Tab Q, No. 5

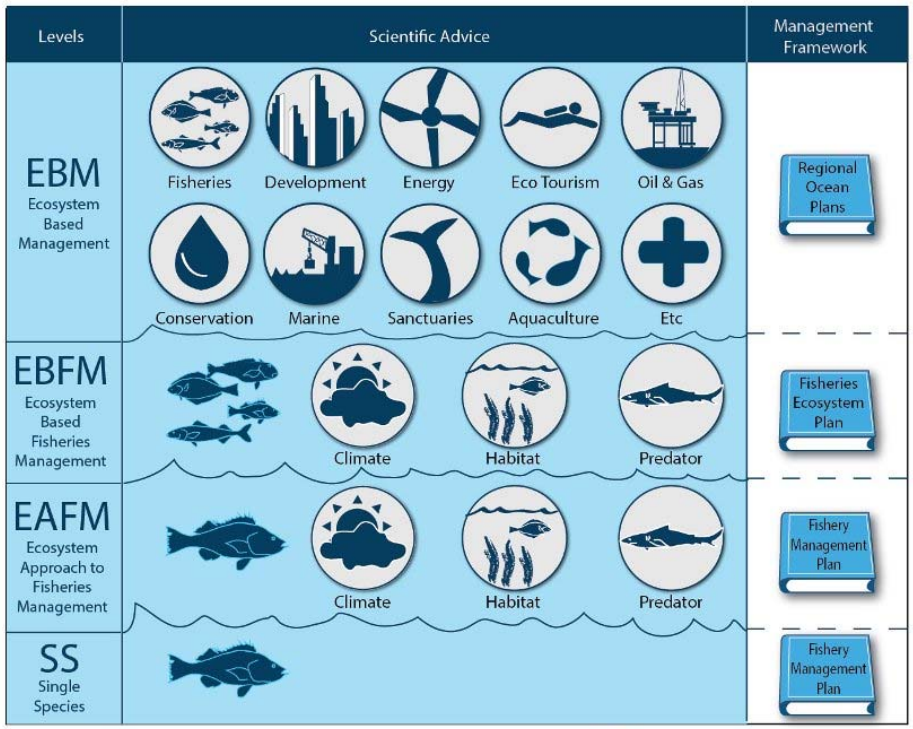
Gulf of Mexico Ecosystem-Based Fishery Management (EBFM) Road Map Implementation Plan

NOAA Fisheries Southeast Fisheries Science Center
Mandy Karnauskas

Gulf Council Meeting, June 20th 2018

What is EBFM?

Can be considered within a spectrum of approaches



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PLOS ONE

RESEARCH ARTICLE

Ecosystem-based fisheries management: Perception on definitions, implementations, and aspirations

John T. Trochta[1©], Maite Pons[1©*], Merrill B. Rudd[1©], Melissa Krigbaum[1©], Alexander Tanz[2©], Ray Hilborn[1]

"We highlight the lack of consensus in the interpretation of EBFM amongst professionals in marine science…**it is unnecessary for management to practice all the traits of EBFM, as some may be disparate from the ecosystem attributes or fishery goals**. Instead, incorporating some ecosystem-based considerations to fisheries management that are context-specific is a more realistic and useful way for EBFM to occur in practice."

What is EBFM?

NOAA Integrated Ecosystem Assessment Program (IEA)

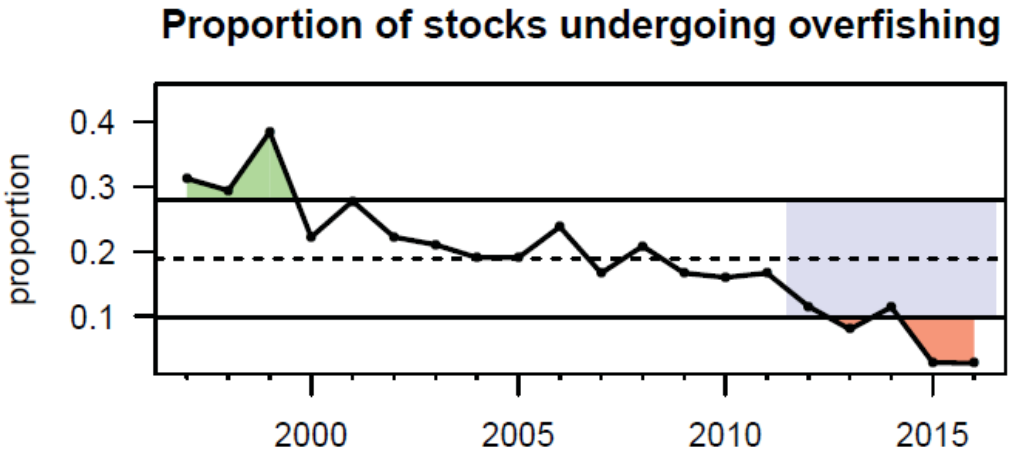
"The analytical engine to implement EBFM"

Gulf of Mexico IEA Mission Statement:

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

Why EBFM?

Single species stock assessments have been highly successful in ending overfishing

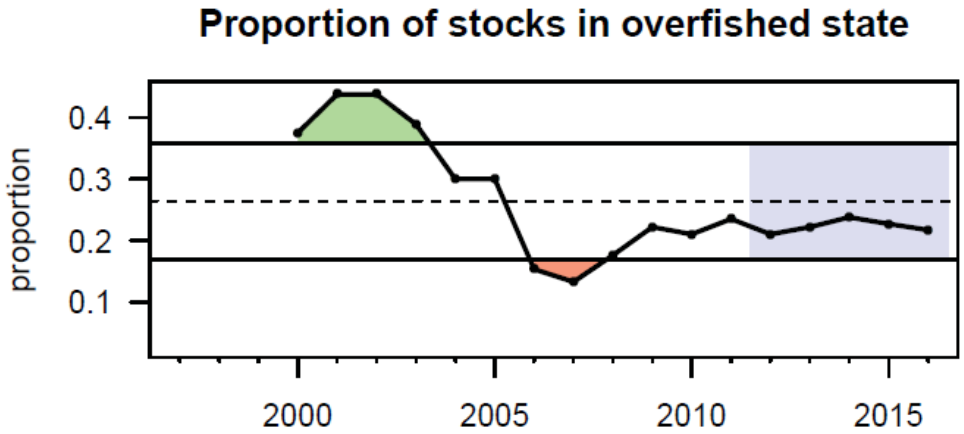


Now, the challenging part: what is **optimum yield**?

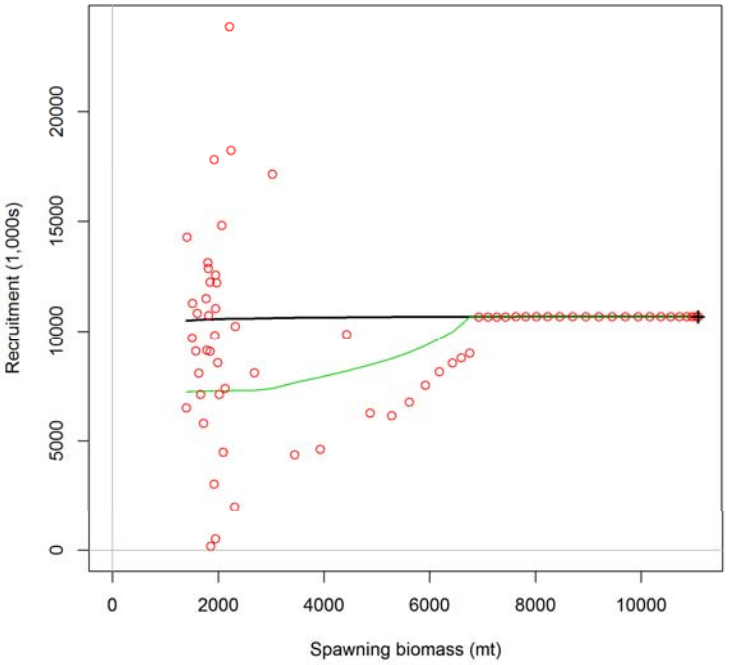
MSY → as reduced by economic, social, ecological factors → OY

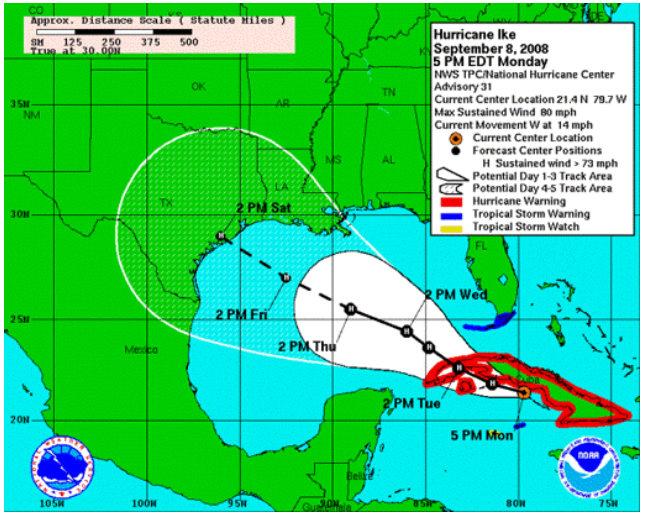
Why EBFM?

- We may be able to improve short-term projections
- Rebuilding plans are costly



- We have rights to productive fisheries





How EBFM?

NOAA Fisheries EBFM Road Map Policy

May 2016
National EBFM Policy released

June 2017
Regional Road Map development initiated

June - September 2018
Public comment period

December 2018
Final Road Maps released

Purpose of the Gulf EBFM Road Map

1) Document the efforts that the SEFSC its partners have completed,
2) guide the organization of ecosystem science within the SE region,
3) clarify regional priorities in order to facilitate collaboration, and
4) assist the Gulf Council with ecosystem-level planning.

Intended audience: Gulf Council, interested public, the NOAA Fisheries Southeast region, and its collaborating partners

Overall objective is to motivate a dialogue on how EBFM can be effectively applied in the Gulf of Mexico, taking into account stakeholder views, regional capacity, and the current state of the science.

Development of the Gulf EBFM Road Map

- Plan development include SEFSC, Regional Office, Council Staff
- Scoping survey to ID priority issues

Scoping survey participation

- Sustainable Fisheries
- Protected Resources
- Fisheries Statistics
- Social Science
- Physical Oceanography
- Ocean Chemistry and Ecosystems
- other

SEFSC labs

other NOAA offices and labs

Gulf EBFM Road Map Outline

Regional context ←

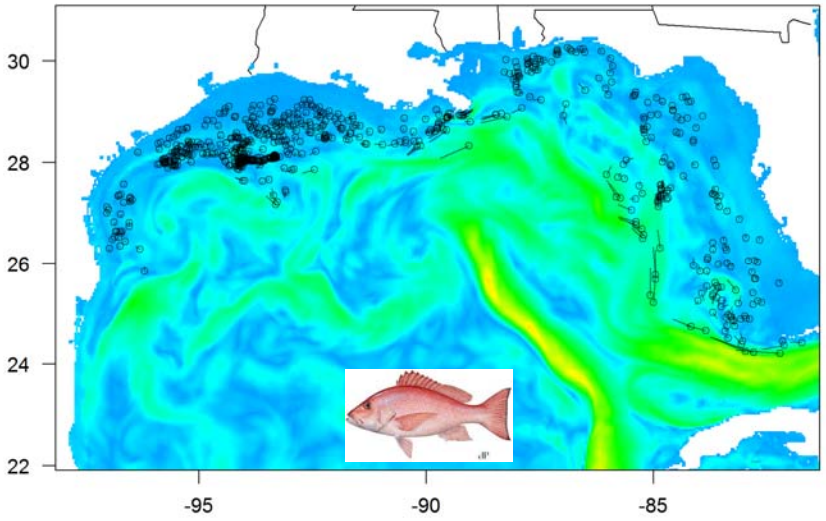
- Stock assessment
- Baseline monitoring
- Climate change
- Habitat considerations
- Multi-species interactions
- Connectivity
- Human dimensions

Expected outcomes and benefits ←

Engagement strategy

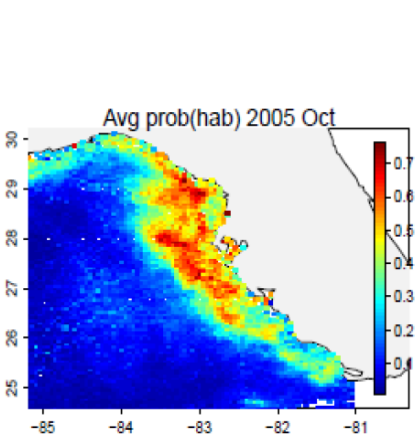
Stock assessment: Quantitative ecosystem linkages

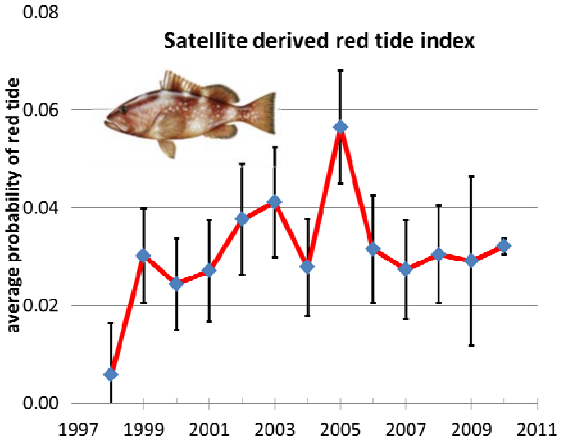
- Larval transport of red snapper
- Red tide and groupers
- Shrimp production



Larval transport modeling to predict recruitment strength

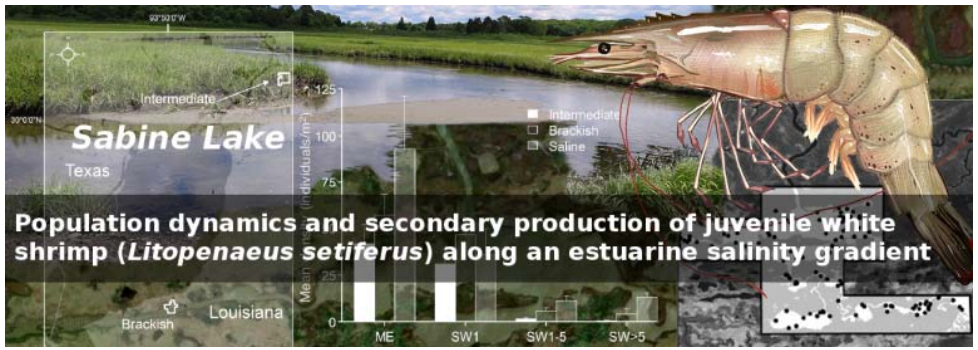
(M. Karnauskas, J. Walter, SEFSC; C. Paris, Univ. of Miami)





Estimating mortality due to red tide events

(Walter et al. 2013, SEDAR33-DW08)



(J. Leo, T. Minello, L. Rozas, SEFSC; many other collaborators)

Stock assessment: Qualitative ecosystem linkages

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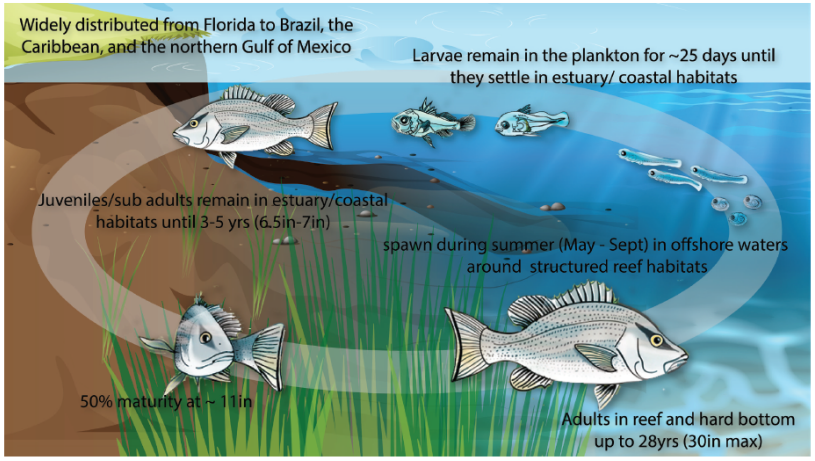
Gray Snapper (*Lutjanus griseus* aka mangrove snapper)



Current Regulations:

Bag limit of 10 per angler

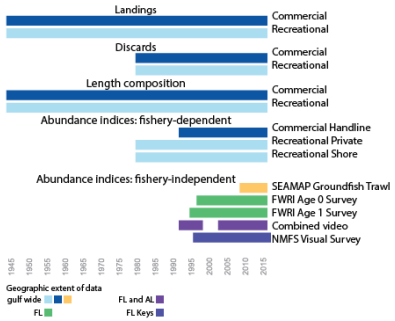
in AL, MS, LA, and Federal Waters

in FL State Waters

5 fish/person/day limit in FL

No regulations in TX

Data Sources:



Management Unit:
Reef Fish

Management Unit Definition:
Gulf of Mexico

Management Entity:
Gulf of Mexico Fishery Management Council

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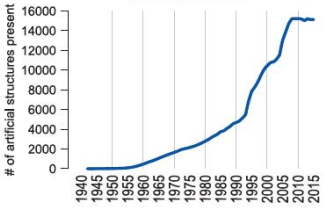
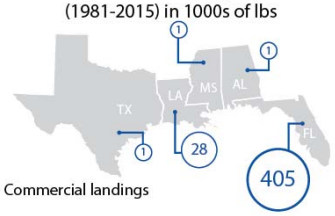
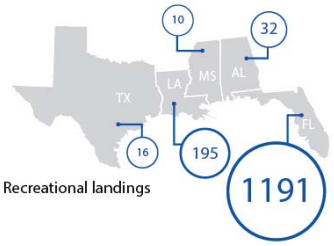
Artificial Reefs



Average annual landings by state (1981-2015) in 1000s of lbs

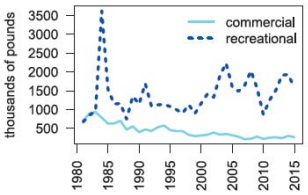


Commercial landings



Recreational landings

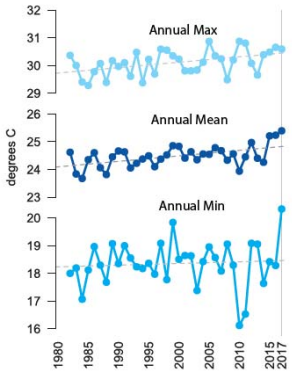
Average annual landings gulf wide (1981-2015)



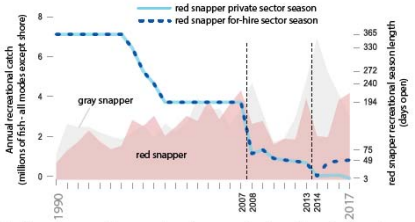
Juvenile and subadult gray snapper require seagrass habitats for nurseries and protection before transitioning into adults

Trends in seagrass cover from 1980 - 2014

Sea surface temperatures in the adult range (Northern Gulf of Mexico)



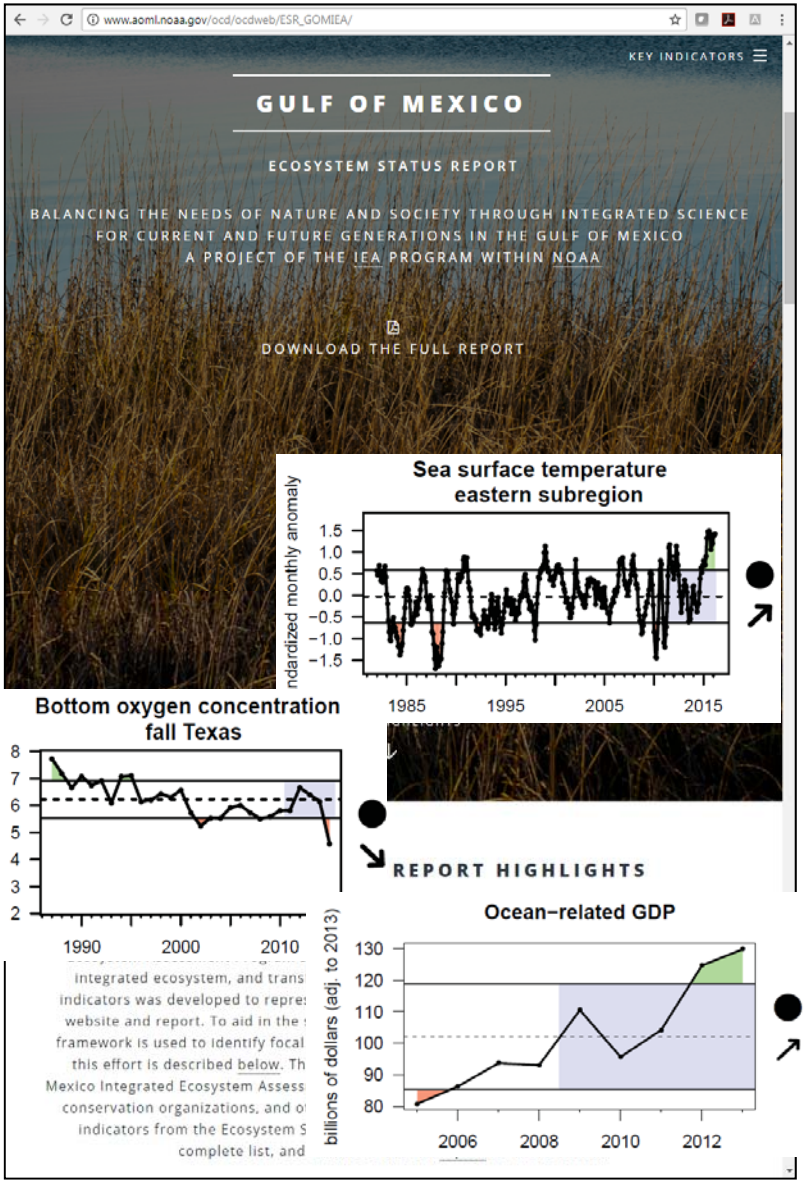
Potential influence of red snapper fishery



Sudden decreases in access to red snapper (such as the reductions in season length from 2007 to 2008 and 2013 to 2014) may cause short-term increases in targeting of other snapper species, such as gray snapper.

Baseline monitoring

- Existing long-term monitoring activities
- Ecosystem Status Reports
- Gulf of Mexico Marine Assessment Program for Protected Species
- Pilot “ecosystem survey” (eDNA, diet data)

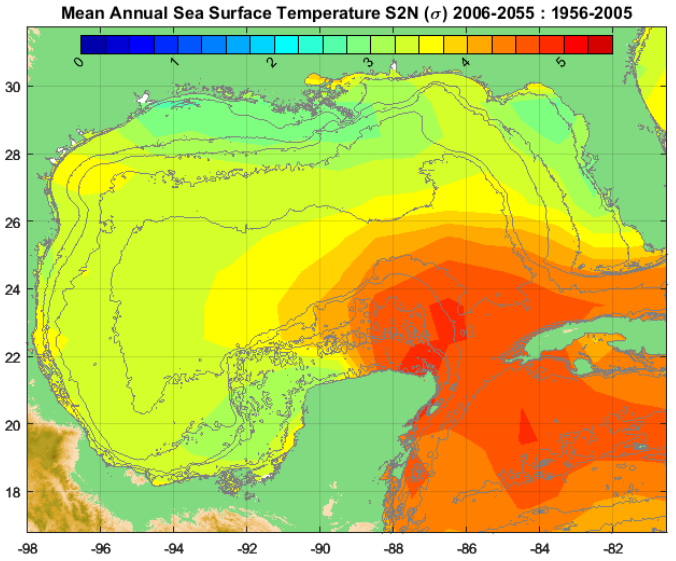


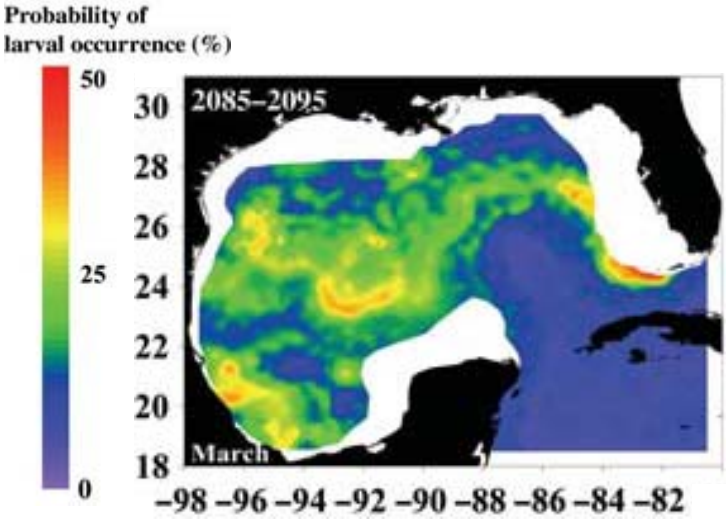
Climate

- Climate vulnerability analyses
- Bluefin tuna spawning predictions
- Biogeochemical modeling

Climate Vulnerability Analysis

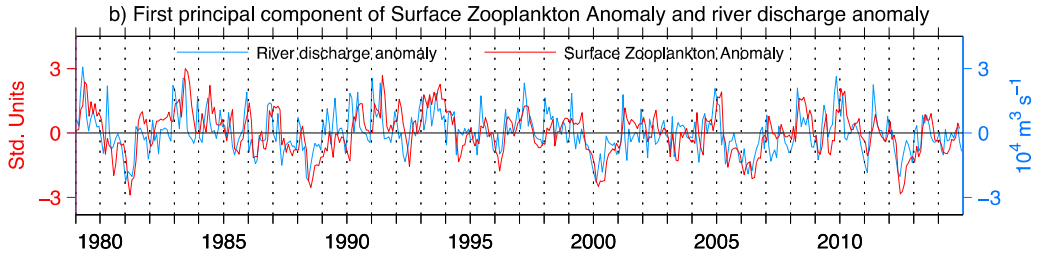
(J. Quinlan, SEFSC)

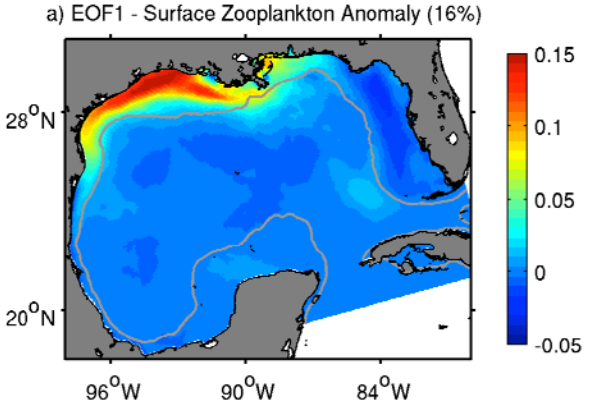




Predicting effects of climate change on bluefin tuna spawning habitat

(B. Muhling et al. 2011, ICES 68(6) 1051–1062)



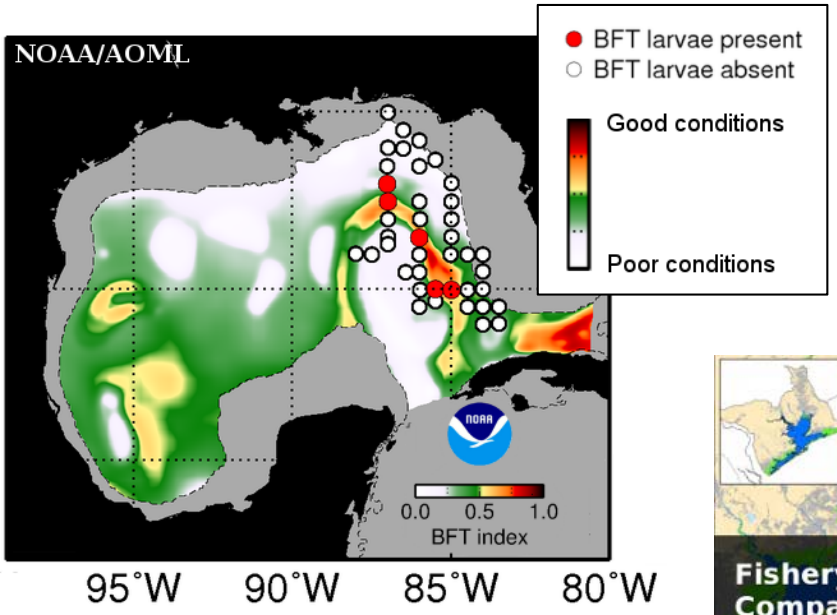


Impacts of El Niño on plankton biomass

(Gomez et al. in review, Geophysical Research Letters)

Habitat considerations

- Estuarine habitat
- Pelagic habitat

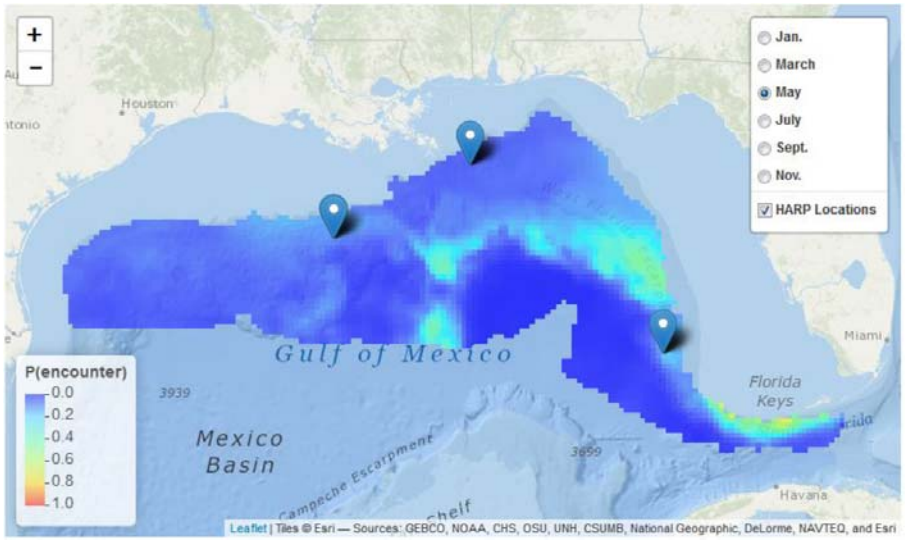


Predicting preferred conditions for Bluefin tuna larvae

(Domingues et al. 2016 Fisheries Oceanography)

Predictions of mammal distributions from visual survey and acoustic data

(M. Soldevilla, L. Garrison, SEFSC; J. Hildebrand, K. Frasier, Scripps Institution of Oceanography)



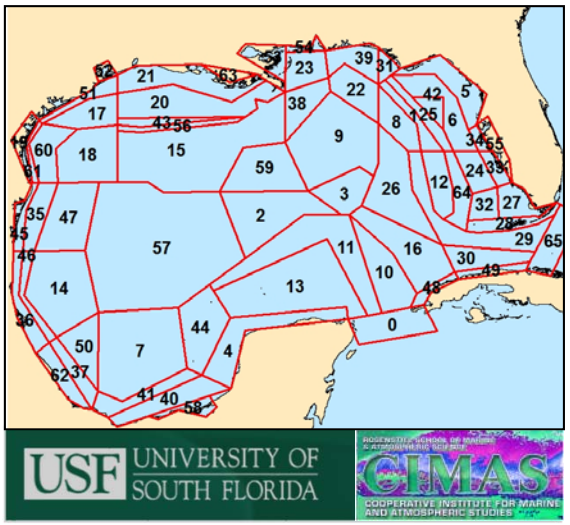
Understanding estuarine productivity

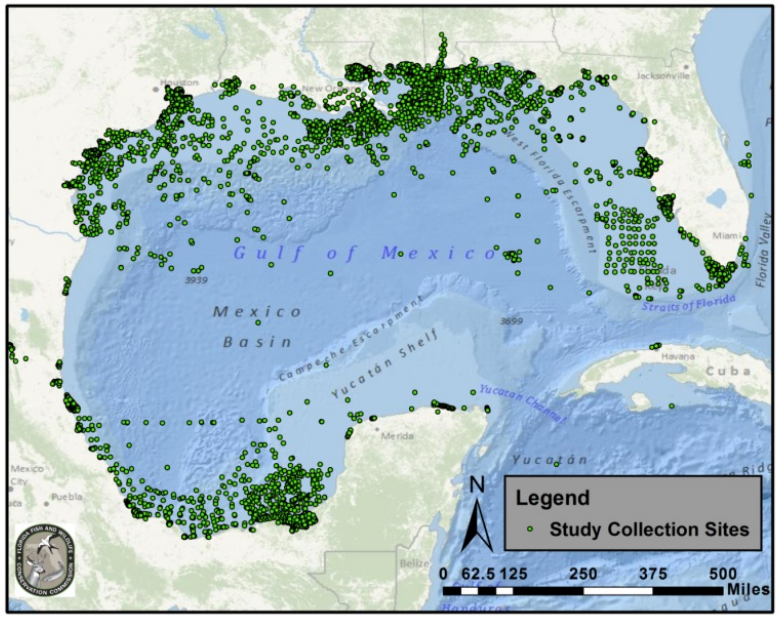
(T. Minello, P. Caldwell, L. Rozas, SEFSC)

Multi-species interactions

- Bycatch issues
- Diet studies
- Ecosystem modeling

ATLANTIS end-to-end ecosystem model
(C. Ainsworth, USF; M. Schirripa, SEFSC)





GoMexSI diet database (J. Simons, Texas A&M)

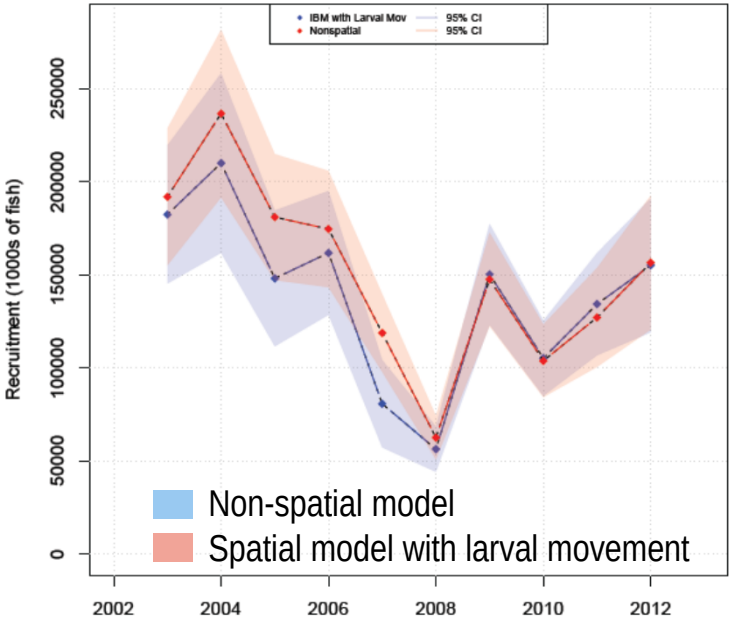
RESTORE project: Integrate information on ecosystem stressors and predator-prey interactions into the assessment and management of fisheries in the Gulf of Mexico

EcoPath with EcoSim

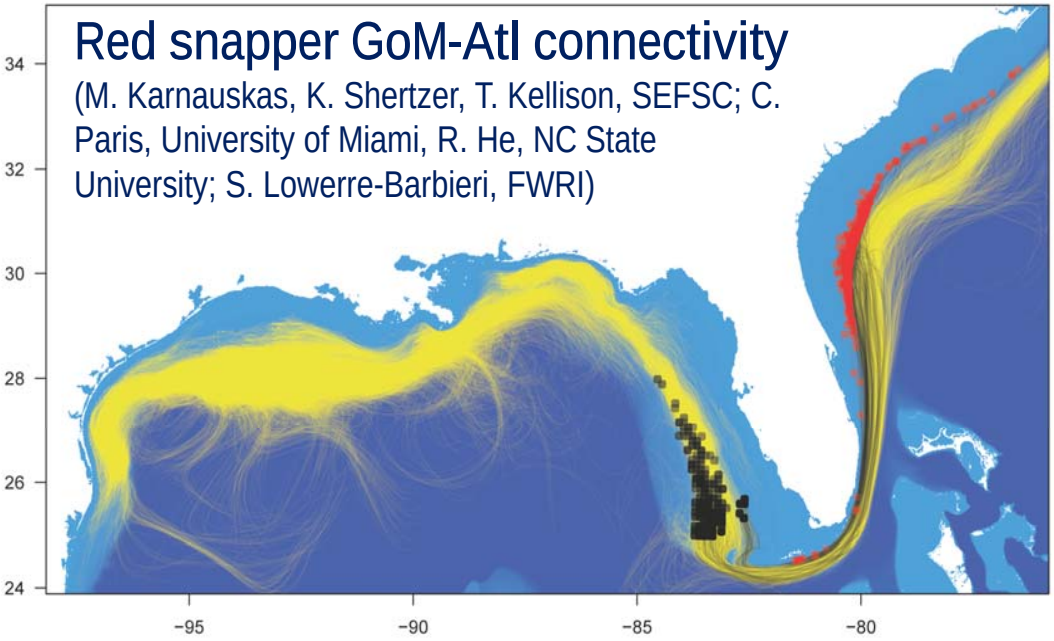
(S. Sagarese, M. Lauretta, SEFSC; D. Chagaris, University of Florida; K. de Mutsert, George Mason University, R. Ahrens, University of Florida)

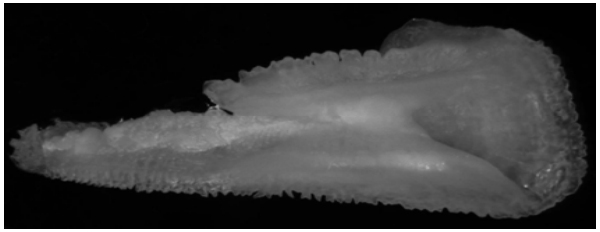
Connectivity: regional

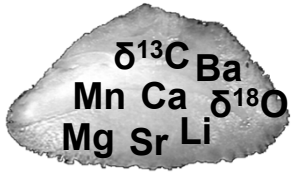
- Estimating larval transport between regions
- Spatially explicit assessments
- Otolith studies



Advanced stock assessments
(D. Goethel, SEFSC)







Otolith microchemistry and shape analysis
(B. Barnett, G. Fitzhugh, SEFSC)

Connectivity: watersheds

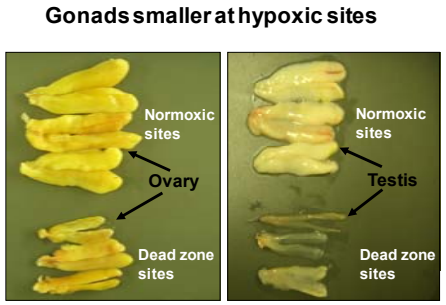
Understanding hypoxia affects on:

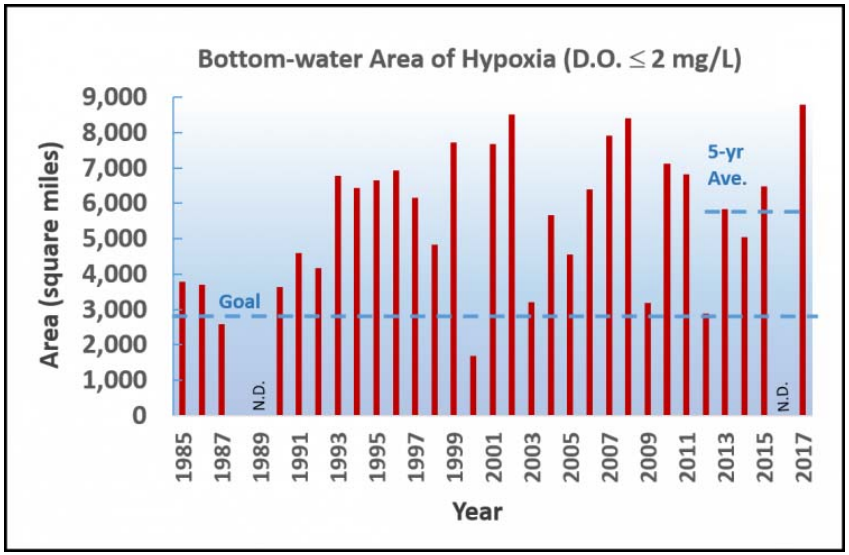
-habitat

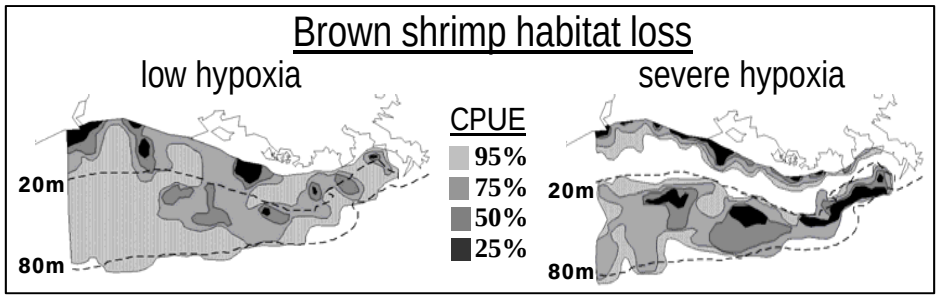
-vital rates

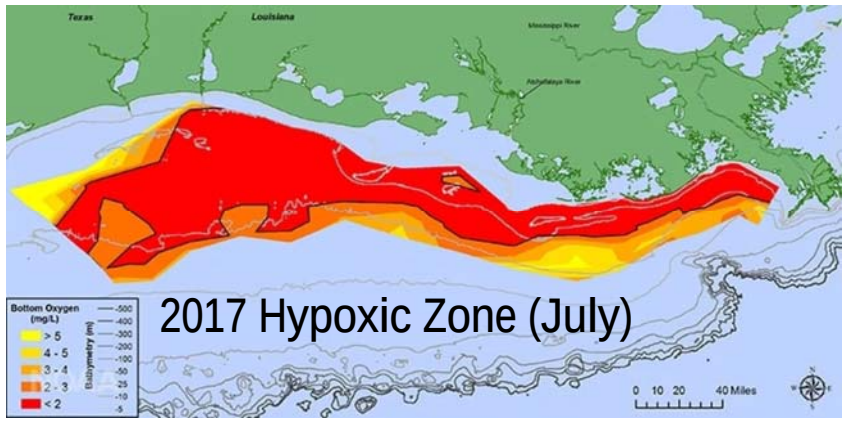
-fisher behavior

-shrimp prices









2017 Hypoxic Zone (July)

- How do effects on vital rates translate to the population?

- Does hypoxia bias management advice from stock assessments?

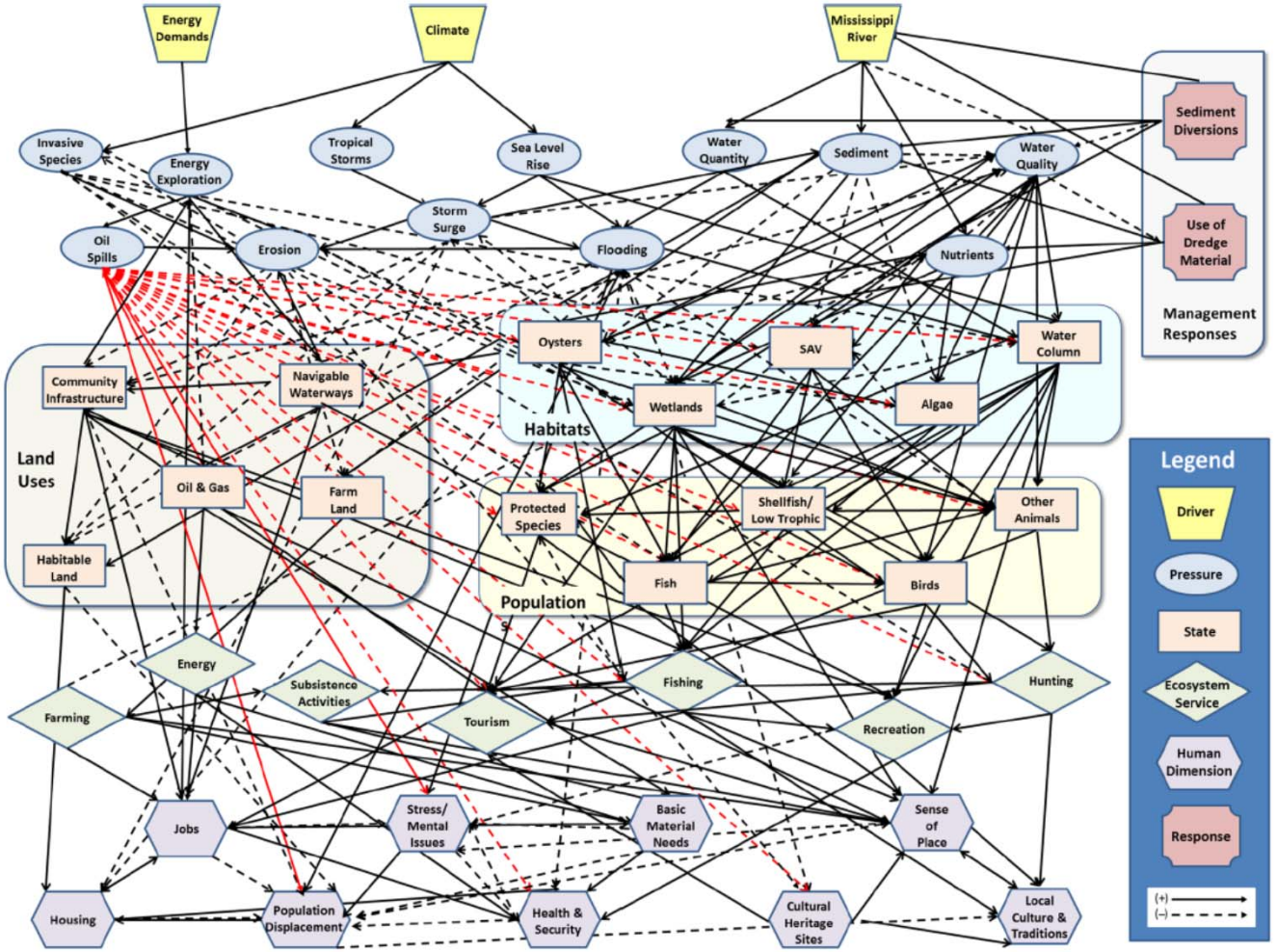
(K. Craig, R. Hart, J. Nance, B. Langseth, SEFSC; M. Smith, Duke University; D. Obenour, NC State University)

Connectivity: land use changes

Biological, social and cultural impacts of river diversions

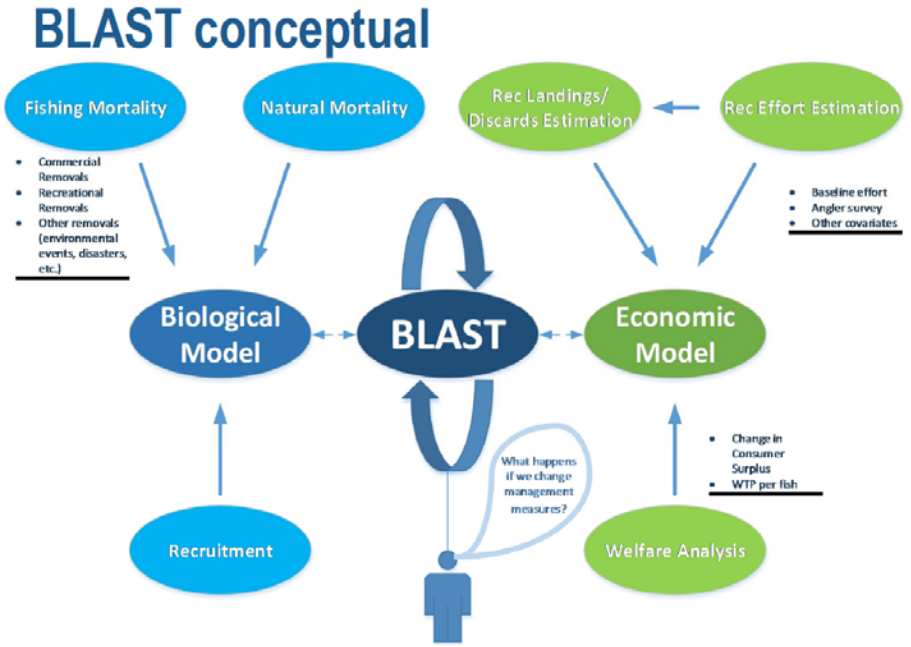
Expert-driven Bayesian network model approach

(S. Martin, S. Giordano, SERO; M. McPherson, S. Blake, SEFSC; N. Trifonova, AOML)

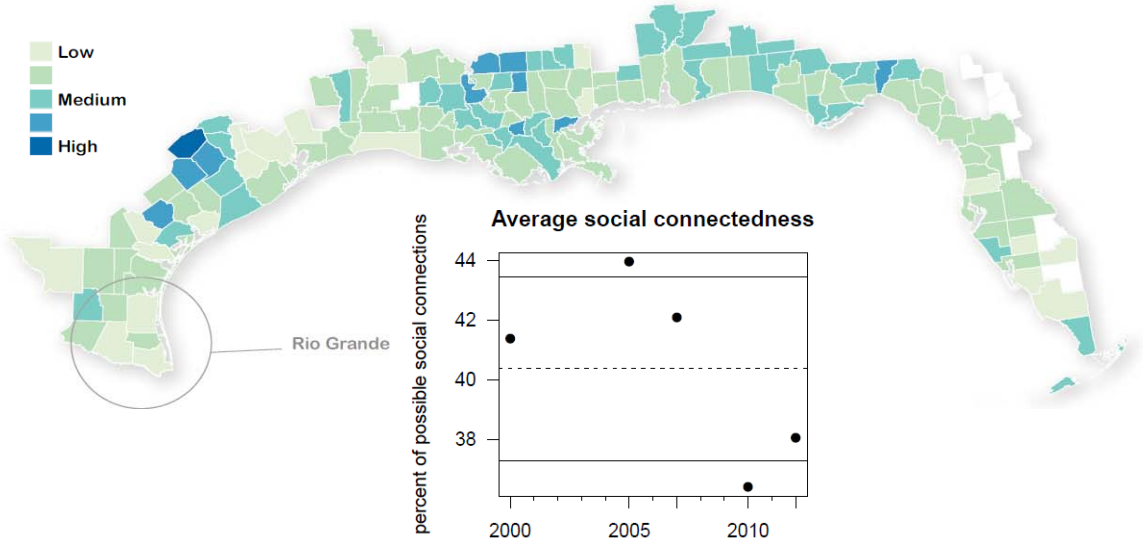


Human dimensions

- Track changes in human well-being
- Understand how different management actions may affect fishing behavior and location choices

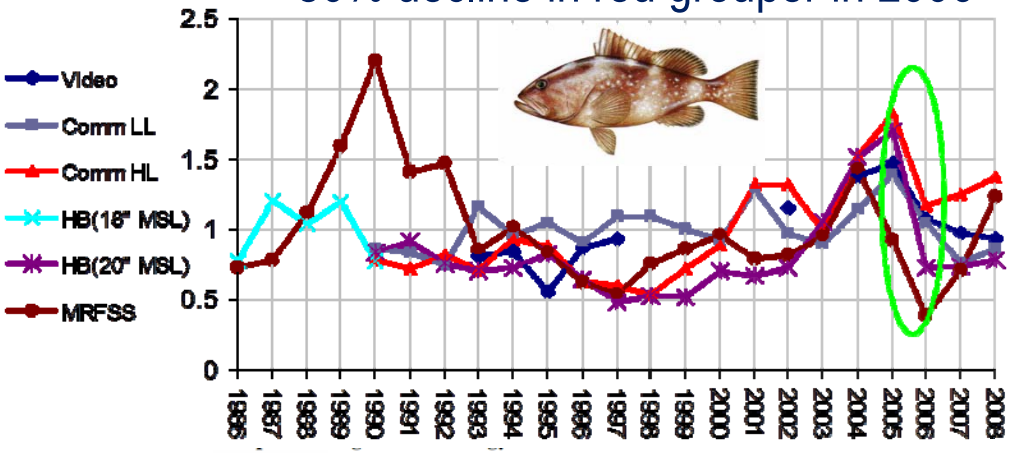


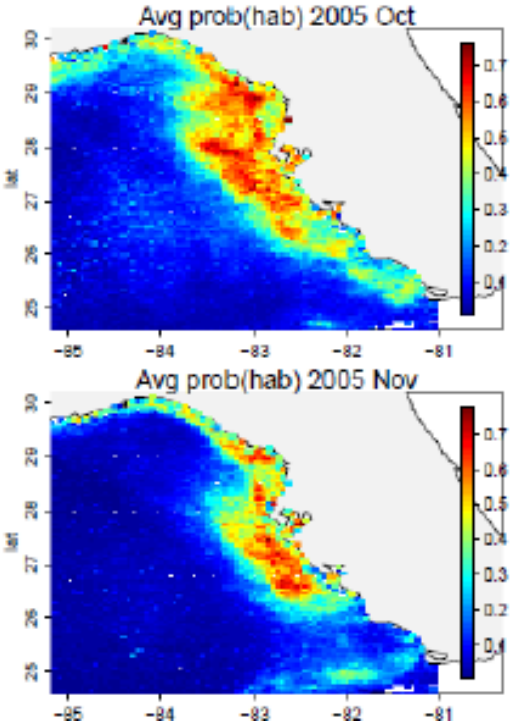
(M. McPherson, C. Liese, D. Carter, L. Perruso, J. Agar, A. Marvasti, S. Crosson, SEFSC; M. Jepson, SERO)



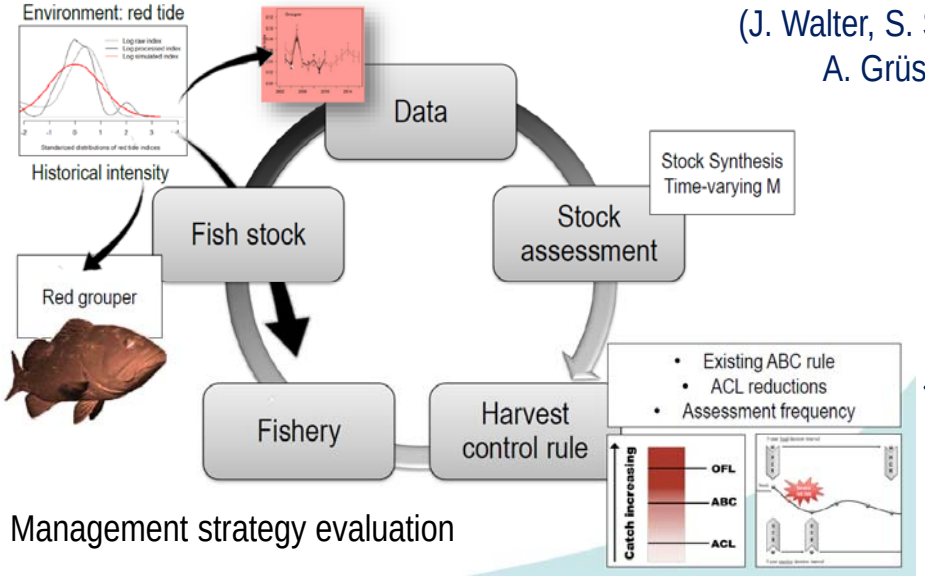
Red tide – a Gulf EBFM success story

~50% decline in red grouper in 2006

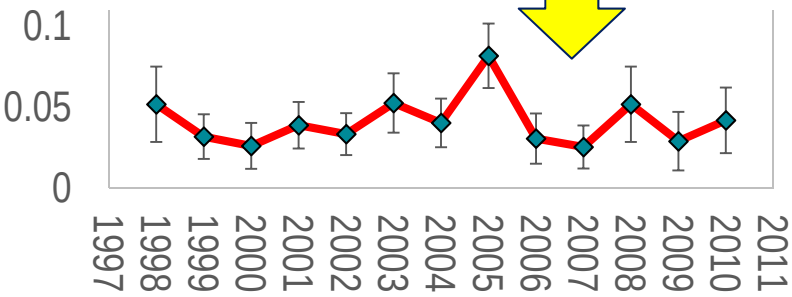




(J. Walter, S. Sagarese, W. Harford, A. Grüss, C. Ainsworth)



Management strategy evaluation

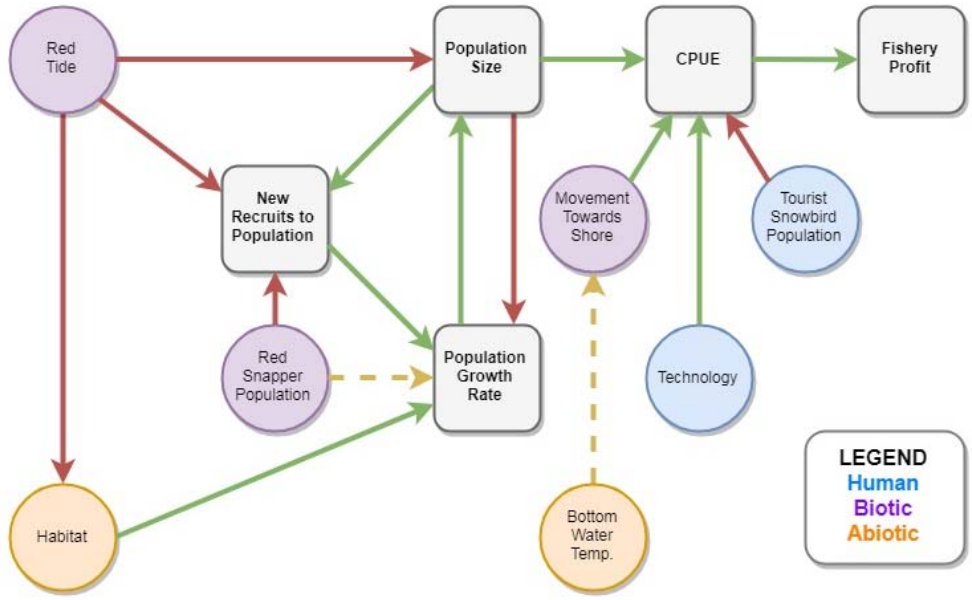


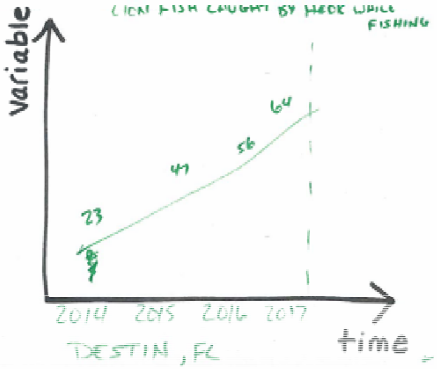
Stakeholder engagement

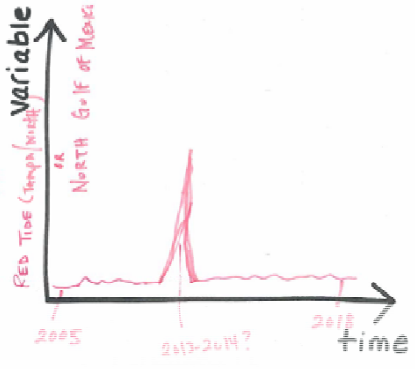
Pilot breakout group activity at 2018 MREP (Marine Resource Education Program)
Gulf red grouper conceptual map

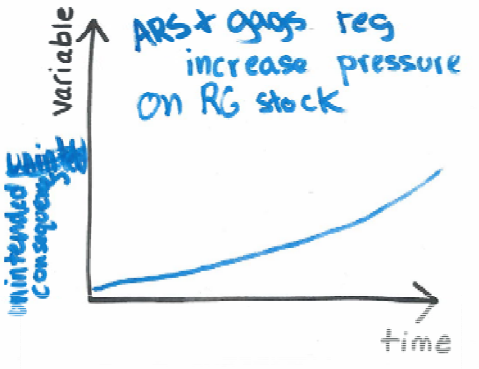
"Participatory ecosystem modeling"

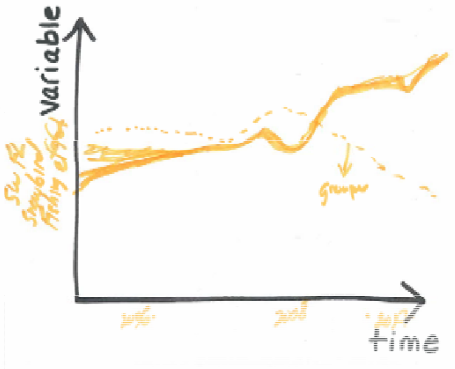
- Integrate anecdotal info into modeling efforts
- Guide management strategy evaluation
- Perform risk assessment
- Predict outcomes of management alternatives



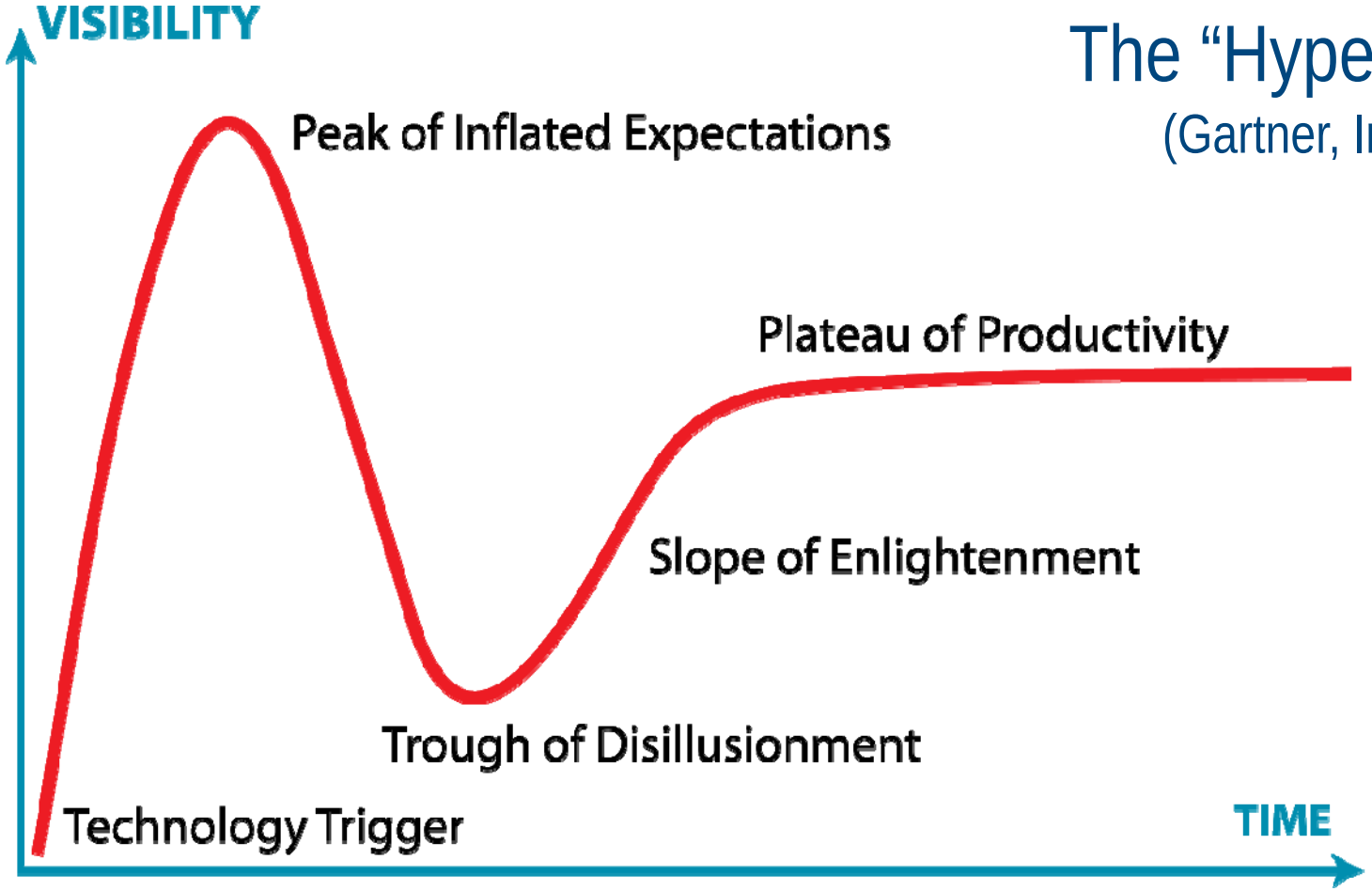








Successful EBFM will require failures



The "Hype Cycle"

(Gartner, Inc. IT firm)

https://en.wikipedia.org/wiki/Hype_cycle

Next steps

- Provide comments on the EBFM Roadmap
- Provide guidance on priority EBFM questions

How can science better support management of marine resources in a complex system?

Thank you to all the SEFSC staff and other NOAA scientists who contributed to the Gulf EBFM Road Map.

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Road Map public comment period until Sept 30 2018