New England Fishery Management Council
50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116
Dr. John F. Quinn, *Chairman* | Thomas A. Nies, *Executive Director*

To: Tom Nies, Executive Director
From: Scientific and Statistical Committee (SSC)
Date: November 22, 2019 **AMENDED 1/22/2020 (amendments are track changed and highlighted)**

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

The SSC met on October 17 and 18, 2019 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 an OFL and an ABC for each stock for each year 2020, 2021, and 2022 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.
A.2 Operational Stock Assessments of 14 Northeast Groundfish Stocks through 2018, including the peer review reports for each stock, version for PDT and SSC meetings (NEFSC, October 2019)
A.3 Supplemental Information: Stock Assessment Support Information (SASINF) -
use this link to access the database which include the assessment reports, peer review presentations, additional information and : http://www.nefsc.noaa.gov/saw/sasi/sasi_report_options.php
A.4 Background: Affected Environment, excerpt from DRAFT Amendment 23/Groundfish Monitoring, NEFMC, October 2019.
A.5 Background: State of the Ecosystem and Current Conditions. NOAA/NEFSC. Available at: https://www.nefsc.noaa.gov/ecosys/ecosystem-status-report/ and https://www.nefsc.noaa.gov/ecosys/current-conditions/
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 Atlantic halibut for fishing years 2018-2020, Jan. 16, 2018.
A.8 Memo from the Groundfish PDT to SSC re candidate groundfish OFLs/ABCs for FY2020-FY2022.
A.9 Presentation: Overview of the 2019 Groundfish Operational Assessments (NEFSC staff)
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. Lastly, the section called "MINORITY REPORTS" is provided for a few stocks where the SSC could not come to consensus. There is also a summary table at the end with the OFL and ABC advice for all stocks.

TOR

Southern New England/MidAtlantic yellowtail flounder.

The SSC accepts the ASAP model approved by the Peer Review Panel with the retrospective adjustment for catch advice and stock status. The SSC notes the magnitude of the retrospective pattern decreased from the previous assessment in 2017 and the estimated biomass is closer to the expanded survey biomass than in the 2017 assessment. However, conducting a survey or analytical assessment for a stock in this depleted state is challenging. The PDT's constant catch projection holds the ABC constant in each year, which increases the OFL during the three-year time period from 31 to 184 mt. The SSC recommends holding the first year ABC (70%Fmsy, based on the rebuilding plan) constant for three years. The OFLs are calculated based on this ABC being caught each year. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	31	22
2021	71	22
2022	184	22

Cape Cod/Gulf of Maine yellowtail flounder.

The SSC accepts the VPA model approved by the Peer Review Panel with the retrospective adjustment for catch advice and stock status. The SSC notes the magnitude of the retrospective pattern decreased from the 2017 assessment and the estimated biomass is closer to the expanded survey biomass than in the 2017 assessment. The three-year default projections (75%Fmsy) had low variation in the ABCs for each year. The SSC recommends the lowest ABC (which occurred in 2021 of the default projections) be held constant for the specification setting period. The OFLs are calculated based on this ABC being caught each year. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	1,136	823
2021	1,076	823
2022	1,116	823

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 for the stock. 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 OFL and ABC (metric tons):

Year	OFL	ABC
2020	790	587
2021	944	587
2022	1,590	587

American plaice.

The SSC accepted using the VPA model for American plaice catch advice. Consistent with the groundfish control rule and past SSC decisions for this stock, the projections of Fmsy were used as the basis for setting the OFL. The SSC based the ABC on 75%Fmsy, but held the values constant at the minimum value (terminal year of the projections – 2022) presented by the PDT for the specification setting period. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	4,084	2,825
2021	3,806	2,825
2022	3,753	2,825

Southern windowpane flounder.

The SSC supports the continued use of the AIM model for setting catch advice of Southern New England/Mid-Atlantic (Southern) Windowpane Flounder. Catch advice for southern windowpane was derived using a fishing mortality rate of 75%Fmsy. It is not possible to estimate retrospective patterns for the AIM model and thus no retrospective adjustments were made. Catch projections from AIM model are not used for this stock; therefore, OFLs and ABCs for the specification setting period are determined by applying the biomass index (three-year average NEFSC fall survey kg/tow index) by the Fmsy proxy and 75% of the Fmsy proxy, respectively using a constant catch approach for three years. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	568	426
2021	568	426
2022	568	426

Northern windowpane flounder.

The SSC supports the continued use of the AIM model for setting catch advice of Gulf of Maine/Georges Bank (Northern) Windowpane flounder. Northern windowpane is under a rebuilding plan that specifies setting catch advice using a fishing mortality rate of 70%Fmsy (Frebuild). It is not possible to estimate retrospective patterns of AIM and thus no retrospective adjustments are made. Catch projections are not conducted for this stock; therefore, OFLs and ABCs for FY2020- FY2022 are determined by applying the survey index (three-year average of he NEFSC fall survey kg/tow index) by the Fmsy proxy and 70% of the Fmsy proxy, respectively. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	84	59
2021	84	59
2022	84	59

Atlantic Halibut

The SSC supports the continued use of the FSD model to provide catch advice for Atlantic halibut. This method is not an analytical assessment, and does not produce reference points, therefore OFL is unknown for this species. The SSC recommends a constant ABC for the specification setting period based on multiplying the 2018 catch by the catch multiplier coming out of the FSD model. This represents an increase from our previous ABC recommendation (137 MT), but a decrease from the most recent catch (156 MT). The SSC does not recommend an OFL based on the assessment methodology. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	unknown	147
2021	unknown	147
2022	unknown	147

Georges Bank cod.

A majority of the SSC accepts the PlanBsmooth model for setting the ABC for Georges Bank cod, which applies a multiplier based on recent survey trend (0.936) to the average catch of the most recent three years. Because the PlanBsmooth model does not produce biological reference points, the majority of the SSC concludes that the OFL is unknown for this stock. The SSC recommendation deviates from previous advice when the SSC has recommended that the modeled results are the OFL and set the ABC at 75% of the OFL. The ABC is recommended to remain constant for each year of the specification period. A majority of the SSC (see the minority report section for an alternative proposal) recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	unknown	1,762
2021	unknown	1,762
2022	unknown	1,762

Gulf of Maine cod.

A majority of the SSC approves the use of the ASAP model for recommending catch advice as well as continuing to use a model averaging approach. Specifically, the SSC chose to average the Rho-adjusted M=0.2 model and the Mramp model to generate the ABC recommendation (M=0.2 Rho adjusted 75%Fmsy = 526 and the Mramp M=0.4 75%Fmsy = 577, producing the average of 552 mt for the constant ABC). The SSC did not reach consensus on this stock (see minority report section for more details). Based on the ASAP model, GOM cod is overfished and overfishing is occurring. A majority of the SSC recommends a constant ABC for the specification setting period, with the constant catch level being the lowest value of the three-year 75%Fmsy projection. The OFL was based on the projections of fishing at Fmsy and was set dynamically for the three-year period assuming the ABC is caught in previous years. A majority of the SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	724	552
2021	929	552
2022	1,150	552

Georges Bank haddock

The SSC approves the use of the VPA model for recommending catch advice. Based on the VPA model, GB haddock is not overfished, nor is overfishing occurring. The SSC recommends a constant ABC for the specification setting period, with the constant catch level being the lowest value of the three-year 75%Fmsy projection (terminal year, 2022). The OFL was based on the projections of fishing at Fmsy and was set dynamically for the three-year period. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	184,822	88,856
2021	130,773	88,856
2022	129,580	88,856

Gulf of Maine haddock

The SSC approves the use of the ASAP model for recommending catch advice. Based on the ASAP model, GOM haddock is not overfished, nor is overfishing occurring. The SSC recommends a constant ABC for the specification setting period, with the constant ABC being the lowest value of the three-year projection at 75%Fmsy (terminal year, 2022). The OFL was based on the projections of fishing at Fmsy and was set dynamically for the three-year period. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	25,334	11,526
2021	23,709	11,526
2022	17,945	11,526

Witch flounder

The SSC approves the use of the existing empirical approach with the updated exploitation rate of 4.9% in the 2019 assessment for recommending catch advice for witch flounder. Based on the empirical approach, the SSC recommends a constant ABC for the specification setting period based on the average exploitation rate from 2007 – 2015 and recent three-year average exploitable biomass. The OFL is unknown as the empirical approach does not produce reference points. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	unknown	1,483
2021	unknown	1,483
2022	unknown	1,483

Pollock

The SSC accepts the continued use of ASAP for assessing the pollock stock status and as a basis for setting the OFL and ABC. The assessment results indicate that the pollock stock is not overfished and that overfishing is not 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 based on the base model with the Fmsy proxy. The SSC recommends a static ABC for the specification period, corresponding to the lowest the ABC in the final year (2022) of the 75%Fmsy projections. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	35,358	16,812
2021	30,795	16,812
2022	24,087	16,812

White hake

The SSC supports the continued use of the ASAP model to provide catch advice for white hake. This method is an analytical assessment, from which reference points are derived. The SSC recommends the values of OFL be based on stock projections with the Fmsy proxy. The SSC recommends a constant ABC for three-years, corresponding to the lowest ABC in the first year (2020) of the 75%Fmsy projections. The SSC recommends the following OFLs and ABCs (metric tons):

Year	OFL	ABC
2020	2,857	2,186
2021	2,906	2,186
2022	2,986	2,186

RATIONALE INCLUDING SIGNIFICANT SOURCES OF UNCERTAINTY

~~As it has done in the past, t~~For catch advice recommendations in 2019, the SSC recommends constant ABCs for stocks with analytical assessments that demonstrated strong retrospective patterns. After additional deliberations, the SSC reaffirms its decision of having the PDT compute the OFLs conditioned on these constant ABCs in this situation. This allows the buffer between the OFL and ABC to increase during the projection years to acknowledge the additional uncertainty caused by the retrospective pattern that is not captured within the projection calculations. The SSC decided to use the lowest of the three ABC values in the standard 75%Fmsy (or 70%Fmsy for some stocks in rebuilding plans) projections. For stocks that are projected to increase during the three projection years, this approach holds the first ABC constant in the following years and allows the OFL to increase. For stocks that are projected to decrease during the projection period due to strong cohorts aging out of the fishery catch, selecting the lowest ABC is an approach that approximates what would have happened if the projections were conducted in a way to account for the retrospective pattern in the projections. If such an adjustment was made, the future catches would be lower than the ones from the standard projections. Since such projections were not available, and the SSC notes the benefit of constant catch for the industry, holding the ABC at the lowest ABC in the standard projection was considered an appropriate approach to prevent overfishing. If the first year

of the projection was held constant when the projected ABCs decrease, the target fishing mortality rate would be exceeded in the second and third year.

Southern New England/MidAtlantic yellowtail flounder and Cape Cod/Gulf of Maine yellowtail flounder.

The constant ABC approach, as described above generally, was used for the two yellowtail flounder stocks. Unaccounted for uncertainties due to the retrospective patterns in the assessments, along with the poor performance of the projections for these species historically led the SSC to use the additional buffer of the static ABC as a method for considering this unaccounted uncertainty.

Georges Bank winter flounder.

Based on the 2017 assessment the stock was approaching an overfished condition but was considered "not overfished". Although fishing mortality rates were at the lowest levels of the time series during 2015-2018, SSB remained near the SSB_{MSY} threshold (4,455 mt) during 2004-2015 and then declined to the lowest level on record in 2018 (3,372 mt). Biomass in 2018 was estimated to be 2,175 mt (24% of biomass target) which is sufficiently low to classify the stock as overfished despite light fishing pressure. Consequently, the stock status of Georges Bank winter flounder has changed from "not overfished and overfishing is not occurring" to "overfished and overfishing is not occurring."

The SSC was aware that the stock is in a rebuilding plan with a terminal year of 2029 (originally 2017) but that the stock showed little progress towards rebuilding to Bmsy, which led to the plan revision. Although the 2015 and 2017 assessments used 75%Fmsy to set the ABC, this lack of progress suggests that using a more conservative F, such as $F_{REBUILD}$ (70%Fmsy), would be more appropriate in the revised rebuilding plan. Harvests at this level should allow the stock to rebuild by 2029.

Also note that the use of 70%Fmsy is at odds with the peer review panel's comment that using 70%Fmsy is greater than $F_{40\%}$msp (the standard Fmsy proxy for groundfish) and as such may not be an appropriate rebuilding target. The PDT provided alternative catch projections using $70\%F_{40}$ which resulted in a lower estimate of ABC.

The peer review panel expressed concern about the stock recruitment relationship used (e.g., fixed steepness as a default as steepness was considered to be inestimable), which suggested a pattern of increased stock biomass. The continuing pattern of weaker recruitment than expected suggested that stock biomass may not be increasing. 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 2020 (the projection year with likely the least uncertainty) may not be appropriate.

Beyond the stock recruitment relationship and the retrospective pattern, the largest source of uncertainty in the assessment is the estimate of natural mortality. There are a number of other, less consequential uncertainties in the assessment including: NEFSC trawl survey catchability, lack of data on discards from the Canadian trawl fishery, and lack of age data from the Canadian DFO spring survey.

American plaice

The VPA model for this stock was recommended by the Peer Review Panel. This model shows that the American plaice stock is rebuilt 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 presence of the retrospective pattern creates significant uncertainty in the projections for this stock. As the PDT noted in its introductory presentation, our collective experience with groundfish management since GARM III (NEFSC 2008) indicates that accounting for this scientific uncertainty in our advice has given us better outcomes. This is consistent with the Wiedenman and Jensen (2018) analysis that underscores the unreliability of projections for Northeast groundfish stocks, especially for those with significant retrospective patterns.

Although the stock status for American plaice is positive (rebuilt, not overfished, not overfishing), the SSC favored a conservative approach for managing this stock. The SSC supported using the rho-adjusted projections of Fmsy as the OFLs. This is consistent ~~with the previous decision for this stock and~~ with the SSC's decisions for other groundfish during this specification setting process. These values are projected to decline over the next three years.

The SSC was presented with catch projections using 75%Fmsy (the groundfish control rule). These showed declining values. The SSC debated whether to use these projections, hold the first year constant, or use the minimum value for all three years. The SSC rejected the proposal to hold the first year constant. With the declining OFL, this approach would increase the risk of overfishing in later years.

There was considerable discussion about whether to use the projected (and declining) 75%Fmsy values for the ABCs. This is what the SSC elected to do in 2017 for this stock. The SSC noted that using the projected values assumes a constant level of uncertainty and thus, a high degree of confidence in the projections. Furthermore, to use the projections in this way, the SSC suggested that the rho adjustment should be applied in each projected year, rather than just the terminal year. This would lead to more aggressive declines than the projections alone indicate. The SSC decided to use the minimum (year 3, 2022) 75% Fmsy value and hold that value constant for three years. This provides an additional uncertainty buffer to increase the chances that overfishing does not occur on this stock.

Southern windowpane flounder.

The AIM model is a data limited approach, therefore precludes the development of projections. As noted in the GARM III report (NEFSC 2008), the AIM model produces metrics that can be considered reference points, therefore the SSC produced both OFL and ABC values, even though this is a data limited approach. This is why OFLs were recommended for the windowpane stocks, where they were not recommended for some of the other data limited approaches used for other groundfish stocks.

Northern windowpane flounder.

The Peer Review Panel did not accept the updated fishing mortality reference point from this assessment and chose to retain the reference point from the 2017 operational assessment (0.34 kt per kg/tow). The Panel cited concern about using the estimated Fmsy proxy in determining management actions for this update, because the updated relationship of biomass replacement to relative F was uninformative. The rationale was that as estimated catch decreases and the survey index also decreases, it is increasingly difficult to model. The SSC concurred with this finding of the review committee.

A 'no possession' rule has been in place for this stock since 2010, and there is concern that this stock is not responding as expected from low catch quotas.

Atlantic halibut

There is uncertainty in the performance of the fishery relative to the catch advice, namely catch relative to the ABC could be close or possibly exceeded in 2018 and has been close in other recent

years. The SSC justifies keeping advice static for 3 years due to the fact that there are no projections, so there is no information to adjust catch for years beyond 2020. The data limited method used to assess the stock was rigorously simulation tested and performed well, which gives the SSC some confidence in the approach and advice, however other approaches of a similar nature do indicate some risk of over or under-harvesting (depending on the direction of the population change) due to the fact that it takes a few data points (in other words, years) to adjust the catch advice as the population abundance changes either up or down.
Other uncertainties considered in the recommendation to decrease catch were that the catchability experiments done on other groundfish were not able to be performed on Atlantic halibut due to the low sample size of Atlantic halibut caught during the experiment. Not having information about catchability may not have an impact as long as the trend in abundance is reflected appropriately by the index, but the lack of information on catchability remains an important uncertainty for Atlantic halibut. As noted in the stock assessment report, because the catch advice multiplier is now below 1 (and has been trending down), this may be a signal that the population is no longer increasing. This trend should be closely monitored, and further reductions may be needed in the later years of the specification period if the trend continues. And finally, discards have increased in the most recent year, and Canadian catch also increased. The discards may reflect a new cohort entering the fishery, or perhaps a change in fishing behavior, so it is a signal that should be closely observed moving forward. The magnitude of the Canadian landings during the specification period is also a source of uncertainty as this is not a jointly managed species, and future catches from Canadian waters represents an additional uncertainty.

Georges Bank cod
The Georges Bank analytical assessment was rejected by the 2015 operational assessment review. The PlanBsmooth method was used in the 2017 operational assessment and is used here for catch advice, but because it is a data limited approach, it cannot account for many uncertainties inherent to this stock. The survey indices used for the model continue to be very low and there are no indications of stock rebuilding even as exploitation of the stock has dropped to very low levels. The ABC recommended by the SSC is higher than recent catch but was set significantly lower than recent ABC levels to account for the uncertainty surrounding this stock that is not accounted for in its data limited assessment approach.
The SSC changed its approach to GB cod by defining the output of the PlanBsmooth approach as the ABC rather than the OFL as was done in the past. This was done to remain consistent in how the SSC handles output from other similar data limited methods (e.g., those for GB yellowtail flounder and witch flounder). The SSC went on to discuss whether an additional buffer should be added to the catch advice produced by the model but given that there was no way to determine the appropriate buffer, the SSC chose to keep the output of the PlanBsmooth method as the ABC.

Gulf of Maine cod
As has been the case with GOM cod, the SSC found the treatment of natural mortality to be a major uncertainty with this stock. The use of the model averaging approach helps to mitigate some of this uncertainty, however it is an important assumption in the model and is a largely unaccounted for source of uncertainty. There was also a review of discard estimates for groundfish stocks, with GOM cod being implicated as a species where there may be an issue with discard estimates, adding an additional uncertainty in to the assessment. A retrospective adjustment was not used for the base models examined by the reviewers; however a sensitivity run was presented that had a significant retrospective adjustment, which creates an additional uncertainty for this stock as there are cases where a retrospective pattern is apparent in the assessment results. Finally, the disconnect between

the state of nature with regard to natural mortality and the projections (there are assumptions about natural mortality used in the projections that raised concerns with the SSC) caused the SSC to reject the use of the projections in setting the ABC. Given all these uncertainties, a constant ABC was set for this stock which used the lowest value over the three-year specification setting period.

Georges Bank haddock

A number of uncertainties exist within the assessment and projections. The assessment has a strong, positive retrospective pattern, requiring a downward adjustment to the terminal biomass, and there is uncertainty in the magnitude of the very large 2013 year class. Size-at-age has also showed a steady decline over time, and if this trend continues, assuming a fixed weight-at-age (based on recent multi-year average) in the catch projections could lead to inflated estimates of the OFL and ABC. The SSC considered these uncertainties in its deliberation, and these were the reasons for adopting the constant catch approach even though this stock had good stock status. There was discussion about using the fixed ABC approach for a stock like haddock with such high biomass, and that it may be overly conservative. However, it was noted that past projections for haddock, even with retrospective adjustments, would have resulted in overfishing, largely due to the continued declines in size at age, therefore the SSC felt its use of the constant catch approach was appropriate.

Gulf of Maine haddock

As with the GB haddock stock, the GOM stock is in good stock status with no overfishing and the stock is not overfished. The 2013 year class was exceptional for both stocks, however, the relative size of the respective recruitments varied from the pattern seen in prior events. The GB stock had large recruitments in 2000 and 2003 and for both events, the year classes on GB were nearly two orders of magnitude larger than for GOM. With the 2013 recruitment, the GB recruitment was approximately one order of magnitude larger, consistent with a proportionally higher presence of the haddock resource outside the GB stock area. The GOM haddock assessment is conducted using the statistical model ASAP; however, like other species assessments, the model fit was subject to retrospective error and a rho adjustment was applied to correct for this error. Unlike other assessments, including the VPA results for GB, the adjustment for GOM haddock was upwards. Hence, the SSC considered the 75% F_{msy} projection estimates of OFL and ABC for this stock, reasoning the direction of the error may not pose an immediate likelihood of overfishing. Despite this discussion and given the relatively large retrospective errors with this assessment and following the relatively large rho adjustment needed to correct the terminal year, the SSC concluded it would be risk averse to apply the same approach used in other assessments with large retrospective pattern and therefore approved the use of the constant catch approach for the ABC.

Witch flounder

The witch flounder assessment was a direct delivery empirical approach, so this assessment did not go through peer review with the other groundfish stocks. The empirical approach does not produce projections or reference points, so the SSC was left to review the output of the approach, which is the ABC for this stock. No alternatives were reviewed or discussed.

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 assumption of dome-shaped selectivity in both the commercial catch and research survey implies a large, unsampled cryptic biomass. A sensitivity analysis was performed with domed-shaped commercial selectivity and flat-topped survey selectivity. Convergence problems were encountered in fitting both model forms. Population

scaling (catchability) is sensitive to the number of years included in the assessment model. The ASAP model may be overparameterized.
Although the population projections appear to be well-determined for both models, the models disagree when making projections with the same F. A table provided by the PDT showed the consequence of projecting OFL/ABC based on one model if the other one corresponded to the true state of nature. The highest risk occurred when setting the OFL/ABC based on the dome-shaped selectivity model, if the flat-topped selectivity model is correct. This risk is reduced with the static ABC and is the basis for the SSCs recommendation.

White hake
The SSC discussed several uncertainties with the white hake assessment. There is a significant retrospective pattern in the assessment which requires adjustment that is not carried in to the projections. The status for white hake has changed from not overfished to overfished, though it is right at the threshold. The SSB had been increasing but may be beginning to decline, exacerbated by the retrospective adjustment downward. Misidentified catch from the early part of the time series was flagged as a major uncertainty, along with low sample sizes for some of the characterization of the commercial fishery. Finally, the stock assessment report noted significant concerns with the projections, which was a major reason for the static ABC advice from the SSC using the lowest value as a way to account for these uncertainties.
The SSC also noted a positive attribute from this assessment in that it is producing stable output between runs by way of the reference points and MSY calculations.

ADDITIONAL COMMENTS (Note: not all species had additional comments)
Southern New England/MidAtlantic yellowtail flounder and Cape Cod/Gulf of Maine yellowtail flounder.
The SSC reaffirms its previous recommendation that the approach of holding the ABC at the lowest ABC in the standard projection be adopted formally as part of the SSCs control rule after some simulation testing of this approach occurs. The SSC also recommends that the PDT explore alternative projections that account for the retrospective pattern within the projection period, for example by retrospectively adjusting each year in the projection.

Georges Bank winter flounder.
The SSC noted that several areas of research could improve the assessment. The SSC suggested that the NEFSC could evaluate a statistical catch-at-age or state-space model as an alternative to the current VPA, as part of a Research Track assessment. A shorter-term investigation could be conducting sensitivity testing of the utility of $70\%F_{40}$ as an alternative BRP for the stock. Finally, the SSC recommended that the source of the retrospective pattern and recent poor recruitment should be studied.

American plaice
The SSC discussed the interplay between the robust stock status of this species, but the strong retrospective and poor performance of the projections for groundfish species in general. As was the case for the yellowtail flounder stocks, the SSC recommends that the PDT explore alternative projections that account for the retrospective pattern within the projection period, for example by retrospectively adjusting each year in the projection.

Northern windowpane flounder.

A 'no possession' rule has been in place for the Northern windowpane flounder stock since 2010, and there is concern that this stock is not responding as expected from low catch quotas. Moving this stock back in to an analytical framework may offer better insight in to why the stock is not rebuilding despite low fishing mortality.

Atlantic halibut

The FSD model does generate parameters, and per comments made by the analyst in the original stock assessment report (Rago 2018), projections can be made under certain assumptions for catch and index behavior, therefore the SSC recommends producing "projected" advice for Atlantic halibut for the specification setting period in the future. There is a Research Track on data limited assessments in the near future, and the model used for Atlantic halibut would be a good candidate to examine as the FSD model approach is unique but similar to other approaches used for groundfish. The stock structure for Atlantic halibut was another item that the SSC feels could be further investigated as there is an important connection between US and Canadian waters that is not well understood. Getting a better sense of how the stock structure is defined for this species will help with future management. Finally, the SSC would like to have some more information as to whether this model can rebuild a stock. This information is available per the original assessment document, so that could be reissued to the SSC during the next specification setting cycle.

Georges Bank/ Gulf of Maine cod

Interaction between low stocks, low ABC, and individual or market behavior across recreational and commercial is an area that needs further exploration to support future advice and consensus from the SSC.

Pollock

There was discussion by the SSC about the biological basis for dome-shaped selectivity in the commercial and survey catch. Given that the survey tows have been shortened to 20 min, large pollock may be able to outswim the trawl net. Large pollock may not be caught in gillnets used in the commercial fishery. These explanations are logical but may not fully explain the sharp drop-off in selectivity between age 7 and 8+ fish. While there may be some good explanations for the doming in the selectivity, these logical arguments are not definitive, and therefore uncertainty exists with this stock, which precipitated the SSC's use of the constant quota approach for pollock. This aspect of the assessment could be investigated experimentally to confirm or refute some of these hypotheses.

White hake

The SSC recommends a level 3 Management Track assessment for next cycle with the following advice on things to change or test (note: these may or may not be possible in newest ASAP version): 1. Incorporation of aging error (likely requires strong prior on selectivity); 2. Incorporating a low sample size to reflect reality of the commercial harvest samples coupled with switching to a Dirichlet likelihood for the age compositions may be worth investigating; 3. Using methods that account for market categories instead of size categories to convert to age composition; 4. Adding a new selectivity block; 5. Adding new survey information to the model if available.
On the data side, improving commercial sampling would help characterize catch better, and processing the existing age structures to augment age and length info would benefit the next assessment.

MINORITY REPORTS

Georges Bank cod

A minority of SSC members were opposed to the process used for setting the ABC for Georges Bank cod. In the previous groundfish updates, the SSC took the output from the PlanBsmooth calculation as an OFL. We then took 75% of this value as the ABC. The intention was to approximate the groundfish control rule that uses 75% of Fmsy to set the ABC. Given the poor status of Georges Bank cod and the absence of any indication that the stock is increasing (in fact, the trend is downward), the concern is that the approach recommended by the majority of the SSC removes a crucial buffer that is used for other stocks and previously for this stock. The minority recommendation would be to use 1,322 mt as the ABC.

~~There was a second minority view from the social scientists on the SSC regarding any reduction in catch given the challenge of accurately knowing the status of the stock relative to previous assessments from the models presented. These members of the SSC noted that industry representatives presented a consistent assessment based on fishing experience and observation. The industry suggested that there were positive signs of recruitment as well as local abundances corroborated by an expanding recreational catch (both in terms of size and total numbers) of cod as well as the increasing difficulty that commercial fishermen have avoiding cod. It is important to note that these positive signals do not show up in the information reviewed by the SSC. Furthermore, the SSC social scientists noted that given the degree to which the limitation on catching cod already adversely affects fishing enterprises and local economies, the council's own Risk Policy guidelines would suggest that this is a case where (highly uncertain) model outcomes alone should not decide ABC. They felt that the risk policy would suggest that the stock rebuilding benefits of lowering the ABC do not justify the potential damage to local economies in this case.~~

Gulf of Maine cod

The SSC did not reach consensus on GOM cod. There was a minority of the SSC that felt the majority recommendations were not appropriately using the harvest control rules for GOM cod. Because the stock could not rebuild per the projections offered, even at an F of zero, a minority of the SSC felt that we were required to use "Option C" of the groundfish control rule~~.~~. The SSC was provided with information on discards and incidental bycatch, but it is important to note that the adequacy of that information was discussed by the SSC, with some believing that the discards and bycatch numbers were likely higher than reported in the PDT report for reasons such as uncertainty in how the MRIP recalibration data were handled in the table provided by the PDT, and the work done by the PDT in support of Amendment 23. The minority recommendation would be for a bycatch only fishery with an ABC of 450.4 mt (the FY2018 bycatch/discard estimate as presented by the PDT). In so far as this is an underestimate of the actual bycatch and is also less than the total catch, it would meet the desired "reduction in bycatch rate" as required in option C of the control rule.

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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	88,856	130,773	88,856	129,580	88,856
GOM Haddock	25,334	11,526	23,709	11,526	17,945	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	2,825	3,806	2,825	3,753	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	16,812	30,795	16,812	24,087	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

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 Dep Commer, NOAA Fisheries, Northeast Fish Sci Cent Ref Doc. 08-15; 884 p + xvii.

Rago, P.J. 2018. Halibut Assessment Report for 2017 for New England Fishery Management Council, January 24, 2018.Unpublished, online at SASINF

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