



NOAA Integrated Ecosystem Assessment Program's Gulf of Mexico Ecosystem Status Reports

**NOAA
FISHERIES**

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State of the Gulf of Mexico Summit, March 26-27, 2017

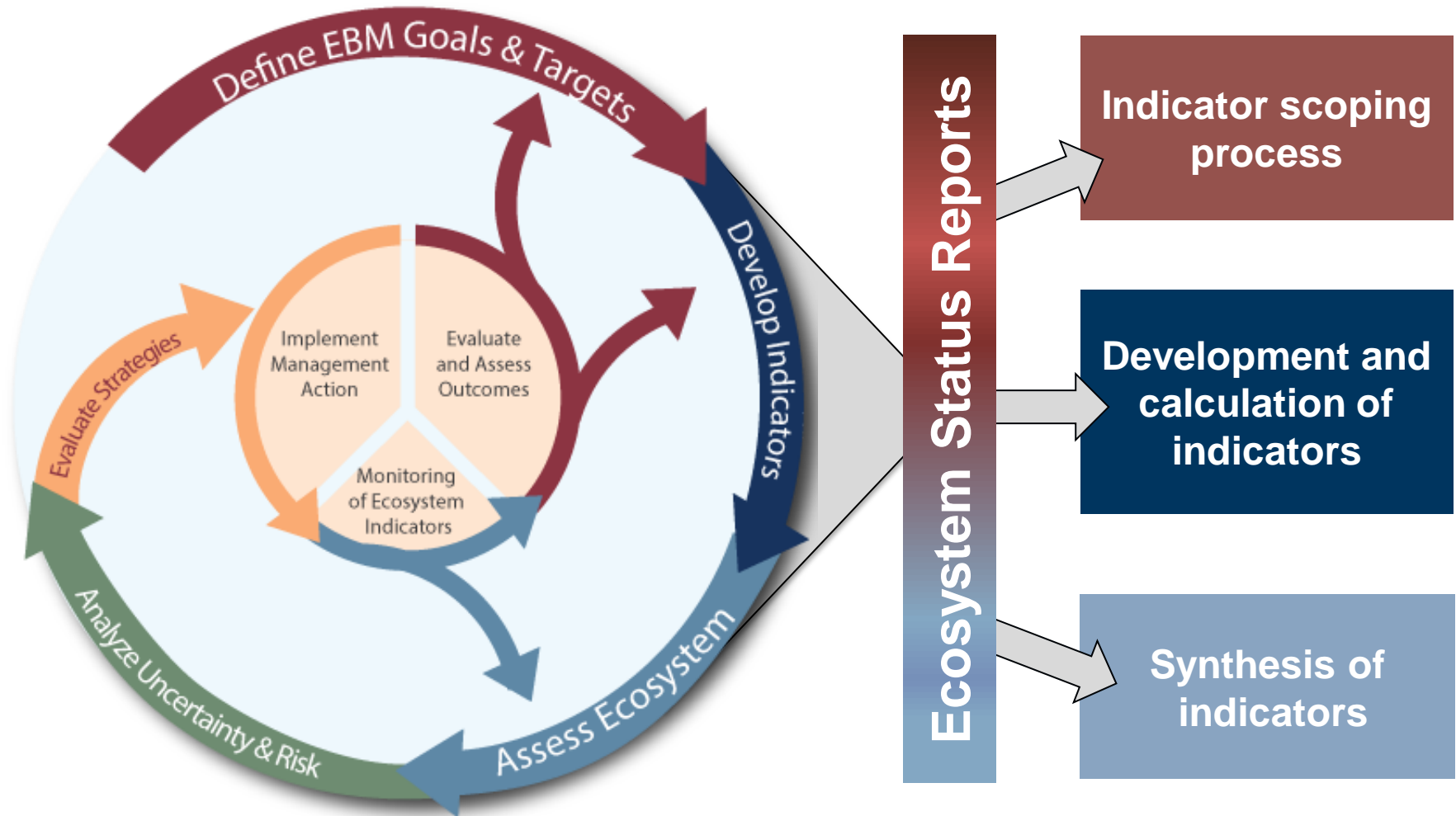
NOAA's Integrated Ecosystem Assessment Program



Currently implemented in five U.S. Large Marine Ecosystems



The Integrated Ecosystem Assessment Loop



Developed from Levin (2008)

The Gulf of Mexico IEA and Status Report

Mission statement of the GoM IEA:

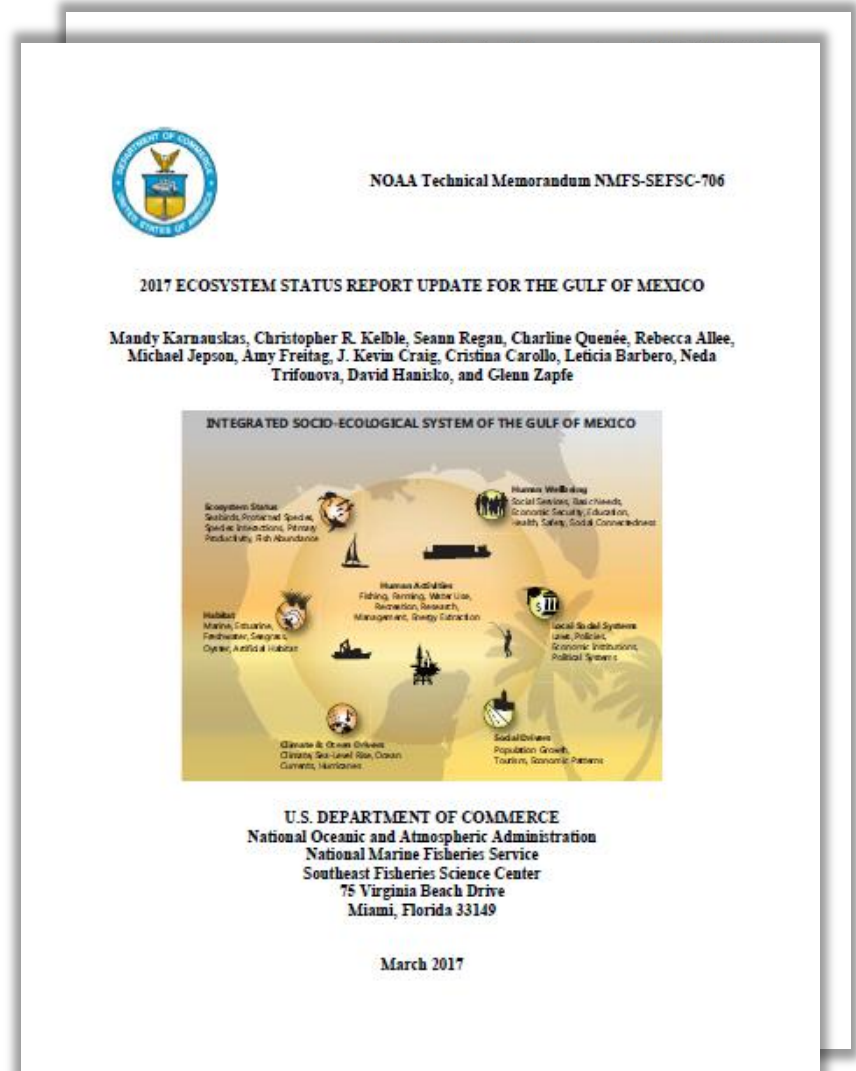
Balancing the needs of nature and society through integrated science for current and future generations in the Gulf of Mexico

Ecosystem Status Report objectives:

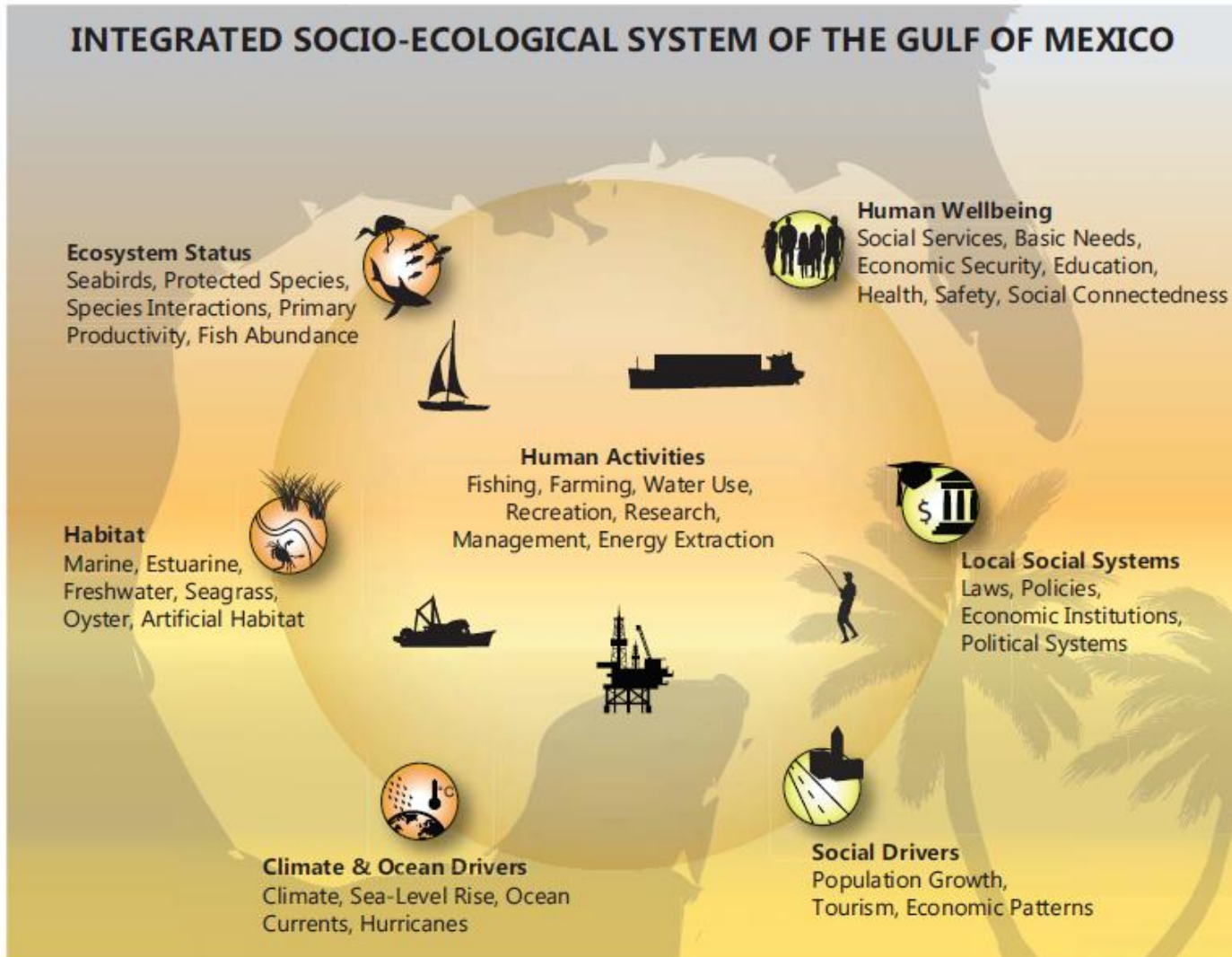
- to provide scientific knowledge of the Gulf of Mexico integrated ecosystem, and transfer that knowledge to scientists and managers
- to provide a broad-level overview of the current state of the Gulf of Mexico with respect to recent and historical trends

Gulf of Mexico Ecosystem Status Report history

- Original report in 2013
- First update report in 2017
 - More emphasis on scoping with management community
 - Greater inclusion of human dimensions
 - Reduced indicator list

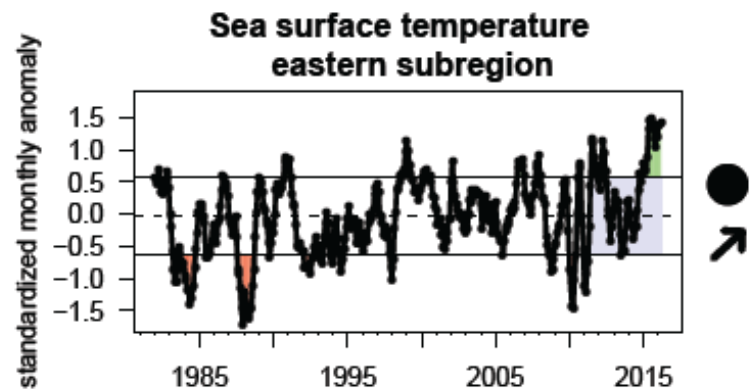
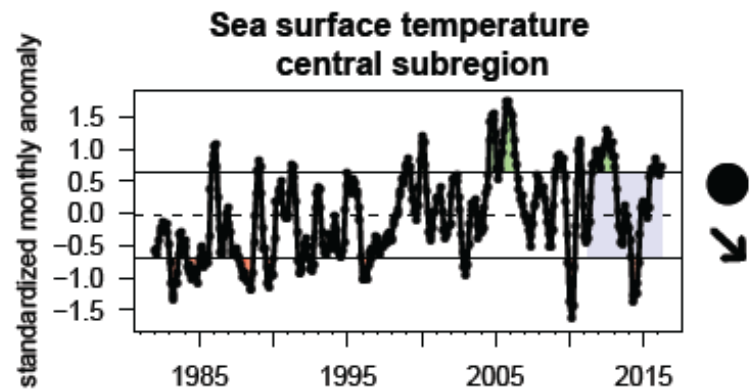
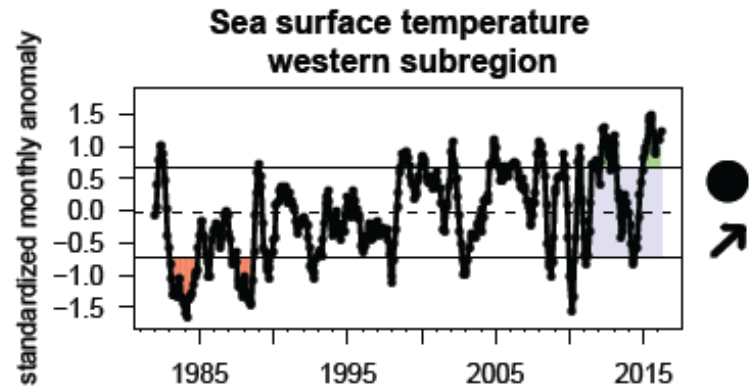
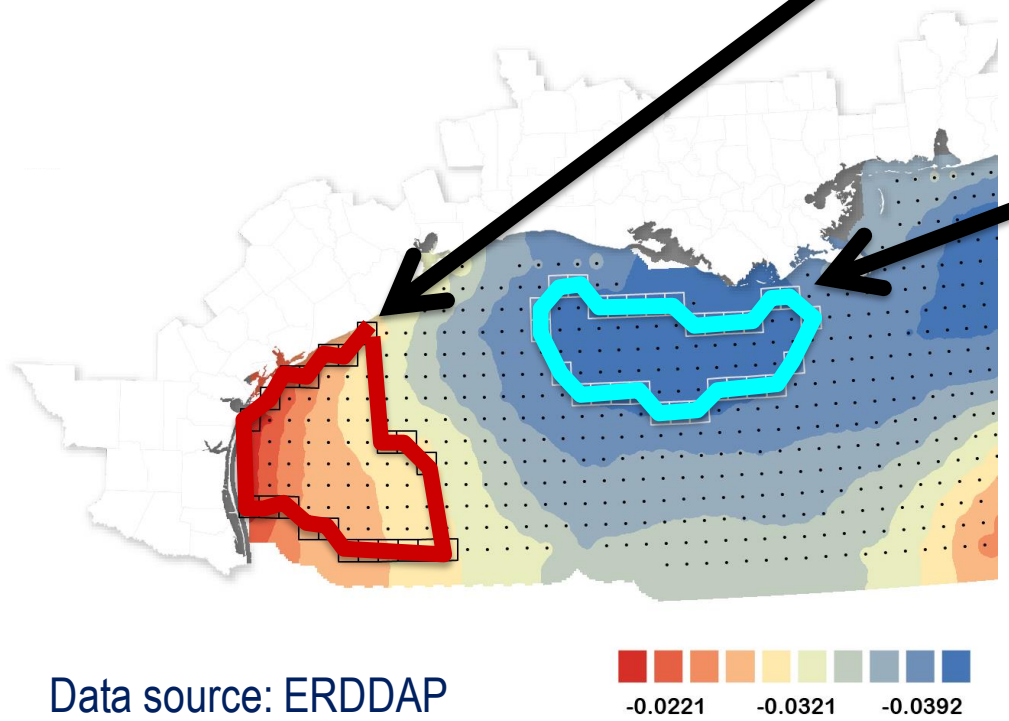


Conceptual model – indicator selection



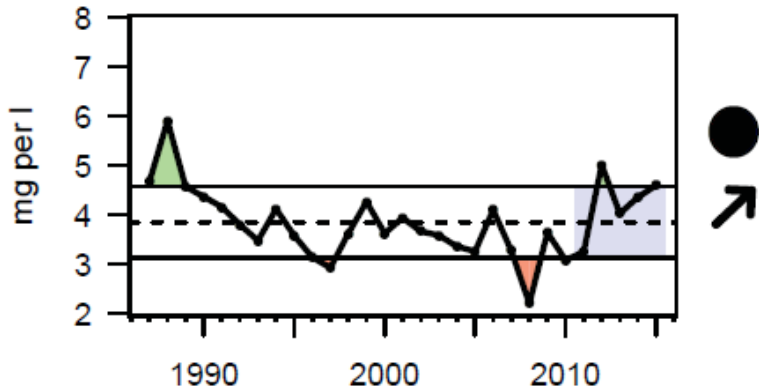
Ecosystem driver: Sea surface temperature

Divergent trends in SST

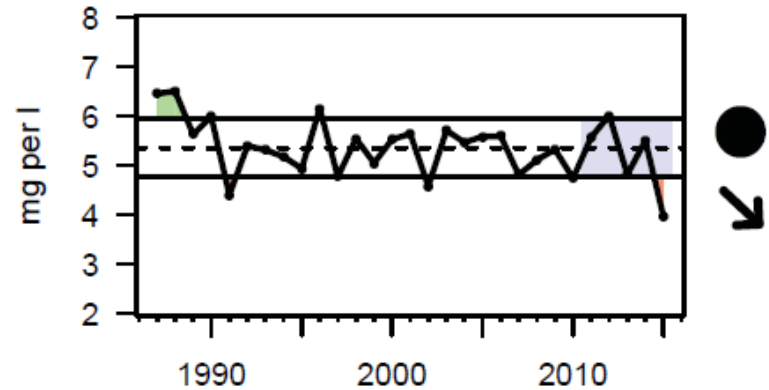


Ecosystem pressure: hypoxia

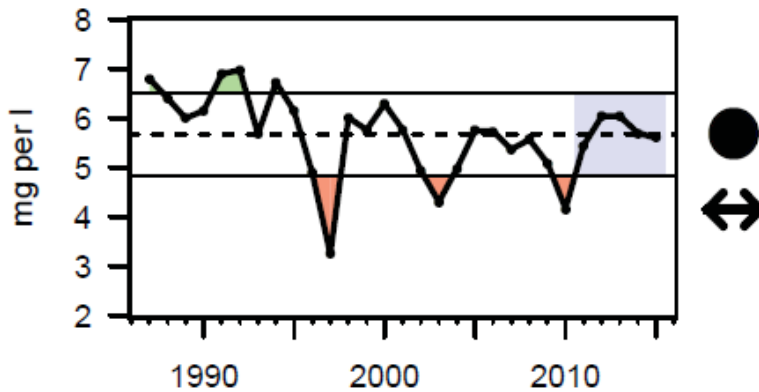
Bottom oxygen concentration
summer Louisiana



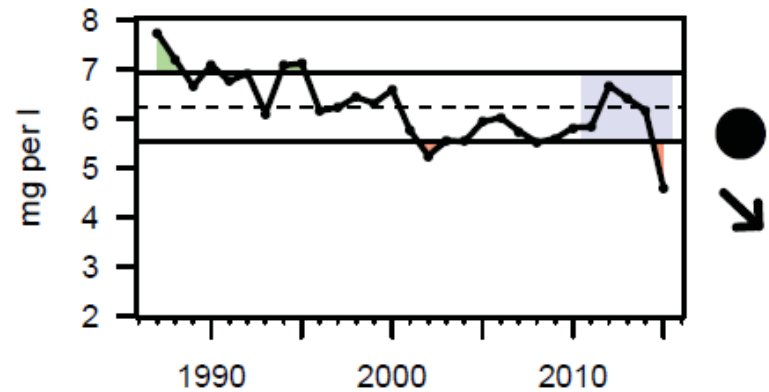
Bottom oxygen concentration
summer Texas



Bottom oxygen concentration
fall Louisiana



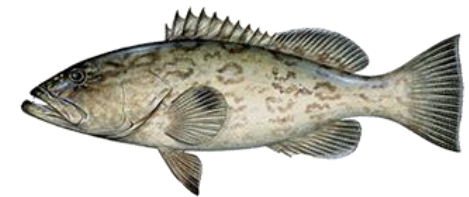
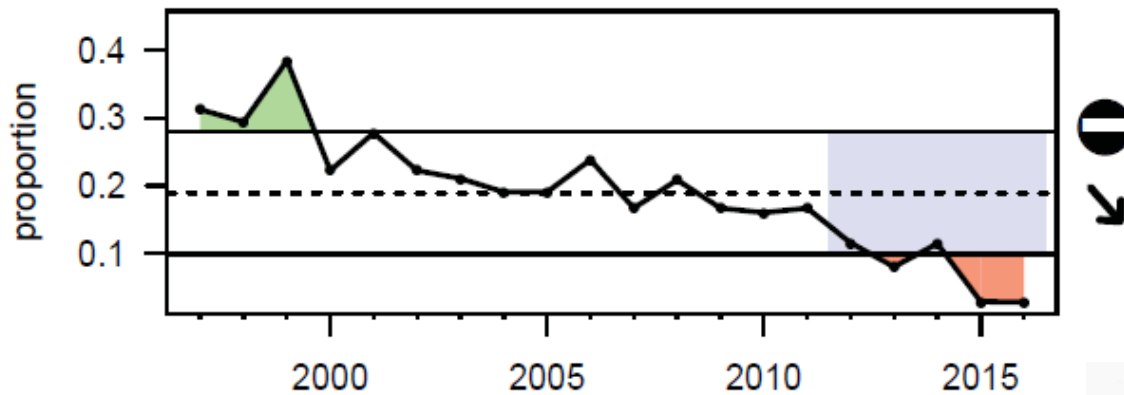
Bottom oxygen concentration
fall Texas



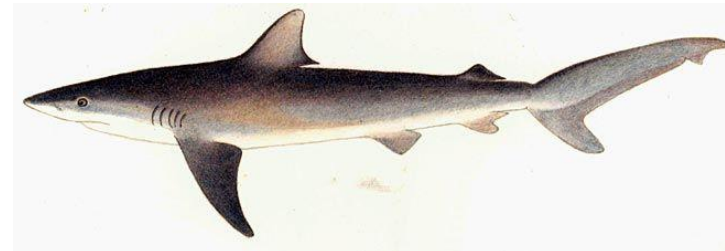
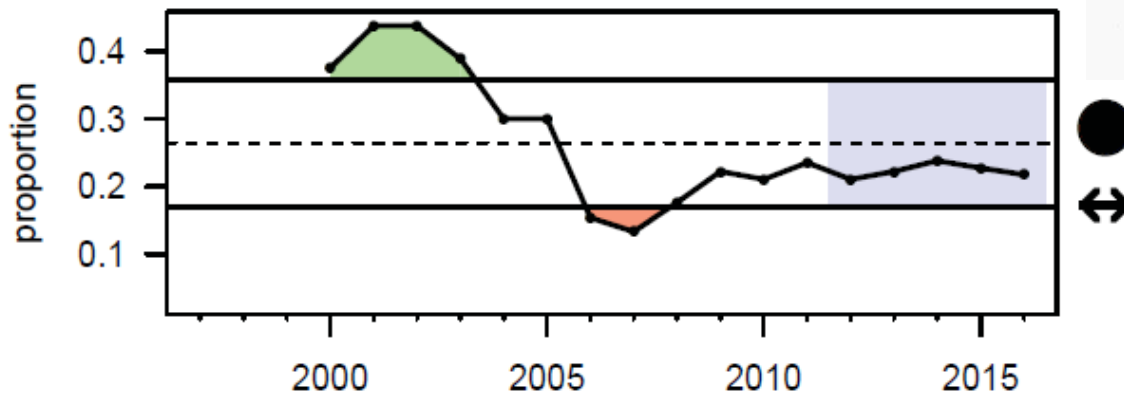
Data source: Southeast Area Monitoring and Assessment Program (SEAMAP)

Ecosystem state: overfishing status

Proportion of stocks undergoing overfishing



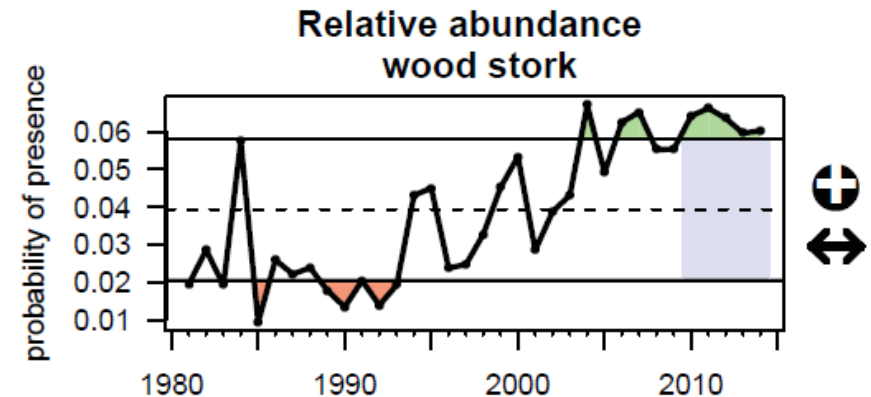
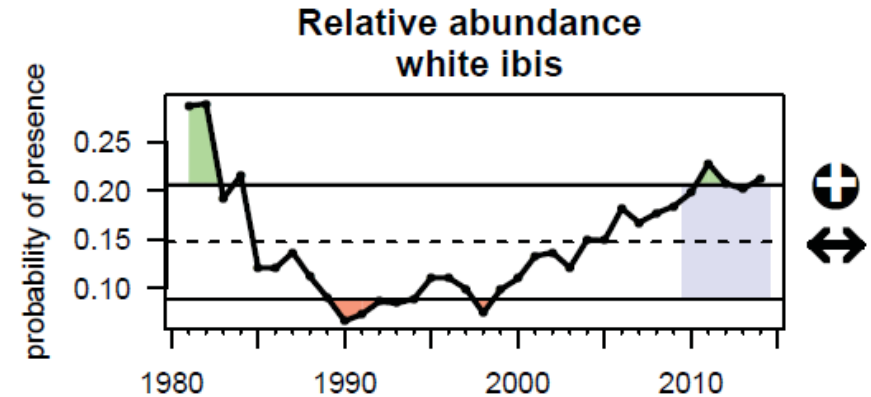
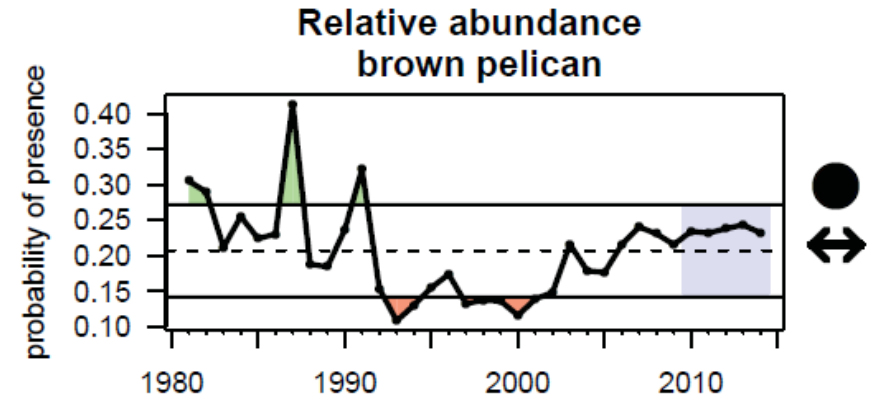
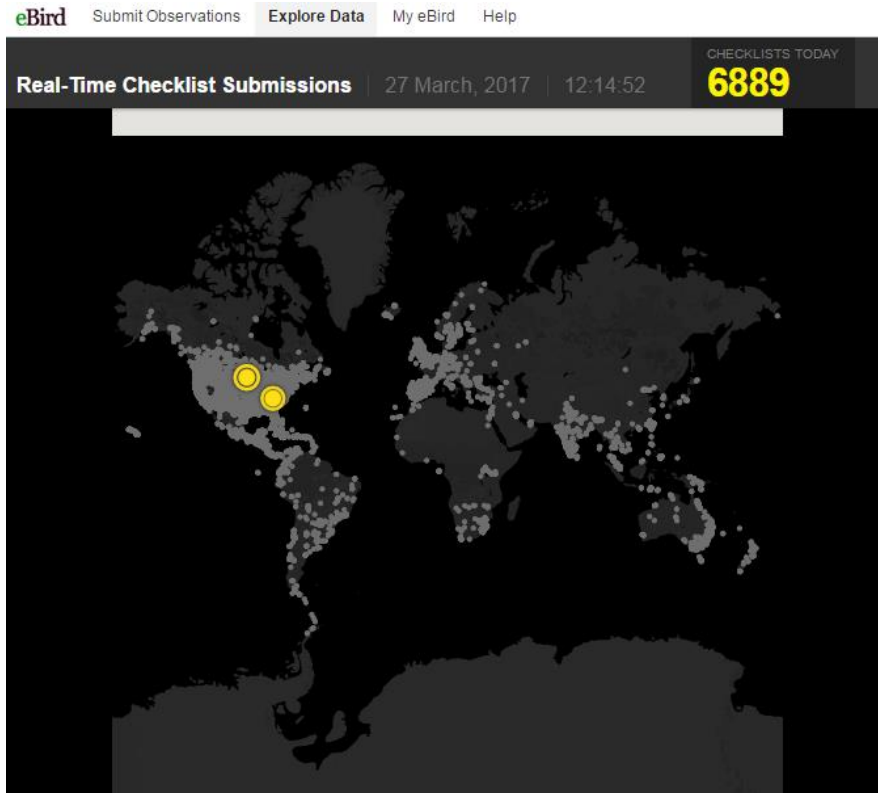
Proportion of stocks in overfished state



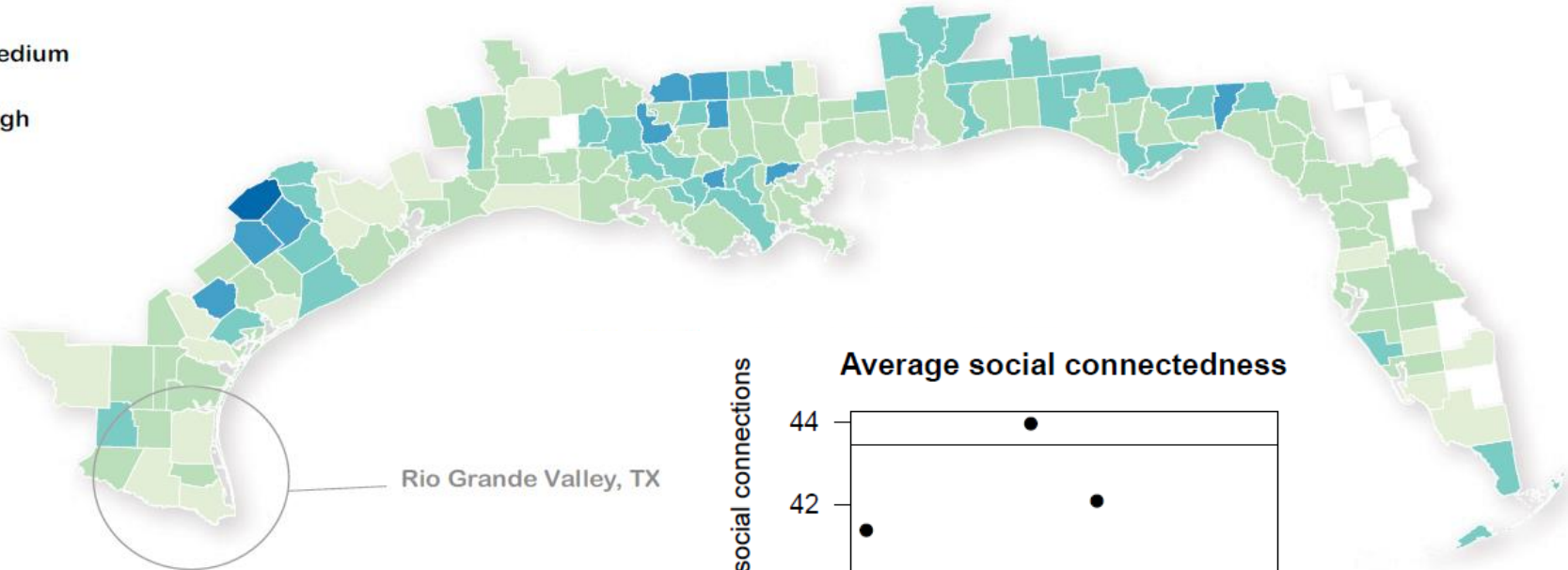
Data source: NOAA's Status of U.S. Fisheries

Ecosystem service: bird abundance

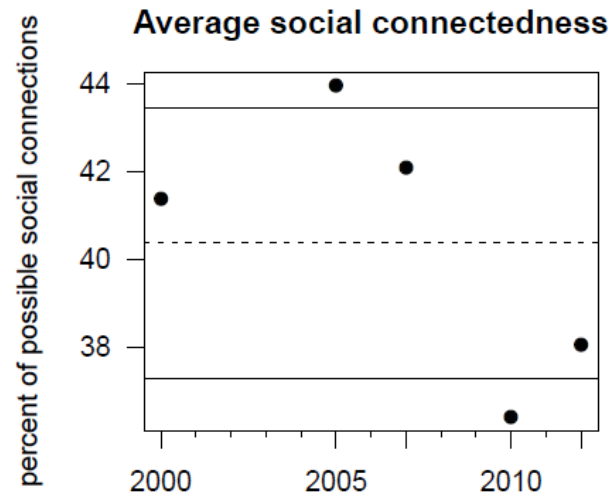
Cornell University's eBird



Ecosystem response: social connectedness

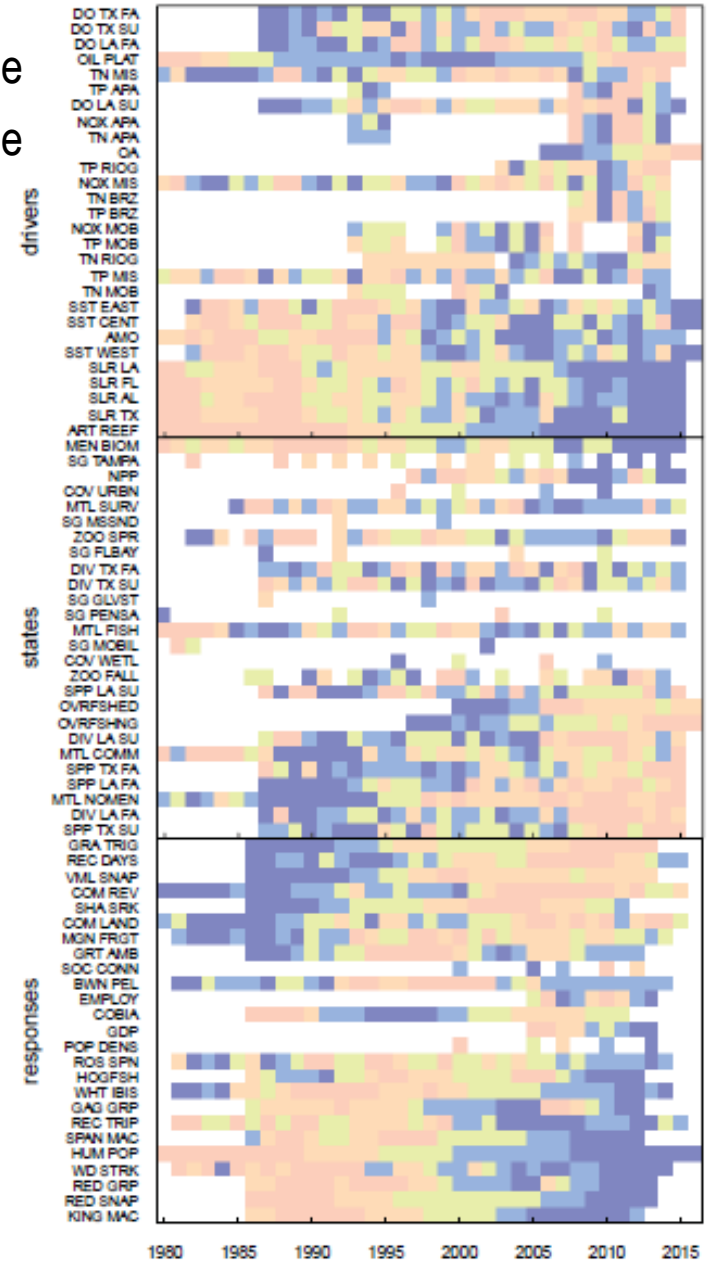
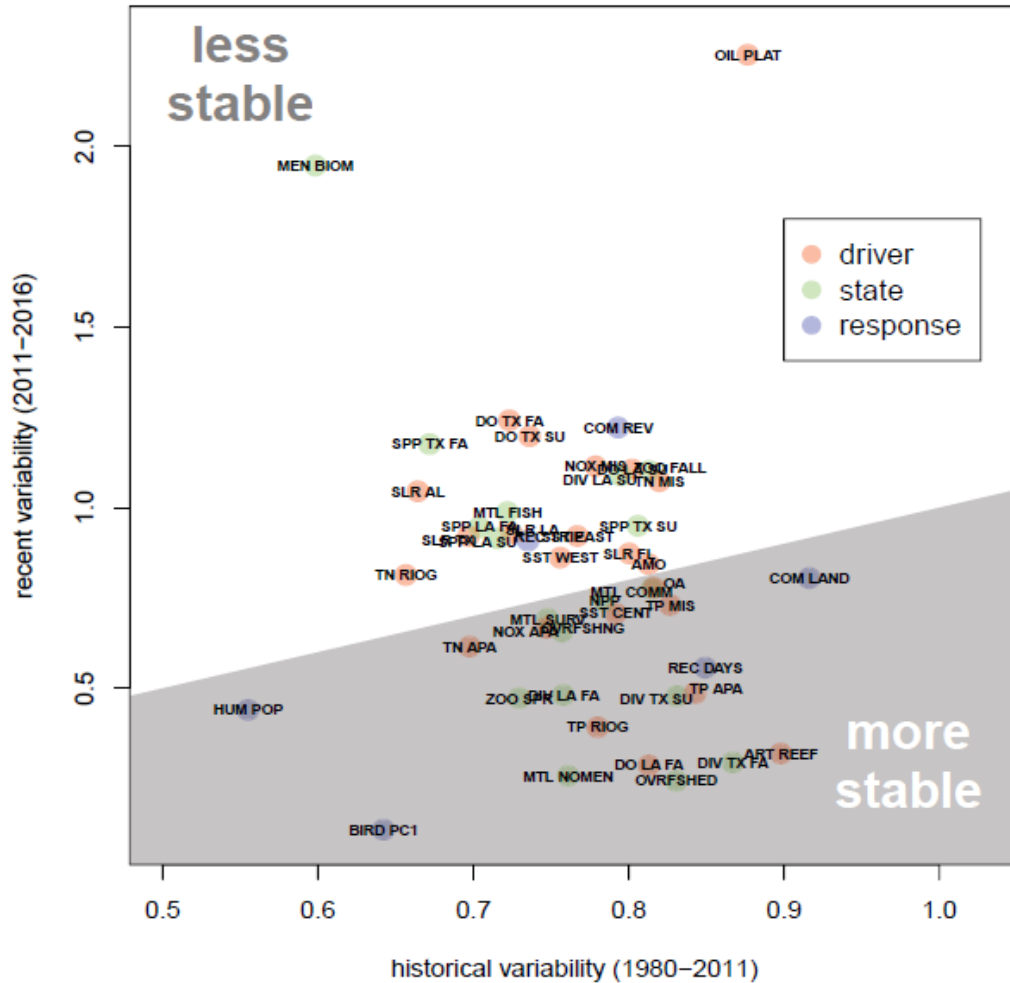


Methods described in
Dillard et al., 2013



Indicator synthesis

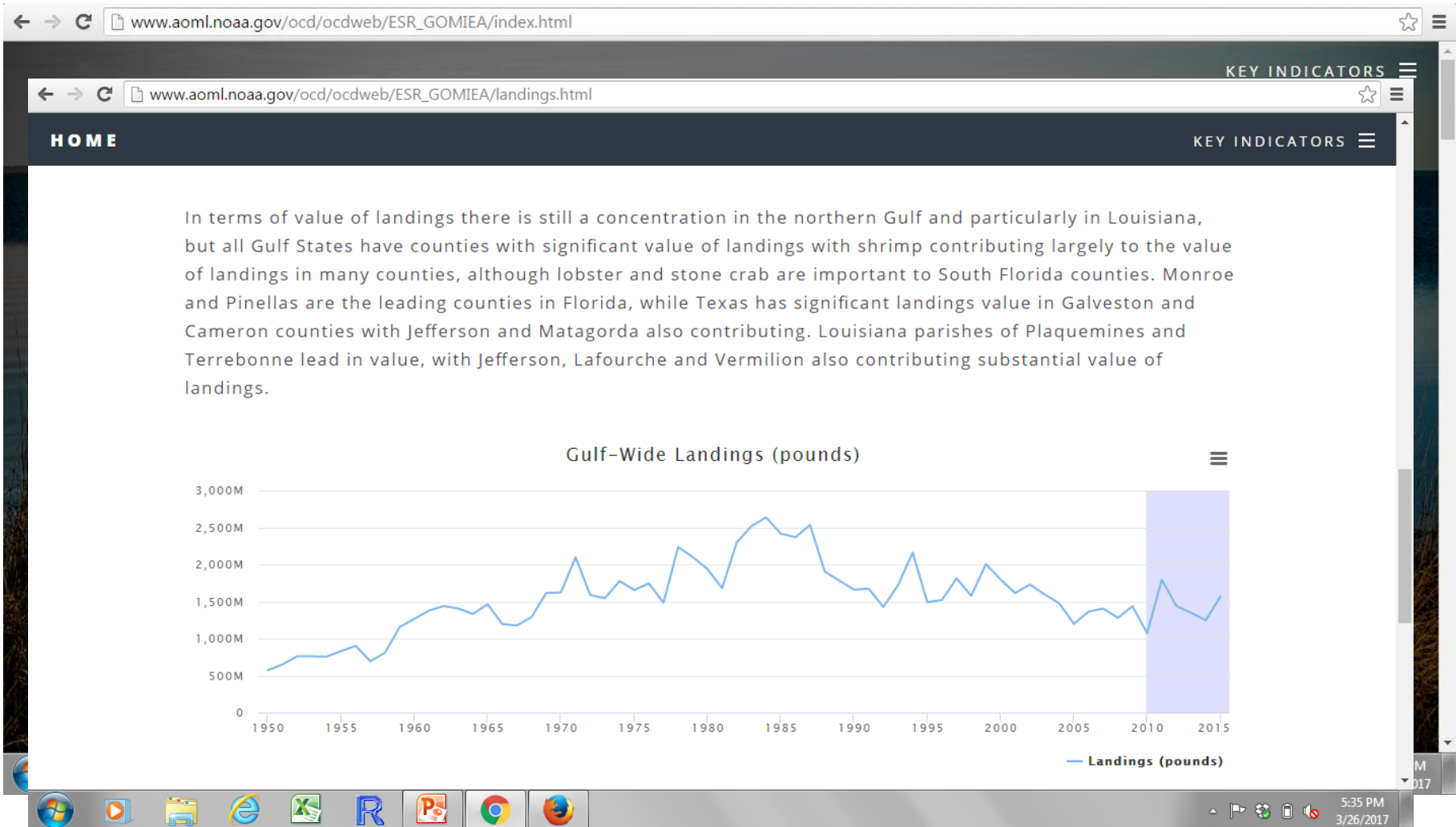
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Highlights: 2017 Update

- Atlantic Multidecadal Oscillation begun to slightly decline after period of increase since 1975
- Sea surface temperature, sea level rise, hypoxia, increasing at faster rates in some areas
- Natural habitats on the decline; artificial habitats on the rise
- Nearly all fish species of primary or secondary economic importance at biomass levels above mean of the last three decades; proportion of stocks undergoing overfishing at an all-time low
- Total commercial landings and revenues, recreational fishing effort, employment in ocean economy and GDP all recently increasing
- Urbanization increasing at faster rates
- External shocks to the system (e.g. Hurricane Katrina) show susceptibility of populations in low-lying areas

Web version of Ecosystem Status Report



Challenges and needs

- Information gaps:

- Protected species (mammals, turtles, corals)
- Estuarine processes and fisheries productivity
- Zooplankton dynamics
- Tourism value of species and habitats
- **All of southern Gulf of Mexico!**

- Need further exploration of relevant spatial scales, process studies

Future work

- Scaling down indicators to look at spatially variable processes (e.g., uneven surface warming patterns)
- Impacts of natural and anthropogenic shocks to the system (Hurricane Katrina, DWH)

Comments and feedback welcome

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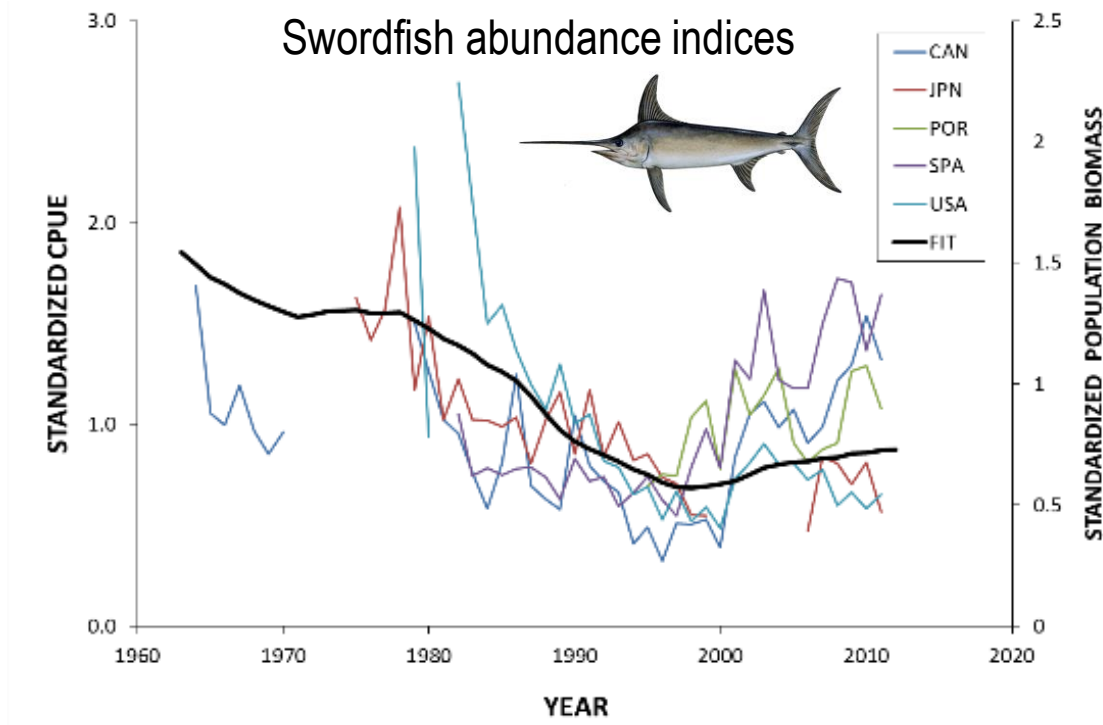
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Acknowledgements:

Matt McPherson, Michael Schirripa, Pamela Fletcher, Scott Cross, Steve Giordano, Bonnie Ponwith, Alex Chester, Randy Clark, Shannon Martin, Ruben van Hooidonk, Frank Muller-Karger, Amy Schuller, Penny Hall, David Gloeckner, Steve Turner, Vivian Matter, Kenneth Brennan, Shannon Cass-Calay, Craig Newton, James Sanders, Mike McDonough, Wesley M. Hochachka, Jeffrey Gleason, and the science and management community that provided feedback on the original Ecosystem Status Report.

How have the Status Reports been used?



- **Gulf of Mexico ESR:** recognition of physical shift in ~1995 led to re-interpretation of data on fish abundances and mammal strandings