



Mid-Atlantic Fishery Management Council Comprehensive Five Year (2020–2024) Research Priorities

Approved December 2019

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Introduction

The 2006 reauthorization of the Magnuson-Stevens Act (MSA) required that each federal Council develop a five-year research priorities document. The research priorities developed by the Council should address “fisheries, fisheries interactions, habitat and other areas of research that are necessary for management purposes.” NOAA Fisheries and the regional science centers are to consider these research priorities when developing their own research priorities and budgets within the region of the associated Council(s).

The Mid-Atlantic Fishery Management Council (Council), in coordination with the Scientific and Statistical Committee (SSC), completed its first research priorities plan in 2008. That plan was primarily informed by reviewing research recommendations within the various stock assessment documents and the Council’s Research Set-Aside Program. The current version of the research plan (2016–2020) was approved in 2015 and the Council’s Visioning Project and Strategic Plan played a critical role in developing and identifying key themes and elements contained in the document. The current five-year research priorities document runs through 2020; however, the Council agreed to update the research plan early in order to align with and be informed by the development of the Council’s next Strategic Plan (2020–2024), the new 5-Year Cooperative Agreement and other Council priorities and guidance documents.

Throughout 2019, Council staff solicited input on existing research priorities and potential new priorities from the Advisory Panel, Monitoring Committee and SSC for each species/FMP as part of the fishery specification review process. The staff lead and NEFSC assessment lead then reviewed all of the species-specific input received and provide recommendations for Council consideration. The SSC also provided extensive feedback and input regarding existing and potentially new research priority themes.

The 2020-2024 comprehensive research priorities document begins with a review of the current priorities document to evaluate the use and utility of the document to the Council and its regional partners. Updated research themes are then included that incorporate SSC input and stakeholder feedback received during the current Strategic Plan development. Revised and re-prioritized species-specific research lists for Council-managed species are then provided. Lastly, short- and long-term strategies and approaches to improve the document's effectiveness are provided, including a review process to track research priority progress and the future direction of a comprehensive research and implementation plan.

Review of Current Five-Year Research Priorities

As mentioned above, the MSA specifies the Council develop a list of research priorities and those lists be provided to NOAA Fisheries and the NMFS Northeast Fisheries Science Center (NEFSC) to help inform science and budgeting needs and priorities for the region. However, there is little information or understanding as to how these research priority documents have been utilized by the Council and the NEFSC in allocating resources to address the identified science and management priorities. Understanding the utility and applicability of this document may be particularly important to understand given potential differences in overall science goals, objectives, and time/funding scales between the Council and NEFSC. These differences were noted by the SSC at their March 2019 meeting and they questioned how the plan is used by the Council and the NEFSC to inform priorities for funding and requested information on what research priorities in the current plan were addressed and if any of the research was used within the management process.

A review of Mid-Atlantic Council supported scientific and management projects from 2015–2018, not including any Research Set-Aside projects, was conducted to evaluate the use and utility of the current research plan (Table 1). During this time period, the Council supported 21 different projects covering all six

fishery management plans (FMPs) and nine different species. These projects covered a wide range of topics including biological information, survey data, stock assessments, social and economic trade-offs and management strategies. Council staff reviewed each project to determine if the project was identified in the current five-year research plan and whether or not it was used to help inform a stock assessment or management. Based on the staff review, the results indicate relatively high overlap of the research priorities plan to inform Council supported projects. Of the 21 total projects, 14 projects (67%) addressed specific research priorities (10) or addressed aspects of the priority themes (4) that are identified in the current research plan. When considering the applicability of the projects, the results are even greater. Over 90% of the projects (19 of the 21) have been, or likely will be in the future, used to support or inform a stock assessment or management action. While the results show high applicability of Council supported projects to inform stock assessments and management, how the current research priorities document was utilized by the Council and staff to inform priority projects and resource allocation is unclear. In 2016-2017, the Council's Collaborative Fisheries Research Program utilized the current five-year research priorities document to identify general specific research priority categories in the RFP and ultimately funded four projects specifically listed under the different species/FMP research needs. How the current five-year plan was used to inform and identify other Council supported projects (10 projects) is not as straightforward. Identifying and prioritizing these projects was largely driven by emerging issues and needs to inform a specific stock assessment or management question, but the research priorities document was not specifically considered.

A comprehensive evaluation of the utility and use of the research plan by the NEFSC is difficult to conduct and is not included here. However, the NEFSC 2016-2021 Strategic Plan¹, the FY2020 Annual Guidance Memo², and the 2020-2023 Greater Atlantic Region Strategic Plan³ include a number of research and science priorities that align with the broad research themes and needs identified in the Council's current five-year priorities document. Common priorities between the Council, NEFSC, and NEFSC/GARFO plans include: improving fishery data collection through increased use of electronic technologies, incorporation of ecosystem level information into stock assessments, improving stock assessment information, modelling approaches and capacity, and increased utilization and incorporation of social and economic information into the management process.

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¹The 2016–2021 Northeast Fisheries Science Center Strategic Plan can be found at: <https://nefsc.noaa.gov/rcb/stratplan/>

² The FY2020 Annual Guidance memo can be found at: <https://nefsc.noaa.gov/rcb/stratplan/agm-fy20-final.pdf>

³ A presentation outlining the strategic goals of the 2020–2023 Northeast Regional Plan can be found at: https://s3.amazonaws.com/nefmc.org/14a.-190531_Strat-Plan-Presentation.pdf

Table 1. Summary of Mid-Atlantic Fishery Management Council supported projects from 2015-2018 used to support science and management needs.

Project Title (Year Started)	Primary Species/FMP	From 5-year research plan (Y/N)	Used in Assessment and/or Management (Y/N)
Acceptable Biological Catch (ABC) Control Rule and Risk Policy Management Strategy Evaluation (2017-2018)	Omnibus	Y	Y - Management
Surf clam species diagnostics and population connectivity estimates to inform management (2018)	SCOQ	N	Possibly Yes in future
Summer Flounder Recreational Management Strategy Evaluation (2018)	Summer Flounder	Not specific research item but related to issues addressed in introduction	Likely Yes in future
Summer Flounder Commercial/Recreational Allocation Model (2016)	Summer Flounder	Y	Y - Management
Summer Flounder Commercial/Recreational Allocation Model Update (2018)	Summer Flounder	Y	Likely Yes in future
Summer Flounder Recreational Measures Model (2015)	Summer Flounder	N	N
Estimating and mitigating the discard mortality rate of black sea bass in offshore recreational rod-and-reel fisheries (2016)	Black Sea Bass	Not specific research item but related to issues addressed in introduction	Not yet
Determining Selectivity and Optimum Mesh Size to Harvest Three Commercially Important Mid-Atlantic Species (2016)	SF/S/BSB	Not specific research item but related to issues addressed in introduction	Y - Management
Collaborative development of a winter habitat model for Atlantic Mackerel, version 2.0, for the identification of "cryptic" habitats and estimation of population availability to assessment surveys and the fishery (2016)	Atlantic Mackerel	Y	Y - Management
Changes in availability of Mid-Atlantic fish stocks to fisheries-independent surveys (2016)	SF/BSB/Spiny Dogfish	N	Not yet
Fisheries-independent pilot survey for golden (<i>Lopholatilus chamaelonticeps</i>) and blueline (<i>Caulolatilus microps</i>) tilefish throughout the range from Georges Bank to Cape Hatteras (2017)	Golden Tilefish and Blueline Tilefish	Y	Y - Management

Developing and Testing Stock Assessment Models for Black Sea Bass Using Stock Synthesis (2016)	Black Sea Bass	Y	Not directly, support for primary assessment model
Black Sea Bass Habitat Research Needs in the Mid-Atlantic (2017)	Black Sea Bass/Habitat	N	N?
Evaluating the Importance of Chub Mackerel in HMS Diets (2018)	Chub Mackerel	N	Not yet
A Genetic-based Investigation of Blueline Tilefish: Development of molecular markers and an assessment of stock structure and connectivity (2015)	Blueline Tilefish	Y	Y - Both
Blueline tilefish biological sample collection (2016)	Blueline Tilefish	Y	Y - Assessment
Atlantic mackerel stable isotope analyses (2017)	Atlantic Mackerel	Y	Y - Assessment
Blueline Tilefish DLM Toolkit - ABC Recommendations (2017-2018)	Blueline Tilefish	N	Y
Delphi Process - Blueline Recreational Catch (2016)	Blueline Tilefish	N	Y
Mackerel Quota DLM/MSE (2017)	Atlantic Mackerel	Y	Y
Implementing Electronic Logbook Reporting for Mid-Atlantic For-Hire Fisheries (2016 - 2017)	Omnibus / Recreational Fisheries	Not specific research item but one of major themes	Y - Management

Research Priority Themes

Similar to the approach taken with the 2016–2020 Research Priorities document, key research themes are included to address broad concepts that cut across a number of Council-managed species. These themes are also responsive to input received during the Council’s development of the updated (2020–2024) Strategic Plan regarding the data and science used in the management process. For example, the updated Strategic Plan revises the Council’s Science goal to address public input on data accuracy and credibility and the use of collaborative research in the science and management process. The Science goal, *ensure that the Council’s management decisions are based on timely and accurate scientific information and methods*, focuses on the core of the Council’s mandated science-based decision-making process. In addition, the updated Strategic Plan now includes an Ecosystem goal that specifies the Council *support the ecologically sustainable utilization of living marine resources in a manner that maintains ecosystem productivity, structure, and function*. This goal seeks to address a wide range of Council issues related to climate change, forage, habitat, species interactions, and other factors that impact the health of the marine ecosystem. These research priority themes are directly related to and support a number of the Science and Ecosystem objectives and strategies identified in the updated Strategic Plan. Aligning the Council’s research priorities with the Strategic Plan will help ensure consistency, appropriately prioritize Council resources, and improve coordination of science and management efforts throughout the region.

A. Stock assessment improvement

Improvements to the data and analysis supporting the stock assessment process was identified as the Council’s top priority in the 2016–2020 research priorities document and the SSC strongly recommended the continued focus on stock assessment improvements in this edition as well. Significant stock assessment

improvements have been made for a number of Council managed species including black sea bass, ocean quahog, Atlantic surfclam, and summer flounder. A major focus of the current document was for all Council-managed species to have a quantitative assessment. While not all species have a quantitative framework, Atlantic mackerel now has an approved benchmark assessment with fishing and biomass proxy reference points, and *Illex* squid is scheduled for a research track assessment in the fall of 2021. However, since the implementation of the current research document, the Council has added two more species (blueline tilefish and chub mackerel) to its list of managed species responsibilities, neither of which has acceptable quantitative stock assessments. The Northeast Region Coordinating Council (NRCC) recently approved a new stock assessment process that makes assessments more flexible, increases research opportunities and establishes a long-term assessment schedule. This process will provide for applied stock assessment research, more timely stock assessment information, and should provide for significant advancements in the regions stock assessment capabilities and capacity.

While advancements have been made and new information obtained (see Table 1 for examples), continued focus and advancement of data collection programs that improve size/age composition of the catch, discard estimates and associated mortality rates, and fishery independent abundance information remains a priority. Feedback obtained during the development of the new Strategic Plan also highlight the need for continued science-based industry collaboration and increased utilization of fishing fleet information and on-water observations. In addition, building off the efforts in the recent summer flounder benchmark that included the development of the Ecosystem Context for Stock Assessment report, continued development and inclusion of ecosystem factors and environmental covariates in stock assessments remain a priority.

B. Research to support measures which reduce/eliminate discards

Obtaining accurate discard information and the management challenges to reduce regulatory discards remain, particularly within the recreational sector. Stakeholder feedback during the development of both strategic plans and during many Advisor Panel meetings focus on the need significantly reduce discards and develop new management strategies to convert regulatory discards into harvest to provide both economic and biological benefits. Reducing regulatory discards through improved gear performance, and the development of management procedures and approaches to allow for greater retention of catch or the avoidance of unmarketable, sub-legal or otherwise prohibited species should continue to be explored.

The Council has supported a variety of discard related projects (see Table 1), primarily in the summer flounder, scup and black sea bass fisheries. However, findings from those projects have yet to directly change management approaches and additional research, data collection and management strategies are needed. In addition, there is a need for continued focus on collaborative research opportunities with both commercial and recreational vessels to evaluate gear selectivity, discard mortality estimates, and innovative management strategies to avoid and minimize discards.

C. Collect and incorporate social and economic data into fishery management decision process and stabilize yields

The continued collection, analysis, and increased utilization of social and economic information in the Council's decision process remains a high priority for the Council and stakeholders. While the Council has been successful in meeting the biological mandates of the MSA, the resulting social and economic consequences have been viewed as unnecessarily severe by both commercial and recreational stakeholders. Unfortunately, basic information on the number of fishermen and their permits, the associated costs to determine profitability of vessels in a port, and how profits change with regulatory changes, is often limited.

Over the last several years, the Council initiated or implemented a number of socioeconomic related policy and management actions. One policy within the Council's EAFM guidance document is to evaluate ecosystem-level trade-offs, including social and economic considerations. The Council has made significant EAFM advancements including the completion of an EAFM risk assessment which identified 12 different social and economic risk elements that may threaten achieving the social and economic objectives the Council may have for its fisheries. Building off the results of the risk assessment, the Council is currently piloting the development a summer flounder conceptual model that will consider the biological, socioeconomic, and management high priority risk elements affecting summer flounder and its fisheries. Once complete, the Council will consider conducting a comprehensive management strategy evaluation (MSE) to answer management questions and objectives identified from the conceptual model which may focus on social and economic targets, thresholds, and trade-offs. Development of MSE approaches for its managed species, with particular focus and inclusion of socioeconomic considerations, remains a high priority.

Beyond EAFM related activities, the Council is considering potential changes to its risk policy to more fully account for economic objectives. Utilizing the results of two different MSE projects, the Council evaluated nine different risk policy alternatives that consider both biological and economic impacts and trade-offs. For the future, the Council has expressed interest in explicitly including both biological and economic factors in the risk policy and the potential development of a forage-based specific risk policy. Additional data collection programs and quantitative modeling approaches need to be conducted to more comprehensively evaluate the biological and socioeconomic implications of these risk policy modifications.

In addition, the Council recently approved changes to the acceptable biological catch (ABC) control rule to allow for constant, multi-year ABCs using the average ABCs (or average risk of overfishing) to provide for management and fishery stability (a goal identified in the 2016–2020 research priorities document). However, the social and economic implications and trade-offs of this approach have not been conducted.

A recent joint Council-SSC meeting primarily focused on increased capacity and utilization of the SSC to provide needed social and economic science information to the Council, highlighting the continued importance and prioritization of this theme. The SSC recommended the Council, working with GARFO, begin to incrementally implement reporting and recordkeeping requirements throughout its FMPs to collect basic social and economic data.

The majority of the social and economic information available is collected through voluntary surveys with permitted vessels, dealers, and processors. Participation in these voluntary surveys has declined for many Mid-Atlantic fisheries, resulting in less socioeconomic information available to understand and evaluate changes in fleet dynamics and profitability. New or additional data collection programs need to be developed in collaboration with the fishing industry to help ensure buy-in and trust in providing this type of information. Highlighting the need, utility, and benefits of providing this information can help alleviate some industry concerns and promote support for these types of data collection efforts.

D. Evaluation of existing allocations to fishery sectors

A number of Council managed species allocate the ABC by fishery sector and, in some cases, by state. The fairness, equity and overall management structure of many of the current allocation scenarios have been questioned by stakeholders and fishery managers. In addition, stakeholders have noted the general inflexibility of the fixed quota allocation system currently in place and recommended that the Council consider alternative methods to allocate annual quotas. Changing species distributions, stock productivity

and the recently updated Marine Recreational Information Program (MRIP) catch timeseries have only added to the desire to reconsider current allocation scenarios. The EAFM risk assessment results indicated “allocation” was a high-risk element for 12 of the Council’s fisheries and/or sectors, the most of any risk element considered. Recent Council actions (e.g., Summer Flounder Commercial Issues Amendment) have tried to address allocation issues, but not all stakeholders have been supportive of the efforts to date and many more allocation decisions remain. Therefore, there remains a strong need to identify methods and analyses (e.g., management strategy evaluation and scenario planning) that help identify alternative management strategies and determine optional allocation options that incorporate biological, social and economic considerations.

E. Recreational data collection and utilization

The SSC recommended the Council include recreational data collection as a priority research theme in the updated research priorities document. The incorporation of the new MRIP recreational catch timeseries into stock assessments and the implications within the management system are just beginning to be considered and addressed by the Council. The SSC noted the inclusion of the new MRIP catch timeseries and the differential catch trends among Council managed species introduces an important new source of scientific uncertainty. The recent passing of the Modernizing Recreational Fisheries Management Act of 2018 adds to the uncertainty of recreational fisheries management but may also provide for opportunities to collect new/additional information and dedicate resources to improving management approaches for recreational fisheries. For example, Sections 201 and 202 of the Act require increased incorporation of various recreational data sources and an evaluation of alternative data collection methods (e.g., smart phone apps and other electronic reporting options). In addition, the NOAA Fisheries recently announced the formation of a recreational electronic reporting task force to help in the development and advancement of electronic data collections programs. Outcomes from this task force could compliment any Council recreational data collection initiatives.

This theme also looks to not only advance new and additional recreational data collection programs to support Council activities, but to also develop new and alternative methods to evaluate and incorporate recreational data into the management process. Approaches such as the use of management strategy evaluations for example, to improve management approaches for the use of recreational data should be perused.

F. Collect ecosystem data and development of ecosystem tools and management strategies to support EAFM initiatives

The Council’s 2020–2024 Strategic Plan, the 2016–2021 NEFSC Strategic Plan and the 2020–2023 Greater Atlantic Region Strategic Plan all include a focus on ecosystem science as a major goal, theme or strategy. There is broad support for the continued collection of ecosystem-level climate, habitat, fleet dynamics, and species interaction information to help improve our understanding on the current and anticipated impacts of climate change on the region’s fisheries and the broader marine ecosystem. Advances in scientific information and understanding will lead to the continued improvement, development, and utilization of ecosystem tools, products, and processes such as the Integrated Ecosystem Assessment, State of the Ecosystem reports, and the Climate-Ready Fisheries Management, respectively. The future success of the Council’s EAFM process relies on the continued support of these activities and requires the investment in ecosystem science and data collection, analytical tools, and management strategies.

G. Climate change impacts on stock productivity and distribution shifts

Climate-related changes in the Mid-Atlantic have already been widely observed and documented by fishermen, managers, and scientists. These changes in the environment have led to shifts in stock distributions, possible changes in stock productivity and have the potential to impact the Council’s ability to effectively manage these resources. Climate induced changes to ocean acidification, food web dynamics, and habitat can also affect growth, natural mortality, and fecundity which can also have implications for stock productivity. While this research theme is embedded in a number of the other included themes (e.g., stock assessment, socioeconomic considerations, allocation and EAFM initiatives), the SSC recommended it be a stand-alone theme given the importance of this issue and its linkages to other research and management priorities. Incremental scientific advances under this theme can inform efforts and activities under other priority themes. NOAA Fisheries recently released a technical memo⁴ outlining a six-step science-management process to incorporate, account for and respond to changing climate conditions and the impacts to fisheries. Enhanced data collection programs to detect change and the development of short/mid-range distribution forecast models to understand the drivers and magnitude of change and the associated biological and management risks are critical research needs. Developing management strategies and governance structure options through MSE simulation, scenario planning and/or structured decision making are necessary to create adaptive approaches to respond to continually changing conditions and risks.

Species Specific Priorities List

The 2016–2020 species-specific research priorities were primarily derived from the research needs identified by the SSC and the stock assessment workgroup following the most recent benchmark stock assessment for a specific species. A broader and more comprehensive process to solicit input on research priorities was undertaken for this document. Input on current and new priorities was provided by the Advisory Panel, Monitoring Committee, and the SSC as part of the specification review/setting process for each Council-managed species. Staff then worked with the Council species lead and the NEFSC assessment lead to review all input received, as well as the research priorities identified in the benchmark stock assessment reports and SSC meeting reports, to develop a revised list of species-specific research priorities. It is important to note that these lists are not meant to be exhaustive and cover every issue, science need or management topic that has been raised for a particular species. These lists are meant to focus on some of the more critical and important areas of consideration to advance science, stock assessment approaches and results, and improve management outcomes.

In addition, a different organizational and prioritization approach for the species-specific priorities list was developed for this document. Draft research priorities are now separated into two different categories, short-term/smaller scale and long-term/larger scale projects. Within each category, the different research topics are then listed in priority order. This type of approach was suggested by the SSC and is meant to reflect the different end users of this document – the Council, the NEFSC and other science partners – and to devise a document that is both tactical and strategic in addressing the most important research and science needs for effective management by the Council. The short-term/smaller scale priorities provide a tactical approach to answer specific scientific and management questions, particularly when limited resources (i.e., funding, expertise and staff) are available. It should be noted that the use of the term “scale” to describe and categorize priorities does not refer to spatial or geographic scale, but references the size and scope of a

⁴ Karp, M.A. et. al. 2018. Accounting for Shifting Distributions and Changing Productivity in the Fishery Management Process: From Detection to Management Action. U.S. Dept. of Comm, NOAA. NOAA Technical Memorandum NMFS-F/SPO-188, 37 p. <http://spo.nmfs.noaa.gov/tech-memos>

particular priority. A short-term/smaller scale priority could be large in spatial/geographic scale but focus on a specific question in which data collection and research could be completed in a short period of time with less resources needed to complete. These priorities are where the Council would likely focus its attention and are the types of projects the Council has typically supported in the past when opportunities are available. Addressing these short-term/small scale projects can lead to incremental advances in support of long-term/larger scale priorities. These priorities are more strategic and seek to address larger concepts and issues that likely require significant resources over an extended period of time. This approach allows the Council, NEFSC and other partners to leverage resources, for example matching funds and technical expertise, to identify funding opportunities to address these larger projects. The SSC also indicated they could provide this type of information (i.e., short/smaller versus long/larger) when developing research priorities during the ABC setting process.

Below is the updated comprehensive list of research priorities for each Council-managed species, in alphabetical order. In addition to the species-specific lists, there is also a list of research priorities that are more general and/or have applicability across several or all Council-managed species. For example, priorities related to habitat, socioeconomic information, allocation strategies and stock structure dynamics are topics that are covered in this section. As mentioned above, these lists are organized by short-term/smaller scale and long-term/larger scale projects and are in priority order under each grouping. Lastly, in order to ensure individual research priorities address the broader priority themes identified by the Council, the corresponding theme(s) associated with each research priority are identified in column on the right.

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Comprehensive list of research needs for Mid-Atlantic Council managed species (updated December 15, 2021)

GENERAL OR CROSS-SPECIES	Corresponding Theme(s)
SHORT-TERM/SMALLER SCALE	
1. Investigate stock structure utilizing otolith microchemistry and other genetic analyses for different Mid-Atlantic stocks (e.g., golden and blueline tilefish, black sea bass, Atlantic mackerel, and surfclam).	A, F, G
2. Understand the objectives and performance measures for the fishery from a biological and socioeconomic perspective, to evaluate the balance of costs and benefits of ABC specifications (e.g., variable vs. average ABC).	B, C
3. Explore the utilization of local ecological knowledge to help characterize and understand fisheries habitat change over time to help identify areas of greatest need of protection.	C, F, G
4. Create a framework to improve social science information regarding crew employment, remuneration and job satisfaction for all Mid-Atlantic fisheries.	C
5. Evaluate the potential impacts of offshore wind development, including the impacts from electromagnetic fields and noise, on habitats, and productivity, larval distribution, and changing community structure of Council-managed stocks.	A, F, G
6. Evaluate the impacts of offshore wind energy development on fisheries-independent surveys (e.g., implications for data collection efforts, survey design, and uncertainty).	A, F, G
7. Evaluate the relationship between changes in landings limits and the rates and magnitude of discarding in the commercial and recreational fisheries.	B, C, D, E
8. Evaluate the use of samples collected by the industry study fleet for all Mid-Atlantic stocks.	A, B, F, G
LONG-TERM/LARGER SCALE	
9. Monitor changes in distribution and habitat use for all Mid-Atlantic species and evaluate implications for stock productivity.	A, B, D, F, G
10. Collect accurate size and age composition of commercial and recreational catch (including the discarded component of the catch) to develop or improve catch at age matrices for all managed stocks.	A, B, E
11. Incorporate ecosystem level data (predator/prey interactions, trophic dynamics, etc.) into single and multi-species assessment and management models.	A, F, G
12. Investigate potential sector and regional allocation changes and adaptive management strategies to respond to changing environmental conditions.	C, D, F, G
13. Develop tools to collect representative economic information on fixed and variable trip costs to understand fleet profitability for all Mid-Atlantic fisheries.	C, E, F
14. Evaluate potential socioeconomic impacts of offshore wind energy development on Council-managed fisheries, including changes in fishing behavior, changes in the distribution of fishing effort, changes in revenues, and differential impacts on commercial and recreational fisheries.	C, E, F A
15. Implement novel supplemental surveys to derive fishery independent indices of abundance (black sea bass, blueline and golden tilefish, Atlantic mackerel).	
ATLANTIC MACKEREL	
SHORT-TERM/SMALLER SCALE	
16. Continue to collect and evaluate mackerel egg data (ECOMON survey).	A
17. Revisit stock structure and spawning components based on recent otolith microchemistry and/or genetic data.	A, F, G
LONG-TERM/LARGER SCALE	

18. Evaluation of time and age-variant natural mortality and predation mortality for this stock	A, F, G
19. Evaluate data quality and assessment sensitivities for U.S. recreational data, and unmonitored Canadian data.	A
20. Develop methods for using acoustics to determine Atlantic mackerel abundance and/or catchability.	A
21. Initiate a reproductive study in the U.S. to obtain fecundity estimates and spawning seasonality. Update Canadian fecundity estimates (which are currently based on a 1986 publication) and compare estimates between countries.	A
22. Obtain biological samples from all components of the fishery and covering both spawning contingents.	A
23. Continue to pursue modeling approaches that explicitly account for the spatial structure of the stock (i.e. two spawning contingents).	A
24. Investigate possible growth and maturity differences between spawning contingents.	A
25. Explore potential changes in environmental conditions (habitat changes, larval diets, cannibalism, etc.) that impact larval survival and recruitment.	A, F, G

BLACK SEA BASS	Corresponding Theme(s)
SHORT-TERM/SMALLER SCALE	
26. Evaluate the biological, management, and socioeconomic drivers of recreational harvest and discards.	B, C, E
27. Improve the precision of recreational and commercial discard estimates and estimate the uncertainty of recreational and commercial discards with emphasis on commercial pot trap and hook and line gear.	A, B
28. Continued evaluation of the appropriateness of the current model structure with two spatial sub-units.	A
LONG-TERM/LARGER SCALE	
29. Investigate movement rates and cues within the population, and spatial patterns in growth, recruitment, and mortality.	A, G
30. Investigate the impact of a changing environment due to climate change on the life history and spatial dynamics of the stock and fisheries.	A, F, G
31. Consider or investigate new or alternative methods that effectively sample in black sea bass habitats.	A

BLUEFISH	Corresponding Theme(s)
SHORT-TERM/SMALLER SCALE	
32. Enhance the data collection of recreational discard lengths and weights to develop a more reliable recreational discard estimate in weight.	A, B, E
33. Evaluate species associations with recreational angler trips targeting bluefish to potentially modify the bluefish recreational CPUE index used in the assessment.	A
34. Evaluate methods for integrating disparate indices produced at multiple spatial and temporal scales into a stock-wide assessment model.	A
35. Evaluate changes in selectivity of age-0 bluefish in fishery independent surveys due to shifting environmental conditions. Investigate trends in recruitment.	A, G
36. Conduct a post-release mortality study to determine if the recreational discard mortality rate has changed over time.	A, B, E

37. Investigate the assumption of zero discards in the commercial fishery.	A, B
LONG-TERM/LARGER SCALE	
38. Develop a fishery independent index and/or fishery dependent sampling program of offshore populations of bluefish to capture larger, older fish.	A, G
39. Investigate how environmental variability may affect timing of migration patterns of juvenile bluefish and the distribution of adults, which in turn, may affect availability.	A, G

BLUELINE TILEFISH	Corresponding Theme(s)
SHORT-TERM/SMALLER SCALE	
40. Identify data sources and sampling methods to improve the biological length samples of commercial and recreational landings to better characterize the size distribution of removals.	A, E
41. Review and consider enhancements to improve mandatory logbook reporting for all recreational anglers and collect fishery-dependent information such as effort, total catch and length information on harvested and discarded fish.	A, B, E
42. Collect additional biological samples to enhance understanding of life history dynamics and biological characteristics of the stock (e.g., age and size of maturity, maximum age, fecundity, spawning periods).	A
LONG-TERM/LARGER SCALE	
43. Investigate new stock assessment approaches, including non-equilibrium methods, should be explored.	A
44. Research the reliability of aging methods and determination of growth parameters (e.g., intensive tagging survey). Collect additional age information from the commercial and recreational sectors.	A
45. Conduct habitat studies of deep-water sites in the mid-Atlantic (Norfolk Canyon, Baltimore Canyon, and Hudson Canyon).	A, G

BUTTERFISH	Corresponding Theme(s)
SHORT-TERM/SMALLER SCALE	
46. Examine the efficiency (including day vs. night) of survey gear and potential changes in butterfish catchability including a parallel catchability estimate for NEFSC Spring surveys so that both Spring and Fall surveys can be included in the model.	A
47. Evaluate approaches to include additional surveys (e.g., states) in the assessment model.	A
48. Evaluate the uncertainty in the ad hoc F_{MSY} proxy and effects on catch advice.	A
49. Consider development of reference points that are internal to the stock assessment model.	A
LONG-TERM/LARGER SCALE	
50. Further investigate methods to inform population scaling within assessments.	A
51. Further investigate the role of butterfish in the ecosystem and refine predation estimates.	A, F
52. Reconsider stock structure and degree of exchange with south Atlantic stock component (i.e., stock ID).	A, G

CHUB MACKEREL	Corresponding Theme(s)
SHORT-TERM/SMALLER SCALE	

53. Develop expanded discard estimates for the region and better quantify South Atlantic catch.	A
54. Collect length, age, growth, maturity information from fishery independent and dependent data sources throughout U.S. Atlantic water.	A
55. Evaluate catch per unit effort including the influence of environmental and socioeconomic factors.	A, C, G
56. Investigate existing egg and larval surveys throughout the U.S. Atlantic coast to better understand chub mackerel recruitment dynamics.	A
LONG-TERM/LARGER SCALE	
57. Investigate stock mixing throughout Atlantic waters, as applicable.	A
58. Investigate habitat use at different life stages.	A, F

GOLDEN TILEFISH	Corresponding Theme(s)
SHORT-TERM/SMALLER SCALE	
59. Continue to utilize fishery-independent information to assess whether the dome-shaped selectivity curve used in the assessment reflects fishery selectivity or availability, or both.	A
60. Continue to collect and analyze biological samples to create year specific age-length keys and to improve life history, maturity and distribution information.	A
61. Develop sampling programs to increase information of recreational landings at size and age.	A, E
62. Continue to assess the accuracy and reliability of aging techniques.	A
63. Evaluate data collection methods to increase information on gear conflicts, species interactions (i.e., spiny dogfish), and bait type to understand their effects on the commercial CPUE index.	A, B, F
LONG-TERM/LARGER SCALE	
64. Evaluate the role of the golden tilefish gear restricted areas on the stock and its fisheries.	A, F
65. Evaluate the effects of climate and environmental indices on stock dynamics.	A, F, G

ILLEX SQUID	Corresponding Theme(s)
SHORT-TERM/SMALLER SCALE	
66. Collect demographic information on growth, mortality, reproduction by sex, season, and cohort.	A
67. Investigate feasibility of real-time management, including undertaking cooperative research with the fishing industry.	A, C
68. Analyze the change in availability of <i>Illex</i> to the survey and fishery, resulting from long-term changes in climate or other oceanographic factors.	A, F
69. Expand investigations into oceanographic correlates with trends in recruitment and abundance.	A, F
LONG-TERM/LARGER SCALE	
70. Quantify escapement over the headrope and wings of the NEFSC survey trawl.	A
71. Investigate beyond-shelf availability.	A

LONGFIN SQUID	Corresponding Theme(s)
SHORT-TERM/SMALLER SCALE	
72. Further develop practicable ways to reduce bycatch.	B

73. Refine understanding of availability and catchability in surveys (e.g., fall NEAMAP-Bigelow comparisons and conversion factors).	A
74. Collect more age, sex and maturity data for each seasonal cohort.	A
75. Evaluate effectiveness of current mesh regulations.	B
LONG-TERM/LARGER SCALE	
76. Quantify escapement over the headrope and wings of the NEFSC survey trawl.	A
77. Determine what portion of stock is outside current research trawl surveys. Until real-time assessment is feasible, expand cohort analysis to refine stock assessments and their incorporation of seasonal indices (currently spring and fall are just averaged).	A A
78. Evaluate approaches to real time management including expanding age and growth studies to better estimate average growth patterns and to discern seasonal productivity/catchability patterns.	A
79. Evaluate methods of incorporating ecological relationships, predation, and oceanic events that influence abundance and availability.	A, F
80. Refine understanding of stock range and structure.	A, G

OCEAN QUAHOG	Corresponding Theme(s)
SHORT-TERM/SMALLER SCALE	
81. Conduct research to better understand life history for an extremely long-lived species at appropriate temporal and spatial scales (growth, size-at-age, recruitment, natural mortality, maturity-at-length, and fecundity – in order of priority).	A
82. Evaluate the cost and benefit of different technological methods (e.g., HABCAM, EM, AI, and optical surveys) for measuring ocean quahog abundance, length frequency, and habitat.	A, F
LONG-TERM/LARGER SCALE	
83. Conduct work to support spatially explicit stock assessments that account for source and sink differences in productivity (i.e., are some areas more important to productivity than others).	A
84. Development of techniques to age ocean quahogs in a cost-effective manner.	A

SCUP	Corresponding Theme(s)
SHORT-TERM/SMALLER SCALE	
85. Explore the relationship between scup market trends, regulatory changes, and commercial landings and discards.	B, C, F
86. Evaluate the spatial and temporal overlap of scup and squid to better understand and characterize scup discard patterns.	A, B, F
87. Characterize the pattern of selectivity for older ages of scup in both surveys and fisheries.	A
LONG-TERM/LARGER SCALE	
88. Continue to evaluate the role and relative importance of implemented management strategies (i.e., gear restricted areas, increased minimum mesh size, and minimizing scup and squid fishery interactions) and expand analysis to consider the long-term climate variability to the increases in stock abundance and high recruitment events since 2000.	A, B, D, F, G
89. Characterize the current scup market and explore the development of new markets.	C

SPINY DOGFISH	Corresponding Theme(s)
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SHORT-TERM/SMALLER SCALE	
90. Integrate recent information on the efficiency of the NEFSC survey gear as it relates to: distribution of spiny dogfish beyond the current NEFSC trawl survey geographic footprint (including inter annual differences); gear efficiency; depth utilization within the footprint; distribution within the survey footprint under different environmental conditions.	A, G
91. Explore model-based methods to derive survey indices for spiny dogfish.	A
92. Investigate alternative stock assessment modeling frameworks that evaluate: the effects of stock structure; distribution; updated biological information such as sex ratio and spiny dogfish productivity; state-space models; and sex-specific models.	A
93. Evaluate the utility of the study fleet information as it relates to issues identified under priority #86 above.	A
LONG-TERM/LARGER SCALE	
94. Research opportunities to increase domestic and/or international market demand.	C
95. Expand information on the efficiency of the NEFSC survey gear as it relates to: distribution of spiny dogfish beyond the current NEFSC trawl survey geographic footprint (including inter annual differences); gear efficiency; depth utilization within the footprint; distribution within the survey footprint under different environmental conditions.	A, G
96. Continue aging studies for spiny dogfish age structures (e.g., fins, spines) obtained from all sampling programs (include additional age validation and age structure exchanges), and conduct an aging workshop for spiny dogfish, encouraging participation by NEFSC, Canada DFO, other interested state agencies, academia, and other international investigators with an interest in dogfish aging (US and Canada Pacific Coast, ICES).	A
97. Evaluate ecosystem effects on spiny dogfish acting through changes in dogfish vital rates.	A, F, G

SUMMER FLOUNDER		Corresponding Theme(s)
SHORT-TERM/SMALLER SCALE		
98. Collect length, weight, and age data by sex to fully evaluate the sex and size distributions of landed and discarded fish in the summer flounder fisheries.		A, B, E
99. Evaluate summer flounder discard survival under different environmental variables and gear configurations with survey design considerations that account for feeding and predation.		A, B, E
LONG-TERM/LARGER SCALE		
100. Continue to evaluate the causes for decreased recruitment, changes in recruitment distribution, and changes in the recruit-per-spawner relationship in recent years. Develop studies, sampling programs, or analyses to better understand how and why these changes are occurring, and the implications to stock productivity.		A, F, G
101. Evaluate range expansion and/or changes in distribution and their implications for stock assessment and management.		A, F, G
102. Explore the potential mechanisms for recent slower growth that is observed in both sexes.		A, F, G
103. Incorporate sex-specific differences in size-at-age into the stock assessment through model structures as well as data streams.		A
104. Reconsider stock structure based on modern approaches.		A, F, G

SURFCLAM		Corresponding Theme(s)
SHORT-TERM/SHORTER SCALE		

<p>105. Conduct research to better understand life history at appropriate temporal and spatial scales (growth, size-at-age, recruitment, natural mortality, maturity-at-length, and fecundity – in order of priority).</p>	A
<p>106. Evaluate the cost and benefits of different technological methods (e.g., HABCAM, EM, AI, or optical surveys) for measuring surfclam abundance and habitat, including clam density.</p>	A, F
<p>LONG-TERM/LARGER SCALE</p>	
<p>107. Examine the effects of climate change on the spatial distribution of clams, on the operation of the fishery, and patterns of discarding/incidental mortality, and on the overall productivity of the stock.</p>	A, B, F, G
<p>108. Evaluate small-scale surfclam patch density and the connectivity of the two stock areas (Mid-Atlantic and Georges Bank) and the implications on stock dynamics, particularly reproductive success and recruitment exchange.</p>	A

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List of completed and/or removed research priorities, including justification or rationale

Species	Completed/Removed Priority	Rationale/Justification	Year Removed
Black Sea Bass	Evaluate the implications of continued ABC overages on stock projections.	Starting to account for anticipated overages in projections and implications of any ABC overages can be evaluated within the management track assessment updates every two years.	2021
Black Sea Bass	Utilize a management strategy evaluation to consider alternative allocation schemes.	May not be as relevant given recent actions to update the commercial state allocations and considering an update to the commercial/recreational allocations.	2021
Scup	Explore the applicability of the pattern of fishery selectivity in the model to the most recent catch data to determine whether a new selectivity block in the model is warranted.	This priority was addressed during the 2021 Management Track assessment (new 2013+ selectivity block added).	2021

Future Direction

The MSA requires each Council to develop a list of research priorities to help inform the research and budget priorities for the regional science center. However, there is little information or understanding as to how these research priority documents have been utilized by the Council and the NEFSC in allocating resources and address the identified science and management priorities. A review of the current 2016–2020 research priorities document was conducted in order to evaluate its utility and applicability. Based on this review and input from the SSC, modifications to the organization and prioritization of the document have been made in an effort to develop a more tactical and strategic document to more effectively advance scientific and management information that is aligned with the resources and priorities of the Council and NEFSC.

In an effort to move beyond the current process of creating a long list of priorities that get reviewed every five years which may or may not be used to inform science and budget priorities, a new approach and process to evaluate the utility and implementation of the research priorities document will be implemented. A [biennial review](#) of the current priorities list (i.e., two reviews that occur in years two and four, during the five-year period) by the Advisory Panel, Monitoring Committee and SSC will help ensure the document is reflective of the current state of scientific knowledge and the Council's science and management priorities. Input on current or new priorities will occur as part of the Advisory Panel development of the Fishery Performance Report and when the SSC and Monitoring Committees review or develop new catch specifications. As part of the initial biennial review, identifying which research priority theme(s) are being addressed will be provided for each species-specific research priority. Providing this information helps link the broad themes to the species-specific priorities to help ensure the identified research addresses the Council's larger priority themes.

The biennial review would not apply to the broader research priority themes which would remain the same for the entire five-year document period. In addition, staff plan to develop a review process to track the progress toward addressing research priorities and to identify what research has been completed and why other areas may not have been addressed. Revised research priorities and a report on the progress made on addressing research needs will then be provided to the Council's Research Steering Committee for feedback and then presented to the Council for approval.

Lastly, a more comprehensive review and evaluation of the various (Mid-Atlantic, New England, NEFSC) research plans and priorities will be conducted in the future. Since the NEFSC serves both the Mid-Atlantic Council and the New England Fishery Management Council, which has its own research priorities list, it must consider both research priority documents to inform research and budget priorities for the entire region. A more comprehensive and holistic review can help identify research similarities, highlight differences, and ensure continued communication and coordination to maximize and leverage limited staff and fiscal resources. This evaluation could lead to the development of a comprehensive research priorities [plan](#) for the Council to provide a process and approach to effectively and efficiently carry out and address the identified research needs identified in this document.

These enhancements, planned reviews, and comprehensive research plan development are included as strategies in the Council's updated 2020–2024 Strategic Plan. Aligning the Strategic Plan and Five-Year Research Priorities will help ensure the Council achieves its science goal and associated objectives.