Scientific and Statistical Committee

Constant/Average ABC Sub-Group

Meeting Summary

March 30, 2023; 1:00 p.m. – 2:00 p.m.

Background:

In 2018, the Council modified the harvest control rule to establish a process to allow the SSC to specify constant multi-year ABCs in order "to provide quota stability to fishery participants". The SSC has provided, and the Council has implemented, constant/average ABCs on several occasions across a variety of fisheries since its implementation. However, following the 2021 management track assessments for black sea bass and scup, the SSC was unable to provide the Council with constant/average ABC recommendations due to instances where the average ABC in a projection year was associated with a probability of overfishing (P*) greater than 0.5, violating the harvest control rule. This outcome was likely due to a number of factors including the estimated high stock biomass for both species and the recent changes to the Council's risk policy that increased risk across all stock levels (particularly those with high biomass).

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. To address this request, the SSC formed a sub-group to identify potential alternatives for SSC and Council consideration. The sub-group has met on several occasions over the last 18 months and have provided updates to the full SSC for feedback on two previous occasions[1]. During the May 9-10, 2023 meeting, the SSC will review the sub-group recommendations and offer feedback and then make a recommendation for Council consideration at their June 2023 meeting.

Previous Sub-Group Considerations:

April 2022 meeting

The first sub-group meeting focused on identifying potential options to develop constant/average ABC recommendations. The sub-group identified the following three options:

1. Status quo
    a. Continue with current process to calculate constant/average ABCs for projection period. If resulting constant/average ABCs result in a P* greater than 0.5 in any given year, then the SSC could do one of the following:
        i. Not provide a constant/average ABC recommendation

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[1] See the May 2022 and September 2021 September 2022 SSC meeting reports for additional information.

    ii. Select the lowest ABC calculated for the projection period and apply constant ABC for specification period

2. Develop a new optimization approach to derive constant/average ABCs
  a. This option would build upon the current process but utilize an analysis conducted by P. Rago to find the highest constant ABC over the management period that would not result in overfishing in any year, but would be lower than the average.
  b. An interface between the current version of the AGEPRO projection model and the R-based optimization code is required to implement this alternative. This alternative would allow the optimization module to fully exploit the current array of options within the existing AGEPRO code. Revisions of the current AGEPRO software are unlikely given resource and staffing constraints.
  c. Timely development and testing of a new projection program in R or other programming language, may be feasible if the range of projection options is limited (e.g., reduced number of recruitment hypotheses, etc.).

3. Use the ABC calculated for the first year of the projection
  a. The first year ABC would then be applied to the rest of the projection cycle (typically another 1-2 years) for constant ABCs
  b. This approach was partially tested by Wilberg et al. (2015) by evaluating the performance of algorithms that set ABCs based on the estimated biomass in the last year of the assessment compared to approaches that forecasted the population dynamics beyond the range of the assessment to estimate year-specific ABCs, which were then "averaged" in a slightly different way than the SSC has used to date. The approaches were tested for a two-year period between assessments, similar to the assessment frequency for many MAFMC stocks.   ABC averaging resulting in slightly higher probabilities of overfishing than the other approaches (Figure 9, p. 41 in Wilberg et al. 2015). Not using projects had similar performance to year-specific ABCs from projections, but the method that did not use projections had lower variability in the ABC over time (Figure 10, p. 42 in Wilberg et al. 2015). Overall, the differences among projection methods were relatively similar, however.

September 2022 meeting

The second sub-group meeting focused on available analyses and assessment/specification timing that might help inform SSC recommendations and the utility of the three options being considered. For example, potentially supporting option #3 above, a simulation analysis[2] suggests that multiyear constant ABCs based on the initial projection year may perform as well across a variety of metrics (e.g., probability of overfishing, catch, biomass) as more complex ABC averaging schemes. However, it was noted that this simulation work was conducted prior to recent changes to the Council's risk policy and an updated analysis may be needed. In addition, the optimization model that could support option #2 above has demonstrated the ability to maximize the average ABC subject to constraints on overfishing and maximum acceptable risk work but additional work and cooperation with the NEFSC staff is needed.

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[2] "Evaluation of Acceptable Biological Catch Harvest Control Rules and Factors Affecting Their Performance" by Wilberg et al. is included as background material for the May 2023 SSC meeting.

The sub-group also noted the increased frequency of Mid-Atlantic stock assessments under the new NRCC stock assessment schedule – 75% of the stocks get an updated assessment and set specifications every 2-3 years. This increased assessment/specification frequency reduces the need for longer term projections and potentially minimizes the need for more complex approaches for developing constant/average ABCs.

Outcomes of March 30, 2023 Sub-Group Call

The sub-group discussed recent conversations with the NEFSC regarding the potential to link up AGEPRO with R software to conduct the optimization routine to calculate the constant/average ABCs. To date, little progress on this approach has been made and NEFSC staff have been extremely busy with other priorities. In addition, it's unclear if investing time and effort to refine and update AREPRO to conduct these calculations is the right approach. AGEPRO will eventually be supplanted by the Woods Hole Assessment Model (WHAM), a state-space modeling framework, and it might make more sense to try and incorporate the constant/average and optimization routine within WHAM. It's unclear what the flexibility options might be within WHAM to incorporate this routine and additional conversations and work with the NEFSC is needed.

Given this, the sub-group identified two preferred options on how best to proceed to provide constant/average ABC recommendations. Below are the recommendations of the sub-group:

- Short-term recommendations:
  - If an average harvest quota exceeds the 50% probability threshold in one or more years, choose the lowest ABC within projection period and make that the ABC for the spec setting (Status Quo a.ii. option identified above)
  - Alternative: if average exceeds the OFL in any year, find the maximum constant catch that does not exceed a specific P* (need to determine threshold). This would be done manually by iteratively evaluating quotas that satisfy the constraints within a defined error tolerance.
  - NEFSC assessment lead consider different projection options in consultation with Council staff
    - For July 2023 SSC meeting, have NEFSC assessment lead and Council staff work with sub-group to talk through projection scenarios if issues arise with constant/average ABC calculations
- Long-term recommendation:
  - Continue to work with the NEFSC staff, in particular Tim Miller, to help develop a projection component in WHAM while it's still in the development process to help provide standard projections and constant/average projections
    - The sub-group noted it's not necessary to have a species stock assessment within WHAM in order to use WHAM for projections, although it would be ideal. Need some specific outputs from the assessment model to feed into WHAM for projections
  - Paul could provide the code he developed for the optimization routine to each assessment lead for potential incorporation