Atlantic States Marine Fisheries Commission
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Ecological Reference Point Work Group January Check-In Summary

January 6, 2025 12:00 PM – 4:00 PM

Members in Attendance: M. Cieri, M. Celestino, A. Schueller, A. Sharov, G. Nesslage, D. Chagaris, J. Boucher, A. Buchheister, S. Madsen. H. Townsend, M. Dean, J. McNamee
Staff: K. Drew, J. Patel, J. Boyle
Public: J. Kaelin, B. Kindseth, A. Binstock, A. Bianchi, K. Wilke. J. Higgins, J. Hornstein, M. Waine

Species Data Updates

Menhaden M Discussions Update

The menhaden SAS has created an M working group. This group has met and is specifically looking at data components and modelling choices to decide on an M value for the single-species assessment. The intention of the meeting next week (January 16th) is to talk about data recovery and magnets. Once those data piece decisions have been made, the modeling options will be investigated.

Zooplankton, Bay anchovy updates

For anchovies, one of the things discussed on the last call was talking about whether swept area biomass could be provided by NEFSC and if a species distribution model should be used instead. The group agreed that a species distribution model should be used.

For zooplankton, we are still waiting for biomass estimates from the NEFSC.

Atl. Herring

Most of the runs for the Atlantic herring assessment are complete. A report has been submitted to the work group. The projections going forward in the herring model lean toward optimistic. If the ERP WG borrows projections from the herring assessment, this should be accounted for. Most of the changes seen in the assessment model are in the NAA transitions across time (model's way of accounting for aging error). The transition from one age to the next seems to be the driving factor, not the recruitment. The stock status hasn't changed, and the biomass is roughly about where it was from the management track assessment.

Bluefin tuna

Bluefin tuna is included as a predator in the NWACS-full model. In looking at diet for this predator, 6 studies with 14 diet compositions were reviewed. A weighting scheme was created based on number of stomachs per study, spatial extent of study, and years covered by each study. Prey items were assigned to categories of NWACS full model. Menhaden ended up being about a quarter of the diet. Spatially, total stock biomass was calculated across 5 geographic regions and 2 depth strata.

Population size of western Atlantic bluefin tuna from 1950-2021 is available in the ICCAT 2021 stock assessment, and projected biomass is available to 2022-24. Data inputs are relatively ready to be used in the full model.

The group agreed that to parameterize the biomass, seasonal proportion of average biomass should be used.

Next steps: M. Dean to find time series of total mortality rate Z if available. M. Dean to re-allocate unknown biomass into proportional groups.

Other species
Northern shrimp assessment outputs were processed for the full model. This species was meant to be a proxy for all shrimp, but Northern shrimp populations have been declining for a long time (and is at the southern end of their range) so there is a possibility that this trend is divorced from overall shrimp trends. This species would only impact the full model. It may be worth looking at other shrimp species, but the group has a bit of a time crunch.

Next steps: K. Drew to look at summer survey data to see if there are signal differences between the different shrimp species.

M. Staudinger started a gut content analysis for striped bass diet in the Gulf of Maine. General statement of support that this type of research is important for our more spatially explicit work. The group is in support since it's part of their research recommendations.

Model Updates
NWACS-MICE
For diet data, old code was repurposed to create a diet matrix based on a Dirichlet distribution. The diet data was weighted by number of stomachs (more stomachs are weighed more heavily than less) and type of diet (volume and number are weighed less than studies that use biomass). The code samples 30% of the data and bootstraps 10,000 samples to get estimated diet composition. The current output has some pieces that need to be revisited. For example, some of the spiny dogfish data seems to imply that spiny dogfish have a greater reliance on zooplankton than has been seen in any previous studies or data. Similarly, the anchovy output shows some inaccurate trends with benthic invertebrate consumption. This is likely due to mis-categorization of shrimp in the input data and can easily be fixed. Additionally, striped bass proportions for older fish need to be revisited as well.

The last step will be to redistribute the unidentified fish group based on diet proportions. Currently, the categories of unidentified species are broken up by unidentified fish and unidentified forage fish.

This is a similar format to what VADER needs for the diet portion of the model. The raw data has time period information that can be used for VADER.

Next steps: D. Chagaris and J. Patel to revisit data to make adjustments for a few species to finalize MICE diet matrix. D. Chagaris, J. Patel, and A. Buchheister to organize a smaller group to meet with J. McNamee to introduce J. McNamee to the diet data process so that J. McNamee can adapt code to the VADER model.

NWACS-Full
All of the time series data is being pulled into one master file to be run through the model.

Next steps: A. Buchheister to meet with J. Patel and D. Chagaris to continue work on diet portion of the model.

VADER
VADER is functional with updates from the last assessment process, and now has STB dynamic M1, per

Schiano et al. The model is ready to run with an update, but weakfish is still missing.

The focus of the latest round of change has been the bottom-up feedback for predators (specifically STB) and recoding in RTMB. The recode is nearly complete and just needs to troubleshoot.

The first step in bottom-up feedback exploration was to investigate information available to inform the model on these effects in our system. Previously the following relationships had been examined: WAA being impacted by menhaden biomass, WAA being impacted by all modeled prey biomass, and LAA being impacted by menhaden biomass. The only one that seemed to indicate a relationship was LAA relative to menhaden biomass.

A conditional M was implemented based on Schiano et al. 2023. M is conditioned on relative weight by year, season, and age, and this paper considers relative weight of striped bass in the first season and relative weight as a function of standard weight. The group reviewed the two parts of conditional M in-depth and reviewed the equations which were overall M drivers for striped bass in this paper.

The outcome from the Schiano method was implemented into VADER. Schiano work standardizes the weights of striped bass based on empirical info on length.

$W_{sa} = 0.001 * 10^{-4.924} * L_{t,a}^{3.007}$

The $L_{t,a}$ parameter is an average length at age for the first season of the year (t is season, not year)
The otolith derived LAA data from Schiano et al. (2023) was used, and the 4 seasons were average to work as a single annual vector. This means that we won't need LAA as a data input as previously thought.

All of the constants in the equations are specific to STB so not generalizable

Additionally, by using LAA from otoliths (truncated time series 1998-2019), but then WAA from assessment (mix of scales and otoliths) there may be a potential disconnect. If this is not acceptable, the group will need to further discuss how to deal with this data element. Some of the group talked about considering not using ages 1 and 2, as Hoenig et al. (2017) only looked at ages 3-6. The group discussed the Schiano M1 model output and the benefits and drawbacks to how naturality mortality changes with relative weight.

Next steps: J. McNamee to get initial runs done once the weakfish data and present the group with a plot of relative mortality vs. natural mortality.