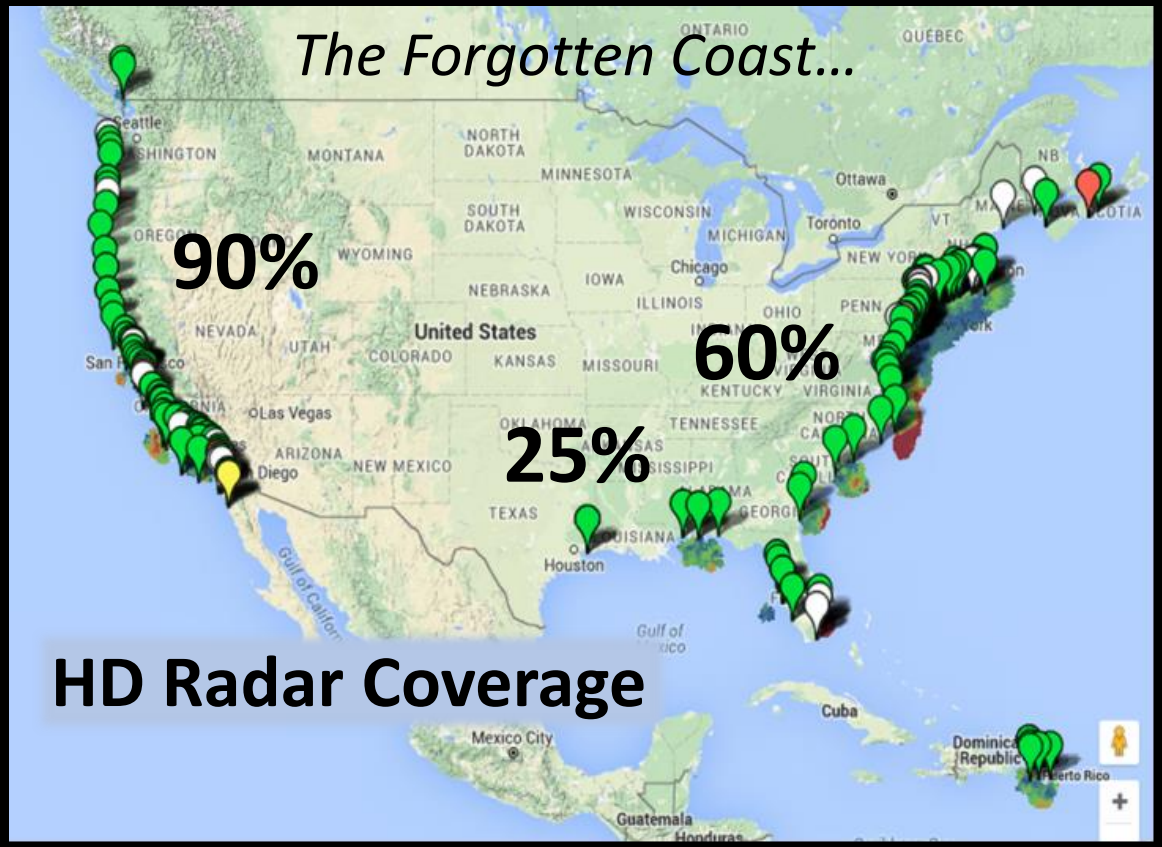
Research - Innovative and Diverse in both Origin and Creativity

USF Eco-Systems Technology Group





A strong science base but an adequate and sustainable system?

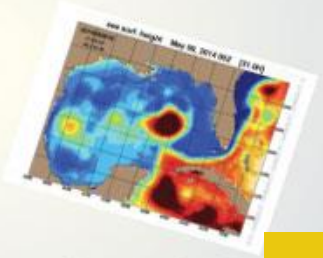


GCOOS Posts Build-out Plan V.2.0

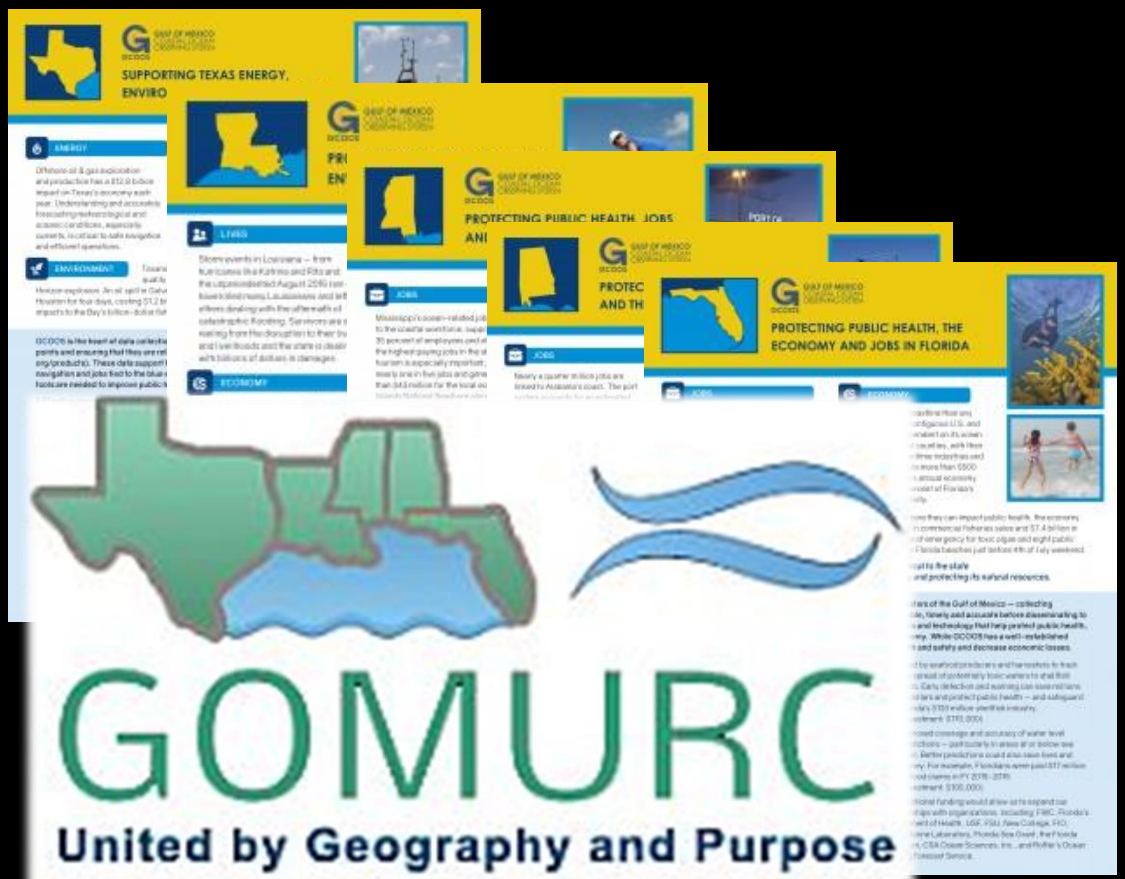
GCOOS

IOOS®

INTEGRATED OCEAN OBSERVING SYSTEM



Click Here to Access the Do



GOMURC

United by Geography and Purpose

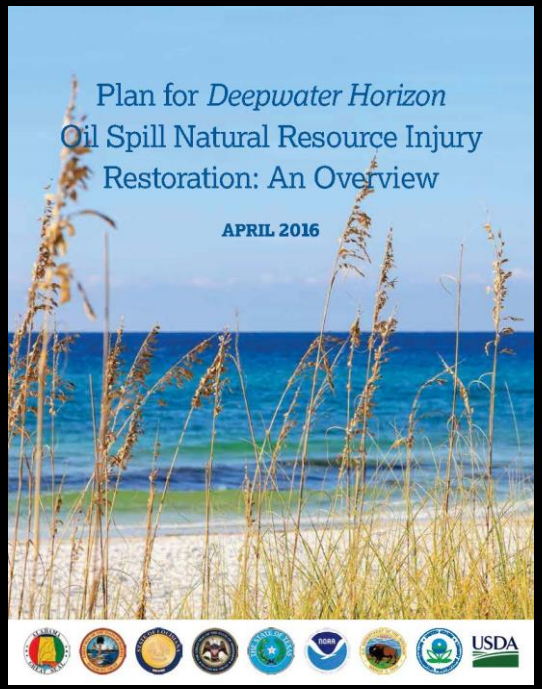
GULF OF MEXICO COASTAL OCEAN OBSERVING SYSTEM

GCOOS

Strategic Plan

2017–2022

A Role for RESTORE in Ocean Observing?



NRDA Trustees

Centers of Excellence

NOAA RESTORE Act Science Program

400 Gulf Leaders
March 27-28 Houston TX

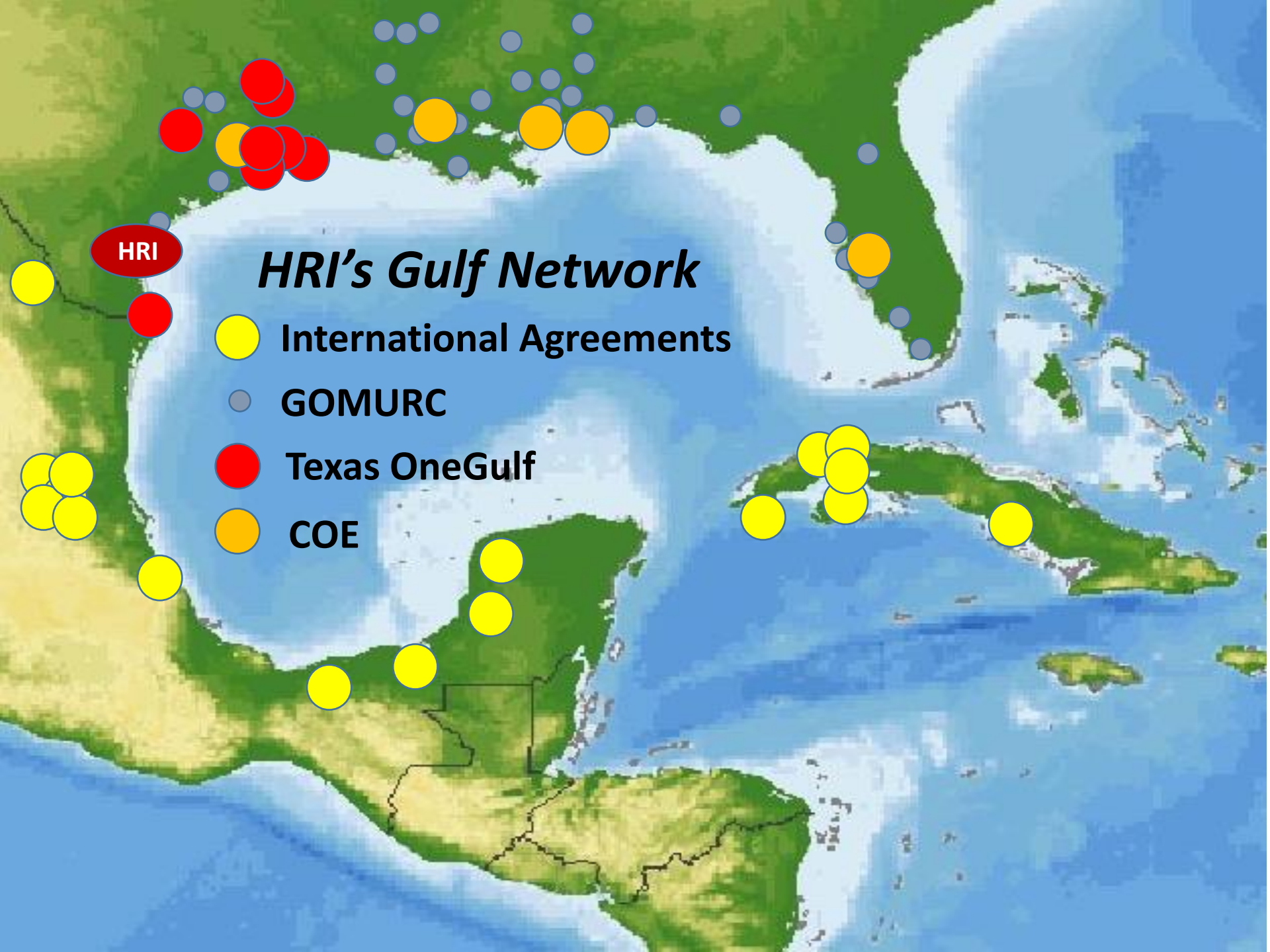
HRI

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


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 RESEARCH INITIATIVE

GOMURC
United by Geography and Purpose

CIIMAR GOMC
Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

Building Partnerships for a Healthier Gulf
GULF OF MEXICO ALLIANCE
Resilience • Habitats • Water • Wildlife • Monitoring • Education

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

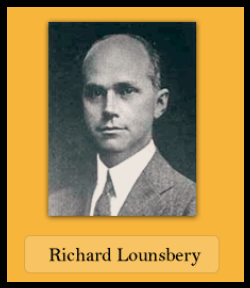
Identify gaps in knowledge and develop research priorities

Synthesize information and results to help guide future research

Establish an international network to pursue priority research

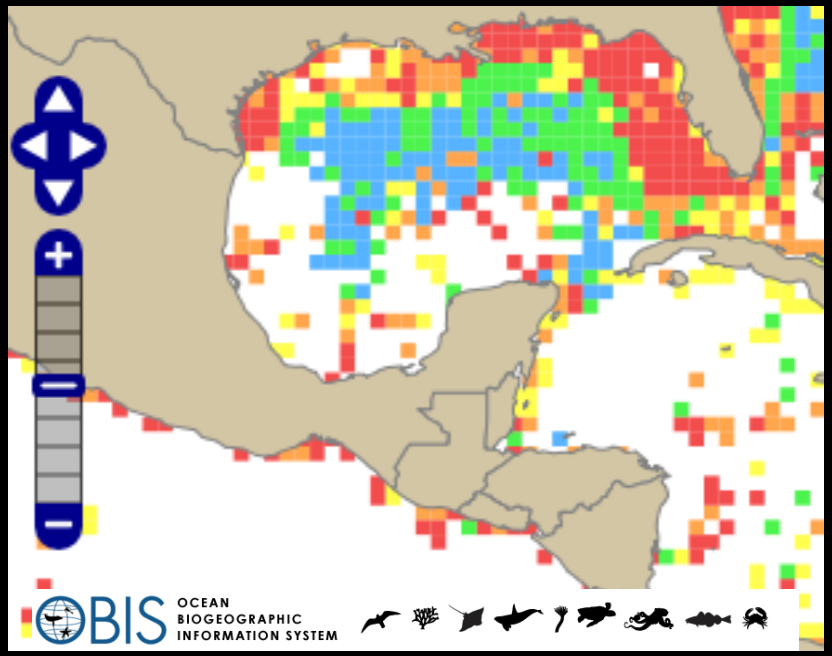
Trinational Ocean Observing Workshop – Havana, Cuba July 8 and 9, 2017

HRI



Robert Lounsbery Foundation

Harte Charitable Foundation



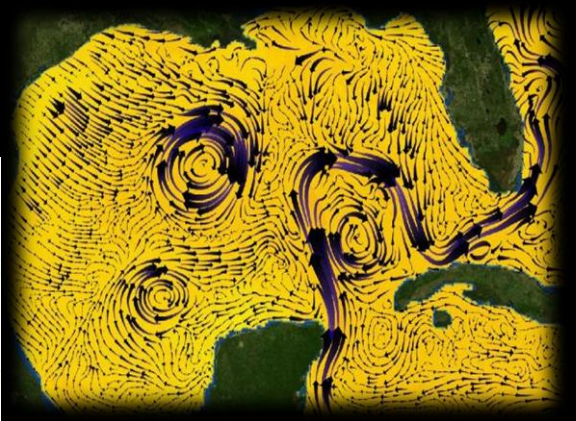
HRI International Endowed Chair - Biodiversity (Mexico)

HRI International Endowed Chair – Conservation (Cuba)

HRI and Ocean Observing

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

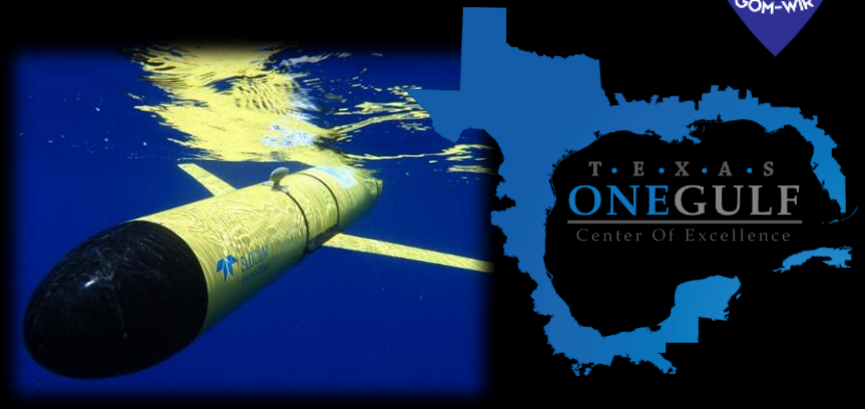
Congressional Briefing by industry, academia…



CHEER LEADING

Gulf of Mexico Workshop on International Research

STATE OF THE GULF OF MEXICO ONE GULF 2017 SUMMIT



CONVENING

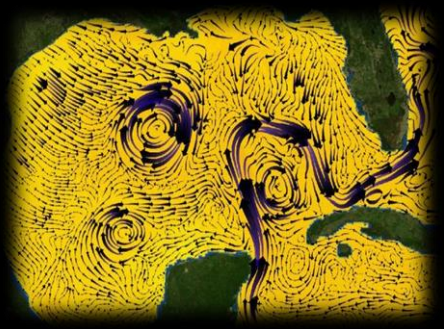
CUBAMAR

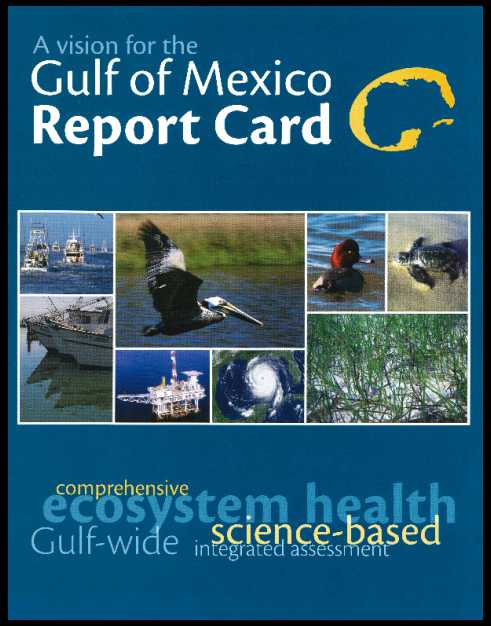
RESEARCH

GOMURC

Gulf of Mexico University Research Collaborative-- Unified by geography and vision.

HRI and Ocean Observing





Mission *– Science Driven Solutions To Gulf of Mexico Problems*

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