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M E M O R A N D U M

Date: August 1, 2021

To: Michael P. Luisi, Chairman, MAMFC

From: Paul J. Rago, Ph.D., Chair, MAFMC Scientific and Statistical Committee (SSC)

Subject: Report of the July 2021 SSC Meeting

The SSC met via webinar from 21st - 23rd of July, 2021 to address the following topics:

- Golden Tilefish ABC specifications for 2022-2024 fishing years
- Atlantic Mackerel ABC specifications for 2022-2023 fishing years
- Scup ABC specifications for 2022-2023 fishing years
- Summer Flounder ABC specifications for 2022-2023 fishing years
- Black Sea Bass ABC specifications for 2022-2023 fishing years
- Bluefish ABC specifications for 2022-2023 fishing years
- Review Research Set Aside project update
- Discuss Joint Council-SSC meeting

See Attachment 1.

Most SSC members were able to participate for all or part of the meeting (Attachment 2). Other participants included Council members, Council staff, NEFSC and GARFO staff, and representatives of industry, stakeholder groups, and the general public. Council staff provided outstanding technical support before, during and after the meeting. I thank Sarah Gaichas for her excellent meeting notes and members of the SSC and Council Staff for their comments on an earlier draft of this report. Presentations and contributions of stock assessment scientists from NEFSC and Council Staff were uniformly outstanding. This professionalism greatly facilitated the work of the SSC. A special thanks is also given to Brandon Muffley whose careful orchestration ensured seamless integration of a complex meeting.

This meeting required in-depth participation by a large fraction of SSC members. I thank species leads John Boreman (Scup and Golden Tilefish), David Secor (Atlantic Mackerel), Michael Wilberg (Summer Flounder), Olaf Jensen (Black Sea Bass), and Cynthia Jones (Bluefish) who expertly led the SSC through the TOR and drafted the initial OFL CV summary. We were also the beneficiaries of outstanding rapporteurs for each stock including (Sarah Gaichas (Golden Tilefish, Atlantic Mackerel), Thomas Miller (Scup), Olaf Jensen (Summer

Flounder), Gavin Fay (Black Sea Bass) and Michael Wilberg (Bluefish). Apart from minor editorial changes, the summaries of the Terms of Reference herein, and the completed worksheets for determining the OFV CV (Attachments 4-8) are exactly as presented in the public meeting. Guidelines for preparation of the OFL CV templates are presented in Attachment 3.

All documents referenced in this report can be accessed via the SSC's meeting website https://www.mafmc.org/ssc-meetings/2021/july-21-23. This report uses many acronyms: a comprehensive guide is listed in Attachment 9.

The meeting opened with a quick overview of the agenda and a brief note on the retirement of our colleague Gary Shepherd who has produced outstanding stock assessments for the Council for many decades. We also noted the passing of Robert Mohn, an intellectual giant and friend, whose work on retrospective patterns has improved stock assessments worldwide. The references herein to "Mohn's Rho" reflect his enduring legacy.

Overview of SSC Process for ABC Determination

Six stock assessments, prepared by the Northeast Fisheries Science Center (NEFSC), were reviewed by the SSC. The discussions are guided by the Terms of Reference (TOR) written by Council staff, in consultation with Council and SSC leadership, and guided by evolving historical precedents within the SSC. The primary focus of the SSC review is to characterize the full scientific uncertainty of the overfishing limit (OFL) to recommend an Acceptable Biological Catch (ABC). Simulation studies have suggested that the uncertainty of catch estimates is underestimated by the within model estimates of variation (SSC, 2016) Accordingly, the SSC uses a composite level of uncertainty, or coefficient of variation (CV) derived by following a template described in the SSC's OFL CV Guidance Document (2020). Nine criteria are considered to develop an overall measure of the coefficient of variation. Each criterion is assigned one of three separate levels of CV and a composite CV, based on the preponderance of the evidence, is assigned by the SSC. The rationale for each criterion is summarized in the Attachments 4 to 8.

The SSC is acutely aware of the importance of its ABC determination. The SSC strives to use a process to derive the OFL CV that is open, transparent, and well documented. Prior to the meeting the SSC's lead for each species collaboratively developed a template of key factors for each criterion. The initial results were provided on the Council's website prior to the SSC meeting. No determinations of CVs are made in this stage. Rather, these initial lists served as template for the broader SSC discussions during which factors were modified, added, or deleted. After a plenary discussion, a consensus determination of CV category was made for each criterion. Finally, an overall determination of the OFL CV was derived based on the overall evidence. No formal weighting of criteria was applied; instead, it was based on the expert judgement of the group. To date, the overall determination has usually been clear-cut. More difficult decisions could arise in the future as assessment circumstances change. Overall, the process strikes a realistic balance between ensuring transparency and efficiency. The advance preparation also ensures that previous discussions are reviewed for current applicability, that group decisions can be made within a limited period, and that future decisions will have sound documentation.

The ABCs for each species and requested scenario are summarized below. Further discussion of the basis for these decisions may be found in the individual species sections.

Table 1. Summary of Estimated OFLs and Recommended ABCs by Stock.

Species	Year	Overfishing Limit (OFL) (mt)	Acceptable Biological Catch (ABC) (mt)	Probability of Overfishing (P*)
Golden Tilefish (Scenario 1/Scenario 2)	2022	1,011/1,011	867/891	0.43/0.44
	2023	1,013/1,010	917/891	0.45/0.44
	2024	975/976	890/891	0.46/0.46
Atlantic Mackerel	2021	11,622	ND[3]	ND[3]
	2022	10,817[1]	8,760[2]	0.40
Scup	2022	14,770	14,566	0.49
	2023	13,708	13,460	0.49
Summer Flounder, P*	2022	16,458	15,403	0.452
	2023	15,759	14,639	0.447
Summer Flounder, constant harvest	2022	16,458	15,021	0.435
	2023	15,865	15,021	0.461
Black Sea Bass	2022	8,735	8,555	0.49
	2023	7,716	7,557	0.49
Bluefish	2022	18,399	11,460	0.320
	2023	20,490	13,890	0.362

[1]The OFL for 2022 assumes 23,184 mt harvested in 2021. See text.
[2]ABC is based on OFL=10,817 with a P*=0.40
[3]Not Determined

Golden Tilefish

Paul Nitschke, NEFSC opened with a summary of the MTA results. Beginning with an overview of the biology he then summarized the major changes in the assessment methods that had occurred over time. Bottom trawl surveys are not useful for Golden Tilefish monitoring but two recent longline surveys may prove useful. These will be more fully evaluated in an upcoming Research Track Assessment (RTA) in 2024. Relative abundance of Golden Tilefish is monitored by a commercial CPUE estimates derived from a generalized linear model. A major change in the current assessment was the inclusion of more year-specific age-length keys. Previous assessments had relied on pooled age length keys. Concerns were expressed about recent declines in numbers of biological samples taken by port agents.

As the assessment relies exclusively on commercial fishery data and has a terminal year of 2020, there were no information gaps due to Covid 19 sampling that affected other stock assessments. Model results indicate that the stock is not overfished (B_{2020}~95% B_{msy}) and overfishing is not occurring (F2020~61% F_{msy}). The biological reference points are derived empirically by estimating average Fs between 2002-2012 when the stock was rebuilding. Re-evaluation of this basis is expected in the 2024 RTA. Catches have been relatively stable at about 900 mt since 2000. CPUE has oscillated over this period as new recruits enter the fishery. Recruits are not precisely identifiable and there may be smearing of several year classes. Current increases in catches and abundance appear to be driven by the 2013-2014 year classes. If historical patterns prevail, CPUE is expected to decline in coming years. The model estimates a dome-shaped selectivity pattern which implies a large population of older, relatively invulnerable cryptic adults.

Mohn's Rho estimates of retrospective pattern reveal low values, suggesting no obvious conflicts between the model assumptions and data. Sensitivity analyses indicated that a small sample of 16 unclassified fish had a major impact on the estimate of abundance for the 2017 cohort. This was raised as a source of concern regarding potential undue optimism over projected stock sizes.

José Montañez provided an overview of management issues, concerns expressed by industry Advisory Panel (AP), and recommendations for an ABC based on the latest model results and application of the previously used OFL CV=100%. Prices and total revenue declined in 2020 owing to effects of the pandemic but landings in 2021 are ahead of last year. Golden Tilefish are rarely encountered in MRIP angler intercepts. A mandatory reporting system for recreational fish was implemented in late 2020 but data are scant to date. It was hypothesized that recreational Golden Tilefish landings increase when tuna fishing is poor. In any event, results of mandatory reporting are not yet interpretable. José also noted the desire to synchronize the fishing year to the calendar year but noted that the 2021 fishing year will be 14 months (Nov 1, 2021 to December 31, 2022).

A general discussion of both science and management issues followed. A member of industry expressed the desire of industry to have stable harvest levels, even at slightly lower levels, to ensure proper development of markets and avoid oscillations between years that cause price changes. Industry reported large proportions of 2 - 3.5 lb fish in current landings, suggesting an incoming year class.

Terms of Reference: Golden Tilefish

Following this general discussion, the SSC addressed the Terms of Reference (italics) for Golden Tilefish. Responses by the SSC (standard font) to the Terms of Reference provided by the MAFMC are as follows:

For Golden Tilefish, the SSC will provide a written report that identifies the following for the 2022-2024 fishing years:

1) *Based on the criteria identified in the acceptable biological catch (ABC) control rule, assign the stock to one of four types of control rules (analytically derived, modified by the assessment team, modified by the SSC, or OFL cannot be specified) the SSC deems most appropriate for the information content of the most recent stock assessment;*

The Peer Review Committee for the most recent management track assessment of Golden Tilefish (2021) deemed the assessment-derived OFLs in 2022, 2023, and 2024 are appropriate for use by management. The SSC determined that the level of uncertainty of OFL in the assessment requires an SSC-specified CV.

2) *If possible, determine the level of catch (in weight) associated with the overfishing limit (OFL) for each requested fishing year based on the maximum fishing mortality rate threshold or, if appropriate, an OFL proxy, and the associated coefficient of variation recommended by the SSC and its basis;*

Based on projection estimates provided in the 2021 management track assessment for Golden Tilefish, the level of catch associated with the OFL for 2022-2024, based on an SSB_{msy} proxy of $SSB_{40\%}$ and assuming that ABCs in 2020 and 2021 are caught, is:

Year	OFL (mt)
2022	1,011

OFLs for 2023 and 2024 depend on whether the constant or varying approach to ABC is selected and are listed under TOR 3.

The SSC recommends using an OFL coefficient of variation (CV) level of 100% for the following reasons. The SSC notes consistency between input data and model dynamics, the available model diagnostics, and the lack of a pathological retrospective pattern. Projections are sensitive to inclusion of the unclassified market category (small sample of small fish) from recent years, as this is the only indication of potential recruitment. Increased availability of age data in 2021allowed for the use of additional data within the pooled age-length key, and the use of year-specific age keys for the most recent years. The final model run used the updated pooled age-length key for years with age data gaps. Bridge run performance in the 2021 management track assessment showed good agreement between assessments. The SSC re-expresses its concern that the assessment relies solely on fishery-dependent data; the MSY estimate relies on a dome-shaped selectivity curve, which suggests a large portion of the population is not vulnerable to harvest.

3) *The level of catch (in weight) and the probability of overfishing (P*) associated with the ABC for each requested fishing year, based on: 1) the traditional approach of varying ABCs in each year, and 2) a constant ABC approach derived from the projected ABCs. If appropriate, specify interim metrics that can be examined to determine if multi-year specifications need reconsideration prior to their expiration;*

The SSC accepted the CV of 100% in the OFL as the foundation for the ABC. Using the Council's published risk policy, the recommended ABCs are as follows:

	ABC (mt)	OFL (mt)	ABC (mt)	OFL (mt)
Year	Traditional (Scenario 1)		Constant (Scenario 2)	
2022	867	1,011	891	1,011

2023	917	1,013	891	1,010
2024	890	975	891	976

Interim metrics: Landings and length/age distributions from fishery; need to maintain/increase port sampling.

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

- Reliance on fishery-dependent data in the assessment.
- Reliability of the F_{msy} proxy and its relationship to potential SPR-based reference points.
- The dome-shape selectivity curve that makes a strong assumption about the presence of older fish in the population, for which strong empirical evidence is lacking.
- The extent of site fidelity of individuals, uncertainty in the stock range and distribution, and the consequences of the newly closed areas on stock dynamics that increase uncertainty and potential bias in assessment results.
- The lack of reliable recreational catch information.
- The use of a pooled age-length key for years in which an age-specific key is unavailable that may lead to misspecification of age structure and reduced ability to both follow and estimate the size of year classes.
- The lack of a recruitment index that places a heavy burden on the estimation of past recruitments from size composition in the landings.

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

No specific additional ecosystem considerations were taken into account by the SSC in reaching its ABC recommendation. The climate vulnerability of Golden Tilefish was considered in the OFL CV deliberations (Hare et al. 2016).

6) *Research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendation and/or could be considered for the 2024 research track assessment;*

- Continue to explore development of a fishery independent survey to estimate abundance and distribution.
- Continue to perform exploratory analyses of fish distributions to assess whether the dome-shaped selectivity curve used in the assessment reflects fishery selectivity or availability, or both.
- Expand observer coverage to improve index standardization of fishery-dependent data.
- Leverage existing fishing activity to provide samples to improve life history and distribution information.
- Assess the accuracy and reliability of aging techniques.
- Evaluate the role of sanctuaries on the Golden Tilefish stock and its fisheries.

- Given the results of the assessment update, it seems reasonable to change the overfishing definition to $F_{40\%}$.
- Continuation of adequate age sampling is critical to the switch from the use of pooled age-length-key to year specific age-length-keys for more appropriate characterization of age structure and better tracking of year classes.
- There is a significant concern with reductions in the biological port sampling that may negatively affect future assessments, including the next RT assessment model in 2024.
- Due to the lack of information on incoming recruitment at the end of the time series (no fishery independent surveys that capture young fish), alternatives to the TAL calculations based on projections that rely on uncertain indications of year class strength should be considered. A conservative approach to changes in the TAL over time appear to have resulted in overall benefits for both the Golden Tilefish stock and for the fishery.

7) The materials considered by the SSC in reaching its recommendations;

- SSC TORs for Golden Tilefish
- Staff Memo: 2022-2024 Golden Tilefish Specification Recommendations
- Draft 2021 Golden Tilefish Management Track Stock Assessment Report
    - See the Stock Assessment Support Information (SASINF) Search Tool for additional information including tables, figures, and additional analyses
- Draft 2021 Management Track Peer Review Panel Summary Report
- OFL/ABC Golden Tilefish Stock Projections
- Draft Golden Tilefish OFL CV Decision Criteria Summary
- 2017 Golden Tilefish Stock Assessment Update Report
- 58th SAW/SARC Stock Assessment Report (2014)
- 2021 Golden Tilefish Advisory Panel Fishery Performance Report
- 2021 Golden Tilefish Fishery Information Document
- Hare, J. A., Morrison, W. E., Nelson, M. W., Stachura, M. M., Teeters, E. J., Griffis, R. B., Alexander, M. A., *et al.* 2016. A Vulnerability Assessment of Fish and Invertebrates to Climate Change on the Northeast U.S. Continental Shelf. PLOS ONE, 11: e0146756. Supplemental information at https://www.st.nmfs.noaa.gov/data-and-tools/NE-CVA/pdf/Tilefish.pdf

All documents without citation can be accessed via the SSC meeting website: https://www.mafmc.org/council-events/2021/ssc-july-21-23

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.

Atlantic Mackerel

Kiersten Curti, NEFSC, presented an overview of the most recent MTA, quickly noting the severe management and scientific challenges for this resource. Following the November 2017 Benchmark assessment at SAW 64 the stock was only 22% of B_{msy} and fishing mortality was nearly double (~180% of) F_{msy}. Unfortunately, the stock in 2019 (current assessment terminal year) remained overfished (23.7% B_{msy}) and overfishing increased slightly to 208% of F_{msy}. Rebuilding remains a primary concern for Atlantic Mackerel and most of the SSC discussion focused on this aspect.

The population is modeled with an age structured model (ASAP) that uses a constant M over ages and time. Fishery-independent surveys are used to estimate SSB, most notably an egg survey in Canada (northern contingent) and a long-term NMFS ecosystem monitoring survey. The spring NEFSC bottom trawl survey is split into RV Albatross and FSV Bigelow survey years (post 2009) to reflect the different catchabilities of the combined vessel and trawl changes.

The catch history suggests a much more productive early period (mid 1970s), with catches consistently exceeding 250,000 mt, followed by a drop to about 50,000 in the late 1970s and early 1980s. Exclusion of foreign vessels in the late 1970s was the primary reason for this drop in landings. Two later peaks in catches occurred in the late ’80s -early ‘90s and then again in the mid 2000s. Since 2009 landings have been low; US catches have been around 10,000 mt. Inclusion of MRIP-adjusted catches increased the overall scale of the population, but the magnitude of the increase varied over time. Prior to 2009 the revised MRIP catches were about 60% higher than before. After 2008, the catches were 213% higher. Total catches however, changed by much smaller fractions because recreational catches have usually represented a relatively small percent of overall removals in the US. Commercial discards, and recreational and bait catches in Canada are not estimated.

Model estimates of total stock biomass have declined over time, paralleling the overall catch trends. Abundance has increased slightly in the most recent years but remains well below historic levels.

Recruitment was estimated to be strong in 1982, 1999, and, most recently, in 2015. Recruitment in 2016 however was the lowest on record and estimates since 2008 have been below the median, except in 2015. The ratio of R/SSB has been increasing since 2010, suggesting possible compensation for low stock sizes.

Natural mortality is estimated as 0.2, but a profile likelihood analysis suggests slightly stronger support for a higher M of 0.26. Retrospective patterns can rarely be traced to specific changes, but the potential misspecification of M and differential rescaling effects of revised MRIP data may have led to an increase in retrospective patterns in SSB and R compared to the benchmark assessment in 2017. For rebuilding, the Mohn’s Rho for recruitment (=0.431) is especially problematic since rebuilding depends strongly on the realization of average recruitment, irrespective of the time stanza used.

Compared to the previous Benchmark Assessment, the perception of stock status has been revised substantially downward in the new Management Track Assessment (MTA). Key differences include:

- SSB in 2016 (terminal year of benchmark) was revised down by 29%;
- The estimated proxy for Maximum Sustainable Yield declined by 17%;
- Projected biomass in 2020 (first projection year from new MTA) is just one third (about 60,000 MT) that predicted for 2020 in projections that were used to develop initial rebuilding after the Benchmark Assessment (about 177,000 mt).

Projections from the 2017 benchmark suggested that rebuilding was possible by 2023, even with modest increases in catches. Updated projections from the 2021 MTA suggest that rebuilding could not occur even if fishing mortality was zero. Multiple factors have changed between assessments, and it is not possible to isolate a primary factor for the disparity. The downward adjustment of the 2015 year class was only -15%, but the very low 2016 and subsequent year classes are important. Median age at maturity increased, and weights-at-age declined. Potential causes of the absence of rebuilding and the choice of an appropriate time series for rebuilding projections are discussed under the Terms of Reference section below.

Jason Didden, MAFMC, followed Kiersten Curti with a reprise of the management issues for Atlantic Mackerel. The official rebuilding program began in November 2019 with an expected rebuild date of 2023. Actual catches since 2012 have been relatively steady but below allowable levels – 2021 landing to date has been relatively low. Revenues have also been relatively steady. The absence of rebuilding raises important concerns about age structure and resiliency of the stock. Recreational harvest is less controlled than commercial harvest and Canadian landings are considered fixed – both are accounted for with deductions from total catch recommendations. If emergency measures were invoked in 2021 to reduce overfishing it is unlikely that a complete cessation of fishing for the remainder of the year would be sufficient to end overfishing. Catch in 2021 appears likely to reach 13,500 mt, depending on the late-season performance of the U.S. fisheries and the potential for emergency action. Most US fishing occurs in the first quarter, so 2022 would offer the first opportunity to implement meaningful controls, though the potential timing of implementing new limits is somewhat uncertain.

Given the revised assessment basis, a new rebuilding schedule can be implemented in 2022. The multitude of options and absence of essential management guidance precluded further consideration of specific options for 2021. The complexity of options is further considered by the SSC in the Terms of Reference below.

Terms of Reference: Atlantic Mackerel

Following this general discussion, the SSC addressed the Terms of Reference (italics) for Atlantic Mackerel. Responses by the SSC (standard font) to the Terms of Reference provided by the MAFMC are as follows:

For Atlantic Mackerel, the SSC will provide a written statement that identifies the following for the 2021 fishing year and interim 2022 fishing year:

1. *As an interim approach to support emergency action, provide catch levels for the remainder of the 2021 fishing season and initial 2022 fishing season to end and/or minimize overfishing while the existing rebuilding plan is modified or reassessed later in 2021;*

SSC recommends separate actions for 2021 and 2022:

- For 2021, the stock is almost certain to be subject to overfishing given the current catch trajectory relative to the estimated OFL of 11,622 mt. Therefore, SSC recommends that measures be taken to eliminate or minimize additional catch during the current year.
- For 2022, SSC recommends that F_{msy} = 0.22 be utilized (estimate from the Management Track Assessment) with a P* of 0.4, resulting in an ABC of 8,760 mt. This calculation assumes 2021 catch equals 23,184 mt, i.e., the sum of the U.S. ABC (19,184 mt) and the 4,000 MT 2021 Canadian quota. The SSC recognizes that 2021 catch will likely be lower than the ABC level, given recent U.S. catch history and potential pending action by the Council/NMFS. Because the 2021 catch remains uncertain, the safest way to not underestimate 2021 catch (which would in turn over-specify 2022 catch) is to assume the full 23,184 mt catch. The static P* = 0.4 (OFL CV=100%, low recruitment scenario) is used as an interim measure to account for some scientific uncertainty while rebuilding is re-considered given stock size is certainly well below B_{msy}. (Standard application of the Council's P* risk policy under the low recruitment scenario would result in a catch recommendation of 3,931 MT with an 11% tolerated risk of overfishing.)

Informing this advice were the following topics:

- Current rebuilding plan —The current rebuilding plan will fail to meet the 2023 target.
- Recent SSC ABC guidance —Given uncertainty in how recent low recruitments would impact expected increases in SSB, SSC recommended no increase in ABC from 2019 to 2020 (29,184 mt in both years), and to await results of the Management Track Assessment for 2021 specifications. The 2021 MTA indicates that the projected rebuilding from the benchmark assessment remains far from being achieved.
- Preface to rebuilding —Preliminary rebuilding scenarios indicate long-term rebuilding will be required for this stock. Immediate and substantial reductions in catch is needed to begin rebuilding.
- Continued stock depletion —The perception of the stock has been revised substantially downward in the new Management Track Assessment (MTA) with respect to the previous Benchmark Assessment. Examples include: SSB in 2016 (terminal year of benchmark) was revised down by 29%; historically low recruitment since 2015; the estimated proxy for Maximum Sustainable Yield declined by 17%; projected biomass in 2020 (first projection year from new MTA) is just 1/3 (about 60,000 mt) of what was predicted for 2020 in projections used to develop initial rebuilding after the Benchmark Assessment (about 177,000 mt).
- DFO 2021 Quota — Canada DFO has reduced quota by half to 4,000 mt to allow for immediate rebuilding.
- Current landings information — Most US landings occur within the first quarter (Jan-Mar) curtailing the effectiveness of a 2021 emergency action. Combined harvests and bycatch

may be around 13,500 mt in 2021 based on fishery performance so far, a historical low in the series (staff memo). There can be substantial landings later in the year, however.

- Alternatives —The SSC also considered three 2021-2022 catch levels stipulated at 1) the lowest recorded harvest (staff recommendation), 2) alternate P* levels, and 3) F = 0.

2. *Provide guidance and scientific advice regarding the approaches, projection considerations, and associated risk for different rebuilding plan alternatives to be considered by the Council in August 2021 (note: the SSC will review rebuilding plan alternatives again and provide catch/ABC recommendations in September before final Council action).*

The SSC advances strategic considerations for rebuilding plan policies and the lists some specific issues specific to Atlantic mackerel rebuilding.

General Rebuilding Considerations:

- Components of a rebuilding plan — Key variables in rebuilding include,
  - T-min: The minimum amount of time a stock rebuilds at F=0.
  - T-max: The maximum time allowed for a stock to rebuild, which is typically 10 years but can exceed 10 years when T-min>10 in which case T-max=10 + mean generation time.
  - T-target: The target number of years for rebuilding; lies between T-min and T-max.
  - P_R-max: The probability of rebuilding by T-max.
  - P_R-target: The probability of rebuilding by T-target.
- Science-determined —T-min and T-max are scientifically derived values estimated from projections. Their values depend upon assessment assumptions and uncertainties.
- Council-determined —The Council sets T-target, P_R-max, and P_R-target based on risk policy, feasibility, and catch-rebuilding trade-offs.
- Feasibility — In considering catch-rebuilding trade-offs, there may only be a limited set of controls across classes of removals. For instance, Canadian Atlantic Mackerel harvests are outside Council control.
- Risk and long rebuilding — Longer rebuilding plans often need revision with changes in recruitment and Biological Reference Points. This can result in unstable quotas. Simulation and data synthesis indicate that, establishing P_R-max = 0.5 (i.e., a greater than 50% chance of rebuilding to the target date) is risk-prone. Values greater than 0.5 are associated with shorter rebuilding time and greater catch stability (Punt and Ralston 2007; Neubauer et al. 2013; Wetzel and Punt 2016).
- Forage Species — Atlantic Mackerel is managed as a forage species. MAFMC policy is to "support the maintenance of an adequate forage base in the Mid-Atlantic to ensure ecosystem productivity, structure and function and to support sustainable fishing communities." As laid out in the MAFMC EAFM Guidance Document, forage species require additional precaution, including the possibility of a more risk-averse harvest control rule.

Atlantic Mackerel Rebuilding Issues:

- Risk — Preliminary estimates of T-min indicate a long rebuilding period if recruitment persists at low levels. Given uncertainties in projections and strategic considerations (see above), SSC recommends P_R-max values >0.5. Because the Council lacks experience in setting P_R-max, reaching out to other Councils and staff may be helpful in learning from their experiences.
- Feasibility — Rebuilding choices will be constrained by classes of removals that are beyond the control of the Council or are difficult to control. These include Canadian catch, unmonitored components of the Canadian fishery, recreational fishing in state waters, and predation removals.
- Catch data streams — Harvest controls during rebuilding could result in very low commercial catches affecting data streams that are important in evaluating stock status and rebuilding.
- Recruitment assumptions —Estimates of T-min, T-max, and projection realizations of P_R-max and T-target are very sensitive to recruitment assumptions, whether recruitment expectations are drawn for the longer historical period (1975-present) or the more recent period (2009--present).
    - Initial T-min (zero total catch) estimates are 3 years for the longer recruitment series and 8 years for the shorter series (if rebuilding starts from 2022).
    - The longer series includes historical strong year-classes, and results in a more optimistic forecast for rebuilding
    - The shorter series will likely provide greater certainty against underperforming short-term forecasts, but is influenced less by historical strong year-classes.
    - Trends in R/SSB are slightly increasing over the historical series, suggesting some degree of compensation in recent time (greater recruitment per spawner).
    - The issue of recruitment assumptions will require additional science deliberation. Additionally, there may be better analytical approaches in using past recruitment patterns in making projections, including an autoregressive sampling approach.
- Biological Reference Points — The SSC recommends that regardless of which recruitment time series is used for rebuilding projections, that Biological Reference Points continue to be derived from the longer assessed period (1975-present).
- Risk of overfishing — P* (probability of overfishing) does not have explicit rebuilding time built in, but application of the P* control rule may lead to rebuilding within a certain period. During rebuilding, we should continue to assess P* as an interim stock metric.
- Adaptation during rebuilding — Longer rebuilding plans and associated projection uncertainty increase the likelihood of needing modifications to the plan. Assessment and projection updates may require revision to risk policy as stock trajectories change with respect to T-target.

Materials Considered in SSC Guidance

- Staff Memo: Atlantic Mackerel Recommendations
- Draft 2021 Atlantic Mackerel Management Track Stock Assessment Report
- Draft 2021 Management Track Peer Review Panel Summary Report
- OFL/ABC Atlantic Mackerel Stock Projections (Excel file)

- 2021 Canadian Mackerel Assessment Summary
- 64th SAW/SARC Stock Assessment Report (2017)
- 2021 Atlantic Mackerel Advisory Panel Fishery Performance Report
- 2021 Atlantic Mackerel Fishery Information Document
- Presentation: 2021 Atlantic mackerel management track assessment
- Neubauer, P., O.P. Jensen, J.A. Hutchings, and J.K. Baum. 2013. Resilience and recovery of overexploited marine populations. Science. 340:347-349.
- Punt, A.E., Ralston, S., 2007. A management strategy evaluation of rebuilding revision rules for overfished rockfish stocks. Biology, Assessment, and Management of North Pacific Rockfishes, 23, 329-+ pp.
- Wetzel, C.R., Punt, A.E., 2016. The impact of alternative rebuilding strategies to rebuild overfished stocks. ICES Journal of Marine Science, 73(9): 2190-2207.

Scup

Mark Terceiro, NEFSC, reported the major conclusions from the current Management Track Assessment (2021). The stock is not overfished and overfishing is not occurring. The most recent benchmark for Scup was 2015, but it has been updated for review by the SSC every other year. The Scup assessment is supported by three synoptic NEFSC surveys and 14 state and regional surveys. The 2021 MTA involved the inclusion of one additional year of data from the 2019 update. There were no changes in the model structure apart from the addition of a selectivity stanza for 2013 onward. The biomass and fishing mortality estimates have insignificant retrospective patterns. Importantly, from a conservation perspective, these patterns suggest consistent underestimation of biomass and overestimation of F. The large 2015 year class resulted in higher than expected discards from 2015 to 2018. Discards are expected to decline in 2020 (incomplete data) and later years.

Changes in mean weights-at-age and maturation were factored into revised biological reference points. Changes in F_{msy} were modest 0.215 to 0.200. SSB remained nearly double B_{msy} of 90,019 mt, but is expected to trend downward over the next few years in the absence of another strong year class. There is no strong indication of a trend in recruitment. The ratio of R/SSB is declining as expected with a population well above B_{msy}. It is anticipated that a parametric stock-recruitment model will be examined in the next Research Track Assessment.

Comparisons across recent assessments suggests strong agreement and low prediction error of stock biomass forecasts. However, the updating of the assessment with revised MRIP estimates increased the overall scale of the population, compromising the utility of the prediction error metric as a measure of model performance.

Karson Coutré, MAFMC, summarized the Council's recent actions and the conclusions of the Advisory Panel (AP). Karson noted the effects of Covid 19 on monitoring efforts in 2020, especially the reductions in observer monitoring. The AP expressed concerns about the veracity of the MRIP estimates. Additional AP concerns were effects of increased shark abundance inshore, importance of surfactants on early life history survival rates, and unknown impacts of wind energy development.

Opposing AP viewpoints were expressed regarding the utility of various size restrictions and overall trip limits. Jeff Kaelin, Lunds Seafood, noted that Lunds and SeaFreeze are pursuing MSC certification for Scup to facilitate marketing of frozen fish to supermarkets. SSC members commented that more formal analyses of economic considerations would be valuable in these discussions.

The SSC noted that a Staff recommendation for constant ABC quota included years in which P*>0.5. Exceeding a 50:50 chance of overfishing is not a viable option under the provision of the MSA. Accordingly, the SSC could not consider this alternative further.

Terms of Reference: Scup

Following this general discussion, the SSC addressed the Terms of Reference (italics) for Scup. Responses by the SSC (standard font) to the Terms of Reference provided by the MAFMC are as follows:

For Scup, the SSC will provide a written report that identifies the following for the 2022-2023 fishing years:

1. *Based on the criteria identified in the acceptable biological catch (ABC) control rule, assign the stock to one of four types of control rules (analytically derived, modified by the assessment team, modified by the SSC, or OFL cannot be specified) the SSC deems most appropriate for the information content of the most recent stock assessment;*

The Peer Review Committee for the most recent management track assessment of Scup (2021) deemed the assessment-derived OFLs in 2022 and 2023 are appropriate for use by management. The SSC determined that the level of uncertainty of OFL in the assessment requires an SSC-specified CV.

2. *If possible, determine the level of catch (in weight) associated with the overfishing limit (OFL) for each requested fishing year based on the maximum fishing mortality rate threshold or, if appropriate, an OFL proxy, and the associated coefficient of variation recommended by the SSC and its basis;*

Based on projection estimates provided in the 2021 management track assessment for Scup, the level of catch associated with the OFL for 2022-2023, based on an OFL proxy of $F_{40\%}$ and assuming that ABCs in 2020 and 2021 are caught, are:

Year	OFL (mt)
2022	14,770
2023	13,708

The SSC recommends using an OFL coefficient of variation (CV) level of 60% for the following reasons. There is high data quality, 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 three 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 44% 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 or clear trend in recent recruitment over the past decade, although a declining trend in recruitment is beginning to emerge, so adjustment of projected recruitment currently appears unwarranted. There is no discernable impact of thermal habitat on interannual variation in availability, so adjustment of survey indices to account for thermal habitat effects also appears unwarranted.

3. *The level of catch (in weight) and the probability of overfishing (P*) associated with the ABC for each requested fishing year, based on: 1) the traditional approach of varying ABCs in each year, and 2) a constant ABC approach derived from the projected ABCs. If appropriate, specify interim metrics that can be examined to determine if multi-year specifications need reconsideration prior to their expiration;*

The SSC used a CV of 60 % in the OFL as the foundation for the ABC. Using the Council's published risk policy for a stock for which B/BMSY > 1, the SSC implemented a P*=0.49 strategy. The Council's request for ABCs that are constant for 2022 and 2023 leads to an ABC recommendation for 2023 that is associated with a P* value = 0.516. The SSC is precluded from setting an ABC that results in overfishing in any one year; therefore, only ABCs associated with the traditional (variable) approach are offered.

The recommended ABCs are as follows:

Year	Traditional (mt)
2022	14,566
2023	13,460

As a general observation, the Council's risk policy that implements p*=0.49 will likely result in instances in which a constant ABC approach, as currently implemented, will result in estimates of P* for individual years that are P*>0.5. The SSC cannot recommend an ABC in any single year in which P*>0.5. The SSC recommends the implementation of the constant ABC policy be re-evaluated to assess if there are methods that could preclude P* values higher than are permitted.

Interim metrics:

(1) The SSC will examine as many surveys as are available for the next SSC meeting, with a focus on the NEFSC surveys.
(2) Catch and Landings information, as available.

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

- While older age Scup (age 3+) are represented in the catch used in the assessment model, most indices used in the model do not include ages 3+. As a result, the dynamics of the older ages of Scup are driven principally by catches and inferences regarding year class strength.
- A sizeable portion of the stock biomass is in older age classes which are assumed to have low Fs as a result of the selectivity pattern imposed in the model.
- Uncertainty exists with respect to the estimate of natural mortality (M) used in the assessment.
- Uncertainty exists as to whether the MSY proxies ($SSB_{40\%}$, $F_{40\%}$) selected and their calculated precisions are appropriate for this stock.
- The SSC assumed that OFL has a lognormal distribution with a CV = 60%, based on a meta-analysis of survey and statistical catch at age (SCAA) model accuracies.
- Survey indices are particularly sensitive to Scup availability, which results in high inter-annual and regional variability – efforts were made to address this question by weighting surveys in the SAW/SARC that should be continued.
- The projection on which the ABC was determined is based on an assumption that the 2020 and 2021 ABCs will be caught.

5. *Ecosystem considerations accounted for in the stock assessment, as appropriate, 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 most recent benchmark 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 improve model fits.

The climate vulnerability assessment (Hare et al. 2016) indicates Scup is moderately vulnerable to climate effects.

6. *Research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendation and/or improve the assessment level;*

    - Characterize the pattern of selectivity for older ages of Scup in both surveys and fisheries.
    - 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.

- 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.
- 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 arises 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.
- SSC is concerned over the reduction in port sampling which has the potential to exacerbate concerns about the dynamics of older fish.
- Uncertainty exists with respect to the estimate of natural mortality 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. Further consideration of ecosystem factors controlling, and potentially forecasting availability of Scup is warranted.

7. *The materials considered by the SSC in reaching its recommendations;*

- SSC TORs for Scup
- Staff Memo: 2022-2023 Scup ABC Recommendations
- Draft 2021 Scup Management Track Stock Assessment Report
    - See the Stock Assessment Support Information (SASINF) Search Tool for additional information including tables, figures, and additional analyses
- Draft 2021 Management Track Peer Review Panel Summary Report (same as GTF report above)
- OFL/ABC Scup Stock Projections
- Draft Scup OFL CV Decision Criteria Summary
- 60th SAW/SARC Stock Assessment Report (2015)
- 2021 Summer Flounder, Scup, and Black Sea Bass Advisory Panel Fishery Performance Report

- 2021 Scup Fishery Information Document
- Hare, J. A., Morrison, W. E., Nelson, M. W., Stachura, M. M., Teeters, E. J., Griffis, R. B., Alexander, M. A., *et al.* 2016. A Vulnerability Assessment of Fish and Invertebrates to Climate Change on the Northeast U.S. Continental Shelf. PLOS ONE, 11: e0146756. Supplemental information at https://www.st.nmfs.noaa.gov/data-and-tools/NE-CVA/pdf/Tilefish.pdf

All documents without citation can be accessed via the SSC meeting website: https://www.mafmc.org/council-events/2021/ssc-july-21-23

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

Results of the Management Track Assessment for Summer Flounder were presented by the lead assessment scientist, Mark Terceiro, NEFSC. The Assessment Oversight Panel categorized this MTA as a Level 1 assessment requiring no prior external review before coming to the SSC. As with Scup, this assessment reflected the effects of a single year of new data. Total commercial catch could not be estimated in 2020 with the same accuracy as in prior years due to lack of observer coverage.

Despite the effects of Covid 19, some of the fishery independent surveys were conducted in 2020. Most survey abundances were low, mean lengths and average weights at age declined, and age at maturity appears to be increasing. Collectively these changes resulted in slight declines in estimate F_{msy} and B_{msy} proxies. The stock is not overfished and overfishing is not occurring.

The inclusion of revised MRIP estimates of recreational landings and discards in the previous assessment resulted in a major change in population scale but no change in status. Projection error, computed as the mean square error of projected biomass for year t minus biomass estimated for the same year in later assessments (t+n) revealed high agreement. As with Scup, the scale changes due to revised MRIP data reduced the utility of this metric of model performance. Nonetheless the Summer Flounder assessment continues to be one of the most stable assessments in the Mid-Atlantic. Changes in reference points between assessments are minimal.

Near target fishing mortality rates in recent decades have allowed for a broad expansion of age classes of both males and females in the population. In particular, increased proportions of males in the population reduces support for a previous hypothesis of differential natural mortality rates by sex. Monitoring commercial catches by port agents has declined. Such changes, if they continue, risk the loss of valuable information to improve our understanding of the underlying biology of Summer Flounder.

Evidence of strong stock-recruitment relationship is poor although R/SSB has declined as expected with high stock sizes in a Beverton-Holt type stock recruitment model.

Kiley Dancy, MAFMC, provided an overview of the Fishery Performance Report, the Advisory Panel and staff recommendations for ABCs in 2022 and 2023. Commercial landings were below their quota in 2020 but appeared to be on track for achieving their quota in 2021. Advisors expressed concerns about the effects of imputation on MRIP catch estimates for 2020, as it predicted a 31% overage in 2020. Disparate views regarding overall recreational effort were expressed by the advisors. Some advisors favored a reduction in the minimum size limits and removal of the small mesh exemption area.

Terms of Reference: Summer Flounder

Following this general discussion, the SSC addressed the Terms of Reference (in *italics*) for Summer Flounder. Responses by the SSC (in normal font) to the Terms of Reference provided by the MAFMC are as follows:

For Summer Flounder, the SSC will provide a written report that identifies the following for the 2022-2023 fishing years:

1. *Based on the criteria identified in the acceptable biological catch (ABC) control rule, assign the stock to one of four types of control rules (analytically derived, modified by the assessment team, modified by the SSC, or OFL cannot be specified) the SSC deems most appropriate for the information content of the most recent stock assessment;*

The approach to estimating uncertainty in the OFL has not changed since the previous benchmark (SAW/SARC 66). Accordingly, the SSC maintains its determination that the assessment should be considered to require an "SSC-modified OFL."

2. *If possible, determine the level of catch (in weight) associated with the overfishing limit (OFL) for each requested fishing year based on the maximum fishing mortality rate threshold or, if appropriate, an OFL proxy, and the associated coefficient of variation recommended by the SSC and its basis;*

The SSC accepts the Maximum Fishing Mortality Threshold ($F_{35\%}$ = 0.422) used in the assessment. The SSC recommends the use of the most recent nine-year recruitment series for OFL projections, because near-term future conditions are more likely to reflect recent recruitment patterns than those in the entire 38-year time series.

3. *The level of catch (in weight) and the probability of overfishing (P*) associated with the ABC for each requested fishing year, based on: 1) the traditional approach of varying ABCs in each year, and 2) a constant ABC approach derived from the projected ABCs. If appropriate, specify interim metrics that can be examined to determine if multi-year specifications need reconsideration prior to their expiration;*

The SSC continues to use the 60% OFL CV based on the following characteristics: (1) the latest management track assessment did not result in major changes to the quality of the data and

model that the SSC has previously determined to meet the criteria for a 60% CV; (2) the Summer Flounder assessment continues to be a data rich assessment with many fishery-independent surveys incorporated and with relatively good precision of the fishery-dependent data; (3) several different models and model configurations were considered and evaluated by SAW-66, most of which showed similar stock trends and stock status; and (4) no major persistent retrospective patterns were identified in the most recent model. Significant improvements in quality of data and investigations of alternate model structures affirm the specification of the 60% OFL CV by the SSC.

Variable ABC			
Year	OFL	ABC	P*
2022	16,458	15,403	0.452
2023	15,759	14,639	0.447
Constant ABC			
Year	OFL	ABC	P*
2022	16,458	15,021	0.435
2023	15,865	15,021	0.461

Interim metrics include NMFS bottom trawl survey indices (relative abundance, weight-at-length, length-at-age, if available) and catch levels, especially the revised imputed MRIP estimates for 2020.

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

- Changes in life history are apparent in the population; for example, declining growth rates and differences in sex-specific age structure.
- Uncertainty regarding recreational catch and discard estimates from MRIP, especially for 2020 where some data were imputed.
- Potential changes in productivity of the stock, which may affect estimates of Biological Reference Points. Changes in size-at-age, growth, and recruitment may be environmentally mediated, but mechanisms are unknown.
- Potential changes in availability of fish to some surveys and to the fishery as a result of changes in the distribution of the population.

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

No specific additional ecosystem information was used by the SSC for consideration in forming its ABC recommendation. The SSC notes that summer flounder were considered to have "moderate" vulnerability in the NEFSC Climate Vulnerability Assessment results (https://www.st.nmfs.noaa.gov/data-and-tools/NE-CVA/pdf/Summer_Flounder.pdf). The

assessment reviewed potential causal factors for changes in distribution or growth rates, but none were identified as significant.

6. *Research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendation and/or improve the assessment level;*

The SSC endorses the research recommendations provided in the SAW-66 assessment report.

The SSC also recommends that research should be conducted to:

- Understand the objectives and performance measures for the fishery from a socioeconomic perspective, to evaluate the balance of costs and benefits of ABC specifications; Reconsider stock structure based on modern approaches (see Hoey et al. 2020, https://doi.org/10.1111/mec.15414);
- Evaluate the causes of decreased recruitment and changes in the recruit per spawner relationship in recent years;
- Evaluate uncertainties in biomass to determine potential modifications to the OFL CV employed;
- Evaluate causes and consequences of Summer Flounder declines in Chesapeake Bay
- Evaluate fully the sex and size distributions of landed and discarded fish in the Summer Flounder fisheries;
- Evaluate the effects of past and possible future changes to size regulations on retention and selectivity in stock assessments and projections;
- Incorporate sex-specific differences in size-at-age into the stock assessment through model structures as well as data streams;
- Validate the otolith-based age determination;
- Further develop understanding of effects of ecosystem changes (e.g., temperature, trophic structure changes) on population dynamics; and
- The SSC is concerned over the reduction in port sampling which has the potential to exacerbate concerns about the dynamics of older fish.

7. *The materials considered by the SSC in reaching its recommendations;*

- SSC TORs for Summer Flounder
- Staff Memo: 2022-2023 Summer Flounder ABC Recommendations
- Draft 2021 Summer Flounder Management Track Stock Assessment Report
- See the Stock Assessment Support Information (SASINF) Search Tool for additional information including tables, figures, and additional analyses
- OFL/ABC Summer Flounder Stock Projections
- Draft Summer Flounder OFL CV Decision Criteria Summary
- 66th SAW/SARC Stock Assessment Report (2018)
- 2021 SF/S/BSB Advisory Panel Fishery Performance Report
- 2021 Summer Flounder Fishery Information Document

- Hare, J.A., Morrison, W.E., Nelson, M.W., Stachura, M.M., Teeters, E.J., Griffis, R.B., Alexander, M.A., Scott, J.D., Alade, L., Bell, R.J. and Chute, A.S., 2016. A vulnerability assessment of fish and invertebrates to climate change on the Northeast US Continental Shelf. *PloS one*, *11*(2), p.e0146756.

All documents without citation can be accessed via the SSC meeting website: https://www.mafmc.org/council-events/2021/ssc-july-21-23

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.

Black Sea Bass

The Black Sea Bass assessment, reviewed at the MTA at the end of June 2021, was led by Gary Shepherd. Gary retired on July 1 and Kiersten Curti expertly presented the results of the assessment and prepared the various projections requested by Council staff. The stock is not overfished and overfishing is not occurring; the retrospectively adjusted $F_{2019} = 0.41 < F_{msy} = 0.46$, and $B_{2019} = 29{,}668$ mt $> B_{msy} = 14{,}092$ mt. The most recent benchmark for Black Sea Bass was 2017 and the assessment was updated again in 2019. A major change in the 2019 updated assessment was the inclusion of the revised MRIP recreational catch data, which resulted in an overall increase in stock abundance. Black Sea Bass are modeled as two spatial area units to reflect substantial differences in recruitment north and south of Hudson River Canyon. Overall stock status is determined by combining the results of each spatial unit. No migration rates between these units are estimated or assumed.

A relevant point for ABC determination is the increased retrospective pattern in the northern unit and a reciprocal but smaller retrospective pattern in the south. In the previous two assessments (2017, 2019) these effects generally "cancelled" each other. For this assessment, the overall pattern was dominated by the northern retrospective pattern. The PRC attributed these patterns to uncertainties of catch location, timing of surveys, and movements of fish between areas. As noted in their report: "There was no clear approach identified to overcome these challenges." A Research Track Assessment (RTA), planned for November 2022, is expected to investigate potential causes for the different patterns.

The current high level of abundance reflects the strong 2011 and 2015 year classes. The 2011 year class graduated to the "plus group" in 2019 and will increase the model uncertainty since its contribution as a cohort is pooled with year classes greater than eight years old. The SSC discussed whether the use of simple averaging of fishing mortality rates between areas was appropriate, but did not recommend an alternative approach.

Julia Beaty, MAFMC, provided an overview of the fishery performance report and concerns of the Advisory Panel. It was noted that the preliminary landings for 2020 were available, but

estimates of dead discards in commercial catches were not available due to reduced sampling by observers during the Covid 19 pandemic. Recreational catches exceeded the RHL in 2020 by about 50% and it is anticipated that a similar overage will occur in 2021.

Terms of Reference: Black Sea Bass

Following this general discussion, the SSC addressed the Terms of Reference (in *italics*) for Black Sea Bass. Responses by the SSC (standard font) to the Terms of Reference provided by the MAFMC are as follows:

For Black Sea Bass, the SSC will provide a written report that identifies the following for the 2022-2023 fishing years:

1. *Based on the criteria identified in the acceptable biological catch (ABC) control rule, assign the stock to one of four types of control rules (analytically derived, modified by the assessment team, modified by the SSC, or OFL cannot be specified) the SSC deems most appropriate for the information content of the most recent stock assessment;*

The approach to estimating uncertainty in the OFL has not changed since the previous benchmark. Accordingly, the SSC maintains its determination that the assessment should be considered an "SSC-modified OFL" status.

2. *If possible, determine the level of catch (in weight) associated with the overfishing limit (OFL) for each requested fishing year based on the maximum fishing mortality rate threshold or, if appropriate, an OFL proxy, and the associated coefficient of variation recommended by the SSC and its basis;*

The SSC accepts the OFL proxy ($F_{40\%}$ = 0.46) used in the assessment. The SSC recommends the use of the method described in the staff memo for estimating total 2021 dead catch for OFL projections, because the previous method had underestimated the dead catch.

3. *The level of catch (in weight) and the probability of overfishing (P*) associated with the ABC for each requested fishing year, based on: 1) the traditional approach of varying ABCs in each year, and 2) a constant ABC approach derived from the projected ABCs. If appropriate, specify interim metrics that can be examined to determine if multi-year specifications need reconsideration prior to their expiration;*

The SSC continues to use the 100% OFL CV. The SSC's rationale for continuing the OFL CV of 100% in 2020 was as follows:

- 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.

All of these factors remain relevant based on the 2021 management track assessment, although the retrospective bias has increased and uncertainty in the 2020 recreational harvest and dead discards are high because of COVID-related disruptions to the MRIP survey in 2020.

Interim metrics include the 2021 MRIP recreational harvest, discard estimates, and trawl survey indices.

The projections based on averaged ABC approach, presented as a staff alternative, cannot be used by the SSC for catch advice because this results in a P*>0.5 in 2023.

The SSC had to use the varying ABC approach as the basis for projections to determine ABCs for 2022 and 2023. (Table 5 of staff memo for 22 & 23). These projections used the 2020 recreational harvest for 2021 and not the ABC, which was a departure from prior implementations.

The SSC recommends an ABC of 8,555 mt for the 2022 fishing season and an ABC of 7,557 mt for the 2023 fishing season, based on the Council's revised risk policy (P* = 0.49 for both 2022 and 2023)

Table 5: 2022-2023 OFL and ABC projections based on the **varying ABC** approach under the staff recommended projection assumptions. See text above for more information. (Source: personal communication, Kiersten Curti, Northeast Fisheries Science Center.)

Year	Assumed Catch		OFL		ABC		ABC F	ABC p*	SSB		B/ B_{MSY}
	MT	Mil. lb	MT	Mil. lb	MT	Mil. lb			MT	Mil. lb	
2020	8,310	18.32	8,795	19.39	6,835	15.07	0.33	N/A	26,375	58.15	1.83
2021	9,149	20.17	8,021	17.68	7,916	17.45	0.40	N/A	25,057	55.24	1.74
2022	8,555	18.86	8,735	19.56	8,555	18.86	0.41	0.49	22,637	49.91	1.57
2023	7,557	16.66	7,716	17.01	7,557	16.66	0.41	0.49	19,538	43.07	1.35

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 an equal M in the assessment model for both sexes — may not adequately capture potential sex-based differences 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 conducted without weighting based on landings or biomass. It is unclear whether or how the uncertainty should be treated when the biological reference points are combined using simple addition.
- Future effects of temperature on stock productivity and range are highly uncertain.
- Estimates of 2020 harvest and dead discards in both the recreational and commercial sectors are highly uncertain because of COVID-related pauses in observer coverage and MRIP intercept surveys.

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

No specific additional ecosystem information was used by the SSC for consideration in forming its ABC recommendation.

The climate vulnerability of Black Sea Bass was considered in the OFL CV deliberations.

6. *Research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendation and/or could be considered for the 2022 research track assessment;*

The SSC endorses the list of research recommendations included in the 62nd SARC report. In addition, the SSC recommends:

- Consider alternative approaches for calculating fishing mortality and fishing mortality reference points for comparison, given the spatial nature of the assessment, for example calculated from summed numbers over the northern and southern models.
- Investigate the implications of size structure (progression of strong year classes) on projected discard mortality
- Improve precision of discard estimates, estimate uncertainty in discards
- Update discard mortality rates based on new research (to the extent that these depth-specific mortality estimates can be appropriately matched to recreational catch from similar depths).
- Re-evaluate the basis for the spatial structure of the stock assessment, including further development of assessment models that account for spatial stock structure.
- Investigate methods and modeling approaches that address the implications of climate drivers on spatial dynamics
- Recent research shows diurnal vertical migration for this stock (Secor et al. 2021), suggesting catchability differences that could affect survey-based estimates. Day/night differences in catch should be evaluated in the NEFSC trawl survey.

7. *The materials considered by the SSC in reaching its recommendations;*

- SSC TORs for Black Sea Bass
- Staff Memo: 2022-2023 Black Sea Bass ABC Recommendations (revised 7/21/21)
- Draft 2021 Black Sea Bass Management Track Stock Assessment Report
    - See the Stock Assessment Support Information (SASINF) Search Tool for additional information including tables, figures, and additional analyses
- Draft 2021 Management Track Peer Review Panel Summary Report
- OFL/ABC Black Sea Bass Stock Projections
- Draft Black Sea Bass OFL CV Decision Criteria Summary
- 62nd SAW/SARC Assessment Summary Report (2016)
- 2021 SF/S/BSB Advisory Panel Fishery Performance Report
- 2021 Black Sea Bass Fishery Information Document
- Kiersten Curti's presentation (additional projections in the presentation)
- Hare, J.A., Morrison, W.E., Nelson, M.W., Stachura, M.M., Teeters, E.J., Griffis, R.B., Alexander, M.A., Scott, J.D., Alade, L., Bell, R.J. and Chute, A.S., 2016. A vulnerability assessment of fish and invertebrates to climate change on the Northeast US Continental Shelf. *PloS one*, *11*(2), p.e0146756.
- Hare, J.A., Morrison, W.E., Nelson, M.W., Stachura, M.M., Teeters, E.J., Griffis, R.B., Alexander, M.A., Scott, J.D., Alade, L., Bell, R.J. and Chute, A.S., 2016. A vulnerability assessment of fish and invertebrates to climate change on the Northeast US Continental Shelf. *PloS one*, *11*(2), p.e0146756.
- Secor, D.H., Bailey, H., Carroll, A., Lyubchich, V., O'Brien, M.H.P. and Wiernicki, C.J., 2021. Diurnal vertical movements in black sea bass (Centropristis striata): Endogenous, facultative, or something else?. *Ecosphere*, *12*(6), p.e03616.

All documents without citation can be accessed via the SSC meeting website: https://www.mafmc.org/council-events/2021/ssc-july-21-23

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.

Bluefish

Tony Wood, NEFSC, provided a comprehensive summary of the results from the Management Track Assessment (MTA) for 2021. The stock is overfished (B_{2019} = 95,742 mt = 47.5% of B_{msy} proxy = 201,729 mt), but overfishing is not occurring (F_{2019} = 0.172 = 95% of F_{msy} proxy = 0.181). The F_{2019} is the lowest in the time series. The last benchmark assessment in 2015 was updated in 2019, wherein the revised MRIP estimates were incorporated. The resultant rescaling increased the estimated biomass about two-fold. The assessment relies on an MRIP abundance index of catch per angler trip and eight fishery independent indices. Available abundances, either 2019 or 2020, were generally low with some near their time series minimums. SSB has

increased slightly over the past five years but catches have been lower, perhaps due to greater abundance offshore.

The SSC questioned the methods for estimating the weight of recreational discards and the disparity between the use of volunteer angler data and the assumptions used in MRIP. MRIP estimates assume that discards have the same average weight as sampled landings. Angler data suggest a higher average weight of discarded fish due to preferences for smaller fish for consumption. Given the overall importance of recreational dead discards in the fishery, it was noted that selectivity patterns in the model could be affected by changes in handling of average weights.

The SSC noted low recruitment estimates in 2019 and asked whether it was possible to detect shifts between spring vs late summer recruiting cohorts. Such data are not available annually. It was suggested that this topic, as well as related questions about changes in average weights, could be evaluated in the next benchmark study, scheduled for 2022.

Matthew Seeley, MAFMC, provided an overview of the fishery, comments from the Advisory Panel (AP), and recommendations for rebuilding as specified by the Council. Landings were summarized by state and by fishery. Most recreational landings are within state waters with average landings-per-trip down from an average to 1.5 fish-per-trip to 1.0 in 2020. Commercial landings were lower in 2019 and 2020; a similar pattern is expected in 2021. AP members reported increasing abundance coastwide, larger fish offshore, and localized pockets of highly successful fishing inshore. Owing to data gaps caused by Covid 19 restrictions, the efficacy of newly instituted recreational regulations is unknown.

Consideration of the Council-approved rebuilding schedule generated considerable discussion within the SSC. A focal point for these discussions was the treatment of the rebuilding F proposed by the Council and its implications for generating ABCs. The Council's rebuild policy is to achieve rebuilding within a seven-year period commencing in 2022. A constant F strategy was selected such that biomass in 2028 has a 50% chance of exceeding the B_{msy} proxy. Given the basis for the rebuilding, the SSC determined that the constant F for rebuilding in seven years (denoted as $F_{rebuild,7} = 0.154$) should be treated as a F_{msy} proxy. As such, the usual Council risk policy, P* criteria, and OFL CV process should apply. Failure to include scientific uncertainty through the direct application of $F_{rebuild,7}$ alone could generate instances where the probability of overfishing exceeded 0.5 between 2022 and 2028.

Terms of Reference: Bluefish

Following this general discussion, the SSC addressed the Terms of Reference (italics*)* for Bluefish. Responses by the SSC (standard font) to the Terms of Reference provided by the MAFMC are as follows:

For Bluefish, the SSC will provide a written report that identifies the following for the 2022-2023 fishing years:

1) *Based on the criteria identified in the acceptable biological catch (ABC) control rule, assignthe stock to one of four types of control rules (analytically derived, modified by the*

assessment team, modified by the SSC, or OFL cannot be specified) the SSC deems most appropriate for the information content of the most recent stock assessment;

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 new management track assessment.

2) *If possible, determine the level of total catch (in weight) for each requested fishing year thatis consistent with the constant 7-year rebuilding fishing mortality rate ($F_{rebuild}$) selected by the Council and, if appropriate, the associated coefficient of variation recommended by the SSC and its basis;*

Based on projection estimates provided in the 2021 management track assessment for Bluefish, the level of catch associated with the OFL for 2022-2023 assuming that ABCs in 2020 and 2021 are caught, are:

Year	OFL (mt)
2022	18,399
2023	20,490
2024	22,773
2025	24,043
2026	25,787

Note that the OFL is calculated on a constant $F_{rebuild}$ (0.154).

The SSC recommends that a CV of 100% be applied to the OFL estimate as an appropriate ABC for Bluefish (*Pomatomus saltatrix*). The chief uncertainty for Bluefish relates to patterns in the revised MRIP estimates. Bluefish are predominantly harvested by recreational anglers who average 80% or more 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. While both Black Sea Bass and Scup MRIP catches converge in the 1980s when the telephone survey was deemed reliable, Bluefish catches 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.

3) *The level of catch (in weight) associated with the ABC for each requested fishing year consistent with the 7-year rebuilding fishing mortality rate ($F_{rebuild}$) selected by the Council.If appropriate, specify interim metrics that can be examined to determine if multi-year specifications need reconsideration prior to their expiration;*

The SSC has calculated the ABC to account for scientific uncertainty in achieving the Maximum Fishing Mortality Threshold ($F_{rebuild}$). The approach for calculating the ABC involves using F-rebuild to calculate the OFL. The ABC is then calculated using the P* approach and the Council's risk policy.

Year	ABC (mt)
2022	11,460
2023	13,890
2024	16,960
2025	19,094
2026	22,103

The SSC notes that performance of the approach the Council is applying for rebuilding plans have not been simulation tested. However, one would expect that the ABCs should result in fishing mortality rates lower than F-rebuild and faster rebuilding times.

4) *The most significant sources of scientific uncertainty associated with determination of totalcatch and the 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.
- Increased importance of dead discards implies that the selectivity pattern in the fishery might be changing.
- The differences in the average weight of recreational discards will affect projections and fishery performance.
- A key source of uncertainty is whether the ABC will be caught.
- 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 negligible, which may not be the case.

5) *Ecosystem considerations accounted for in the stock assessment, as appropriate, and any additional ecosystem considerations that the SSC considered in selecting the ABC, includingthe basis for those additional considerations;*

The SSC concluded that ecosystem considerations did not alter its consideration of uncertainty in determining ABCs (see OFL CV table).

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

- Bluefish have a low CVA ranking (Hare et al. 2016)

6) *Research or monitoring recommendations that would reduce the scientific uncertainty in theABC recommendation and/or could be considered for the 2022 research track assessment;*

Arising from the management track 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.
- 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. Explore alternative definitions for targeting for calculating CPUE (e.g., directed trips or directed trips + incidental harvest)
- 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 by the SSC in reaching its recommendations;*

- Staff Memo: 2022-2026 Bluefish specifications
- Atlantic bluefish Operational Assessment for 2021
- 2021 Operational Assessment ABC Projection for 2022-2026 and a 7 year rebuilding projection (2022-2028) and a 7 year rebuilding projection (2022-2026) with constant fishing mortality.
- OFL/ABC Bluefish Stock Projections
- Draft Bluefish OFL CV Framework Discussion Table
- 60th SAW/SARC Assessment Summary Report (2015)
- also add full benchmark report
- 2021 Advisory Panel Bluefish Fishery Performance Report

- 2021 Bluefish Fishery Information Document
- Public hearing document from the bluefish allocation and rebuilding amendment.
- Updated projections and ABC calculations
- Hare, J.A., Morrison, W.E., Nelson, M.W., Stachura, M.M., Teeters, E.J., Griffis, R.B., Alexander, M.A., Scott, J.D., Alade, L., Bell, R.J. and Chute, A.S., 2016. A vulnerability assessment of fish and invertebrates to climate change on the Northeast US Continental Shelf. *PloS one*, *11*(2), p.e0146756.

All documents without citation can be accessed via the SSC meeting website: https://www.mafmc.org/council-events/2021/ssc-july-21-23

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 bestscientific information available.*

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Economics Working Group Activities

Mark Holliday, SSC, presented a comprehensive summary of the recent activities of the Economics Working Group, highlighting a successful joint meeting with the Council's Research Steering Committee. The focal point of this meeting was a discussion of research priorities under Research Set Aside (RSA) programs. Five separate theme papers were prepared in advance of the meeting and short presentations of each were made at the meeting.

1. Consistency with Stated Council Plans/Objectives & Linkages to Management Goals; Application of Benefit/Cost Principles in Proposal Evaluation
2. Peer Review and Principal Investigator (PI) Communications: Before, During, and After Completion of RSA projects.
3. RSA Program Transparency and Conflicts of Interest
4. Universal data access and transparency
5. Decoupling allowances and forage and ecosystem species

Feedback received from the workshop participants was considered valuable for refining the overall scope of research activities funded by RSA.

Two additional webinar meetings are planned in August and October, 2021 to be followed by a final meeting in December, in time for Council action. The August meeting will address alternative funding mechanisms, including refinements of the auction process. Raw data from previous auctions have not been made available so the Economics Work Group will rely on more theoretical analyses of potential advantages and disadvantages of auctions for this meeting. The October meeting will address concerns about monitoring of landings and enforcement issues. The final meeting will represent a synthesis of the previous meetings with a focus on developing a list of recommendations for action by the Council at its December 2021 meeting. Mark

concluded by noting the advantages of greater participation by the SSC in this process. Michelle Duval, Council member and Research Steering Committee vice chair, expressed appreciation for the work of the Economics Working Group.

Other Business

Topics for Joint SSC-Council Meeting in August 2021

Brandon Muffley, MAFMC, offered a number of topics for discussion by the SSC and Council at the upcoming August meeting. These topics follow from prior recommendations made to council, ongoing activities of the SSC, and new topics, notably the challenges of rebuilding as identified at this SSC meeting.

Topic	***Rationale***
Economic Working Group: Research Set Aside re-development progress	Discussion of progress to date, plans for remainder of year and suggestions for improvement. Future areas of collaboration for consideration could include the Recreational Reform Initiative and economic aspects of rebuilding plans.
Ecosystems Working Group	In May, the SSC formed an Ecosystem Work Group to begin to identify ways to "operationalize" ecosystem information for SSC decisions and to improve science advice to the Council regarding ecosystem priorities and planning. The first meeting on 8/4/21 will begin development of short and long-term tasks and ideas for the 2022 State of the Ecosystem (SOE) report. Expected outcomes include a general work plan through 2022, identification of ecosystem issues from the 2021 SOE, broader use of SOE report, utility for identifying Council priorities and strategic planning.
Offshore Wind	Offshore wind development has important biological consequences for stocks, implications for habitat alteration and ecosystem changes, and economic consequences for fisheries. Further refinement of the role of the SSC amid the many groups studying these topics would be useful.
Considerations for Emerging Fisheries.	As distributions of species continue to change, what are the scientific and economic issues of exploratory fishing on new stocks?
Science and Research Needs to Provide Advice for Data Limited Stocks	For data limited stocks and those for which previously approved models have been rejected, quantification of ABCs and associated risk is difficult to impossible. Consideration should be given to alternative approaches for developing assessment methods.
Policy Considerations for Rebuilding Strategies	Rebuilding a stock is one of the most difficult tasks in fisheries management and science. Science and management are inseparable; neither alone can provide a sufficient basis for rebuilding. Considerations include not only the usual specification of time lines, but also the more difficult challenges include dealing with unexpected changes, such as lower than average recruitment, increases in discards, changes in growth

	rates and uncontrollable sources of mortality when fish are harvested in other jurisdictions. Multiple paths towards rebuilding are feasible and some may have lower economic impacts for stakeholders. Incorporation of economic factors in rebuilding plans could be an important advance.

Review of Process

At the end of the meeting the SSC commented on various aspects of the review process followed and potential improvements. It was noted that a more timely specification of TORs would improve preparation of relevant syntheses for ABC determination. In some instances, greater specificity of the TORs would have been welcome. No explicit concerns were raised about the process for addressing the TOR nor the process of filling out the OFL CV matrix of evaluation criteria. So far, it seems like a proper balance between transparency and efficiency has been struck.

The SSC spent a considerable amount of time discussing the topic of rebuilding. The vigorous discussions were valuable for refining the application of uncertainty to derived OFLs. Further consideration of rebuilding topics is warranted.

The SSC received six assessments through the NRCC's Management Track Assessment (MTA) process, ranging from Level 1 (Summer Flounder) to 3 (Atlantic Mackerel). The SSC was pleased with the quality of all the assessments, but requested further clarification of the scope for changes in the MTA. The MTA Peer Review Committee (PRC) expressed some additional concerns about the quality of the Plan B options and the overall communication process between the NEFSC and the PRC.

Additional Public Comment

During the course of the meeting a number of topics were raised by members of the public. One commenter noted the growing empirical evidence of noise from offshore wind construction activities on fishing success. These could have important implications for future survey monitoring as well. To date, most effects have focused on the potential impacts of reduced survey domains rather than the effects of changes in catchability due to noise levels. It was noted that some of these concerns were raised at an earlier SSC meeting. SSC members also noted that a large-scale simulation study of potential effects on fishery independent surveys just began in June.

Another commenter noted the importance of terrestrial runoff of pollutants and atmospheric deposition of contaminants as potential factors affecting the lower recruitment of some species. To date there have been no comprehensive investigations of the potential role of these factors.

Attachment 1

Mid-Atlantic Fishery Management Council

Scientific and Statistical Committee Meeting

July 21 – 23, 2021 via Webinar

Webinar Information
(Note: same information for all three days)
Link: July 2021 SSC Meeting
Call-in Number: 1-844-621-3956
Access Code: 173 421 7574##

REVISED AGENDA*

*** Note: the agenda for Thursday, July 21st was revised slightly to include additional time from 2:00 – 3:00 p.m. to continue the Atlantic Mackerel discussion from Wednesday, July 21st. Other minor modifications to scheduled times were also adjusted to account for the mackerel addition.**

Wednesday, July 21, 2021

12:30 Welcome/Overview of meeting agenda (P. Rago)

12:40 Golden Tilefish ABC specifications for 2022-2024 fishing years
- Review of 2021 management track assessment and peer review (P. Nitschke)
- Review of staff memo and 2022 (review) and 2023-2024 ABC recommendations (J. Montañez)
- 2022 (review) and 2023-2024 SSC ABC recommendations (A. Sharov)

3:00 Atlantic Mackerel ABC specifications for the 2022-2023 fishing years
- Review of 2021 management track assessment and peer review (K. Curti)
- Review of staff memo and 2022-2023 ABC recommendations (J. Didden)
- 2022-2023 SSC ABC recommendations (D. Secor)

5:30 Adjourn

Thursday, July 22, 2021

8:30 Scup ABC specifications for 2022-2023 fishing years

- Review of 2021 management track assessment and peer review (M. Terceiro)
- Review of staff memo and 2022-2023 ABC recommendations (K. Coutre)
- 2022-2023 SSC ABC recommendations (J. Boreman)

11:00 Summer Flounder ABC specifications for the 2022-2023 fishing years

- Review of 2021 management track assessment (M. Terceiro)
- Review of staff memo and 2022-2023 ABC recommendations (K. Dancy)
- 2022-2023 SSC ABC recommendations (M. Wilberg)

12:00 Lunch

12:30 Continue with Summer Flounder 2022-2023 ABC specifications

2:00 Continue Atlantic Mackerel discussion from Wednesday, July 21st

3:00 Black Sea Bass ABC specifications for 2022-2023 fishing years

- Review of 2021 management track assessment and peer review (K. Curti)
- Review of staff memo and 2022-2023 ABC recommendations (J. Beaty)
- 2022-2023 SSC ABC recommendations (O. Jensen)

5:30 Adjourn

Friday, July 23, 2021

8:30 Bluefish ABC specifications for 2022-2023 fishing years

- Review of 2021 management track assessment (T. Wood)
- Review of staff memo and 2022-2023 ABC recommendations (M. Seeley)
- 2022-2023 SSC ABC recommendations (C. Jones)

11:00 Review and discuss RSA project update by SSC Economic Work Group

12:00 Other Business

- Joint Council-SSC meeting topics

12:30 Adjourn

Note: agenda topic times are approximate and subject to change

Attachment 2

MAFMC Scientific and Statistical Committee

July 21 – 23, 2021

Meeting Attendance via Webinar

Name	Affiliation
SSC Members in Attendance:	
Paul Rago (SSC Chairman)	NOAA Fisheries (retired)
Tom Miller	University of Maryland – CBL
Ed Houde	University of Maryland – CBL (emeritus)
Dave Secor	University of Maryland – CBL
John Boreman	NOAA Fisheries (retired)
Lee Anderson (July 21 and 22 only)	University of Delaware (emeritus)
Jorge Holzer (July 21 and 22 only)	University of Maryland
Yan Jiao	Virginia Tech University
Rob Latour	Virginia Institute of Marine Science
Brian Rothschild (July 21 and 23 only)	Univ. of Massachusetts – Dartmouth (emeritus)
Olaf Jensen	Rutgers University
Sarah Gaichas	NOAA Fisheries NEFSC
Wendy Gabriel (July 23 only)	NOAA Fisheries (retired)
Mike Wilberg (Vice-Chairman)	University of Maryland – CBL
Mike Frisk	Stony Brook University
Mark Holliday	NOAA Fisheries (retired)
Cynthia Jones	Old Dominion University
Gavin Fay	U. Massachusetts—Dartmouth
Others in attendance (only includes presenters and members of public who spoke):	
Paul Nitschke (July 21 only)	NEFSC
Kiersten Curti (July 21 and 22 only)	NEFSC
José Montañez	MAFMC staff
Jason Didden	MAFMC staff
Brandon Muffley	MAFMC staff
Laurie Nolan (July 21 only)	F/V Sea Capture
Doug Christel (July 21 and 22 only)	GARFO
Mark Terceiro (July 22 only)	NEFSC
Bonnie Brady	Long Island Commercial Fisheries Assoc
Karson Coutré	MAFMC staff
Kiley Dancy	MAFMC staff
Julia Beaty	MAFMC staff
Jeff Kaelin	Lunds Fisheries
Cynthia Ferrio (July 23 only)	GARFO
Tony Wood (July 23 only)	NEFSC
James Fletcher (July 22 and 23 only)	United National Fisherman's Assoc.

Attachment 3

OFL CV Decision Table Criteria (updated June 2020)

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 or highly uncertain 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.	Single model structure with many parameter sensitivities explored. Moderate agreement among different model runs indicating low sensitivities of model results to specific parameterization.	Highly divergent outputs from multiple models or no exploration of alternative model structures or sensitivities.
Retrospective analysis	Minor retrospective patterns.	Moderate retrospective patterns.	No retrospective analysis or severe retrospective patterns.
Comparison with empirical measures or simpler analyses	Assessment biomass and/or fishing mortality estimates compare favorably with empirical estimates.	Moderate agreement between assessment estimates and empirical estimates or simpler analyses.	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 low risk of change in productivity due to 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 moderate risk of change in 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 are variable and degrading. Comparable species in the region have high uncertainty in short term predictions. Climate vulnerability analysis suggests high risk of changing productivity from changing climate.
Trend in recruitment	Consistent recruitment pattern with no trend.	Moderate levels of recruitment variability or modest consistency in pattern or trends. OFL estimates adjusted for recent trends in recruitment. OFL estimate appropriately accounted for recent trends in recruitment.	Recruitment pattern highly inconsistent and variable. 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. Fishing mortality at levels expected to influence population dynamics in recent years.	Moderate agreement in the surveys to changes in catches. 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. "One-way" trips for production models.
Simulation analysis/MSE	Can be used to evaluate different combinations of uncertainties and indicate the most appropriate OFL CV for a particular stock assessment.		

Attachment 4

SSC-Approved OFL CV Decision Table for Golden Tilefish

Decision Criteria	Summary of Decision Criteria Considerations	Assigned OFL CV Bin (60/100/150)
Data quality	**Surveys** • No fishery-independent survey data are available, but pilot fishery-independent surveys have been conducted in 2017 and 2020. • Three commercial CPUE indices have been developed from longline fleet records: 1973-1982, 1979-1993, and 1990-2020. • A VTR index has been updated with data through 2020. **Landings and discards** • Historical commercial landings data are available since 1915. • The assessment uses commercial landings data since 1970. • Commercial discard estimates are low (1.2% of landings in the last five years), as is recreational harvest; neither was used as a component of catch removals in the assessment model. • Improved collection and processing of age data to make year specific age length keys (see below). • Projections are sensitive to inclusion of unclassified market category (small sample of small fish) from recent years as this is the only indication of potential recruitment.	100%
Model appropriateness and identification process	• The last full assessment was completed in 2017, using data through 2016. The most recent update in 2021 is a management track assessment (MTA) with expedited peer review. • The assessment uses a forward-projection age-structured model updated with landings, catch-at-age and mean weight-at-age by using updated pooled and year-specific age-length keys, and commercial CPUEs through 2020. • Increased availability of age data in 2021allowed for the use of additional data within the pooled age-length key, and the use of year-specific age keys for the most recent years. The final model run used the updated pooled age-length key for years with age data gaps. • The MSY estimate relies on a dome-shaped selectivity curve, which suggests a large portion of the population is not vulnerable to harvest.	100%
Retrospective analysis	• The final model run in the 2021 MTA had minor retrospective patterns in F, SSB, and age-1 recruitment. No retrospective adjustments were made to the assessment output. • Bridge run performance showed good agreement between assessments.	60%
Comparison with empirical measures or simpler analyses	• The 2021 MTA identified qualitative metrics of stock status, including VTR-based CPUE trends, that concluded stock biomass has been increasing over time. • Landings-at-length suggest a broad distribution of both younger and older fish in the fishery, with no evidence of size or age truncation in the most recent years of the time series.	150%

	• No assessment independent estimates of population scale.	
Ecosystem factors accounted	• Ecosystem factors were not incorporated into the 2017 assessment nor the 2021 MTA update. • Climate vulnerability analysis (Hare et al. 2016) ranked tilefish high risk (https://www.st.nmfs.noaa.gov/data-and-tools/NE-CVA/pdf/Tilefish.pdf).	150%
Trend in recruitment	• A recent large year class (2014) has started to recruit to the commercial fishery's large-medium market category in 2020. Another above-average year class likely occurred in 2017, but its size remains highly uncertain since it just began recruiting to the fishery. • Estimates of recruitment to the fishery are very uncertain because there is a lack of information on the abundance of young fish in the commercial index and a lack of fishery independent surveys that capture young fish. • Doesn't appear to be a substantial trend in recruitment, so no need to constrain how recruitment is used in forecasts.	100%
Prediction error	• A comparison of the 2018-2020 assessment-based projections of SSB with a constant 742 mt ABC to estimates of SSB based on year-specific aging keys suggests a low prediction error in recent years. • Unable to consider more than two assessments for consistency.	100%
Assessment accuracy under different fishing pressures	• F, SSB, and indices of recruitment have been relatively level for more than a decade. Management has been steady over this period. • SSB declined precipitously in the late 1970s and early 1980s, which was associated with a steep increase in F. A reduction in F in the late 1990s is associated with an increase in SSB to its current level beginning around 2010. • F has been near the management reference point in recent years, such that it should have measurable effects on population dynamics.	100%
Simulation analysis/MSE	• No formal MSE-type analyses have been conducted for this stock. • Simulation analysis for golden tilefish management currently in progress.	NA

Attachment 5

SSC-Approved OFL CV Decision Table for Scup

Decision Criteria	Summary of Decision Criteria Considerations	Assigned OFL CV Bin (60/100/150)
Data quality	**Surveys** • Synoptic surveys over the stock area include the NEFSC spring and autumn bottom trawl surveys, but these surveys show large interannual fluctuations that reflect availability rather than abundance in any single year. • Surveys generally rarely catch fish age three and older, although older ages are present in commercial and recreational catch at ages. Other surveys do not cover the entire stock area, and most catch few fish over age 2. The inclusion of multiple state surveys, which by themselves are geographically restricted, do provide broad coverage of the stock area in aggregate. • Covid related issues limited coverage of state and federal surveys. **Landings and discards** • 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. • About 44% of the total catch in weight is based on new MRIP estimates. • Length sampling of recreational landings has generally been adequate since 1988. • Recreational discard is low. • Covid-related issues introduce uncertainty into catch estimates, requiring imputation methods for 2020 estimates.	60%
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 modelling adjustments. • Addition of new selectivity block improved the model diagnostics for the 2021 management track assessment. • A significant portion of the stock biomass is represented by the plus group, which is assumed to be lightly exploited because of the selectivity pattern applied. • About 25 different configurations were explored in the 2015 benchmark. • The effect of new MRIP estimates on continued validity of prior sensitivity analyses depends on the magnitude of the change.	100%

	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 latest management track assessment.	
Retrospective analysis	• Retrospective patterns were not degraded from earlier assessment results following the addition of the 2013-present selectivity block. • Retrospective patterns were minor: F was overestimated by 20% and SSB was underestimated by 14% over the last seven terminal years. • Adjusted 2019 estimates were within the model estimate 90% confidence intervals. • General trends in retrospective patterns for SSB, R, and F have been consistent for the past four assessments.	60%
Comparison with empirical measures or simpler analyses	• Age structure in fishery and survey catches has been expanding since the 1990s. • Aggregate survey indices remain near time series highs, although there is evidence of declines in the last three years. • 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. • No empirical estimates of scale are available.	100%
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 signals were observed. • Scup are considered moderately vulnerable to climate effects in the Hare et al. (2016) report.	100%
Trend in recruitment	• Trends in recruitment have been consistent with no apparent trend; although the year classes in 2014 and (especially) 2015 were above average, the 2016 – 2019 year classes were below average. • R/SSB has declined over the time series and has remained low, as would be expected as a result of the large stock size. • OFL projections were sampled from estimated recruitment for 1984-2019; the SSC found this to be appropriate.	60%
Prediction error	• No estimate of prediction error is feasible at this point, given the inclusion of revised MRIP data in the updated assessment and attendant effects on biomass estimates. However, the updated MRIP data lead to relatively little change in estimates of F and SSB of Scup, so prediction error is unlikely to increase.	100%
Assessment accuracy under different fishing pressures	• Fishing mortality declined by more than four-fold over the assessment series, while SSB increased more than ten-fold. • In the most recent years, fishing mortality rates have been moderate and at levels expected for management targets. • Fishing mortality in the past 17 years has been low, but increases in SSB, R, C, and survey indices are consistent.	60%
Simulation analysis/MSE	• No formal MSE-type analyses have been conducted for this stock.	NA

Attachment 6

SSC-Approved OFL CV Decision Table for Summer Flounder

Decision Criteria	Summary of Decision Criteria Considerations	Assigned OFL CV Bin (60/100/150)
Data quality	**Surveys** • R/V Bigelow indices take account of trawl efficiency estimates at length from 'sweep-study' experiments. • Data rich assessment with many fishery-independent surveys incorporated and with relatively good precision of the fishery dependent data. **Landings and discards** • Estimates of recreational catch came from newly calibrated MRIP time-series. • Uncertainty from imputation of MRIP recreational catch in 2020 influences projections, though not the assessment itself.	60%
Model appropriateness and identification process	• The research track assessment (SAW-66) included consideration of alternative models (sex-specific ASAP and sex-specific state space), model configurations, and sensitivity analyses of key assumptions. • Most of which (alternative models) showed similar stock trends and stock status.	60%
Retrospective analysis	• No major persistent retrospective patterns were identified in the most recent model.	60%
Comparison with empirical measures or simpler analyses	• The last benchmark assessment included a comparison with swept area biomass. Simple to more complex models have generally shown consistent estimates of biomass.	60%
Ecosystem factors accounted	• No ecosystem factors were included in the assessment. • No factor ("driver") was identified as strongly influencing the spatial shift in spawner biomass or the level of recruitment. • Classified as "moderate climate vulnerability" by Hare et al. (2016).	100%
Trend in recruitment	• The most recent 9-year recruitment series is used for OFL projections, because near-term future conditions are more likely to reflect recent recruitment patterns than those in the entire 38-year time series. • There has been no apparent recent temporal trend in stock-wide recruitment.	60%
Prediction error	• Prior assessments were largely consistent prior to the change in MRIP estimates (and since this change), but the scale change with changes in assumptions about the MRIP data is substantial.	100%
Assessment accuracy under different fishing pressures	• Fishing mortality has been relatively high during the time series.	60%
Simulation analysis/MSE	• An MSE is currently being conducted, but has not yet been completed.	NA

Attachment 7

SSC-Approved OFL CV Decision Table for Black Sea Bass

Decision Criteria	Summary of Decision Criteria Considerations	Assigned OFL CV Bin (60/100/150)
Data quality	**Surveys** • 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-1fish only, requiring use of a Recreational Catch Per Angler (CPA) index. • Recreational CPUE time series for both the northern and southern regions were used in model fitting. **Landings and discards** • 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. • MRIP coverage in 2020 was only partial requiring some imputation.	100%
Model appropriateness and identification process	• Black Sea Bass 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. The current approach for calculating the fishing mortality rate and the fishing mortality reference point uses a fixed and equal weighting between the northern and southern regions despite evidence for changing stock distribution and catches among the two regions. • 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.	60%
Retrospective analysis	• Substantial retrospective bias in both northern and southern sub-areas was present in the 2019 operational assessment (Mohn's r>0.4) – although the direction of bias is in opposite directions in the two sub-areas.	150%

	• The retrospective pattern continued in the 2021 MTA but was larger in magnitude. The retrospective biases were 2-3x larger in the north than in the south. • 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.	60%
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 BSB productivity has thus far increased with warming (Free et al. 2019). • Black Sea Bass were determined to have high climate vulnerability (Hare et al. 2016).	150%
Trend in recruitment	• OFL is calculated based on most recent, higher, but more variable recruitment. • Black Sea Bass 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. Continued evidence to support strong 2015 year class. • The 2017 year class may be one of the lowest in the time series.	100%
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 considerably more challenging.	100%
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 F's were reduced; i.e., a strong response to declining F. Recent F's have been near Fmsy.	60%
Simulation analysis/MSE	• No formal MSE-type analyses have been conducted for this stock.	NA

Attachment 8

SSC-Approved OFL CV Decision Table for Bluefish

Decision Criteria	Summary of Decision Criteria Considerations	Assigned OFL CV Bin (60/100/150)
Data quality	**Surveys** • A fishery-dependent measure of abundance is obtained as catch-per-unit effort from the MRIP intercept survey (1985-2019), which constitutes a large component of data (recreational catch [landings+discards] = 88% of total on average). • 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. This survey does not cover the southern portion of the species range. Bigelow estimates adjusted for results of cooperative research studies on gear efficiency. • Additionally, eight regional surveys are used in model tuning. **Landings and discards** • Age data available for all years in surveys (1982-2019), 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 included in analysis. • Recreational discards are high at approximately 50% of the recreational landings over the time series, but greater than landings in 2019 thus, adding 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 discard mortality rate.	100%
Model appropriateness and identification process	• A complex ASAP SCAA model was used with fixed M=0.2 was used in the assessment model. This may not account for age-specific predation of bluefish by other predators. • 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.	100%
Retrospective analysis	• Retrospective patterns in the operational assessment are considered minor, with retrospective errors over the last 7 terminal years averaging -22% for Fand +23% for SSB. • The SARC60 benchmark and subsequent updates showed similar trends for SSB, F, and recruitment.	100%

	• 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 six 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 composition and weight-at-age. • Comparisons with simpler estimates of biomass have not been done. • Comparisons of mortality rates with catch-curve estimates were made.	100%/150%
Ecosystem factors accounted	• Aspects of the ecosystem seem to be changing in recent years. • The benchmark assessment used a thermal niche model to assess survey catchability of Bluefish, but thermal niche modeling was not found to improve the assessment. • Bluefish have a low CVA ranking (Hare et al. 2016).	100%
Trend in recruitment	• Average recruitment from 1985 to 2019 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 when recruitment was higher. • The highest recruitment occurred in 1989 and the lowest in 2019 (approximately 3-fold variability).	100%
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. • The MRIP calibration results in different patterns across the species that rely on this measure, hence increasing uncertainty. Because this stock is a very large recreational utilization (>80% of the catch), it is heavily influenced by MRIP estimates. • Finally, the mode of fishing shows a trend to increasing shore fishing in the most recent years because shore fishing has a larger adjustment in MRIP than the other categories.	100%
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 but a slight increase in 2019 to 0.172 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 over the 2010-2019 period have been relatively high with several recent ones low, resulting in better data contrast for modeling.	60%
Simulation analysis/MSE	• No formal MSE-type analyses have been conducted for this stock.	NA

Attachment 9

List of Acronyms used in this report.

Acronym	*Definition*
ABC	Acceptable Biological Catch
AOP	Assessment Oversight Panel
AP	Advisory Panel
ASAP	A Stock Assessment Program
Bmsy	Biomass level at MSY
CV	Coefficient of Variation
DFO	Department of Fisheries and Oceans
EAFM	Ecosystem Appoach to Fisheries Management
Fmsy	Fishing Mortality rates at MSY
FSV	Fishery Survey Vessel
GARFO	Greater Atlantic Regional Fisheries Office
GRA	Gear Restriction Areas
MAFMC	MidAtlantic Fishery Management Council
MRIP	Marine Recreational Information Program
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSY	Maximum Sustainable Yield
MTA	Management Track Assessment
NEFSC	Northeaset Fisheries Science Center
NMFS	National Marine Fisheries Service
NRCC	Northeast Region Coordinating Council
OFL	Overfishing Limit
PRC	Peer Review Committee
RHL	Recreational Harvest Limit
RSA	Research Set Aside
RTA	Research Track Assessment
RV	Research Vessel
SARC	Stock Assessment Review Committee
SAW	Stock Assessment Workshop
SSC	Scientfic and Statistical Committee
TAL	Total Allowable Landings
TOR	Terms of Reference