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## New England Fishery Management Council

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To: Tom Nies, Executive Director

From: Scientific and Statistical Committee

Date: November 30 2017

Subject: Overfishing levels (OFLs) and acceptable biological catch (ABC) recommendations for groundfish stocks for fishing years 2018-2020.

The SSC met on October 23 and 24, 2017 in Boston, MA to address the following term of reference (TOR):

Review the 2017 Groundfish Operational Assessments and work of the Groundfish Plan Development Team (PDT). Taking into account the Council's Risk Policy Statement, provide the OFL and an ABC for each stock for each year 2018, 2019, and 2020 that will prevent overfishing, and achieve rebuilding if needed, consistent with the Council's ABC control rule for groundfish stocks. (See list of documents for the assessment summary and Groundfish PDT report under Information below).

To address this TOR, 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 and 10-12.

A.2 Operational Stock Assessments of 19 Northeast Groundfish Stocks through 2016, including the peer review reports for each stock (NEFSC, October 2017)

A.3 Background: 2017 Groundfish Operational Assessment Presentations (NEFSC, September 2017) assessment presentations by stock available at this link:

<https://www.nefsc.noaa.gov/groundfish/operational-assessments-2017/agenda.html>

A.4 Background: Catchability studies and expert review (NEFSC, September 2017) available at this link: <https://www.nefsc.noaa.gov/groundfish/operational-assessments-2017/panelreview.html>

A.5 Supplemental Information: Stock Assessment Support Information (SASINF) - use this link to access the database: [http://www.nefsc.noaa.gov/saw/sasi/sasi\\_report\\_options.php](http://www.nefsc.noaa.gov/saw/sasi/sasi_report_options.php)

A.6 Recent information on the commercial and recreational groundfish fisheries, excerpt from Framework Adjustment 56, NEFMC, June 2017.

A.7 Letter from GARFO to NEFMC re Framework Adjustment 56 partial approval and witch flounder stock status, Aug. 8, 2017

A.8 Letter from GARFO to NEFMC re groundfish inadequate rebuilding progress, Aug. 31, 2017.

A.9 Memo SSC to Council re OFL and ABC recommendations for groundfish stocks for fishing years 2016-2018, Nov. 17, 2015

A.10 Memo SSC to Council re OFL and ABC recommendations for witch flounder, Jan. 23, 2017

A.11 Memo from the Groundfish PDT to SSC re candidate groundfish OFLs/ABCs for FY2018-FY2020, Oct. 13, 2017.

A.12 Presentation: Overview of the 2017 Groundfish Operational Assessments (NEFSC staff)

A.13 Presentation: Groundfish PDT Report (NEFMC staff)

The SSC reviewed the work on all groundfish stocks (apart from Georges Bank, GB, yellowtail flounder and Atlantic halibut) that were recently assessed and peer reviewed during the 2017 Groundfish Operational Assessments in September 2017. Georges Bank yellowtail flounder was previously reviewed at the August 2017 SSC meeting and the Atlantic halibut assessment will be reviewed by the SSC on December 18, 2017 via conference call.

The Assessment Oversight Panel (AOP) met with the lead scientists for each of the assessments on July 24, 2017 in Woods Hole to define the ‘rules of engagement’ for the operational assessments. The meeting focused on clarifying any deviations from the most recent benchmark assessment for each stock that were considered sufficiently modest to be allowable during the operational assessments (i.e. new interpolation techniques for age length keys), and those that were considered to be more substantial and therefore not allowable (i.e. altering catchability in analytical assessments). On this topic, there was a strong focus on recent catchability work that was performed on several flatfish species. This meeting also sought to improve consistency across the assessments, especially with respect to the procedures used for so called “Plan B” approaches, or back up analyses to be used for catch advice if the main assessment technique failed peer review. Some of the highlights of the discussion were:

1. As developed for the 2015 assessments, the guidance on when to apply the Mohn’s Rho adjustment for retrospective patterns in biomass or fishing mortality was approved again.
2. Recommendations for “Plan B” approaches to developing catch advice if the model fails were made for all stocks that were not currently using a “Plan B” approach.
3. The group develop some degree of consistency in the “Plan B” approaches used.
4. It was agreed to that the new estimates of survey catchability will not be incorporated in cases where analytic models are used, but will be presented for comparison purposes in the operational assessment document. For stocks where new information is available and that utilized an index based or empirical approach, updated catchability (q) estimates will be used.
5. For cases using an exploitation rate, the group determined that these exploitation rates should be estimated in a consistent and scientifically defensible manner for stocks using empirical approaches. Assessments with empirical approaches should present a range of estimates and a scientific rationale for the preferred method.

The default control rule for groundfish as defined in recent amendments to the Northeast Multispecies FMP and other management actions is as follows:

*"These ABC control rules will be used in the absence of better information that may allow a more explicit determination of scientific uncertainty for a stock or stocks. If such information is*

*available - that is, if scientific uncertainty can be characterized in a more accurate fashion -- it can be used by the SSC to determine ABCs, these ABC control rules can be modified in a future Council action (an amendment, framework, or specification package):*

*a. ABC should be determined as the catch associated with 75% of FMSY.*

*b. If fishing at 75% of FMSY does not achieve the mandated rebuilding requirements for overfished stocks, ABC should be determined as the catch associated with the fishing mortality that meets rebuilding requirements (Frebuild).*

*c. For stocks that cannot rebuild to BMSY in the specified rebuilding period, even with no fishing, the ABC should be based on incidental bycatch, including a reduction in bycatch rate (i.e., the proportion of the stock caught as bycatch).*

*d. Interim ABCs should be determined for stocks with unknown status according to case-by-case recommendations from the SSC."*

In recent years, the SSC has either used one of the default options listed above or applied other approaches tailored to particular elements of scientific uncertainty in others (e.g., constant catch levels). The PDT used the outcomes of the operational assessments to develop OFL and ABC alternatives for the SSC to consider using either the defined ABC control rule, approaches tailored for particular stocks in recent specification setting, or recommendations from the peer review panel. The SSC also developed new approaches for some stocks based on our evaluation of uncertainty and the attributes of the available science.

This report provides an overview of the general issues addressed by the SSC, followed by details on the approaches used for developing catch advice for each stock. Table 1 summarizes the approaches used to develop ABC recommendations for each stock and any pertinent notes on the approach utilized or other issues considered by the SSC. The OFL and ABC recommendations for each stock are provided in Table 2 under "Summary of recommendations".

### **General issues**

#### *Process for the assessment and development of catch advice*

The SSC applauds the efforts of the stock assessment scientists at Northeast Fisheries Science Center (NEFSC) and the peer review panel in producing and evaluating such a large number of assessments in such a disciplined and efficient manner. The SSC also applauds the PDT for producing similarly clear and streamlined information on alternatives for catch advice for the SSC to consider. The PDT also provided summaries of recent catch performance which aided the SSC in their discussion of catch advice.

One issue noted by the SSC, which complicated the SSC's deliberations, was the treatment of the new catchability information produced for some flatfish stocks. Direct guidance from the Assessment Oversight Panel (AOP) was offered on how to treat this information, but this information was not directly provided to the SSC for their deliberations. The AOP agreed that new estimates of survey catchability will not be incorporated in cases where analytic models are used, but will be presented for comparison purposes in the operational assessment document. For

stocks where new information is available and that utilized an index based or empirical approach, updated catchability (q) estimates will be used. This issue became central to our discussion of the basis for catch advice for Southern New England/Mid-Atlantic (SNE/MA) yellowtail flounder. It was noted by the NEFSC and the SSC members who participated in the peer review of the operational assessments that this catchability information was addressed during the review, and since it was not in the reports produced for the SSC, individuals who had participated in the operational assessment review offered their recollection of that discussion to help inform the SSC. This issue could have been lessened if the information had been more formally addressed in the SSCs background materials.

The use of constant catch approaches by the SSC as a way to address scientific uncertainty is being used routinely. Because of this, **it is recommended that this approach be adopted formally as part of the SSCs control rules.** In addition to the constant catch approach, the SSCs deliberations highlight the need for a more rigorous control rule when using empirical approaches, therefore **the SSC reaffirms its previous recommendation to allow the “Significant Change Working Group” to continue its work on developing a strawman control rule for empirically assessed stocks** (see SSC report dated August 14, 2017).

#### *Retrospective patterns*

One positive outcome of the recent operational assessments was that the increasing retrospective issues seen in the past did not worsen for this latest round of operational assessments, and it improved for some species. Despite this, retrospective patterns remain a persistent problem in many, but not all, assessments. The SSC continues to view the development of a clear rule for when a retrospective adjustment would be applied as a positive step toward more consistent development of catch advice, however some SSC members continue to question whether continued adjustments are a sound strategy, whether other more appropriate scientific responses can be developed, and whether management strategies (especially ABC control rules) can be developed that are robust to the unknown causes of retrospective patterns. **The SSC continues to recommend that a thorough re-examination of the appropriate scientific and management responses to retrospective patterns is warranted,** and suggested that the current discussions at the Northeast Regional Coordinating Council (NRCC) on the research track assessment process might be a good venue to offer this as an appropriate topical analytical area to focus on. The SSC recommended comprehensive and integrated approach be taken to understanding the contributing factors to retrospective patterns and that this research be hypothesis driven. This type of approach can examine additional sources of information, such as environmental information to understand its impact on the resources and the stock assessment. For instance, if an environmental covariate corresponds to periods of lower productivity for a suite of populations, this information can be used in a “stoplight” type approach, and varying degrees of caution can be used when setting catch advice based on this information. In addition to environmental information, other information that could influence retrospective patterns should be thoroughly investigated such as misreporting of catch, predation effects, and trawl survey catchability issues.

### *Cross stock risk*

One topic that came up multiple times during the SSCs deliberations was the notion of indirect impacts to risk on stocks external to the stock being examined. This topic was both discussed by the SSC and was the topic of multiple public comments during the meeting. The current discussion was mainly focused on sea scallops. Catch advice for several groundfish species have impacts on the management of sea scallops. This type of discussion occurs frequently at the SSC, however, despite this frequency, the SSC is not formally provided information with which to address this risk (a notable exception was the recent deliberation on Georges Bank yellowtail, see SSC report dated August 14, 2017). **The SSC recommends finding a good way to formally provide information on indirect risks of catch advice to external stocks.**

### *Review process*

The SSC discussed some of the challenges they faced during the operational assessment deliberations. One idea discussed was whether more time was needed beyond the two days traditionally set aside for the groundfish deliberations. This was not favored by the SSC. The discussion turned to how the SSC is meant to use peer reviewed information. In some cases during the deliberations, the SSC rejected the findings of the peer review panel and these discussions took up a large portion of time to deliberate. It was questioned as to whether this was appropriate. It was generally agreed that the SSC does have the authority to reject a peer review finding, however this should be done judiciously as it is in essence a second peer review for the assessment. One potential solution offered was to integrate the SSC in the peer review to a higher degree than currently done, or to have the SSC be the peer review group explicitly. The discussion ended at this point, with the solution being to bring this concept to the NRCC for further evaluation.

### **Stock-specific issues**

The following section goes stock by stock to address the issues discussed by the SSC. The cases where the SSC adopted one of the PDT options without substantive additional discussion are not presented below, therefore for the stocks not explicitly presented below, it can be assumed that the SSC recommendation for OFL and ABC as presented in Table 2 is the result of adopting one of the PDT options as well as their reasoning for developing it for consideration by the SSC.

### *Georges Bank winter flounder*

The GB winter flounder discussion was the first where the notion of the survey catchability research arose. The discussion focused on whether the catchability information would be impactful to the deliberations. The SSC disagreed on this topic and this disagreement was not resolved. The SSC discussed numerous approaches for developing catch advice for this species including adopting one of the PDT recommendations, basing catch advice off recent exploitation and survey information, or using the Plan B approach referred to as “PlanBsmooth”. The PDT options were based off the peer review advice, while the other approaches were developed external to the peer reviewed information. There was discussion on how to address the disagreement including the development of a minority report. After rigorous debate, a **consensus**

was reached to adopt an OFL of 1,083 mt with an ABC not to exceed 855 mt which is based off one of the PDT options for this stock (Table 26 Document A11). This OFL and ABC were to be held constant for the three years of the specification setting period 2018 - 2020 to account for scientific uncertainty. This recommendation is based off the VPA model for this stock. The SSC noted that there were some troubling diagnostic issues with the VPA output, but at this point did not feel they warranted overriding the peer reviews acceptance of the model as a basis for catch advice.

#### *Gulf of Maine winter flounder*

The SSC supports the PDT recommendation for Gulf of Maine (GOM) winter flounder along with maintaining a constant catch scenario for all three years of the specification (an OFL of 596 mt with an ABC not to exceed 447 mt for 2018 – 2020; Table 26 Document A11). One factor the SSC did focus on in this case is that there are three surveys used for the analysis. The three surveys have different gear and survey protocols, therefore the SSC questioned whether it was appropriate to apply the estimated catchability from the catchability research project to all three surveys rather than only the NMFS trawl survey, which was the survey that the research focused on. The appropriateness of the application of the catchability assumption for surveys other than the NMFS trawl survey should be investigated further before the next operational assessment for this species.

#### *Southern New England/Mid-Atlantic Winter Flounder*

The SSC noted a couple of issues with SNE/MA winter flounder. The first was that the projections were overly optimistic, and this was driven by over estimating recruitment. The SSC noted that we appeared to be in a period of low recruitment, therefore assuming that this recruitment will be higher in the projections was not a reasonable assumption. Additionally, the assessment for this stock was allowing for domed shaped selectivity. This was creating an abundance of “cryptic biomass”, or biomass seen in the computer output of the population, but which does not show up in catch or survey data. This was another factor that caused the SSC to question the performance of the projections. The decision was to use the model output and PDT option as an initial basis for the SSCs recommendation on catch advice, but to account for the scientific uncertainties mentioned above. In accounting for scientific uncertainty the SSC chose to base the ABC on an average of recent 3 years of catch (CY2014-CY2016). This resulted in the **recommendation of an OFL of 1,228 mt and an ABC not to exceed 727 mt, keeping this catch advice constant for 2018 – 2020.** The action to reduce the ABC is based on the continued poor stock status and need to account for the scientific uncertainties associated with the cryptic biomass issue within the catch advice. An additional recommendation from the SSC was to better account for changes in productivity manifested in periods of low recruitment by sub-setting the recruitment from this period of lower productivity when doing the projections.

#### *Cape Cod/Gulf of Maine Yellowtail Flounder*

The SSC also discussed survey catchability research during deliberations on Cape Cod/Gulf of Maine (CC/GoM) yellowtail flounder catch advice. However, in the end the SSC decided to use the PDT constant ABC option. This resulted in a **recommendation of an OFL of 662, 736, and**

**848 mt for the years 2018 – 2020 respectively and an ABC not to exceed 511 mt in each of those years.** The rationale for applying a different approach in setting catch advice for CC/GoM yellowtail as compared to SNE/MA yellowtail (described below) was that the projections were performing better for this stock and there were some positive signals from the assessment regarding the population including increased biomass levels and a strong recruitment signal. One additional note from the SSC for this stock was a discussion on the use of an ensemble of models for setting catch advice. In this case there were attributes to both the analytical approach and the empirical approach, and there may be value in investigating the use of an ensemble of information for setting catch advice in the future as this can often address multiple sources of uncertainty simultaneously and in a formulaic manner.

#### *Northern and Southern Windowpane Flounder*

For both stocks the SSC supported the PDT options for catch advice. The one element the SSC wanted to add to this catch advice is that there is now information available with which to use an area swept biomass approach, and it is recommended that this be investigated for future windowpane assessments.

#### *Atlantic wolfish*

The SSC adopted the PDT constant OFL and ABC option. This results in **an OFL set at 120 mt and an ABC not to exceed 90 mt for 2018 – 2020**. The SSC did discuss the need to develop a new harvest control rule for this stock as it felt odd to many SSC members to set an ABC so much higher than any catch amount seen in recent history. The SSC went on to discuss the probable reason for this, which was the prohibition on harvest, and the SSC thought it would be worthwhile to recommend to the Council that they may want to revisit the need for the SSC to develop catch advice for a stock that has a harvest prohibition on it.

#### *American Plaice*

The SSC adopted the PDT option using the projection at  $75\%F_{MSY}$  for catch advice. The **recommendation was for an OFL of 2,260, 2,099, and 1,945 mt and an ABC not to exceed 1,732, 1,609, and 1,492 mt from 2018 – 2020 respectively**. There was a discussion on improving the analysis for plaice in the future given new age information on the stock. The SSC noted some data conflicts in the information namely that the trends were different inshore and offshore, however, given that stock status appeared to be good, the SSC was comfortable with the  $75\%F_{MSY}$  projection recommendation. Economic considerations were discussed for this stock, but given that there was no quantified information provided for review, the SSC requested developing techniques to bring economic information into the process in the future.

#### *Witch Flounder*

There was discussion on the SSCs ability to determine an OFL for this stock, but the SSC felt that it did not have a good approach for doing so, nor did the peer review panel offer an ability to develop an OFL based on the approach used to analyze this stock (empirical approach). The SSC was made aware that the Council is seeking guidance on how to address the unknown OFL situation from NOAA and the Council will provide this guidance to the PDT and SSC once it is

received. **The SSC recommended using the PDT option of a constant ABC approach, resulting in an ABC not to exceed 993 mt in 2018 – 2020. OFL is unknown for this stock.** The justifications for this catch advice which uses a recent exploitation level of 6% was that there is a recent, strong year class that will allow for rebuilding. This signal is corroborated by other sources of information external to the stock assessment. Further, the SSC noted that further restrictions in the catch of this stock would increase the risk of constraining catch and negative economic consequences on other stocks.

#### *Gulf of Maine cod*

As was done previously for this stock, an ensemble approach using multiple model inference was used to set catch advice. The SSC differed from past practices though, by dropping one of the three models considered in the past (Mramp model with M=0.4 for some period then reverting to M=0.2). The assumed reduction to an M=0.2 was not considered biologically reasonable. Therefore, the SSC recommends setting catch advice on two models, the “M=0.2” model and the “Mramp” model which keeps the M constant at 0.4. This results in a **recommended OFL of 938 mt and an ABC not to exceed 703 mt for the years of 2018 – 2020**. It is important to note that the rho adjustment was not used in this case for the M=0.2 model. This departure from the standard rules of engagement were justified based on an examination of the CVs from this model, which indicated a very precise estimate (tight bounds on the CV). Given that the peer reviewers did not recommend using a rho adjusted value and because the procedure previously did not use the adjustment, the SSC felt comfortable proceeding with this approach. The SSC noted that inclusion of the rho adjustment would have had little impact on the catch advice. Additionally, the use of the ensemble approach offers a different mechanism for accounting for scientific uncertainty.

#### *Georges Bank cod*

The Georges Bank cod stock uses the “PlanBsmooth” approach as its official assessment technique. The SSC adopted the PDT option of a **constant OFL and ABC approach for catch advice, resulting in an OFL of 3,047 mt and an ABC not to exceed 2,285 mt in 2018 – 2020**. The SSC discussion focused on the technique itself, and the SSC recommends that this approach be simulation tested to answer questions about the techniques stability and that other control rule options be investigated such as capping the proportional change from year to year.

#### *Pollock*

The SSC adopted the PDT option of a constant ABC for pollock, resulting in **OFLs of 51,680, 53,940, 57,240 mt for 2018 – 2020 respectively and an ABC of 40,172 for each of these years**. The justification for the constant catch approach is that there is a cryptic biomass that is accumulating for this species, therefore the SSC felt that the constant catch approach was warranted to account for this scientific uncertainty.

#### *Southern New England/Mid-Atlantic Yellowtail Flounder*

SNE/MA yellowtail flounder was a unique case for SSC deliberations in 2017. Advice was rendered at the October meeting which rejected the use of the analytical assessment, peer review



advice, and PDT options for catch advice. Instead, at the October meeting, the SSC chose to use a Plan B approach for setting catch advice, namely the approach referred to as “PlanBsmooth” after discussing other alternatives for setting catch advice in the absence of information from an analytical assessment. Subsequent to the meeting, the “PlanBsmooth” method developed at the October meeting was reviewed and it was found to be inconsistent with regard to the years of catch used in the average (during the meeting the calendar years of 2015, 2016, and the estimated catch from 2017 was used, whereas the standard approach for “PlanBsmooth” would be to use 2014 - 2016).

Given this finding, the SSC redeliberated SNE/MA yellowtail flounder during a conference call on November 27, 2017 and addressed this ToR:

Review the calculation of the mean recent catch for the Southern New England/Mid-Atlantic yellowtail flounder PlanBsmooth approach used at the October 23-24, 2017 SSC meeting and, if appropriate, adjust the resulting SSC recommendation for the overfishing limit (OFL) and acceptable biological catch (ABC) for fishing years 2018 - 2020.

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

1. Application of PlanBsmooth approach to groundfish stocks, C. Legault
2. GARM 2017 PlanBsmooth, C. Legault
3. Overview presentation: Council staff
4. Link to October 23-24 SSC Meeting documents:

<https://www.nefmc.org/calendar/oct-23-24-2017-ssc-meeting>

SSC members discussed the catchability research with respect to this stock and whether to use the assessment for catch advice with members not coming to consensus on whether the assessment was a robust basis for catch advice. Some SSC members noted that the stock was in poor condition given the indicators examined by the SSC, and conservative management is warranted.

Two proposals were offered for catch advice. The first proposal was to continue with the previous advice of using the “PlanBsmooth” approach, but correct the years used for averaging catch to 2014 - 2016. This proposal used a constant ABC approach, but resulted in an OFL at 134 mt and an ABC not to exceed 100 mt.

The second proposal was based on the output of the analytical assessment, which was in line with the peer review advice and an option developed by the PDT for the October meeting. This proposal also used a constant ABC approach with an OFL at 45 mt and an ABC not to exceed 35 mt for 2018 – 2020. These two proposals were debated by the SSC.

Proponents of the first proposal cited their lack of confidence in the analytical assessment given the results of the assessment in the context of the catchability research, as well as some of the information provided with regard to performance of the projections with the “PlanBsmooth” approach catch used as the basis for the projections.

Proponents of the second approach cited the poor stock status as a reason to be precautionary, noting that when a stock was in poor condition, even small amounts of catch can impact the population dynamics. Further, it was noted that the original decision to approve the “PlanBsmooth” approach during the meeting was due, in part, to coherence between the modeling approaches, but given the update, that coherence was negated.

After a vigorous discussion with multiple additional proposals being made, the SSC reached the following recommendations. **The majority of the SSC recommends averaging the two proposals as outlined above. This results in an OFL at 90 mt with an ABC not to exceed 68 mt for 2018 – 2020.** The model averaging approach was recommended to account for the scientific uncertainty associated with the two divergent model outputs with regard to catch.

There was also a **minority opinion from the SSC to recommend an OFL with a range from 134 – 45 mt with an ABC in the range of 100 – 35 mt.** This was recommended to highlight the range of the uncertainty that the SSC was contending with when making their recommendation, and it was felt that recommending this range rather than the averaging approach as outlined above was a better way to reflect the uncertainty in the catch advice that the SSC was giving to the Council.

Both of the recommendations are higher than what the analytical model suggests as being appropriate in the first year of the specification, but the majority OFL and ABC recommendation becomes lower than projections at 75%F<sub>MSY</sub> based recommendations in subsequent years, therefore the SSC felt that it was adequately accounting for the continued poor stock status of this stock in its recommendations. Additionally, the 68 mt ABC is a major reduction from the previously set 267 mt ABC.

### **Summary of SSC recommendations**

- 1. A thorough examination of the appropriate scientific and management responses to retrospective bias is warranted. This examination should be comprehensive and hypothesis driven.**
- 2. It is recommended that the approach of setting constant catch specifications be adopted formally as part of the SSCs control rules to account for scientific uncertainty.**
- 3. The SSC reaffirms its previous recommendation to allow the “Significant Change Working Group” to continue its work on developing a strawman control rule for empirically assessed stocks for Council review.**
- 4. The SSC recommends finding a way to formally provide information on indirect risks of catch advice to external stocks and their potential economic impacts.**
- 5. The appropriateness of the application of catchability assumptions for surveys other than the NMFS trawl survey should be investigated further before the next operational assessment process.**

- 6. Recommend investigating the use of an ensemble of information for setting catch advice in the future as this can often address multiple sources of uncertainty simultaneously and in a formulaic manner.**
- 7. It is recommended that an area swept biomass approach be investigated for future windowpane assessments.**
- 8. Recommend to the Council that they discuss the need for the SSC to develop catch advice for a stock that has a harvest prohibition on it (i.e. Atlantic wolfish).**
- 9. Recommend that the “PlanBsmooth” approach be simulation tested to answer questions about the assessment techniques stability and that other control rule options be investigated such as capping the proportional change from year to year when using this approach.**

Table 1. Summary of approaches used to develop ABC recommendations, changes from status quo ABCs and other notes. “(constant)” means the 2018 ABC recommendation remains unchanged for 2019 and 2020.

Stock	ABC Approach	Notes
GB cod	Plan-B smooth; OFL = recent catch x recent survey trend, ABC = 75%OFL (constant)	See detailed notes above
GOM cod	OFL = average of two FMSY projections from two models (m=0.2 and Mramp assuming M=0.4 in the projection), ABC=75%OFL (constant)	See detailed notes above
GB Haddock	75%FMSY projection which incorporates reduced growth and adjustments to selectivity for the large 2013 year class (constant)	2013 cohort believed to be better estimated so not adjusted
GOM Haddock	75%FMSY projection	New recreational dead discard estimate used
GB Yellowtail Flounder	Exploitation rate applied to average swept-area biomass estimates from three surveys (constant)	Dispensed with at Sept 2017 Council meeting
SNE/MA Yellowtail Flounder	Average of 75%FMSY projection and 75%OFL from plan-B smooth (constant)	See detailed notes above
CC/GOM Yellowtail Flounder	75%FMSY projection (constant)	See detailed notes above
American Plaice	75%FMSY projection	See detailed notes above
Witch Flounder	Exploitation rate applied to 3 year average swept-area biomass estimates using two surveys in each year (constant)	See detailed notes above
GB Winter Flounder	75%FMSY projection (constant)	See detailed notes above
GOM Winter Flounder	75%FMSY X 30+cm biomass from survey area swept	See detailed notes above; Incorporates new estimate of Q from the sweep experiment
SNE/MA Winter Flounder	Average of 3 years of catch	See detailed notes above
Acadian Redfish	75%FMSY projection	Used projected catch for 2017 & 2018 despite retrospective due to good stock status
White Hake	75%FMSY projection	ABC in 2018 - 2020 decrease from 2016 value
Pollock	75%FMSY projection (constant)	See detailed notes above
Northern Windowpane Flounder	75%FMSY × 3 year average kg/tow (constant)	See detailed notes above

Table 1 continued. Summary of approaches used to develop ABC recommendations, changes from status quo ABCs and other notes. “(constant)” means the 2018 ABC recommendation remains unchanged for 2019 and 2020.

<b>Stock</b>	<b>ABC Approach</b>	<b>Notes</b>
Southern Windowpane Flounder	75%FMSY × 3 year average kg/tow (constant)	See detailed notes above
Ocean Pout	75%FMSY × 3 year average kg/tow (constant)	Stock does not appear to be responding to catches << ABC
Atlantic Halibut-2015 SSC	75% × (2015 OFL + 6% for 5Y) (constant)	SSC conference call scheduled for Dec 18, 2017 to set specs
Wolffish	75%FMSY × 2016 exploitable biomass (constant)	See detailed notes above; Stock does not appear to be responding to catches << ABC

Table 2. OFL and ABC levels for the specification period of 2018 – 2020 for 19 groundfish stocks. The existing 2018 specification for Atlantic halibut is also included as a placeholder until this stock is reviewed in December 2017.

<b>Stock</b>	<b>OFL 2018</b>	<b>ABC 2018</b>	<b>OFL 2019</b>	<b>ABC 2019</b>	<b>OFL 2020</b>	<b>ABC 2020</b>
GB cod	3,047	2,285	3,047	2,285	3,047	2,285
GOM cod	938	703	938	703	938	703
GB Haddock	94,274	73,114	99,757	73,114	100,825	73,114
GOM Haddock	16,954	13,131	16,038	12,490	13,020	10,186
GB Yellowtail Flounder	unknown	300	unknown	300	-	-
SNE/MA Yellowtail Flounder	90	68	90	68	90	68
CC/GOM Yellowtail Flounder	662	511	736	511	848	511
American Plaice	2,260	1,732	2,099	1,609	1,945	1,492
Witch Flounder	unknown	993	unknown	993	unknown	993
GB Winter Flounder	1,083	855	1,182	855	1,756	855
GOM Winter Flounder	596	447	596	447	596	447
SNE/MA Winter Flounder	1,228	727	1,228	727	1,228	727
Acadian Redfish	15,451	11,552	15,640	11,785	15,852	11,942
White Hake	3,885	2,971	3,898	2,971	3,916	2,971
Pollock	51,680	40,172	53,940	40,172	57,240	40,172
Northern Windowpane Flounder	122	92	122	92	122	92
Southern Windowpane Flounder	631	473	631	473	631	473
Ocean Pout	169	127	169	127	169	127
<i>Atlantic Halibut- 2015 SSC</i>	<i>210</i>	<i>158</i>				
Wolffish	120	90	120	90	120	90