SSC Constant/Average ABC Sub-group

Meeting Summary

April 21, 2022; 10:00 a.m. – 11:30 a.m.

Background:

In 2018, the Omnibus ABC framework adjustment[1] was implemented that modified the Council's harvest control rule and established a process to allow the SSC to specify constant multi-year ABCs in order "to provide quota stability to fishery participants". The framework specified that constant multi-year ABCs be derived from the average of ABCs (or average risk of overfishing) if the average probability of overfishing remains between zero and 40 percent and does not exceed a 50-percent probability in any given year. The SSC has provided, and the Council has implemented constant/average ABCs on several occasions across a variety of fisheries since its implementation.

Following the 2021 management track assessments for black sea bass and scup, the SSC reviewed both varying/standard and constant/average ABC options. When calculating the constant/average ABCs and applying the Council's new risk policy which increased risk (higher probability of overfishing, P*) under all stock biomass levels, particularly high stock biomass, there were instances where the average ABC in a projection year was associated with a P* greater than 0.5. A P* greater than 0.5 means that the probability of overfishing exceeds 50% and the ABC would exceed the OFL in those years, which is not allowed under National Standard 1. Therefore, the SSC was unable to provide the Council with constant/average ABC recommendations. The Council requested the SSC develop an alternative process to apply during these situations that would allow the SSC to still provide constant ABC recommendations.

Sub-group discussion/options:

After discussing the existing harvest control rule regulatory language and the possible and practical application of the constant/average ABC process, the sub-group identified three options for developing a new process to determine constant/average ABC calculations.

Below are the different options discussed and associated considerations:

a) Status quo
   - Continue to use the current process under all biomass conditions to calculate constant/average ABCs.
   - Current process

[1] To find out more information about the omnibus framework, you can read the approved Environmental Assessment document here - Omnibus ABC framework adjustment EA.

- Conduct projections through the management period to calculate annual ABCs using the maximum fishing mortality rate threshold, projected biomass relative to its reference point, and the Council's P* control rule,
- Conduct ABC averaging procedure to calculate a constant ABC over the management period.

- If resulting constant ABCs under averaging in any given year are associated with P* values greater than 0.5, the SSC would not provide constant/average ABC recommendations to the Council.
- Otherwise, the SSC could consider the entire ABC projection period (3-5 years) and pick the minimum ABC and apply as the constant harvest recommendation.

b) Develop a new optimization approach as considered in the white paper by Paul Rago[2].
   - The new approach would add another step to the status quo approach if the average ABC is expected to result in overfishing in any year of the projection period. The new step is to find the highest constant ABC over the management period that would not result in overfishing in any year. By definition, this constant ABC would be less than the average ABC.
   - A benefit is that this process would continue to use projection information (B, F, recruitment) in specifying ABCs and would build on the previous process.
   - Negatives aspects of this option are that it results in increasing complexity of the ABC calculations, which increases the chance that errors are made in calculations and makes the process more difficult to understand and explain.
   - Presents an opportunity to develop a process to automate calculations internally to minimize complexity and potential computation/data transfer errors associated with current process.

   i. Could develop some pseudo-code to offer to the NEFSC to see if this is something they could further refine and apply to AGEPRO or other Toolkit models,
      a. Sub-group has already had initial discussions with some assessment leads at the NEFSC about the potential to develop code for existing models.
      b. Need to continue discussions with the NEFSC to see about interest/time/opportunities to create code to do this (both standard P* application and the constant/average process).

   OR

   ii. The SSC develops the internal modeling framework in R code and then sends to the NEFSC assessment leads to use for projections and ABC calculations
      a. Will not have all the applications and bells and whistles of AGEPRO

c) Use the ABC calculated for the first year of the projection and apply to the rest of the 2-3 year specification cycle
   - This option would only provide constant ABCs over the management period.
   - Projections of the later years of the management period would not be conducted (years 2 and 3).

[2] P. Rago white paper, "Implications of MAFMC Risk Policy for Multi-Year ABC Recommendations", is included as background material.

- This option would reduce the complexity of the calculations and potential errors in moving data between models/spreadsheets.
- Not doing projections (except for year 1) may reduce our understanding of future biomass trends and potential for overfishing.
    - If the stock is expected to decline, P* would be higher than expected in out years; if stock increasing, P* would be lower than expected in out years.
- Based on previous simulation work (Wiedenmann et al. 2017), this approach has very similar performance for probability of overfishing, average catch, and average biomass, compared to annual ABCs based on projections. Additionally, annual ABCs in the region change relatively little year over year for most stocks.

The SSC will need to make multi-year ABC recommendations for Butterfish in July and potentially Spiny Dogfish in October. There are no other multi-year ABC recommendations anticipated until mid-2023 following the June management track peer review for a number of Mid-Atlantic stocks. Therefore, the SSC has some time to consider and develop a new process to address the Council request to provide constant/average ABCs.

References

Wiedenmann, J., M.J. Wilberg, A. Sylvia, T.J. Miller. 2017. An evaluation of acceptable biological catch (ABC) harvest control rules designed to limit overfishing. Canadian Journal of Fisheries and Aquatic Sciences 74: 1028-1040.