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MEMORANDUM

Date: 18 September 2019

To: Michael P. Luisi, Chairman, MAFMC

From: John Boreman, Ph.D., Chair, MAFMC Scientific and Statistical Committee

Subject: Report of the September 2019 SSC Meeting

The SSC met in Baltimore on the 9th, 10th, and 11th of September 2019 primarily to review (and perhaps modify) 2020 ABC recommendations previously developed for Summer Flounder and Spiny Dogfish, and to develop new ABC recommendations for Bluefish, Scup, and Black Sea Bass based on recently-completed and peer-reviewed operational assessments (Attachment 1). The SSC also discussed progress being made by the *Illex* Working Group, MAFMC research priorities, and SSC membership needs.

The SSC had at least 13 members present for the ABC recommendations, which constituted a quorum (Attachment 2). Also participating were Council members and staff, NEFSC staff, and representatives from the fishing industry. All documents referenced in this report can be accessed via the SSC's meeting website (http://www.mafmc.org/ssc-meetings/2019/september-9-11).

New OFL CV Decision Process

For the three species requiring new ABC specifications, the SSC followed the Council-approved guidance document developed by the SSC for assigning a coefficient of variation (CV) level to the estimate of the overfishing limit (OFL); the guidance document can be found at: http://www.mafmc.org/s/Tab06_SSC-OFL-CV-Guidelines_2019-06.pdf. This document describes the guidelines and process the SSC will use from now on when assigning an OFL CV value when the SSC makes ABC recommendations for Council-managed species. The intent of the document is to provide a clear, consistent, and transparent process that summarizes the SSC conclusions regarding the scientific uncertainty of the OFL estimate.

As part of the process outlined in the guidance document, draft OFL CV framework tables are developed by the SSC species lead, in consultation with the NEFSC stock assessment lead and Council staff. The draft tables are then reviewed and discussed with the OFL CV workgroup. The SSC species lead and workgroup develop a narrative summarizing the key findings based on the draft framework table and provide a draft, non-binding OFL CV recommendation for SSC consideration. The draft document developed by the SSC species lead and workgroup is then provided to the full SSC and posted as meeting materials in advance of the meeting in which ABC recommendations will be made. The general, non-binding criteria for each box in the OFL CV tables are provided in Attachment 3. Completed and SSC-approved OFL CV framework tables for Bluefish, Scup, and Black Sea Bass are provided as attachments 4, 5, and 6, respectively.

Bluefish

Tony Wood (NEFSC staff) presented a summary of the recently-completed and peer-reviewed operational assessment of Bluefish, followed by Matt Seeley (MAFMC staff), who summarized the management history and the fishery performance report recently updated by the Bluefish Advisory Panel. The operational assessment concluded that Bluefish were overfished in 2018 but overfishing was not occurring. The Bluefish stock has experienced a decline in spawning stock biomass (SSB) over the past decade, coinciding with an increasing trend in the fishing mortality rate. Spawning stock biomass (SSB) was estimated to be about 46% of the updated biomass target reference point, while fishing mortality on the fully selected age 2 fish in 2018 was 80% of the updated fishing mortality threshold reference point. As a result of the very low catch in 2018, fishing mortality was estimated below the reference point for the first time in the time series, possibly a result of lower availability; anecdotal evidence suggests larger Bluefish stayed offshore and inaccessible to most of the recreational fishery. Recruitment over the last decade has been below the time series average.

The SSC's responses to the terms of reference provided by the MAFMC (in *italics*) are as follows.

For Bluefish, the SSC will provide a written report that identifies the following for the 2020-2021 fishing years:

1) *The level of uncertainty that the SSC deems most appropriate for the information content of the most recent stock assessment, based on criteria listed in the Omnibus Amendment.*

    The SSC deems the assessment uncertainty level that requires an SSC-derived coefficient of variation (CV) for the OFL as the most appropriate for the 2019 operational assessment.

2) *For the approaches identified in TOR 3 below, if possible, the level of catch (in weight) associated with the overfishing limits (OFL) based on the maximum fishing mortality rate threshold or, if appropriate, an OFL proxy.*

    The OFL for 2019 is 15,373 mt.

    The OFL projections for 2020 and 2021 assume that the ABC will be caught. Determining OFL for 2020 and 2021 requires a decision on the uncertainty in the OFL so that the ABCs can be determined.

3) *The level of catch (in weight) and the probability of overfishing associated with the acceptable biological catch (ABC) for the stock including: 1) the typical approach of varying ABCs in each year, and 2) a constant ABC approach derived from the average 2020-2021 ABCs. Specify the number of fishing years for which the ABCs apply and, if possible, interim metrics that can be examined to determine if multi-year specifications need reconsideration prior to their expiration.*

The SSC recommends that a CV of 100% be applied to the OFL estimate as appropriate for calculating ABC for Bluefish (see Attachment 3). This OFL CV is an increase from the previously applied value of 60%. The chief uncertainty for Bluefish relates to patterns in the revised MRIP estimates. Bluefish are predominantly harvested by recreational anglers, who average 80% or so of landings. The new calibrated MRIP time series for Bluefish resulted in a substantial increase in catch that approximately follows a similar pattern as seen in the old survey. For both Black Sea Bass and Scup, the original and revised MRIP catches converge in the 1980s when the telephone survey was deemed reliable. Original and revised MRIP catch estimates for Bluefish do not converge in the 1980s, and this adds to the uncertainty in the catch time series. In addition, the importance of dead discards has increased for this stock over time. Because MRIP data is an important component of input data to the ASAP model, it adds to uncertainty in model projections.

Using an OFL with a lognormal distribution with a CV = 100% and a varying ABC approach, the SSC recommends the following OFLs and ABCs, based upon projections that assume the ABC will be fully caught in each year:

Year	OFL Total Catch	ABC Total Catch	ABC F	ABC P* value	B/B_{MSY}
2019	15,373	22,614	0.279	0.679	0.467
2020	14,956	6,603	0.078	0.163	0.516
2021	17,355	8,167	0.083	0.183	0.582

The average of the projected ABCs is 7,385 mt. These values were projected forward for 2020 and 2021, assuming the average value of the ABCs was landed. The SSC recommends the following OFLs and ABCs using a constant ABC approach:

Year	OFL Total Catch	ABC Total Catch	ABC F	ABC P* value	B/B_{MSY}
2019	15,373	22,614	0.279	0.679	0.467
2020	14,956	7,385	0.087	0.198	0.514
2021	17,228	7,385	0.075	0.154	0.579

Next year, the SSC will consider the following interim metrics: the extent to which the full 2019 ABC is caught and, if possible, the recreational CPUE, recreational catch, and dead discards.

4) *The most significant sources of scientific uncertainty associated with determination of OFL and ABC.*

In order of importance:

- The revised MRIP estimates are an important new source of uncertainty. In particular, the trend of the recreational catch estimates has an important influence on recent estimates of biomass and on the stock status estimates. The revised MRIP estimates had a different trend (relative to the old estimates) than was present for the other species reviewed. The pattern in the new MRIP data are an important source of uncertainty in determination of stock status and in short term projections.
- The increased importance of dead discards implies that the selectivity pattern in the fishery might be changing.
- A key source of uncertainty is whether the ABC will be caught.
- Uncertainty in the stock recruitment relationship adds to uncertainty in appropriate reference points (the use of the $F_{35\%}$ proxy).
- Approximately 60% of the population biomass is in the aggregated 6+ age group, for which there is relatively little information.
- The extent to which the MRIP index and MRIP catch are partially redundant in the assessment needs to be determined.
- Commercial discards are assumed to be insignificant, which may not be the case.

5) *Ecosystem considerations accounted for in the stock assessment, and any additional ecosystem considerations that the SSC considered in selecting the ABC, including the basis for those additional considerations.*

The SSC concluded that ecosystem considerations did not alter its evaluation of uncertainty in determining ABCs (see Attachment 3).

The 2015 benchmark stock assessment included ecosystem considerations:

- An index of habitat suitability was calculated based on a thermal niche model. It was fit as a covariate to survey catchability, but did not improve model fits.
- Diet compositions from multiple surveys were included as auxiliary information

6) *Prioritized research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendations and/or improve the assessment level*.

Arising from the operational assessment:

- A primary source of uncertainty is the recreational catch time series. The MRIP trend does not seem consistent with hypothesized reasons for differences between the mail and phone surveys. This historical correction to the MRIP estimates for Bluefish should be explored further to evaluate the causes of differences from other species and to consider their plausibility.
- Investigate whether and how the selectivity pattern in discards has changed over time, and how discard mortality has changed over time.
- Investigate reliability of the recreational CPUE: evaluate species associations with recreational angler trips targeting Bluefish to potentially modify the MRIP index used in the assessment.
- Investigate patterns and trends in recent recruitments.

Arising from the benchmark assessment:

- Develop a fishery independent index that better captures older, larger fish, which would reduce reliance on MRIP sampling.
- Long term environmental variability may have caused changes in the timing of the movement of juvenile Bluefish and the distribution of adults throughout the region that, in turn, may have affected availability.
- Changes in the selectivity of age-0 Bluefish in the survey relative to water column or surface temperature and date should be examined.
- Evaluate methods for integrating disparate indices produced at multiple spatial and temporal resolutions into a stock-wide assessment model, especially for a migratory species like Bluefish.
- Initiate fishery-dependent and fishery-independent sampling of offshore populations of Bluefish.

7) *The materials considered in reaching its recommendations.*

- Staff Memo: 2020-2021 Bluefish ABC recommendations
- 2019 Operational Assessment and Peer Review Panel Report: Monkfish, Bluefish, Black Sea Bass, Scup
- OFL/ABC Bluefish Stock Projections
- Draft Bluefish OFL CV Framework Discussion Table
- 60th SAW/SARC Assessment Summary Report (2015)
- 60th SAW/SARC Assessment Report (2015)
- 2019 Advisory Panel Bluefish Fishery Performance Report
- 2019 Bluefish Fishery Information Document

8) *A conclusion that the recommendations provided by the SSC are based on scientific information the SSC believes meets the applicable National Standard guidelines for best scientific information available.*

The SSC believes that the recommendations provided are based on scientific information that meets the applicable National Standard guidelines for best scientific information available.

Summer Flounder

The SSC developed ABC recommendations for the 2019-2021 fishing years during its February 2019 webinar, based on the recently-completed and peer-reviewed benchmark assessment (SAW/SARC-66). The SSC recently received a data update from the NEFSC, which was summarized by Kiley Dancy (MAFMC staff) at the meeting. The total catch of Summer Flounder in 2018 was the lowest since 1982. State and federal survey indices indicate that the aggregate stock size of Summer Flounder increased from 2017 to 2018 and that recruitment in 2018 was above average. Sampling of the commercial fishery in 2018 indicate that increased survival of Summer Flounder over the last two decades has allowed fish of both sexes to grow to the oldest ages estimated to date. Based on the information received, the SSC found no compelling reason to change its ABC recommendation for the 2020 fishing year (**11,354 mt**). An operational assessment is expected to be completed in 2021.

Scup

Mark Terceiro (NEFSC staff) presented an overview of the recently-completed and peer-reviewed operational assessment of Scup, followed by Karson Coutré (MAFMC staff), who summarized the management history and contents of the fishery performance report recently updated by the Summer Flounder, Scup, Black Sea Bass Advisory Panel. Scup were not overfished and overfishing was not occurring in 2018 relative to the biological reference points updated in the operational assessment. Spawning stock biomass (SSB) was estimated to be about two times the updated biomass target reference point in 2018, and the 2018 fishing mortality rate was 73% of the updated fishing mortality threshold reference point. The 2015 year class is estimated to be the largest in the time series, while the 2016-2018 year classes are estimated to be below average. Stock biomass is projected to further decrease toward the target unless more above-average year classes recruit to the stock in the short term.

The SSC's responses to the terms of reference provided by the MAFMC (in *italics*) are as follows.

For Scup, the SSC will provide a written report that identifies the following for the 2020-2021 fishing years:

1) *The level of uncertainty that the SSC deems most appropriate for the information content of the most recent stock assessment, based on criteria listed in the Omnibus Amendment.*

   The SSC determined that, based on the acceptance of the operational assessment by peer review panel, there is adequate basis to specify an OFL. The SSC determined the level of uncertainty of OFL in the assessment requires an SSC-specified CV.

2) *For the approaches identified in TOR 3 below, if possible, the level of catch (in weight) associated with the overfishing limits (OFL) based on the maximum fishing mortality rate threshold or, if appropriate, an OFL proxy.*

   OFL catch in 2019 is estimated at 21,350 mt. OFL catches in 2020 and 2021 are based on the assumptions that ABC will be caught in 2019 and 2020, respectively.

3) *The level of catch (in weight) and the probability of overfishing associated with the acceptable biological catch (ABC) for the stock including: 1) the typical approach of varying ABCs in each year, and 2) a constant ABC approach derived from the average 2020-2021 ABCs. Specify the number of fishing years for which the ABCs apply and, if possible, interim metrics that can be examined to determine if multi-year specifications need reconsideration prior to their expiration.*

   The SSC recommends that a CV of 60% be applied to the OFL estimate as an appropriate ABC for Scup. This decision largely comes from the high data quality and giving high weight to that OFL CV criterion, as well as consistency of signals from surveys, catch at age, and model results; the data agree with theory throughout. There is also a relatively low effect of revised MRIP estimates; only minor retrospective patterns in the statistical catch-at-age model; and the unlikelihood that additional adjustments (e.g., for ecological factors or below-average recruitment in the past two years) would increase uncertainty. Several surveys show declines or low abundance in early years to record lows in the mid-1990s and increases in abundance thereafter. Age structure in surveys shows a decline or low abundance of older ages in survey catches in early years and increases in abundance of older ages in recent years. Age structure in commercial landings-at-age and recreational landings-at-age show similar trends of increasing abundance of older ages in the stock. Several large recruitment events have been indicated by survey indices. In combination, these trends are consistent with lower fishing mortality rates in recent years, and increasing stock abundance as indicated by model results. Although up to 40% of the catch weight is attributable to the recreational fishery, the increase in recreational catch related to new MRIP estimates is relatively low in comparison to other stocks. There has been no obvious trend in recent recruitment, so adjustment of projected recruitment appeared unwarranted. There was no significant impact of thermal habitat on interannual variation in availability, so adjustment of survey indices to account for thermal habitat effects also appeared unwarranted.

ABCs are based on projections that assume the ABC will be fully caught in each year; recruitment is sampled from 1984-2018.

Using an OFL with a lognormal distribution with a CV = 60% and a varying ABC approach, the SSC recommends the following OFLs and ABCs based upon projections:

Year	OFL Total Catch	ABC Total Catch	ABC F	ABC P* value	B/B_{MSY}
2019	21,350	20,711	0.208	0.478	1.95
2020	18,674	16,227	0.185	0.400	1.75
2021	16,012	13,913	0.185	0.400	1.62

The average of the projected ABCs is 15,070 mt. These values were projected forward for 2020 and 2021, assuming the average value of the ABCs was landed. The SSC recommends the following OFLs and ABCs using a constant ABC approach:

Year	OFL Total Catch	ABC Total Catch	ABC F	ABC P* value	B/B_{MSY}
2019	21,350	20,711	0.208	0.478	1.95
2020	18,674	15,070	0.171	0.349	1.75
2021	16,159	15,070	0.200	0.450	1.63

Interim metrics to be evaluated next year would include updated landings and discard data to enable evaluation of the assumption that the full ABC was caught; survey indices, including identification of trends in recruitment; and fishery performance reports to evaluate whether the commercial sector is targeting Scup.

4) *The most significant sources of scientific uncertainty associated with determination of OFL and ABC.*

Based on the operational assessment:

- Following the record 2015 year class, recruitments in 2016, 2017, and 2018 have all been below the time series mean. If this trend continues, short-term projections, which assume random values from the recruitment distribution over the 1984-2018 time series, may overestimate allowable catches absent additional high recruitments. However, the stock is currently above the target level, so reduction back to the target biomass would be expected.
- The Scup SCAA uses multiple selectivity blocks. The final selectivity block (2006-2018) is the longest in the model. The applicability of the most recent selectivity block to the current fishery condition is uncertain. If the fishery

selectivity implied in this block changes, estimates of stock number, spawning stock biomass, and fishing mortality become less reliable.

- Most of the fishery-independent indices used in the model provide estimates of the abundance of Scup < age 3. One consequence is that much of the information on the dynamics of Scup of older ages arise largely from the fishery catch-at-age and from assumptions of the model, and are not conditioned on fishery-independent observations. As a result, the dynamics of these older fish remain uncertain. Knowledge of the dynamics of these older age classes will become more important as the age structure continues to expand.
- The projection on which the ABC was determined is based on an assumption that the quotas would be landed in 2019, 2020, and 2021.

Based on the benchmark assessment:

- Uncertainty exists with respect to the assumed natural mortality rate (M) used in the assessment.
- Uncertainty exists as to whether the MSY proxies ($SSB_{40\%}$, $F_{40\%}$) selected and their precisions are appropriate for this stock.
- Survey indices are particularly sensitive to Scup availability, which results in high inter-annual variability – efforts were made to address this question in the SAW/SARC that should be continued

5) *Ecosystem considerations accounted for in the stock assessment, and any additional ecosystem considerations that the SSC considered in selecting the ABC, including the basis for those additional considerations.*

The ABCs were not modified based on ecosystem considerations. The benchmark stock assessment included ecosystems considerations, specifically efforts to estimate habitat suitability based on a thermal niche model that was fit to survey catchability, but this did not affect uncertainty in OFL CV.

6) *Prioritized research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendations and/or improve the assessment level.*

Based on the operational assessment:

- Characterize the pattern of selectivity for older ages of Scup in both surveys and fisheries.
- Explore the applicability of the pattern of fishery selectivity in the model to the most recent catch data to determine whether a new selectivity block in the model is warranted.
- Mean weights-at-age have declined and age-at-maturity has increased slightly (the proportion mature at age 2 has decreased) in recent years. Continued monitoring of both is warranted.
- It was conjectured that the increase in stock biomass since 2000 resulted from increased recruitments due to the imposition of gear restriction areas (GRAs), to

minimize interactions between Scup and squid fisheries, and from increases in commercial mesh sizes. Long-term climate variation is a potential alternative explanation for increased recruitments from 2000 to 2015. Research to explore the validity of both hypotheses is warranted.

Based on the benchmark assessment:

- Improve estimates of discards and discard mortality for commercial and recreational fisheries.
- Evaluate the degree of bias in the catch, particularly the commercial catch.
- Conduct experiments to estimate catchability of Scup in NEFSC surveys.
- Explore the utility of incorporating ecological relationships, predation, and oceanic events that influence Scup population size on the continental shelf and its availability to resource surveys used in the stock assessment model.
- Explore additional source of age-length data from historical surveys to inform the early part of the time series, providing additional context for model results.
- An MSE could evaluate the effectiveness of Scup management procedures.

7) *The materials considered in reaching its recommendations.*

- Staff Memo: 2020-2021 Scup ABC recommendations
- 2019 Operational Assessment and Peer Review Panel Report: Monkfish, Bluefish, Black Sea Bass, Scup
- OFL/ABC Scup Stock Projections
- Draft Scup OFL CV Framework Discussion Table
- 60th SAW/SARC Assessment Summary Report (2015)
- 60th SAW/SARC Assessment Report (2015)
- 2019 Advisory Panel Fishery Performance Report
- 2019 Scup Fishery Information Document

8) *A conclusion that the recommendations provided by the SSC are based on scientific information the SSC believes meets the applicable National Standard guidelines for best scientific information available.*

The SSC believes that the recommendations provided are based on scientific information that meets the applicable National Standard guidelines for best scientific information available.

Spiny Dogfish

Jason Didden (MAFMC staff) summarized the recent data update for Spiny Dogfish prepared by the NEFSC. US commercial landings decreased 22% in 2018 and recreational landings and distant water fleet landings remained negligible. Canadian landings have been less than 100 tons since 2009. Overall landings in 2018 were dominated by females, a trend that has persisted since the US EEZ fishery began; most fishing takes place near shore where females are more abundant. The fraction of male dogfish in the landings increased in 2018 to about 10%. The three-year average of the mature female swept area biomass in the NEFSC spring survey decreased in 2019 because the high 2016 value in the average was replaced by the lower survey biomass estimate from 2019. The average is still above the biomass threshold and it would take a value lower than 24,400 mt in 2020 to cause an overfished condition next year. The 2019 data update indicates little evidence to suggest that stock condition has changed substantially from what was indicated in the 2018 benchmark assessment; therefore, the SSC decided not to change its ABC recommendation for the 2020 fishing year (**11,354 mt**). An operational assessment is expected to be completed in 2021.

Black Sea Bass

Gary Shepherd (NEFSC staff) presented an overview of the recently-completed and peer-reviewed operational assessment of Black Sea Bass, followed by Julia Beaty (MAFMC staff), who summarized the management history and contents of the fishery performance report recently updated by the Summer Flounder, Scup, Black Sea Bass Advisory Panel. The Black Sea Bass stock was not overfished and overfishing was not occurring in 2018 relative to the updated biological reference points. Spawning stock biomass (retrospectively-adjusted SSB) was estimated to be about 2.4 times the updated biomass target reference point, and the fishing mortality rate on the fully-selected ages 6-7 fish was 57% of the updated fishing mortality threshold reference point after adjusting for retrospective biases. The 2011 year class was estimated to be the largest in the time series and the 2015 year class was the second largest. Recruitment of the 2017 year class as age 1 in 2018 was estimated to have been well below average.

The SSC's responses to the terms of reference provided by the MAFMC (in *italics*) are as follows.

For Black Sea Bass, the SSC will provide a written report that identifies the following for fishing years 2017-2019:

1) The level of uncertainty that the SSC deems most appropriate for the information content of the most recent stock assessment, based on criteria listed in the Omnibus Amendment.

> The SSC determined that, based on the acceptance of the operational assessment by peer review panel, there is adequate basis to specify an OFL. The SSC determined the level of uncertainty of OFL in the assessment requires an SSC-specified CV.

2) For the approaches identified in TOR 3 below, if possible, the level of catch (in weight) associated with the overfishing limits (OFL) based on the maximum fishing mortality rate threshold or, if appropriate, an OFL proxy;

The SSC accepts the updated OFL proxy ($F_{40\%}$ = 0.46) used in the 2019 operational assessment. OFL catch in 2019 is estimated at 9,859 mt. OFL catches in 2020 and 2021 are based on the assumption that ABCs will be caught in 2019 and 2020, respectively.

3) The level of catch (in weight) and the probability of overfishing associated with the acceptable biological catch (ABC) for the stock including: 1) the typical approach of varying ABCs in each year, and 2) a constant ABC approach derived from the average 2020-2021 ABCs. Specify the number of fishing years for which the ABCs apply and, if possible, interim metrics that can be examined to determine if multi-year specifications need reconsideration prior to their expiration

The SSC recommends using a CV associated with the OFL of 100%. Classifications for the different decision criteria ranged from the 60% bin to the 150% (Attachment 6). Our overall classification in the 100% bin is based largely on the following observations:

- There is a strong retrospective bias present in the assessment results and this pattern differs between the two spatial sub-areas.
- The fishery has a large recreational component (~60 - 80% of total harvest in recent years), and thus a substantial reliance on MRIP. Updated MRIP numbers differ substantially from the old estimates, and the updated estimate for one year (2016) was considered implausible owing to high variance in wave-specific data.
- Spatially explicit models were implemented in the 2016 benchmark assessment, and there were detailed efforts to explore the consequences of the misspecification of the spatial resolution of these models on perceptions of stock status.
- There were broadly consistent patterns in the fishery independent indices.

The SSC also notes that the assessment included a thorough analysis of the particulars of the life history of Black Sea Bass and, thus, recommends that no additional buffer for an atypical life history is necessary.

Using an OFL with a lognormal distribution with a CV = 100% and a <u>varying</u> ABC approach, the SSC recommends the following OFLs and ABCs based upon projections:

Year	OFL Total Catch	ABC Total Catch	ABC F	ABC P* value	B/B_{MSY}
2019	9,859	7,917	0.33	0.39	1.96
2020	8,795	7,123	0.34	0.40	1.71
2021	8,083	6,546	0.36	0.40	1.61

The average of the projected ABCs is 6,835 mt. These values were projected forward for 2020 and 2021, assuming the average value of the ABCs was landed. The SSC recommends the following OFLs and ABCs using a constant ABC approach:

Year	OFL Total Catch	ABC Total Catch	ABC F	ABC P* value	B/B_{MSY}
2019	9,859	7,917	0.33	0.39	1.96
2020	8,795	6,835	0.30	0.38	1.68
2021	8,083	6,835	0.33	0.42	1.58

The SSC notes that the ABCs given above assume that the catch will be equal to the ABC each year, without error. If the actual catches moving forward do not meet this assumption, the SSC may have to reconsider the values given in the table.

Next year, the SSC will use the following interim metrics to determine if the ABC specification needs to be reconsidered:

- Estimated actual recreational and commercial catch levels
- Survey indices by subareas looking for continued evidence of divergence
- Evaluate patterns in MRIP in each sub-area for further departures from expectation

4) The most significant sources of scientific uncertainty associated with determination of OFL and ABC.

- The retrospective pattern was large enough to need the corrections (outside the 90% confidence intervals), and the additional uncertainty caused by applying the correction is unclear. The model for the northern sub-area has a larger retrospective pattern than the model for the southern sub-area.
- The natural mortality rate (M) used in the assessment — because of the unusual life history strategy the current assumption of a constant M in the assessment model for both sexes — may not adequately capture the dynamics in M.
- The spatial distribution of productivity within the stock range.
- The level, temporal pattern, and spatial distribution of recreational catches.
- The nature of exchanges between the spatial regions defined in the assessment model.
- The extent to which the spatial structure imposed reflects the dynamics within the stock. The combination of the values from the northern and southern sub-areas is done without weighting based on landings or biomass. It is unclear whether or how the uncertainty should be treated when the BRPs are combined using simple addition.
- Future effects of temperature on stock productivity and range are highly uncertain.

5) Ecosystem considerations accounted for in the stock assessment, and any additional ecosystem considerations that the SSC took into account in selecting the ABC, including the basis for those additional considerations.

The recent operational assessment did not undertake any new analyses to explore potential additional ecosystem impacts on OFL. The SSC also considered the Free et al. (2019) paper that suggests that Black Sea Bass productivity has thus far increased with warming. No additional ecosystem considerations were included in the determination of ABC.

The 2016 benchmark assessment included different dynamics for each spatial sub-area to address observed differences in productivity. The assessment also explored the role of benthic habitat, temperature, depth, and salinity as explanatory factors on exchange rates (which did not provide additional explanatory power and were not included in the assessment).

6) Prioritized research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendation and/or improve the assessment level.

The SSC endorses the list of research recommendations included in the 62nd SARC report.

In addition, the SSC recommends:

- Considering a directed study of the genetic structure in the population north of Cape Hatteras.
- Increasing our understanding of movement rates and cues within the population, and spatial patterns in growth, recruitment, and mortality.
- Developing a reliable fishery independent index for Black Sea Bass beyond the existing surveys. This may require development and implementation of a new survey.
- Additional monitoring and compliance investments to control ABCs at recommended levels that are necessary if predicted scientific outcomes for future stock biomasses are to be realized.
- Evaluating the implications of range expansion to stock and fishery dynamics.
- Understanding the importance of recruitment variability, given the role of individual, strong year classes in the dynamics of the population and the fisheries it supports.
- Evaluating evidence for increased production due to climate shift.

7) The materials considered in reaching its recommendations.

- Staff Memo: 2020-2021 Black Sea Bass ABC recommendations
- 2019 Operational Assessment and Peer Review Panel Report: Monkfish, Bluefish, Black Sea Bass, Scup
- OFL/ABC Black Sea Bass Stock Projections, revised 8/27/19

- Draft Black Sea Bass OFL CV Framework Discussion Table
- 62nd SAW/SARC Assessment Summary Report (2016)
- 62nd SAW/SARC Black Sea Bass Assessment Report
- 2019 Advisory Panel Fishery Performance Report
- 2019 Black Sea Bass Fishery Information Document
- Impacts of historical warming on marine fisheries production (Free et. al. 2019)

8) A certification that the recommendations provided by the SSC represent the best scientific information available.

The SSC believes that the recommendations provided are based on scientific information that meets the applicable National Standard guidelines for best scientific information available.

Illex Working Group

Jason Didden (MAFMC staff) provided an overview of the *Illex* Working Group, including draft terms of reference; Jason and Paul Rago (SSC member) co-chair the working group. The overview centered on several themes, including the difficulty of the task, the importance of assembling all potential data sources, and deep engagement with fishery participants. The potential reliance on catch-per-unit-effort (CPUE) information and the impact of market conditions on fishery performance make engagement with fishery participants particularly critical to increase the chance of working group success. Periodic input by the Mackerel, Squid, Butterfish Advisory Panel input may not be sufficient to achieve deep engagement. The full range of stakeholders with interests in the *Illex* fishery should be included.

The working group is organizing its efforts based on shorter-term and longer-term tasks. The shorter-term tasks are designed to explore information that could inform SSC catch advice for in-year adjustments starting at the May 2020 SSC meeting. Longer-term tasks are designed to inform an upcoming benchmark assessment scheduled for 2021. Staff acknowledged the SSC's concern that this timeline is ambitious, potentially unrealistic, and dependent on the resources committed to the effort. SSC members highlighted the need to clearly lay out the various goals, and clearly identify what data and approaches can be brought to bear related to the goals.

SSC members raised a variety of ideas for consideration by the working group:

- A management strategy evaluation (MSE) looking at various management procedures should be considered given the uncertainties involved.
- Simple models or power analyses that attempt to track cohorts with fishery-dependent data or determine what would be needed to detect useful abundance indicators could be used.
- Managers need to be sure that the management system and associated processes can handle possible in-season adjustments, and that the costs of a new system are justified by the potential benefits.

- The data flow component of any real-time approach will be as important as the management and modeling approaches.
- Seeing simple as well as complex approaches would be useful; for example, depletion models like the Falkland Islands approach (migration makes these challenging).
- The Council should further explore what kind of flexibility is allowed in the Magnuson-Stevens Act.
- The utility of an experimental fishery or research set-aside should be explored.
- Intermediate analyses may be useful, such as examining if there is a general apparent lack of depletion throughout the various fishing years.

There was also a discussion that the working group was not a direct charge to the SSC at this point, but the SSC would be reviewing the output of the working group.

Public participants attending the meeting indicated that fishery participants are extremely willing to contribute ideas, data, and some vessel time to assist in development of approaches that allow additional utilization of *Illex* during high availability years. They also highlighted that fishery participants are the only ones that have access to substantial information (biological and economic) about the *Illex* fishery during the fishing season, and reaffirmed the discussion regarding the need for deep engagement with fishery participants (harvesters <u>and</u> processors). There is also interest in continuing to explore whether NAFO/Canadian assessments can be used to justify higher or additional U.S. quotas. Skepticism about the usefulness of MSEs was also voiced.

Five-Year (2020-2024) Research Priorities

Brandon Muffley (MAFMC staff) provided an overview on the current status and development of the Council's five-year research priorities document. At the request of the SSC during their March 2019 meeting, a review on the Council's utilization of the current research priorities document was also provided. The review indicated a high proportion of Council-supported scientific and management projects were identified in the current research plan and were used to support a stock assessment or management action.

The SSC offered extensive feedback on the broad science and research themes to be highlighted in the next priorities document. The SSC indicated all of the existing themes, except for data collection through electronic reporting, remain very relevant and should continue to be considered high priority. The SSC viewed the strength of the Council's research program lies in the ability to catalyze efforts of others through collaborative research and matching funds. In addition, new themes focusing on climate change implications on stock productivity and distribution and addressing recreational data collection were recommended for inclusion. The SSC also recommended prioritizing the species- and FMP-specific needs by shorter-term/lower cost vs longer-term/higher cost projects to allow for both tactical and strategic approaches in order to leverage resources and address the extensive list of priorities. The SSC saw a need for vigilant oversight of the Council's research, perhaps by the Council's Research Steering Committee, to make sure it is coherent and addressing the Council's strategic plan. Feedback from the SSC will be incorporated into the draft 2020-2024 research priorities document and in the Science goal of the updated strategic plan.

Future SSC Membership

The SSC also discussed future SSC membership needs and expertise. Earlier in 2019, the Council re-appointed 16 existing members of the SSC to another three-year term, leaving four vacancies on the SSC. The Council is seeking to align new SSC membership and expertise with future Council needs and priorities. The SSC had a lengthy discussion regarding increased social science membership and the appropriate utilization of this increased expertise. There was broad support for increased social science membership; however, the SSC believes the Council needs to define role that the social sciences would play in addressing Council needs in order to appropriately identify expertise and expectations.

Other areas of additional expertise and needs noted by the SSC include stock assessment science, fisheries ecology and life history with expertise in data-limited methods, ecosystem science with expertise in stock structure or genetics, recreational fisheries and data collection, and operations research expertise in management strategies and optimization. The SSC also suggested reinstituting the appointment of a Council member to serve as a liaison between the Council and SSC; the Council Vice-chair responded by stating that he and the Council Chair are filling that role. The Council will determine membership needs and expertise at their December meeting and new members will be selected in order to begin with participation on the SSC in March of 2020.

c: SSC Members, Warren Elliott, Chris Moore, Brandon Muffley, Matt Seeley, Kiley Dancy, Karson Coutré, Jason Didden, Julia Beaty, Tony Wood, Mark Terceiro, Kathy Sosebee, Gary Shepherd, Jan Saunders

Mid-Atlantic Fishery Management Council

Scientific and Statistical Committee Meeting

September 9 - 11, 2019

Royal Sonesta Harbor Place

550 Light Street, Baltimore, MD, 21202

AGENDA

Monday, September 9, 2019

1:00 Welcome/Overview of meeting agenda (J. Boreman)

1:10 Bluefish ABC specifications for 2020-2021 fishing years (T. Wood/M. Seeley)

4:00 Summer Flounder data and fishery update; review of previously recommended 2020 ABC (K. Dancy)

5:00 Adjourn

Tuesday, September 10, 2019

8:30 Scup ABC specifications for 2020-2021 fishing years (M. Terceiro/K. Coutré)

11:30 Spiny Dogfish data and fishery update; review of previously recommended 2020 ABC (J. Didden)

12:30 Lunch

1:30 Black Sea Bass ABC specifications for 2020-2021 fishing years (G. Shepherd/J. Beaty)

4:30 *Illex* workgroup update and feedback

5:30 Adjourn

Wednesday, September 11, 2019

8:30 Review and input on 5-year (2020-2024) research plan

10:00 Review and discussion on future SSC membership

11:30 Other business

12:00 Adjourn

Attachment 2

MAFMC Scientific and Statistical Committee
9-11 September 2019

Meeting Attendance

Name	Affiliation
SSC Members in Attendance:	
John Boreman (SSC Chairman)	NOAA Fisheries (retired)
Tom Miller (SSC Vice-Chairman)	University of Maryland – CBL
Ed Houde	University of Maryland – CBL (emeritus)
Dave Secor (September 9th and 10th only)	University of Maryland – CBL
Paul Rago	NOAA Fisheries (retired)
Wendy Gabriel	NOAA Fisheries Northeast Fisheries Science Center
Lee Anderson	University of Delaware (emeritus)
Yan Jiao	Virginia Tech University
Rob Latour	VIMS
Brian Rothschild	University of Massachusetts – Dartmouth (emeritus)
Olaf Jensen	Rutgers University
Sarah Gaichas	NOAA Fisheries Northeast Fisheries Science Center
Cynthia Jones (via webinar, September 9th only)	Old Dominion University
Mike Wilberg	University of Maryland – CBL
Others in attendance:	
Kiley Dancy (September 9th and 10th only)	MAFMC staff
Matt Seeley (September 9th only)	MAFMC staff
Jason Didden (September 9th and 10th only)	MAFMC staff
Karson Coutré (September 9th and 10th only)	MAFMC staff
Julia Beaty (September 10th only)	MAFMC staff
Brandon Muffley	MAFMC staff
Emily Gilbert (September 9th and 10th only)	NOAA Fisheries GARFO
Tony Wood (via webinar, September 9th only)	NOAA Fisheries Northeast Fisheries Science Center
Mark Terceiro (via webinar, September 9th and 10th only)	NOAA Fisheries Northeast Fisheries Science Center
Gary Shepherd (via webinar, September 10th only)	NOAA Fisheries Northeast Fisheries Science Center
Kathy Sosebee (via webinar, September 10th only)	NOAA Fisheries Northeast Fisheries Science Center
Dustin Colson Leaning (September 9th and 10th only)	ASMFC staff
Kirby Rootes-Murdy (September 9th only)	ASFMC staff
Caitlin Stark (September 10th only)	ASMFC staff
Mike Luisi (September 9th and 10th only)	MAFMC Chair
Warren Elliott	MAFMC Vice-Chair
Meghan Lapp	SeaFreeze
Greg DiDomenico (September 10th only)	GSSA
Jim Ruhle (September 10th only)	

OFL CV Decision Table Criteria

Decision Criteria	Default OFL CV=60%	Default OFL CV=100%	Default OFL CV=150%
Data quality	One or more synoptic surveys over stock area for multiple years. High quality monitoring of landings size and age composition. Long term, precise monitoring of discards. Landings estimates highly accurate.	Low precision synoptic surveys or one or more regional surveys which lack coherency in trend. Age and/or length data available with uncertain quality. Lacking or imprecise discard estimates. Moderate accuracy of landings estimates.	No reliable abundance indices. Catch estimates are unreliable. No age and/or length data available or highly uncertain. Natural mortality rates are unknown or suspected to be highly variable. Incomplete landings estimates.
Model appropriateness and identification process	Multiple differently structured models agree on outputs; many sensitivities explored. Model appropriately captures/considers species life history and spatial/stock structure (e.g. black sea bass).	Single model structure with many parameter sensitivities explored.	Highly divergent outputs from multiple models or no exploration of alternative model structures or sensitivities.
Retrospective analysis	No retrospective adjustment necessary, or OFL estimate includes retrospective adjustment.	OFL estimate includes retrospective adjustment only if outside 95% bounds of non-adjusted terminal B and F.	No retrospective analysis or severe retrospective pattern observed.
Comparison with empirical measures or simpler analyses	Assessment biomass and/or fishing mortality estimates compare favorably with empirical estimates.	Both assessment biomass and/or fishing mortality empirical estimates highly uncertain.	Estimates of scale are difficult to reconcile and/or no empirical estimates.
Ecosystem factors accounted	Assessment considered habitat and ecosystem effects on stock productivity, distribution, mortality and quantitatively included appropriate factors, reducing uncertainty in short term predictions. Evidence outside the assessment suggests that ecosystem productivity and habitat quality are stable. Comparable species in the region have synchronous production characteristics and stable short-term predictions. Climate vulnerability analysis suggests positive impacts on productivity from changing climate	Assessment considered habitat/ecosystem factors but did not demonstrate either reduced or inflated short-term prediction uncertainty based on these factors. Evidence outside the assessment suggests that ecosystem productivity and habitat quality are variable, with mixed productivity and uncertainty signals among comparable species in the region. Climate vulnerability analysis suggests neutral impacts on productivity from changing climate.	Assessment either demonstrated that including appropriate ecosystem/habitat factors increases short-term prediction uncertainty, or did not consider habitat and ecosystem factors. Evidence outside the assessment suggests that ecosystem productivity and habitat quality variable and degrading. Comparable species in the region have high uncertainty in short term predictions. Climate vulnerability analysis suggests negative impacts on productivity from changing climate.
Trend in recruitment	OFL estimates adjusted for recent trends in recruitment.	No recruitment trend or uncertain. Insufficient evidence to adjust OFL estimate based on recruitment information available.	Recruitment trend not considered or no recruitment estimate.
Prediction error	Low estimate of recent prediction error	Moderate estimate of recent prediction error	High or no estimate of recent prediction error
Assessment accuracy under different fishing pressures	High degree of contrast in landings and surveys with apparent response in indices to changes in removals. Observed high fishing mortality in recent years.	Moderate contrast in surveys and catches. "One-way" trips for production models. Observed moderate fishing mortality in fishery (i.e. lack of high fishing mortality in recent years).	Relatively little change in surveys or catches over time. Low precision of estimates. Low fishing mortality in recent years.
Simulation analysis/MSE	Can be used to evaluate different combinations of uncertainties and indicate the most appropriate OFL CV for a particular stock assessment		

SSC-Approved OFL CV Decision Table for Bluefish

Decision Criteria	Default OFL CV=60%	Default OFL CV=100%	Default OFL CV=150%
Data quality		A fishery-dependent measure of abundance is obtained as catch-per-unit effort from the MRIP intercept survey (1985-2018), which constitutes a large component of data (recreational catch = 80% of total). Newly revised historical MRIP catch estimates were used in assessment. The new estimates scale up the entire MRIP catch series instead of converging in the 1980s as expected. NEFSC fall survey data are available for all years (except fall 2017 Bigelow) in the assessment. These surveys do not cover the southern portion of the species range. Additionally, six regional surveys are used in model tuning. Bigelow estimates adjusted for results of cooperative research studies on gear efficiency. Age data available for all years in surveys (1982-2017), and age-length keys from surveys were applied to commercial landings and recreational landings. Lengths of recreational discards were obtained through angler self-reporting from the Volunteer Angler Survey and minimal information from MRIP. Commercial discards are low, considered negligible and not include in analysis. Recreational discards are high at approximately 50% of the recreational landings and add a level of uncertainty. The MRIP calibration for live discards converges as expected in the 1980s to the MRFSS values, unlike the calibrated catch time series. Note also that recent discards are larger fish. Live discards are assumed to have a 0.15 mortality rate.	
Model appropriateness and identification process		A complex ASAP SCAA model was used with fixed M = 0.2 was used in the assessment model. The fishery is modeled with two fleets: commercial and recreational. The benchmark assessment authors tested several configurations of the ASAP SCAA before the current configuration was accepted. The model is strongly driven by the MRIP index. YPR and AGEPRO models were also used to assess BRP and projections.	
Retrospective analysis		Retrospective patterns in the operational assessment are considered minor, with retrospective errors over the last 7 terminal years averaging -18% for F and +19% for SSB. The SARC 60 benchmark and subsequent updates showed similar trends for SSB, F, and recruitment. Moreover, as the assessment has been updated more of the time series shows overfishing with the retrospective patterns, indicating that the stock has been overfished with overfishing occurring over the past five years. New calibrated MRIP data resulted in a rescaling of SSB, F, and R to higher estimates compared with old data.	

Comparison with empirical measures or simpler analyses		Simple measures of comparison were used for age compositions and weight-at-age.	
Ecosystem factors accounted		Aspects of the ecosystem seem to be changing in recent years. Fall ocean bottom and surface temperatures are increasing, and salinity is at or near the historical high. These physical data series may have shifted around 2012, the warmest year on record for this ecosystem. Spring chlorophyll concentrations, a measure of bottom-up ecosystem production in the Bluefish stock area, are variable, but the fall time series has been decreasing, especially during 2013-2017. Spring abundances for key zooplankton prey are variable and may be worth examining along with other forage species. Bluefish have two recruitment contingents, one in spring and one in fall, and both could be affected by changing abundances of forage. The benchmark assessment used a thermal niche model to assess survey catchability of Bluefish.	
Trend in recruitment		Average recruitment from 1985 to 2018 is 46 million fish at age 0 with no real trend over time. Recruitment has been approximately 15% below average over the last decade, except in 2013. Overall recruitment is variable; the highest recruitment occurred in 1989 and the lowest in 1992, with an average recruitment of 46,159,000 age 0 fish.	
Prediction error		Prior to the 2015 benchmark, comparisons of annual forecasts of stock biomass with realized estimates of stock biomass in subsequent assessments reveal a one-year ahead forecasting error with a CV=14%. For two-year forecasts the CV is 26%, and for 3 year forecasts the CV is also 26%. The average percentage difference between the projection and the subsequent estimate for 1, 2, and 3-yr projections was +12%, +23% and +24%, respectively. Inclusion of the revised MRIP data increased the population scale proportionately through the entire time series, rendering prediction comparisons less useful as a metric of model performance. Moreover, the MRIP calibration results in different patterns across the species that rely on this measure, hence increasing uncertainty. Finally, the mode of fishing shows a trend to increasing shore fishing in the most recent years.	
Assessment accuracy under different fishing pressures	Fishing mortality has varied over a 3-fold range during the assessment period, with a major decline in 2018 that may be dependent on the MRIP recalibration. Over the past decade F has fluctuated around the series average of F = 0.35, except for the dramatic decline in 2018 to F = 0.15. Recent Fs have been relatively high, resulting in better data contrast for modeling.		
Simulation analysis/MSE	No formal MSE-type analyses have been conducted for this stock.		

SSC-Approved OFL CV Decision Table for Scup

Decision Criteria	Default OFL CV=60%	Default OFL CV=100%	Default OFL CV=150%
Data quality	Synoptic surveys over the stock area include the NEFSC spring and autumn bottom trawl surveys, but these surveys show large interannual fluctuations which reflect availability rather than abundance in any single year. Surveys generally rarely catch fish age three and older (less of a concern now than 10-15 years ago), although older ages are present in commercial and recreational catch at ages. Other surveys do not cover the stock area, and most catch few fish over age 2. Commercial landings have been well sampled for length and age since 1995. Commercial discards have been fairly well sampled since 2000, although discard observations are highly variable and skewed. New MRIP data were used to estimate recreational landings and discards, leading to an average increase of 18%. About 40% of the catch weight is based on new MRIP estimates. Length sampling of recreational landings has generally been adequate since 1988. Recreational discard is low. Recreational landings are up to half of total catch, not the dominant component.		
Model appropriateness and identification process		The assessment model is based on a complex statistical catch-at-age model (ASAP SCAA). Catch is modelled as four fleets (commercial and recreational landings and discards). Life history does not require special model efforts. About 25 different configurations were explored in earlier benchmark. The effect of new MRIP estimates on continued validity of prior sensitivity analyses depends on the magnitude of the change. Because proportion of landings attributable to new MRIP estimates is relatively low, we could expect sensitivity analyses to remain valid. Biological reference points were updated in the operational assessment.	
Retrospective analysis	Retrospective patterns were minor: F overestimated by 26% and SSB underestimated by 11% over the last 7 terminal years. Adjusted 2018 estimates were within the model-estimated 90% confidence intervals. General trends in retrospective patterns for SSB, R, and F have been consistent for the past 10 years.		
Comparison with empirical measures or		Age structure in fishery and survey catches has been expanding since the	

simpler analyses		1990s. Aggregate survey indices are near time series highs. Several large recruitment events likely gave rise to survey index highs. Given the potential effects of availability in any given year, swept area estimates of biomass are less reliable than for some other stocks.	
Ecosystem factors accounted		No ecosystem factors were considered in the assessment, but mean weights at age and maturity have been declining. Previous assessments examined thermal habitat models to evaluate factors affecting availability, but no strong effects were observed.	
Trend in recruitment		Although the 2014 and especially the 2015 year classes were above average, 2016 – 2018 year classes were below average. OFL projections were sampled from estimated recruitment for 1984-2018.	
Prediction error		No estimate of prediction error is feasible at this point, given the inclusion of revised MRIP data in this year's assessment and attendant effects on biomass estimates. However, inclusion of the updated MRIP data led to relatively little changes in estimates of F and SSB of Scup, so prediction error is unlikely to increase.	
Assessment accuracy under different fishing pressures	Fishing mortality declined by more than 4-fold over the assessment series, while SSB increased more than 10-fold. Fishing mortality in the past 16 years has been low, but increases in SSB, R, C, and survey indices are consistent.		
Simulation analysis/MSE	No formal MSE-type analyses have been conducted for this stock.		

SSC-Approved OFL CV Decision Table for Black Sea Bass

Decision Criteria	Default OFL CV=60%	Default OFL CV=100%	Default OFL CV=150%
Data quality		Large recreational component (~60-80% of total in recent years) places reliance on MRIP. Updated MRIP numbers show an understandable pattern of large increases in northern sub-area in recent years, but less so in the south. MRIP data for 2016 are considered implausible owing to high variance in wave-specific data, but attempts to account for this observation did not materially affect model results. Fishery-independent data are derived from both NEFSC and state surveys. NEFSC surveys provide coverage of all ages. State surveys in the northern portion of the Mid-Atlantic provide estimates of all ages, but state surveys in the southern sub-area index age-1 fish only, requiring use of a Recreational Catch Per Angler (CPA) index.	
Model appropriateness and identification process	BSB uses a two-area model for assessment, with no exchange between sub-areas (North/South). A range of alternative model structures were presented at SAW 62, including a single area model, and a two-area model with exchange. Most of this wide range of different models give qualitatively similar conclusions about stock status and trends. The two-area model responds to presence of a dominant 2011 year class in the northern sub-area but not in the southern. Adoption of the two sub-area model greatly improved model fit, especially of the 2011 year class data. Growth rates are different between sub-areas as well. However, the division of the stock into two sub-areas was based on exchange and stock structure with limited support in the ecological literature: tagging data, oceanographic data, and a need to have a relatively equitable division of available data.		
Retrospective analysis			Substantial retrospective bias in both northern and southern sub-areas is present in the 2019 operational assessment (Mohn's $\rho > 0.4$) – although the direction of bias is in opposite directions in the two sub-areas. Retrospectively adjusted SSB is approximately 40-50% higher than unadjusted, but

			adjustments do not change stock status. This pattern was also present in SAW 62.
Comparison with empirical measures or simpler analyses	The relationship between the recreational CPA index and a swept area index of exploitable biomass from the NESFC spring survey was presented at the 2019 operational assessment, as a part of a "Plan B" approach. The swept-area estimate was coherent and broadly consistent with model output.		
Ecosystem factors accounted		No ecosystem factors were considered in the assessment. Clear northward shift in the stock's geographic distribution suggests an influence of temperature and changing ecosystem dynamics, especially at the northern edge of the range. Analysis of temperature-linked surplus production suggests that Black Sea Bass productivity has thus far increased with warming.	
Trend in recruitment		OFL is calculated based on most recent, higher, but more variable recruitment. BSB stock abundance has been dominated by several recent strong year classes. Most notably, a 2011 year class was strong in the northern sub-area but very weak in the southern sub-area. This year class has supported a large fraction of the fishery. Evidence exists for a second recent strong year class in 2015, which was more evenly distributed. This year class is now beginning to enter the fishery. The 2017 year class may be one of the lowest in the time series.	
Prediction error		In the past, the SSC could compare across successive stock assessment predictions of OFL, but inclusion of the revised MRIP data increased the population scale proportionately throughout the entire time series, rendering prediction comparisons less useful as a metric of model performance. Combining model predictions from the two sub areas into a single stock projection makes understanding prediction error more challenging.	
Assessment accuracy under different fishing pressures	Long-term catch and survey index history shows substantial contrast, including periods of high (early 1990s) and low (recent decade) F and a 6-fold increase in SSB since Fs were reduced; i.e., a strong response to declining F. Recent Fs have been near F_{msy}.		
Simulation analysis/MSE	No formal MSE-type analyses have been conducted for this stock.		