NOAA FISHERIES

March 17, 2016

NEFSC Science and Research Director's Annual Guidance Memo for Fiscal Year 2017

Purpose

We are beginning to implement the 2016-2021 NEFSC Strategic Science Plan. To achieve the goals we have set for ourselves in the plan will require a number of organizational and procedural changes. However, that which makes us strong as a Center will remain constant: our commitment to pursuing the best in science and to the people who rely on and care about the ocean and its resources.

The first step in this process involves developing activity plans for FY17. These plans will be reviewed and ranked to support decision making as we develop spending plans for the new fiscal year. The purpose of this memo is to provide guidance for developing these activity plans. It also includes a review of our FY15 and FY16 accomplishments and background budgetary information. Detailed directions for preparing the activity plans and using the online Science Planning Evaluation and Reporting System (SPERS) will be provided separately.

The SPERS system serves several purposes. It allows us to rank proposals with regard to their importance in achieving our mission and strategic plan objectives. It establishes an inventory of our work that's searchable and reportable. And it provides a way for us to quantify progress toward our strategic plan goals. Through this ranking process we will prioritize our activities as we make sometimes difficult decisions regarding the work that we will carry out within budgetary realities.

FY15-16 in Review

Accomplishments

As a multi-disciplinary Science Center, our accomplishments are many and varied. Some noteworthy achievements are highlighted next. It's not possible to recognize all our important accomplishments, so please consider the following as examples:

Northeast Climate Vulnerability Assessment: NEFSC fishery oceanographers led the nation's first multispecies assessment of the vulnerability of regional marine fish and invertebrate species to the effects of climate change. The study examined 82 species that occur off the northeastern U.S., where ocean warming is occurring rapidly. Researchers found that most species evaluated will be affected, and that some are likely to be more resilient to changing ocean conditions than others. This work is already receiving noteworthy recognition and will be of considerable value to our science and management partners in the coming years.

Gulf of Maine Atlantic salmon action plan released: The NEFSC salmon team, together with GARFO colleagues, was instrumental in developing this five-year plan for stabilizing and recovering this population. The plan includes continued efforts to reconnect Gulf of Maine waters to those of headwater streams, restore habitat, reduce fishery mortality off West Greenland, and improve marine survival. Gulf of Maine Atlantic salmon comprise the Northeast component of the national Species in the Spotlight initiative, and recovering the stock will involve broad-based collaboration with federal and state government partners, academic institutions, recreational fishing organizations, and NGOs.

Northeast fishery sampling in transition: The Center's Fishery Sampling Branch has successfully implemented an updated, comprehensive bycatch observation method across nearly 50 fisheries in the region (the Standardized Bycatch Reporting Methodology or SBRM.) This involved a large in-house effort for allocating coverage and managing the data, as well as significant outreach to fisheries where observer coverage will increase, such as lobster vessels in Maine and Massachusetts. Also, the program managed a challenging transition of groundfish at-sea monitoring into industry-based funding. This change also involved significant outreach and many hours of direct support to ease the way for sector managers and their vessels. It's important to note that, in accomplishing this, branch staff did not miss a beat in supporting observers and at-sea monitors, and ensuring delivery of high-quality data for science and management.

Drones come to NEFSC: The Center now has three qualified drone pilots. In 2015 and 2016, NEFSC's hexacopter tracked tuna and gray seals in separate projects. Aerial tuna spotters located schools of bluefin, Center and University of Massachusetts researchers operating from a commercial tuna boat imaged the school using sonar, while the drone captured still images of the fish. Meanwhile, an NEFSC-led group of researchers counted gray seal pups on Muskeget Island using drones. The long-range plan is to improve understanding of population structure and numbers for both species.

New approach to right whale photo identification crowd-sourced: Protected Species Branch staff looked outside the box for help in speeding up identification of individual right whales from survey photos. Partnering with Kaggle and Mathworks in a prize-based competition put nearly 500 data scientists around the world to work designing an algorithm to automate the process. Winners hailed from Poland, the U.S., and Japan. The resulting work is open source and free for anyone to use. The next steps are to see if the algorithm can be turned into software that scientists can take into the field.

Connecting fisheries and protected species management to the larger marine environment: NEFSC's Climate, Ecosystem, Habitat and Assessment Steering Group is just one way we are rising to the challenge of sustaining fisheries and protected species in a rapidly changing ocean environment. The group is working to harness our climate, ecosystem, habitat, survey, and stock assessment work into service for ecosystem-based fishery management. Most of the effort thus far has focused on finfish assessments, with plans to expand work to include ESA-listed species. Both the New England and the Mid-Atlantic Fishery Management Councils are developing ecosystem-based approaches to fishery management, and Center staff are providing essential support for these initiatives.

Northeast Trawl Advisory Panel: This joint advisory panel to the New England and Mid-Atlantic Fishery Management Council is led by the chairs of the two federal fishery management councils, and staffed by scientists from the Ecosystems Surveys Branch and the Population Dynamics Branch. It is also supported by the Center's Northeast Cooperative Research Program. Members are drawn from commercial fishing, fishery science, and fishery management professionals. The objectives are to promote understanding of the NEFSC trawl survey and the data it collects, evaluate ways to complement and supplement it, and to improve the survey. Two meetings were held last fall, and a charter has been finalized. In the year ahead, the group will be focusing on industry-based surveys and improved understanding of survey gear performance. The Ecosystems Surveys Branch, is, of course, most directly involved in this initiative, while also ensuring that all our assessment survey needs are addressed and conducting research related to survey gear performance.

NEFSC Program Reviews: Peer review is necessary for us to evaluate our science and to help us navigate change as new challenges and ideas arise. In 2015, a comprehensive peer-review of our protected species program and our Fisheries Sampling Branch were conducted. As with prior reviews, these resulted in a number of action items. In 2016, our ecosystem and climate science program review will occur. Also planned for this year are reviews of the Northeast Cooperative Research Program and a national level review of the agency's aquaculture research programs.

Climate change takes center stage: In 2015 and 2016 NEFSC researchers reported on a number of large-scale changes in fishery species distribution from the individual species to species aggregations triggered by climate change. Our tracking of oceanographic conditions in the Northwest Atlantic also made headlines. These results are now posted on a new Fisheries and Climate website and on a redesigned Ecosystem Considerations site.

Ocean acidification: The NEFSC Ocean Acidification Research Group works across divisions, with other science centers, academic partners, and the National Ocean Acidification Program. We've established a carbonate analytical laboratory and an integrated monitoring program, and we've conducted experimental assessments of low pH

conditions on priority species of phytoplankton, shellfish, and finfish. Data are archived at the National Centers for Environmental Data.

NOAA Fisheries' first community resiliency assessment: NEFSC Social Sciences Branch authors completed a study on Hurricane Sandy economic and social impacts on fishing industries in New York and New Jersey and social factors that influence recovery and disaster preparedness. It's the first of its kind for fishing communities and a template for similar assessments in other regions. The intention is to provide a tool for making better decisions about what kinds of disaster preparation and post-disaster assistance are the most effective.

Operational assessments for 20 stocks of Northeast groundfish: This was the fourth comprehensive assessment of all groundfish stocks conducted by the NEFSC since 2001. For the first time, port-based outreach meetings were held ahead of the assessment meeting and industry comments were included in review documents and the final report. Also, the meeting was supported by a public, searchable, data-rich website where meeting presentations, working papers, background documents, and data for each assessment can be accessed. Status was unchanged for 15 stocks, worsened for 2, improved for 1, and became more uncertain for 2. Retrospective patterns emerged for more stocks in comparison to the last assessment. Of the stocks for which status can be determined, the majority remain below their biomass targets. A rapid increase in Georges Bank haddock, redfish, pollock, and white hake contrasts sharply with the decline of cod and flatfishes. This initiative required major time commitments from our Population Dynamics Staff who, nevertheless, were able to complete scheduled benchmark and additional update assessments in 2014 and 2015 and make considerable progress in developing a suite of process improvements.

Atlantic salmon population viability and safe passage model: Researchers from NEFSC and GARFO developed a model to assess how dams affect the viability of fish species that need to use both fresh and marine waters during their lifetimes. The project tested how varying passage efficiency at dams related to survival rates for these species. The analysis supported new USFWS performance standards for dams that could increase downstream fish survival by more than 30%. It's now being adapted for use with other species in other rivers.

Probiotic for commercial oyster production: Researchers at Milford showed that a naturally-occurring *Vibrio* sp. probiotic isolate can significantly improve larval oyster resistance to this pathogen. The staff are now working with a private company to test whether this can be produced in sufficient quantity and quality for effective use in commercial oyster culture. The work is being conducted under a cooperative research and development agreement which allows a federal lab to collaborate with private sector entities for research and development.

Integrated assessment modeling--butterfish and beyond: Center staff worked with industry and academics to develop a method for estimating butterfish abundance that takes into account temperature suitability, spatially-available temperatures over time, and availability of butterfish to surveys over space. The method contributed to an improved estimate of butterfish catchability, which resulted in an increase in butterfish quota and trip limits. More importantly, the truly collaborative effort was a demonstration of good will between industry and scientists. The effort reflected a heightened sense of respect for fishermen's knowledge and provided a model for considering new methods in the assessment process.

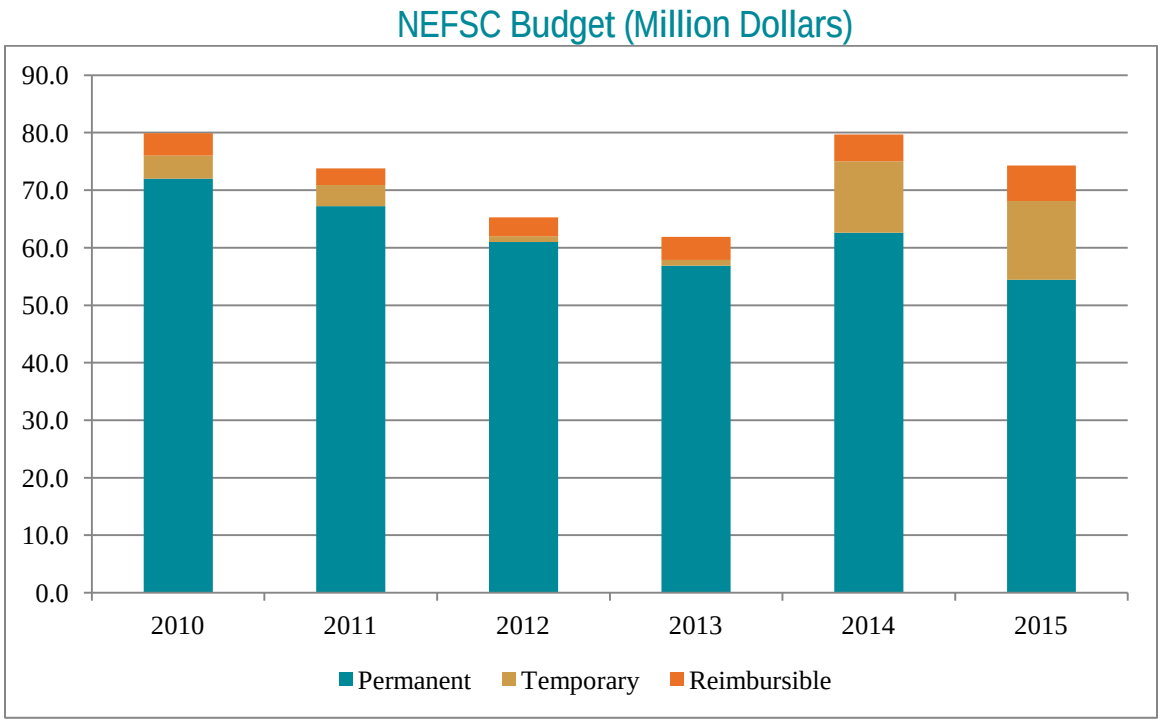
Integrated sea scallop assessment model: A team led by Woods Hole Oceanographic Institution and the Center developed an integrated assessment model that numerically simulates oceanographic, population dynamic, and socioeconomic relationships for the U.S. commercial Atlantic sea scallop fishery. The model is intended to allow researchers to evaluate effects of ocean acidification on Atlantic sea scallops, which is the most valuable fishery in the U.S. The results of the model showed that harvests could decline substantially by 2050 under current harvest rules and RCP 8.5 CO_2 emissions (a "business-as-usual" scenario). The integrative model also used components of the stock assessment model. The results show that valuable fisheries can be negatively impacted by ocean acidification in the coming decades but also highlight the need for a better understanding of the effect of ocean acidification on growth, recruitment, and mortality in populations of living marine resources.

Shark advances: Center shark researchers showed just how long white sharks live and that they grow more slowly and mature much later than previously thought, presenting the first reliable growth curve for this species in the western North Atlantic. With lifespan estimates now of 70 years and more, white sharks may be among the longest-lived fishes. Increased age at maturity make white sharks more sensitive to fishing pressure than previously thought, given the longer time needed to rebuild white shark populations. The NEFSC's 2015 coastal shark research survey, the longest running along the East Coast, captured and tagged more than 2,800 sharks, the most in the survey's 29-year history. The results are very good news for shark populations. The last survey was in 2012, during which 1,831 sharks were captured and tagged, compared with 2,835 in 2015.

Passive acoustic monitoring expands: The NEFSC's passive acoustics research group is listening for large whales throughout the region and is now also looking for spawning aggregations of cod. Using moored arrays, autonomous underwater gliders, and bottom-mounted receivers, they have amassed terabytes of data reflecting the occurrence of these animals over time and space. The cod project is occurring off Massachusetts. Researchers are attempting to confirm spawning is actually occurring by detecting the grunting noise made by spawning males.

The Northeast Cooperative Research Program continues to bring stakeholders and scientists together to conduct research in support of our mission and to encourage constructive engagement. Their role has been noted in several of the activities described above. In addition, work in support of a pilot Gulf of Maine longline survey, enhancements to the study fleet, and ongoing support of the New England Fishery Management Council's Research Set-Aside programs are of particular importance to the Center.

Background Budget Information



Budget basics

There are three primary funding sources that support the NEFSC's research programs. These are termed permanent, temporary, and reimbursable. Allocated funds may be permanent or temporary and are provided to the Center through Congressional appropriation. Within our allocation, funds are associated with budget lines called PPAs (Programs, Projects, and Activities). Each PPA has specific language tracing back to the original Congressional intent that limits the type of activity that it can support.

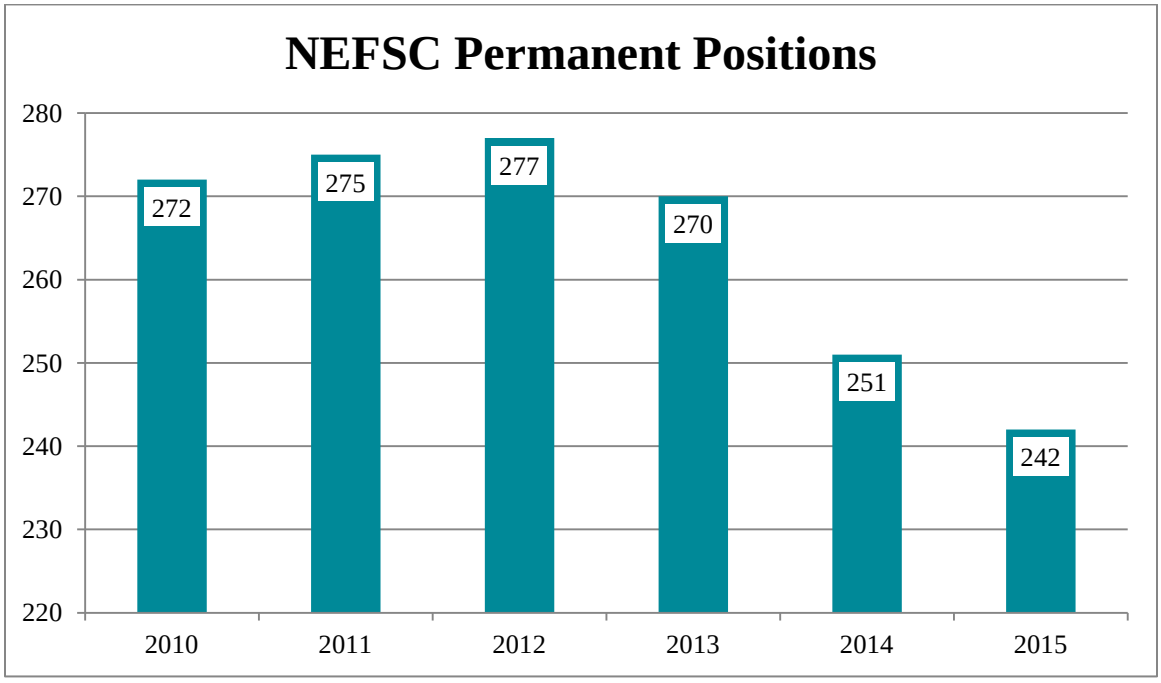
Permanent funds cover our permanent labor, facility costs, GSA vehicles, safety and security assurance, library service and other shared services. The majority of our allocated, permanent funds support labor and fixed costs.

Temporary funds are also appropriated, but are distributed initially to other NMFS or NOAA offices before coming to the Center. Some are awarded to us through annual competitions, such as those that are managed by NOAA Fisheries Headquarters offices. Temporary funds also come to the NEFSC to cover particular needs on a temporary (annual) basis or as carryover from the prior fiscal year.

Some funds also come from outside NOAA, and these are called "reimbursable." The sources are generally other government agencies that pay some or all NEFSC costs for conducting research of mutual interest.

Recent budget history

The proportion of permanent funds allocated to labor has increased in recent years as overall levels of appropriated funds have declined. This challenge has been exacerbated by ongoing efforts to ensure that our programs align with PPA language, and increased fixed costs (e.g. for facilities). The number of FTEs has decreased steadily during the last 4 years but this is partially due to very long delays in the recruitment process (the FY15 FTE level is lower than it should be for this reason, and several hiring actions initiated in FY15 will be completed in FY16). However, overall reductions in labor costs are necessary to ensure that we have sufficient discretionary funds to support priority research and this downward trend will likely continue for the next few years. The center also maintains a contract labor pool to help us carry out our activities.



* FY 2014 and FY2015 numbers do not account for FTEs that are in process of being filled

FY17 Budget Outlook

The president has submitted his FY17 budget request to Congress. NOAA FY17 funding priorities include improving community resilience to disasters, evolving the National Weather Service, investing in observational infrastructure, and achieving organizational excellence. Requested increases for NOAA Fisheries that are of interest to the NEFSC include $9 million for fishery disaster assistance, $5.6 million for ecosystem-based fishery management, and $1.1 million for observers. The president also requested increases of $17.5 million for our research partners at NOAA Research (OAR), $5.8 million for studying climate change and fishery stocks, and $11.7 million for work on integrated ocean acidification.

The total request from the president for FY17 is within the limit set by Congress in its 2015 two-year budget resolution that set overall funding levels for FY16 and FY17. However, Congress will still have to divide those funds among the 12 spending bills that fund our government. The overall level is little changed from last year, and required increases for some programs will mean funding remains tight. Therefore, initial planning for FY17 will be based on FY16 actuals for appropriated funds.

FY17 Priorities

Research, Collaboration, and Outreach

Priorities for FY17 link directly to NOAA Fisheries Priorities and Annual Guidance for 2016 which, in turn, link to current Department of Commerce, NOAA, and NOAA Fisheries strategic plans. They are also responsive to

guidance in the draft NOAA Fisheries Ecosystem-Based Fishery Management Policy and the recently-published NOAA Fisheries Climate Science Strategy. The NOAA Fisheries guidance defines three core priorities:

- Ensure the productivity and sustainability of fisheries and fishing communities through science-based decision-making and compliance with regulations
- Recover and conserve protected species through the use of sound natural and social sciences
- Improve organizational excellence

The NEFSC mission is to provide ecosystem-based science supporting stewardship of living marine resources under changing climatic conditions. Our general priorities are defined within the four themes of our strategic plan: Sustainable Fisheries, Protected Resources, Science in Support of Ecosystem Based Fisheries Management, and Organizational Excellence. Our objectives include:

- Improved internal and external communication to ensure transparency, accountability, and trust;
- Increased multidisciplinary, cross-cutting science enabled through greater investment in cooperative and collaborative research;
- Improved efficiency and effectiveness in meeting commitments to statutory and regulatory requirements;
- Scientific investigations that support progression toward ecosystem-based fisheries management; and
- Investment in our people and infrastructure to enable us to meet our mission.

Activity plans must be responsive to one or more of the plan's themes, and to specific foci and targets within these themes. Activities will implement the targets.

Innovative research is essential to our success as a science center, and is the mechanism through which we bring new ideas, and new research findings forward in support of our mission and our management partners. Even though some research activities provide more opportunities for innovation than others, every research project should encourage innovation in some way.

Many Center activities and programs are already directly responsive to the Ecosystem-Based Fishery Management (EBFM) foci and targets. Any FY17 plans for these activities should recognize this linkage. Other activities and programs may be more directly responsive to targets and foci under the Sustainable Fisheries and/or Protected Resources themes. These linkages should be recognized in FY17 plans; however, these plans must also recognize and develop links with EBFM themes and foci.

Emphases for 2017

Cooperative Research: The strategic plan calls for elevation of the role of cooperative research to improve our assessments and environmental science and to engage fishermen and other stakeholders in the process of planning and carrying out scientific investigations and producing management advice based on research results. Opportunities for cooperative research should be identified whenever possible, and described within activity plans.

Collaboration: Wherever possible, collaboration will be strongly encouraged. This includes connecting areas of strength across Divisions and laboratories to increase success in securing external funds; communication with stakeholders; and interdisciplinary, modeling, and synthesis components of research activities. Examples of research areas naturally disposed to cross-divisional collaborations include stock assessments, ecosystem modeling, and fishery oceanography.

External Communication: New this year, to the extent possible, I ask that each of our activities incorporate an explicit commitment to communication, transparency, outreach, and engagement with our partners in the academic, NGO and fishing communities. Keep in mind that people are interested in what you are doing and we need to make a real effort to better connect their interest with our activities and results.

Assessments: In FY17, we will continue to prioritize core assessments and the data streams that support them. At the same time, we will be incorporating climate, ecosystem, and habitat factors in single species assessments, evaluating multispecies and ecosystem assessment tools, and developing ecosystem-based fishery management.

Ecosystem-Based Fishery Management: During FY17 we expect to make substantive progress towards ecosystem-based fishery management for the commercial and protected species that we monitor and assess. The

Center's Climate, Ecosystems and Habitat Assessment Steering Group (CEHASG) will play a larger role in coordinating, facilitating, and guiding the multidisciplinary, cross-cutting science that will be necessary to achieve this goal.

Response to Program Reviews: In FY16 and FY17, we will also be emphasizing recommendations from the FY13-FY16 science program reviews for data, fishery stock assessments, protected species, and ecosystem and climate science.

Research Priorities for FY17

- Assessments to support sustainable fisheries, protected resources, and ecosystem-based fishery management information needs
    - Assessments of commercially important fish and invertebrate stocks, as agreed through the NRCC, and assessments of protected species consistent with MMPA and ESA priorities.
    - Advances in commercially important and protected species assessments that consider climate, habitat, ecosystem, and habitat interactions and engage scientists throughout the Center.
    - Evaluation of multispecies assessment approaches as a suitable basis for provision of catch advice and better understanding of ecosystem dynamics.
    - Continued development of Integrated Ecosystem Assessments (IEA) and use of IEA approaches to provide management advice in an ecosystem/climate change context.
    - Research on processes which link productivity, recruitment, and distribution of commercially and recreationally important wild and cultured species and their prey and predators to environmental factors and climate change.
- Fishery-Dependent Data
    - Observing and at-sea monitoring as necessary to meet requirements of the standardized bycatch reporting methodology and to address priority fishery management information needs
    - Evaluation and implementation of electronic fishery monitoring that is consistent with regional priorities.
    - Improvements in the regional fishery-dependent data systems that support critical assessment and management requirements.
- Fishery-Independent Data
    - Surveys required to support assessment information needs and basic ecosystem monitoring and process research. Specific survey funding decisions for FY17 and beyond will be informed by analyses that will be completed in FY16.
    - Research on survey gear performance and efficiency in support of recommendations from the NEFMC/MAFMC Trawl Survey Advisory Panel.
    - Development of acoustic and video approaches for improved monitoring and assessment.
    - Continued development and integration of data products collected in conjunction with our commercial and recreational fishery partners and the Cooperative Research Program.
- Interactions of aquacultured species and the environment
    - Responses of aquacultured shellfish and finfish to changing environmental conditions.
    - Environmental compatibility of aquaculture practices.
    - Impacts of aquacultured shellfish and the industry on the environment.
- Cooperative research that enhances the participation of commercial and recreational fishery participants and other stakeholders in the design, collection, and analysis of data supporting stock assessments and improves our understanding of environmental factors that influence the productivity and distribution of commercially important species and their prey.
- Providing ecological and socioeconomic information to inform and evaluate management decisions and support analyses required by legal and regulatory processes with particular emphasis on advice for addressing ecosystem/climate change.
- Research that applies Management Strategy Evaluation approaches to assessment and provision of management advice and develops ecosystem-based fishery management strategies.
- Activities that support the "Species in the Spotlight" Atlantic Salmon initiative.