



New England Fishery Management Council

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To: Tom Nies, Executive Director

From: Scientific and Statistical Committee

Date: August 14, 2020

Subject: Terms of Reference – Overfishing levels (OFLs) and acceptable biological catch (ABC) recommendations for Atlantic herring for 2021-2023

The Scientific and Statistical Committee (SSC) met on July 29, 2020 via webinar to address the following term of reference (TOR):

Review information provided by the Council's Herring Plan Development Team (PDT), the results of the recent Atlantic herring management track assessment, and using the acceptable biological catch (ABC) control rule selected by the Council in Amendment 8, recommend the overfishing level (OFL) and the ABCs for Atlantic herring for 2021-2023.

To address this TOR, the SSC considered the following information:

1. 2020 Management Track Assessment for Atlantic Herring, Preliminary Report Final report
 - a. 2020 Management Track Assessment for Atlantic Herring, Changes to Projection Methodology
 - b.-i. Several PDFs of assessment model output
 - j. 2020 Management Track Peer Review Committee Report
2. Presentation slides, 2020 Management Track Assessment
3. Herring PDT Report (Draft)
4. Presentation slides, PDT Report
5. SSC Final Report for Atlantic Herring Specifications (2019-2021), November 2018
6. Risk Policy Roadmap and Matrix - July 2020
7. State of the Ecosystems Reports for the Northeast U.S. Shelf (NOAA/NEFSC)

SSC Attendance

A. Birkenbach, M. Carroll, Y. Chen, J. Collie, K Friedland, A. Jordaan, J. Maguire, J. McNamee, R. Merrick, A. Pershing, F. Serchuk, P. Sullivan, L. Williams

SSC Response

The SSC received a thorough overview of the management track assessment from Dr. Jon Deroba detailing the available fishery dependent and independent data, updated analyses, stock assessment results, calculation of reference points, recommendations regarding the stock status, and stock projections. The SSC also received a report on the PDT analyses from Dierdre Boelke, including the herring PDT recommendations for OFL and ABC for 2021-2023.

The results of the Atlantic herring management track stock assessment indicated that the stock status for Atlantic herring was overfished but overfishing was not occurring. The stock assessment used the Age Structured Assessment Program (ASAP) which was used in previous assessments, with no structural

changes. Short-term projections of future stock status were carried out using ASAP and assumed that age 1 recruitment was derived from the estimated recruitments for 1965 – 2017 for FY2021-2023 and the last five years for initial conditions in 2020 (2015-2019). The key concern for this stock is the relatively poor recruitment in 2013-2019. If the estimated recent low recruitment continues, then the spawning stock biomass (SSB) is likely to remain relatively low in the near term, putting the stock at relatively high risk for continued overfished status in years 2021-2023.

The ABC recommendations made by the PDT were based on the Council-selected ABC control rule which was informed by a management strategy evaluation (MSE) process. The control rule is biomass based, with a maximum fishing mortality of 80% F_{MSY} proxy when biomass is greater than 50% SSB/SSB_{MSY} . When biomass falls below this threshold, fishing mortality declines linearly until 10% SSB/SSB_{MSY} , when fishing mortality is set to zero, or a fishery cutoff at 0.1. The ABC control rule was applied to projected biomass estimates for 2021-2023.

The SSC was prepared to implement the harvest control rule selected through the Amendment 8 MSE process. However, the SSC had reservations about the projections for Atlantic herring and were concerned about the assumptions regarding future recruitment, though noted that previous work indicated that the impact of low recruitment within the window of the short term projections did not have strong impacts on the catch advice generated from the control rule. The SSC noted that age 1 recruitment in projections for 2021-2023 was drawn from 1965-2015 and the resulting projected biomass showed a substantial increase in the third year of the projection relative to the earlier years of the projection. The SSC considered that the projected increase in biomass in 2023 was uncertain and were concerned about setting ABC based on this value. Following a discussion on this topic, the SSC resolved to make ABC recommendations for 2021 and 2022 based on the ABC control rule and ASAP projections, but recommended keeping ABC in 2023 the same as 2022 due to the uncertainty in recruitment assumptions underlying the projections. However, the SSC recommended that the OFL be set to follow the projections for all three years of the advice.

The use of the reduced ABC in 2023 is consistent with the SSC's role in accounting for scientific uncertainty. It acknowledges that the projections are sensitive to the assumptions around recruitment. The SSC discussed that the Gulf of Maine and Georges Bank is considerably warmer than during most of the 1965-2015 period and that there may be other environmental factors that could be controlling herring recruitment. In carrying the 2022 ABC into 2023 instead of using the projections, the SSC is following the practice it developed in 2018. During that meeting, Dr. Deroba reran the projections using a more conservative recruitment assumption. Applying the harvest control rule to the final year of that projection led to an ABC that was similar to carrying the second year value forward. This suggests that the rationale of adding an additional uncertainty buffer onto the third year by holding it static is an appropriate way to handle scientific uncertainty for the herring stock.

The SSC supported the New England Fishery Management Council (NEFMC) and Northeast Fisheries Science Center's (NEFSC) scheduled management track assessment in 2022. This management track assessment should verify the projected trend in biomass and provide information for the 2023 – 2024 specifications based on more informed estimates of recent recruitment. The SSC wanted to emphasize the need for this scheduled management track assessment as it was an important factor in the deliberations.

In response to TOR1, OFL and ABC values (expressed in metric tons) resulting from these deliberations are as follows:

| Year | OFL | ABC |
|-------------|------------|------------|
| 2021 | 23,423 | 9,483 |
| 2022 | 26,292 | 8,767 |
| 2023 | 44,600 | 8,767 |

The SSC wanted to highlight a couple areas that need additional research. Continuing to investigate the mechanisms that are driving the current low recruitment are important. This could involve things like researching environmental linkages to recruitment such as temperature drivers or predation effects. Additionally, a dedicated acoustic survey for this schooling pelagic species may improve and supplement the existing trawl survey information as a source for abundance information for the stock. Finally, the SSC lauds the NEFSC and the NEFMC PDT for their continued work to incorporate social and economic science into the materials provided for this species. In particular, the risk policy matrix is an important tool to summarize the factors to be considered across scientific disciplines. The SSC recommends continuing to build social, cultural, and economic information out by focusing in on the potential impact of management decisions for Atlantic herring and the impacts on other fisheries and economic activities in the region, including possible distributional effects. Of note in this regard is the fact that there are impacts on other fisheries not managed by the NEFMC that could be folded into this focus, for instance looking at interactions with species such as Atlantic striped bass and the tuna species. Some of these connections are touched on through reference to the role Atlantic herring play in the larger ecosystem and the interactions with habitat and other managed species, but could be built out further to assist decision making about this species in the larger social-ecological context in line with Magnuson-Stevens Act (MSA) National Standards and other requirements.

The SSC recognized that the fixed-net herring fishery necessitated a somewhat ad hoc procedure for specifying biological reference points based on the selectivity of the mobile gear fishery. During the management track assessment, it wasn't possible to resolve this potential inconsistency. However, the ASAP model for herring now incorporates both fleets separately. As the percentage of catch caught by the fixed-gear fleet increases, it will become more important to separately account for the fixed-gear fishery. The herring peer-review panel recommended modifying the approach for estimating reference points by explicitly including the fishing mortality rate for the fixed-gear fleet. The result would be a contour plot of SPR for combinations of F_{mobile} and F_{fixed} ; one of these contours is $SSB_{40\%}$. The equations for making these calculations have been derived in the context of multispecies models, in which predation mortality represents the additional fleet.

Summary of recommendations

1. The SSC recommends an OFL for Atlantic herring of 23,423 mt in 2021, 26,292 mt in 2022, and 44,600 mt in 2023.
2. The SSC recommends the ABC for Atlantic herring should not exceed 9,483 mt in 2021, 8,767 mt in 2022, and 8,767 mt in 2023.
3. The SSC recommends a management track stock assessment for Atlantic herring in 2022 based on the recent benchmark assessment.
4. The SSC recommends further investigation into understanding the recent low recruitment of Atlantic herring and possible drivers.

5. The SSC recommends investing in an acoustic survey for this species to better understand abundance trends.
6. The SSC recommends continued build out of the social science information (social, cultural, economic) for this species to better contextualize its role in the larger social-ecological system. This should include a focus on inter-species interactions, taking into account species not managed by the NEFMC including but not limited to striped bass and tuna.