



**NOAA
FISHERIES**

Northeast Regional Action Plan for the NOAA Fisheries Climate Science Strategy

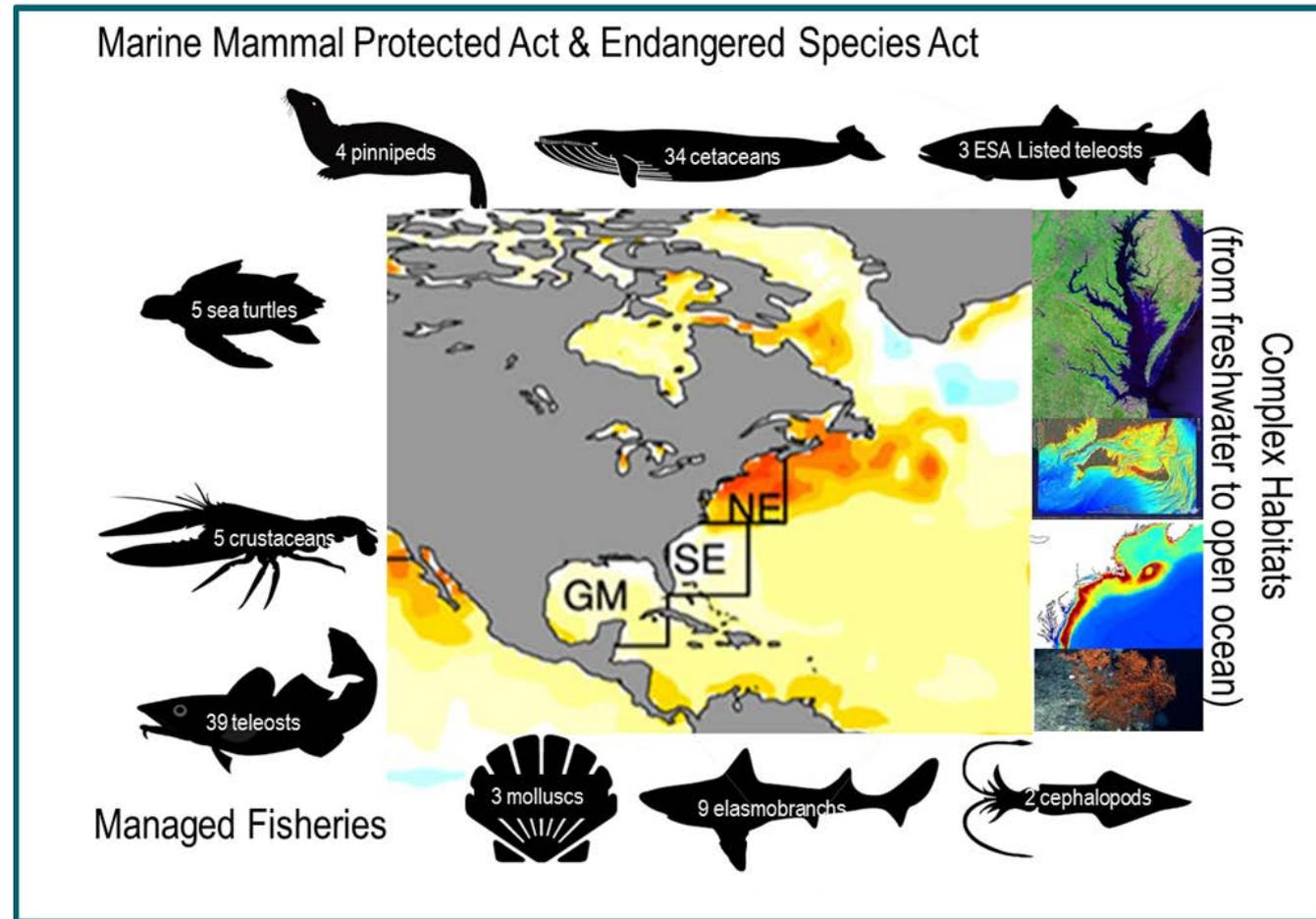
Jon Hare

NEFSC Ecosystem and Climate Science Program Review
Management Considerations Session

June 8, 2016

Climate Change

- Climate change will affect most living marine resources (negatively or positively)



Climate Change

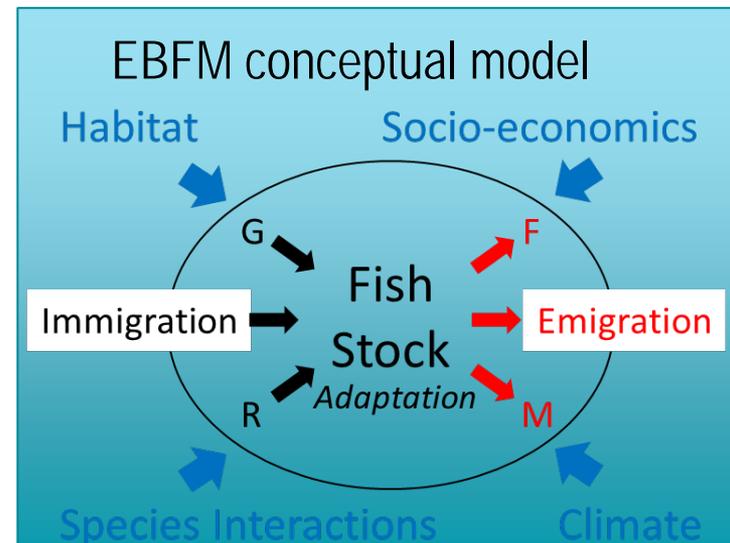
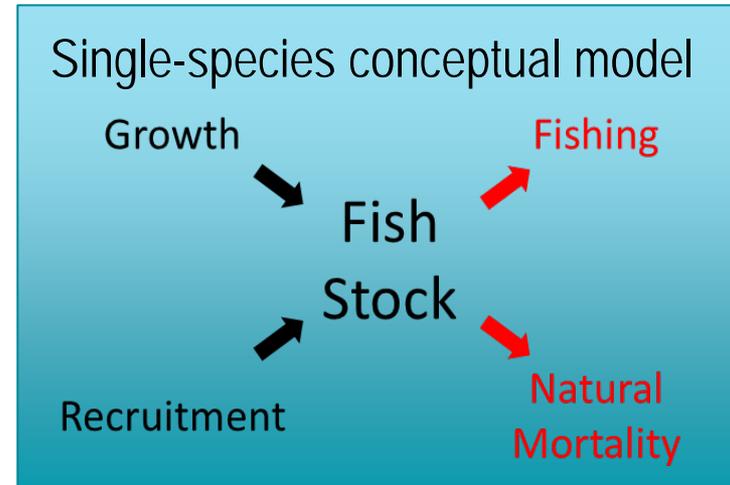
- All interactions between humans and LMRs will be affected
 - Commercial fishing
 - Recreational fishing
 - Tourism
 - Aquaculture
 - ...
- Governance is complicated



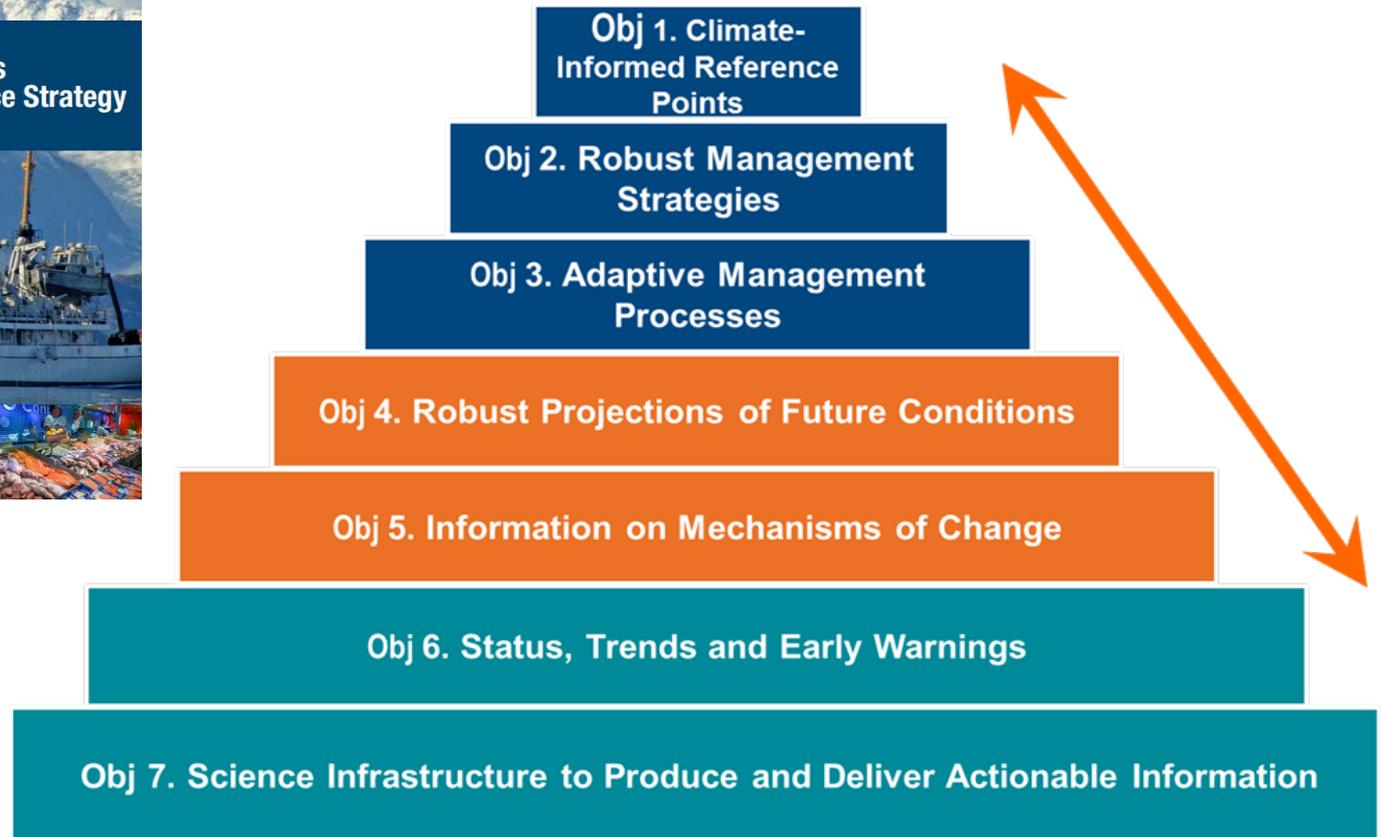
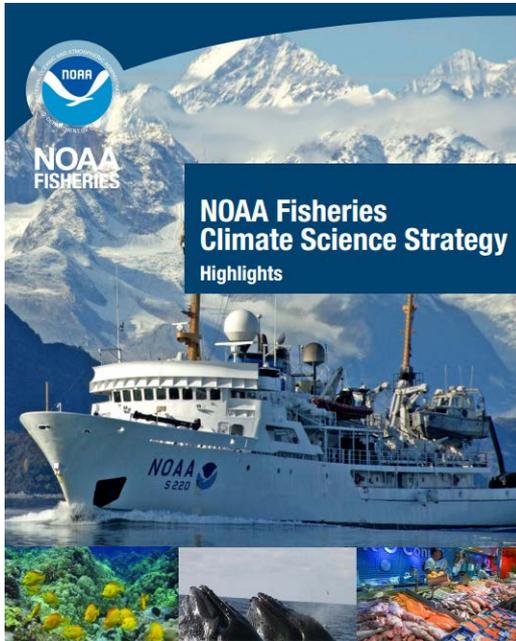
<http://www.nefsc.noaa.gov/publications/tm/tm208/>

Climate Change

- Climate change acting with other drivers to affect species and the ecosystem
- Need to move toward Ecosystem-Based Fisheries Management, which includes climate change effects



NOAA Climate Science Strategy



<https://www.st.nmfs.noaa.gov/ecosystems/climate/national-climate-strategy>

NOAA Climate Science Strategy

- Climate Science Strategy – Immediate Actions

1 **progress** **Conduct LMR climate vulnerability analyses in each region.**

2 **progress** **Maintain and develop Ecosystem Status Reports to track change and provide early-warnings.**
<http://nefsc.noaa.gov/ecosys/ecosystem-status-report/sitemap.html>

3 **progress** **Increase capacity to conduct climate-informed Management Strategy Evaluations**

NOAA Climate Science Strategy

- Climate Science Strategy – Immediate Actions

1 **progress** **Conduct LMR climate vulnerability analyses in each region.**

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<http://nefsc.noaa.gov/ecosys/ecosystem-status-report/sitemap.html>

3 **progress** **Increase capacity to conduct climate-informed Management Strategy Evaluations**

Fisheries Climate Vulnerability Assessment

Northeast Fisheries Climate Vulnerability Assessment (NEVA): First Implementation of a National Methodology

A joint NOAA Fisheries and NOAA Research Assessment

Jon Hare, Wendy Morrison, Mark Nelson, Megan Stachura, Eric Teeters, Roger Griffis, Mike Alexander, Jamie Scott, Keirsten Curti, John Kocik, Larry Alade, Toni Chute, Lisa Milke, Sean Lucey, Tobey Curtis, Dan Kircheis, Cami McCandless, Eric Robillard, Dave Richardson, Rich Bell, Harvey Walsh, Conor McManus, Katey Marancik, and Carolyn Griswold

Ecosystem Status Report

ECOSYSTEM STATUS

Executive Summary

1. Introduction

2. Climate Forcing

3. Physical Pressures

4. Production

5. Benthic

Invertebrates

6. Fish Communities

7. Protected Species

8. Human Dimensions

9. Ecosystem Services

10. Stressors and

Impacts

11. Status

Determinations

12. Synthesis

Consolidating information from Climate Forcing to Human Dimensions

Ecosystem Advisories produced every 6 months

Annual Reports produced for NEFMC & MAFMC

Foundation for Ecosystem Considerations in stock assessments

Mike Fogarty, Kevin Friedland, Jason Link, et al.

<http://nefsc.noaa.gov/ecosys/ecosystem-status-report/>

Management Strategy Evaluation

NEFSC and academic efforts

Supporting NEFMC, MAFMC and ASMFC

Capability is developing

Jon Deroba and Sarah Gaichas

Background Document

For the

New England Fishery Management Council

May 16-17, 2016 workshop on

Atlantic Herring Acceptable Biological Catch Control Rule

Management Strategy Evaluation



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NOAA Climate Science Strategy

- Climate Science Strategy – Short-term Actions

1  **Complete region-level action plans.**

2 **Part of RAP** **Strengthen climate-related science capacity nation-wide.**

3 **Part of RAP** **Increase resources for process-oriented research.**

4 **Part of RAP** **Establish climate-ready terms of reference for ESA, MSFCMA, MMPA stock assessments and Biological Opinions, etc.**

Northeast Regional Action Plan

- NEFSC-GARFO Representative WG
- MAFMC, NEFMC, ASMFC, NOAA collaborators provided input during development
- Defined 15 Priority Actions across the 7 Objectives
- Actions defined under a *No New Resources* and *New Resources* Scenarios – Resource Limited

Northeast Regional Action Plan

NERAP Leadership Group

Jen Anderson - GARFO - National Environmental Policy Act

Diane Borggaard - GARFO - Protected Resources

Kevin Friedland - NEFSC - Ecosystem Assessment Program

Jon Hare - NEFSC - Ecosystems Processes Division

Northeast Regional Action Plan

NERAP Working Group

Peter Burns - **GARFO** - Sustainable Fisheries:

Kevin Chu - **GARFO** - Stakeholder Engagement (Aquaculture):

Trish Clay - **NEFSC** - Social Sciences Branch

Matt Collins - **HQ (at GARFO)** - Habitat Restoration

Peter Cooper - **HQ (at GARFO)** - Highly Migratory Species

Paula Fratantoni - **NEFSC** - Oceanography Branch

Mike Johnson - **GARFO** - Habitat Conservation

John Manderson - **NEFSC** - Northeast Cooperative Research Program

Lisa Milke - **NEFSC** - Aquaculture and Enhancement Division

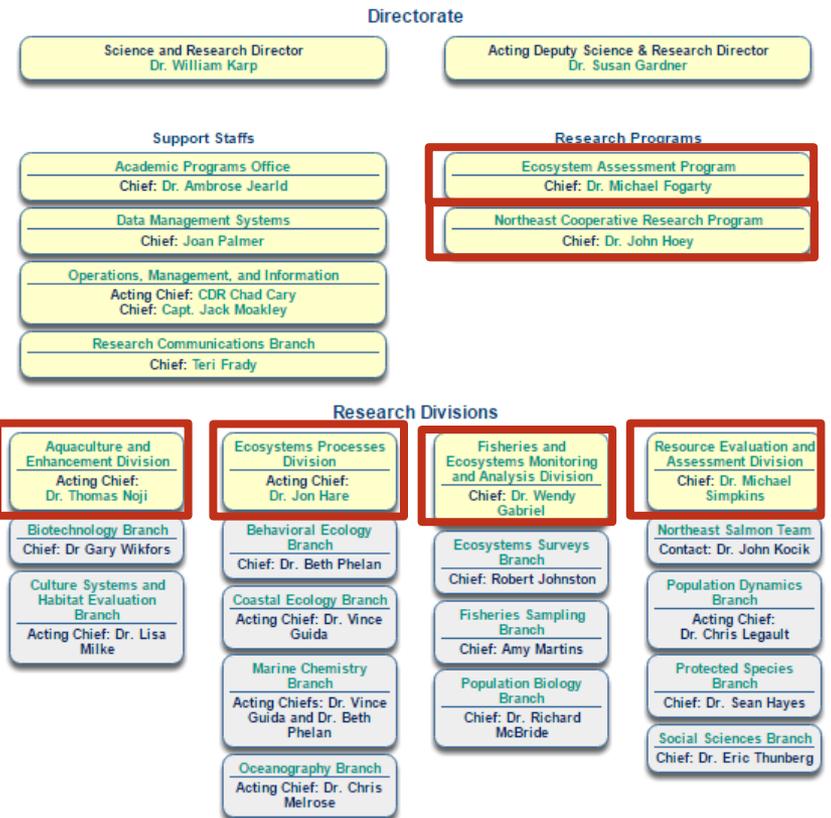
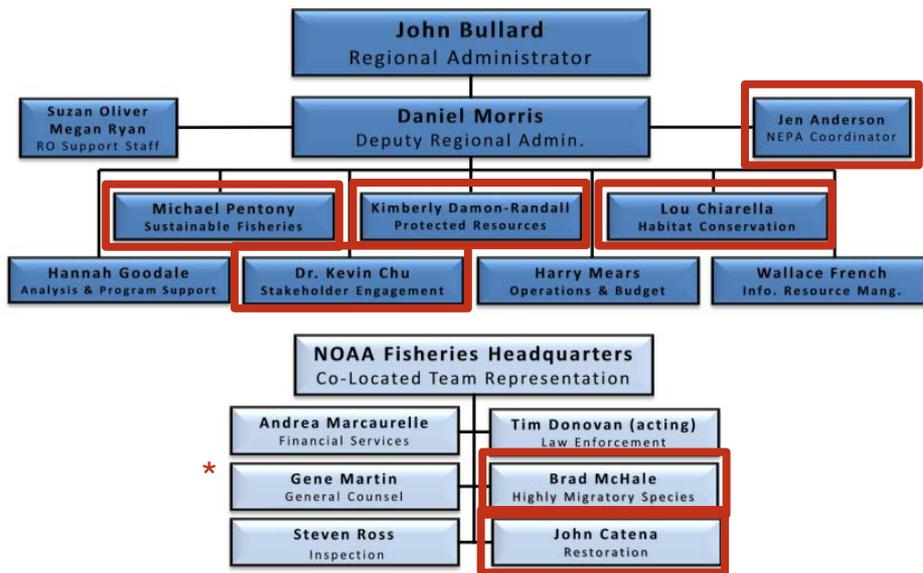
Tim Miller - **NEFSC** - Population Dynamics Branch

Chris Orphanides - **NEFSC** - Protected Species Branch

Vince Saba - **NEFSC** - Ecosystem Assessment Program

Northeast Regional Action Plan

GARFO & NEFSC Joint Working Group



Northeast Regional Action Plan

External Partners

Mid-Atlantic Fishery Management Council Staff

New England Fishery Management Council Staff

Atlantic States Marine Fisheries Commission Staff

Federally-Recognized Tribes

NOAA Partners

Dwight Gledhill - **NOAA OAR** Ocean Acidification Program

Elizabeth Turner - **NOAA NOS** Center for Sponsored Coastal Ocean Research

Charlie Stock - **NOAA OAR** Geophysical Fluid Dynamics Laboratory

Michael Alexander - **NOAA OAR** Earth Systems Research Laboratory

Ben Haskell - **NOAA NOS** National Marine Sanctuaries

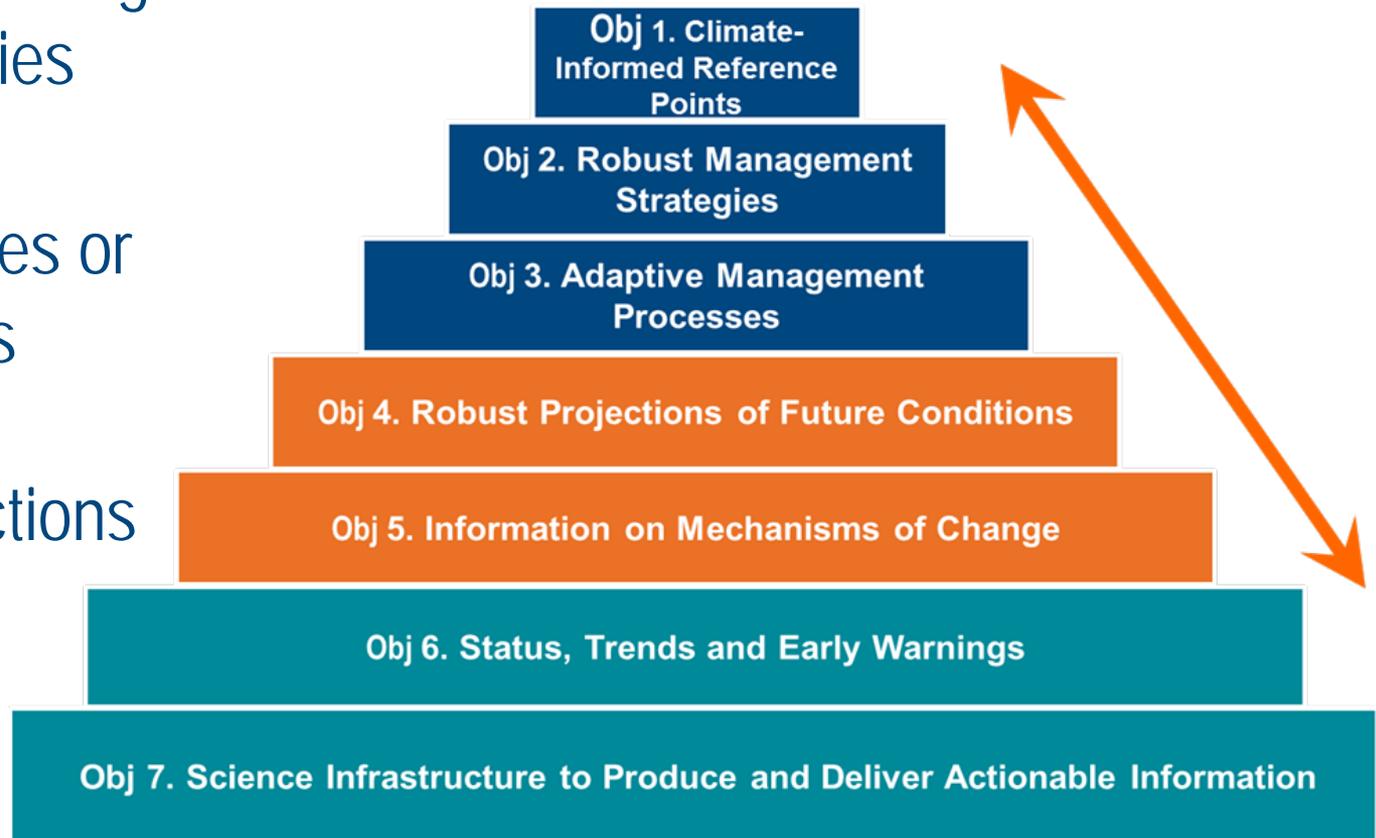
Ellen Mecray - **NOAA NCEI** Regional Climate Services

Nicole Bartlett - **NOAA North Atlantic Regional Team**

Bruce Vogt – **NOAA Chesapeake Bay Office**

Northeast Regional Action Plan

- Regional Strengths or Opportunities
- Regional Weaknesses or Challenges
- Regional Needs / Actions



Northeast Regional Action Plan

- Priority Action 1 - Give greater emphasis to climate-related Terms of Reference and analyses in stock assessments.
- Priority Action 2 - Continue development of stock assessment models (e.g., Age Structured Assessment Program, new state-space model, multi-species models) that include environmental terms (e.g., temperature, ocean acidification).
- Priority Action 3 - Develop climate- related products and decision support tools to for protected species assessments and other management actions.
- Priority Action 4 - Increase social and economic scientist involvement in climate change research.

Northeast Regional Action Plan

- Priority Action 5 - Develop Management Strategy Evaluation capability to examine the effect of different management strategies under climate change.
- Priority Action 6 - Improve spatial management of living marine resources through an increased understanding of spatial and temporal distributions, migration, and phenology.
- Priority Action 7 - Continue to build industry-based fisheries and ocean observing capabilities and use information to develop more adaptive management.

Northeast Regional Action Plan

- Priority Action 8 - Work with NOAA Oceanic and Atmospheric Research and academic scientists to develop short-term (day to year) and medium-term (year to decade) living marine resource forecasting products.
- Priority Action 9 - Work with NOAA Oceanic and Atmospheric Research and academic scientists to develop and improve regional hindcasts and climatologies.
- Priority Action 10 - Conduct research on the mechanistic effects of multiple climate factors on living marine resources with a goal of improving assessments and scientific advice provided to managers.

Northeast Regional Action Plan

- Priority Action 11 - Develop and implement vulnerability assessments in the Northeast U.S. Shelf Region.
- Priority Action 12 - Continue production of the Ecosystem Status Report, and other related products, and improve the distribution of information from the reports through the formation of an Environmental Data Center.
- Priority Action 13 – Maintain ecosystem survey effort in the Northeast U.S. Shelf ecosystem including the Bottom Trawl Survey, Ecosystem Monitoring Program, Sea Scallop Survey, Northern Shrimp Survey, and Protected Species Surveys and expand where possible (e.g., data poor species).

Northeast Regional Action Plan

- Priority Action 14 – Initiate a Northeast Climate Science Strategy Steering Group (NECSSSG) to coordinate, communicate, facilitate, and report on issues related to climate change and living marine resource management.
- Priority Action 15 – Coordinate with other NOAA Programs to link living marine resource science and management to climate science and research activities

Habitat, Aquaculture, EBFM, Ocean Acidification

Northeast Regional Action Plan

Strengths – data, models, research, hypotheses, partners, recognition of the issue

Challenges – magnitude of issue, inertia of current structures, scientific and management questions, funding

Strategies – define Action Plan, strengthen partnerships, integration, work toward common purpose