NEFSC Survey and Data Collection Programs

Jon Hare and many others
Northeast Fisheries Science Center

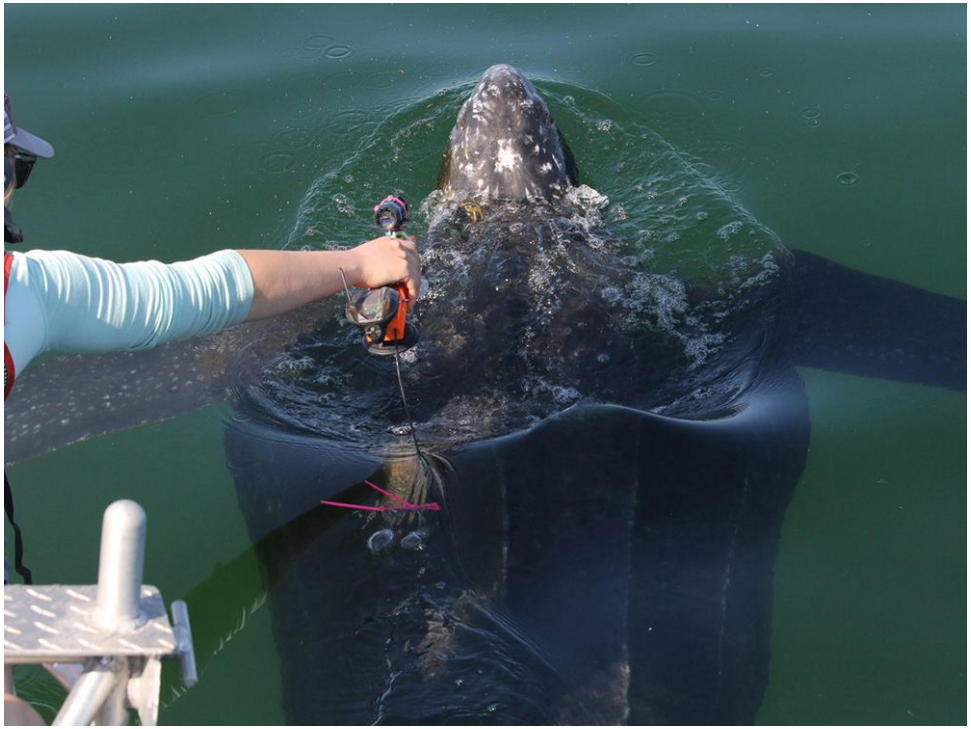
Mid-Atlantic Fishery Management Council
February 11-13, 2020

Take Home Messages

1. We have a lot of priorities
2. We have a lot of work going on
3. Our resource environment is challenging (regionally and nationally)
4. MAFMC is an important partner

Outline

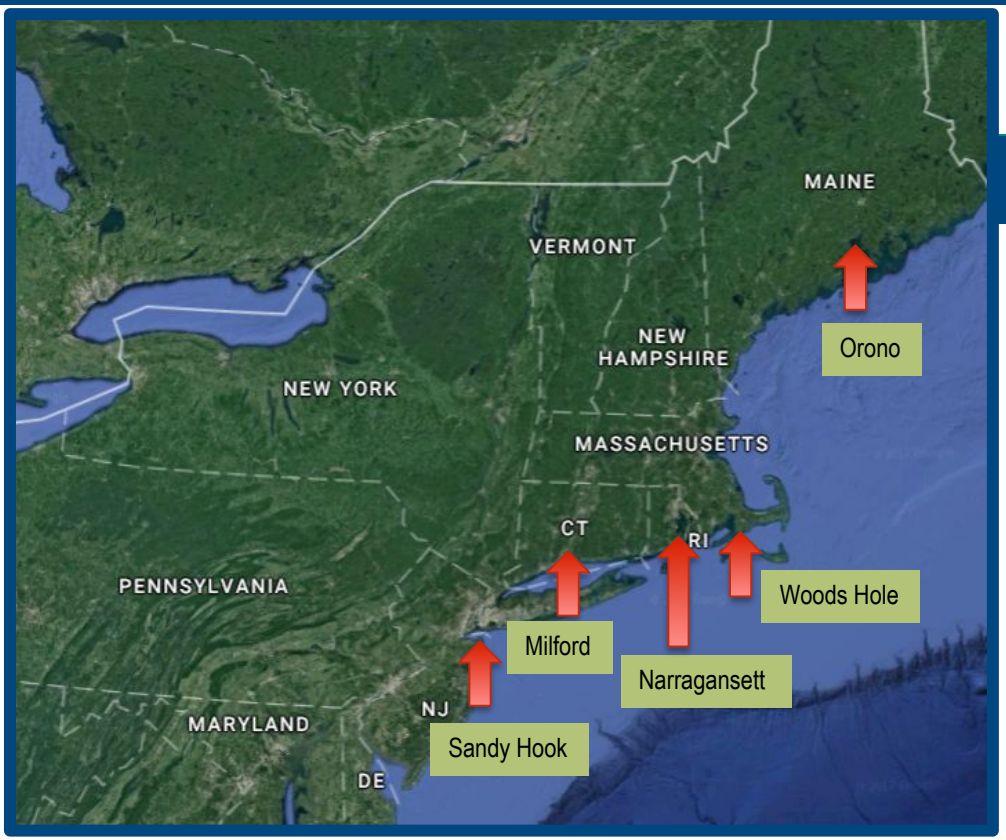
1. **Who we are**
2. Priorities - NOAA Fisheries and others
3. Scientific Enterprise
   - Monitoring (Data Collection)
   - Other elements of science
4. Resource Environment
5. Activities w/ MAFMC



Who We Are

150 Years Devoted To

- **Science in service to the American public**
- **Promoting prosperity of fisheries and marine resources**
- **Working with others to find opportunities and solve problems**



We cover 160 K sq miles – an area the size of CA

Yearly Base Budget $53.4 million

=

Per American Per Month

Who We Are

Sustainable Fisheries

Aquaculture

Protected Species

Ecosystems and Habitats

- Assess ~75 fish, shellfish, marine mammal and sea turtle stocks
- Observe ~4,300 commercial fishing trips per year
- Conduct > 430 research survey days at sea per year
- Provide > 300 algal cultures to stakeholders per year

Main Legislative Drivers

Marine Mammal Protection Act – 1972

Endangered Species Act - 1973

Magnuson-Stevens Fisheries & Conservation Act - 1976

National Aquaculture Act - 1980

NEFSC Organization

Ecosystems and Aquaculture Division (**EAD**)
Tom Noji

Fishery Monitoring & Research Division (**FMRD**)
Amanda McCarty

Population & Ecosystems Monitoring & Analysis Division (**PEMAD**)
Wendy Gabriel

Resource Evaluation & Assessment Division (**READ**)
Mike Simpkins

Operations, Management, and Infrastructure (**OMI**)
Garth Smelser

Information Technology Division (**ITD**)
Kevin Portanova

Directorate
Jon Hare / Nicole Cabana (A)

Ecosystems & Aquaculture Division

- Fisheries ecology including laboratory studies of environmental effects
- Shellfish and finfish aquaculture research
- Habitat science including classification, characterization, and assessment
- Ecosystem monitoring including temperature, salinity, plankton, nutrients, carbonate, sea birds, and marine mammals

Fishery Monitoring & Research Division

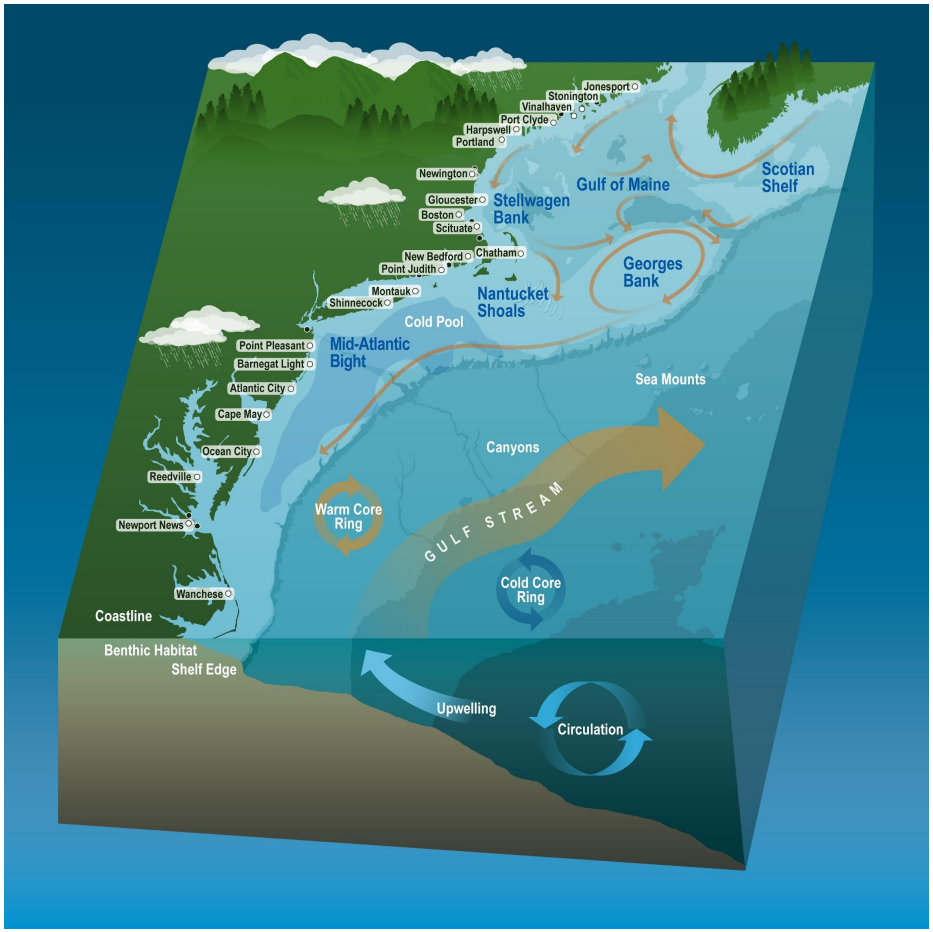
- Observer programs including NEFOP, ASM, IFS, Hering IFM
- Cooperative Research including Study Fleet, NTAP research,, Bottom Longline Survey, and Enhanced Biosampling
- Research Set-Aside Program for Atlantic Sea Scallop, Atlantic Herring, and Monkfish fisheries
- Fishery Dependent Data Initiative to integrate and modernize
- ER and EM

Population and Ecosystems Monitoring and Analysis Division

- Fishery independent monitoring surveys (8 per year)
- Age and growth
- Reproduction and maturity
- Food habits
- Shark biology and ecology
- Hydroacoustics
- Cooperative field work and research with regional partners

Resource Evaluation and Assessment Division

- >25 fish/invert stock assessments
- Science for right whale and salmon recovery
- EAFM & EBFM for Councils/Commission
- Social and economic impacts of regulations
- Climate change impacts and vulnerability of stocks & communities



Operations, Management, and Infrastructure Division

- People
- Facilities
- Budget
- Communications
- Safety & security
- Vessel coordination
- Fun Fact - Oldest aquarium in the country

Information Technology Division

- Provide Information Technology solutions
- IT infrastructure
- Project management
- Data systems support and development
- Information security

Directorate

- Strategic Planning
  - Sciences
  - Resources
- Organizational excellence
  - Diversity & Inclusion
  - Learning / Training
- Wind Team

NOAA FISHERIES

Questions?

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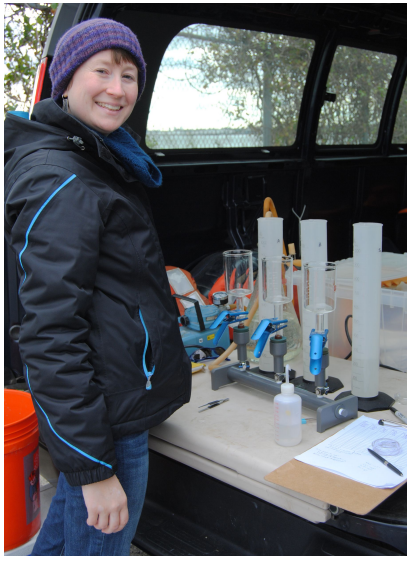
NOAA Fisheries Mission

Stewardship of living marine resources through science-based conservation and management and the promotion of healthy ecosystems



NOAA FISHERIES

National Strategic Goals

- Amplify the economic value of commercial and recreational fisheries, while ensuring their sustainability
- Conserve and recover protected species while supporting responsible fishing and resource development
- Improve organizational excellence and regulatory efficiency

DRAFT Regional Strategic Plan

Amplify the economic value of commercial and recreational fisheries, while ensuring their sustainability

- Manage stocks for optimum yield
- Increase U.S. marine aquaculture production
- Promote ecosystem-based fisheries management
- Adequately assess all prioritized stocks and maintain information for currently assessed stocks
- Modernize fishery information collection, management, and dissemination systems, and enhance cooperative data collection and sharing

DRAFT Regional Strategic Plan

Conserve and recover protected species while supporting responsible fishing and resource development

- Stabilize highest priority protected species (North Atlantic Right Whale, Atlantic Salmon)
- Review and streamline permitting and authorization processes for energy development and national defense, while maximizing fishing opportunities and conservation outcomes
- Minimize bycatch and entanglement of protected species while supporting fisheries
- Improved international cooperation and coordination

DRAFT Regional Strategic Plan

Improve organizational excellence and regulatory efficiency

- Match a diverse workforce to mission needs
- Recapitalize infrastructure and facilities
- Institutionalize prioritization and performance management practices
- Review agency regulations and remove or modify rules that unnecessarily burden businesses and economic growth
- Institutionalize the use of innovative technologies
- Expand regional collaborations
- Enhance stakeholder communications

Other Guidance

- Stock Assessment Improvement Plan
- Northeast Regional Climate Action Plan
- Ecosystem Based Fisheries Management Roadmap
- Habitat Assessment Improvement Plan
- NOAA Marine Aquaculture Strategic Plan
- NEFMC Research Priorities
- MAFMC Research Priorities
- ASMFC Research Priorities
- Assessments and SSCs research recommendations
- Scientific Program Reviews outcomes
- Center Program reviews (e.g., Observer, Coop Res.)

NOAA FISHERIES

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NEFSC Science Enterprise

Research

Monitoring / Observing → Modeling → Assessment → Management

New Technologies & Approaches

Fishery Monitoring Programs

- Start Date = 1998
- Sampling Commercial Vessels
- Northeast Fisheries Observer Program
- At-Sea Monitoring (NE Groundfish)
- Industry Funded Scallop
- Industry Funding Herring*
- Electronic Monitoring
- Standardized Bycatch Reporting Methodology

Bottom Trawl Survey - Spring

- Start Date = 1968
- Annual DAS = 60
- NOAA Vessel / Bottom Trawl
- Fishery abundance and distribution
- Fish age, length, weight, sex, and maturity
- Food habits information
- Vertical profiles of temperature and salinity
- Plankton samples

Bottom Trawl Survey - Fall

- Start Date = 1963
- Annual DAS = 60
- NOAA Vessel / Bottom Trawl
- Fishery abundance and distribution
- Fish age, length, weight, sex, and maturity
- Food habits information
- Vertical profiles of temperature and salinity
- Plankton samples

Sea Scallop Survey

- Start Date = 1979
- Annual DAS = 33
- University RV / Dredge & HabCam
- Distribution, abundance, and recruitment
- Meat weights, age & growth, and meat condition
- Habitat imagery, oceanographic and environmental data

Atlantic Surfclam / Ocean Quahog Survey

- Start Date = 1982
- Annual DAS = 15
- Commercial Vessel / Clam Dredge
- Abundance, distribution, biomass,
- Shell length, meat weight, age data (for surfclams)
- Depth and bottom temperature data

Ecosystem Monitoring Survey

- Start Date = 1977 (MARMAP)
- Annual DAS = 36 to 52
- NOAA Vessels / varied gears
- Egg and larval indices (Summer flounder, Atlantic mackerel, Atlantic menhaden)
- Hydrography, Primary Production and Carbon Chemistry (NCEI)
- Zooplankton and Ichthyoplankton (NCEI)
- Sea birds, Marine mammals, Turtles (AMAPPS)
- Long-term Ecological Research Site

Gulf of Maine Shrimp Survey

- Start Date = 1983
- Annual DAS = 22
- Converted Commercial Vessel / Bottom Trawl
- Abundance, distribution, biomass
- Age & size composition
- Length and weight data for finfish (7 assessments)
- Oceanographic data with net mounted CTD

Gulf of Maine Bottom Longline Survey

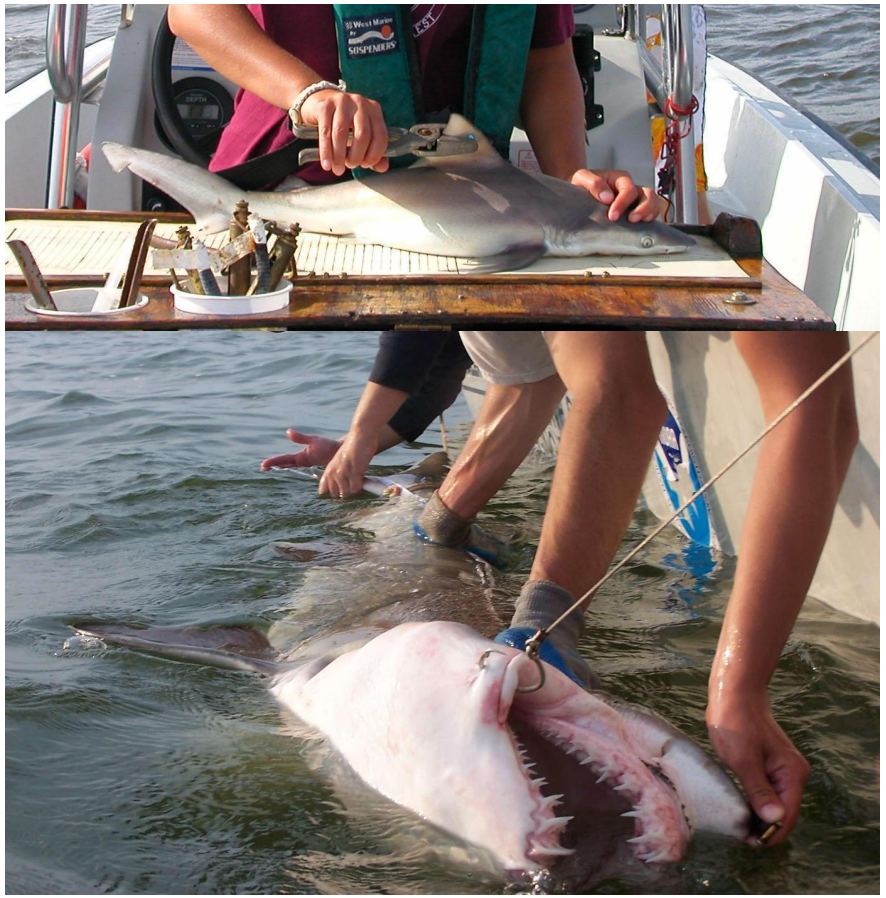
- Start Date = 2014
- Annual DAS = 50
- Commercial Vessel / Longline
- Matches Bottom Trawl Survey - spring and fall
- Fishery abundance and distribution
- Fish age, length, weight, sex, & maturity
- Temperature, salinity, current measurements
- Tagging (thorny skate)

Study Fleet

- Start Date = 2002
- Commercial vessels
- >5,000 trips per year (post-2012)
- Location, tow time, gear
- Species, catch, weight
- Temperature/depth observations
- Software development (FLDRS, GoFish)

Cooperative Atlantic States Shark Pupping and Nursery Survey

- Start Date = 1998
- Annual DAS = 30
- Small boats / long line
- Identification and monitoring of shark nursery habitat for EFH designation
- Recruitment and abundance indices
- Tagging and sampling for life history studies



Large Coastal Shark Bottom Longline

- Start date = 1996
- Biennial DAS = 47
- Commercial Vessel / Longline
- Tagging
- Age, growth, maturity sampling
- Monitoring abundance and species composition

Maine-New Hampshire Trawl Survey

- Start Date = 2000
- Spring and Fall
- Annual DAS = ~50
- Commercial Vessel / Bottom Trawl / NMFS Funding
- Fishery abundance and distribution
- Fish age, length, weight, sex, and maturity
- Food habits information
- Bottom temperature

NEAMAP Mid-Atlantic Trawl Survey

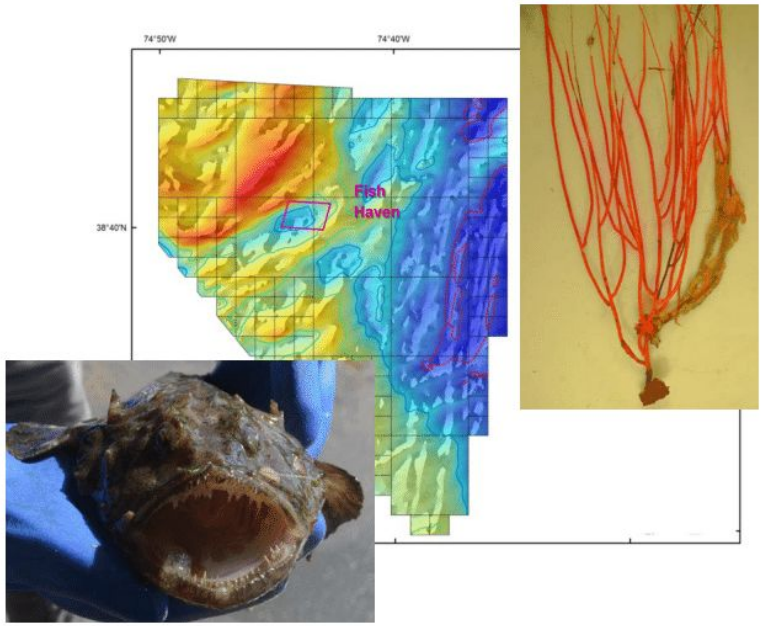
- Start Date = 2008
- Spring and Fall
- Annual DAS = ~120
- Commercial Vessel / Bottom Trawl / NMFS Funding
- Fishery abundance and distribution
- Fish age, length, weight, sex, and maturity
- Food habits information
- Bioacoustics / temperature & salinity

Habitat Surveys

OCS Study
BOEM 2017-088

- Project specific surveys
- Annual DAS = ~30 (variable)
- NOAA Vessels
- Characterization of wind energy development areas
- Deep sea coral mapping
- Essential fish habitat descriptions and mapping

Habitat Mapping and Assessment of Northeast Wind Energy Areas



U.S. Department of Interior
Bureau of Ocean Energy Management
Office of Renewable Energy Programs

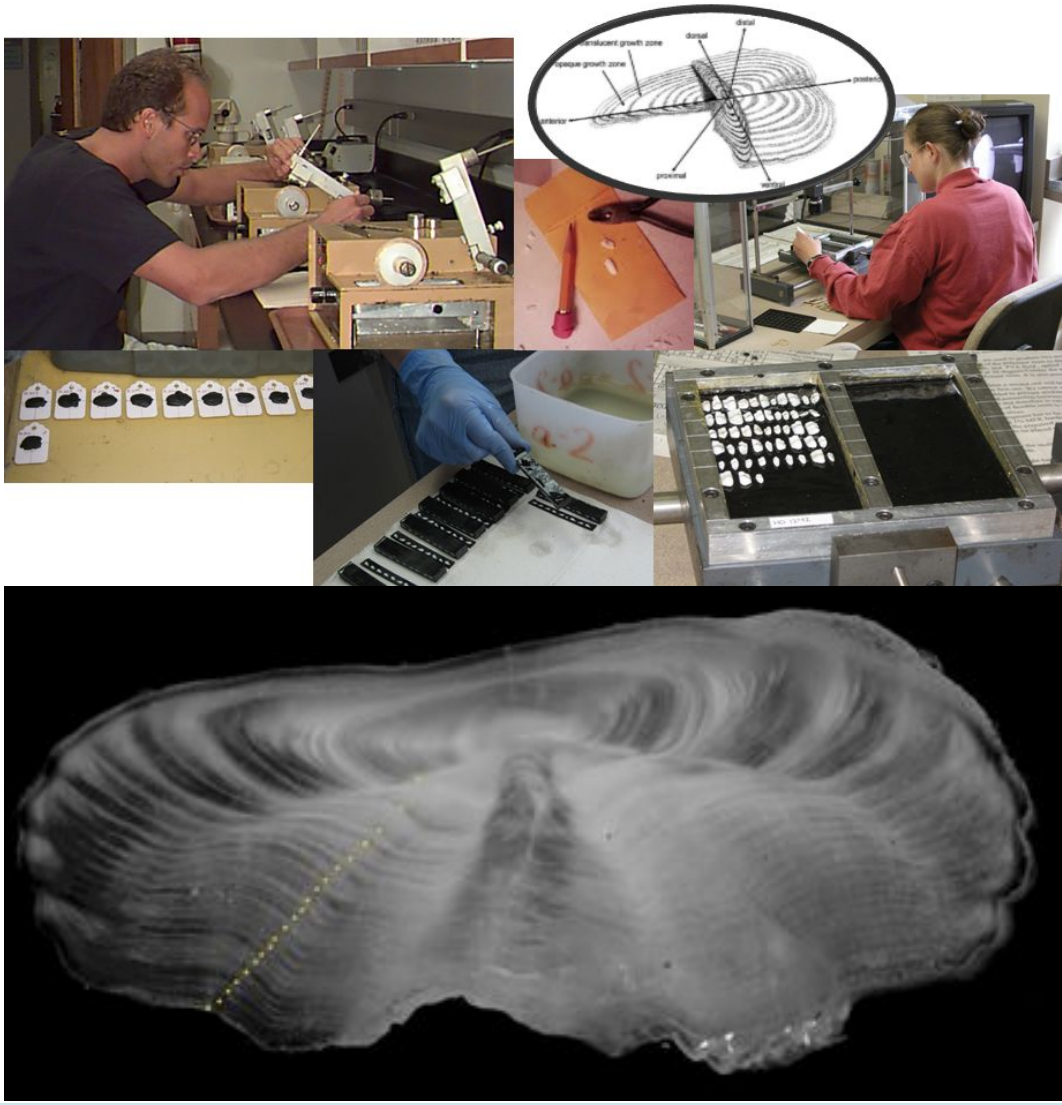
BOEM
Bureau of Ocean Energy Management

Social Science Surveys

- North Atlantic Recreational Fishing Survey 2019
- Survey of Groundfish Fishermen (w/ CINAR)
- Survey of Lobstermen re: Bait Availability (w/ CINAR)
- Socio-Economic Survey of Hired Captains and Crew
- Fixed Cost Survey 2021

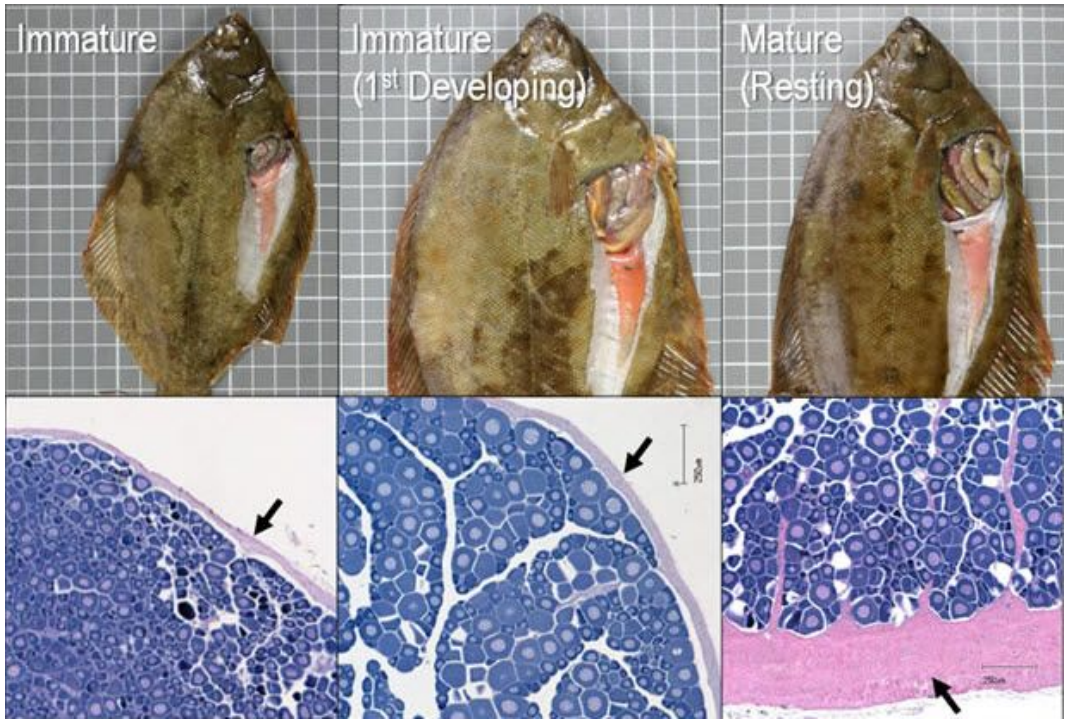
Age & Growth

- 23 species of fish and shellfish aged
- On average 55,000-90,000 samples aged per year
- Emphasis on QA/QC using tests of accuracy, precision and bias



Fish Reproduction and Condition

- Document reproductive characteristics and fish condition
- Age- and length-at-maturity
- Spawning seasons
- Reproductive condition (maturing, spent)
- Skipped spawning
- Fecundity and egg production
- Energy content of forage fish



Other Data Collection and Survey Programs

- Northeast Trawl Advisory Panel research
- Research Set Aside Programs
- Atlantic salmon programs
- Marine mammals and sea turtle programs
- Surveys w/ partners ("Twilight Zone" Surveys)

NOAA FISHERIES

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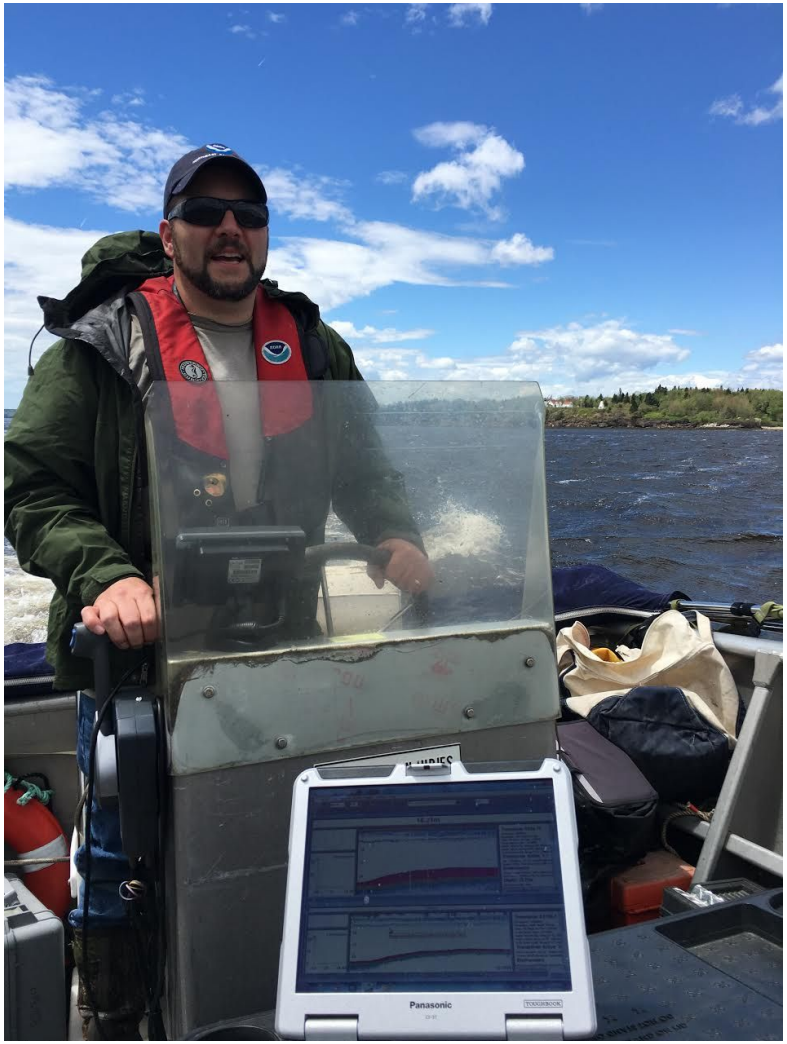


NEFSC Science Enterprise

Research

Monitoring / Observing → Modeling → Assessment → Management

New Technologies & Approaches

Modeling

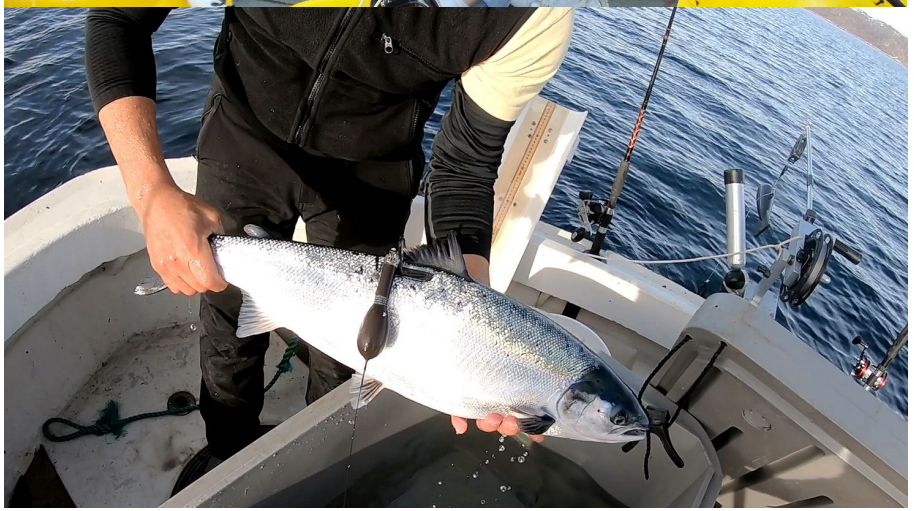
- Stock Assessment Models
  - ASAP, WHAM
- Ecosystem Models
  - Atlantis, Hydra
- Coupled Climate Models
  - Species Distribution, Population
- Bio-economic Models
  - Fishery Performance
- Management Strategy Evaluation
  - Atlantic herring, Summer Flounder

Assessments

- Fish and invertebrate stock assessments
- Marine mammal stock assessments
- Habitat assessments
- Fishing community assessments
- Climate assessments
- Integrated ecosystem assessments

Research and New Technologies

- Aquaculture
- Stock structure and identification
- eDNA & genomics
- Passive and active acoustics
- Machine learning & artificial intelligence
- Effects of sound
- Environmental effects (e.g., T, OA)
- Tagging (traditional, electronic)



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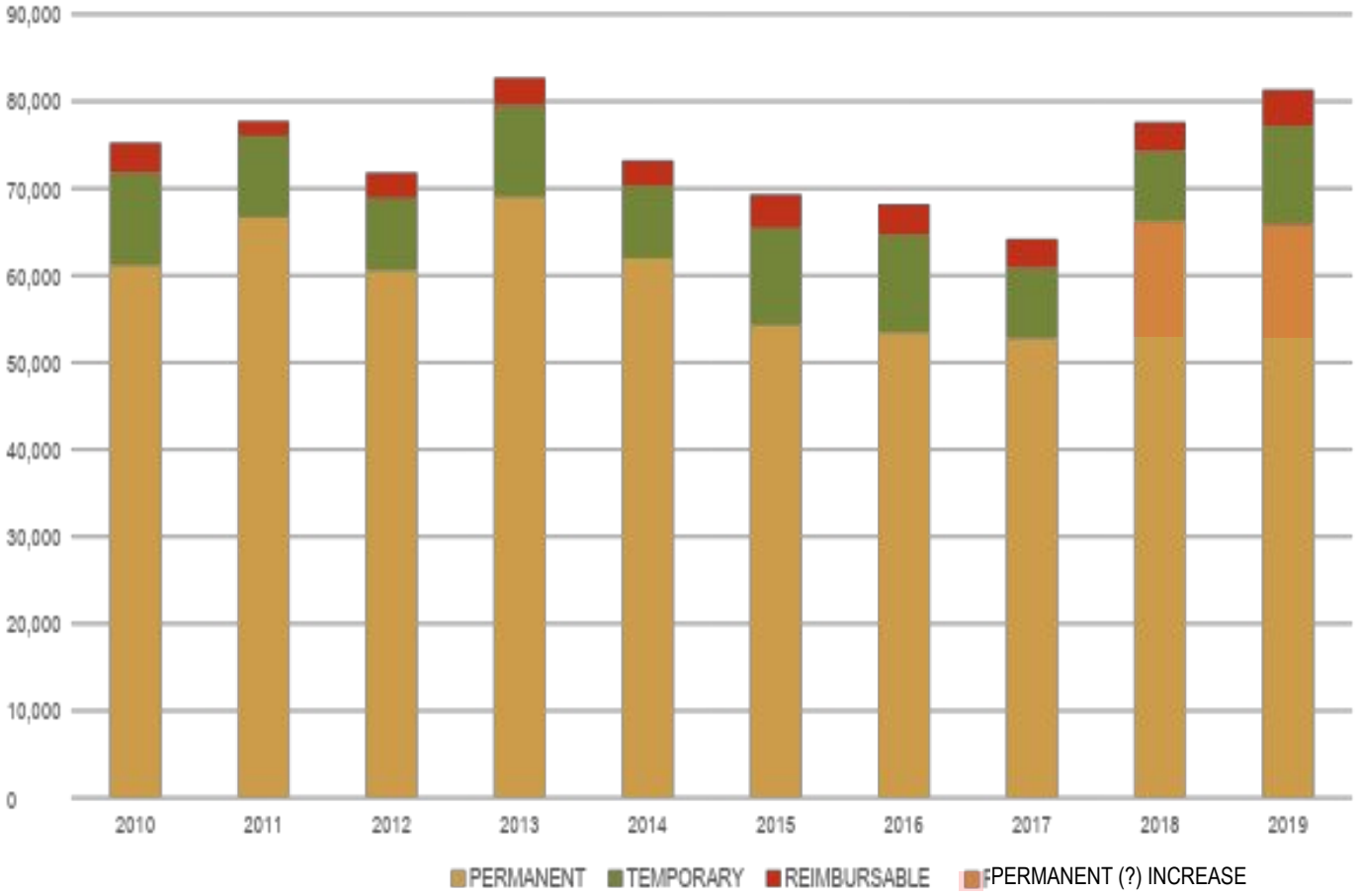
Resource Environment

Main Resources

- Funding (Federal Appropriations and Temporary/Reimbursable Funds)
- Federal Employees and Contractors
- Days-at-Sea / Aircraft Hours
- Facilities

Resource Environment

NEFSC Budget History (in $1,000's)



- Temporary and Reimbursable funds are project specific
- Increasing proportion of permanent funds are highly directed (observers, protected species, aquaculture)

cumulative inflation of 17.86% (https://smartasset.com/investing/inflation-calculator)

Resource Environment

NEFSC Budget Structure

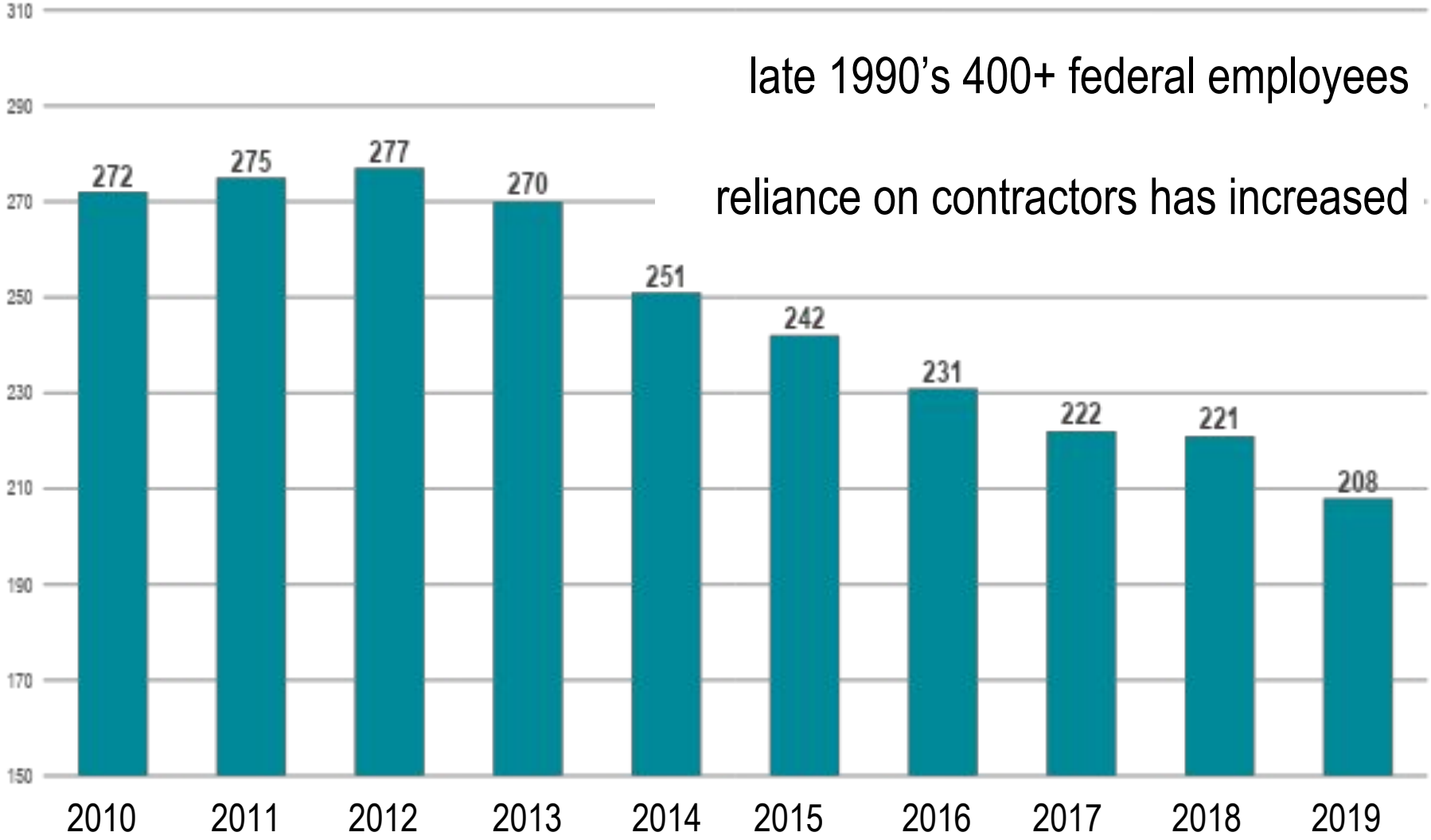
NEFSC works under ~25 budget lines in 8 categories

- Protected Species
- Atlantic salmon
- Socio-economics
- Observer Programs
- Habitat Programs
- Fisheries programs
- Aquaculture Programs
- Cooperative Research

https://plus.maths.org/content/not-just-matter-time-part-1

Resource Environment

Federal Staff Environment

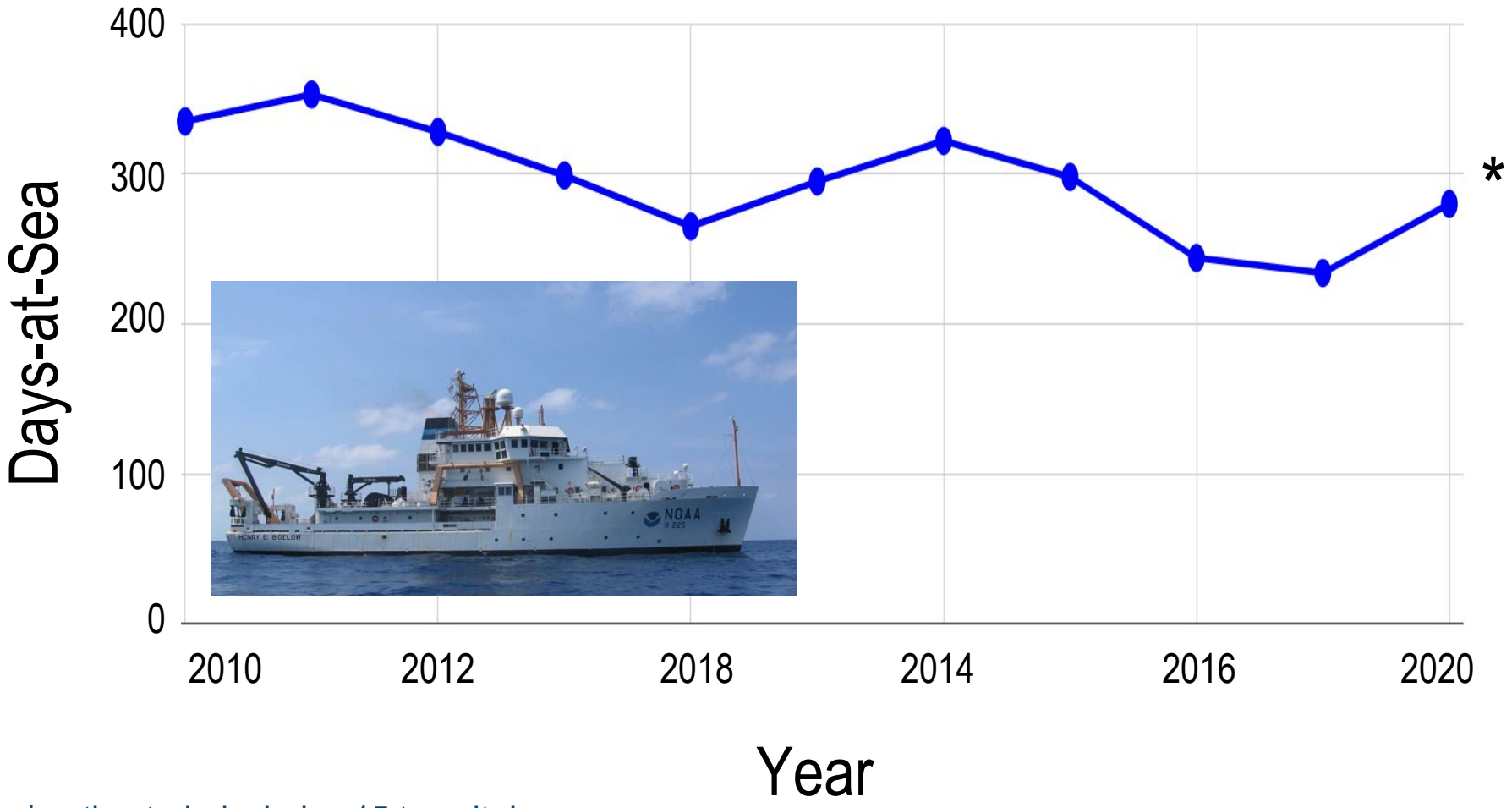


late 1990's 400+ federal employees

reliance on contractors has increased

Resource Environment

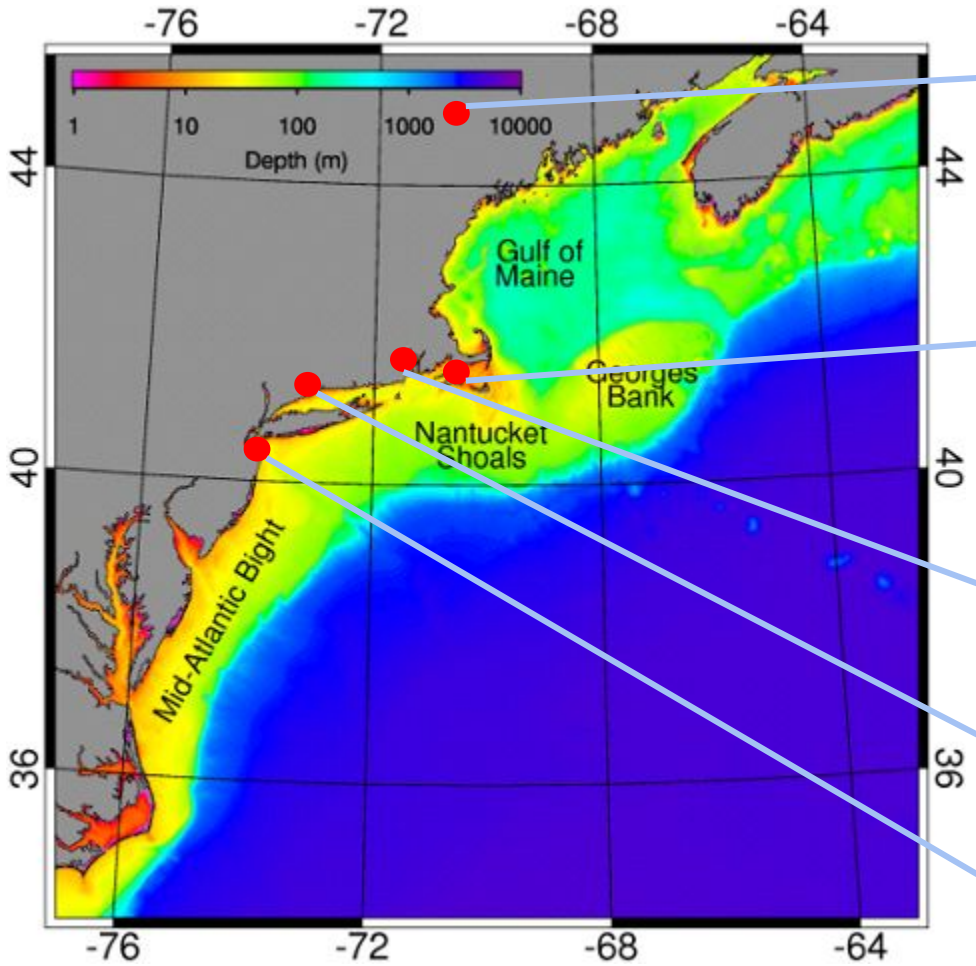
Days-at-Sea



* estimated - includes 15 transit days

Resource Environment

Facilities



Maine Field Station

Technology Park
Carlson Lane
Pocasset Warehouse
Woods Hole Laboratory

Narragansett Laboratory

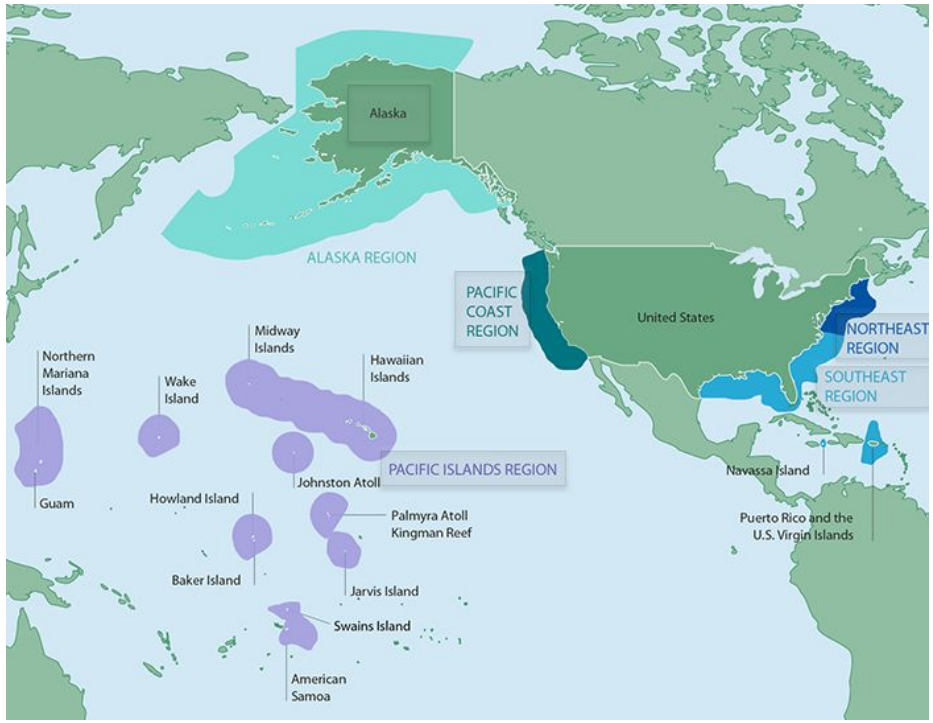
Milford Laboratory

Sandy Hook Laboratory*

Resource Environment

National Issues not just Northeast Fisheries Science Center

- Funding (Federal Appropriations and Temporary / Reimbursable Funds)
- Federal Employees and Contractors
- Days-at-Sea / Aircraft Hours
- Facilities



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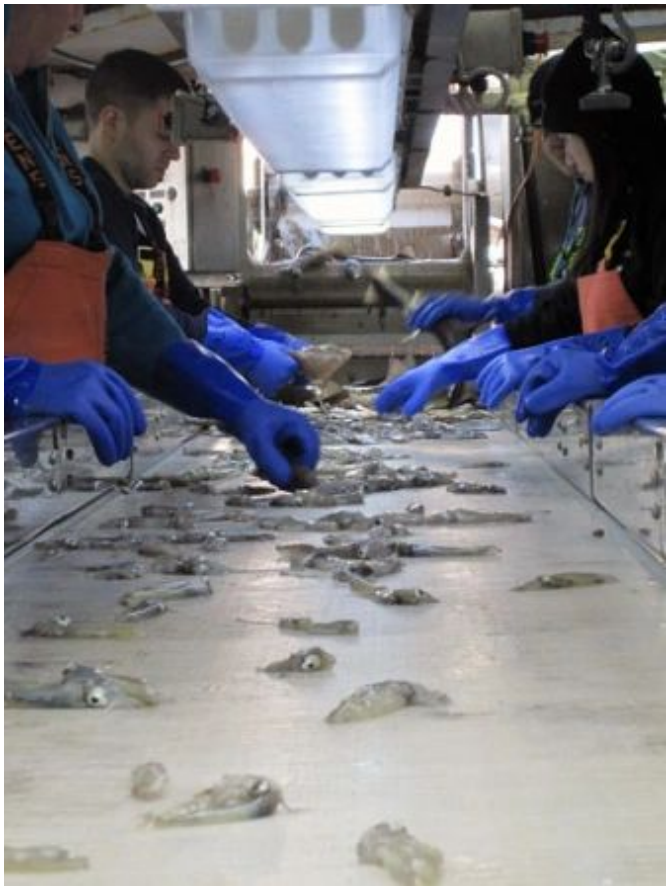
Activities w/ MAFMC

Management Track Assessments

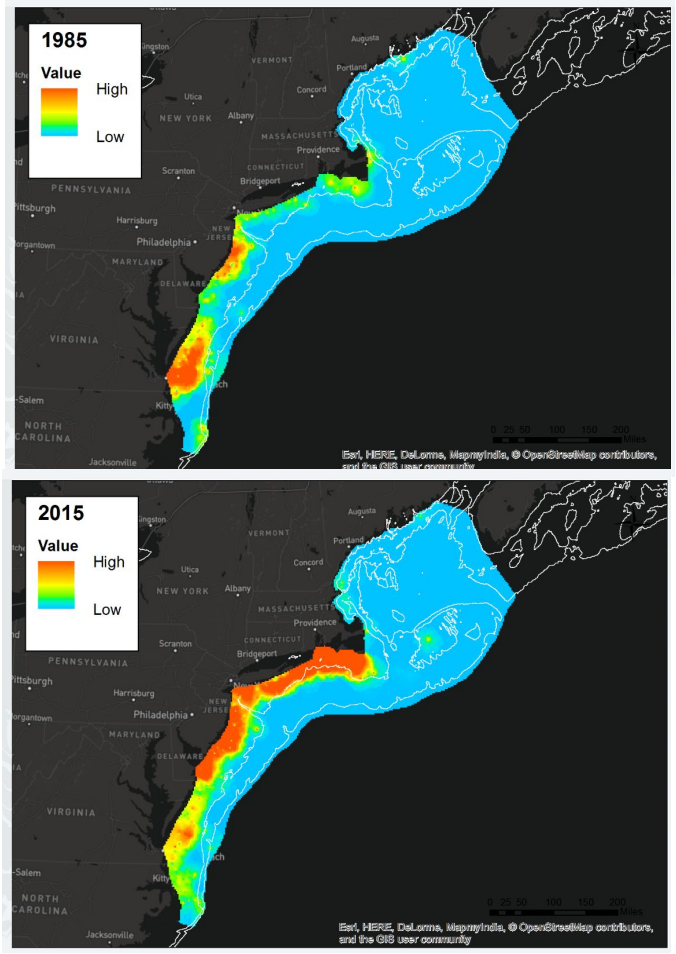
- 2 year - Bluefish, Butterfish, Black Sea Bass, Scup, Summer Flounder, Atlantic Mackerel
- 3 year - Golden Tilefish, Longfin Squid, Shortfin Squid, Goosefish
- 4 year - Atlantic Surfclam, Spiny Dogfish
- 6 year - Ocean Quahog
- TBD - Chub Mackerel, Blueline Tilefish



Activities w/ MAFMC

Research Track Assessments (MAFMC relevant)

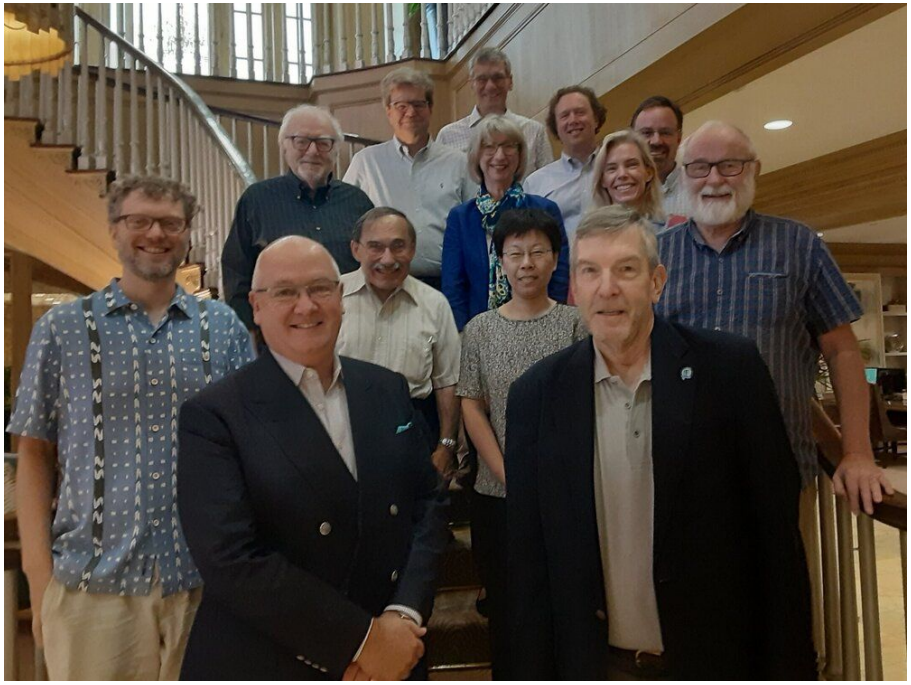
- 2020 - Index Based Methods and Control Rules
- 2021 - Butterfish and Shortfin Squid
- 2022 - Spiny Dogfish, Black Sea Bass and Bluefish
- 2023 - Applying State Space Models
- 2024 - Golden Tilefish



https://oceanadapt.rutgers.edu/

Activities w/ MAFMC

- EAFM Activities
  - Risk assessment
  - Support for Summer Flounder MSE
- Participation in *Illex* Working Group
- Advising on Golden Tilefish survey
- Climate change activities
- River herring activities
- Scenario Planning
- FMAT and SSC participation



Activities w/ MAFMC

Cooperative Research

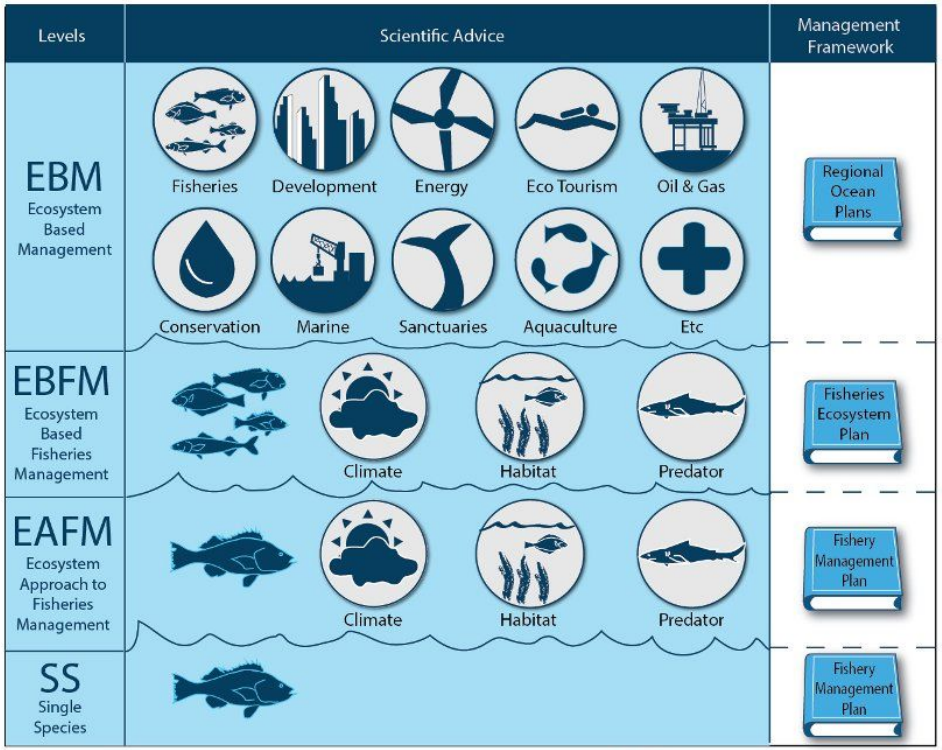
- 2019 Cooperative Research Engagement Workshops
  - Cooperative Research Strategic Report recently released
- 2020 Cooperative Research Summits
  - New England Summit in Providence, RI - 5/21/20
  - Mid-Atlantic Summit in Hampton, VA - 6/3/20
  - Register on the website!

https://www.fisheries.noaa.gov/outreach-and-education/northeast-cooperative-research-summits

Activities w/ MAFMC

- Communication, Coordination, Collaboration
- Changing climate
- Wind energy development
- Land-based and coastal habitat alteration
- Sustaining fishing communities / coastal communities
- Fishing - protected species interactions
- Predator - prey interactions

Ecosystem Approaches to Management



NOAA FISHERIES

Take Home Messages

1. We have a lot of priorities
2. We have a lot of work going on
3. Our resource environment is challenging (regionally and nationally)
4. MAFMC is an important partner

Recognize Jim Weinberg

- Benthic ecologist
- Assessment scientist
- Recognized impacts of climate change in the early 2000's
- Stock Assessment Review Chair
- Fishery Management Council Liaison
- Friend

NOAA FISHERIES

Questions?