NOAA FISHERIES

- Northeast Fisheries Science Center

2016 State of the Ecosystem Report to the New England Fishery Management Council

- Northeast Fisheries Science Center
- Mystic CT
- April 29, 2016

CHASG Working Group Seminar
April 15, 2016
Woods Hole

NEFSC Ecosystem Considerations

Northeast Fisheries Scienc...

https://localonly.wh.whoi.edu/review/lgarner/ecosys/

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Northeast Fisheries Science Center

Ecosystem Considerations

NOAA FISHERIES

EcoAp Links NEFSC Links

Ecology of the Ecosystem
Background information on the structure and function of the Northeast Shelf Ecosystem

Climate Change
Impact of Climate Change on the Ecosystem and Fisheries Species

Ecosystem Status
Assessment of Ecosystem Condition and Socioeconomic Impacts

Current Conditions
Semiannual Review of the Physical and Biological Status of Ecosystem

Spatial Analyses
Species Distribution Patterns and Related Consideration

Print

There is now broad agreement that we need to adopt a more holistic approach to marine resource management at both the national and international levels. To accomplish this goal, the foundation of marine Ecosystem-based Management is now being developed and refined. Virtually all specifications of marine EBM share at least three common elements: (1) a commitment to establishing spatial management units based on ecological rather than political boundaries, (2) consideration of the relationships among ecosystem components, the physical environment, and human communities, and (3) the recognition that humans are an integral part of the ecosystem. We need to account for the important goods and services derived from marine ecosystems and the diverse and cumulative impacts of human activities in these systems (Figure 1) to forge a sustainable future.

Figure 1. Examples of some important ecosystem services (blue icons), stressors (red), adverse effects (yellow), and issues of special concern (green) that will be considered in Ecosystem-Based Management on the Northeast U.S. Continental Shelf (adapted from image by Barbara Ambrose, National Coastal Data Development Center).

The importance of implementing marine Ecosystem-based Management in the United States has recently been highlighted with the adoption of a new National Ocean Policy, established under

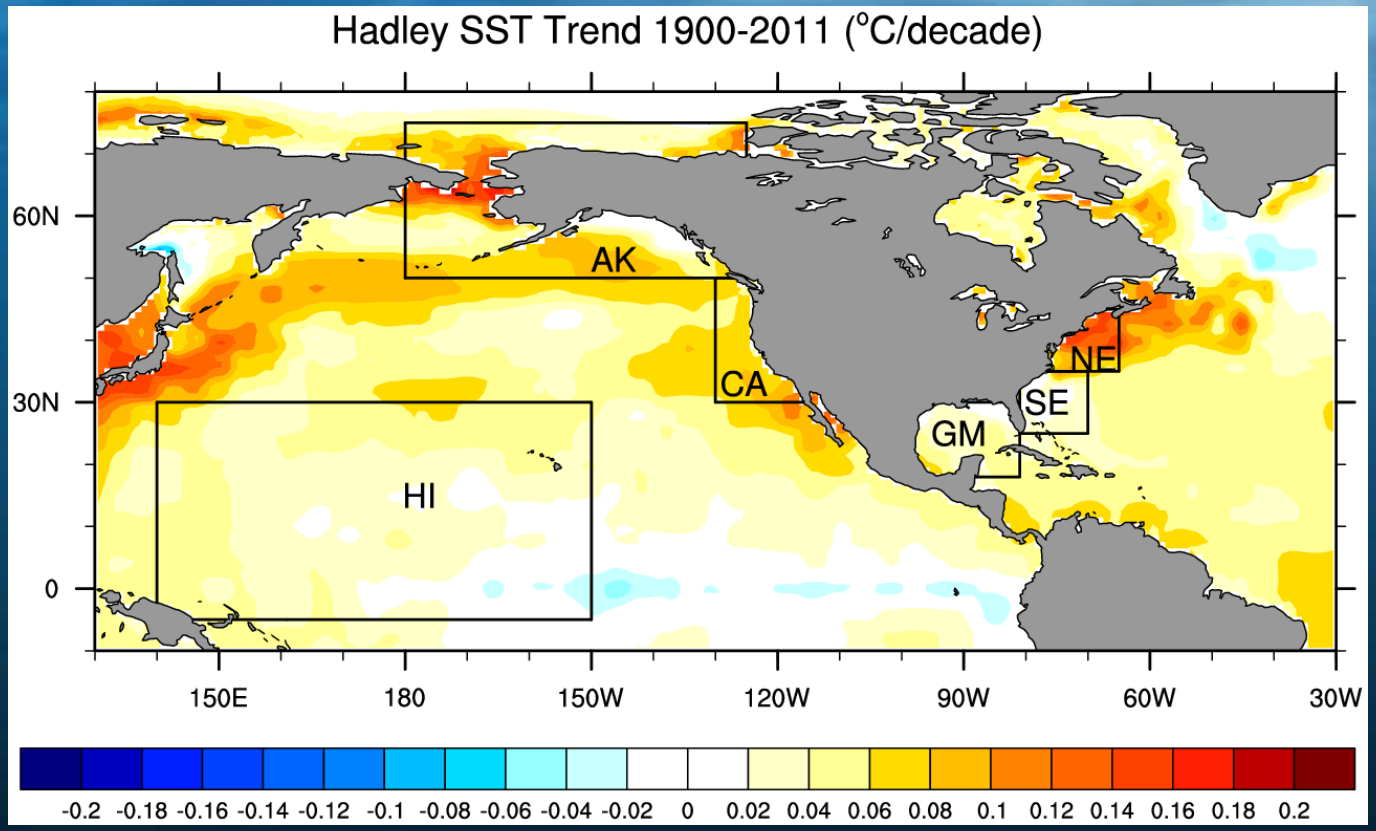
Main Findings:

- Rate of temperature change on the Northeast Shelf is among the highest in the world
- Average summer temperature in 2015 was second highest in over 150 years of observation
- New high resolution climate models predict much higher rates of change in temperature than earlier coarser resolution models
- Changes in fish distribution patterns differ in Gulf of Maine vs Mid Atlantic –Georges Bank
- Strong evidence of decadal-scale changes in productivity affecting recruitment and fish condition factors

Main Findings (Continued):

- Significant changes in fishery characteristics over last two and half decades to invertebrate-dominated fisheries
- Steady reduction in diversification of species composition of landings over last two decades
- Regional differences in dependence on commercial and recreational fishing results in differential social vulnerability to change.

Rate of Temperature Increase on Northeast Shelf among Highest on the Planet



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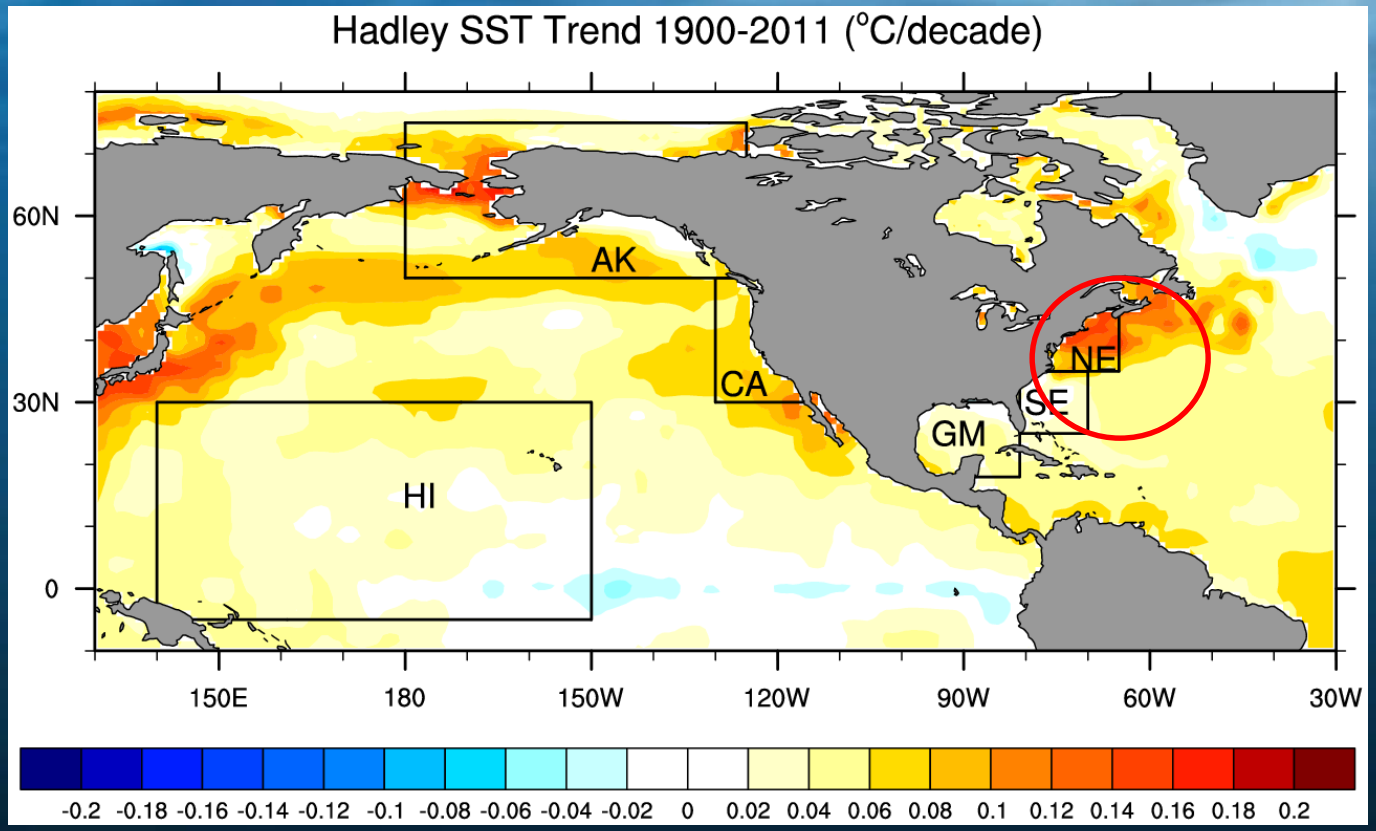
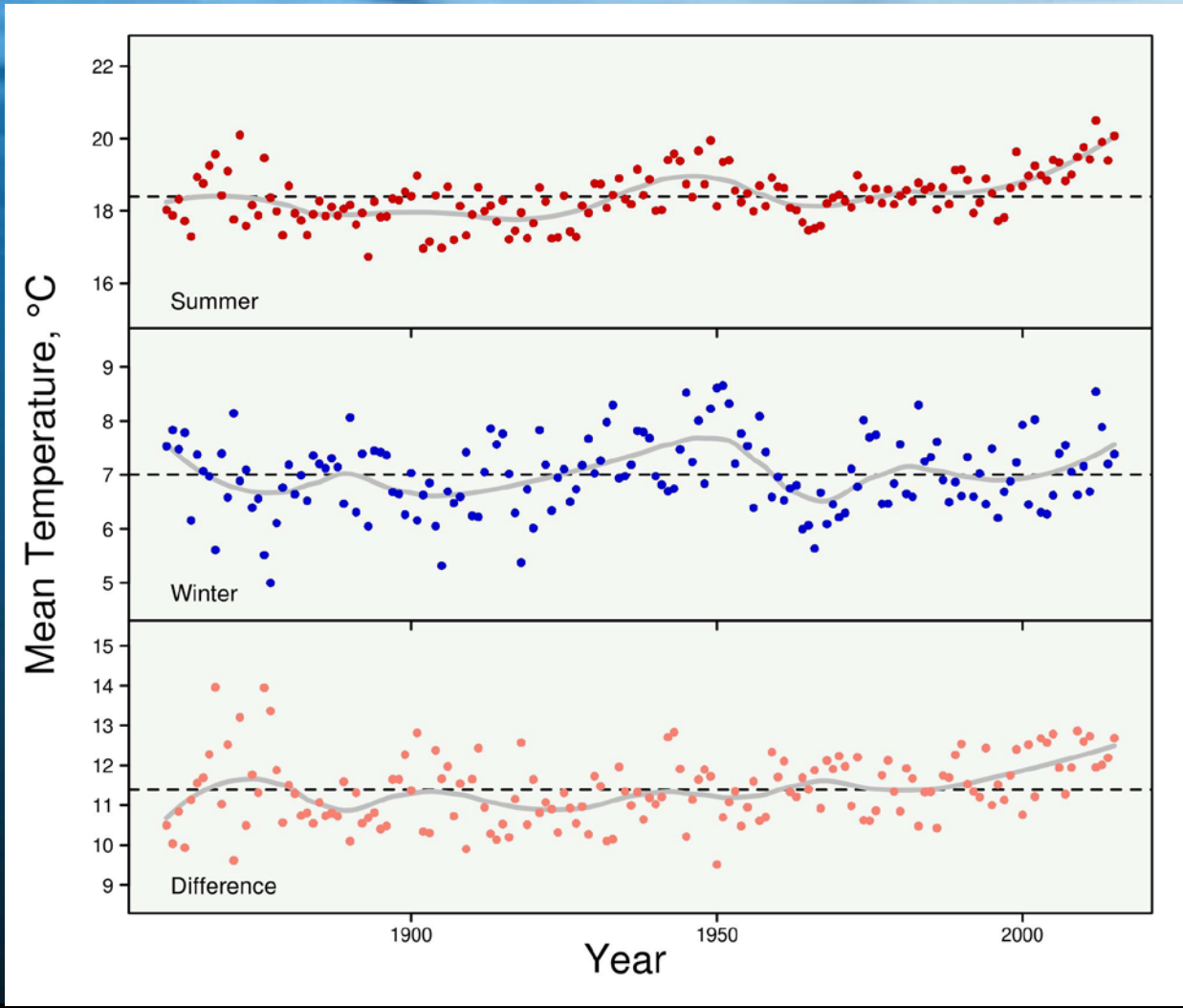
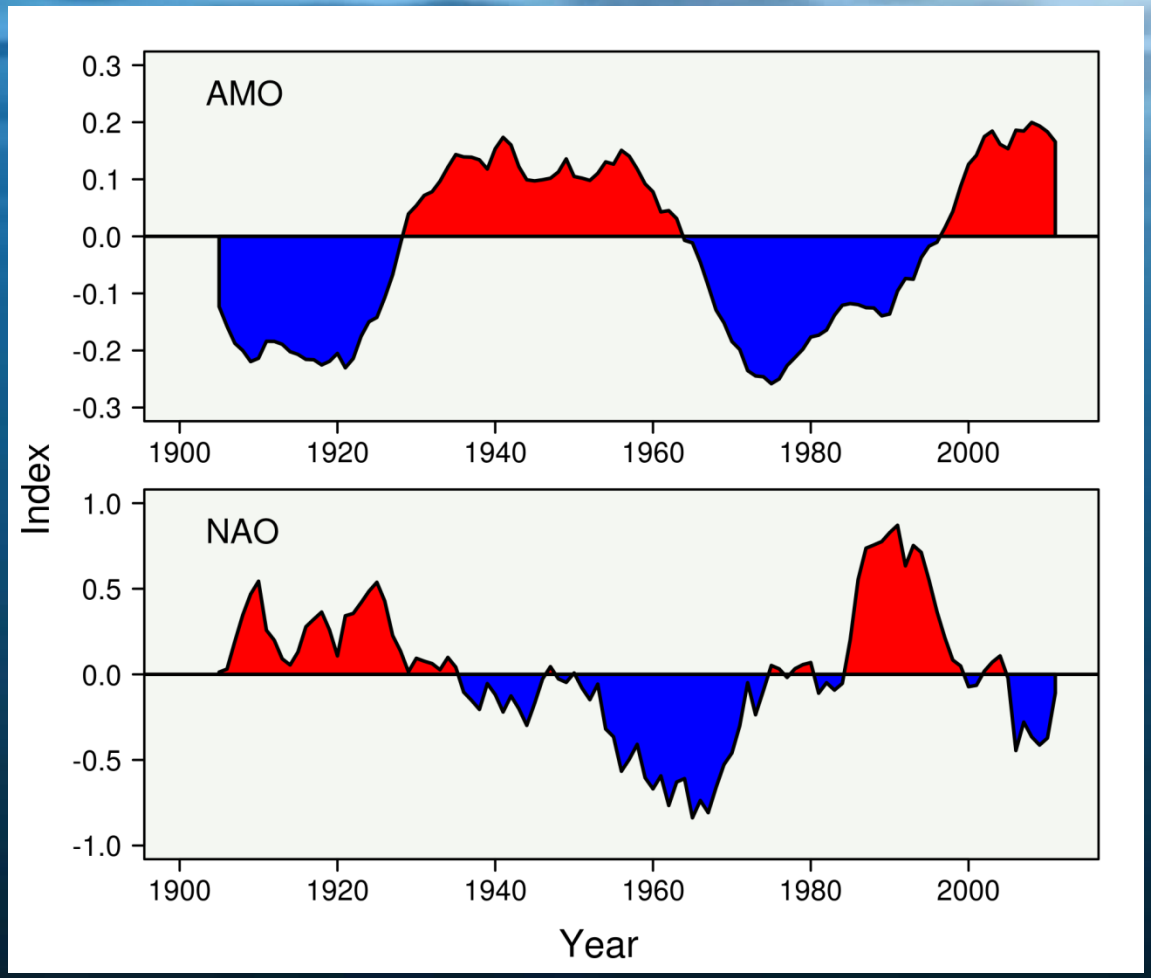


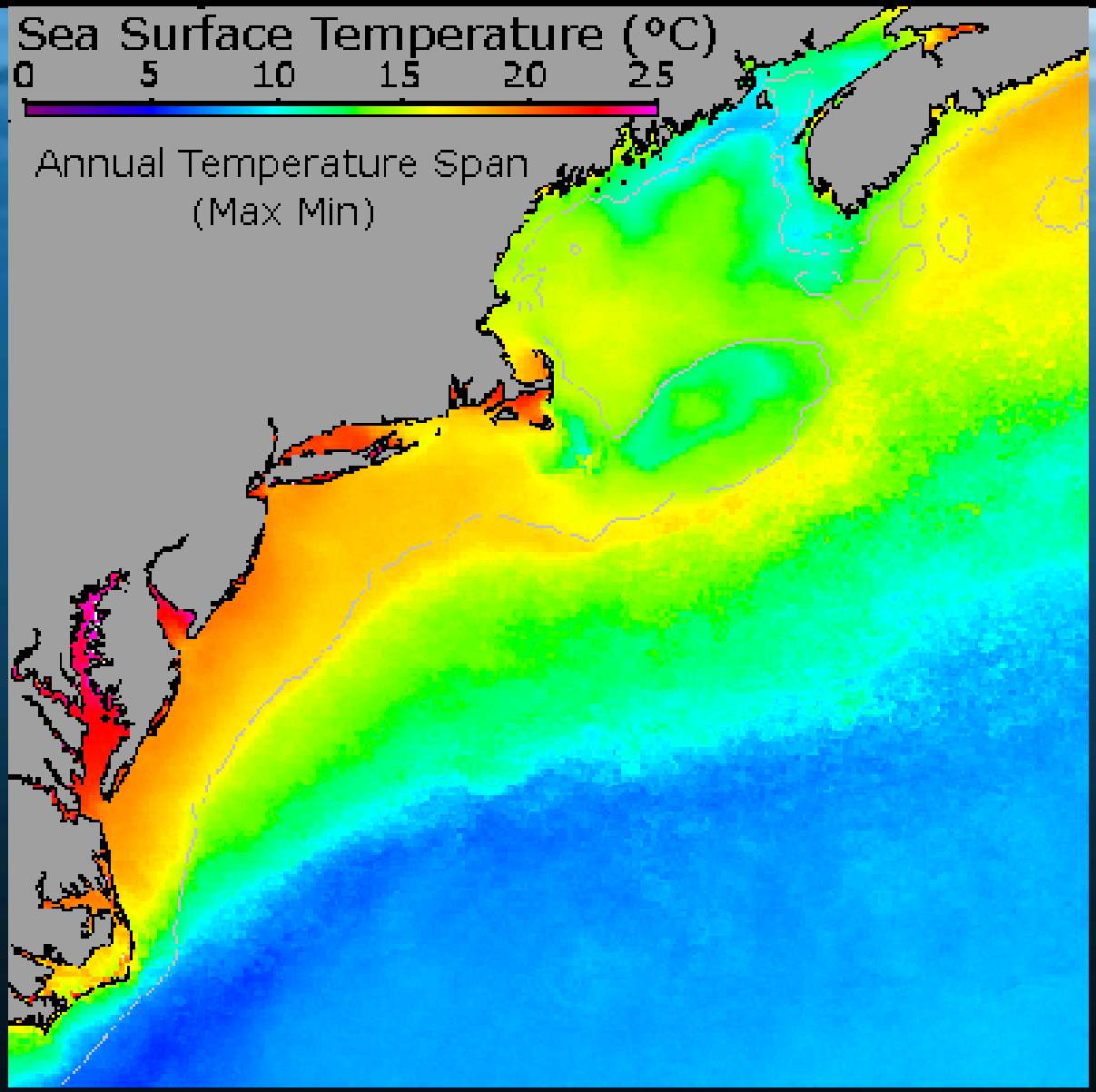
Long-Term Sea Surface Temperature on The Northeast Continental Shelf



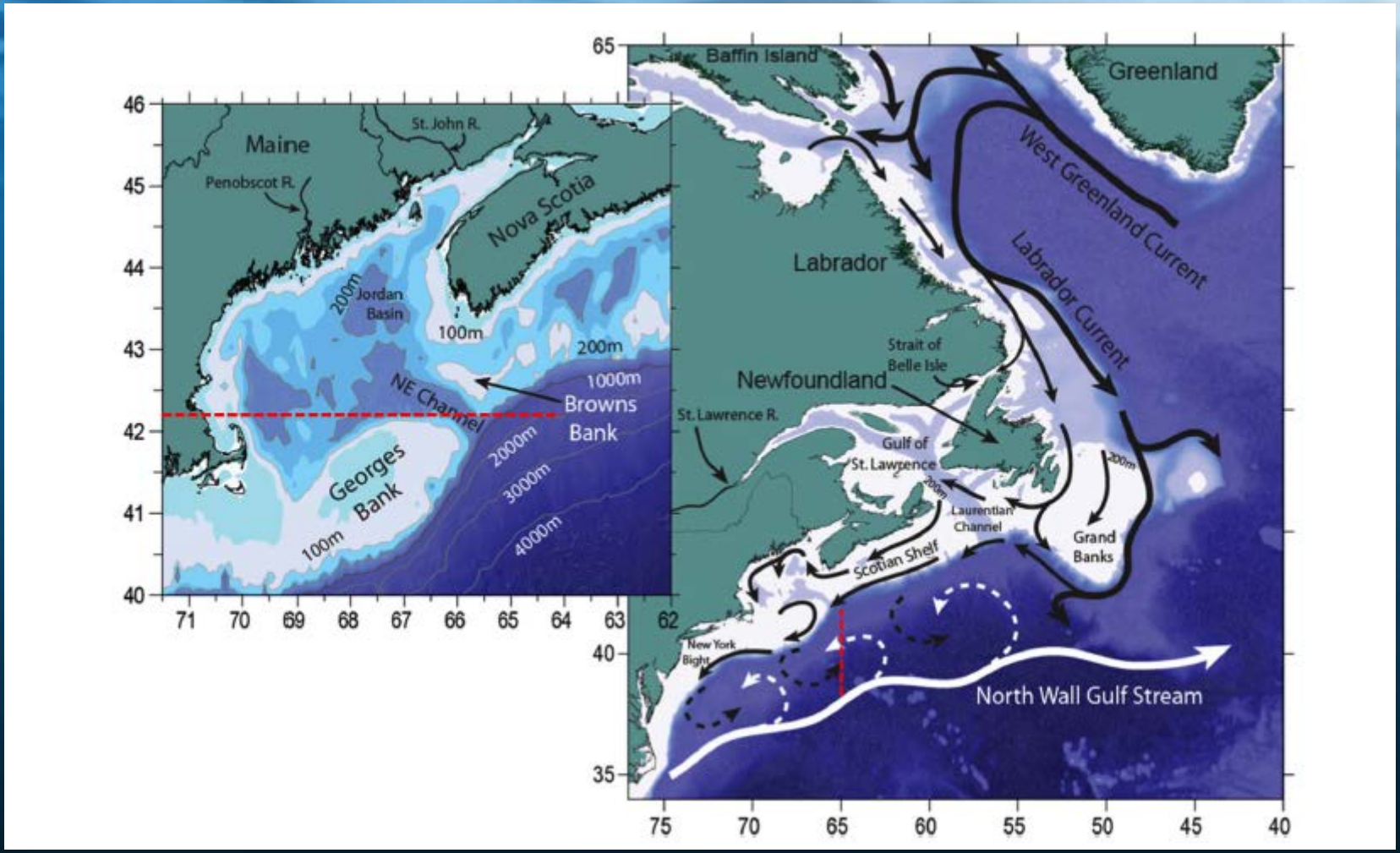
Basin-Scale Climate Indicators: Atlantic Multidecadal Oscillation (AMO) and North Atlantic Oscillation (NAO)



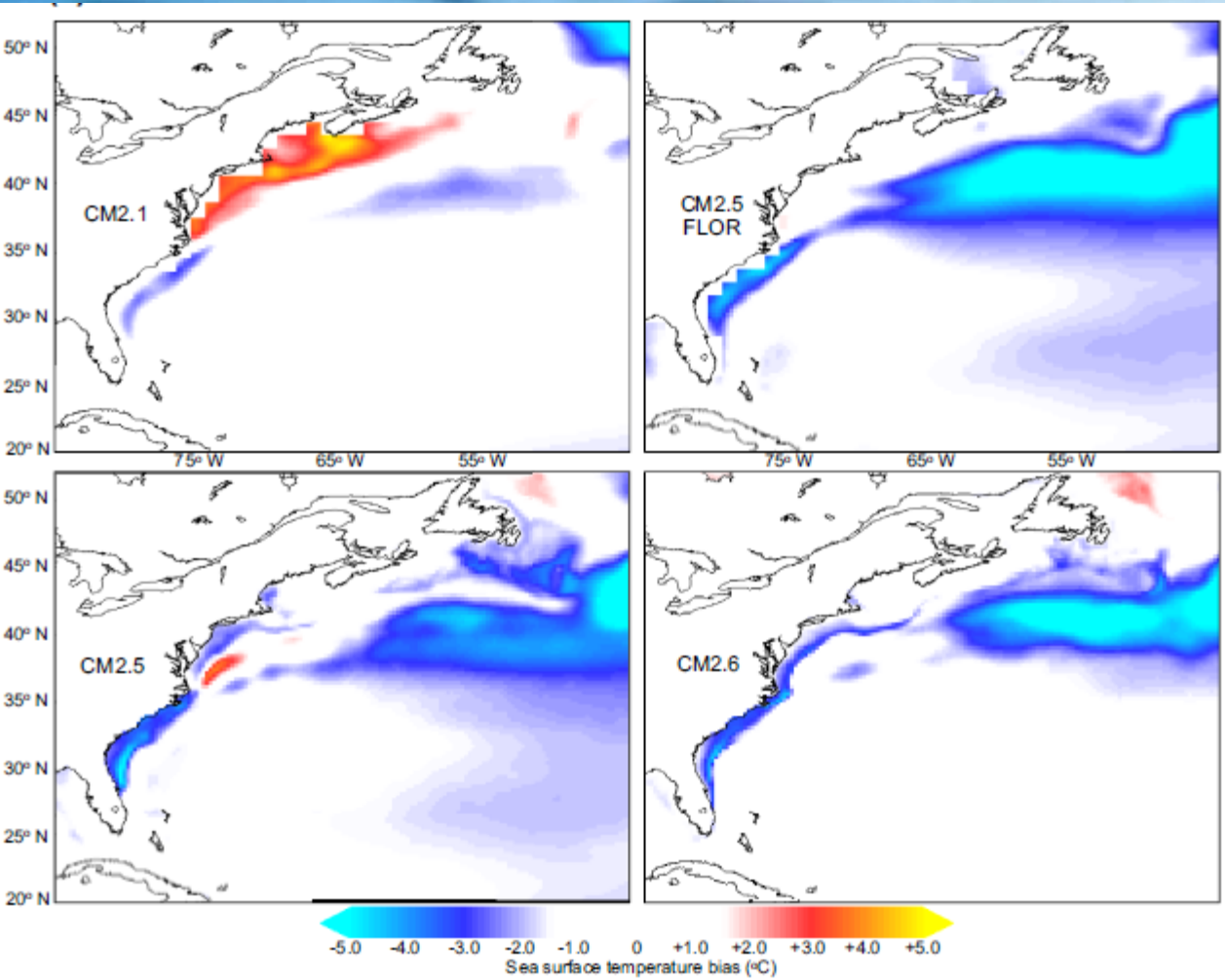
The Annual Temperature Range on the NES Is Among the Highest in the World



Predict Increase in Warmer Saltier Water into the Gulf of Maine



Increasing Spatial Resolution in Climate Models Reduces Bias



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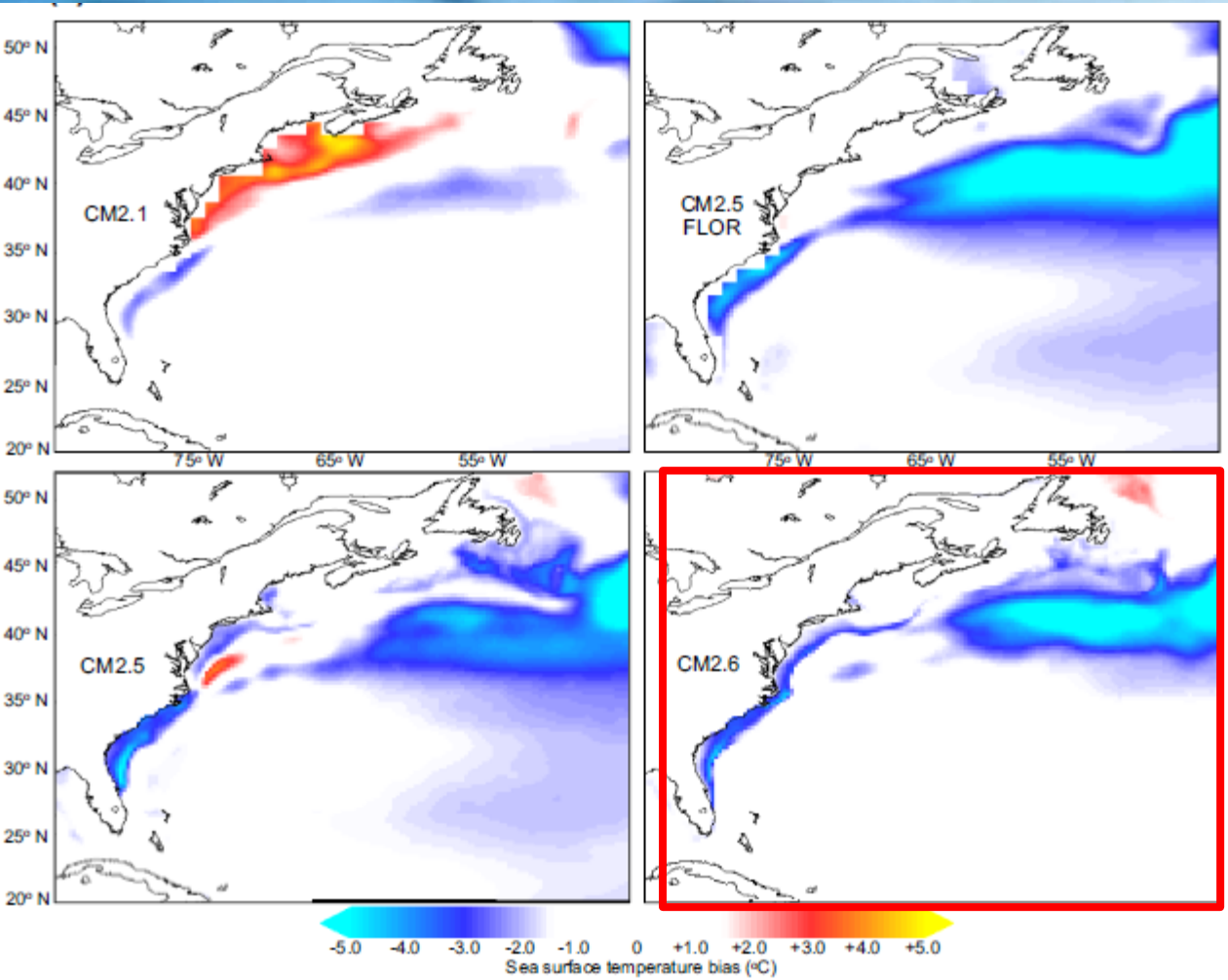
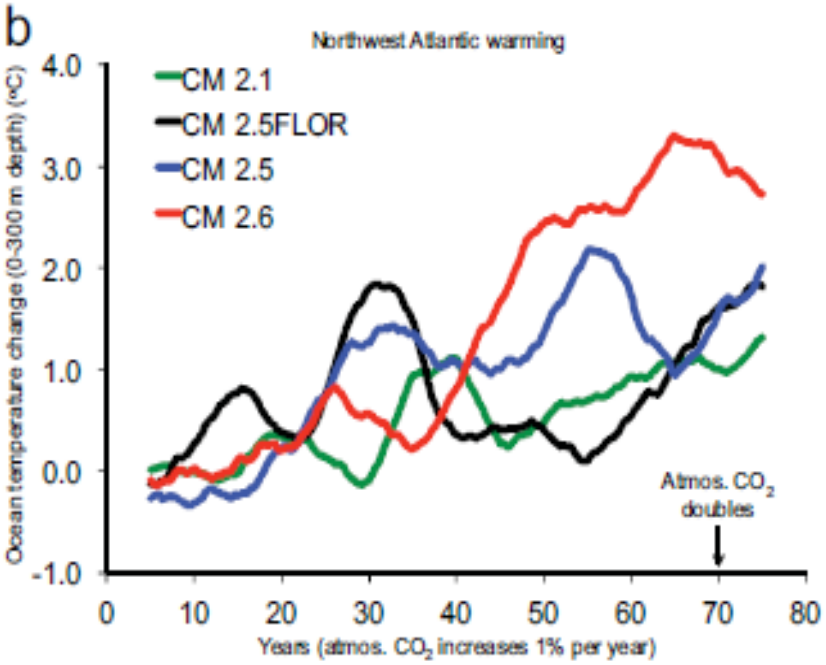
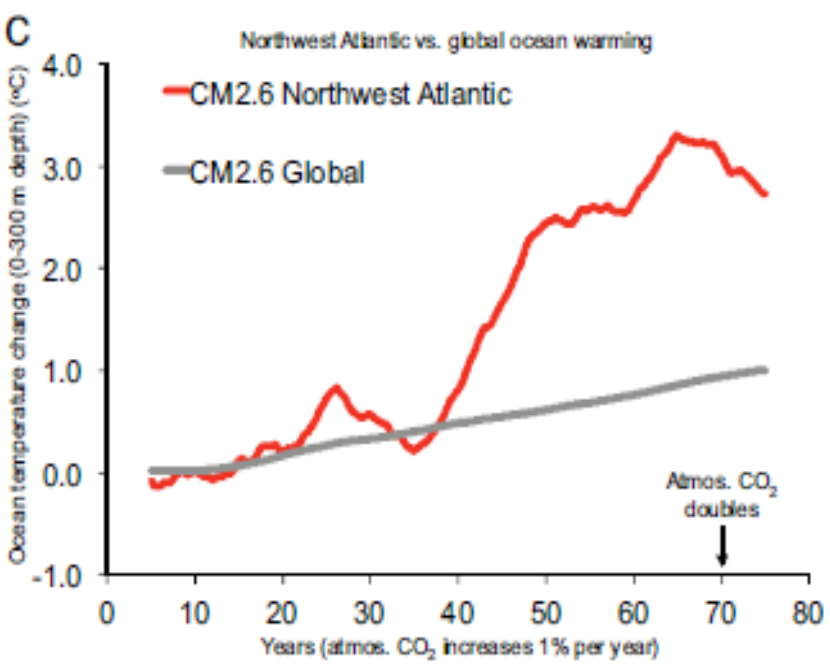


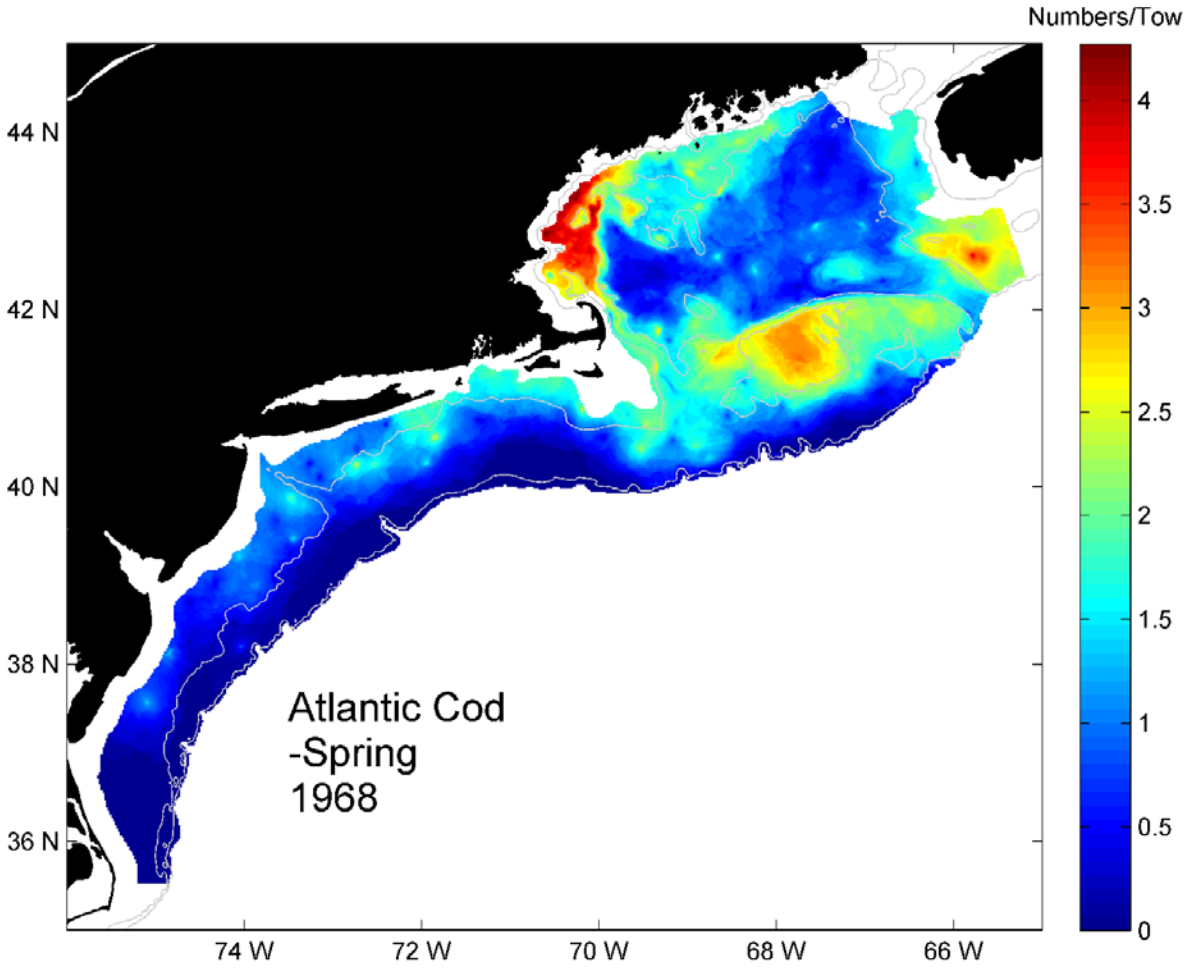
New High Resolution Climate Model Predicts Higher Rate of Temperature Increase



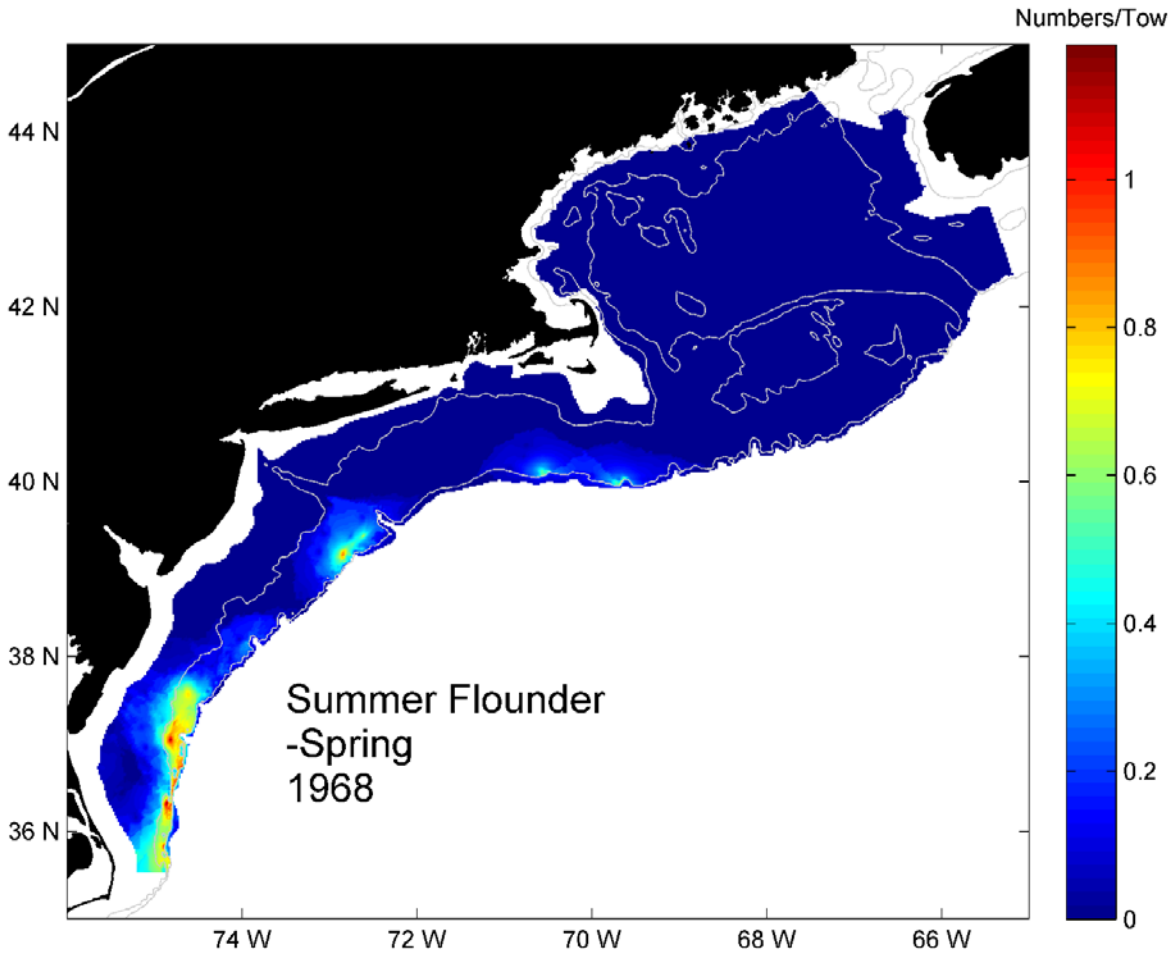


nefsc.noaa.gov/ecosys/climate-change

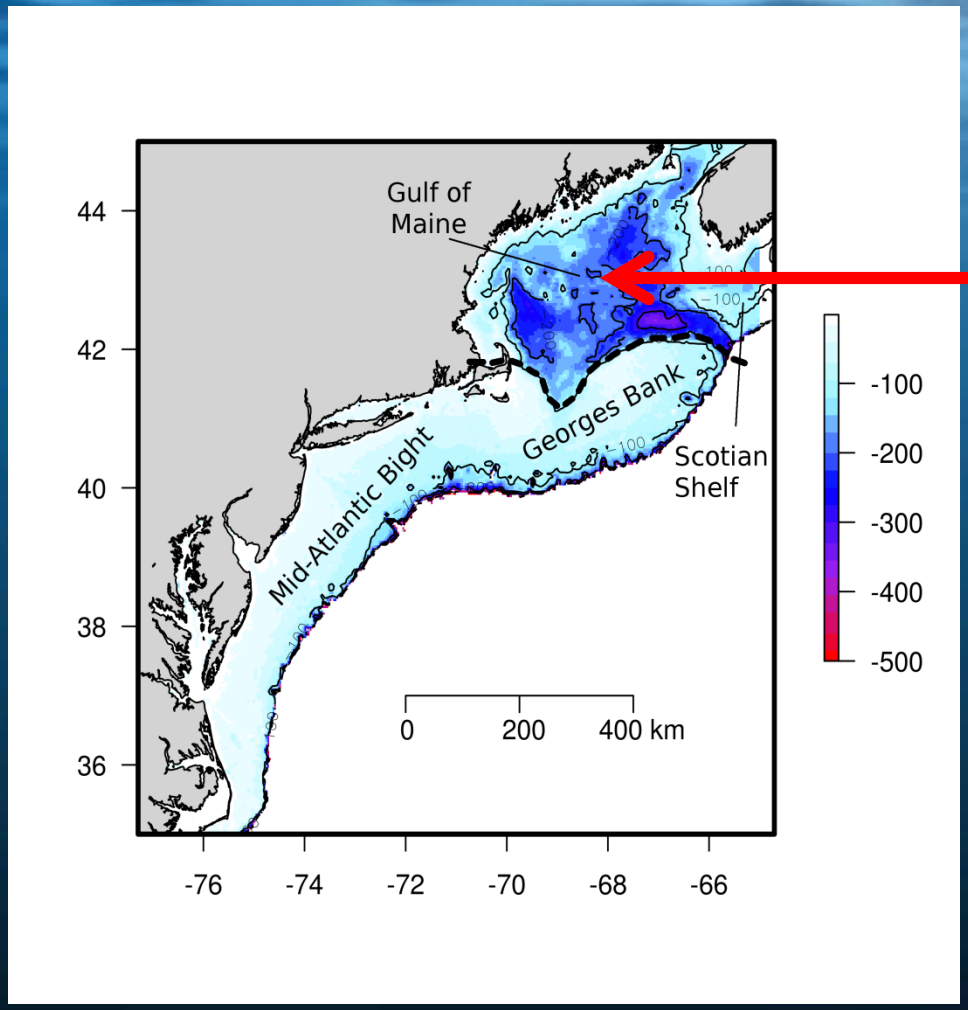
Shifting Fish Distribution Patterns: Cod

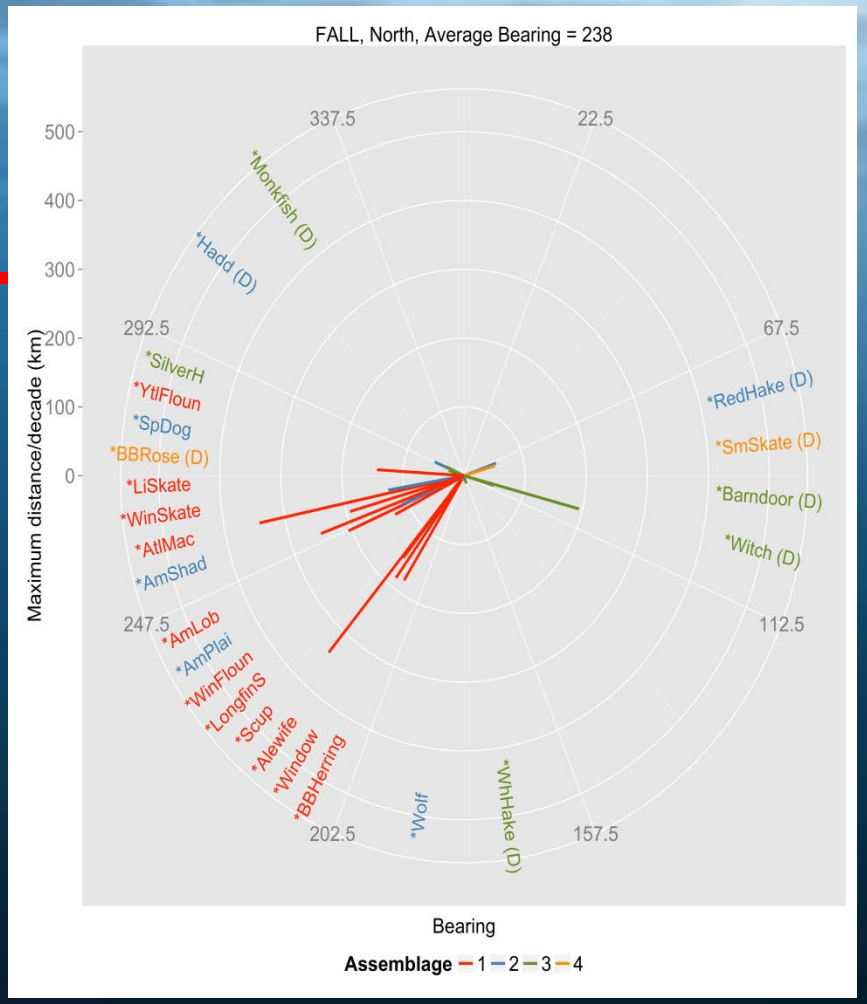


Shifting Fish Distribution Patterns: Summer Flounder

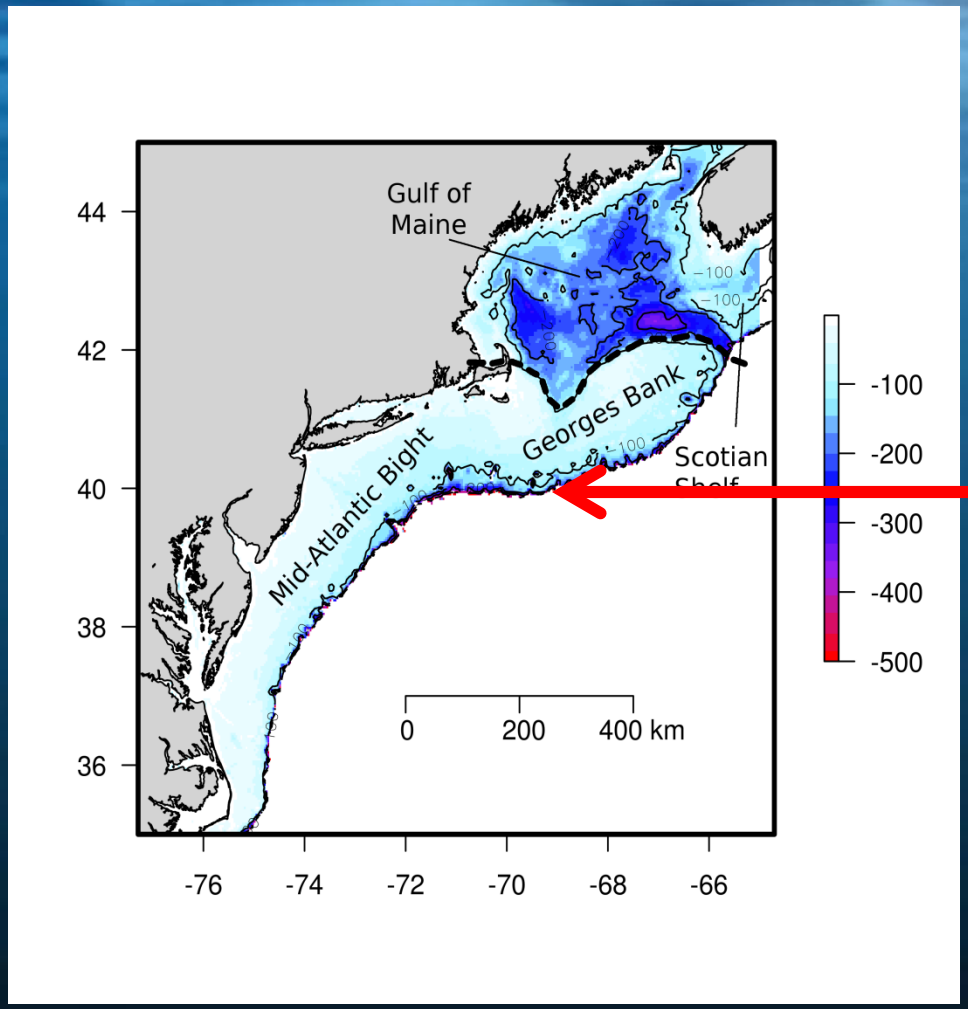


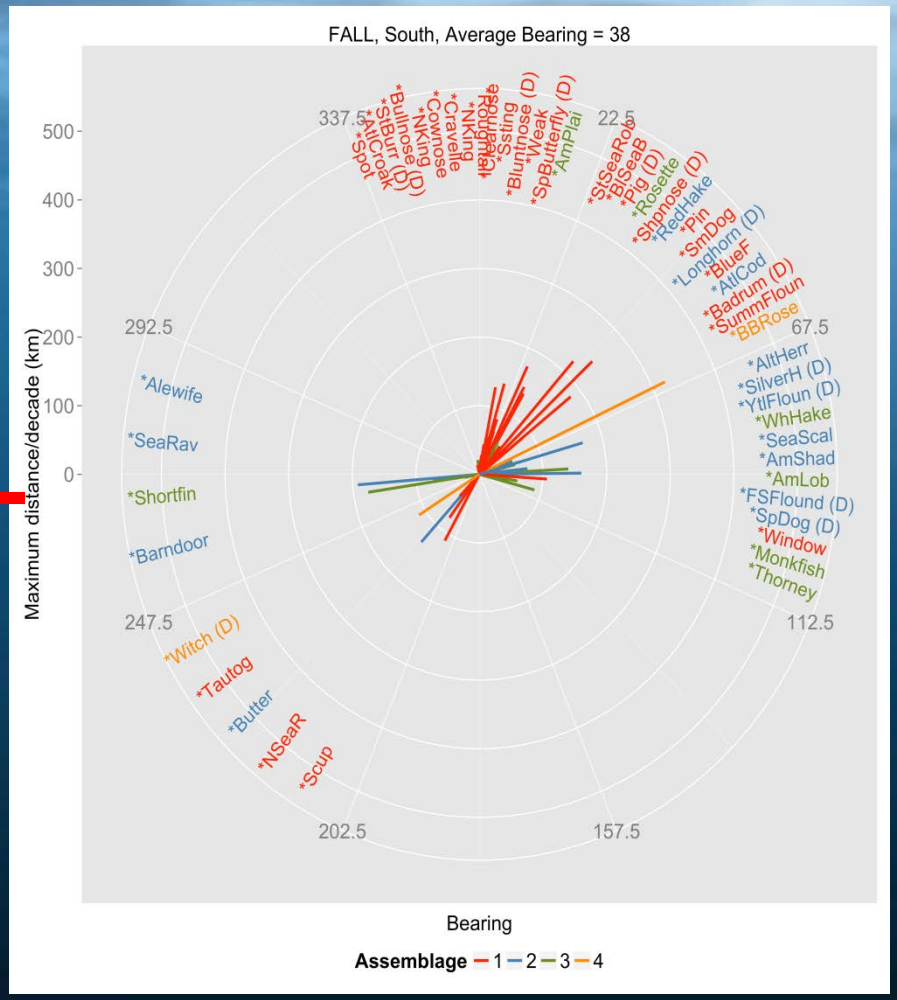
Directional Change in the Gulf of Maine



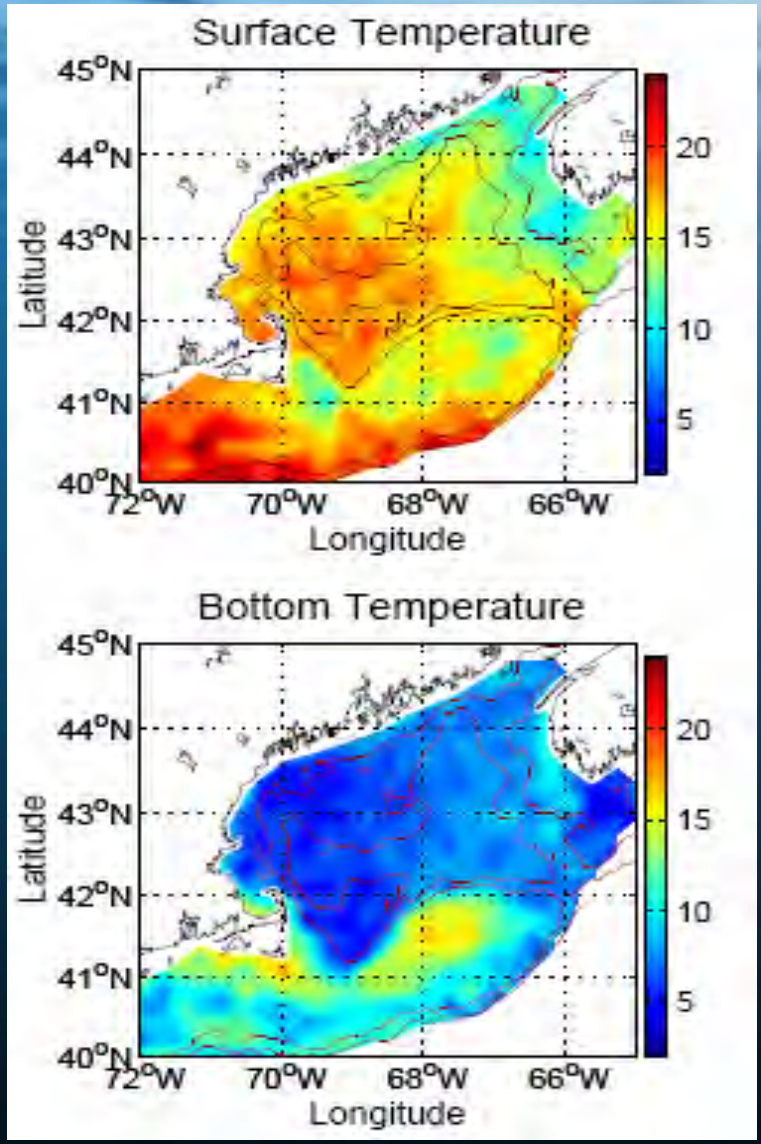


Directional Change on the Mid-Atlantic Shelf and Georges Bank

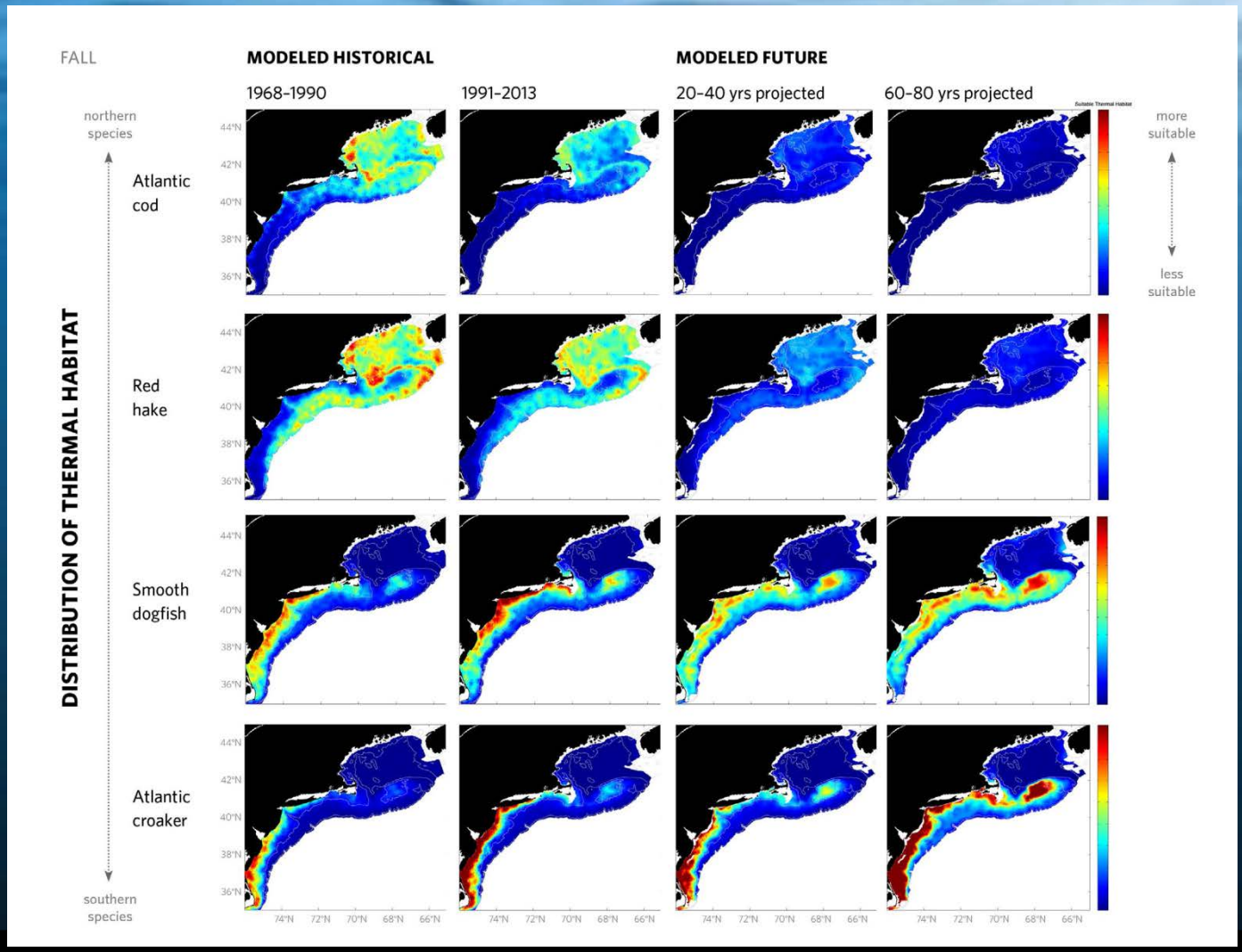




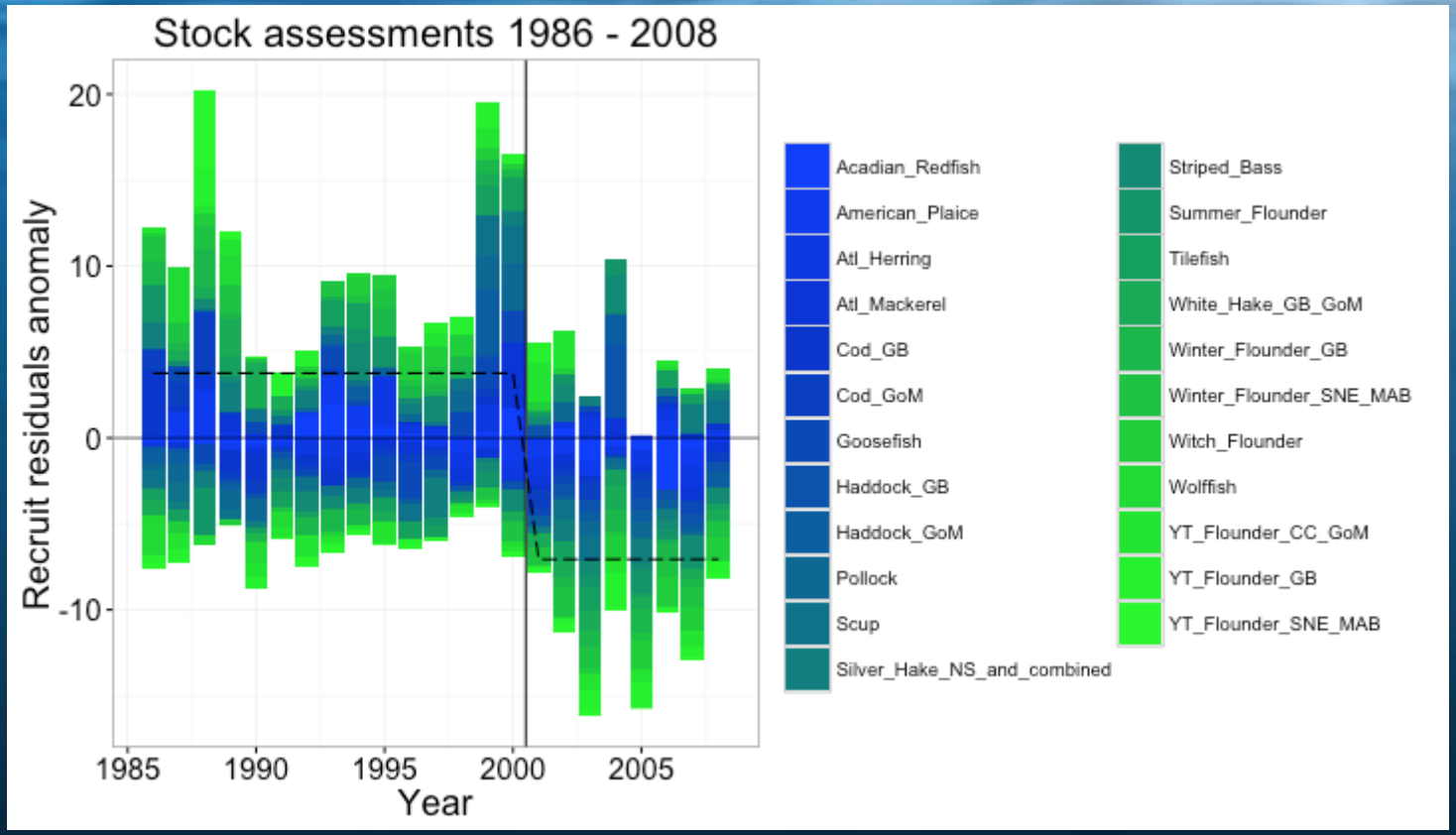
Summer Surface and Bottom Temperatures



What Does the Future Hold: High Resolution Climate Forecasts of Thermal Habitat



Changing Fish Productivity Patterns: Shifts in Recruitment Success (Assessment Results)



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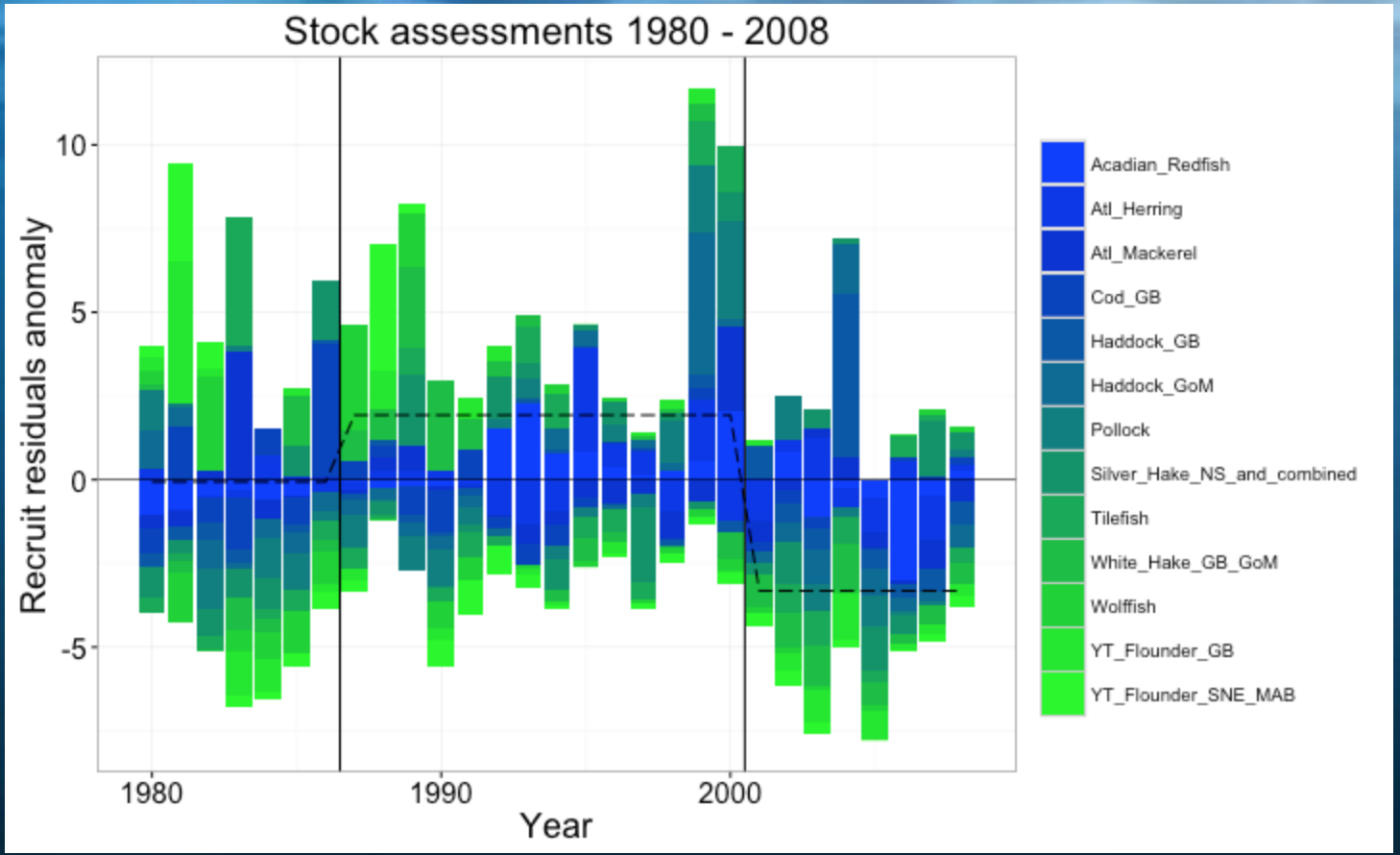
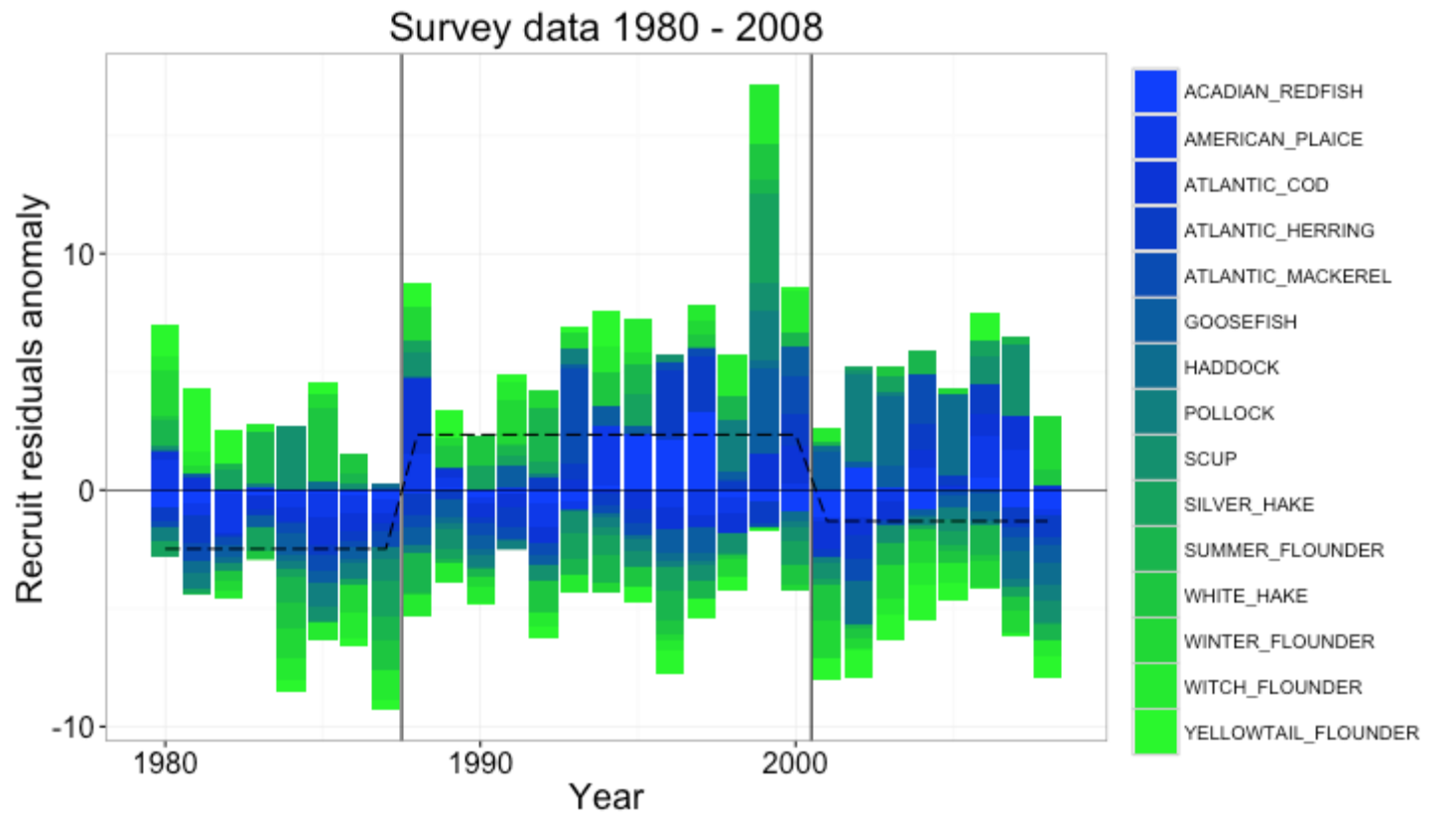
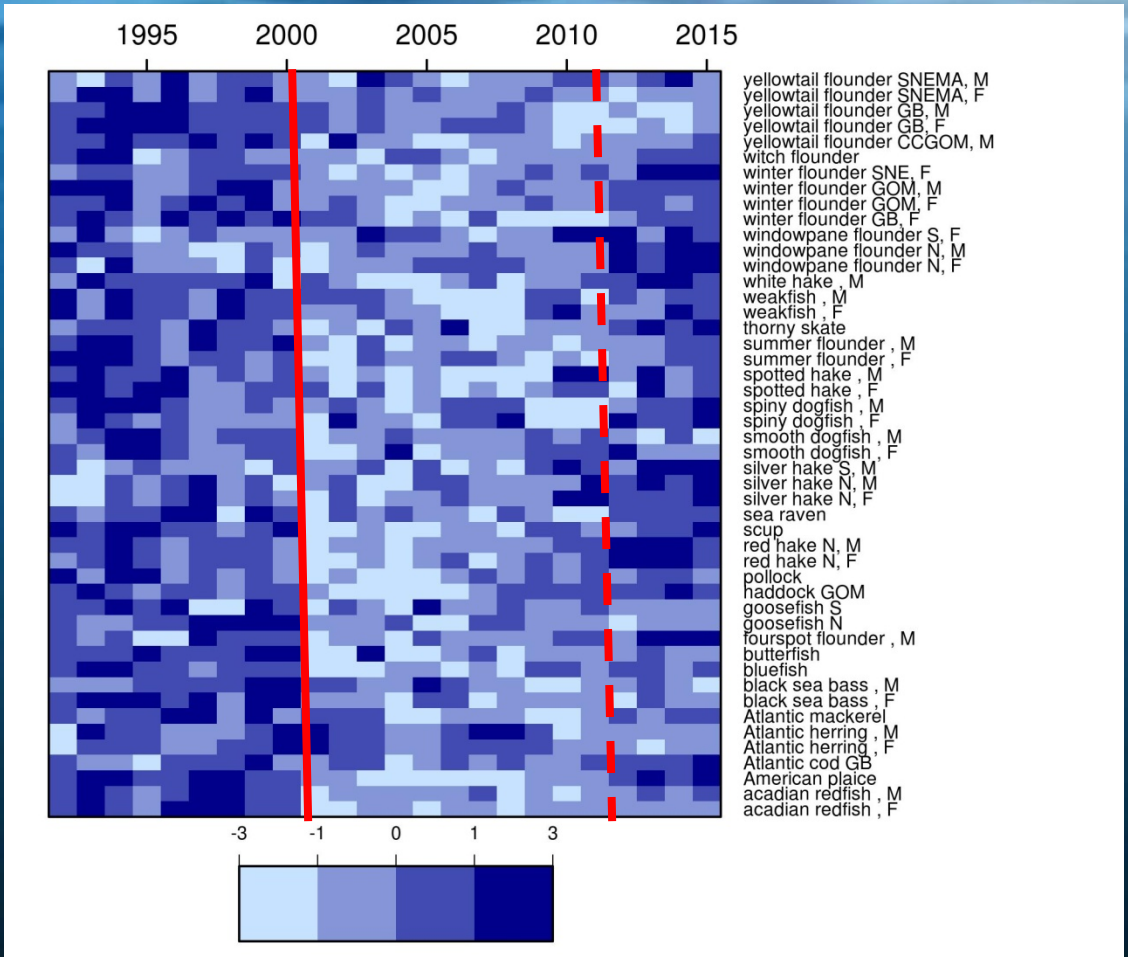


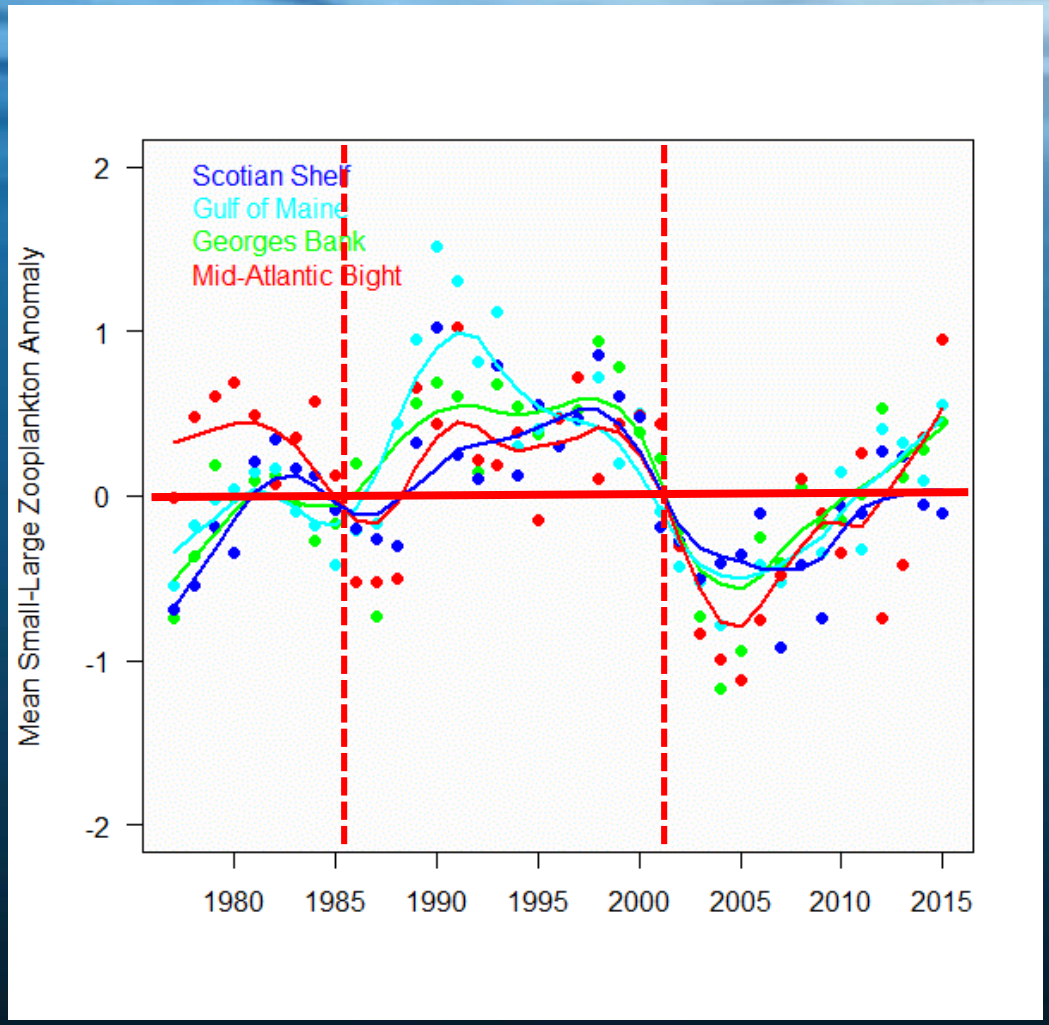
Changing Fish Productivity Patterns: Shifts in Recruitment Success (Survey Results)



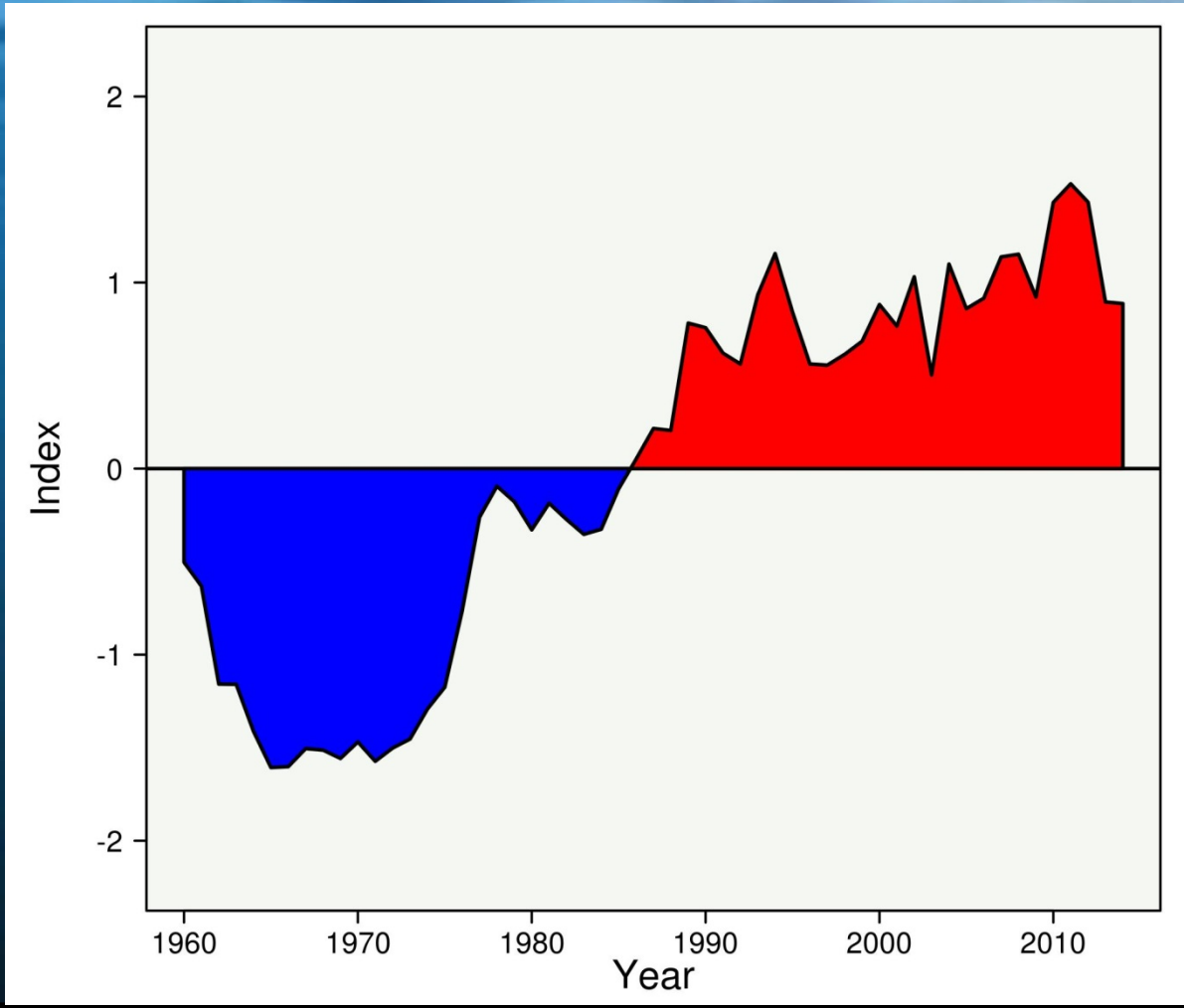
Changing Fish Productivity Patterns: Condition Factors



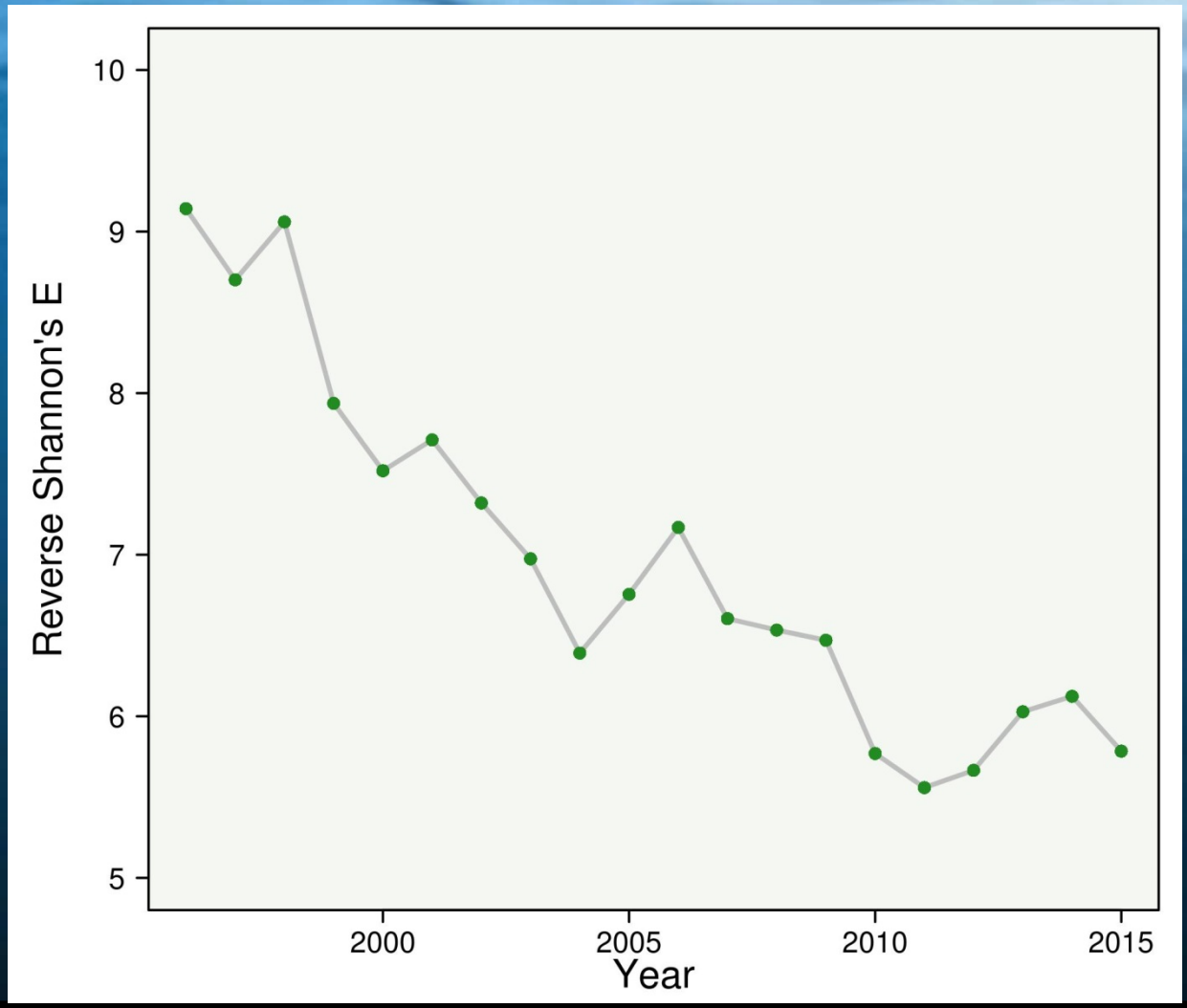
Changes at the Base of the Food Web: Copepod Species Composition



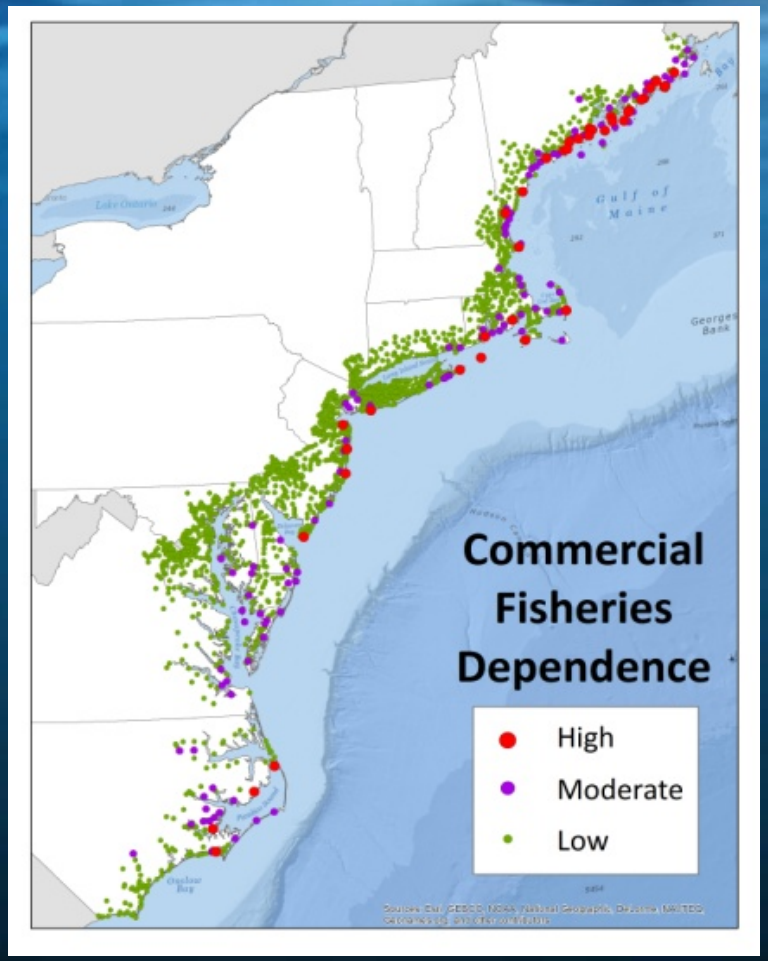
Shifting Fisheries: Shellfish-Domination

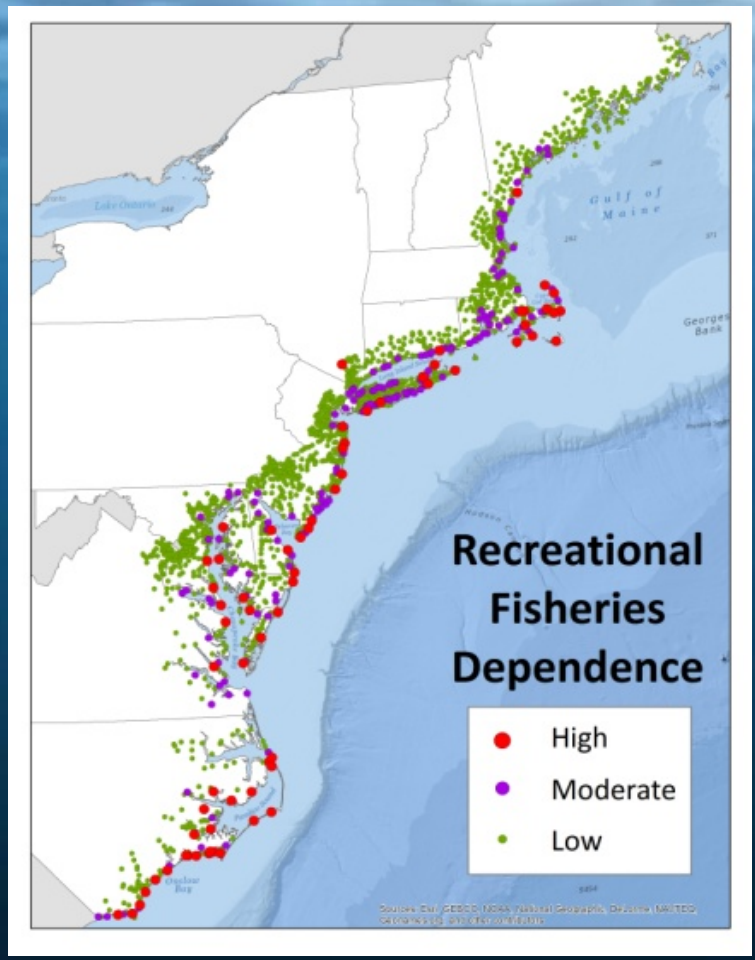


Diversification in Catch Composition



Measures of Social Vulnerability: Commercial and Recreational Fishery Dependence





Measures of Social Vulnerability and Gentrification Vulnerability