

NEFMC Research Priorities and Data Needs, 2019-2023

This document is the New England Fishery Management Council's five-year research priority list for 2019-2023, as approved by the Council in April 2019. This list was reviewed by the Scientific and Statistical Committee in March 2019, and several of its comments have been incorporated.

Definition of Columns

Title	Name of the research priority.
Description, rationale, potential use	Why this is a Council research priority, what question this may address, and other information that would help researchers design research to address the need.
Priority	A sense of the timing of when the data or project results would be needed to inform the management process.
	URGENT (essential): Research that is <u>essential for compliance with federal requirements</u> , including National Standards, or that has been identified by management as necessary to aid decision-making. It is expected that a one- or two-year project would meet the information need. Postponement would have a significant impact on management.
	IMPORTANT (near term): Obtaining a new set of data or research result that is likely to aid in the evaluation of a <u>near term or ongoing management goal</u> . The research might involve a time-limited program or work that could continue indefinitely. Postponement will not have an immediate impact on fishery management; however, the information generated will likely inform near term (e.g., <5 year) Council actions.
	STRATEGIC (future needs): Research that is valuable but is not associated with an immediate need or near-term (e.g., <5years) Council action.
Status	Whether there is research underway on this topic, if known.
FMP	Which FMP or FMPs the topic relates most directly to.
Species	Which species the topic relates most directly to.
Broad category	Overarching topic.
Cross-listing	What other research priority list the item may also be on, if known.
Notes	Any other helpful information on the topic.

	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
1	Efficiency estimation of NMFS trawl survey gear for monkfish, silver hake, and red hake; estimate efficiency based on gear configuration.	Identify any issues regarding the use of a constant catchability coefficient.	Strategic (future needs)	not begun	Monkfish, Small-mesh multispecies	Monkfish, Silver hake, Red hake	Fish surveys	unknown	Absolute abundance and biomass indices are not used for small-mesh multispecies.
2	Continue development of hydroacoustic surveys and other resource surveys of pelagic species to provide an independent means of estimating stock sizes and/or defining localized depletion (long-term research).	This priority has two parts: to help evaluate status of resource with acoustic survey and to see if that tool could be useful for defining localized depletion.	Important (near term)	underway	Atlantic herring	Atlantic herring	Fish surveys	assessment, RSA	An RSA project looked at defining localized depletion, but the work was not completed due to issues securing the research funds. It did test the utility of that survey technology. A 2013 S-K project on herring acoustic survey.
3	Investigate availability and detectability of Atlantic herring in the NEFSC spring and fall trawl survey to evaluate how well the survey detects herring.	Evaluating how well the bottom trawl survey detects herring could be useful for assessing herring biomass and if it changes over time (i.e., depth preferences).	Important (near term)	underway	Atlantic herring	Atlantic herring	Fish surveys	unknown	The 2018 assessment evaluated depth preference. Commercial data (Study Fleet) may help identify depth preferences and trends.
4	Conduct deep water (>200 m) surveys for red crab.	Would improve red crab stock assessment.	Important (near term)	not begun	Red crab	Red crab	Fish surveys	assessment	Red crab is a data poor stock. The last assessment report (2009) noted that a survey "is the most important research recommendation for red crabs."
5	Develop a conversion factor between the survey results for the <i>R/V Albatross</i> and <i>R/V Bigelow</i> for wolffish.	Would improve wolffish stock assessment.	Important (near term)	unknown	Northeast multispecies	Atlantic wolffish	Fish surveys	unknown	This factor becomes less important as more years of <i>R/V Bigelow</i> data are used in assessments.
6	Supplement existing surveys with fixed gear and/or advanced sampling techniques to facilitate sampling in inaccessible areas.	e.g., use of longline or pot/trap gear to sample within complex habitat areas.	Important (near term)	underway	Multiple	Multiple	Fish surveys	unknown	NEFSC/CRB funding a longline survey.
7	Further investigations into stock definition, stock movements, mixing, and migration through tagging studies, DNA markers, morphological characteristics and other means for groundfish (Atlantic cod, Atlantic halibut).	To improve the understanding of stock structure of Atlantic cod and Atlantic halibut, possibly make changes in the future to the stock boundaries.	Important (near term)	underway	Northeast multispecies	Cod, Halibut	Population dynamics	unknown	Multiple ongoing projects. Cod: SMAST, MA DMF, Cornell, UNH; TNC and GMRI (three S-K projects); contributions to the Atlantic Cod Stock Structure Working Group. Halibut: TNC.
8	Investigate stock definition, movement, mixing, and migration through tagging studies, DNA markers, morphological characteristics and other means for silver hake and red hake.	This has always been an issue for stock assessments; climate change has added to the uncertainty.	Important (near term)	underway	Small-mesh multispecies	Silver hake, Red hake	Population dynamics, Climate change	unknown	One genetic study for red hake has occurred and will be reviewed at the 2020 benchmark assessment.
9	Monkfish life history work focusing on age and growth, longevity, reproduction, and natural mortality.	Age-based assessment	Important (near term)	underway	Monkfish	Monkfish	Population dynamics	assessment, RSA	2018 Monkfish RSA project used histological protocol for age determination; NEFSC efforts & timeline unknown.
10	Scallop life history work focusing on natural mortality, including all sources of non-harvest mortality such as predation, disease, and discard mortality.		Important (near term)	unknown	Sea scallop	Scallops	Population dynamics	assessment, RSA	As of the latest assessment (2018), discard mortality questions remain.
11	Investigate age, growth, maturity, and fecundity of managed skate species.		Strategic (future needs)	underway	Skates	Skates	Population dynamics	assessment	

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12	Investigate the biology of red crab: growth rates; molt; reproductive cycles; maturity schedule; fecundity; sex ratios by depth and year; larval supply, transport and settlement; early juvenile distributions and abundance; and particularly the reproductive consequences of depleting large males.	Would improve red crab stock assessment.	Important (near term)	unknown	Red crab	Red crab	Population dynamics	assessment	Red crab is a data poor stock. The last assessment report (2009) noted all of these topics as important.
13	Investigate stock definition, stock movements, mixing, and migration through tagging studies, DNA markers, morphological characteristics and other means for Atlantic herring.	To improve data on estimate of herring biomass and to support herring management under sub-ACL management by area.	Urgent (essential)	not begun	Atlantic herring	Atlantic herring	Population dynamics	assessment, RSA	
14	Calculate and/or improve river herring and shad life stage-specific estimates of range-wide natural and human mortality rates, including fishing.	Would improve RH/S stock assessment.	Important (near term)	unknown	Atlantic herring	River herring, Shad	Population dynamics	TEWG	
15	Collect information on the marine phases of river herring and shad specific to migrations at sea.	Data would improve RH/S stock assessment on determining: 1) river origin of individual catch in coastal/ocean (independent surveys, tagging) and in non-targeted ocean fisheries; and 2) marine survival.	Important (near term)	unknown	Atlantic herring	River herring, Shad	Population dynamics	TEWG	
16	Monkfish tagging and telemetry studies that focus on basic life history and habitat use.	Monkfish was proposed as a species to monitor to assess adverse and beneficial impacts of wind farm development in the MA and RI-MA WEAs.	Strategic (future needs)	underway	Monkfish	Monkfish	Population dynamics, Habitat, Wind energy	RSA	RSA has funded tagging work in recent years partly tied with age validation work.
17	Investigate fine-scale spawning dynamics and the appropriate size and timing of spawning area closures.	Potential to adjust time-area closures for groundfish species.	Important (near term)	underway	Multiple	Multiple	Population dynamics	unknown	Two S-K projects and Council-funded projects on cod and winter flounder spawning.
18	Continue to explore the sources of uncertainties in groundfish stock assessments, including retrospective patterns, and identify appropriate adjustments (e.g., data or modeling revisions) to resolve those patterns.	Would improve groundfish stock assessments.	Urgent (essential)	underway	Northeast multispecies	Groundfish	Stock assessment, Ecosystems	unknown	Council contracted with John Wiedenmann and Olaf Jensen at Rutgers for this work; NEFSC also working on this issue.
19	Explore the sources of uncertainties in Atlantic herring stock assessments, including retrospective patterns, and identify appropriate adjustments (e.g., data or modeling revisions) to resolve those patterns.	To improve data on estimate of herring biomass.	Strategic (future needs)	underway	Atlantic herring	Atlantic herring	Stock assessment	unknown	Very large topic for all assessments, challenging to resolve.
20	Improve and standardize data collection methods for river herring and shad stocks.	Needed for management & assessment of RH/S (e.g., for catch caps). Useful beyond Herring FMP.	Urgent (essential)	underway	Atlantic herring	River herring, Shad	Stock assessment	TEWG	
21	Develop biological benchmarks used in RH/S assessment modeling and management.	Needed for management & assessment of RH/S (e.g., for catch caps). Useful beyond Herring FMP.	Urgent (essential)	underway	Atlantic herring	River herring, Shad	Stock assessment	TEWG	
22	Develop guidance for rejecting stock assessments and next steps.	Would improve the stock assessment process.	Urgent (essential)	unknown	Multiple	Multiple	Stock assessment	unknown	Badly needed.

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23	Explore use of survey results from the <i>R/V Bigelow</i> as a separate index of abundance as the survey time series lengthens.	Would improve stock assessments.	Important (near term)	underway	Multiple	Multiple	Stock assessment	unknown	This is part of the benchmark assessment process already. The 2018 A. herring benchmark assess. was the first to do so for a NE species/stock.
24	Incorporate other surveys into stock assessments as appropriate.	Would improve stock assessments. Including industry-based surveys, state surveys, NEAMAP, collaborative surveys with industry and scientists.	Important (near term)	underway	Multiple	Multiple	Stock assessment	unknown	Used recently for GOM cod, witch flounder, and GB yellowtail flounder assessments.
25	Evaluate the effectiveness of the groundfish ABC control rule for setting groundfish catch advice.	Use of the groundfish ABC control rule has been difficult recently. Investigate: 1) the potential for using F-ramp procedures in control rules, and 2) when to use "Option C" and how to estimate ABC with it (for stocks that cannot rebuild to BMSY in the specified rebuilding period, even with no fishing, the ABC should be based on incidental bycatch, including a reduction in bycatch rate).	Strategic (future needs)	unknown	Northeast multispecies	Groundfish	Fisheries management	unknown	This was a Nov. 2016 SSC recommendation resulting from discussion of the Wiedenmann and Jenson work. The SSC felt that control rules for all FMPs should be investigated starting with groundfish.
26	Examine whether the current definition of the directed groundfish fishery (landing >1 lb. groundfish per year) is still appropriate.	Investigate the modern groundfish fishery and explore other definitions to identify whether the economic analyses for groundfish actions accurately capture the fishery.	Important (near term)	unknown	Northeast multispecies	Groundfish	Fisheries management, Human dimensions	unknown	
27	How should the inshore and offshore components of the groundfish fishery be identified?	Investigate the modern groundfish fishery.	Important (near term)	unknown	Northeast multispecies	Groundfish	Fisheries management, Human dimensions	unknown	
28	Catch efficiencies by mesh size, when new minimum fish size regulations are implemented.	Investigate potential means to improve access to healthy stocks while minimizing impacts to stocks needing conservation.	Strategic (future needs)	unknown	Northeast multispecies	Groundfish	Fisheries management	unknown	
29	Options to broaden the definition of the sector system & increase flexibility in groundfish fishery operations (e.g., expanding the range of participants allowed to join sectors and the suite of permits and their associated allocations that can be used under sectors).	Investigate potential means to improve access to healthy stocks while minimizing impacts to stocks needing conservation.	strategic (future needs)	unknown	Northeast multispecies	Groundfish	Fisheries management	unknown	
30	Evaluate the efficacy of existing and potentially new small-mesh multispecies exemption areas and seasons.	Investigate potential means to improve access to healthy stocks while minimizing impacts to stocks needing conservation.	Important (near term)	underway	Northeast multispecies, Small-mesh multispecies	Groundfish, Small-mesh multispecies	Fisheries management	unknown	SMAST recently completed an EFP on this topic.
31	Analysis of previous actions implemented in the Herring FMP to determine if they have been effective and are meeting intended goals.		Important (near term)	not begun	Atlantic herring	Atlantic herring	Fisheries management	unknown	This priority was added in 2019.
32	Evaluate the benefits of skate species-specific management.		Strategic (future needs)	unknown	Skates	Skates	Fisheries management	unknown	Recommended by the SSC.

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33	Develop effective skate species identification methods for fishermen, dealers, and port samplers (e.g., inexpensive biochemical/genetic assay method, better training & morphological keys for juvenile skates and skate wings).	To improve data on species composition of landings and discards.	Strategic (future needs)	unknown	Skates	Skates	Fisheries management	assessment	
34	Investigate skate discards: discard mortality rates for any outstanding species and gear type; alternative methods of estimating dead discards in the specifications process, e.g. forecasting; and examining trends in magnitude of discards.	Discards affect TALs; recent estimates have fluctuated; incidental possession limits triggered in FY2016 & 2017; moving away from the assumed discard rate.	Important (near term)	underway	Skates	Skates	Fisheries management	assessment, RSA	2018 monkfish RSA project on reducing skate bycatch in monkfish gillnets.
35	Investigate monkfish age validation.	Resolve the age and growth issues that prevented the stock assessment model from being updated in the 2016 Operational Assessment.	Important (near term)	unknown	Monkfish	Monkfish	Fisheries management	assessment, RSA	
36	Investigate monkfish discard mortality rate estimates across gear types.	Improve stock assessments	Strategic (future needs)	unknown	Monkfish	Monkfish	Fisheries management	unknown	The assumed rate is currently set at 100%.
37	Research to elucidate modes of infection, transmission and distribution of scallop diseases and parasites that may adversely impact scallop health, meat quality and reproductive viability.	Special attention should be directed to conditions that may result in modifications to the scallop rotational area management strategy to maximize yield.	Important (near term)	underway	Sea scallop	Scallops	Fisheries management	RSA	Susan Ingalls has been funded through S-K in 2017.
38	Evaluate ways to control predation on scallops.	Managing to optimize yield/recruit; natural mortality events can impact short and long-term management.	Strategic (future needs)	not begun	Sea scallop	Scallops	Fisheries management	unknown	
39	Research to address potential implications of spat collection, seeding and relocation of scallops for enhancement purposes in light of unknown impacts of diseases and parasites.		Strategic (future needs)	underway	Sea scallop	Scallops	Fisheries management	RSA	CFF has been funded to do some of this work.
40	Research that investigates the factors affecting scallop fishing power and estimates of how they relate to projections of landings per unit of effort.		Important (near term)	underway	Sea scallop	Scallops	Fisheries management	RSA	SMAST (Wright, Cadrin, O'Keefe) funded by RSA to complete LPUE work. It was presented to the SAW 65 workgroup.
41	Research related to identifying the major sources of scallop management uncertainty and measuring their potential effects on future fishery allocations.		Important (near term)	unknown	Sea scallop	Scallops	Fisheries management	unknown	A15 lists sources of mgmt. uncertainty. Scallop CTE wants to look at carryover as a potential 2019 priority, & the PDT would consider mgmt. uncertainty in this evaluation.

	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
42	Investigate the feasibility of permit splitting across and within all FMPs.	Explore ways to increase flexibility and reduce the barriers for new entrants to various NEFMC managed fisheries, to achieve the goals of the FMPs. The Council should explore why the decision was made to bind certain permits together and revisit this to see whether it is still appropriate today. This could involve the MAFMC or be limited to NEFMC permits.	Important (near term)	unknown	Multiple	Multiple	Fisheries management, Human dimensions	unknown	
43	Continue to improve reporting accuracy, including accurate reporting of species and area fished.	Would improve catch reporting, including proper identification of key species, which are often misreported by fishermen (e.g. red/white hake; silver/offshore hake).	Important (near term)	underway	Multiple, Small-mesh multispecies, Northeast multispecies	Multiple, Offshore hake, Red hake, White hake	Fishery performance & monitoring	unknown	Amendment 23/Groundfish Monitoring for the Commercial Fishery.
44	Research the extent and composition of discards and bycatch in the small-mesh multispecies fishery.	Could be used to design selective gear or area/season management.	Strategic (future needs)	not begun	Small-mesh multispecies	Small-mesh multispecies	Fishery performance & monitoring	unknown	
45	Improve estimates of red and silver hake discards from the northern shrimp fishery (if reopened).	Could be used to design selective gear or area/season management.	Strategic (future needs)	not begun	Small-mesh multispecies	Red hake, Silver hake	Bycatch	unknown	This priority was more important when northern red hake overfishing was occurring.
46	Identify gears and/or methods that would reduce bycatch and/or improve discard survival of unwanted catch of red hake discards in small mesh fisheries.	Could be used to design selective gear or area/season management.	Urgent (essential)	not begun	Small-mesh multispecies	Red hake	Bycatch	unknown	This priority is very important because southern red hake is overfished and the Council is initiating action, although research results are unlikely to be available in time.
47	Identify gears and/or methods that would reduce bycatch and/or improve discard survival of unwanted catch of silver hake discards in the large mesh fishery.	Could be used to design selective gear or area/season management.	Strategic (future needs)	not begun	Small-mesh multispecies, Northeast multispecies	Silver hake	Bycatch	unknown	Silver hake catches have been a fraction of the ACL, but we have reduced the southern whiting specifications by 38% due to declining biomass.
48	Improve sampling for commercial groundfish catch at age data, such as through cooperative NMFS-industry programs to supplement port agent activities, with an emphasis on bycatch (incl. incidental catch).	Improve data for stock assessments	Strategic (future needs)	unknown	Northeast multispecies	Groundfish	Fishery performance & monitoring	unknown	
49	Evaluate spatially-explicit changes in groundfish fleet behavior in response to restricted fishing in closed areas.	Impacts analysis of management actions.	Strategic (future needs)	unknown	Northeast multispecies	Groundfish	Fishery performance & monitoring	unknown	It is important to understand the effects of a key management tool, i.e. closed areas.
50	Research the extent and composition of discards and bycatch in the large-mesh groundfish fishery.	Improve catch reporting.	Important (near term)	underway	Northeast multispecies	Groundfish	Fishery performance & monitoring	unknown	Multiple - GARFO, NEFSC, PDT
51	Investigate groundfish discard mortality rate estimates across gear types (e.g., GB cod for the recreational fishery).	There are currently different mortality rates used for GB and GOM cod for the recreational fishery; the explanation for this difference is unclear.	Important (near term)	underway	Northeast multispecies	Groundfish	Fishery performance & monitoring	unknown	Recent Council-funded project and literature review by PDT changed discard mortality rates for wolffish, Atlantic halibut, and GOM haddock.

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52	Identify spawning components on a spatial and temporal scale for Atlantic herring and define whether localized depletion has negative impacts on spawning capacity.	Progress on acoustics and stock mixing herring research priorities would help with this priority.	Important (near term)	unknown	Atlantic herring	Atlantic herring	Fishery performance & monitoring	unknown	
53	Investigate Atlantic herring fishery fleet behavior and decision-making with respect to their relationship to population dynamics, closed areas, catch rates, etc.		Strategic (future needs)	not begun	Atlantic herring	Atlantic herring	Fishery performance & monitoring	unknown	Generally lower priority, not very clear what main objective is here. Could help evaluate current and future management measures.
54	Research the extent and composition of discards and bycatch in the skate and monkfish fisheries.		Strategic (future needs)	unknown	Skates, Monkfish	Skates, Monkfish	Fishery performance & monitoring	assessment	
55	Investigate discard mortality rates by gear type, area, season, depth, and bottom type for all seven skate species with an emphasis on overfished species (thorny and smooth skates).	Improve data for specifications setting.	Important (near term)	unknown	Skates	Skates, Smooth skate, Thorny skate	Fishery performance & monitoring	unknown	
56	Identify gears and/or methods that would reduce bycatch and/or improve discard survival of unwanted catch, that may change the ratio of component catch species or improve size and species selectivity of gear for groundfish.	Minimize bycatch	Urgent (essential)	underway	Northeast multispecies	Groundfish	Bycatch	unknown	Many projects, e.g., a BREP 2018 award is creating a bycatch avoidance model for the rec fishery; Also small-mesh belly panel to reduce flatfish. Four S-K projects on lobster trap bycatch and haddock trawls.
57	Identify gears and/or methods that would reduce bycatch and/or improve discard survival of unwanted catch, that may change the ratio of component catch species or improve size and species selectivity of gear for monkfish, herring and skates.		Important (near term)	underway	Monkfish, Atlantic herring, Skates	Monkfish, Atlantic herring, Skates	Bycatch	RSA	A 2013 S-K project on reducing sturgeon bycatch in monkfish gillnet.
58	Collect data on discards of other clupeids in the A. herring and other fisheries; develop improvements to river herring/shad catch estimation methods in the A. herring fishery.	Improve monitoring and reduce bycatch.	Important (near term)	underway	Atlantic herring	River herring, Shad	Bycatch	TEWG	The PS program collects catch and discard data in the A. herring fishery. This could be expanded to other fisheries, but that is outside the scope of the current herring PS program. The process was peer reviewed and deemed sufficient for catch cap monitoring with no changes recommended.
59	Continue River Herring Bycatch Avoidance Program in the Atlantic herring fishery, and develop or evaluate innovative approaches for avoidance or monitoring river herring/shad catch in small mesh fisheries (e.g., bycatch avoidance, environmental cues, electronic monitoring, portside sampling).		Important (near term)	underway	Atlantic herring	River herring, Shad	Bycatch	TEWG, RSA	Council maintained this as a research priority for 2019-2021 RSA.
60	Policy evaluation of bycatch management, incl. possible implementation of a 100% retention policy to minimize discarding and ecosystem effects.		Important (near term)	unknown	Multiple	Multiple	Bycatch	unknown	

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61	Research and development of fishery dependent data collection systems that support scallop management.	In-season, near real-time data collection at haul level would inform fishing operations (e.g., bycatch avoidance) and more real-time management.	Important (near term)	not begun	Sea scallop	Scallops	Bycatch, Fishery performance & monitoring		This priority was added in 2019.
62	Identify "hot spots" within the scallop fishery using data on observed take of sea turtles and other suitable information.	Need data on observed turtle interactions for other fisheries or fishery surveys in the area where the scallop fishery operates.	Strategic (future needs)	underway	Sea scallop	Scallops	Protected species, Bycatch	RSA	There has not been an observed take of a turtle in a scallop dredge in several years. CFF funded for many years to do sea turtle research.
63	Develop gear modifications or fishing techniques that may reduce or eliminate the threat of sea turtle interactions without unacceptable reductions in target retention in all fisheries.		Strategic (future needs)	underway	Multiple	Multiple	Protected species, Bycatch	unknown	MADMF funded in 2016 with a NMFS Species Recovery Grant to study leatherback behavior off Cape Cod to help reduce entanglements. CFF funded with 2015 S-K grant.
64	Evaluate barriers to marketing whiting and red hake, which could lower fishery discards and improve profitability.	Could help the industry to improve opportunities to market fish that might otherwise be discarded.	Important (near term)	not begun	Small-mesh multispecies	Small-mesh multispecies	Human dimensions	unknown	
65	Data collection efforts for improved social and economic impact analyses, as well as cost-benefit analysis, for all fisheries, but particularly groundfish and Atlantic herring.	Some of this is done but need more fixed cost info.	Important (near term)	underway	Northeast multispecies, Atlantic herring, Multiple	Groundfish, Atlantic herring, Multiple	Human dimensions	unknown	2013 and 2017 S-K projects on groundfish communities. For herring, some work was done for the IFM amendment.
66	Evaluate the socioeconomic impacts and consequences of area rotation on the scallop fishery, including potential distributional effects and impacts on other fisheries.		Important (near term)	not begun	Sea scallop	Scallops	Human dimensions	RSA	2019/2020 Scallop RSA priority to conduct MSE. Also related to 2018 priority of follow-up to OHA2.
67	For all fisheries: (1) Characterize the vessels, firms, organizations, and communities involved; (2) Identify capacity use and fixed costs; (3) Characterize stakeholders besides directed fishery participants; (4) Characterize dealers and processors (e.g., dependence on fishery, location, costs, earnings, employment); and (5) Characterize market dynamics (e.g., relationships between fishermen, buyers, and processors; and end users).	For use in Council actions: describing the potentially impacted human communities and potential impacts.	Important (near term)	underway	Multiple	Multiple	Human dimensions	unknown	This priority was added in 2019.
68	Improve quantification of economic impacts from restricted fishing in closed areas (e.g., develop spatially-explicit fleet behavior model).		Important (near term)	unknown	Multiple	Multiple	Human dimensions	unknown	
69	Investigate the existence value of deep-sea corals and evaluate tradeoffs between coral protection and fishing.		Important (near term)	unknown	Multiple	Multiple	Human dimensions, Habitat	unknown	

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70	Within a variety of habitat types, quantify the degree of seabed contact for fishing gears and their component parts, particularly groundfish trawls (e.g., chain vs. roller sweeps, modified ground cables (e.g. shortened, raised), semi-pelagic doors). Better quantify gear dimensions (width) to more accurately estimate swept area.	Would support refinements to the SASI/Fishing Effects model and facilitate the design of gear-restriction vs. closure area management approaches.	Strategic (future needs)	unknown	Northeast multispecies	Groundfish	Habitat	unknown	SASI/Fishing Effects model has been updated recently (wrapping up in 2019) but did not tackle this issue.
71	Characterize and evaluate current and potential HMAs and HAPCs.	Identify nursery and over-wintering habitats of species vulnerable to habitat alteration by fishing gear (e.g., scallop dredge).	Important (near term)	underway	Sea scallop	Scallops	Habitat	RSA	Scallop RSA has funded Scott Gallagher at WHOI to compete 3 years of BACI work in the EGB HAPC.
72	Evaluate habitat recovery following impact by fishing gear (e.g., scallop dredges or trawls and clam dredge), and long-term or chronic effects of fishing on marine resource productivity.	Would help develop or revise spatial management for habitat protection. This includes examining gear impacts on seabed habitats in Northeast US waters that account for effort, season, sedimentary character and biological community.	Strategic (future needs)	unknown	Sea scallop	Scallops	Habitat	unknown	
73	Identify and evaluate methods to reduce the habitat impacts of scallop and clam dredge fishing, including studies that evaluate variability in dredge efficiency across habitats, times, areas.	Would support development of gear-restriction vs. closure area management approaches.	Strategic (future needs)	underway	Sea scallop	Scallops	Habitat	unknown	
74	Research resulting in greater understanding of the relationships between managed species and the geological, biological, and physical features of the habitats they occupy; assess spatial variation in habitat use and fisheries productivity. Specific suggestions for work: (1) Concurrent spatial data on recruitment, growth and reproduction of managed fish and shellfish across habitats and environmental settings. (2) Links between habitat characteristics and primary prey species, through a concurrent assessment of habitat characteristics and prey species occurrence. (3) Evaluate and quantify linkages between habitat types (e.g., space/time variation of shelter and prey) and the productivity of managed species.	Research to help analyze and evaluate the benefits of spatial management alternatives for habitat. This work could help refine EFH designations. Ideally, these results will contain spatially-explicit data incl. species abundance at different life-history stages, measures of species condition (or survivorship, growth rate, or similar metric linked to variation in productivity across the landscape) and the characteristics of concurrently sampled habitat features, substrates and associated prey.	Urgent (essential)	unknown	Multiple	Multiple	Habitat	unknown	This is the cornerstone of habitat management and important for habitat management in an ecosystem plan. The work should explicitly explain data limitations defining essential fish habitat, given the original sampling design and spatial and temporal scales of sampling.
75	Studies that would inform assessments of the effects of fixed gears on seabed habitat components.	The extent of fixed gear movement along the seabed during setting, soaking, and hauling is unknown. Would support refinements to SASI/Fishing Effects model. Also important for deep-sea corals.	Strategic (future needs)	underway	Multiple	Multiple	Habitat	unknown	For example, Schweitzer & Stevens paper on trap gears. Consider impacts to coral and sponge habitats specifically, possibly using Jordan Basin as a study site.

	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
76	Refine estimates of benthic boundary shear stress at the seabed/water column interface and ground truth critical shear stress thresholds across seasons and depths (i.e., are seabed sediments stable/unstable at various levels of flow, as predicted by models, what are effects of variation in biological attributes that influence disturbance via shear stress).	Would support refinements to SASI/Fishing Effects model. When possible, use data from sensors deployed on the seabed to ground truth modeled estimates.	Strategic (future needs)	unknown	Multiple	Multiple	Habitat	unknown	Understanding this (i.e., sheer stress) might also be important for deep-sea coral habitat suitability modeling and perhaps other biological components of the benthos.
77	Targeted studies following the 2013-2015 Northeast region deep-sea coral research in the Gulf of Maine and in the offshore canyons and seamounts that focus on defining areas/habitat conditions that support coral and sponge "garden" habitats. Studies of growth, reproduction, population connectivity and particularly the functional role as fish habitat are needed. Develop more sophisticated, higher-resolution models that predict coral presence/absence or relative abundance, not just likelihood of occurrence or habitat suitability.	Would facilitate future revisions (boundary changes, or additions of new areas) to deep-sea coral management zones in the Gulf of Maine and canyon.	Strategic (future needs)	underway	Multiple	Multiple	Habitat	unknown	It would also be nice to do more general DSC surveys, so as to both ground truth/improve the habitat suitability model, and lessen our need for it. Would also give us a handle on DSC biodiversity, biogeography, and genetics (or "population connectivity"). During discussion of the Jordan Basin coral DHRA, the Council requested studies on the effects of mobile trawl gear. Potentially a separate topic. Additional funding through the Deep-Sea Coral Research and Technology Program will be available for the northeast region in a few years; will likely lead to work on this priority.
78	Geological and biological sampling using acoustic, video, and grab sampling in the Gulf of Maine and Southern New England region to improve spatial resolution of habitat distributions and characterize temporal variability. Include targeted sampling of benthic community structure (infauna and epifauna) in representative substrate types (e.g., mud, sand, gravel, cobble, and boulder in high and low energy environments) across multiple environmental settings.	Would improve support for spatial management intended to target specific habitat types for protection. Some areas of the GOM are very sparsely sampled for benthic habitat characteristics. SNE includes habitat management areas of particular interest (i.e., Great South Channel HMA) as well as offshore wind development sites.	Important (near term)	underway	Multiple	Multiple	Habitat, Wind energy	unknown	This is an important priority for habitat management in an ecosystem plan. Acoustic mapping is underway in GOM for deep-sea corals (US/CAN collaboration using ROPOS platform). In addition to GOM, such mapping also being discussed in Great South Channel/Nantucket Shoals region. Data related to this priority exist in SNE region related to offshore wind projects but have not been provided to fisheries managers.
79	Synthesize predator/prey information on A. herring and other forage fish, fill data gaps; investigate the role of forage fish in the Northwest Atlantic ecosystem and their importance for other managed species; assess the relative importance of herring vs. other forage as both prey and predator in the ecosystem (e.g., competition with right whales and juvenile cod for C. finmarchicus).	Information is needed to develop ecosystem management tools and approaches.	Important (near term)	underway	Atlantic herring	Atlantic herring	Ecosystems	unknown	Amendment 8 MSE and 2018 herring assessment looked at some of this but not all. For example, the food web model explored in MSE.
80	Quantify predator/prey relationships that are important to the development of management strategy evaluations.	Information is needed to develop ecosystem management tools and approaches.	Important (near term)	not begun	Multiple	Multiple	Ecosystems	unknown	

	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
81	Study trophic interactions of monkfish predation on other species and monkfish cannibalism; recognize the need to incorporate monkfish into prey assessments.		Strategic (future needs)	unknown	Monkfish	Monkfish	Ecosystems	RSA	Can be combined with a broader issue under ecosystems research.
82	Investigate the influence of physical factors (incl. environmental changes) on shifts in the range and distribution of skate species.	Could improve understanding of why thorny skate is not rebuilding.	Important (near term)	underway	Skates	Skates	Ecosystems	unknown	Can be combined with a broader issue under ecosystems research.
83	Examine trophic interactions between skate species and other bottom species that occupy the same habitats.		Strategic (future needs)	unknown	Skates	Skates	Ecosystems	unknown	Can be combined with a broader issue under ecosystems research.
84	Evaluate whether stock status of some species is increasing the rebuilding timeline of groundfish stocks.	Information is needed to develop ecosystem management tools and approaches.	Urgent (essential)	not begun	Northeast multispecies	Groundfish	Ecosystems	unknown	This is the complementary factor of Priority #83.
85	Investigate effectiveness of seasonal and year-round spatial management to achieve goals such as: improved yield, mortality reduction, spawning protection, bycatch avoidance/reduction, and ecosystem protection and improvement.	Information is needed to develop ecosystem management tools and approaches.	Strategic (future needs)	unknown	Multiple	Multiple	Ecosystems	unknown	
86	Monitor trends in non-target, ecosystem components.	Information is needed to develop ecosystem management tools and approaches.	Strategic (future needs)	unknown	Multiple	Multiple	Ecosystems	unknown	
87	Develop and enhance industry-based oceanographic data collection (e.g., physical, primary productivity, habitat metrics).	Information is needed to develop ecosystem management tools and approaches.	Strategic (future needs)	underway	Multiple	Multiple	Ecosystems	NEFSC	
88	Better understand species responses to climate change (e.g. distribution changes) and how these changes may affect fisheries (e.g., South Atlantic stocks moving north).	Information is needed to build resiliency into FMPs, and to account for possible new interactions between fisheries and fish species.	Urgent (essential)	underway	Multiple	Multiple	Ecosystems, Habitat, Climate change, Human dimensions	unknown	Ongoing climate vulnerability assessment work, Rutgers modeling work. This priority was added in 2019.
89	Research ecosystem operational advice: synthesize existing data, modelling, and meta-data analysis, incl. environmental variability and climate change; relationship between habitat and fishery resource productivity (incl. impact of fishing on functional value of habitat); trophic interactions and their implications; managing mix species fisheries; function and effectiveness of closed area management.	Information is needed to develop ecosystem management tools and approaches.	Important (near term)	underway	Multiple	Multiple	Ecosystems, Climate change	unknown	This integrates other habitat research priorities, including the importance and role of quality habitat on recruitment and juvenile productivity/survival. A 2017 S-K project on "choke" species in a changing climate.
90	Evaluate potential resilience of managed species to climate change and ecosystem change by preservation of forage diversity.	Information is needed to develop ecosystem management tools and approaches.	Important (near term)	not begun	Multiple	Multiple	Ecosystems, Climate change	unknown	

	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
91	Develop habitat suitability modeling capability for purpose of exploring climate effects on fisheries stock distribution and abundance.	Habitat suitability modeling is and has already been used to predict deep-sea coral distributions in the NE. Can adapt the models to support other habitat research such as predicting habitat effects related to aquaculture expansion and potential offshore wind energy areas. Monthly modeling could predict when and where seasonal migrations (versus summer residence) may be affected by climate change and when and where interaction with offshore wind construction activities and permanent habitat alterations may occur so as to better facilitate mitigation plans. Work can support the Northeast Regional Habitat Assessment including the Nearshore, Offshore & Blueprint tasks. The higher resolution of these models is well suited for better delineation of EFH.	Important (near term)	underway	Multiple	Multiple	Ecosystems, Habitat, Wind energy, Climate change	unknown	Work is underway at NMFS Sandy Hook Lab for the mid-Atlantic. To date, three habitat suitability models (i.e., Species Distribution Models including Generalized Additive Model, Random Forest, and Maximum Entropy) have been compared for accurate predictability of species distributions. The climatology database is being updated and integrated with the latest high-resolution global climate model of NOAA's Geophysical Fluid Dynamics Lab. The new models are being used for current and historic habitat suitability predictions in place of previous climate models to produce improved species response curves. University of Maine is modeling sea scallop and lobster distributions. This priority was added in 2019.
92	Impact of offshore wind development on scallop production.	Could include: impacts on scallop larval settlement, growth, reproduction, fishing opportunities, etc.	Urgent (essential)	not begun	Sea scallop	Scallops	Wind energy, Population dynamics, Fisheries management, Habitat	RSA	This priority was added in 2019 and is a 2019/2020 Scallop RSA priority.
93	Evaluate the effects of noise (e.g., from pile driving, seismic testing, etc.) on behavior and reproductive success of managed fish and shellfish species.	Information is needed to assess impacts of offshore development on marine fishery resources, particularly offshore wind.	Urgent (essential)	unknown	Habitat	Multiple	Wind energy, Habitat	unknown	This priority was added in 2019 and is a 2019/2020 Scallop RSA priority.
94	Evaluate the fishability of offshore windfarms, fishing displacement in response to offshore windfarms, and how this affects spatial management of fisheries.	Information is needed to allow the Council to accurately articulate concerns about these projects.	Urgent (essential)	unknown	Habitat	Multiple	Wind energy, Fishery performance & monitoring	unknown	This priority was added in 2019.
95	Assess how changes in fisheries-independent surveys that cannot access wind farms for sampling will affect stock assessments and the impact of additional uncertainty in management advice.	Information is needed to plan for necessary changes in survey efforts so that adequate assessment of fishery resources can be maintained post-development.	Urgent (essential)	underway	Multiple	Multiple	Wind energy, Fish surveys, Stock assessment	unknown	This priority was added in 2019. NEFSC is discussing this issue.
96	Will specific changes to FMPs be able to mitigate impacts of wind farm placement on either fishermen or on resource areas (e.g., Demarcation Line adjustments, management and/or habitat boundary adjustments)?	Need to understand how fisheries management approaches and offshore wind development intersect, and how fisheries management could be adapted to react to offshore wind development.	Important (near term)	unknown	Multiple	Multiple	Wind energy, Fisheries management, Ecosystems, Habitat	unknown	This priority was added in 2019.

Definitions of acronyms

ABC	Acceptable Biological Catch
ACL	Annual Catch Limit
BACI	Before After Control Impact
BREP	Bycatch Reduction Engineering Program
CRB	Cooperative Research Branch
CTE	Committee
DSC	Deep-sea corals
DHRA	Designated habitat research area
EFH	Essential Fish Habitat
EFP	Exempted Fisheries Permit
EM	electronic monitoring
GARFO	Greater Atlantic Regional Fisheries Office
GB	Georges Bank
GOM	Gulf of Maine
HAPC	Habitat Area of Particular Concern
HMA	Habitat Management Area
IFM	industry-funded monitoring
LPUE	Landings per unit effort
MSE	Management Strategy Evaluation
MWT	midwater trawl
NEAMAP	Northeast Area Monitoring and Assessment Program
NEFSC	Northeast Fisheries Science Center
NMFS	National Marine Fisheries Service
OHA2	Omnibus Habitat Amendment 2
PDT	Plan Development Team
PS	Port-side
RH/S	River herring and shad
RSA	Research-Set-Aside
SASI	Swept Area Seabed Impacts
S-K	Saltonstall-Kennedy Grant Program
SSC	Scientific and Statistical Committee
TEWG	Technical Expert Working Group
WEA	Wind Energy Area