#	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	Supplement existing surveys with the use of 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.
3	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, the first to help evaluate status of resource with acoustic survey and the second to see if that tool could be useful for defining localized depletion.	Important (near term)	underway	Atlantic herring	Atlantic herring	Fish surveys	assessment, RSA	One 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.
4	Develop fishery acoustic indices for herring, and develop a volume-to-weight conversion factor for herring.	To improve data on estimate of herring biomass.	Important (near term)	underway	Atlantic herring	Atlantic herring	Fish surveys	unknown	This is similar to Priority #3 on acoustics.
5	Investigate availability and detectability of Atlantic herring in the NEFSC spring and fall trawl survey.	If this priority means evaluating how well the bottom trawl survey detects herring, that 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	2018 assessment did evaluate depth preferences and notes trend toward deeper waters in recent years.
6	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 and was last assessed in 2009. The assessment report noted that a survey "is the most important research recommendation for red crabs."
7	Develop a conversion factor between the survey results for the *R/V Albatross* and *R/V Bigelow* 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 *R/V Bigelow* data are used in assessments.
8	Further investigations into stock definition, stock movements, mixing, and migration through tagging studies, DNA markers, morphological characteristics and other means for groundfish (Atlantic cod and 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 and halibut - TNC; Also for cod - contributions to the Atlantic Cod Stock Structure Working Group.
9	Further investigations into 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	
10	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 and climate change has added to the uncertainty.	Important (near term)	underway	Small-mesh multispecies	Silver hake, Red hake	Population dynamics	unknown	One genetic study for red hake has occurred and will be reviewed at the 2020 benchmark assessment.

#	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
11	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 MF RSA project funded to use histological protocol for age determination; NEFSC efforts & timeline unknown.
12	Scallop life history work focusing on natural mortality, including all sources of non-harvest mortality such as predation, disease, and incidental mortality.		Important (near term)	unknown	Sea scallop	Scallops	Population dynamics	RSA	
13	Investigate age, growth, maturity, and fecundity of managed skate species.		Strategic (future needs)	underway	Skates	Skates	Population dynamics	assessment	
14	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 and was last assessed in 2009. The assessment report noted all of these topics as important.
15	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	
16	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	
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	Council funded projects on groundfish spawning for cod and winter flounder.
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.	Important (near term)	underway	Northeast multispecies	Groundfish	Stock assessment	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	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.

#	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
21	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	
22	Develop biological benchmarks used in 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	
23	Explore use of survey results from the *R/V Bigelow* 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 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 B_{MSY} 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 an SSC recommendation (see November 10, 2016 SSC memo) 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	Is the current definition of the directed groundfish fishery (landing >1 lb. groundfish per year) still appropriate?	Investigate the modern groundfish fishery.	Strategic (future needs)	unknown	Northeast multispecies	Groundfish	Fisheries management	unknown	
27	How should the inshore and offshore components of the groundfish fishery be identified?	Investigate the modern groundfish fishery.	Strategic (future needs)	unknown	Northeast multispecies	Groundfish	Fisheries management	unknown	
28	Investigate the feasibility of groundfish permit splitting by stocks.	Investigate the modern groundfish fishery.	Strategic (future needs)	unknown	Northeast multispecies	Groundfish	Fisheries management	unknown	
29	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	
30	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	

#	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
31	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.
32	Evaluate the efficacy of existing and potentially General Category scallop 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, Sea scallop	Groundfish, Scallops	Fisheries management	RSA	NEFMC sent a letter to GARFO in 2017 requesting expansions of exemption areas. GARFO is working to evaluate.
33	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.
34	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	
35	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.
36	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.
37	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.
38	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	
39	Evaluate the benefits of skate species-specific management.		Strategic (future needs)	unknown	Skates	Skates	Fisheries management	unknown	Recommended by the SSC.
40	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 MF RSA project funded to reduce skate bycatch in MF gillnets.

#	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
41	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	
42	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%.
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	Improve sampling for commercial A. herring catch at age data (e.g., cooperative NMFS-industry programs to supplement port agent efforts), with an emphasis on bycatch (incl. incidental catch).		Strategic (future needs)	underway	Atlantic herring	Atlantic herring	Fishery performance & monitoring	unknown	This priority is unclear. Catch at age data are not critical for this species - lots of data already collected. If this is about bycatch port sampling, that has higher relevance.
45	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 (including incidental catch).	Improve data for stock assessments	Strategic (future needs)	unknown	Northeast multispecies	Groundfish	Fishery performance & monitoring	unknown	
46	Define localized depletion of spawning components on a spatial and temporal scale for Atlantic herring.	Progress on other herring research priories on acoustics and stock mixing would help with this priority.	Important (near term)	unknown	Atlantic herring	Atlantic herring	Fishery performance & monitoring	unknown	
47	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.
48	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 primary management tool, i.e. closed areas.
49	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	
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	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	

#	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
52	Investigate groundfish discard mortality rate estimates across gear types.		Important (near term)	underway	Northeast multispecies	Groundfish	Fishery performance & monitoring	unknown	Recent Council funded project and literature review by PDT - changed in discard mortality rates for wolffish, Atlantic halibut, and GOM haddock.
53	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	
54	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.
55	Identify gears and/or methods that would reduce bycatch and/or improve discard survival of unwanted catch of red hake discards in the small mesh fishery.	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.
56	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.
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 groundfish.	Minimize bycatch	Important (near term)	underway	Northeast multispecies	Groundfish	Bycatch	unknown	multiple ongoing projects; a BREP 2018 award is creating a bycatch avoidance model for the rec fishery; Also small-mesh belly panel to reduce flatfish.
58	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	
59	Investigate portside sampling & electronic monitoring as tools to monitor the A. herring fishery.	Improve monitoring	Important (near term)	underway	Atlantic herring	Atlantic herring	Bycatch	unknown	Pilot study recently funded for MWT fishery.
60	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	NMFS had a discard peer review to look at this.

#	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
61	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., environmental cues and bycatch avoidance, electronic monitoring and 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.
62	Policy evaluation of bycatch management, including possible implementation of a 100% retention policy to minimize discarding and ecosystem effects.		Important (near term)	unknown	Multiple	Multiple	Bycatch	unknown	
63	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.	Research to help analyze spatial management alternatives for habitat. Ideally, these results will contain spatially-explicit data including 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.	Strategic (future needs)	unknown	Multiple	Multiple	Habitat	unknown	This is also an important priority for habitat management in an ecosystem plan. This priority is very general; Priorities #64-66 are related. The work should explicitly explain data limitations defining essential fish habitat, given the original sampling design and spatial and temporal scales of sampling.
64	Concurrent spatial data on recruitment, growth and reproduction of managed fish and shellfish across habitats and environmental settings.	Would improve our understanding of the linkages between habitat type and the attributes of habitat that enhance managed species production.	Strategic (future needs)	not begun, unknown	Multiple	Multiple	Habitat	unknown	This is an important priority for habitat management in an ecosystem plan. Often when the term "benthic" is mentioned, only epifauna are implied, but particularly in the GOM with it's large areas of soft bottom substrate (esp. mud). Should include infauna here. While infaunal surveys are very time consuming, without them, a big part of the benthic community structure is omitted, as well as possible fish food.
65	Links between habitat characteristics and primary prey species, through a concurrent assessment of habitat characteristics and prey species occurrence.	Would improve understanding of the linkages between habitat type and the attributes of habitat that enhance managed species production.	Strategic (future needs)	unknown	Multiple	Multiple	Habitat	unknown	Related to #66. Should include infauna here.

#	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
66	Evaluate and quantify linkages between habitat types (e.g., space/time variation of shelter and prey) and the productivity of managed species.	This could help refine EFH designations to understand the relative benefits of EFH impact minimization alternatives, and possibly to inform reference point definitions.	Strategic (future needs)	unknown	Multiple	Multiple	Habitat	unknown	Very similar to #65.
67	Geological and biological sampling of the Gulf of Maine region to improve spatial resolution [of habitat distributions] and characterize temporal variability.	Some areas of the GOM are very sparsely sampled for benthic habitat characteristics. Would improve support for spatial management intended to target specific habitat types for protection.	Strategic (future needs)	unknown	Multiple	Multiple	Habitat	unknown	This is an important priority for habitat management in an ecosystem plan.
68	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.	Strategic (future needs)	unknown	Multiple	Multiple	Habitat	unknown	This is an important priority for habitat management in an ecosystem plan.
69	Studies that ground truth, via physical sampling, epibenthic fauna observed in video and still imagery-based datasets.	Would help estimate biodiversity; this could be important in a deep-sea coral context as interactions between corals and other species can be quite specific.	Strategic (future needs)	underway	Multiple	Multiple	Habitat	unknown	This sort of work is being done for deep-sea corals. Should include infauna here.
70	Acoustic surveys (e.g., multibeam, side-scan sonar) to add to the growing number of seafloor habitat maps in the region, particularly in the Gulf of Maine.	Would facilitate development of spatial management approaches designed to encompass specific habitat types.	Strategic (future needs)	underway	Multiple	Multiple	Habitat	unknown	Also being discussed in Great South Channel/Nantucket Shoals region. Underway in GOM.
71	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	Schweitzer & Stevens paper on trap gears is an example of this. Consider impacts to coral and sponge habitats specifically, possibly using Jordan Basin as a study site.
72	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).	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	

#	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
73	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.
74	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 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.
75	Studies of invasive organisms to understand their distribution and spread, and to evaluate impacts on habitats, ecosystems, and target species.	Invasive species could be considered when managing fisheries spatially, if fishing facilitates their spread, or if invasive species impact managed resources or habitat function.	Strategic (future needs)	unknown	Multiple	Multiple	Habitat	unknown	
76	Characterize habitats within scallop fishing grounds: identification of nursery and over-wintering habitats of species vulnerable to habitat alteration by scallop fishing.	Would facilitate development of or revisions to spatial management approaches for habitat protection.	Strategic (future needs)	underway	Sea scallop	Scallops	Habitat	unknown	Partially completed through OHA2.
77	Experimental examination of gear impacts on seabed habitats in Northeast US waters that take effort, season, sedimentary character and biological community into account.	Sampling should follow an appropriate experimental design, such as before-after control impact (BACI). Pay attention to studies that replicate the broad scale impacts of commercial levels of fishing activity rather than single impact studies, and to monitoring long-term recovery of habitat features.	Important (near term)	underway	Multiple	Multiple	Habitat	unknown	Scott Gallagher's Closed Area II study of scallop dredge impacts is an example of this. See Priorities #78-80.
78	Evaluate habitat recovery following impact with scallop dredges or trawls.	Would help develop or revise spatial management approaches for habitat protection.	Urgent (essential)	underway	Sea scallop	Scallops	Habitat	RSA	RSA has funded Scott Gallagher at WHOI to compete 3 years of BACI work in the EGB HAPC.

#	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
79	Examine fine scale fishing effort distributions in relation to fine scale habitat distribution.	Would help develop or revise spatial management approaches for habitat protection.	Urgent (essential)	underway	Sea scallop	Scallops	Habitat	RSA	RSA has funded Scott Gallagher at WHOI to compete 3 years of BACI work in the EGB HAPC.
80	Studies that would help evaluate current and potential habitat management areas and Habitat Areas of Particular Concern.	Assess whether these areas are accomplishing their stated purposes; better define the complex ecosystem processes occurring in these areas.	Important (near term)	underway	Sea scallop	Scallops	Habitat	RSA	RSA has funded Scott Gallagher at WHOI to compete 3 years of BACI work in the EGB HAPC.
81	Evaluate long-term or chronic effects of scallop fishing on marine resource productivity.	Would help develop or revise spatial management for habitat protection.	Strategic (future needs)	unknown	Sea scallop	Scallops	Habitat	unknown	
82	Identify and evaluate methods to reduce the habitat impacts of scallop fishing, including studies that evaluate variability in scallop 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	
83	Conduct monkfish tagging and telemetry studies that focus on basic life history and habitat use.		Strategic (future needs)	underway	Monkfish	Monkfish	Habitat	RSA	RSA has funded tagging work in recent years partly tied with age validation work.
84	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	unknown	This integrates other habitat research priorities, including the importance and role of quality habitat on recruitment and juvenile productivity/survival.
85	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.
86	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	unknown	
87	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
88	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.
89	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.
90	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.
91	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 complimentary factor of Priority #90.
92	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	
93	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	
94	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	
95	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	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.
96	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	unknown	MADMF funded in 2016 with a NMFS Species Recovery Grant to study leatherback behavior off Cape Cod to help reduce entanglements.
97	Investigate protected species bycatch/discards in the Atlantic herring fishery.		Strategic (future needs)	underway	Atlantic herring	Atlantic herring	Protected species	unknown	Observers collect these data. EM has proven useful.
98	Investigate the existence value of deep-sea corals and evaluate tradeoffs between coral protection and fishing.		Strategic (future needs)	unknown	Multiple	Multiple	Human dimensions	unknown	
99	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.	Strategic (future needs)	not begun	Small-mesh multispecies	Small-mesh multispecies	Human dimensions	unknown	

#	Title	Description, rationale, potential use	Priority	Status	FMP	Species	Broad categories	Cross-listing	Notes
100	Continue to support data collection efforts for improved social and economic impact analyses, as well as cost-benefit analysis, for all fisheries, but particularly groundfish.		Important (near term)	unknown	Northeast multispecies, Multiple	Groundfish, Multiple	Human dimensions	unknown	
101	Continue to support data collection efforts for improved social and economic impact analyses, as well as cost-benefit analysis, for all fisheries, but particularly Atlantic herring.	Some of this is done but need more fixed cost info.	Strategic (future needs)	underway	Atlantic herring, Multiple	Atlantic herring, Multiple	Human dimensions	unknown	Some work was done on this for the IFM amendment.
102	For the Atlantic herring fishery: (1) Characterize the individuals, families, firms, organizations, and communities involved in the Atlantic herring fishery; (2) Identify capacity use and fixed costs of Atlantic herring vessels; (3) Characterize Atlantic herring stakeholders besides those of the commercial herring fishery (e.g., whale watching, tuna, groundfish, lobster fisheries); (4) Characterize Atlantic herring dealers and processors (e.g., dependence on herring, location, costs, earnings, employment); and (5) Characterize market dynamics (e.g., relationships between fishermen, buyers, and processors; and end users in bait and fresh markets).	Some of this is done but more info always useful. Amendment 8 did expand the description of other stakeholders in the Herring FMP, but there are data limitations.	Strategic (future needs)	underway	Atlantic herring	Atlantic herring	Human dimensions	unknown	
103	Improve quantification of economic impacts from restricted fishing in closed areas (e.g., develop spatially-explicit fleet behavior model).		Strategic (future needs)	unknown	Multiple	Multiple	Human dimensions	unknown	
104	Evaluate the social and economic impacts and consequences of area rotation on the scallop fishery, including evaluation of potential distributional effects and impacts on other fisheries.		Important (near term)	not begun	Sea scallop	Scallops	Human dimensions	RSA	2019/2020 RSA priority to conduct MSE. Also related to 2018 priority of follow-up to OHA2.

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: Research that is essential for compliance with federal requirements, 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
	IMPORTANT: Obtaining a new set of data or research result that is likely to aid in the evaluation of a near term or ongoing management goal. 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 the there is research currently 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 categories	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.

Definition 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
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
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