



New England Fishery Management Council

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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: November 22, 2020

Subject: Terms of Reference – Overfishing levels (OFLs) and acceptable biological catch (ABC) recommendations for nine groundfish stocks for fishing years 2021 to 2023

The SSC met on October 13, 2020 via webinar to address the following terms of reference (TOR):
1) Considering the Council’s Risk Policy Statement, provide an OFL and an ABC for each stock for each year 2021, 2022, and 2023 that will prevent overfishing, and achieve rebuilding if needed, consistent with the Council’s ABC control rule for groundfish stocks.

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

A.1 The Council’s Risk Policy Road Map (2016), that includes the Risk Policy Statement and Implementation Plan, see pp. 4-5.

A.2 Management Track Peer Review Panel Report, DRAFT (September 2020)

A.3 Supplemental Information: Stock Assessment Support Information (SASINF):

<https://www.fisheries.noaa.gov/resource/data/northeast-region-stock-assessment-support-materials>

A.4 Background: Affected Environment, excerpt from Framework Adjustment 59, NEFMC, April 2020.

A.5 Background: State of the Ecosystem and Current Conditions. NOAA/NEFSC. Available at:

<https://www.fisheries.noaa.gov/new-england-mid-atlantic/ecosystems/state-ecosystem-reports-northeast-us-shelf>

A.6 Memo SSC to Council re OFL and ABC recommendations for groundfish stocks for fishing years 2018-2020, Nov. 30, 2017.

A.7 Memo SSC to Council re OFL and ABC recommendations for groundfish stocks for fishing years 2020-2022, Nov. 22, 2019 (amended Jan. 22, 2020).

A.8 Memo from the Groundfish PDT to SSC re possible groundfish OFLs/ABCs for FY2021-FY2023.

A.9 Memo from the Groundfish PDT to Groundfish Committee re analysis of new MRIP data and possible allocation

A.10 Presentation: Groundfish PDT Report (NEFMC staff)

INTRODUCTORY STATEMENT

This report contains four main sections. In the first section (“TOR”), the report provides the SSC’s catch advice by groundfish stock. 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 fourth section is a summary table with the OFL and ABC advice for the nine stocks.

TOR

Georges Bank winter flounder

The SSC concurs with the Peer Review Panel that the results of the VPA assessment are acceptable as the source of catch advice for estimation of reference points and stock status. Based on this

information, the SSC recommends that Georges Bank winter flounder be considered overfished, although overfishing is not occurring. The SSC considered the alternatives provided by the PDT and the SSC recommends that the first year ABC (at 70%Fmsy, based on the rebuilding plan) be held constant while allowing the OFL to follow the projection, assuming the ABC is caught each year. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2021	865	634
2022	974	634
2023	1,431	634

Gulf of Maine winter flounder

The assessment for Gulf of Maine winter flounder estimates the swept area biomass of fish that are 30+ cm in length. The assessment used a revised estimate of survey catchability based on a catchability study done in 2020 (update of Miller et. al. 2017). The revised catchability estimate is lower than the previous estimate increasing the resulting swept area biomass. The peer review panel recommended using an SPR-based estimated exploitation rate ($E_{40\%}$) to set OFL and recommended that ABC should be based on 75% of $E_{40\%}$, using the most recent two-year average of estimated fall survey biomass. There was some concern by the SSC over the lack of response in stock biomass in recent years to low exploitation rates (well below $E_{40\%}$), but the SSC agreed with the peer review panel’s recommendation, and recommended that the OFL and ABC should be fixed during the next three years (2021-2023). The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2021	662	497
2022	662	497
2023	662	497

Southern New England/Mid-Atlantic winter flounder

The SSC accepts the continued use of ASAP for assessing this winter flounder stock and as a basis for setting OFL and ABC. Retrospective patterns occurred in the assessment results, but these were lower than the 90% confidence intervals of the 2019 estimates of SSB and F. The assessment indicates that the SNE/MA winter flounder stock is overfished, but overfishing is not occurring. Short-term projections were made following standard protocols, without retrospective adjustment, assuming a catch of 231 mt in 2020 and fishing at $F_{40\%}$ in 2021-2023. The SSC recommends an OFL based on the projected value for 2021 and maintained at the same level for 2022 and 2023. The SSC recommends a static ABC for the years 2021-2023, corresponding to the three-year average catch from 2016-2018. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2021	1,438	456
2022	1,438	456
2023	1,438	456

Redfish

The SSC accepts the ASAP model approved by the Peer Review Panel with the retrospective adjustment for catch advice and stock status. The SSC recommends using the control rule applied to the model outputs for setting catch advice. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2021	13,519	10,186
2022	13,354	10,062
2023	13,229	9,967

Atlantic Halibut

The SSC supports the continued use of the First and Second Derivative (FSD) model to provide catch advice for Atlantic halibut. The method used by the PDT to fill in missing 2019 Canadian catch for this stock was accepted by the SSC for use in setting catch advice. The FSD model is not an analytical assessment, reference points are not generated and therefore OFL is unknown for this species. The SSC recommends a constant ABC for the specification setting period based on multiplying the 2019 catch by the catch multiplier coming out of the FSD model. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2021	unknown	150
2022	unknown	150
2023	unknown	150

Southern windowpane flounder

The SSC supports the continued use of the AIM model for setting catch advice for Southern New England/Mid-Atlantic (Southern) Windowpane Flounder. The SSC supports the status determination for this stock as not overfished and overfishing is not occurring. Southern windowpane was considered rebuilt as of 2012. Catch advice for southern windowpane was derived using a fishing mortality rate of 75%Fmsy. Catch projections from the AIM model are not possible; therefore, OFLs and ABCs for the specification setting period are determined by applying the updated FMSY proxy (1.780) to the terminal year biomass index (0.288, which is lower than the value from last year, i.e., 0.319) and applying a constant catch approach for three years. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2021	513	384
2022	513	384
2023	513	384

Northern windowpane flounder

The SSC supports the conclusion of the Peer Review Panel that the AIM model should no longer be used as the basis for catch advice due to the lack of significance in the relationship between population response and fishing mortality. As such, the SSC used the Plan B approach (based on estimated swept-area biomass) as the basis for catch advice. However, this approach does not allow estimation of retrospective patterns, projections, or biological reference points. In the absence of reference points, the SSC supports the determination of overfished and overfishing status as

unknown. An alternative proposal was made to base the exploitation rate applied in the Plan B approach on the 10-year management period during which the “no possession” stock definition was in place (2010- 2019). Accordingly, the exploitation rate was recalculated for this 10-year period. This work was completed during the meeting and reevaluated post-meeting. Based on that analysis, the SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2021	unknown	160
2022	unknown	160
2023	unknown	160

Ocean pout

The SSC accepts the use of the direct delivery assessment for catch advice and stock status. The PDT produced static OFL and ABC catch advice as projections were not possible for this stock. The SSC recommends the OFL and ABC be held constant for three years. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2021	125	87
2022	125	87
2023	125	87

Wolffish

The PDT produced static OFL and ABC catch advice as projections were not possible for this stock. The SSC recommends that the OFL and ABC be held constant for three years. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2021	122	92
2022	122	92
2023	122	92

RATIONALE INCLUDING SIGNIFICANT SOURCES OF UNCERTAINTY

As it has done in the past, the SSC recommends constant ABCs for stocks with analytical assessments exhibiting strong retrospective patterns and/or recruitment assumptions that appear overly optimistic. The SSC reaffirms its decision of having the PDT compute the OFLs conditioned on constant ABCs in this situation. This allows the uncertainty buffer between the OFL and ABC to increase during the projection years to acknowledge the additional scientific uncertainty caused by the retrospective pattern and/or uncertain recruitment assumptions that are not captured within the projection calculations. For stocks projected to increase during the three projection years, the SSC decided to use the first ABC (75%Fmsy or 70%Fmsy for some stocks in rebuilding plans) held constant in the following years and allows the OFL to increase.

Georges Bank winter flounder.

The stock status of Georges Bank winter flounder has not changed from the last assessment and remains as “overfished and overfishing is not occurring.”

The SSC notes that the stock is in a rebuilding plan with a terminal year of 2029 (originally 2017) but that the stock has shown little progress towards rebuilding to Bmsy. There was a major retrospective pattern (Mohn's rho = 0.57 for SSB, 0.34 for F, and 0.45 for recruitment). Because the 2019 point estimates of SSB and F, when adjusted for retrospective error, were outside the 90% confidence intervals of the unadjusted 2019 point estimate, it was necessary to perform a retrospective adjustment to the terminal year values.

The continuing pattern of weaker than expected recruitment suggests that stock biomass is not increasing. A sensitivity analysis conducted during the peer review indicated that the increase in biomass over the projection period is likely driven by the recruitment assumption, which has high uncertainty. This coupled with the retrospective pattern influences the uncertainty in the OFL projections and is sufficient for the SSC to conclude that increases in ABC beyond 2021 (the projection year with the least uncertainty) may not be appropriate. Additionally, the uncertainty in the recruitment assumption has a connection to the biological reference point estimates themselves, therefore if the recruitment assumption were to be changed in the future, the biological reference points would need to be re-estimated based on the new assumption.

Beyond the stock recruitment relationship and the retrospective pattern, the largest source of uncertainty in the assessment is some missing survey information as well as some missing Canadian catch, though the latter is not a large amount and likely has little negative consequence given the adjustment the PDT made to the catch assumption in the projections.

Gulf of Maine winter flounder

The SSC is concerned that biomass does not seem to be responding to what appear to be very low exploitation rates on this stock. Despite this, the SSC agreed with the recommendations of the peer review committee. As projections were not possible with this assessment, the only option was to keep the OFL and ABC static for all three years. Some of the main uncertainties for this stock discussed by the SSC were that climate and predation effects that are not accounted for in the assessment, given that these may affect the lack of response by the stock to management measures.

Southern New England/MidAtlantic winter flounder

The recommended ABC levels follow Option C of the NEFMC control rules. The SNE/MA winter flounder stock has a low probability (~5%) of meeting its rebuilding target by 2023, even with no fishing. Therefore, the ABC is set to accommodate incidental bycatch while discouraging active targeting of winter flounder. The recommended OFL level in 2021 corresponds to fishing the stock at $F_{40\%}$. The OFL is held constant for three years because of uncertainty in the projections for 2022 and 2023.

The most important uncertainty in the SNE/MA winter flounder assessment is the projection of future recruitment. The population projections are sensitive to the recruitment model chosen and the temporal period from which recruitment is drawn. This assessment shifted from using a stock-recruitment relationship (S-R) to estimate F_{MSY} to using $F_{40\%}$ as an F_{MSY} proxy. This shift reduced the biological reference points substantially from the previous assessment (F_{MSY} from 0.340 to 0.284 and SSB_{MSY} from 24,687 to 12,322 metric tons).

One reason for abandoning the stock-recruitment curve is that the Beverton-Holt curve (with a high assumed steepness) has overestimated recruitment in recent years (indicated by large negative residuals). Use of this S-R for projections would likely overestimate future recruitment. The substitution of the historical recruitment distribution doesn't resolve this problem as the expected value is median recruitment, even at very low SSB. Winter flounder SSB has been reduced to such a low level that the shape of the S-R at low SSB becomes important. For this reason, the population projections were overly optimistic and were discounted by the SSC for setting ABCs and OFLs.

A temperature-dependent stock recruitment model was incorporated into the ASAP model for SNE/MA winter flounder (Bell et al. 2018) and updated in the present assessment (Bell & Wood 2020). The population estimates were similar to the base model, but the temperature-dependent S-R provides a plausible explanation of low recruitment in recent years of elevated temperatures and resulted in a lower steepness estimate. While recognizing that a research track is needed to fully investigate a new assessment model, the SSC expressed concern that a research track assessment for this stock may not occur for several assessment cycles during which time the problem of overly optimistic projections will persist. The SSC recommends further development and evaluation of environmentally dependent S-R models with ASAP or other state-space models. As noted with GB winter flounder, , the recruitment assumption has a connection to the biological reference point estimates themselves, therefore if the recruitment assumption were to be changed in the future, the biological reference points would need to be re-estimated based on the new assumption.

Redfish

The SSC discussed the lack of fit of the assessment model to the survey data. The SSC appreciated the work done to explore alternate weightings of the survey and catch data to achieve closer fits between the model and the survey data. The SSC notes that the model was nearly rejected during the review, therefore this work should continue with the potential of including redfish as an in-depth review (level 3) management track assessment so that these alternative weightings can be explored and reviewed more thoroughly. The SSC supported using the projections as these are reasonably well defined. The SSC was also comfortable with the recruitment assumption because the projections are not sensitive to recruitment in the short term (i.e. 3 years) because incoming redfish recruitment does not enter the fishery until after age 3. Therefore, the SSC accepted the base model for current catch advice but recommends exploring survey fitting and the incorporation of more age data as these become available in future assessments.

A final uncertainty noted by the SSC and discussed with some public in attendance was potential change in catch in future years due to a need for bait in some fixed gear fisheries; catch may increase in the coming years and the SSC felt this trend should be closely monitored given that catch advice may decrease depending on the outcome of the investigation described above.

Atlantic Halibut

The FSD approach used for Atlantic halibut continues to perform well for recommending catch advice. There was an anomaly in the 2019 catch data with missing Canadian catch, so the PDT used the NAFO database to fill in that missing catch. The SSC accepted the modified catch information as provided by the PDT, but the missing data represent an important uncertainty. Additional uncertainties considered by the SSC are: (1) catch appears to be increasing at a faster rate than the stock is increasing, and (2) stock boundary definitions continue to be considered uncertain.

Southern windowpane flounder

The AIM model is a data limited approach and therefore does not allow for projections. As noted in the GARM III report (NEFSC 2008), the AIM model produces metrics that can be considered reference points, and hence the SSC was able to provide OFL and ABC values.

The AIM model fit was good with a randomization test indicating a significant correlation between $\ln(\text{relative } F)$ and $\ln(\text{replacement ratio})$, a measure of the relationship between catch and survey index values. The problem with the AIM model for northern windowpane (i.e., the lack of significance in the relationship between population response and fishing mortality, see section below) was not a problem for southern windowpane. We may learn more about AIM performance based on the index-based assessment research track review currently underway.

Northern windowpane flounder

Candidate ABCs were provided based on the average exploitation rate over different periods as recommended by the 2020 Peer Review Panel. Three suggestions of different time periods were put forward for calculating average exploitation rates: (1) R/V Bigelow survey years encompassing 2009-2019; (2) AIM years, the years used in previous calculations of biological reference points (1995-2001); and (3) all years in the time series (1975-2019). There was an acknowledged inconsistency in using the AIM years for calculation of exploitation rate while at the same time rejecting this model as a basis of catch advice, so this was not moved forward in the deliberation. Furthermore, it was agreed that the full time series would not be used as this encompassed a period of overfishing on the stock. During SSC deliberations, there was discussion of the rationale for using the Bigelow years as basis for catch advice. An alternative proposal was made to base the exploitation rate on the 10-year management period wherein the “no possession” stock definition was in place (2010- 2019). It was suggested that the exploitation rate be recalculated for this time period. This work was completed during the meeting and reevaluated post-meeting producing the ABC = 160 mt.

Ocean pout

The SSC felt that the control rule provided adequate buffer against scientific uncertainty for the specification setting period for ocean pout.

Wolffish

The SSC felt that the control rule provided adequate buffer against scientific uncertainty for the specification setting period for wolffish.

ADDITIONAL COMMENTS (Note: not all species had additional comments)

Georges Bank winter flounder

The SSC noted several areas of research that could improve the assessment. Some additional recommendations from the SSC for this stock are:

- a. The residual pattern in the stock-recruitment relationship indicates that recent recruitment has been weaker than expected. Alternative projections should be considered that assumed future recruitment will be similar to recent recruitment.
- b. The NEFSC should evaluate a statistical catch-at-age or state-space model as an alternative to the VPA, as part of a future Research Track assessment for this stock.

Gulf of Maine winter flounder

The SSC noted the high climate vulnerability for this species (Hare et.al. 2016) and felt that this should be considered in future stock assessments. Predation may also be an important factor affecting the dynamics of this stock. The SSC recommended exploring the use of the NEFSC spring trawl survey index in the assessment and exploring potential catchability differences amongst the state surveys and their possible incorporation in future assessments.

Southern New England/MidAtlantic winter flounder

After being increased from 0.2 to 0.3 at the last benchmark assessment in 2011, the natural mortality rate of winter flounder remains uncertain. The selectivity function for the commercial fleet was changed from dome-shaped to flat-topped. This change removed cryptic biomass at older ages, while slightly increasing the retrospective pattern in F. Exploration of these model choices and the recruitment uncertainty described in the rationale section should be undertaken during the

management track process to the extent allowed and practicable so that several years do not pass until these uncertainties can be addressed through a research track.

Atlantic halibut

A Research Track is underway evaluating index based assessments. As the model used for Atlantic halibut is an index-based approach, the SSC awaits the results from this endeavor to gauge whether progress can be made with this approach. The stock structure of Atlantic halibut is another issue that the SSC feels should be further investigated as the connection between fish in US and Canadian waters is not well understood. Finally, the SSC recommends evaluating additional survey indices for inclusion in the assessment, such as the GOM longline survey.

Northern windowpane flounder

A Research Track is underway evaluating index- based assessments. As the model used for Northern windowpane flounder is an index-based approach, the SSC awaits the results from this endeavor to gauge whether progress can be made with this approach.

Ocean pout

The SSC had a thorough discussion about ocean pout, and contemplated stating that the OFL was unknown but decided not to do this. The reference point used for this stock ($F_{msy} = 0.76$) was set several assessment cycles back and, as such, probably needs to be reexamined to determine whether it is still applicable.

SSC MEMBER ATTENDANCE

Mr. Carroll, Dr. Collie, Dr. Friedland, Dr. Jordaan, Dr. Kerr, Mr. Maguire, Dr. McNamee, Dr. Merrick, Dr. O'Keefe, Dr. Pershing, Dr. Serchuk, Dr. Sullivan, Dr. Uchida, Dr. Wiedenmann, Dr. Williams.

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Bell, R. and Wood, A. 2020. Environmentally driven winter flounder ASAP model 2020. Working paper.

Hare JA, Morrison WE, Nelson MW, Stachura MM, Teeters EJ, Griffis RB, et al. 2016. A Vulnerability Assessment of Fish and Invertebrates to Climate Change on the Northeast U.S. Continental Shelf. *PLoS ONE* 11(2): e0146756. <https://doi.org/10.1371/journal.pone.0146756>

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Northeast Fisheries Science Center (NEFSC). 2008. Assessment of 19 Northeast Groundfish Stocks through 2007: Report of the 3rd Groundfish Assessment Review Meeting (GARM III), Northeast Fisheries Science Center, Woods Hole, Massachusetts, August 4-8, 2008. US Dept. Commerce, NOAA Fisheries, Northeast Fish Sci Cent Ref Doc. 08-15; 884 p + xvii.

SUMMARY OF RECOMMENDATIONS

The following is a summary table for all of the OFL and ABC recommendations made during the October 2020 meeting.

Year	Stock	OFL	ABC	Method (Control Rule; Other)
'21	Georges Bank Winter Flounder	865	634	ABC recommendation deviates from control rule after the first year based on uncertainty in the recruitment assumption in projections; static ABC accounts for buffering against additional uncertainty not accounted for in the control rule
'22		974	634	
'23		1,431	634	
'21	GOM Winter Flounder	662	497	Control rule but no projection, so static for each year
'22		662	497	
'23		662	497	
'21	Southern New England/Mid-Atlantic Winter Flounder	1,438	456	Control rule option C and option D hybrid
'22		1,438	456	
'23		1,438	456	
'21	Redfish	13,519	10,186	Control rule
'22		13,354	10,062	
'23		13,229	9,967	
'21	Atlantic Halibut	Unknown	150	Control rule but no projection, so static for each year
'22		Unknown	150	
'23		Unknown	150	
'21	Southern Windowpane Flounder	513	384	Control rule but no projection, so static for each year
'22		513	384	
'23		513	384	
'21	Northern Windowpane Flounder	Unknown	160	Control rule, option D
'22		Unknown	160	
'23		Unknown	160	
'21	Ocean Pout	125	87	Control rule but no projection, so static for each year
'22		125	87	
'23		125	87	
'21	Wolffish	122	92	Control rule but no projection so static for each year
'22		122	92	
'23		122	92	