Ecosystem and Ocean Planning Committee & Advisory Panel Meeting

February 24, 2022
Webinar Meeting Summary

The Mid-Atlantic Fishery Management Council's (Council) Ecosystem and Ocean Planning (EOP) Committee and Advisory Panel (AP) met on Thursday, February 24, 2022 from 1:00 p.m. to 2:30 p.m. The purpose of the meeting was for the EOP Committee and AP to provide feedback and input on a research project the Council is collaborating on with a research team from Rutgers University. The project is developing forecast models to predict short-term (1-10 years) climate-induced distribution changes for four economically important Mid and South Atlantic managed species (summer flounder, spiny dogfish, *Illex* squid, and gray triggerfish). A forecast model for summer flounder has been developed and the Committee and AP provided feedback on the model outputs and their potential utility and offered input on future project direction and next steps.

EOP Committee Attendees: K. Wilke (Committee Chair), A. Nowalsky (Committee Vice-Chair), J. Cimino, M. Duval, P. Geer, K. Kuhn, S. Lenox, T. Schlichter, S. Winslow, D. Stormer, M. Luisi (Council Chair), J. Hermsen, W. Townsend (Council Vice-Chair)

EOP Advisory Panel Attendees: W. Goldsmith, F. Hogan, S. Rubow, Z. Greenberg, J. Weis, M. Lapp, E. Bochenek, C. LoBue, M. Heard Snow, P. Himchak, F. Akers, J. Kaelin, P. Simon, P. deFur, J. Firestone, M. Binsted, J. Hancher, B. Brady

Other Attendees: M. Pinsky, A. Fredston, C. Collier, E. Knight, S. Close, G. DiDomenico, J. Byrd, K. Dancy, B. Muffley, K. Almeida, J. Beaty

Overview of project presentations:

Staff started the off the presentation with a review of the biological, science, and management challenges created due to shifting stock distributions. It also addressed the Council's interest and engagement in the current research project and the potential areas of application of the research project outcomes. Existing stock distribution models offer forecasts that are typically 60-100 years in the future and the Council has utilized this information in a strategic way, i.e., incorporation and policy recommendations in the Ecosystem Approach to Fisheries Management (EAFM) guidance document. The types of models being developed in this project may allow the Council to consider changes in stock distributions in both a strategic and a more tactical and responsive way within the management decision process.

Dr. Alexa Fredston, Rutgers University, then introduced "dynamic range models" that are designed to mechanistically forecast range shifts over short time scales while accounting for

transient dynamics in populations. The team at Rutgers is fitting these models to data on each of the four focus species from 1972-2006, and running "retrospective forecasts" of the subsequent decade (2007-2016) to evaluate the model performance. Some of the features of these models include spatial structure, age structure, and a number of user options such as choosing which process (movement, mortality, or recruitment) is temperature-dependent. Preliminary results suggest that the temperature-dependent recruitment model has skill at forecasting summer flounder range dynamics. Future steps include running these models for the other species and "competing" the best models against more traditional species distribution modeling methods.

Questions and feedback on project from Committee and AP:

Following the presentations, the meeting was opened up for Committee and AP questions and feedback regarding the modeling framework and initial outputs for summer flounder. In general, the group was supportive of the modeling approach and work done to date, but also had a number of questions and raised a variety of areas for additional consideration by the project team. Below is a bulletized summary of some of the broader feedback offered by the Committee and AP (this is not comprehensive list of all discussion):

- Habitat, in addition to temperature, is also changing and has implications for recruitment, productivity and distribution shifts, particularly for an estuarine dependent species like summer flounder, and is not considered in current model.
    - The project team did note that the modeling framework is quite flexible and habitat variables could be added, but the goal of this project is to develop short-term forecasts with a "simplified" model that incudes stock dynamics, temperature and fishing as the primary drivers. If the results of the project show these initial factors are not sufficient for short-term forecasts, future model development may need to look to these other forces (i.e., habitat) and see if performance improves.
- Since the model is considering stock dynamics across the range of a species, there was interest in the ability to evaluate these dynamics and different spatial scales (i.e., are stock dynamics and distributions different off North Carolina than off Massachusetts, for example).
    - The project team noted this is a strength of the current model and spatial structure used to evaluate the data.
- The group recommended the project team consider other potential sources of data beyond the NEFSC trawl survey. For example, the use of industry and/or study fleet information and other fishery independent surveys (e.g., Rutgers larval survey). It was also noted that there is an opportunity to gain some additional insight and information from the upcoming *Illex* research track assessment peer review later in March.
    - The project team noted that *Illex* model development has yet to begin and would certainly be interested in the information from the peer review.
- The group commented on some of the differences found between forecast model and the observed data for summer flounder and the considerations for evaluating inter-annual variability versus overall 1-10 year prediction trend of the population centroid. It was also questioned how the centroid signal could be influenced by variability in the timing of the seasonal migration due to the inter-annual variability in temperature (e.g., stocks staying further north longer because of warmer water). The group supported the model outputs that provide not only the point estimates from the forecast model but also the associated

uncertainty associated with the estimate and if the observed data falls within the estimate bounds.

- The project team noted the forecast model does a pretty good job at predicting the observed inter-annual variability in the population centroid, except for the last year of the prediction, which is the most uncertain model estimate. Need to consider the trade-offs associated with specifying a model to appropriately capture the inter-annual variability but also need to pick-up the correct long-term (10 year) trend in the signal as well.

Additional webinars/meetings with the project team and the EOP Committee and AP will be held in the future as the other three species-specific models are developed and the project begins to wrap-up. Staff will also keep the Council apprised of any project updates and developments.