



**NOAA
FISHERIES**

Northeast Fisheries Science Center

Strategic Science Plan

2016 - 2021

Ecosystem-based science supporting stewardship of living marine resources under changing climatic conditions



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The Northeast Fisheries Science Center is a leader in marine science; our scientists and our science are recognized regionally, nationally, and internationally.

The results of our research support regional fishery managers, characterization of the status of protected species, and development of recovery plans when appropriate. The Center's monitoring and scientific investigations on ecosystem functions and processes are essential to an improved understanding of the dynamics and productivity of exploited and protected resources. Similarly, our aquaculture and enhancement science is becoming increasingly important as we approach global limits to wild fisheries production, strive to encourage investment in aquaculture, and understand and mitigate the environmental impacts of cultivated fish and shellfish production. The Center also maintains and administers a large and complex fisheries observer program which places trained observers on fishing vessels to meet information needs for science and management.

This Strategic Science Plan builds upon the earlier version in several ways. In particular, it provides a comprehensive, strategic perspective that takes into account our broad, multidisciplinary capabilities, current and emerging scientific needs and challenges, and opportunities for leveraging our capacity through research collaborations and cooperative research with fisheries stakeholders. It also ensures that the recommendations and outcomes from the systematic peer review process administered by the Office of Science and Technology are implemented.

We emphasized the importance of engaging staff, stakeholders, and partners in the process of developing this plan. We collected information through surveys and interviews with partners and stakeholders, held two regional workshops, and conducted internal working sessions with staff.

In the coming years, this Plan will guide us as we build on a strong foundation of excellence in marine science.

We will continue to provide scientific products in support of statutory and regulatory requirements, and progress toward regional ecosystem-based fisheries management recognizing the increasing influence of climate change.

This Strategic Science Plan will help to ensure that the Center is working on critical priorities and aligning staff and resources to address these priorities. The Plan reduces research gaps, improves organizational efficiency, and helps the Center work more effectively with its partners and stakeholders to better meet our collective needs.

Major objectives include:

Improved internal and external communication to ensure transparency, accountability, and trust;

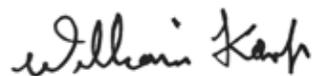
Increased multidisciplinary, cross-cutting science enabled through greater investment in cooperative and collaborative research;

Improved efficiency and effectiveness in meeting commitments to statutory and regulatory requirements;

Scientific investigations that support progression toward ecosystem-based fisheries management; and

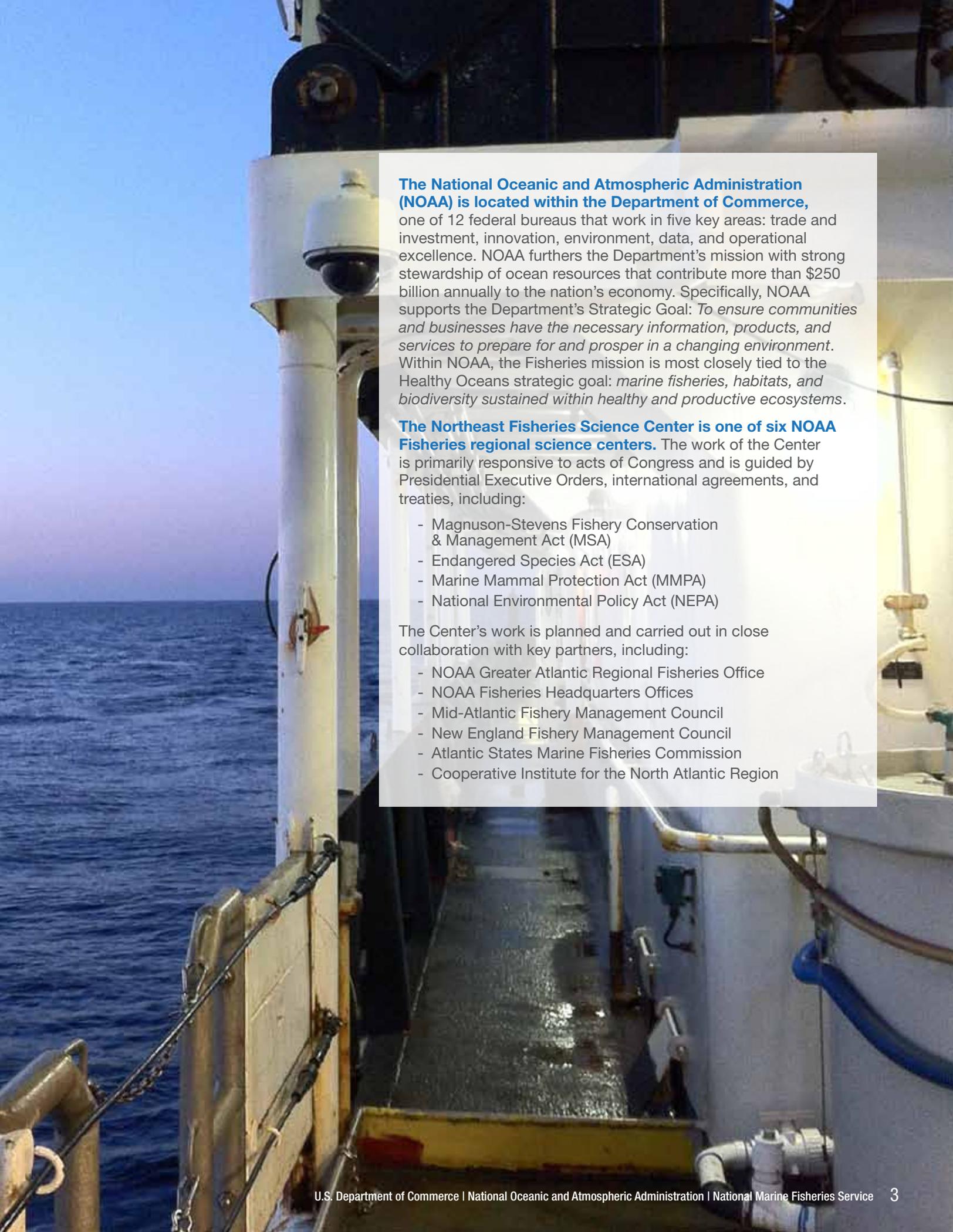
Investment in our people and infrastructure to enable us to meet our mission.

Thank you,



William A. Karp, Ph.D.
Science and Research Director
Northeast Fisheries Science Center





The National Oceanic and Atmospheric Administration (NOAA) is located within the Department of Commerce,

one of 12 federal bureaus that work in five key areas: trade and investment, innovation, environment, data, and operational excellence. NOAA furthers the Department's mission with strong stewardship of ocean resources that contribute more than \$250 billion annually to the nation's economy. Specifically, NOAA supports the Department's Strategic Goal: *To ensure communities and businesses have the necessary information, products, and services to prepare for and prosper in a changing environment.* Within NOAA, the Fisheries mission is most closely tied to the Healthy Oceans strategic goal: *marine fisheries, habitats, and biodiversity sustained within healthy and productive ecosystems.*

The Northeast Fisheries Science Center is one of six NOAA Fisheries regional science centers.

The work of the Center is primarily responsive to acts of Congress and is guided by Presidential Executive Orders, international agreements, and treaties, including:

- Magnuson-Stevens Fishery Conservation & Management Act (MSA)
- Endangered Species Act (ESA)
- Marine Mammal Protection Act (MMPA)
- National Environmental Policy Act (NEPA)

The Center's work is planned and carried out in close collaboration with key partners, including:

- NOAA Greater Atlantic Regional Fisheries Office
- NOAA Fisheries Headquarters Offices
- Mid-Atlantic Fishery Management Council
- New England Fishery Management Council
- Atlantic States Marine Fisheries Commission
- Cooperative Institute for the North Atlantic Region

Strategic Framework

The Plan is structured around four components. **Guiding Principles** are overarching values that are integral to all aspects of the Plan; they underpin the Center's science program and operating procedures. **Themes** are broad categories that establish a high-level organizational framework for the Plan. **Foci** describe accomplishments we expect to achieve under each theme, and **Targets** describe the work we will conduct to achieve these accomplishments.

Guiding Principles

The Center's guiding principles are Collaboration, Trust, Efficiency, and Integration.

Collaboration with partners and stakeholders is essential to our success. This has always been one of our guiding principles and has played a large role in our historic accomplishments. Cooperative and collaborative data collection, data sharing, and jointly designed and executed research projects will increase substantially in the coming years. Key partners include commercial and recreational fisheries stakeholders; the aquaculture community; non-governmental organizations; academic institutions; state and federal agencies including other NOAA line offices; and the Greater Atlantic Regional Fisheries Office, Mid-Atlantic Fishery Management Council, New England Fishery Management Council, and Atlantic States Marine Fisheries Commission.

Trust results from continuous improvements to communications and transparency so that partners and stakeholders believe in the integrity of the Center's science and understand its work. The work we do must be fully transparent. We must recognize the importance of building trust through full engagement of stakeholders and partners and improved external communications.

Efficiency gained from improvements to operational and administrative systems and processes will increase the Center's effectiveness, resilience, and will ensure the best use of limited fiscal and human resources.

Integration enables the Center to address complex, multi-disciplinary, scientific challenges by harnessing the talent and experience that can be found throughout our organization. Integration among the Center's Divisions is particularly important in the progression towards ecosystem-based fisheries management.

Themes

Science conducted under the Sustainable Fisheries and Protected Resources themes is responsive to the Center's core statutory and regulatory mandates. **Sustainable Fisheries** includes data collection, stock assessments, aquaculture, and a range of related scientific investigations. **Protected Resources** science supports determination of the status of protected species and developing recovery plans when appropriate. Research on marine mammals, turtles, seabirds, and protected fish and invertebrate species is included under this theme.

The Plan is aspirational in many ways, and seeks to build on our achievements to advance understanding of ecosystem processes and dynamics, and, thereby, to improve the science we conduct under the Sustainable Fisheries and Protected Resources themes. To enable and encourage this, we have defined one overarching cross-cutting theme, **Science in Support of Ecosystem-Based Fisheries Management (EBFM)**. Through this construct, we will better integrate ongoing ecosystem monitoring, research on ecosystem processes, analytical support for integrated ecosystem assessment, and research conducted by social scientists and economists that investigates the human dimensions of regional marine ecosystems, the roles that humans play in managing change, and the impacts of change on coastal communities and economies.

The final theme, **Organizational Excellence**, recognizes the importance of our people and infrastructure, and the need to invest effectively to maintain a vibrant, creative, and fulfilled workforce and the resources that our staff and contractors need to conduct their work efficiently and effectively. Organizational excellence catalyzes engagement with external partners and stakeholders through collaborations and cooperative research, resulting in enhanced communications, greater mutual understanding, and leveraging of resources.

Foci

Foci describe our goals and objectives under each theme.

Targets

Targets describe the work we will conduct during the next five years to achieve our strategic foci. Progress in completing these targets will be documented to evaluate success in meeting our objectives.



Themes	Foci
Sustainable Fisheries	A Improve accuracy and efficiency of data collection and enable seamless public access to our data and data products.
	B Improve quality, efficiency, and responsiveness of stock assessments and other science-based advice.
	C Advance aquaculture to support sustainable production.
Protected Resources	D Improve accuracy and efficiency of data collection and enable seamless public access to our data and data products.
	E Improve quality, efficiency, and responsiveness of stock assessments and other science-based advice.
Science in Support of Ecosystem-Based Fisheries Management	F Improve understanding of the influence of climate, ecosystem, habitat factors, and species relationships on living marine resource dynamics in order to provide integrated scientific advice to managers.
	G Improve understanding of economic and socio-cultural factors in marine resource management and apply this knowledge in the provision of management advice.
Organizational Excellence	H Recruit, train, support, and retain a high-quality workforce.
	I Engage partners, stakeholders, and the public to increase transparency and collaborative opportunities and evaluate research goals and priorities.
	J Facilitate and advance Center-wide communication and collaboration.
	K Invest in infrastructure required to support the mission.

Sustainable Fisheries

Foci:

- A. Improve accuracy and efficiency of data collection and enable seamless public access to our data and data products.
- B. Improve quality, efficiency, and responsiveness of stock assessments and other science-based advice.
- C. Advance aquaculture to support sustainable production.



A

Improve accuracy and efficiency of data collection and enable seamless public access to our data and data products.

Targets

1

Review fishery-dependent sampling and data collection protocols (including observer sampling activities) to ensure assessment information needs are properly addressed and implement changes as appropriate.

2

Develop and implement an advanced, integrated system for collecting, managing and disseminating fishery-dependent data and ensure stakeholders are engaged in this process.

3

Continue to evaluate and implement advanced technologies for improving information used in assessments.

4

Conduct research and collaborate with industry to address assumptions in survey methodology and improve the quality of and access to fishery-independent data.

5

Conduct research on consequences of different data collection, sampling, and assessment approaches on the uncertainty of assessment results.

6

Hold periodic workshops with partners and stakeholders to share information on trends, field observations, and scientific advances, and explore possibilities for cooperative and collaborative research to address priority research questions.



B

Improve quality, efficiency, and responsiveness of stock assessments and other science-based advice.

Targets

1

Reform stock assessment process in collaboration with our partners to broaden participation and improve timelines and efficiency, responsiveness to management needs, and consideration of climate, ecosystem, and habitat factors.

2

Evaluate the Center's role in regulatory support, including economic and socio-cultural factors in fisheries management advice, to improve efficiency and effectiveness while minimizing impacts on research.

3

Evaluate and prioritize research needs on an annual basis to support improved assessments; meet with stakeholders to review progress on current cooperative projects and to plan and prioritize cooperative research that will improve assessments.



C

Advance aquaculture to support sustainable production.

Targets

1

Conduct research on responses of aquacultured shellfish to changing environmental conditions including those associated with stressors and climate change.

2

Investigate the environmental compatibility of aquaculture practices emphasizing interactions with protected species and habitat and the valuation of ecosystem services.

3

Provide advice, research and analysis, and training services to NOAA, other regulatory agencies, the aquaculture industry, and the public.



Protected Resources

Foci:

- D. Improve accuracy and efficiency of data collection and enable seamless public access to our data and data products.
- E. Improve quality, efficiency, and responsiveness of stock assessments and other science-based advice.



D

Improve accuracy and efficiency of data collection and enable seamless public access to our data and data products.

Targets

1

Develop and implement a comprehensive and integrated system for collecting, managing, and disseminating protected species data, including passive acoustics, telemetry, and survey results.

2

Collect ecosystem, species abundance and distribution, and socio-economic data to help identify emerging threats and assess how they affect distribution, behavior, and species interactions; adapt surveys to changing distributions and behaviors of stocks.

3

Enhance cooperative data collection for protected species, including finfish and invertebrates, their habitats, and environmental impacts.



E

Improve quality, efficiency, and responsiveness of stock assessments and other science-based advice.

Targets

1

Update abundance estimates, at least every three to five years, and estimate population trends for marine mammals, turtles, and fish.

2

Monitor distribution and primary migration routes of protected species and identify shifts in patterns over time; adapt assessments as necessary.

3

Improve assessment of human threats to protected species by investing in more complex analyses and comprehensive data collection, particularly for species at higher risk and environmental factors that influence distribution and productivity.

4

Conduct research to develop and test effectiveness of mitigation measures to improve advice, making use of cooperative research arrangements and platforms where possible.



Science in Support of Ecosystem-Based Fisheries Management

Foci:

- F. Improve understanding of the influence of climate, ecosystem, habitat factors, and species relationships on living marine resource dynamics in order to provide integrated scientific advice to managers.
- G. Improve understanding of economic and socio-cultural factors in marine resource management and apply this knowledge in the provision of management advice.



F

Improve understanding of the influence of climate, ecosystem, habitat factors, and species relationships on living marine resource dynamics in order to provide integrated scientific advice for managers.

Targets

1

Build information technology systems needed to integrate data sources, perform related modeling, and work collaboratively among different research units and labs.

2

Maintain essential ecosystem and climate observing programs and improve integration with other regional and national programs. Develop and implement an explicit role for cooperative research in support of this target.

3

Conduct research to better understand ecosystem processes, with particular emphasis on the ecology of protected and managed species and related species interactions, and how these might be influenced by climate change.

4

Make substantive progress toward an Integrated Ecosystem Assessment for the Northeast Shelf, and through this process, provide a broader range of ecosystem advice.

5

Advance capacity for bringing ecosystem considerations to bear in stock assessments by developing extended single species assessments that incorporate climate, ecosystem, and habitat considerations.



G

Improve understanding of economic and socio-cultural factors in marine resource management and apply this knowledge in the provision of management advice.

Targets

1

Develop more comprehensive benefit cost analyses that support ecosystem-based fisheries management goals.

2

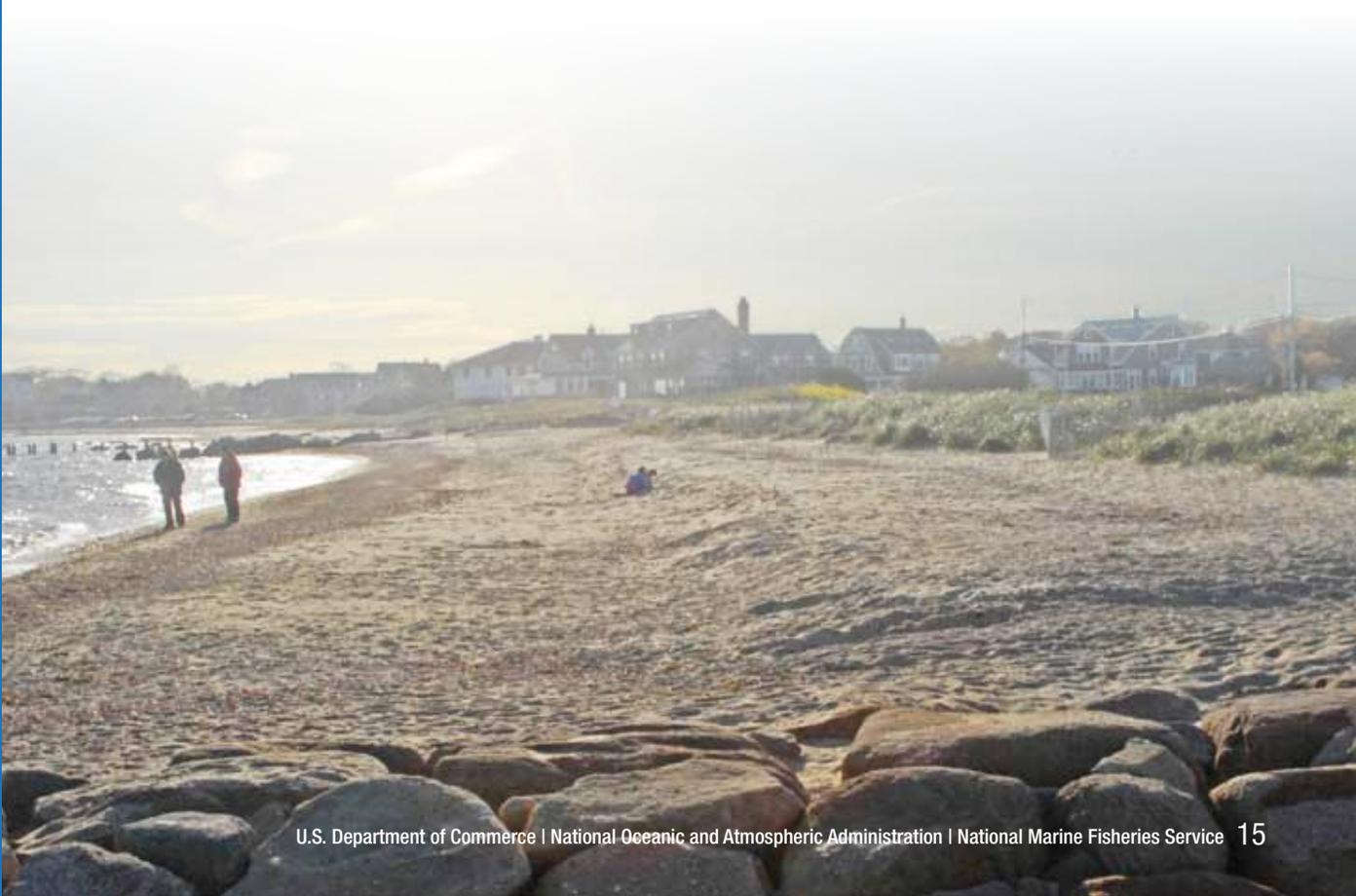
Expand the scope and depth of ecosystem services valuation.

3

Develop spatial dynamic models to evaluate a range of economic and regulatory policies that incorporate human behavior.

4

Strengthen progress towards ecosystem-based fisheries management goals by incorporating expertise from economists and social scientists and communicating findings.



Organizational Excellence

Foci:

H. Recruit, train, support, and retain a high-quality workforce.

I. Engage partners, stakeholders, and the public to increase transparency and collaborative opportunities and evaluate research goals and priorities.

J. Facilitate and advance Center-wide communication and collaboration.

K. Invest in infrastructure to support the mission.



H

Recruit, train, support, and retain a high-quality workforce.

Targets

1

Develop a fully engaged Center staff by creating a communicative and supportive working environment that rewards achievement, creativity, and innovation and empowers staff.

2

Assess staff training needs and interests and implement a plan to develop new skills.

3

Engage education and research communities to discover highly skilled and motivated employment candidates that reflect the diversity of the nation.

4

Improve, streamline and standardize administrative processes and systems where possible to improve overall efficiency.



Engage partners, stakeholders, and the public to increase transparency and collaborative opportunities and evaluate research goals and priorities.

Targets

1

Develop and implement an effective external communications and outreach strategy.

2

Engage regularly with research partners to review ongoing collaborations and identify new opportunities.

3

Redefine and restructure the Center's Cooperative Research Program to emphasize its role in building trust and improving data collection, science, and communication.



J

Facilitate and advance Center-wide communication and collaboration.

Targets

1

Develop and implement an effective internal communications and outreach strategy.

2

Work with staff and supervisors to identify and implement opportunities for interdisciplinary research.

3

Define and implement opportunities for cross training to improve program coordination and integration.

4

Maintain state-of-the-art communications capabilities to link all Center facilities.

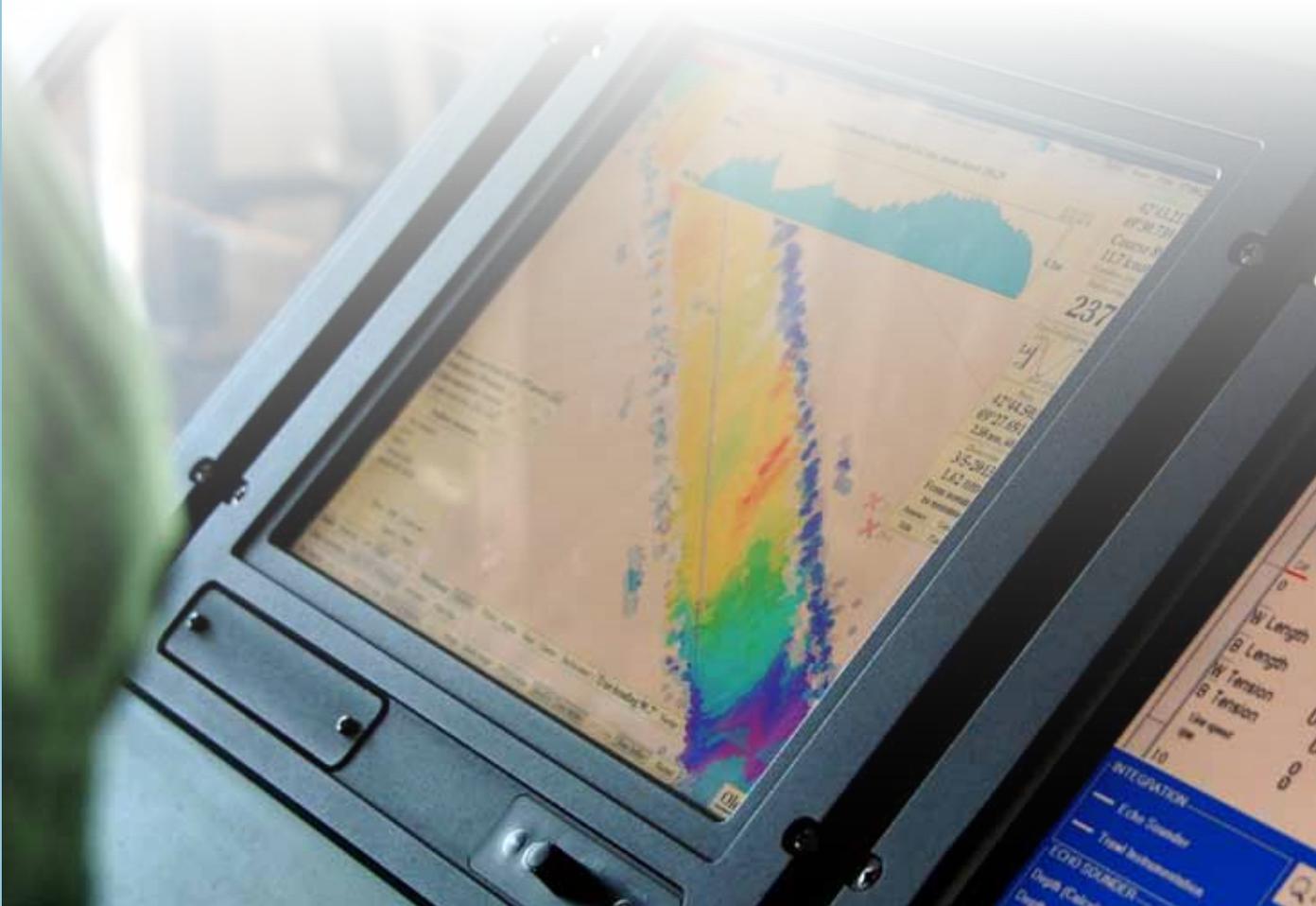


K

Invest in infrastructure to support the mission.

Targets

- 1 Improve Center information technology infrastructure to ensure that all staff have the resources necessary to carry out their work efficiently and effectively.
- 2 Design and implement state-of-the-art systems that integrate, manage, and disseminate all data and data products produced by Center scientists.
- 3 Continue efforts to address deficiencies in Center facilities and to improve working conditions for staff and contractors. Ensure that scientific collections are properly archived and maintained.
- 4 Maintain state-of-the-art communications capabilities to link all Center facilities.



Implementation

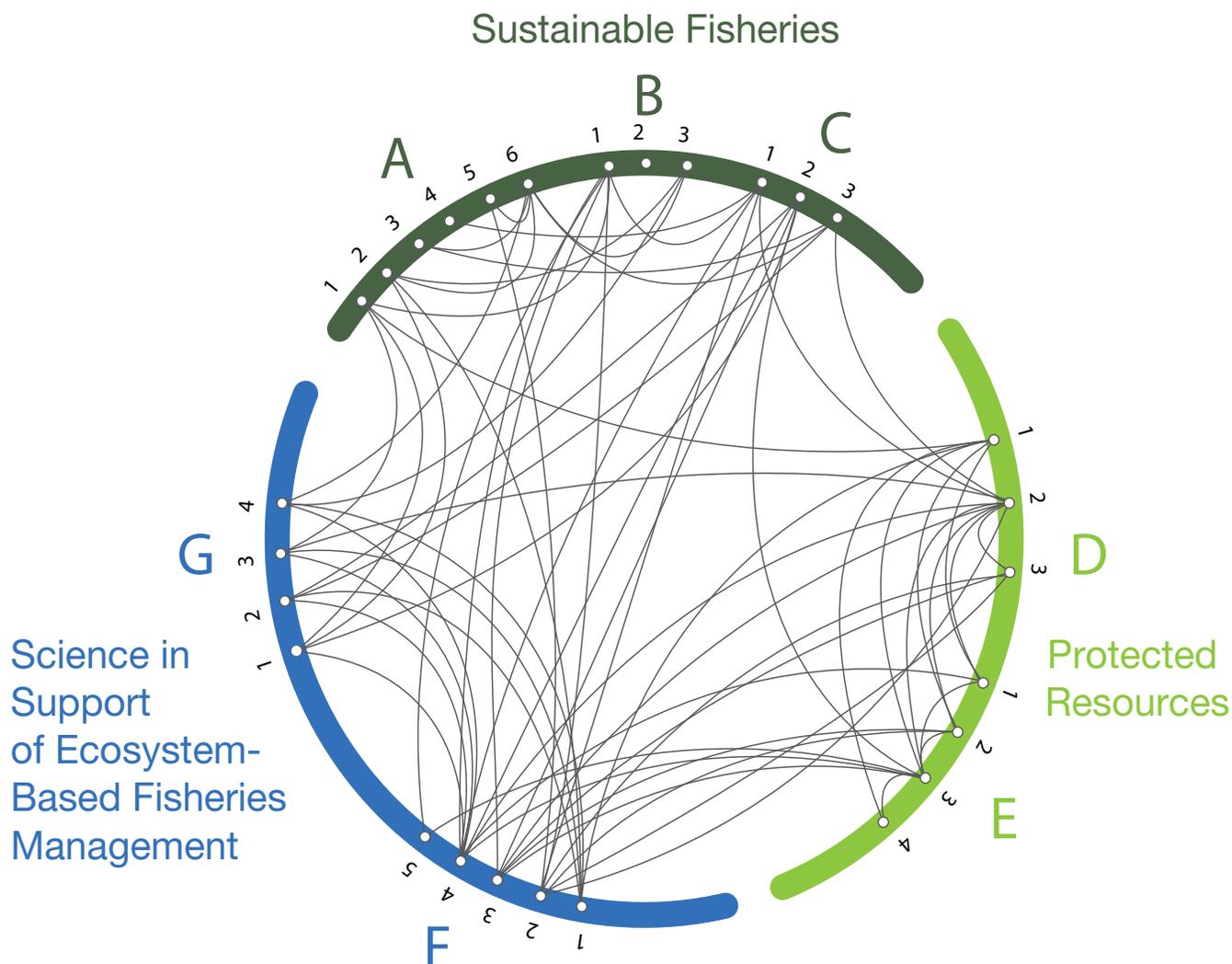
Throughout this plan we emphasize the importance of interdisciplinary, cross-cutting science. Externally, we must strengthen lines of communication and engagement with government, academic, and stakeholder partners in order to be successful. Internally, the plan must be recognized in our everyday decision making, reflected in our resource investments, and supported by our employees.

To achieve our full potential within the Center, we must break down internal barriers to communication and collaboration and overcome geographical impediments.

The graphic below is a visual representation of the connectivity across our science targets in the Sustainable Fisheries, Protected Species, and Science in Support of Ecosystem-Based Fisheries Management themes. These linkages allow us to leverage our capabilities, explore innovative solutions and gain efficiency across the science portfolio.

Moving forward, we will develop an implementation plan that enhances our annual evaluation and prioritization process for ongoing and proposed projects and describes in greater detail how the Center will provide ecosystem-based science supporting stewardship of living marine resources under changing climatic conditions.

Connections among targets (see following pages for a description of each target)



Summary of Targets by Theme

Sustainable Fisheries

A Improve accuracy and efficiency of data collection and enable seamless public access to our data and data products.

- A1** Review fishery-dependent sampling and data collection protocols (including observer sampling activities) to ensure assessment information needs are properly addressed and implement changes as appropriate.
- A2** Develop and implement an advanced, integrated system for collecting, managing and disseminating fishery-dependent data and ensure stakeholders are engaged in this process.
- A3** Continue to evaluate and implement advanced technologies for improving information used in assessments.
- A4** Conduct research and collaborate with industry to address assumptions in survey methodology, and improve the quality of and access to fishery-independent data.
- A5** Conduct research on consequences of different data collection, sampling, and assessment approaches on the uncertainty of assessment results.
- A6** Hold periodic workshops with partners and stakeholders to share information on trends, field observations, and scientific advances, and explore possibilities for cooperative and collaborative research to address priority research questions.

B Improve quality, efficiency, and responsiveness of stock assessments and other science-based advice.

- B1** Reform stock assessment process in collaboration with our partners to broaden participation and improve timelines and efficiency, responsiveness to management needs, and consideration of climate, ecosystem, and habitat factors.
- B2** Evaluate the Center's role in regulatory support, including economic and socio-cultural factors in fisheries management advice, to improve efficiency and effectiveness while minimizing impacts on research.
- B3** Evaluate and prioritize research needs on an annual basis to support improved assessments; meet with stakeholders to review progress on current cooperative projects and to plan and prioritize cooperative research that will improve assessments.

C Advance aquaculture to support sustainable production.

- C1** Conduct research on responses of aquacultured shellfish to changing environmental conditions including those associated with stressors and climate change.
- C2** Investigate the environmental compatibility of aquaculture practices emphasizing interactions with protected species and habitat and the valuation of ecosystem services.
- C3** Provide advice, research and analysis, and training services to NOAA, other regulatory agencies, the aquaculture industry, and the public.

D Improve accuracy and efficiency of data collection and enable seamless public access to our data and data products.

- D1** Develop and implement a comprehensive and integrated system for collecting, managing, and disseminating protected species data, including passive acoustics, telemetry, and survey results.
- D2** Collect ecosystem, species abundance and distribution, and socio-economic data to help identify emerging threats and assess how they affect distribution, behavior, and species interactions; adapt surveys to changing distributions and behaviors of stocks.
- D3** Enhance cooperative data collection for protected species, including finfish and invertebrates, their habitats, and environmental impacts.

E Improve quality, efficiency, and responsiveness of stock assessments and other science-based advice.

- E1** Update abundance estimates, at least every three to five years, and estimate population trends for marine mammals, turtles, and fish.
- E2** Monitor distribution and primary migration routes of protected species and identify shifts in patterns over time; adapt assessments as necessary.
- E3** Improve assessment of human threats to protected species by investing in more complex analyses and comprehensive data collection, particularly for species at higher risk and environmental factors that influence distribution and productivity.
- E4** Conduct research to develop and test effectiveness of mitigation measures to improve advice, making use of cooperative research arrangements and platforms where possible.

Protected Resources

Science in Support of EBFM

- F** Improve understanding of the influence of climate, ecosystem, habitat factors, and species relationships on living marine resource dynamics in order to provide integrated scientific advice for managers.
- F1** Build information technology systems needed to integrate data sources, perform related modeling, and work collaboratively among different research units and labs.
 - F2** Maintain essential ecosystem and climate observing programs and improve integration with other regional and national programs. Develop and implement an explicit role for cooperative research in support of this target.
 - F3** Conduct research to better understand ecosystem processes, with particular emphasis on the ecology of protected and managed species and related species interactions, and how these might be influenced by climate change.
 - F4** Make substantive progress toward an Integrated Ecosystem Assessment for the Northeast Shelf, and through this process, provide a broader range of ecosystem advice.
 - F5** Advance capacity for bringing ecosystem considerations to bear in stock assessments by developing extended single species assessments that incorporate climate, ecosystem, and habitat considerations.

G Improve understanding of economic and socio-cultural factors in marine resource management and apply this knowledge in the provision of management advice.

- G1** Develop more comprehensive benefit cost analyses that support ecosystem-based fisheries management goals.
- G2** Expand the scope and depth of ecosystem services valuation.
- G3** Develop spatial dynamic models to evaluate a range of economic and regulatory policies that incorporate human behavior.
- G4** Strengthen progress towards ecosystem-based fisheries management goals by incorporating expertise from economists and social scientists and communicating findings.

H Recruit, train, support, and retain a high-quality workforce.

- H1** Develop a fully engaged Center staff by creating a communicative and supportive working environment that rewards achievement, creativity, and innovation and empowers staff.
- H2** Assess staff training needs and interests and implement a plan to develop new skills.
- H3** Engage education and research communities to discover highly skilled and motivated employment candidates that reflect the diversity of the nation.
- H4** Improve, streamline and standardize administrative processes and systems where possible to improve overall efficiency.

I Engage partners, stakeholders, and the public to increase transparency and collaborative opportunities and evaluate research goals and priorities.

- I1** Develop and implement an effective external communications and outreach strategy.
- I2** Engage regularly with research partners to review ongoing collaborations and identify new opportunities.
- I3** Redefine and restructure the Center's Cooperative Research Program to emphasize its role in building trust and improving data collection, science, and communication.

J Facilitate and advance Center-wide communication and collaboration.

- J1** Develop and implement an effective internal communications and outreach strategy.
- J2** Work with staff and supervisors to identify and implement opportunities for interdisciplinary research.
- J3** Define and implement opportunities for cross training to improve program coordination and integration.
- J4** Maintain state-of-the-art communications capabilities to link all Center facilities.

K Invest in infrastructure to support the mission.

- K1** Improve Center information technology infrastructure to ensure that all staff have the resources necessary to carry out their work efficiently and effectively.
- K2** Design and implement state-of-the-art systems that integrate, manage, and disseminate all data and data products produced by Center scientists.
- K3** Continue efforts to address deficiencies in Center facilities and to improve working conditions for staff and contractors. Ensure that scientific collections are properly archived and maintained.
- K4** Maintain state-of-the-art communications capabilities to link all Center facilities.

Organizational Excellence



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September 2015

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