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Dr. John F. Quinn, *Chairman* | Thomas A. Nies, *Executive Director*

To: Tom Nies, Executive Director
From: Scientific and Statistical Committee (SSC)
Date: January 22, 2020

Subject: Terms of Reference – Overfishing levels (OFLs) and acceptable biological catch (ABC) recommendations for four groundfish stocks for fishing years 2020 to 2022

The SSC met on January 10, 2020 in Boston, MA to address the following terms of reference (TORs):

1) Review the 2019 Groundfish Operational Assessments and work of the Groundfish Plan Development Team (PDT). Considering the Council's Risk Policy Statement, provide a final recommendation for an OFL and an ABC for American plaice, Georges Bank (GB) haddock, Gulf of Maine (GOM) haddock and pollock for each fishing year 2020, 2021, and 2022 that will prevent overfishing, consistent with the Council's ABC control rule for groundfish stocks.
2) Review the information concerning GOM cod provided by members of the public at the October 17-18, 2019 meeting and, if necessary, make corrections to the minority report on GB Cod ABCs recommended from that meeting

To address these TORs, the SSC considered the following information:

A.1 Relevant groundfish meeting materials from the October 2019 SSC meeting located here: https://www.nefmc.org/calendar/oct-17-18-ssc-meeting
A.2 Memo from the Executive Director to the SSC on ABC Control Rule Regulations, dated January 3, 2019
A.3 Memo SSC to Council re OFL and ABC recommendations for groundfish stocks for fishing years 2020-2022, Nov. 22, 2019
A.4 Memo from the Groundfish PDT to SSC re ABCs for GB haddock, GOM haddock, American plaice, and pollock stocks
A.5 Presentation: Groundfish PDT Report (NEFMC staff)
A.6 Correspondence the Council received requesting the remand

INTRODUCTORY STATEMENT

This report contains four main sections. In the first section ("TERM OF REFERENCE 1"), the report provides the SSC's final catch advice for the four groundfish stocks remanded to the SSC by the Council for further consideration. The second section ("RATIONALE INCLUDING SIGNIFICANT SOURCES OF UNCERTAINTY"), discusses the SSC's rationale for the catch advice made in the first section. The third section ("ADDITIONAL COMMENTS"), provides additional relevant SSC discussion. The final section ("TERM OF REFERENCE 2) provides a response from the SSC to this additional TOR.

There is also a summary table at the end of the report showing the OFL and ABC advice for the 20 groundfish stocks. Some of these stocks were considered during the 2019 and 2020 SSC meetings, but not all of them as noted.

TERM OF REFERENCE 1

American plaice.

The SSC approves the use of the VPA model for recommending American plaice catch advice. The assessment results indicate that the American plaice stock is not overfished and that overfishing is not occurring. Population projections for American plaice appear to be reasonably well determined for this species based on the updated work of the PDT. The projections of F_{msy} were used as the basis for setting the OFL. The SSC based the ABC on 75% F_{msy}. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	4,084	3,155
2021	3,740	2,881
2022	3,687	2,825

Georges Bank haddock

The SSC approves the use of the VPA model for recommending Georges Bank (GB) haddock catch advice. Based on the VPA model, GB haddock is not overfished, nor is overfishing occurring. The projections of F_{msy} were used as the basis for setting the OFL. The SSC based the ABC on 75% F_{msy}. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	184,822	145,367
2021	116,883	90,337
2022	114,925	88,856

Gulf of Maine haddock

The SSC approves the use of the ASAP model for recommending Gulf of Maine (GOM) haddock catch advice. Based on the ASAP model, GOM haddock is not overfished, nor is overfishing occurring. Population projections for GOM haddock appear to be reasonably well determined for this species based on the updated work of the PDT. The projections of F_{msy} were used as the basis for setting the OFL. The SSC based the ABC on 75% F_{msy}. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	25,334	19,696
2021	21,521	16,794
2022	14,834	11,526

Pollock

The SSC accepts the continued use of ASAP base model for assessing the pollock stock status and as a basis for setting the OFL and ABC. Based on the ASAP model, pollock is not overfished, nor is overfishing occurring. Population projections for pollock appear to be reasonably well determined

for both the base model and the sensitivity model. The SSC recommends the values of OFL be based on stock projections from the base model with the F_{msy} proxy. The SSC based the ABC on 75% F_{msy}. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	35,358	27,447
2021	28,475	22,062
2022	21,744	16,812

RATIONALE INCLUDING SIGNIFICANT SOURCES OF UNCERTAINTY

The SSC offers the following general comments. The SSC truly appreciated the additional information and repackaging of existing information provided as support for our recommendations. A key element was the update of the Wiedenmann and Jensen (2018) analysis with regard to projection performance. This was a major focal point for the SSC in our new recommendations and was one of the main drivers of the change in the advice that was generated for the stocks examined. The updated findings of the Wiedenmann and Jensen (2018) analysis provided new science for consideration by the SSC that was not available at the previous meeting. This new information prompted the SSC to reconsider the projection analyses in the context of this update to the best available science.

Additionally, the economic information provided by the output from the Quota-Change Model (QCM) with respect to differences in projected catches between the static ABCs and the 75% F_{msy} ABCs was very instructive and helpful to the SSC.

The social science information presented also helped clarify some important considerations, such as what is meant by "stability in quota" or effects of the SSC decisions if the assumptions of the QCM are not fully met. This helped the SSC to more fully understand the socio-economic impacts of its advice.

The SSC recognized that the 2019 assessment results indicate, American plaice, George Bank haddock, Gulf of Maine haddock, and pollock stocks are not overfished, overfishing is not occurring, and are rebuilt. Stock biomass in each of the stocks was above B_{msy}, and recent annual catches were well below their respective stock-specific annual ABCs. It was noted that realized catches of these four stocks were affected to a large degree by catch constraints placed on other stocks in the groundfish fishery, which significantly impacted the fisheries for these 'healthy' stocks.

American plaice

The VPA model for this stock was recommended for use by the Peer Review Panel. This model shows that the American plaice stock is rebuilt, is not overfished, and that overfishing is not occurring. The model does have a significant retrospective pattern. The SSC supported the Peer Review Panel's recommendation to use the rho adjustment for this stock.

The SSC focused in on a number of positive attributes for this stock when making our new recommendation. The first was that this species appears to have had a number of positive recruitment events in the most recent time period. The indication is that this mitigates risk to this stock as there does not appear to be external factors influencing the productivity of this stock negatively as is seen in some other groundfish stocks. As mentioned in the general comments, this

species appears to have fairly good performance in its most recent projections, which was supported by the update of the projection performance analysis done by the PDT for this stock.

Another important consideration for this stock is that the weight-at-age (WAA) appears to be without trend in the most recent period of time. Some of the other stocks examined have WAA that is trending, adding additional uncertainties into the projection analysis, but this is not the case for American plaice. A final biological consideration was that there were very minor differences in the resulting spawning stock biomass (SSB) estimates from the two ABC scenarios (static ABC or projected 75% F_{msy}). In both cases, the change in SSB was under 6% during the projection period.

As noted, there is a strong retrospective bias in the assessment for this stock. This was an area of focus in the previous advice of the SSC and continues to be an uncertainty that concerns the SSC. Given the improved performance of the projections, the SSC felt that the retrospective adjustment made prior to implementing the projection methods adequately mitigates this uncertainty; therefore, additional buffering is not needed.

Some final factors that the SSC discussed with regard to American plaice had to do with economics and social science. The QCM showed very little difference in realized catches between the different ABC scenarios. There was a comment about impacts to lease price between the scenarios, so while the choice of ABC approach did not impact catch and therefore the stock, there were other potential indirect impacts to the fishery, for instance with regard to lease price. Additionally, social information about trust (from the crew survey) helped the SSC in thinking about risk in the context of broader impacts.

Georges Bank haddock

Georges Bank (GB) haddock garnered the most concern from some members of the SSC. Stock status is good for GB haddock, but a number of uncertainties exist within the assessment and projections. Two of the main uncertainties are that the assessment has a strong retrospective pattern and there is uncertainty in the weight-at-age, which has a steady decline over time. The projections may not adequately account for the trending WAA, so if the trend continues and the uncertainty is not mitigated by the WAA and selectivity year class adjustments in the projections, this could lead to inflated estimates of the OFL and ABC. A decline in the survey information for this stock was also discussed by the SSC, a signal that is offered as an indication that the population may be declining faster than the model indicates. Finally, of the four species examined for the meeting, the GB haddock stock projection appeared to perform the worst. The SSC considered these uncertainties in its deliberations, leading some on the committee to offer that the 25% buffer from the OFL may not be adequate.

The SSC went on to discuss some of the elements in the economic information, namely the very low utilization on GB haddock. As was the case for American plaice, the different ABC scenarios did not have much influence on projected utilization. Given the unprecedented large stock size of GB haddock, the SSC believed that following the control rule directly (without adding additional buffers for uncertainty) would not increase the risk of overfishing. The SSC noted that the only year there was a big difference between scenarios in ABC advice was in 2020; after that the advice becomes very similar regardless of the scenario used. These factors led the SSC to recommend following the control rule directly despite the detailed discussion and concerns addressed.

Gulf of Maine haddock

As with the GB haddock stock, the Gulf of Maine (GOM) stock is rebuilt (i.e., is above B_{msy}), not overfished, and overfishing is not occurring. The GOM haddock assessment is conducted using the statistical model ASAP. The model fit was subject to retrospective error and a rho adjustment was applied to correct for this error. Unlike other assessments with retrospective bias, the adjustment for GOM haddock was upwards, opposite to the usual direction of a retrospective rho adjustment. The tendency for this stock is to underestimate biomass and overestimate fishing mortality. As mentioned in the general comments, this species appears to have fairly good performance in its projections, which was further supported by the update of the projection performance analysis done by the PDT for this stock. As a final consideration, the QCM showed very little difference in impact to realized catch between the different ABC scenarios. Since the predicted catch did not seem to depend on the scenario chosen, the risk to the stock did not appear to change regardless of the scenario chosen. Hence, the SSC recommended using the F_{msy} projection estimates of OFL and 75% F_{msy} projection estimates for ABC for this stock given that stock status was good and there was low risk of overfishing under either scenario.

Pollock

The most important uncertainties in the pollock assessment are the apparent dome-shaped selectivity pattern and strong retrospective patterns in F and SSB. The pollock projections appear to be performing better than was generally thought when the SSC's first recommendation was rendered; this observation is supported by the updated work performed by the PDT on projection performance. The projections of exploitable biomass do not depend strongly on incoming recruitment, so this uncertainty is mitigated in the case of pollock. The projections using 75% F_{msy} keep SSB above the SSB_{msy} level with the base model.

There is a risk if the stock-assessment model assumes dome-shaped selectivity and the true state of nature is flat-topped selectivity, as shown in the consequence table from the pollock assessment, but this risk is the product of the consequence and the likelihood of occurrence of that consequence, both of which are unknown.

The SSC was presented with results of the QCM, which showed that the likelihood of F attaining F_{msy} is low, due to mixed-stock constraints. As noted for GOM haddock, since the risk does not appear to change regardless of the ABC scenario selected, the SSC recommended using the F_{msy} projection estimates of OFL and 75% F_{msy} projection estimates for ABC for this stock.

TERM OF REFERENCE 2

The SSC agreed that portions of the discussion under the minority report section from our previous report (dated November 22, 2019) were recorded under the wrong stocks. Corrections were made and an amended November report is appended to this report. There were an additional set of errors that were flagged by the PDT, these were also amended in the attached report.

ADDITIONAL COMMENTS

One note the SSC wanted to offer was regarding some of the language being used around what the SSC has been doing with the groundfish species catch advice. The use of a static ABC has become a somewhat common practice for the SSC, and because of this a reference to a "static ABC control rule" or similar phrasing that refers to keeping a single ABC for the specification period as a "control rule" has started to show up in some documents and in discussions. It is important to note

that this is not an official control rule but more a process the SSC has used in the absence of other options for dealing with unaccounted for scientific uncertainty.

Executive Director Nies informed the SSC that the NEFMC will be investigating the control rules for the groundfish stocks. The process that the NEFMC will use will be to initiate the investigation through the use of a contractor. To that point, a draft request for proposals (RFP) was presented to the SSC for comment. Several SSC members voiced their support for the project and felt like this was in response to comments made by the SSC previously, so the SSC felt very positive about the project and the proposed approach. The SSC offered that the proposed timeline for when the work would be done and completed would be helpful for anyone answering the RFP, so that was an initial recommendation from the SSC, namely to include the timeline in the RFP text. Executive Director Nies thanked the SSC for its initial input and stated that they could forward any remaining comments on the RFP via email.

Finally, the SSC discussed current committee membership. There are a couple of vacancies on the SSC that were solicited by the NEFMC. The SSC inquired as to how many applications were received by the NEFMC for the vacancies. During the discussion it became apparent that the SSC was down to only a single member from NOAA, with none of the members being from the Population Dynamics or the Social Sciences branches. The SSC felt it was important to have members from these groups on the committee and hoped that some recruitment from these branches could occur.

During the discussion, the lack of a NOAA Science Center liaison was also brought up. The SSC felt that this position was a valuable one in the past and the SSC hoped that this position could be reestablished.

SUMMARY OF RECOMMENDATIONS

The following is a summary table for all of the OFL and ABC recommendations. The table contains all of the groundfish stocks, some of which were not assessed during this year.

Stock	OFL 2020	ABC 2020	OFL 2021	ABC 2021	OFL 2022	ABC 2022
GB Cod	unknown	1,762	unknown	1,762	unknown	1,762
GOM Cod	724	552	929	552	1,150	552
GB Haddock	184,822	145,367	116,883	90,337	114,925	88,856
GOM Haddock	25,334	19,696	21,521	16,794	14,834	11,526
GB Yellowtail Flounder	unknown	162	unknown	162		
SNE/MA Yellowtail Flounder	31	22	71	22	184	22
CC/GOM Yellowtail Flounder	1,136	823	1,076	823	1,116	823
American Plaice	4,084	3,155	3,740	2,881	3,687	2,825
Witch Flounder	unknown	1,483	unknown	1,483	unknown	1,483
GB Winter Flounder	790	587	944	587	1,590	587
GOM Winter Flounder*	596	447	-	-	-	-
SNE/MA Winter Flounder*	1,228	727	-	-	-	-
Redfish*	15,852	11,942	-	-	-	-
White Hake	2,857	2,186	2,906	2,186	2,986	2,186
Pollock	35,358	27,447	28,475	22,062	21,744	16,812
N. Windowpane Flounder	84	59	84	59	84	59
S. Windowpane Flounder	568	426	568	426	568	426
Ocean Pout*	169	127	-	-	-	-
Atlantic Halibut	unknown	147	unknown	147	unknown	147
Atlantic Wolffish*	120	90	-	-	-	-

* These stocks will be assessed in 2020.

REFERENCES

Wiedenmann, J, and Jensen, OP. 2018. Uncertainty in stock assessment estimates for New England groundfish and its impact on achieving target harvest rates. Canadian Journal of Fisheries and Aquatic Sciences. 75:342-356, https://doi.org/10.1139/cjfas-2016-0484