

US EPA ARCHIVE DOCUMENT



deep corals



wetlands



beaches



living resources

Overview of the Gulf of Mexico Large Marine Ecosystem – Implications for Managing Restoration Activities

**Steven Murawski - College of Marine Science
University of South Florida**

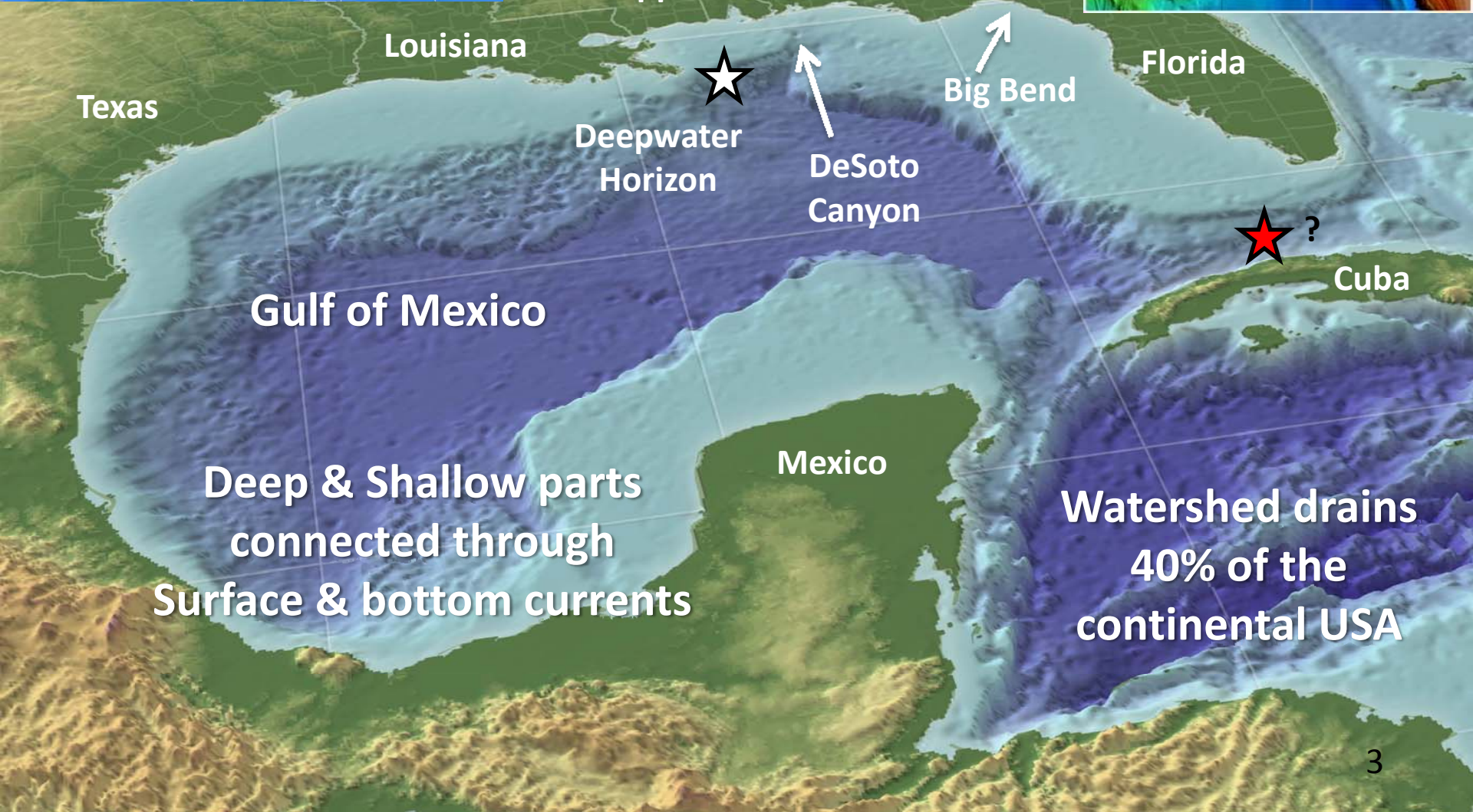
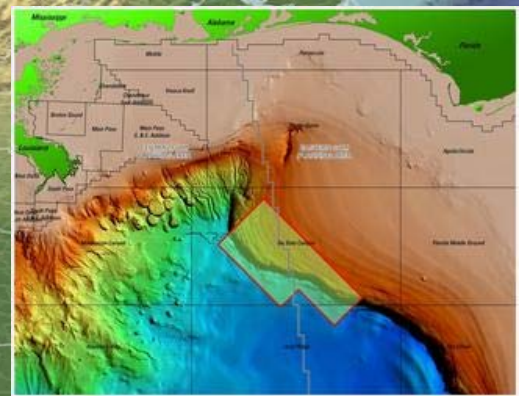
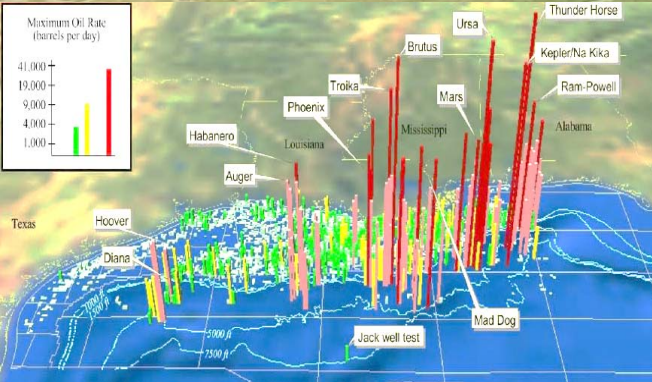


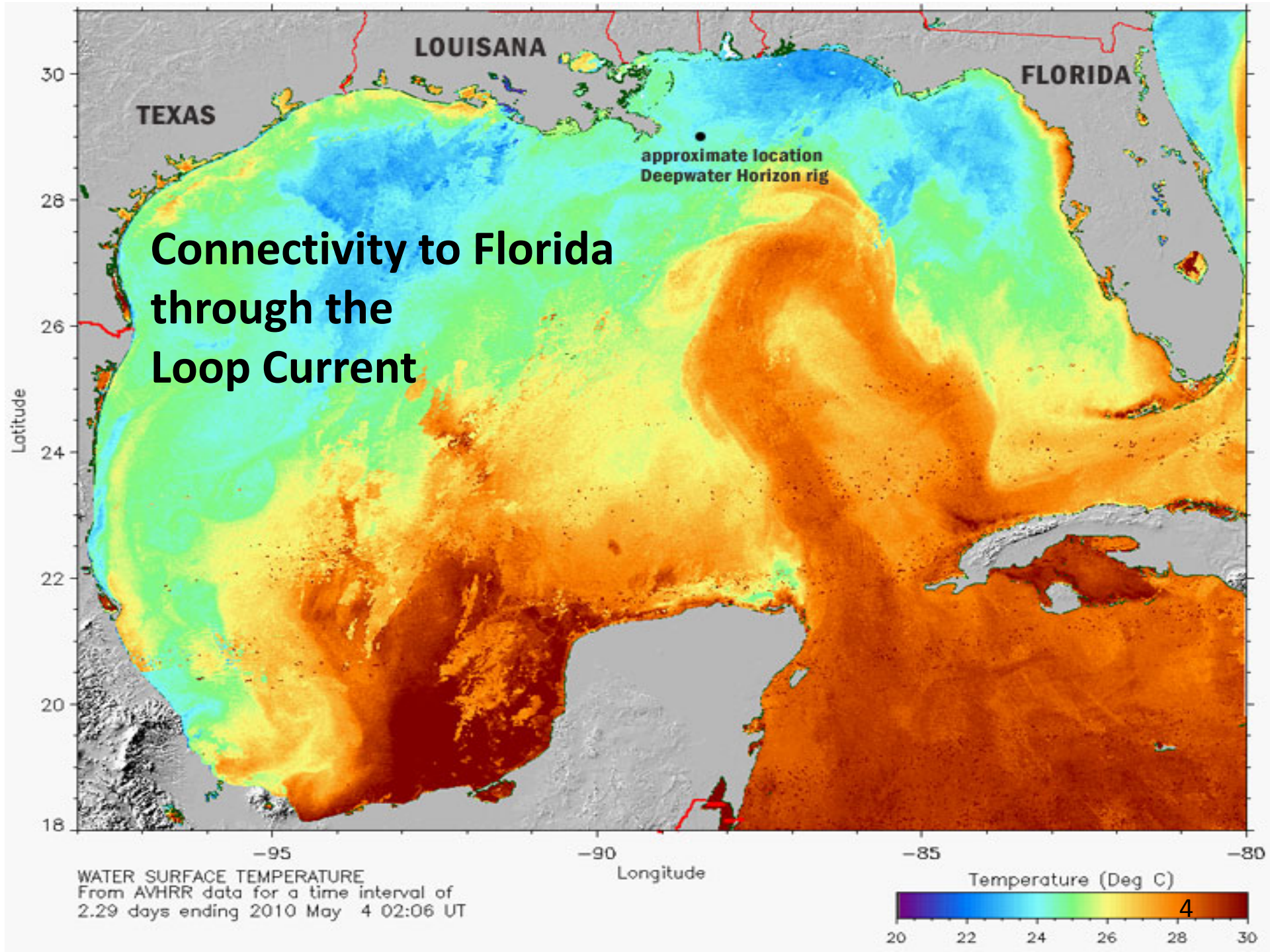
smurawski@usf.edu

June 1, 2011

Bottom Lines:

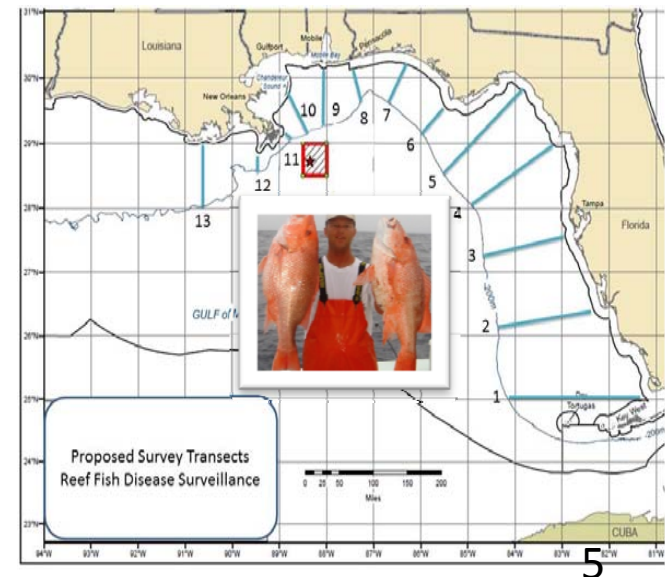
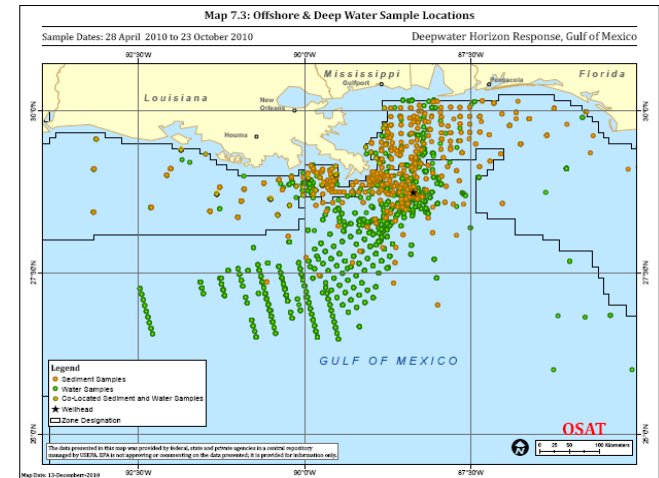
- **Restoration and protection of ocean and coastal resources of Florida are vital to achievement of a “Healthy Gulf”**
- **Science can help restoration planners: (1) set achievable goals, (2) monitor progress, (3) help prioritize restoration efforts , and (4) provide ecosystem-level understanding of the linkages among projects and of ecosystem services improved**
- **Monitoring & control areas need to be established at the outset of restoration**
- **Setting goals for restoration activities should incorporate likely impacts of storm surge and sea level rise**
- **Compensatory restoration projects need to be carefully considered**
- **Societal goals needs to be incorporated through a transparent, credible and adaptive approach**





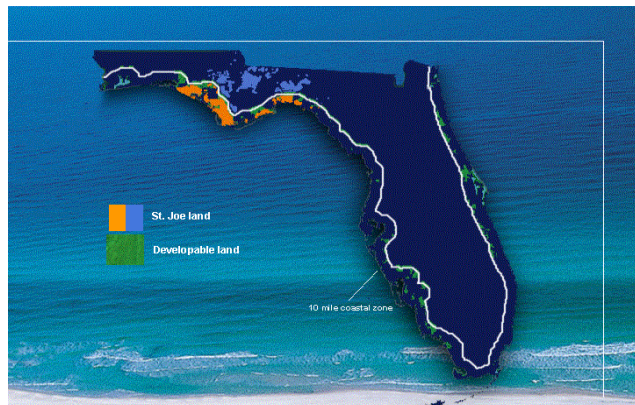
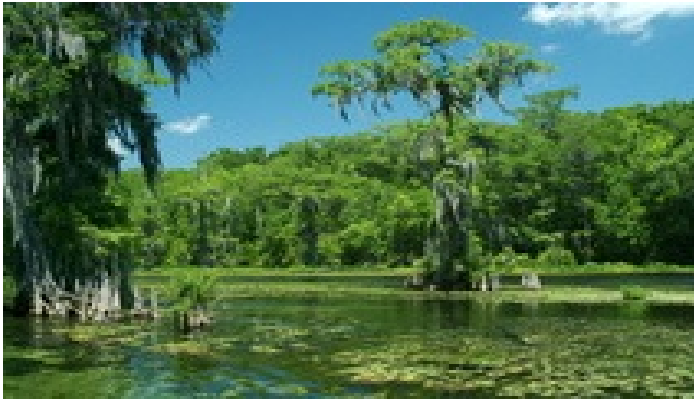
Ongoing Efforts to Understand the Impacts of Deepwater Horizon

- Federal and state efforts under Response & NRDA (impacts on natural resources, seafood safety, etc.)
- Academic efforts under a one-time \$10 million grant to the Florida Institute of Oceanography (20 Florida institutions)
- Proposed establishment of BP-funded Centers. 4-8 with partners from Gulf institutions and others. Research probably initiated in the autumn
- USF/FWRI survey of fish diseases funded by NOAA/NMFS
- Other federal efforts through EPA, BOEMRE, NOAA, USGS, NSF (“Rapid” grants), National Institute of Environmental Health Sciences (NIEHS) study of worker health

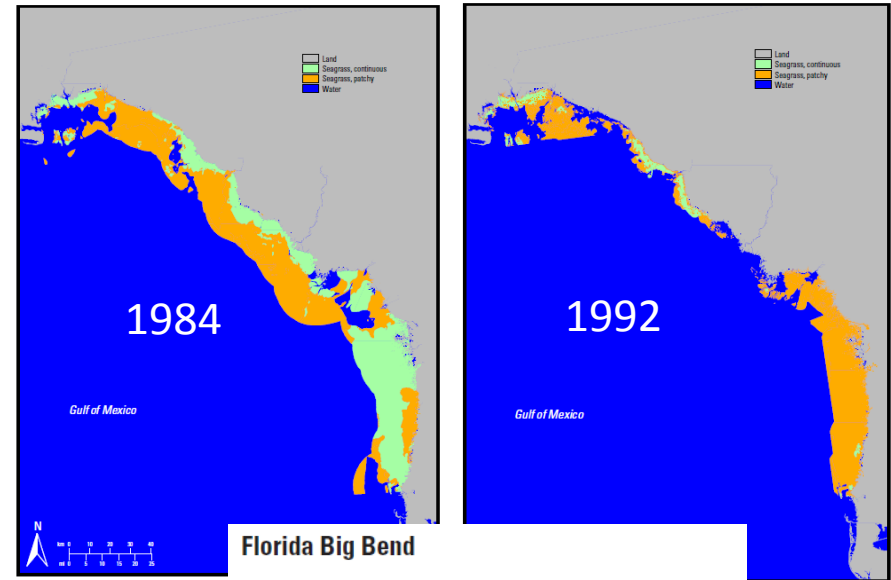


The Big Bend Region

Some of the most pristine wetlands and sea grass beds in the Gulf of Mexico



Distribution of Sea Grasses



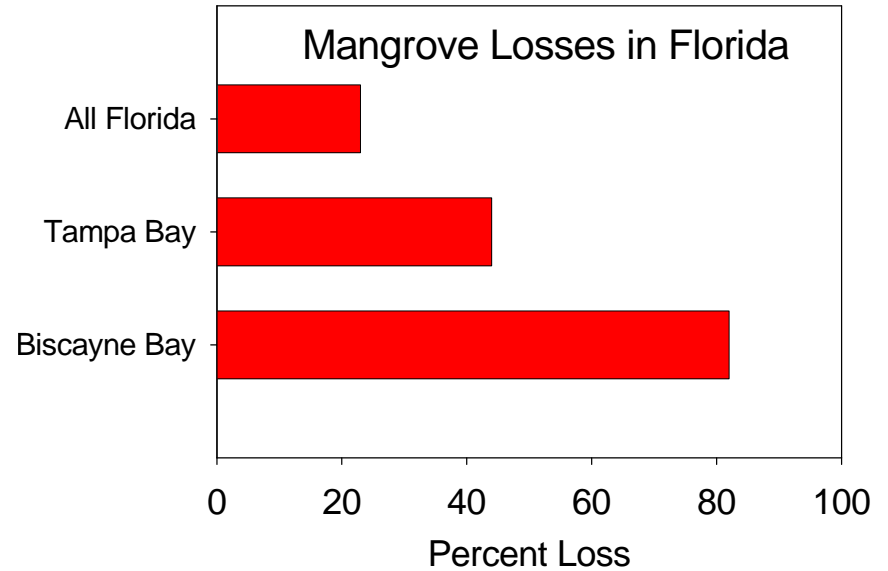
By Robert A. Mattson,¹ Thomas K. Frazer,² Jason Hale,² Seth Blitch,² and Lisa Ahijevych³

Facing Significant challenges from:

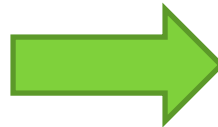
- Increased upland use for forestry and agriculture
- Nutrient enrichment of coastal waters
- Hydrologic alteration of watersheds
- Development pressure
- Storm surge/sea level rise

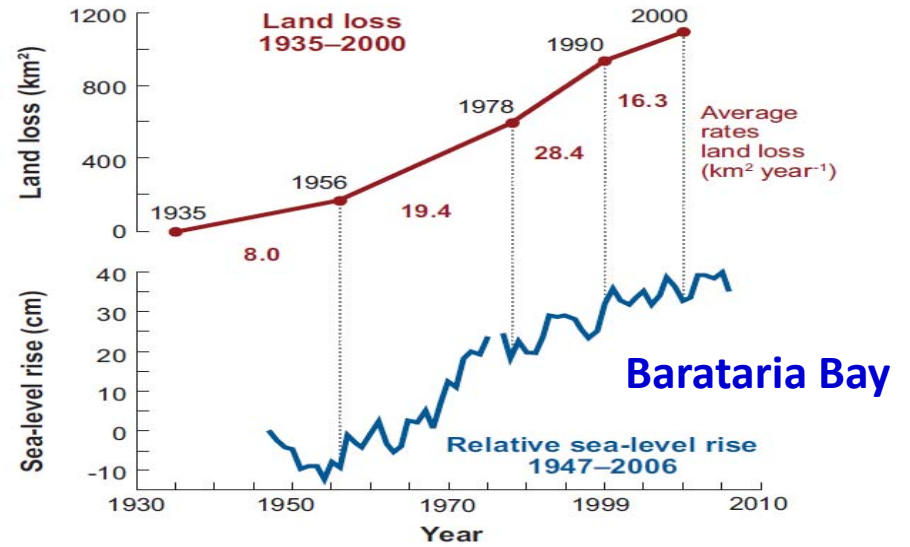
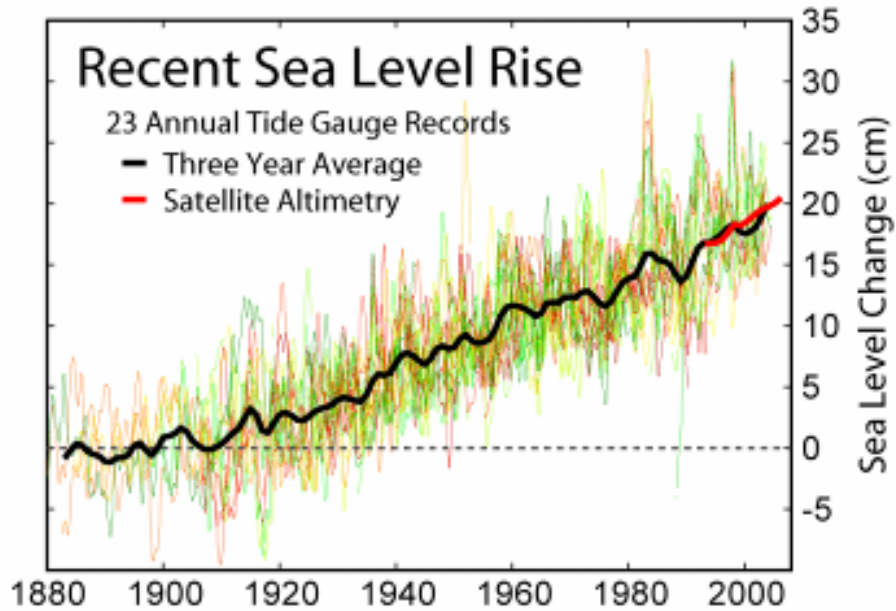


Mangrove ecosystems are a major nursery area for a wide array of biota and a carbon sink, as well as providing wave attenuation

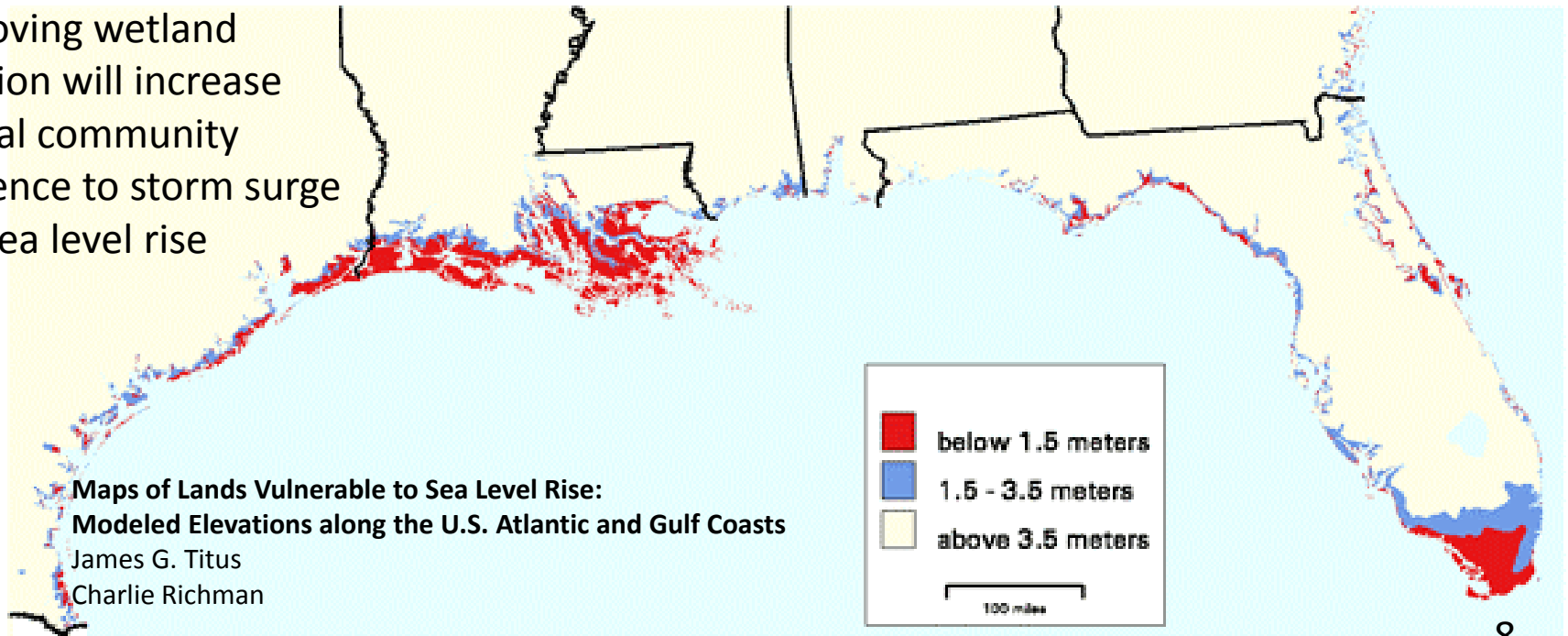


Much of west Florida's mangroves have been lost, but some can be restored using salt marsh restoration first as "nurseries"

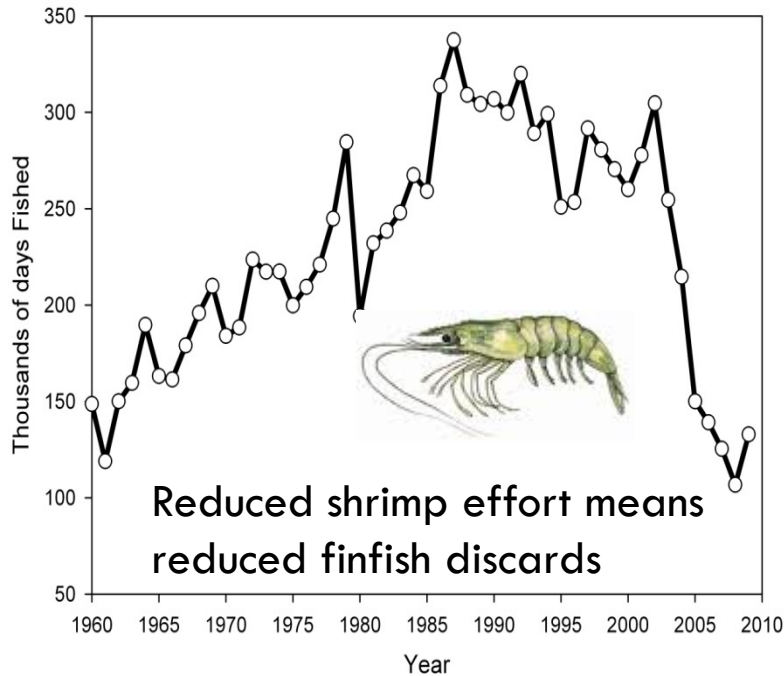




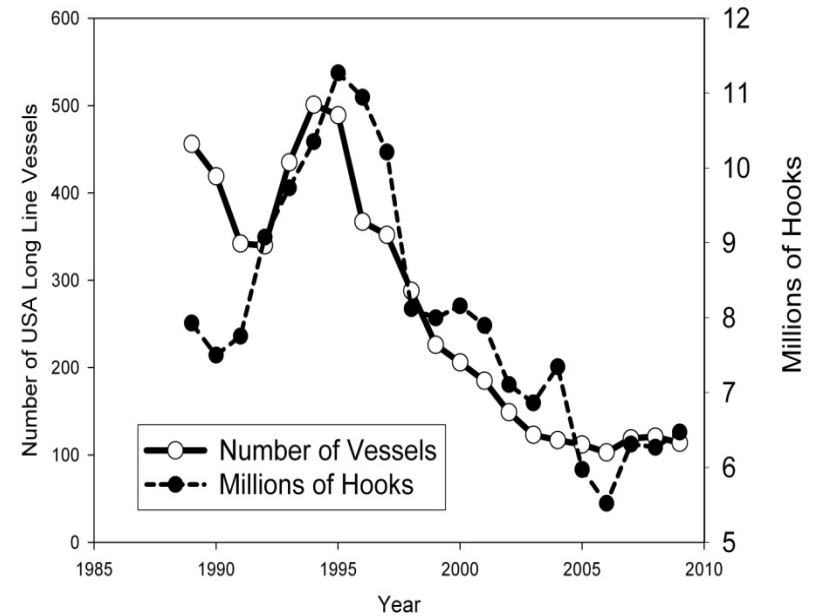
Improving wetland function will increase coastal community resilience to storm surge and sea level rise



USA Shrimp Trawl Effort Gulf of Mexico



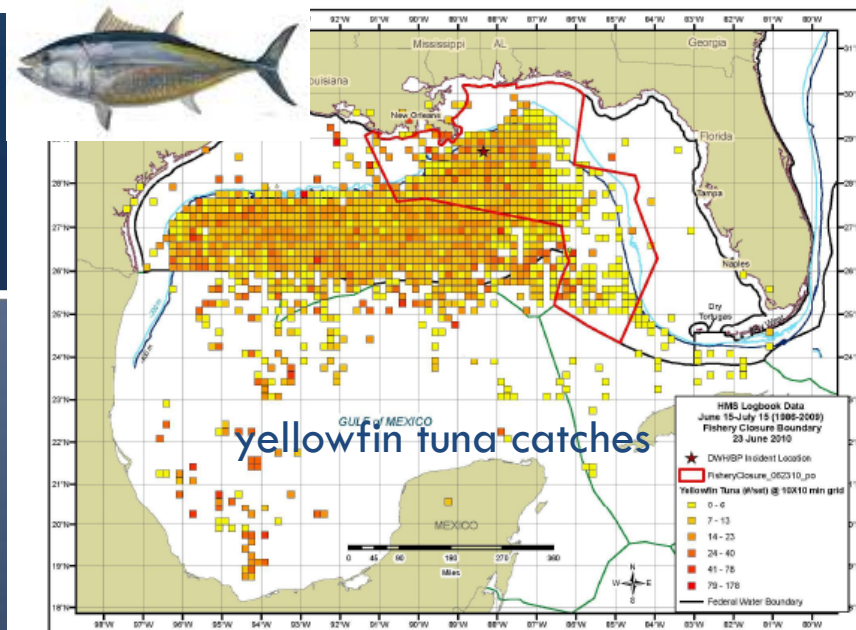
Trends in USA long-line fishing effort



How will impacts of habitat restoration and reductions in fishing effort be simultaneously accounted for?

Important Gulf of Mexico Fisheries:

- Reef fishes
- Large pelagics
- Nearshore predators
- Crustaceans; oysters



The Connectivity of the Gulf of Mexico Requires an Ecosystem View of Issues

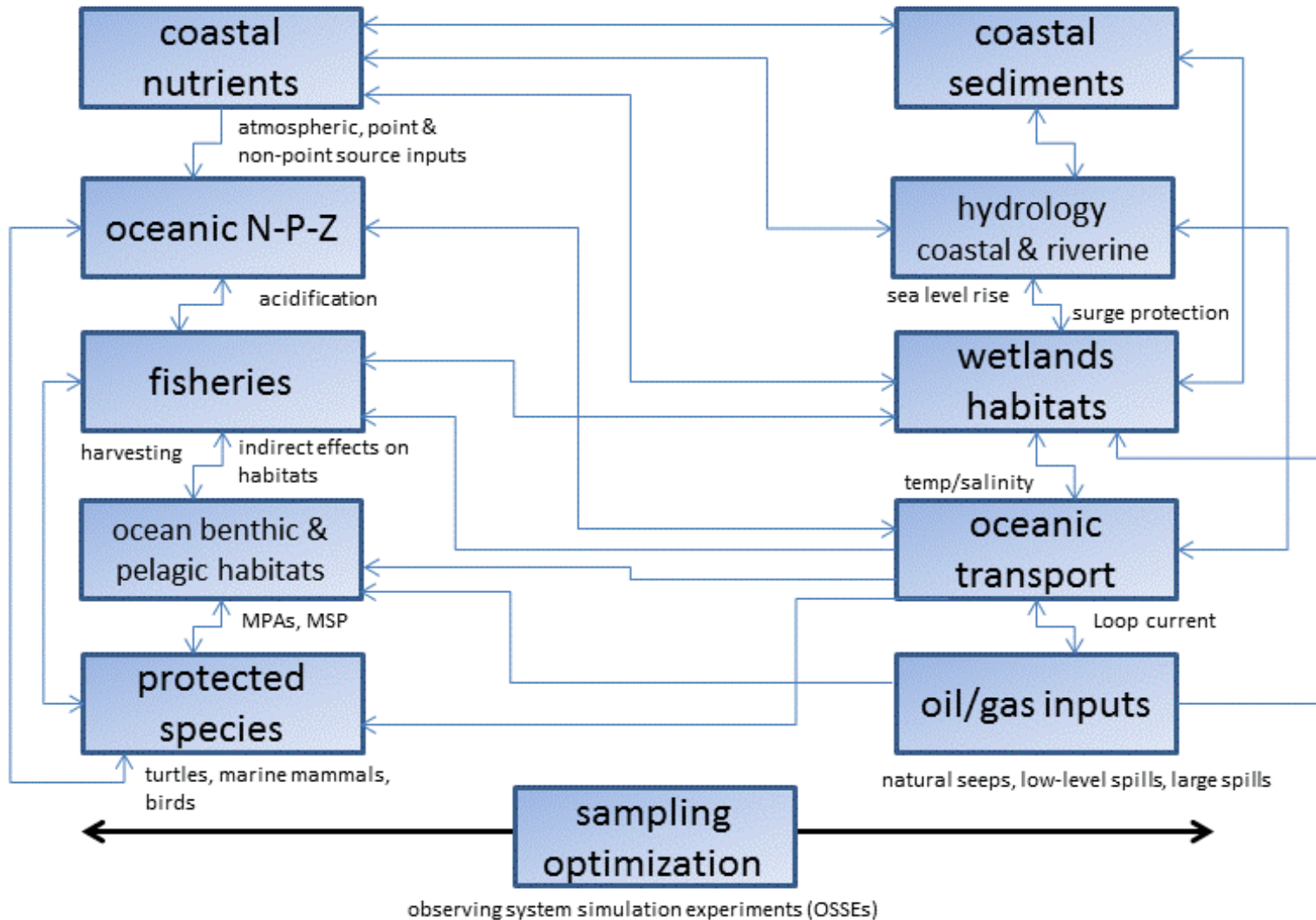
Science plan needs to help sort out the effects of recovery actions given many simultaneous anthropogenic and natural factors: Effects of the oil spill; Nutrient enrichment; Harmful algal blooms; coastal development; fishing (overfishing)



Conceptual Gulf of Mexico Ecosystem Model supporting Long-Term Restoration Activities

Modeling Foci:

- Hydrodynamic transport
- Sources and sinks
- Fate and effects
- Spatial planning & connectivity
- Food webs & species interactions
- Time & space scales of natural variability
- Ecosystem services & human dimensions



Some Important Restoration Questions.....

- **Potential impacts of wetlands and barrier beach/island reconstruction on habitats, species productivity, storm surge protection and sea level rise? Most cost effective?**
- **How much protection of intact components (e.g., Florida Big Bend)?**
- **Effectiveness of nitrogen abatement strategies and interaction with sediment strategies**
- **Impact of compensatory recovery strategies (e.g., mangroves; MPAs, etc).**
- **Impacts of the oil spill and pace of the recovery. Environmental baselines to measure the effect of oil spill recovery efforts.**
- **How do fishery management policies and habitat improvements under the recovery plans interact?**
- **Establishment of specific restoration targets, given inherent tradeoffs and potentially conflicting objectives.**

Measuring the Impacts of Restoration

What metrics should managers consider in restoration efforts? How do they relate to the existing set of environmental measurements? What improvements will facilitate creation meaningful metrics?

- **Change in wetlands size and habitat quality**
- **Size/intensity of the “dead zones” (hypoxic areas)**
- **Population sizes, disease prevalence and yields of fishery populations**
- **Population sizes and recovery rates of protected species (sea turtles, mammals, birds)**
- **Water/sediment quality at Gulf beaches**
- **Baselines for hydrocarbons, dissolved oxygen, physical variability, water mass movements,**
- **Improvements in skill to forecast the movement and dispersion of hydrocarbons from any oil/gas facility in the Gulf (how would a proposed or current facility impact resources and sites should a future accident occur, e.g., drilling in Cuban waters?)**

End Notes....

- **Florida's ocean and coastal resources are a vital to the Gulf of Mexico LME and there is an enormous economic dependency upon them; Florida alone has a \$9 billion/year recreational fishery (40% of the USA total marine recreational fishing) and \$5 billion/year commercial fishery**
- **Appreciate the Restoration Task Force and staff reaching out to the region's science expertise. Scientists are an important source of institutional memory and are strong advocates for getting restoration right!**
- **Need to work on collaboration mechanisms among agencies, states, academics and private research institutions (should learn from our response activities r.e. DWH)**
- **Need to harmonize science activities under NRDA, BP's commitments for research, agencies and restoration-related activities. We need a common coordination strategy (Gulf Research Collaborative) and an understanding regarding use of penalty funds**

