

No.	Title	Description, rationale, potential use	Rating	Status	FMP	Species	Broad categories	Cross-listing	Notes
8	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)	Underway	Atlantic herring	Atlantic herring	Population dynamics	Assessment, RSA	2018 assessment explored multi-stock model but data insufficient to estimate movement or relative stock composition. NEFSC has proposed conducting otolith microchemistry, but to date that has not been funded. NEFSC generic research on consequences of ignoring stock structure. Topic is still urgent as spatial dynamics may be important for the current low recruitment situation.
9	Enhance herring fishery sampling (portside, at-sea observers and monitors) to track spawning activity on GB.	Increase number of samples and sample for spawning condition	Urgent (essential)	Not begun	Atlantic herring	Atlantic herring	Population dynamics, Fishery performance & monitoring	Unknown	Priority added in 2020. NEFMC (2019b) has details. This topic may be even more urgent if Maine sampling is no longer funded through ACCSP. Funds may expire in June 2022 unless extended. These data are essential for the assessment.
10	Further investigation into understanding the recent low recruitment of Atlantic herring and possible drivers.	Better understand the implications for the herring population (e.g., environmental, fertilization rates, egg condition)	Urgent (essential)	Unknown	Atlantic herring	Atlantic herring	Population dynamics	Unknown	Priority added in 2020. NEFSC is funding a CINAR project that plans to explore this topic in some detail (2021).
11	Understand the impacts of fishing gear on herring egg mats.	Better understand the implications for the herring population.	Strategic (future needs)	Unknown	Atlantic herring, Multiple	Atlantic herring, Multiple	Population dynamics, Conservation engineering, Bycatch	Unknown	Priority added in 2020.
12	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	A TEWG synthesis is being prepared. NEFSC staff involved in shad assessment.
13	Collect information on the marine phases of river herring and shad specific to migrations at sea.	Improve RH/S stock assessment for: 1) river origin of individual catch in coastal/ocean (independent surveys, tagging) & in non-targeted ocean fisheries; & 2) marine survival.	Important (near term)	Underway	Atlantic herring	River herring, Shad	Population dynamics	TEWG	Turner et al and Lynch et al published several papers on at-sea distributions.
14	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. Age validation is a NEFSC priority. NEFSC involved in Bank et al (2020).
16	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 & GMRI (3 S-K projects); contributions to the Atlantic Cod Stock Structure Working Group. Halibut: TNC.
17	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	Ashford et. al. studied red hake stock structure with elementary chemistry, life history and oceanography and will be reviewed at the red hake stock structure workshop for 2020 assessment.
24	Investigate fine-scale spawning dynamics and the appropriate size and timing of spawning area closures.	Potential to adjust time-area closures for groundfish species or impact small-mesh multispecies exemption areas.	Important (near term)	Underway	Multiple	Multiple	Population dynamics	Unknown	Two S-K projects and Council-funded projects on cod and winter flounder spawning. NEFSC has supported a GMRI study.
28	Continue to explore uncertainties in groundfish stock assessments, including retrospective patterns; identify 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 J. Wiedenmann & O. Jensen at Rutgers work; NEFSC working on this issue (WKFORBIAS workshop, report in prep).
93	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)	Underway	Multiple	Multiple	Ecosystems	Unknown	NEFSC Food Habits Program and evacuation rate studies.

94	Study trophic interactions of monkfish predation on other species and monkfish cannibalism; recognize the need to incorporate monkfish into prey assessments.		Strategic (future needs)	Underway	Monkfish	Monkfish	Ecosystems	RSA	NEFSC Food Habits Program and evacuation rate studies underway, through insufficient to estimate predation rates.
96	Ichthyoplankton monitoring	Data is needed to assess changes in predation and effects on productivity	Important (near term)	Underway	Multiple	Multiple	Ecosystems, Population dynamics	Unknown	Priority added in 2020. Failures to obtain full spatial coverage during recent EcoMon plankton surveys contribute to uncertainty about recent shifts in spawning activity.
97	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)	Underway	Northeast multispecies	Groundfish	Ecosystems	Unknown	Bell et al. (2017) on winter flounder rebuilding.
98	Investigate effectiveness of seasonal and year-	Investigate potential means to improve	Important	Underway	Multiple,	Multiple,	Ecosystems,	Unknown	SMAST finished EFP on this, SMS PDT has not seen results yet.
99	Monitor trends in non-target, ecosystem components.	Information is needed to develop ecosystem management tools and approaches.	Strategic (future needs)	Underway	Multiple	Multiple	Ecosystems	Unknown	See NEFSC Ecosystem Status Reports.
100	Develop and enhance industry-based oceanographic data collection (e.g., physical, primary productivity, habitat metrics, including seasonal variation in these metrics).	Information is needed to develop ecosystem management tools and approaches.	Strategic (future needs)	Underway	Multiple	Multiple	Ecosystems	NEFSC	Possible application for industry data trust (RODA project). Study Fleet and eMOLT programs collecting some data.
101	Better understand species responses to climate change (e.g. distribution, productivity, recruitment) and how these changes may affect fisheries (e.g., South Atlantic stocks moving north, scallop distribution, silver and red hake stocks).	Information is needed to build resiliency into FMPs and surveys (strata based on historic distribution), and to account for possible new interactions between fisheries and fish species. It could potentially explain why some species are not rebuilding (e.g., thorny skate). Consider changes at the species level, and accounting for interactions between species. This could avoid forcing the industry to rebuild stocks to unachievable levels.	Urgent (essential)	Underway	Multiple	Multiple	Ecosystems, Habitat, Climate change, Human dimensions	HI-EBFM	Priority added in 2019. Northeast Fish and Shellfish Climate Vulnerability Assessment (Hare et al. 2016). Rutgers modeling work (e.g., Morely et al. 2016). NHRA habitat suitability models (results in 2022) will incorporate climate forecasts. NEFSC work in Northeast groundfish and Climate Program Office programs. NEFSC habitat modeling work underway for thorny skate. Kleisner et al (2016, 2017) included skate species. Research by Chang et al (NMFS FATE project), Lehnert et al. (2019), Friedland et al (2020; 2021a,c).
102	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 mixed 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, Habitat	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. Data on the trophic interaction of skates with other benthic species would be helpful. Several NEFSC projects underway. Topic came up in the 2019 interviews of Council members (Williams et al 2020).
103	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. Relevant to silver hake, which serves as a key part of the ecosystem as forage.	Important (near term)	Underway	Multiple, Small-mesh multispecies	Multiple, Small-mesh multispecies	Ecosystems, Climate change	Unknown	Work underway with Northeast groundfish (Saba FY19 funds to incorporate Cobalt into Atlantis ecosystem model) could address some of these issues.
105	Develop habitat suitability modeling capability for	Habitat suitability modeling is and has	Important	Underway	Multiple	Multiple	Ecosystems,	Unknown	Priority added in 2019. The climatology database is being