



New England Fishery Management Council

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MEETING SUMMARY

Climate and Ecosystem Steering Committee

Via webinar

March 27, 2026

The Climate and Ecosystem Steering Committee (CESC) met on March 27, 2026 to:

- Learn about joint species distribution models and discuss their applications to management,
- Review and discuss an ecosystem component species evaluation framework,
- Discuss selected sections of the 2026 State of the Ecosystem report,
- Provide direction on climate and ecosystem on ramps work, and
- Receive updates on other issues of general interest to the steering committee.
- Discuss other business, as necessary

MEETING ATTENDANCE: John Pappalardo (Chair); Geoff Smith (Vice Chair), Katie Almeida, Dr. Joe Caracappa, Dr. Jeremy Collie, Anthony DiLernia, Travis Ford, Dr. Lisa Kerr, Dr. Gareth Lawson, Dr. Kathy Mills, Jackie Odell, Dr. Michelle Staudinger, Megan Ware, and Peter Whelan (all Steering Committee members present); Michelle Bachman, Emily Bodell, Connor Buckley, Dr. Jamie Cournane, Jennifer Couture, Dr. Rachel Feeney, Robin Frede, Julian Garrison, Dr. Cate O'Keefe, and Jonathon Peros, (NEFMC staff); Daniel Salerno and Terry Alexander (additional NEFMC members or designees); Dr. Chris Haak and Angelia Miller (invited presenters). In addition, 33 other people attended.

KEY OUTCOMES

- The Steering Committee was appreciative of the species distribution modeling products and offered a few specific ideas:
 - Consider the distinct influences of static vs. dynamic variables when applying the results to management.
 - Consider novel data streams such as eDNA and validation with commercial data.
 - Consider applications to stock assessment, climate vulnerability analysis, and when evaluating management opportunities for more abundant vs. constraining species (e.g., cod and haddock).
- The Steering Committee had positive reactions to the Ecosystem Component Species evaluation framework.
 - They wondered if it should stop after the first section on need for conservation and management and indicated some support for a productivity and susceptibility analysis when a stock assessment was not available or inconclusive.
 - They suggested being clear in the framework about management implications and tradeoffs, and that the final summary might weigh questions 4-9 higher than questions 10-13.
- The Steering Committee supposed continued work to identify on ramps for climate and ecosystem information, coordinated with other Council and outside efforts.

- The Steering Committee appreciated the annual State of the Ecosystem report and the context it provides for climate-ready fisheries management. They agreed that short term forecasts were useful and liked seeing them highlighted in this year's report.

WELCOME AND INTRODUCTIONS

The Chair welcomed Steering Committee members to the meeting and summarized the outcomes of the previous meeting on September 2, emphasizing the importance of integrating ecosystem information into management decisions. There were no changes to the agenda.

JOINT SPECIES DISTRIBUTION MODELS AND APPLICATIONS TO MANAGEMENT

Dr. Chris Haak presented a joint species distribution model (SDMs) developed for the New England and Mid-Atlantic Councils, explaining their purpose, methodology, and applications. The model employs 20 years of spring and fall trawl survey data as well as diverse environmental covariates, e.g., temperature, salinity, depth, benthic terrain characteristics, and tidal flows. The presentation described the modeling methods, with a focus on addressing survey integration challenges, highlighting eventual successes in combining inshore and offshore trawl data into a single framework.

In nearly all cases adult and juvenile densities are estimated separately. Some species such as sea scallops and clams are modeled outside of the joint framework owing to fundamentally different data streams, and others captured in the trawl survey do not have sufficient sample sizes for joint model integration (e.g., offshore hake, Atlantic halibut, and wolffish) and will be modeled on their own later this year to support essential fish habitat designation (EFH) updates and other initiatives.

While essential fish habitat (EFH) designation was a primary driver for the development of these models, the results can be applied to a range of decisions. Beyond providing information on habitat use for individual species and life stages, the joint model framework enables identification of the strength and direction of covariance in species' distributions and their shared or distinct environmental niches.

Products for individual species include:

- Maps of estimated species density by grid cell. Mean density values over time can be represented as a continuous value or displayed as quantiles, or density can be presented as a cumulative proportion to indicate key areas of the region for a species.
- Maps showing locations with increases or decreases in estimated density over a period to indicate spatial shifts.
- Line graphs of annual density trends over time averaged across the domain.
- The models estimate which environmental variables / processes are driving distribution and density estimates. This information can be represented by variance partitioning bar graphs and in smooths plots that show the shape of the relationship between density and individual environmental covariates. Variance that remains unexplained by the environmental predictors included in the models might be due to species interactions with each other and/or missing predictors.

Community products include:

- Pairwise correlations in density between species (i.e., do model grid cells rank similarly for different species). These can be estimated for all months or by season (spring or fall).
- Spatially explicit correlations in density over time between species (i.e., considering the results grid cell by grid cell, how do species track one another).
- Overall correlations in population sizes between species over time across the northeast U.S. This can indicate synchrony and asynchrony between species (e.g., two species might generally co-occur in space, but show asynchronous highs and lows in abundance when considering year by year results).

- Pairwise overlaps in area occupied (i.e., for species that show high overlaps in distribution, does the extent of their overlap shift over time).
- Estimates of how species' distributions correlate in response to shared environmental variables.
- Hierarchical clustering dendrograms show groups of species with similar responses to modeled variables and/or random effects.

The presentation concluded with some overall findings about the work:

- Applications include (1) EFH designation, (2) understanding distribution and range shifts, (3) considering ecological relationships in the context of an ecosystem component species evaluation or harvest portfolio analysis, and (4) estimating possible bycatch or food web interactions, given prior knowledge of catchability in different gears and information about predator/prey relationships.
- Analyses based on density predictions are more straightforward to interpret and are already being applied to EFH questions. Community relationship metrics are more exploratory and require further interpretation as they are applied to management questions.
- The framework is designed to be modular. Given the joint nature of the work, the complexity of these products and analyses are limited to what can be done given sample sizes for more data-limited species. A subset of species or areas could be explored in more detail where additional data were available or to address specific questions.
- Currently the oceanographic variables are taken from the GLORYS and DOPPIO climate reanalyses, but MOM6 model products developed through the Changing Ecosystems and Fisheries Initiative are being explored and could also be used.

Steering Committee discussion:

A committee member asked about patterns of responses to dynamic (temperature, salinity, currents) vs. static (depth, sediment, rugosity) variables. What proportion of species are responsive to dynamic changes happening in the ecosystem due to climate change? Dr. Haak responded that more work is required to evaluate the responses and understand the patterns observed, but that temperature (dynamic variable) is a big driver and drives seasonal differences. Year to year, he is not sure how much temperature changes are driving significant shifts in space use. Depth is also important for many species. The committee member noted that in their own species distribution model work when projecting outside the current period, they are finding it is important to understand whether static vs. dynamic variables are relatively more important. The committee member and Dr. Haak agreed to follow up on this topic, especially as these tools could be used to estimate near-term future patterns of habitat use based on climate forecasts.

Another committee member noted that in a stock assessment context there have been advancements in combining multiple surveys into a single index, vs. using surveys more independently. They suggested that some of the techniques employed here might be used to improve survey integration in assessments. Dr. Haak noted that stock assessment indices aren't a use case that has been directly considered, but these results could be informative in that context. He also noted that the scallop distribution model which is under development this spring employs some slightly different, novel techniques around survey integration that differ a bit from the approach used in the joint SDM.

Another committee member suggested that considering the interactions between two key recreational groundfish species, cod and haddock, would be a useful application of this work. Generally, the recreational groundfish fishery is underperforming on haddock harvest given interactions with cod, so it would be useful to consider how their relationship with each other might have changed in the past 20 years.

A council member asked whether the models have been validated with commercial catch data, and Dr. Haak noted that this idea has been considered but that only cursory comparisons with fisheries dependent data have been completed to date. He emphasized that count models are hard to fit with commercial data

given varying catchability, etc., but presence/absence models would be easier to develop. The council member also asked if the models could be used to predict spawning areas by estimating a distribution using data on fish in spawning condition. Dr. Haak agreed that conceptually this might be possible but given maturity stage data are only available for a subset of survey catches, sample sizes would be reduced substantially. Council staff noted that there has already been some exploratory work to estimate size-specific habitat use to determine if breakpoints other than size at 50% maturity might provide a clearer picture of shifts in distribution across a fish's ontogeny. This work may be more useful for parsing out patterns of habitat use for smaller juveniles vs. spawners, given the data limitations noted above.

A committee member asked whether environmental DNA (eDNA) could be used in this sort of analysis. Dr. Haak noted that this is a hot topic and there are multiple eDNA surveys coming online. He emphasized that eDNA is presence not absence, and that thinking about its relationship to existing time series is important, but that there are frameworks that can be used to integrate presence only data such as eDNA into count models. To date, use of eDNA hasn't been considered for this model, which is already rather complex. The member emphasized that it seems important to begin to think about applications for eDNA, for example in areas such as windfarms that cannot be sampled with traditional gear. Dr. Haak noted that camera-based and sonar work are also alternative sampling technologies that could be further explored in a modeling context.

Another committee member asked how this information might be used in conjunction with climate risk maps, specifically how has species and community risk changed in the last 20 years and how might it change going forward? Dr. Haak noted that the ongoing regional work to update the climate vulnerability assessment analysis includes development of presence/absence SDMS, and that their results could be compared to ours (note that Dr. Haak and Council staff are already talking with Northeast Fisheries Science Center staff about the climate vulnerability assessment updates).

Dr. Haak also noted that the CT/Long Island Sound and Chesapeake Bay surveys have been integrated into these models and are useful for helping us understand patterns of habitat use in lower salinity areas, which are not sampled in most of the region's trawl surveys.

Public comment

There was no public comment.

ECOSYSTEM COMPONENT SPECIES EVALUATION FRAMEWORK

Angelia Miller presented a framework for evaluating ecosystem component species (EC Species). The objective of the evaluation is to analyze factors in Magnuson Stevens Act and National Standard Guidelines, as well as changes in environmental drivers and fishery data, to develop criteria and thresholds for designating EC Species within the NEFMC fishery management system. The goal is to produce a robust screening framework that can be applied across species (now and later). A near-term deliverable is a pilot evaluation in the form of a white paper containing quantitative and qualitative results for each of the case study species/stocks.

The evaluation framework includes three main steps: determining conservation and management needs (3 factors/questions), evaluating 10 factors from the National Standard Guidelines, and considering additional information. Specific data sources and analyses are proposed for each of the 13 questions/factors, which are summarized in the table below. The committee was asked for feedback on several aspects of the framework, including whether to evaluate all 13 factors for each species, the use of a productivity and susceptibility analysis (PSA) to supplement the evaluation, and the appropriate way to signal the need for an ecosystem component designation.

PSA could be used as a supplemental analysis when status is unknown or there is no formal assessment (NMFS Vulnerability Working Group, Patrick et al. 2009). It evaluates a species or stock's level of vulnerability to fishing pressure as the combination of its productivity and its susceptibility to the fishery.

Scores are averaged across productivity and susceptibility attributes to derive a vulnerability score, where low productivity and high susceptibility scores signal that the stock is the most vulnerable to overfishing, and high productivity and low susceptibility scores signal that the stock is the least vulnerable to overfishing.

For each of the 13 factors, Ms. Miller presented an overview including availability of data, analytical approach, challenges and gaps, the relationship between the factor and EC Species identification, and the relationship to PSA. See the slides for more information.

	ECS Designation?
<i>I. Conservation and Management Determinations</i>	
1. Is the stock/species overfished or likely to become overfished?	
2. Is the stock/species subject to overfishing or likely to become subject to overfishing?	
3. Is the stock/species predominately caught in federal waters?	
<i>II. National Standard Guideline Factors (§ 600.305(c))</i>	
4. Is the stock an important component of the marine environment?	
5. Is the stock caught by the fishery?	
6. Will an FMP improve or maintain the condition of the stock/species?	
7. Is the stock/species a target of the fishery?	
8. Is the stock important to commercial, recreational and subsistence users?	
9. Is the fishery important to the Nation or regional economy?	
10. Is there a need to resolve competing interests and conflicts among user groups and would an FMP further that resolution?	
11. What is the economic condition of the fishery and would an FMP produce more efficient utilization?	
12. Are there needs of a developing fishery, and would an FMP can foster orderly growth?	
13. What is the extent to which the fishery is already adequately managed by states, by state/Federal programs, or by Federal regulations pursuant to other FMPs or international commissions, or by industry self-regulation, consistent with the requirements of the Magnuson-Stevens Act and other applicable law?	
Legend Supports an ECS Designation Designation depends on the answer Does not support an ECS Designation	

Steering Committee discussion:

There were a few questions about the implications of designating a species as an ecosystem component. One member asked if an EC Species is part of a fishery management plan. Ms. Miller noted that yes, the three options are fully managed in an FMP, managed as an EC Species under an FMP, or unmanaged. Another asked whether accountability measures would be required. General Counsel noted that there would be some sort of measures required, but that this would not need to include formal accountability measures unless the Council wanted to employ them.

In terms of the structure of the evaluation, a member wondered if it would be best to stop after the third factor so that stocks that are overfished or subject overfishing are not evaluated further. Another member wondered how we answer questions 1 and 2 without a stock assessment. To the second question, Ms. Miller emphasized that the PSA could be used to estimate stock condition and fishing pressure, absent a formal stock assessment. Building on the first question, another committee member noted that there are many more currently managed species on the pilot list than there are species that are not currently under an FMP. They suggested that the range of approaches used in the evaluation framework must be sufficient to accommodate different levels of data availability across species.

A committee member suggested being clear on the costs and benefits of EC Species designation. For example, would there no longer be a stock assessment or EFH designation? Are there monitoring or enforcement implications? Do we gain time savings in terms of plan development and administration? They suggested weighing the first three questions highest, perhaps stopping after that point in the evaluation if a species is overfished or overfishing is occurring and it is predominantly caught in federal waters. They suggested that next, the analysis should evaluate questions 4-9, and finally it should address questions 10-13. They suggested weighing the responses to questions 4-9 higher than 10-13 when deciding about whether to ultimately designate the species as an ecosystem component.

Another committee member thought that it was interesting to consider species on a continuum of management interventions, and wondered how do you keep an eye out for the condition of a species in the middle of the continuum? They suggested that we might want a pathway for adding / considering new EC Species as they are coming into our region.

Public comment

There were no public comments.

CLIMATE AND ECOSYSTEM ON RAMPS IDENTIFICATION

Michelle Bachman presented an update on climate and ecosystem on ramps and process mapping work, where an on ramp represents the combination of a climate or ecosystem information product and a specific step in the Council's FMP development process. She acknowledged that this work is complex, in that information products can be applied across multiple process steps and there are many groups involved in both Council actions and in product development. She discussed the progress made on creating flowcharts for different council processes and the development of the structure for an on ramps table to describe opportunities for incorporating climate and ecosystem information into decision-making. The work is related to other ongoing New England Council projects and staff are coordinating with a national effort that spans the eight regional fishery management councils. Key next steps include filling out the on-ramps table, starting with the current practices section, and identifying 2-3 specific on-ramps to pursue, with a goal of providing recommendations by summer.

Steering Committee discussion:

A steering committee member suggested identifying how an information product flows through the management system including whether it is used in multiple places. Another member agreed that considering specific example case studies would be very useful. They commented that there are multiple tangible examples in the region, and we are doing some forward-looking work in terms of risk policy and harvest control rules. Other members agreed with these points. Another member noted that describing the timing of process steps would be important so that scientific partners are clear on when the Council needs certain types of information.

A member suggested framing this work as 'Ecosystem Approaches to Fisheries Management' and reminded the group that there is lots of information and literature on this topic.

A council member suggested that indicators for at-risk communities and fleets might be an important information product to consider in this context.

2026 STATE OF THE ECOSYSTEM REPORT

Dr. Joe Caracappa presented some highlights from the recently released 2026 State of the Ecosystem report, highlighting key findings for the Gulf of Maine and Georges Bank regions. The SOE team incorporated new forecasting data from the MOM6 model and solicited more feedback from industry and the public about unusual observations.

Steering Committee discussion:

Steering Committee members noted that they appreciated both the report and the incorporation of prior feedback over time. They agreed that sharing near-term climate forecasts (1 year out) is a good place to start and suggested that multi-year but still shorter term (e.g., 3 year) forecasts would be useful for management context if available. Another member agreed with this, and asked whether decadal forecasts been evaluated for skill over a 2-3 year timeframe. Dr. Caracappa wasn't certain about using decadal forecasts at shorter time scales but can follow up. He emphasized that it is important to consider forecasts at regional / ecological production unit spatial scales as predictions may be uncertain at finer spatial scales.

Another member noted the relationship between this product and the Council's draft holistic strategic plan, and that it seems like the SOE is a very important product because it hits a lot of different issues of importance to the Council and is very accessible. The report gives managers a sense of how flexible we will need to be given variability and instability in the ecosystem.

In response to a question, Dr. Caracappa noted that of the indices in the report, the survey and socio-economic products have been thoroughly reviewed and are most ready to use.

Public comment

There were no public comments.

ADDITIONAL UPDATES AND OTHER BUSINESS

The Steering Committee Chair and staff highlighted the availability of a memorandum summarizing other recent work expected to be of interest to members and relevant to the committee's work. There were no questions on these topics, and no other business was brought forward.

The Climate and Ecosystem Steering Committee meeting adjourned at 1:00 p.m.