

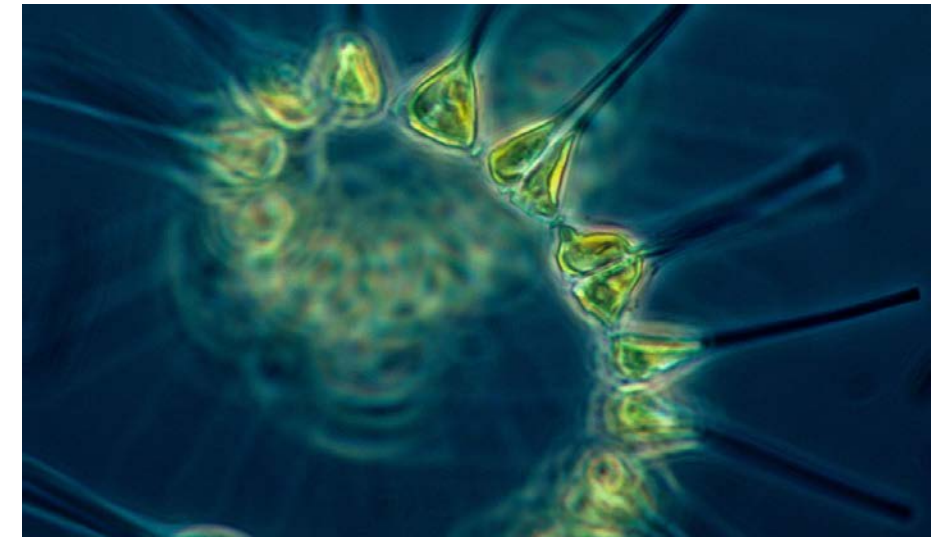
#2d2



Science in Support of Ecosystem Based Fishery Management



New England
Fishery Management
Council



About New England Fishery Management Council

- The NEFMC conserves and manages fisheries through science, public participation and balancing competing interests.
- We are considering a new management model, EBFM, to better support healthy and sustainable fisheries and resources.
- Learn more at nefmc.org



Presentation Objectives

- Review of the science available to support EBFM
- Develop shared understanding and hear from you
- Create transparency around the information used for decision making
- To answer any questions you have



Workshop Process

- This is one in a series of presentations
- TBD: layout the workshop schedules



What We Will Cover

- Data sources
- Science related to:
 - Ecosystem productivity
 - Predator- prey relationships
 - Climate change impacts
- The role of collaborative research



Drawing From Existing Data Sources

- The Northeast shelf is extensively monitored, and this data provides a strong foundation for EBFM.
- Fishery Ecosystem Plan (FEP) can build off existing programs, including:
 - Fisheries trawl survey,
 - ECOMON cruises,
 - Food Habits database,
 - Northeast Fishery Observer Program and At-Sea Monitoring Data
 - Other fisheries dependent surveys ,
 - Habitat studies,
 - Protected species surveys
 - Satellite observations, and
 - Study fleet



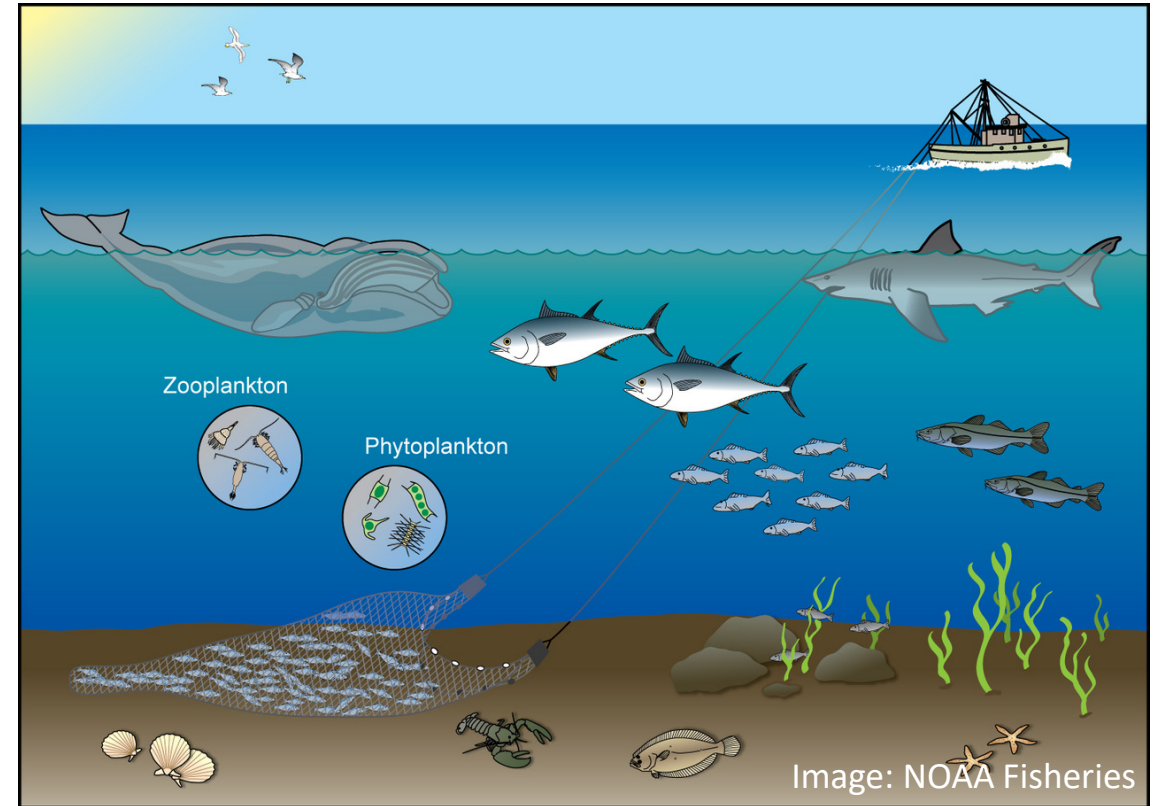
Additional Monitoring and Research Priorities

- From the FEP, Section 9.7 *Catch Monitoring, Ecosystem Data Collection and Research to Support EBFM in New England*
- Collaborative research
 - Increases overall capacity and stakeholder participation
- Modernized data system that centralizes data
- Catch monitoring
- Ecosystem data collection



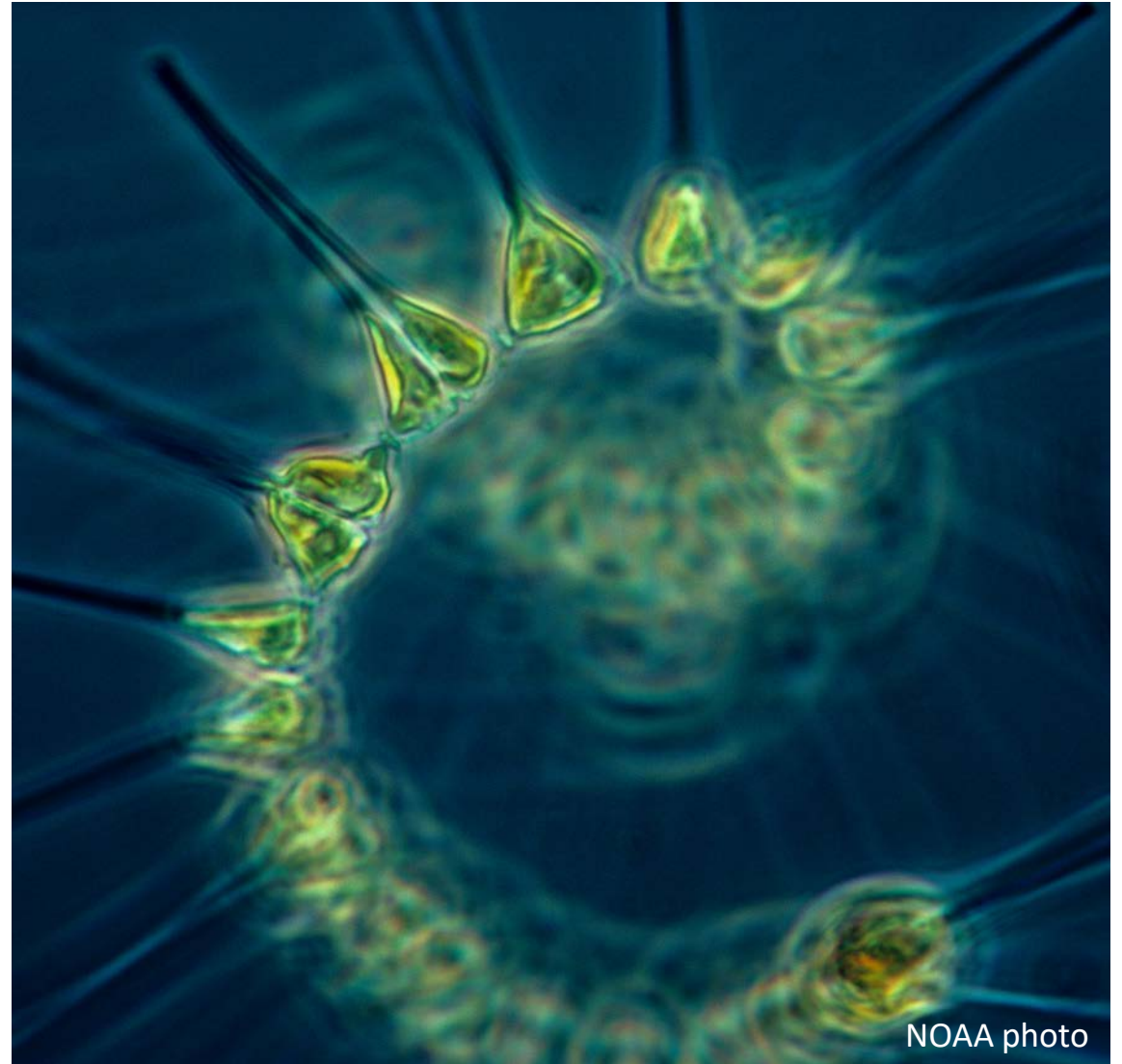
The Georges Bank Ecosystem

- Georges Bank is a shallow, offshore plateau that supports a very productive ecosystem.
- The food web depends on primary production from phytoplankton, small algae that rely on sunlight to grow. The shallow nature of Georges allows sunlight to penetrate the water column, making it a very productive area.



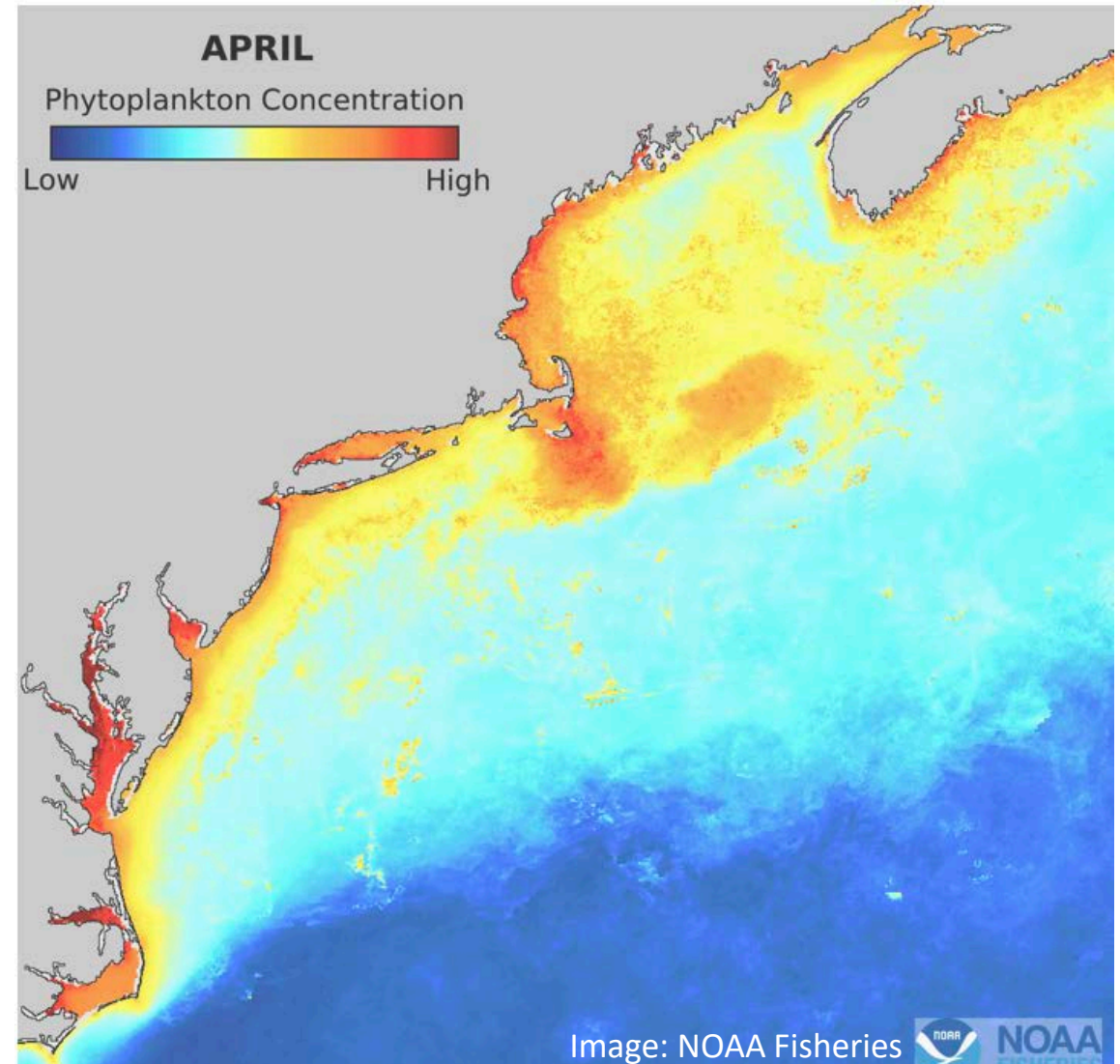
Assessing Productivity

- Phytoplankton are a major component of the food web and a primary food source for zooplankton and filter feeders such as shellfish.
- So the amount of phytoplankton produced on Georges Bank is an indicator of the amount of energy, and therefore production, within the system.
- NE Fisheries Science Center models determine how changes in phytoplankton composition and productivity influence the food web and fisheries productivity.



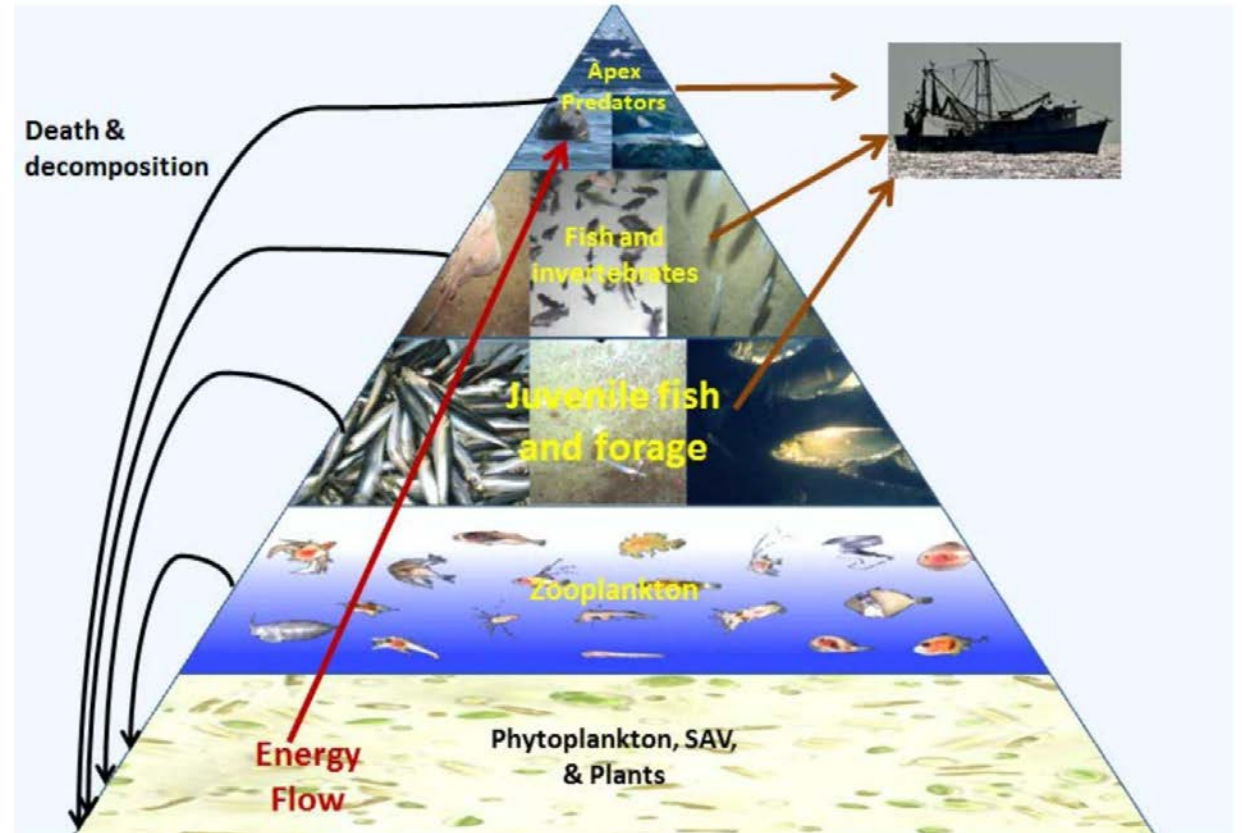
How is Primary Productivity Measured

- Satellite imagery is used to measure chlorophyll-a concentrations, a proxy for phytoplankton abundance.
- Models use temperature, sunlight, clarity of the water, and other factors to convert chlorophyll a concentrations to primary production
- Changes in primary production can potentially be used to adjust catch limits
- In New England, commercial landings have been steady while primary production has increased slightly according to 2020 NOAA State of the Ecosystem Report.



Energy Flow in the Marine Ecosystem

- Graphic illustrates energy transfers from plankton to top predator fish and removals due to fishing.
- **Graphic is being recreated for clarity**



Food Web Interactions

- A key difference between current management and an EBFM approach is the inclusion of food web interactions.
- NEFSC has been monitoring food habits of fish for over 50 years. There are now over three quarters of a million observations on over 100 species of fish
- On Georges Bank, most of the fish are eaten by other species in the ecosystem.



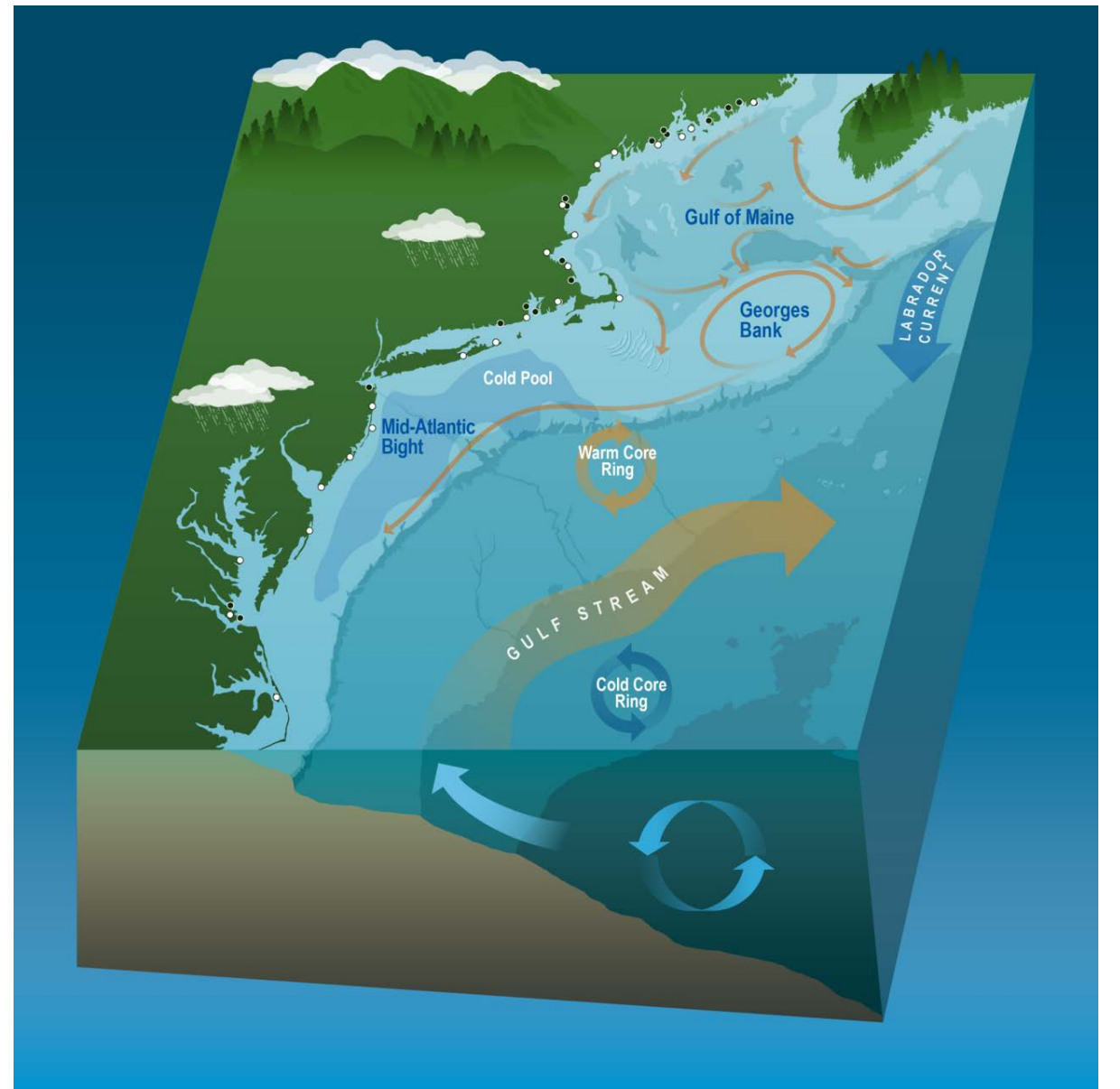
Food Web Interactions

- Leads to largely stable levels of overall biomass and fish production, although often with dramatic changes in individual species.
- Harvest can result in cascading effects through the system as top predators are removed and other energy sources are reduced



Responding to Climate Change

- The marine environment is warming in response to climate change
- Species are responding to climate change, including moving in and out of Georges Bank
- EBFM approach allows flexibility of fishing for groups of fish vs. individual species
- Research and monitoring indicates that the stock complexes are largely stable over time even as individual species change behaviors and distribution.



Collaborative Research

- Working with the industry and other stakeholders on research and monitoring greatly improves capacity and the overall understanding of the ecosystem.
- Options for enhanced catch monitoring to analyze data in real time; ecosystem data collection; social and economic indicators; and more.



What is Your Role?

- Participate in workshops to learn and share.
- Determine what your goals would be in a fishery managed under EBFM.
- Ask questions and let us know what you think.



More Information on the Science Supporting EBFM

- **New England Fishery Management Council** <https://www.nefmc.org/>
- **NEFMC EBFM committee page** <https://bit.ly/NEFMC-EBFM>
- **NEFMC Science and Statistical Committee (SSC)** <https://bit.ly/NEFMC-SSC>
- **NOAA Northeast Fishery Science Center** <https://bit.ly/NEFSCenter>
- **NOAA State of the Ecosystem** <https://bit.ly/NOAA-Ecosystem>

