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M E M O R A N D U M

Date: August 7, 2024
To: Wes Townsend, Chairman, MAFMC
From: Paul J. Rago, Ph.D., Chair, MAFMC Scientific and Statistical Committee (SSC)
Subject: Report of the July 23-25, 2024 SSC Meeting

Executive Summary

A summary of the ABC recommendations for 2025 and beyond is provided in Table 1. Brief descriptions of the rationales for each species and other topics discussed during the meeting follow.

Bluefish— The Management Track (MT) assessment in 2023 indicated the stock is not overfished nor is overfishing occurring. Bluefish are in the 3rd year of a 7-year rebuilding program, based on a $F_{rebuild}$ of 0.183 yr-1. After review of available new information on stock indices, catches, and fishery performance measures, **the SSC recommends continuation of the previously recommended ABC for 2025 of 9,903 mt.**

Summer Flounder—The MT assessment in 2023 indicated that the stock was not overfished but that overfishing was occurring, albeit at only 3% higher than the F_{msy} proxy. After review of available new information on stock indices, catches, and fishery performance measures, the **SSC recommends continuation of the previously recommended ABC for 2025 of 8,761 mt.**

Scup— The MT assessment in 2023 indicated the stock is not overfished nor is overfishing occurring. A small error was discovered by NEFSC staff in the projections used to set measures for 2024-2025. Correcting the error resulted in a 4% increase in the projected ABC for 2025 from 18,028 mt to 18,740 mt. After review of available new information on stock indices, catches, and fishery performance measures, the **SSC recommends modifying the previously recommended ABC for 2025 to 18,740 mt**.

Blueline Tilefish—The status of this stock is unknown. There is no additional information available to suggest the current ABC is inappropriate. SEDAR 92 is currently developing an operational assessment and will be updating the data and assessment tool used to derive the original ABC recommendation set in 2018. After review by the SSC of available new

information on stock indices, catches, and fishery performance measures, the **SSC recommends continuation of the previously recommended ABC for 2025 of 46.5 mt (100,520 lb)**.

Golden Tilefish—A new stock assessment approach, using the state-space Woods Hole Assessment Model (WHAM), was applied to this "data moderate" species and indicates the stock is not overfished but overfishing was occurring in 2023, the terminal year of the assessment. No fishery independent surveys of relative abundance are available. Golden Tilefish live in deep water and burrow in the bottom, which greatly reduces their catchability in trawl-based surveys. Instead, estimated changes in relative abundance were based on analyses of commercial landings per unit effort using a Generalized Linear Model (GLM). Although aging data has improved greatly in recent years, the absence of age data during a 12-year gap (1983-1994) creates considerable uncertainty in model formulation. In particular, the model estimates a sharp transition from a relatively flat-topped selectivity pattern in the early period to a more dome-shaped selectivity period in recent years. This feature results in increased spawning stock abundance. Direct evidence to support or refute this selectivity transition awaits further analyses of three fishery independent long-line surveys and better characterization of historical fisheries and spatial patterns of contemporary fisheries. Incorporation of random effects on both numbers at age and selectivity in the assessment model created instability in model estimates and stock status. Recent history of the fishery under relatively constant quotas and ITQs have induced economic stability and profitability. The final model formulation from the MT assessment strikes an appropriate balance among these competing perspectives. However, short-term model projections suggest a rapid increase in abundance when fished at $F_{msy,}$ which is somewhat incongruous with recent stock history. In view of the considerable sensitivity of the model to alternative parameterizations, an OFL CV of 150% was used. **The SSC agreed with the final model and provided two scenarios that satisfy the Council's Risk Policy:**

- **Annual ABCs of 566 mt, 973 mt and 1,018 mt for 2025-2027, respectively, OR**
- **A constant ABC of 852 mt over this three-year period.**

Black Sea Bass—The stock assessment model for this stock is a spatially-structured state-space model (multi-WHAM) that includes seasonal migration between Northern and Southern components. It also relies on a spatio-temporal model-based survey index (VAST) that integrates the NEFSC spring trawl survey with nine other smaller scale surveys into a single estimate of abundance. The model also incorporates estimates of relative abundance derived from catch per angler estimates for Black Sea Bass, using information from trips that caught a guild of related species. All these features were outcomes of a multi-year Research Track assessment completed in late 2023. The 2024 MT assessment in June represented the first implementation of the new modeling paradigm and its use for deriving Biological Reference Points and projections. The SSC appreciated the conceptual advances, but noted that many of the model features are not easily compared to previous models, particularly fishing mortality reference points. As in previous models, the stock is not overfished and overfishing is not occurring. The stock biomass is more than twice the B_{msy} level and expected to decline towards the biomass target in the short run, but not as quickly as previously thought. Another MT will be conducted in 2025 to set specifications for 2026 and 2027. (The shortened interval between

assessments is a result of a management need to synchronize specifications among the other stocks in the Fishery Management Plan.). An OFL CV of 150% was used, primarily due to the uncertainty associated with MRIP estimates of recreational removals. **The SSC recommends an ABC of 6,027 mt for 2025.**

Butterfish—This stock is not overfished nor is overfishing occurring. The MT assessment suggests the stock is well above B_{msy} and lightly fished, but these conclusions depend heavily on inter-related estimates of natural mortality (M) and survey catchability. Both factors are primary determinants of stock size and subject to considerable uncertainty. Some of this uncertainty is manifest in the magnitude of the F_{msy} proxy. As in the prior MT assessment (2022), the SSC substituted an alternative F_{msy} equal to 2/3 M. This reduces the magnitude of projected catches and is thought to be more consistent with ecological properties for forage fish**. An OFL CV of 150% was used. Given these caveats the SSC recommends ABCs for 2025 and 2026 of 17,115 mt and 13,842 mt, respectively.**

Atlantic Surfclam— The stock is at a high level of abundance. The stock is not overfished nor is overfishing occurring. Catch limits for 2025 and 2026 are already in place based on an earlier MT stock assessment. However, the June 2024 MT assessment revealed that the OFLs for these years differ from earlier estimates. Therefore, the SSC recommends replacing the previously specified ABCs for 2025-2026 with a revised set of ABCs based on a 2025-2028 projection from the 2024 assessment. This establishes a consistent scientific (or could also use "technical") basis for ABCs and satisfies a criterion for best scientific information available. An OFL CV of 100% was used. **The recommended ABC levels for 2025 to 2028 are 46,141 mt, 43,372 mt, 42,088 mt, and 41,971 mt, respectively.**

Ocean Quahog The stock is at a high level of abundance. The stock is not overfished nor is overfishing occurring. After review of available new information on stock indices, catches, and fishery performance measures, the **SSC recommends continuation of the previously recommended ABC for 2025 of 44,020 mt.**

Recreational Measures Setting Process Framework/Addenda

The SSC's review highlighted the following points of concern:

- Recreational harvest measures are developed after the ABC has been set, and therefore do not influence ABC recommendations directly. However, if ABCs are consistently exceeded in the future, assumptions about the expected catch in the current year will need to be revised. Exceeding the ABC in the base year of the projection will reduce the stock size and projected catches in future years.
- F-based approaches were interesting conceptually and worthy of further development, but insufficient to form the basis for setting recreational measures.
- All proposed alternatives shift the objective of management away from achieving the RHL to changing the recreational catch by specific amounts based on observed stock characteristics. Alternatives rely on observable features of the stock and associated fisheries to create binned responses to change recreational catches by predefined levels of liberalization or restriction. As such, the focus of management shifts from achieving the RHL to achieving a given level of change in recreational catch.

- The binning approach and the change in management focus increases the likelihood that the ABC will be exceeded for abundant stocks that are close to, or above, their biomass at maximum sustainable yield. The Council's risk policy allows for little uncertainty for stocks at these levels, and, to date, no management uncertainty is recognized in determination of either ACLs or ACTs.
- It is unknown whether the biennial setting of recreational measures will promote stability or induce instability in recreational measures, or avoid overfishing. Differences among the recreational species and associated fisheries, uncertainty of measures used to define the status bins, and detectability of short-term trends in recruitment will need to be considered.
- Management strategy evaluation (MSE) results were limited to Summer Flounder, but are likely to be broadly applicable. MSE considered effects of bag limits, season lengths, and size limits individually but not in combination. No single measure performed best. In recent management, combinations of all measures, varying by state, are used.
- MSE should be considered a starting point to compare the performance of alternatives, but cannot identify the "best" alternative without additional context. Further work is needed to consider effects of different starting conditions (e.g., stock status), varying proportions of removals by recreational fisheries, and mixed recreational management regulations.

Updated Research Findings for Surfclam Genetics

A study of the genetics of Atlantic Surfclam was presented to the SSC in 2023 but was incomplete due to loss of sampling sites during the Covid pandemic. Updated results provide strong empirical evidence of the linkages among stock areas under a hypothesis known as "stepping stones with isolation by distance." Repeat sampling at several sites verified the persistence of unique Operational Taxonomic Units (OTU) for periods up to 20 years apart. There are two subspecies and evidence of hybrids. Commercial harvests come primarily from the offshore OTU with minor contributions from the inshore OTU. The results provide valuable insights on population genetics of the Atlantic Surfclam and potential long-term effects of climate change. There are, however, no immediate concerns for current management practices.

Table 1. Summary of the catch limit recommendations, in metric tons, made by the Mid-Atlantic SSC during their July 23-25, 2024 meeting. The status of Blueline Tilefish is unknown. None of the remaining stocks were overfished. Overfishing was occurring for Summer Flounder and Golden Tilefish. No overfishing was occurring in the remaining stocks. The OFL CVs for Golden Tilefish, Tilefish, Black Sea Bass, Butterfish, and Atlantic Surfclam were derived using criteria approved by Council in June 2024. OFL – Overfishing Limit; ABC – Acceptable Biological Catch; P* is the probability of overfishing based on the Council's Risk Policy, OFL CV – Overfishing Limit Coefficient of Variation.

Species	Year	OFL	ABC	P*	OFL CV
Bluefish	2025	11,734	7,929	**	100%
Summer Flounder	2025	11,325	8,761	0.32	60%
Scup	2025	19,135	18,740	0.49	100%
Blueline Tilefish	2025	***	45.6	***	***
Golden Tilefish (annual ABC)	2025 2026 2027	920 1,186 1,147	566 973 1,018	0.33 0.43 0.46	150%
Golden Tilefish (constant ABC)	2025 2026 2027	920 1,137 1,123	852 852 852	0.47 0.40 0.40	150%
Black Sea Bass	2025	6,193	6,027	0.49	150%
Butterfish	2025 2026	17,587 14,224	17,115 13,842	0.49 0.49	150%
Atlantic Surfclam	2025 2026 2027 2028	58,221 55,326 53,687 52,960	46,141 43,372 42,088 41,971	0.39 0.39 0.39 0.39	100%
Ocean Quahog	2025	44,948	44,020	0.49	100%

** The risk policy for bluefish is based on a 7-yr rebuilding strategy with an annual $F_{rebuild}$ ==0.183.

*** The output from the 2018 DLMTool was treated as an OFL (236,329 pounds) and the SSC applied an OFL CV of 150%, assuming a B/Bmsy ratio of 1.0. The ABC was then split between the Mid-Atlantic and South Atlantic jurisdictions to derive the Mid-Atlantic ABC of 45.6 MT.

Full Report

Background

The SSC met in person in Philadelphia, PA and via webinar from 23 – 25 July 2024, to develop Acceptable Biological Catch (ABC) recommendations for Blueline Tilefish, Golden Tilefish, Black Sea Bass, Butterfish, and Atlantic Surfclam. Additionally, the SSC reviewed previously recommended ABCs for Bluefish, Summer Flounder, Scup, and Ocean Quahog. Also, the SSC developed comments on the Recreational Measures Setting Process Framework/Addenda. A separate report of the SSC for the Recreational Measures review will be included in the Council's briefing materials. The SSC provided comments to the principal scientist on his updated study of Atlantic Surfclam genetics. The agenda for the meeting and the list of participants are provided in Attachments 1 and 2, respectively. A summary of the ABC recommendations by the SSC is provided in the Executive Summary (Table 1).

I wish to express my appreciation to Brandon Muffley for his leadership in organizing the meeting and to Council staff named in the individual species sections below. Scientists from NEFSC also deserve special mention for their detailed presentations and participation during the three-day meeting. Attendance in person by Emily Liljestrand and Paul Nitschke is greatly appreciated. Their attendance facilitated the SSC's interpretation of the results of the recent Research Track (RT) and Management Track (MT) assessments for Black Sea Bass and Golden Tilefish, respectively. Timely contributions from other Center staff were greatly appreciated.

Members of the public also contributed to the meeting. Their contributions provided valuable context for the scientific discussions and stimulated debates within the SSC.
Finally, I thank all the members of the SSC for their lively and thoughtful contributions. Many members served as discussion leads of the Terms of Reference and the OFL CV matrices. Others served as rapporteurs for the committee's summaries. I thank Sarah Gaichas, Geret DePiper, and Brandon Muffley for contributing their comprehensive notes from the meeting.

All documents referenced in this report can be accessed via the SSC's meeting website https://www.mafmc.org/ssc-meetings/2024/july 23-25. A comprehensive guide to the acronyms in this and earlier reports is provided in Attachment 8.

Bluefish

Jose Montanez, MAFMC, summarized recent fishery performance of recreational and commercial fisheries for bluefish. Aggregate landings are the lowest in the time series. Survey indices suggest that the 2019 year class is relatively strong. Based on the most recent Management Track (MT) assessment, the stock is not overfished nor is overfishing occurring. Bluefish are in the 3rd year of a 7-year rebuilding program based on a $F_{rebuild}$ of 0.183. The stock is not yet rebuilt.

The SSC inquired about potential changes in diet of this well-studied species. Changes in available forage species may be affecting the distributional shifts reported by Advisory Panel members.

Given the importance of recreational catches, the changes in the Marine Recreational Information Program (MRIP) estimates in 2018 had a major effect on stock size estimates. Still, revisions at the 2022 Research Track (RT) assessment supported the validity of earlier perceptions of stock abundance.

Given that the recreational and commercial catches were under their respective catch limits and the measures of relative abundance in 2023 were about the same as in 2022, **the SSC recommends continuation of the previously recommended ABC for 2025 of 9,903 mt.**

Summer Flounder

Kiley Dancy, MAFMC, summarized the current information on the fishery and stock status. The MT assessment in 2023 indicated that the stock was not overfished but that overfishing was occurring, albeit at only 3% higher than the F_{msy} proxy. Recruitment has been below average since 2011 and early signs of a strong 2018 year class have not been realized. Members of the Advisory Panel noted colder water and lower salinities have been observed through much of the Mid Atlantic region this year and suggested these may be factors in delaying arrival of fish to fishing areas and reducing growth.

To address some of these uncertainties, the SSC recommended including plots of survey data with confidence intervals. It was noted that exceedance of the overfishing threshold is not unexpected given the definition of P*. More specifically, overfishing is expected to occur about 30% to 40% of the time given the relative biomass of Summer Flounder, and the Council's risk policy, and the absence of a management uncertainty buffer.

Fisheries have been below their catch limits, surveys are not showing any marked changes, and the catch projections are appropriately based on a reduced set of recent, lower than average, recruitment estimates. With this perspective, the **SSC recommends continuation of the previously specified ABC for 2025 of 8,761mt.**

Scup

Hannah Hart, MAFMC, provided an overview of the recent fishery information and an update on relative abundance indices. Survey indices in 2023 were near the median values. Based on the 2023 MT assessment, the stock is not overfished nor is overfishing occurring. A small error was discovered in the projections used to set measures for 2024-2025. This resulted in a 4% increase in the projected ABC for 2025 from 18,028 mt to 18,740 mt.

The OFL for Scup has been exceeded three years in a row (2021-2023). SSC expressed concerns about the developing pattern of catches routinely exceeding the OFL. This may require projection updates of within-specification period ABCs to revise out-year projections. Currently, in the projections reviewed by the SSC,it is assumed that the ABCwill be caught in the initial year and all subsequent years. This is an iterative process such that departures from this assumption have consequences for future ABCs. The projected catch is used to reduce population abundance when recalculating reference points. If, as has happened in the last 3 years, the ABC catch is exceeded, a greater reduction in population abundance would be needed

to ensure the SSC does not set an ABC that leads to overfishing. An ABC overage in 2025 might require re-estimation of quotas for 2026 that were predicated on removal of the actual ABC in 2025. The SSC wishes to make clear that this action is not the SSC trying to account for management uncertainty. The re-estimation of the ABC in projections would be necessary solely to ensure the SSC does not set an ABC that with the best scientific information available can be shown to be overfishing (i.e., p*> 0.5). The SSC also noted that no management buffers were applied for either the ACLs or ACTs. Within-season forecasts of expected end of year catches have proven difficult, so it is not clear if overages in 2024 will occur. However, the impacts of overages on ABC estimation should be addressed in the projections developed for Scup at the next MT in 2025.

Notwithstanding these concerns, the **SSC recommends an increase of about 4% from the previously recommended ABC for 2025 to a new value of 18,740 mt**. The implications of routine ABC and OFL overages will need to be understood by the Council.

Blueline Tilefish

Hannah Hart, MAFMC, provided an overview of recent catch information on Blueline Tilefish. The assessment update of this stock is conducted through SAFMC and will be updated at SEDAR 92 in early 2025. MAFMC and NEFSC staff are participating in this operational assessment. Based on the results of the 2016 stock assessment, the stock south of Cape Hatteras was not overfished and not experiencing overfishing. The status of the stock north of Cape Hatteras was unknown. Attempts to obtain more information on recreational landings by requiring a permit and mandatory reporting have not been successful to date. The reporting rate in the mandatory reporting scheme is estimated to be about 4%. A contractor has been hired to identify and recommend solutions to improve recreational catch and effort reporting. A final report will be submitted to the Council in October. Estimates from MRIP are imprecise (PSE>100%) and much higher than those from the mandatory program, but the reliance on a "Delphi" method from 2016 to estimate private recreational harvest does not allow strong inferences to be drawn.

Commercial catches vary with landed price, costs, and availability of alternative species. There is some evidence of increased targeting by commercial harvesters. Unsuccessful charter trips for tuna and swordfish are increasingly turning to Blueline Tilefish as a "consolation prize." Total recreational harvest assumes a 3.65 lb average weight which may be more appropriate for inshore populations. Efforts are underway to collect additional biological data and update the average weight of recreationally caught Blueline Tilefish.

There is no additional information available to suggest the current ABC is inappropriate. SEDAR 92 is currently developing an operational assessment and will be updating the catch and biological data being used to derive the original ABC recommendation. After review of available new information on stock indices, catches, and fishery performance measures, the **SSC recommends continuation of the previously recommended ABC for 2025 of 46.5 mt (100,520 lb)**.

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

Terms of Reference

For Blueline Tilefish, the SSC will provide a written report that identifies the following for the 2025 fishing year:

1. *The appropriateness of retaining status quo (i.e., 2024 fishing year) ABC specifications for the 2025 fishing season. If status quo is inappropriate, specify an alternative ABC for 2025 and provide any supporting information used to make this determination;*

The SSC suggests retaining the current 100,520 lb ABC. There is no additional information available to suggest the current ABC is inappropriate. SEDAR 92 is currently developing an operational assessment, updating the data being used with the Data Limited Toolbox approach that originally developed the ABC recommendation.

2. The most significant sources of scientific uncertainty associated with the ABC determination;

The Data Limited Methods Tool provides uncertain estimates even with accurate input data, however the data currently being used is highly uncertain.

- Uncertainty in catch
    - Recreational catch is >70% of total catch.
    - MRIP estimates are highly variable due to rare intercepts (MRIP not currently used in catch accounting).
    - Delphi method-derived constant multiplier that was applied to charter catch to estimate private recreational catch.
    - Recreational catch is in numbers with constant average weight (3.65 lbs) applied, while average weight of individual fish depends on harvest method and location. Smaller fish inshore, larger offshore. Weight at length may be more appropriate to estimate total catch weight.
    - Discard mortality is highly uncertain and likely varies across gear/area.
- Data limited stock assessment based on a Management Strategy Evaluation tool for Mid-Atlantic portion of the stock was last updated in 2017. (New SEDAR Data Limited Tool update is in progress and expected for delivery to Management 2025.)
- Lack of reference points for Mid-Atlantic portion of the stock.
- Catch history may be unreliable for a stock that could be expanding its range.
- Although work is underway to assess the permitting process, the current belief of the SSC is that reporting likely underrepresents both fishing effort and landings.

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

- Staff memo
- Supplemental staff memo updating recreational catch based on July correction to CAMS
- AP report (AP did not have access to updated recreational catch)
- Fishery information document (does not include updated recreational catch)

- Staff presentation

4. 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 represent the best scientific information available.

Golden Tilefish

Paul Nitschke, NEFSC, summarized the results of the most recent MT assessment for Golden Tilefish. This was the first implementation of the results from the RT assessment completed in March 2024. A new stock assessment approach, using the state-space Woods Hole Assessment Model (WHAM) was applied to this "data moderate" species. The previous model was a statistical catch-at-age model (ASAP). Important data concerns include the absence of a fishery independent survey of relative abundance, gaps in aging data, and reliance on three separate CPUE indices, none of which spans the entire data range.

Golden Tilefish live in deep water and burrow in the bottom which greatly reduces their catchability in trawl-based surveys. Instead, relative abundance is based on analyses of commercial landings per unit effort using a Generalized Linear Model (GLM). Although aging data has improved greatly in recent years, the absence of age data during a 12-yr gap (1983-1994) creates considerable uncertainty in model formulation. In particular, the model estimates a sharp transition from a relatively flat-topped selectivity pattern in the early period to a more dome-shaped selectivity pattern in recent years. Direct evidence to support or refute this transition awaits further analyses of the Golden Tilefish long-line surveys and better characterization of historical fisheries and spatial patterns of contemporary fisheries. Incorporation of random effects on both numbers at age and selectivity created instability in model estimates and stock status.

The perception of stock status in the WHAM model is strongly influenced by the inclusion of random effects (RE) on numbers at age, recruitment, and selectivity. In particular, use of RE results in a relatively shallow dome shaped estimate of selectivity with age, which suggests a higher force of mortality on larger fish. This leads to estimates of higher overall fishing mortality and lower current stock sizes. Various metrics of model goodness of fit were helpful but not entirely definitive for distinguishing among alternative parameterizations. The final model formulation from the MT assessment, which fixes full selectivity at ages 5 and 6, is perceived as a reasonable balance among these competing perspectives. However, model projections suggest a rapid increase in abundance when fished at F_{MSY} which is somewhat incongruous with recent stock history and life history.

Jose Montanez, MAFMC, highlighted that Golden Tilefish is primarily harvested by a small fleet of longline vessels with negligible removals from incidental catches by other fleets and recreational harvests. Directed fishery permit holders have IFQs. Fish recruit to the fishery at age 4 and mature at age 5. Most of the catch occurs in just two Statistical Areas (537 and 616). Over the past 24 years of relatively constant quotas, the fishery has been both profitable and stable. The apparent stability of the population and fishery provides additional support for

existing management policies and regulations. The paucity of recent port sampling continues to be an ongoing source of concern. Estimated recreational catch is now incorporated into the model but, due to its very low level, has little effect on stock status. There is no management allocation of catch to the recreational fishery in the current management plan.

Questions and discussions by the SSC were extensive. Concerns were expressed about the basis for the sharp dome-shaped selectivity since 1987 in contrast to the more flat-topped selectivity pattern in earlier years. The SSC appreciated the extensive investigations of alternative model formulations that occurred between the RT and MT assessments. A dome-shaped selectivity pattern implies a larger population of cryptic biomass that is difficult to validate, particularly in the absence of a fishery independent survey. The SSC suggested further analyses of the recent long-line surveys and historical patterns of spatial harvesting as ways of testing this hypothesis. The SSC also inquired about the estimation of age 1 fish and noted that the first empirical evidence of year class abundance occurs roughly 3 to 4 years later, when they recruit to the fishery. Applicability of a recent research on Golden Tilefish population dynamics in the Gulf of Mexico should be reviewed.

The SSC and previous RT and MT review panels noted that larger and older fish were caught historically. This observation again begs the question of how newer fishing practices, exclusion from historical fishing areas, interference with other fixed gear, or abundance in deep unfishable areas may be responsible. In general, the SSC was skeptical of the sharp transition from a flat-topped to dome shaped selectivity, but the absence of age data during this transition undermines the ability to address this argument.

Public comments provided valuable insights on the historical changes in hook type from J-hooks to circle hooks. Gut hooking is rare with circle hooks. Large fish fetch a lower price per pound, have less meat yield per pound, and are generally not targeted by industry. Recent closures of the canyons and conflicts with lobster pot gear were highlighted.

Following these presentations and 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:

Terms of Reference

For Golden Tilefish, the SSC will provide a written report that identifies the following for the 2025-2027 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 SSC finds that the most appropriate type of control rule for Golden Tilefish is “modified by the SSC”.

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;

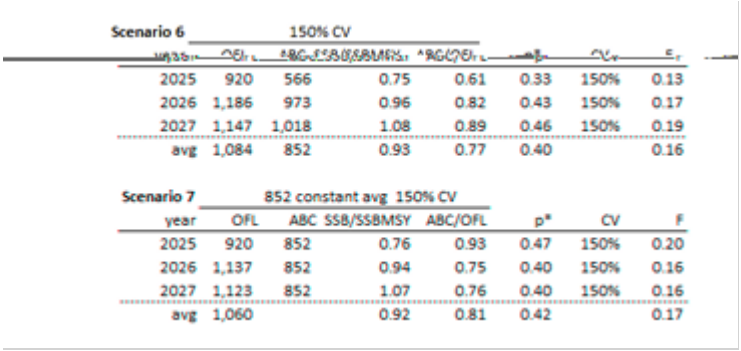
Based on a consideration of the OFL CV criteria table (Attachment 3), the SSC assigns a CV of 150% (Attachment 4).

The OFLs calculated for Golden Tilefish from the assessment are

2025	920 mt
2026	1,186 mt
2027	1,147 mt

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 offers two alternatives for ABCs based on an SSC-modified CV of 150% and the calculated OFLs. The first alternative is a three-year projection based on achieving the highest ABCs within each year without exceeding the Council's risk policy. The second alternative is a three year projection based on achieving the highest average ABC that does exceed the Council's risk policy. The SSC notes these are alternatives. It is not possible to combine options from the different tables to create a hybrid alternative.



Scenario 6			150% CV				
year	OFL	ABC	SSB/SSBMSY	ABC/OFL	p*	CV	F
2025	920	566	0.75	0.61	0.33	150%	0.13
2026	1,186	973	0.96	0.82	0.43	150%	0.17
2027	1,147	1,018	1.08	0.89	0.46	150%	0.19
avg	1,084	852	0.93	0.77	0.40		0.16

Scenario 7		852 constant avg	150% CV				
year	OFL	ABC	SSB/SSBMSY	ABC/OFL	p*	CV	F
2025	920	852	0.76	0.93	0.47	150%	0.20
2026	1,137	852	0.94	0.75	0.40	150%	0.16
2027	1,123	852	1.07	0.76	0.40	150%	0.16
avg	1,060		0.92	0.81	0.42		0.17

The SSC highlights the industry prefers a constant ABC. A constant ABC recommendation results in a P* in the first year of P*=0.47, which is close to the overfishing definition. Equally, the variable ABC results in a final year P*=0.46, also close to the overfishing definition.

The SSC will pay attention to the results from the Golden Tilefish long-line survey scheduled for 2025 as an interim measure. The SSC will also evaluate the extent to which catches are in line with those expected from projections. The SSC will consider length composition of the catch as an indicator of the robustness of recent recruitments.

4. The most significant sources of scientific uncertainty associated with determination of total catch and the ABC;

- There are no fishery independent indices.
- No single fishery-dependent index covers the entire time period.
- There are periods where no age data are available (1983-1994 & 2001-2002).
- There are alternative and potentially viable explanations for our understanding of stock status that have profoundly different implications for management.
- The dome-shaped selectivity curve in the assessment implies that there is a substantial cryptic biomass of older, larger Golden Tilefish in the Mid-Atlantic Bight that is not subject to fishing pressure..
    - There is some evidence of older, larger fish in some regions (e.g., Georges Bank, off MD and VA), and there is some reason to believe that larger, older fish are less vulnerable to the sizes of circle hooks used in the fishery. However, there is little empirical evidence from surveys of the biomass of older, larger fish of the magnitude implied by some of the models.
    - This older and larger cryptic biomass can represent a considerable fraction of the SSB in some simulations where dome shaped selectivity is used, which would provide a resilience to exploitation in the population. If this predicted biomass of older fish is not present to the extent it is estimated by the model, the resilience of the population may be compromised.
- Recreational harvest data remain poorly specified.

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 SSC did not use any additional ecosystem considerations in setting the recommendation options for ABC.

The Research Track assessment considered ecosystem effects on early life stages of Golden Tilefish, but these were not formally incorporated into the assessment model.

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

- Monitor the status of incoming year classes (2021 and 2022) that are driving the projections used to determine the ABC.
- Analyses of alternative selectivity of hook sizes from the long line survey would strengthen our understanding of selectivity.
- Evaluate the distribution of the fishery and how it is changing in response to area closures related to the canyons and shifts in the distribution of the lobster fishery.
- Compare the age distribution of the SSB under the final model with alternative models, particularly the RE model for selectivity and the initial model with RE for numbers (IID) and selectivity fixed to one for age 5 only.

For mid-long term research:

- Explore the implications of age-varying natural mortality M.
- The next assessment should investigate the use of RE for selectivity.
- Explore use of ensembles of models to capture uncertainties of alternative model formulations.

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

- Staff Memo: 2025-2027 Golden Tilefish Specifications Recommendations
- 2025-2027 Golden Tilefish OFL/ABC Projections
- Draft Golden Tilefish OFL CV Decision Criteria Summary
- Draft 2024 Golden Tilefish Management Track Assessment Report
- Draft June 2024 Management Track Peer Review Panel Summary Report
- 2024 Golden Tilefish Advisory Panel Fishery Performance Report
- 2024 Golden Tilefish Fishery Information Document

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

The SSC believes that the methods for determining the recommendations represent the best scientific information available.

Black Sea Bass

Emily Liljestrand, NEFSC, summarized the results of the MT assessment and highlighted the transition from the previous model through the RT assessment. The stock assessment model for this stock is a spatially-distributed state-space model (multi-WHAM) that includes migration between Northern and Southern stock components. It also relies on a newly defined spatio-temporal model (VAST) that integrates the NEFSC spring trawl survey with nine other smaller scale surveys into a single estimate of abundance. Winter bottom temperature is used as an environmental covariate to estimate recruitment in the northern stock area. Finally, the assessment incorporates estimates of relative abundance derived from MRIP catch per angler estimates for Black Sea Bass and a guild of related species.

All of these features were outcomes of a multi-year Research Track peer review completed in late 2023. The MT in June represented the first implementation of the new modeling paradigm and its use for deriving Biological Reference Points and projections. As in previous models, the stock is not overfished and overfishing is not occurring. The stock is more than twice the B_{MSY} level and expected to decline in the short term, but not nearly as quickly as previously thought. The scalar value of F_{MSY} proxy reference point is above 1.0 owing to the complexity of distributing fishing mortality across two spatial units and two fleets within each area. The F_{MSY} is not strictly comparable to previous reference point values for a single area.

Julia Beaty, MAFMC, provided an overview of recent landings, overall fishery performance, and management activities. Since 2014 ABCs have been exceeded, except in 2022. Recreational overages are more common than commercial. Fishermen have reported colder water and lower salinities may be affecting timing of fisheries and availability in 2024. Another MT will be

conducted in 2025 to set specifications for 2026 and 2027. The shortened interval between assessments is a result of a management need to synchronize specifications for all three species within the Fishery Management Plan.

The SSC appreciated the conceptual advances, but noted that many of the model features are not easily compared to previous models, particularly fishing mortality reference points. The SSC discussed the estimation of fishing mortality reference points at length. Concerns were raised about the appropriateness of the algorithm, noting that the force of mortality on the whole population should be estimated as a weighted average of the fishing mortality rates in each area rather than as a sum. The weighting factor is the abundance by age class in each area. After extensive discussion and additional analyses at the meeting, the SSC affirmed that the computations in the model and those presented were done appropriately. The SSC appreciated Emily Liljestrand, Kiersten Curti, Jon Deroba and Tim Miller for their focused efforts to resolve a problem that could have delayed development of an ABC for 2025.

SSC discussions on other assessment performance and interpretation issues addressed the use of a constant natural mortality (M) at age, the types of time series models used to forecast environmental covariates, trend differences in abundance between northern and southern stock areas, and the use of a truncated stanza of recruitment (2000 onwards) for projections. The relative error estimates of MRIP data were highlighted as a concern, particularly considering potential changes that may occur as a result of ongoing survey design experiments. If ABCs continue to be exceeded, the SSC noted that future projections of OFLs may need to alter the typical assumption that the bridge year catches are equal to or less than the ABC.

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

Terms of Reference

For Black Sea Bass, the SSC will provide a written report that identifies the following for the 2025 fishing year:

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 SSC finds that the most appropriate type of control rule for Black Sea Bass is “modified by the SSC”.

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;*

Overall OFL CV based on Tier 1 criteria is 150%, based primarily on uncertainty in the MRIP recreational catch estimates that are dominant in this assessment. The new OFL CV process

cannot set an OFL CV lower than the maximum OFL CV of Tier 1 criteria. Please see Attachment 5 outlining the full SSC OFL CV decision process.

OFL for 2025: 6,193 mt

3. *The level of catch (in weight) and the probability of overfishing (P*) associated with the ABC for the 2025 fishing year;*

ABC for 2025: The Council's risk policy for a stock with this status calls for a P* of 0.49. Application of this value and the OFL CV lead to a 2025 ABC of 6,027 mt

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

- The assessment has a large component of recreational catch, which relies on MRIP estimates. MRIP catch estimates have rescaled the assessment in the past and there is a potential revision in coming years that may rescale it again.
- The spring 2023 NEFSC bottom trawl survey only covered the Georges Bank area.
- There has been no length information since 2020 on individuals in the unclassified market category.
- There are few length samples for discarded recreational fish; there are some samples for headboats.
- The bottom temperature covariate on recruitment is projected with an AR1 process using the mean from the entire time series. While this does not impact a single year projection, uncertainty in future year projections may increase given that the bottom temperature time series does not appear to be stationary.
- Assessment model results are sensitive to natural mortality (M), which is poorly known with conflicting estimates from different methods

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;*

- A winter bottom temperature covariate was developed and used to predict recruitment for the northern portion of the stock within the assessment. This reduced uncertainty in recruitment.
- The research track assessment did a comprehensive evaluation of ecosystem indicator variables potentially affecting stock dynamics, including winter bottom temperature, shelf water volume, and many other indicators.
- The assessment is a single spatial model with movement between north and south areas, resolving more ecological processes than previous assessments.
- The SSC also considered black sea bass climate vulnerability, which was ranked high by Hare et al (2016).

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

- Anything that reduces uncertainty in MRIP catch estimates; this is the primary avenue to reducing the OFL CV assigned by the SSC.
- Improved port sampling for biological samples (high priority from research track).
- Improved sampling for length composition of recreational discards
- Further exploration of the magnitude of M via tagging, and exploration of age specific M
- The SSC also endorses the recommendations from the research track and management track reviews.

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

- Staff memo
- Projections document
- Draft 2024 Management track assessment
- Draft 2024 Management track assessment peer review
- AP report
- Fishery information document
- A multi-stock, multi-region extension of WHAM (T. Miller, NEFSC)
- Supplemental material:
    - AOP report
    - 2023 Research track assessment report
    - 2023 Research track peer review summary and individual peer reviewer reports
- 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. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0146756 (Accessed 1 March 2016).
- NEFSC presentation
- Council staff presentation
- Presentation from the Research Track peer review of reference point calculations
- Mike Wilberg presentation on clarifying WHAM reference point calculation
- Email communications between Kiersten Curti and Tim Miller (NEFSC) regarding WHAM fishing mortality reference point calculations
- Online consultation with Kiersten Curti and Jon Deroba regarding WHAM F reference point calculations

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 concludes that these recommendations are based on the best scientific information available according to National Standard guidelines.

Butterfish

Chuck Adams, NEFSC, summarized the findings of the most recent MT assessment. An update of the change-point analysis for the recruitment stanza for projections revealed that a one-year change (from 2011 to 2010) in the length of this period was required. As a result, a level 2 MT assessment was necessary. As in the previous MT, Butterfish is not overfished nor is overfishing occurring. The MT assessment suggests that the stock is well above B_{MSY} and lightly fished, but

these conclusions depend heavily on inter-related estimates of natural mortality (M=1.278) and survey catchability (q=0.2). Both factors are the primary determinants of stock size. Both are subject to considerable uncertainty, since M becomes estimable when q is fixed at 0.2. Some of this uncertainty is manifested in the magnitude of the F_{MSY} proxy of 5.104. Given these interdependencies, the SSC expressed concerns about model stability.

As in the prior MT (2022), the SSC substituted an alternative F_{msy} proxy equal to 2/3 M = 0.85. This reduces the magnitude of projected catches and is thought to be more consistent with ecological properties for short-lived forage fish.

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

Terms of Reference

For Butterfish, the SSC will provide a written report that identifies the following for the 2025-2026 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 SSC finds that the most appropriate type of control rule for Butterfish is "modified by the SSC".

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 a consideration of the OFL CV criteria table, the SSC assigns a CV of 150% (Attachment 6). The OFLs calculated for Butterfish based on an FMSY proxy of 2/3M are:

Year	OFL (mt)
2025	17,587
2026	14,224

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

Year	ABC (mt)	P*
2025	17,115	0.49
2026	13,842	0.49

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

- There are multiple missing or incomplete survey indices, including: NEFSC Bigelow (2017 fall; 2020 spring, fall; 2023 spring) and NEAMAP (2017 spring, 2020 spring)
- In the early part of the catch time-series, during a period when discards were high, estimated precision of discards was poor.
- The assessment model is not able to resolve the scale of the population without relying on an assumed q=0.2 for the spring Albatross survey
  - M is uncertain (estimated conditional on q which is fixed) and highly influential, especially given the definition of the F_{MSY} proxy used by the SSC as 2/3M.
- The choice of the F_{MSY} proxy reference point.
- The fundamental limitations of assessing a stock which has been lightly exploited in recent decades.

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 SSC considered the climate vulnerability assessment of butterfish.

The Management Track assessment considered ecosystem effects:
- Previous peer-reviewed Butterfish assessments included consideration of stomach contents data from NEFSC trawl surveys and studies on marine mammals and birds.
- For the 2021 research track assessment, an analysis of Butterfish condition was conducted, and results showed a significant change point between 2010 and 2011. This analysis was updated for the 2022 management track, and results were the same. This analysis was again updated for the current assessment and results showed a significant change point between 2009 and 2010.
- Analysis of butterfish habitat was used to estimate availability to the survey.

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

- Continued investigation of sources of predation mortality
- Research into survey catchability is a high priority.
- Examine shorter (sub-annual) model time steps.
- Evaluate maturity methods, impact on maturity ogive, and estimated reference points.
- Consider alternative ways to calculate discards.
- Evaluate adequacy of port sampling to support continued assessments (is full age structure sampled?).
- Evaluate methods for developing age length keys to avoid pooling.
- Further investigation into methods used to identify recruitment stanzas

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

- Management Track Assessment and Review Panel Report for Butterfish

- 2024 Staff memo for Butterfish
- 2024 Butterfish Advisory Panel Fishery Performance Report
- 2024 Butterfish Fishery Information Document
- 2022 Butterfish Research Track Assessment Working Group Report
- 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. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0146756 (Accessed 1 March 2016).

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 methods for determining the recommendations represent the best scientific information available.

Atlantic Surfclam

Dan Hennen, NEFSC, provided an overview of the MT assessment. As in the previous MT assessment, the stock is not overfished nor is overfishing occurring. A key feature of recent assessments is an apparent decline in growth rates in southern areas, but a less pronounced difference in northern areas. The updated assessment revealed a sharp drop in survey abundance but the underlying causes are not known. This is consistent with declines in overall commercial LPUE. Natural mortality (M) is fixed in the model, so the model cannot fully explain the reasons for the decline in abundance (fishing mortality overall has been consistently low). A time-varying M may be introduced in future assessments. Temperature changes may factor in detection of such trends. Bioenergetic studies suggest a close relationship between temperature and starvation.

The SSC noted that the stock fell below the B_{msy} target reference point for the first time and represents the continuation of a nearly quarter century long trend of declining stock biomass. A similar trend in LPUE has also occurred. The SSC suggested that a strategic long-term planning process may be warranted to address these trends and set expectations for fishery management. Economic profitability relies on harvesting of high density beds which appear to be less commonly encountered near existing processing plants in recent years. This imposes additional costs on the industry.

The SSC inquired about the potential utility of "clappers" as indicators of M. Clappers are dead clams with intact shell hinges. In oysters the abundance of "boxes",the equivalent of clappers, have been useful for M estimation. Dan Hennen noted that clam harvesting is a rather energetic process and the prospect of a shell hinge surviving the capture, transfer, and sorting process intact is low.

Jessica Coakley, MAFMC, noted that catch limits for 2025 and 2026 are already in place, based on the 2020 MT stock assessment. However, the June 2024 MT assessment revealed that the ABCs for these years are higher than earlier estimates. Therefore, the SSC recommends replacing the previously specified ABCs for 2025-2026 with a revised set of ABCs based on a

2025-2028 projection from the 2024 assessment. This establishes a consistent theoretical basis for ABCs and satisfies a criterion for best scientific information available.

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

Terms of Reference

For Atlantic Surfclam, the SSC will provide a written report that identifies the following for the 2025-2028 fishing years:

1. *Using the results of the 2024 management track stock assessment, review the previously recommended 2025-2026 overfishing limit (OFL) and acceptable biological catch (ABC) specifications and determine if new recommendations are necessary. If so, please provide a justification for revised 2025-2026 OFL and ABC specifications;*

The 2024 management track estimated new OFLs for 2025 and 2026 that differed from those the SSC used as the basis for its previous recommendations for ABC in 2025 and 2026. The 2024 management track assessment estimated that in 2025 the stock would be slightly below the biomass target, as opposed to previous projected estimates to be above the target, which indicates a lower tolerance for the probability of overfishing under the ABC control rule.
The SSC agreed that the basis for its recommendations should be on the newest information from the current assessment reflecting best available science.

2. *For the 2025-2026 fishing seasons, if applicable (ToR #1), and the 2027-2028 fishing seasons, based on the criteria identified in the 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 SSC finds that the most appropriate type of control rule for Atlantic Surfclam is "modified by the SSC."

3. *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 overall OFL CV based on the SSC's Tier 1 criteria is 100%, based primarily on the model appropriateness criterion, due to uncertainty in natural mortality (Attachment 7).

The new OFL CV process cannot set an OFL CV lower than the maximum OFL CV of Tier 1 criteria.

Year	OFL (mt)
2025	58,221
2026	55,326

2027	53,687
2028	52,960

4. *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;*

Year	ABC (mt)	P*
2025	46,141	0.39
2026	43,372	0.39
2027	42,088	0.39
2028	41,971	0.39

5. *The most significant sources of scientific uncertainty associated with determination of total catch and the ABC;*

- Estimates of recruitment remain uncertain, as both the survey and commercial gear do not select for younger animals. Uncertainty in recruitment is relatively unimportant in this stock due to species longevity, and relatively low fishing mortality overall.
- Fit to survey index in the south is poor.
- Some sensitivity in model results occur when allowing the model to estimate time-varying natural mortality and potential incongruence with life history.
- There is one shallow inshore component that is exploited but cannot be surveyed under current protocols.
- Large uncertainty around survey data points may lead to overinterpretation of trends in indices.
- The 2020/2021 surveys were not conducted (COVID, vessel issues).
- Length composition data are sparse for some years and areas in recent years.
- Growth rates based on von Bertalanffy model fits in both northern and southern areas show a decrease in L_{inf} over time, a decrease in k in the south, and an increase in k in the north. These patterns are inconsistent.
- Potential concerns about domed selectivity (consequences and mechanisms), whichay be an artifact of parameter interactions that are not currently understood.
- Factors controlling recruitment are uncertain.
- There is some sensitivity to initial biomass starting parameter values, which may have arisen from large variation in max and min starting values, with low (56%) model convergence rate.

6. *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;*

- Decreasing trends in growth parameters have been identified and included in the assessment, and the stock has been considered as two areal components.
- Climate vulnerability indicates a high risk.
- Shifting distribution is being accounted for by survey restratification.

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

- Conduct experiments to investigate and evaluate plausible mechanisms underlying time varying growth and interactions with natural mortality.
- Investigate potential for estimating a time-varying natural mortality.
- Developing figures to illustrate the effects of interactions between historically sustainable fishing mortality values and potentially declining natural mortality on future projections, pending capacity to estimate time-varying natural mortality.
- Explore assessment frameworks that better represent the spatial scale of fishing impacts on the population.

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

- Council staff Memo
- Draft 2024 Atlantic Surfclam Management Track Assessment Report, including management track presentations and tables/figures on SASINF
- Draft June 2024 Management Track Peer Review Panel Summary Report
- 2024 Atlantic Surfclam Advisory Panel Fishery Performance Report
- 2024 Surfclam Fishery Information Document
- Estimated Proportion of Undersized Surfclam Landings for 2023
- Assessment Oversight Panel Summary Report
- 61st SAW/SARC Assessment Summary Report (2016)
- 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. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0146756 (Accessed 1 March 2016).
- NEFSC presentation
- Council staff presentation

9. *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 methods for determining the recommendations represent the best scientific information available.

Ocean Quahog

Jessica Coakley, MAFMC, summarized recent catches and fishery performance. Landings continue to be substantially below the quota, and are declining, especially in the Southern VA and Delmarva regions. Overall LPUE has been relatively stable, but shifting among primary fishing areas has occurred, most likely driven by economic considerations.

The most recent MT indicated that the stock is at a high level of abundance and is not overfished nor is overfishing occurring. Quotas for the period 2021 to 2026 were set following the MT

assessment in 2020. The next MT assessment will occur in 2026. After review of available new information on stock indices, catches, and fishery performance measures, the **SSC recommends continuation of the previously specified ABC for 2025 of 44,020 mt.**

Recreational Measures Setting Process Framework/Addenda

Tom Miller, SSC, chaired a subgroup consisting of Cynthia Jones, Andrew Scheld, and Jorge Holzer. Miller summarized the findings of the subgroup and Mike Wilburg chaired the meeting for this session. Paul Rago recused himself from the discussion as his contributions to the FMAT/PDT activities were supported by a contract with the Council.

The work of the subgroup was an outgrowth of an earlier review in 2022 of the Harvest Control Rule (HCR) Framework by the SSC. Following that review, it was deemed desirable to have SSC engagement during, rather than after alternative development. Key concerns from the review of the HCR Framework were that all approaches relied on binning approaches for establishing both inputs and responses, and that these frameworks had not been evaluated for performance. The current HCR framework will sunset by 2025 and, without additional management action, the previous process for setting recreational management measures will be reinstated for Bluefish, Black Sea Bass, Scup, and Summer Flounder. The complexity of the Recreational Measures vary considerably; the SSC noted that the fraction of recreational catch of the overall catch varies from 35 to 86% for these species.

Discussions by the SSC addressed many of the operational aspects of the Framework/Addenda including the use of discrete bins for both status and responses and the potential for discontinuities. The ability to detect such bins was also a concern given the range of uncertainties in stock assessment outputs. Ratios and trend estimation tend to be particularly problematic.

The SSC appreciated initial efforts of the Management Strategy Evaluation (MSE), but noted that more complete answers will require substantially more time than available under the current Council and Commission timeline. No additional resources are presently available to address the outstanding issues.

Public commenters noted that species differences should lead to different responses. Another noted that more specific recommendations on what should be excluded would be helpful feedback for the FMAT/PDT for finalization of the alternatives. It was noted that the SSC was not asked to choose a preferred alternative in its Terms of Reference (TORs).

A separate report from SSC addressing all of the TORs will be provided to the Council and Policy Board. A summary of the primary concerns is provided below:

- Recreational harvest measures are developed after the ABC has been set, and therefore do not influence ABC recommendations directly. However, if ABCs are consistently exceeded in the future, assumptions about the expected catch in the current year will need to be revised. Exceeding the ABC in the base year of the projection will reduce the stock size and projected catches in future years.
- F-based approaches were interesting conceptually and worthy of further development, but insufficient to form the basis for setting recreational measures.

- All proposed alternatives shift the objective of management away from achieving the RHL to changing the recreational catch by specific amounts based on observed stock characteristics. Alternatives rely on observable features of the stock and associated fisheries to create binned responses to change recreational catches by predefined levels of liberalization or restriction. As such, the focus of management shifts from achieving the RHL to achieving a given level of change in recreational catch.
- The binning approach and the change in focus increases the likelihood that the ABC will be exceeded for stocks that are close to, or above, their maximum sustainable yield. The Council's risk policy allows for little uncertainty for stocks at these levels, and no management uncertainty is recognized in determination of either ACLs or ACTs.
- It is unknown whether the biennial setting of recreational measures will promote stability or induce instability in recreational measures, or avoid overfishing. Differences among species, uncertainty of measures used to define the status bins, and detectability of short-term trends in recruitment will need to be considered.
- MSE results were limited to Summer Flounder, but may be broadly applicable. MSE considered effects of bag limits, season lengths, and size limits individually but not in combination. No single measure performed best. In recent management, combinations of measures, varying by state, are used. The performance of mixed regulatory approaches were not evaluated in the MSE.
- MSE should be considered a starting point to compare the performance of alternatives, but cannot identify the "best" alternative without additional context. Further work is needed to consider effects of different starting conditions (e.g., stock status), varying proportions of removals by recreational fisheries, and mixed recreational management regulations.

Updated Research Findings for Surfclam Genetics

A study by Dr. Matt Hare, Cornell University, on the genetics of Atlantic Surfclam was presented to the SSC in 2022, but was incomplete due to loss of sampling sites during the Covid pandemic. Updated results provide strong empirical evidence of the linkages among stock areas under a hypothesis known as "stepping stones with isolation by distance." Repeated sampling at several sites verified the persistence of unique Operational Taxonomic Units (OTU) for periods up to 20 years apart. There are two subspecies and evidence of hybrids. Commercial harvests come primarily from the offshore OTU with minor contributions from the inshore OUT. The results provide valuable insights on population genetics of the Atlantic Surfclam and potential long-term effects of climatic change. There are however no immediate concerns for current management practices.

Other Business

The revised OFL CV guidance document has been approved by the Council and was applied to Golden Tilefish, Black Sea Bass, Atlantic Surfclam, and Butterfish at this meeting. Notable changes include the reduction in number of factors from nine to six, the use of tiers to distinguish primary (Tier 1) from secondary (Tier 2) determinants of the OFL CV, and consideration from recent scientific literature on the expected magnitude of uncertainty in assessments worldwide.

The MAFMC has released a Request For Proposals (RFP) entitled "Evaluating the Data Needs and Management Strategies to Support Climate-Ready Fisheries Management." The project is comprehensive and SSC discussions primarily addressed the potential scope of the project. Proposals are due by August 30, 2024

The SCS8 meeting of regional SSCs will be held in August in Boston (agenda). Four representatives from the SSC will be attending and three will be speaking. The focus of the meeting will be the development of tangible methods with broad applicability to the overall problem of dynamic biological reference points in a changing environment. Ideally the meeting will facilitate greater collaboration among SSCs and more frequent exchanges of ideas. Participation of MAFMC's SSC members at other Council's SSCs meetings was encouraged.

The SSC's discussions about specification of biological reference points in WHAM, and Black Sea Bass in particular, suggested that a more detailed examination of this topic by subgroup occur between the September 2024 and March 2025 meetings of the SSC. Collaboration with NEFSC Population Dynamics Branch will be essential.

Discussions about the role of MRIP data throughout the meeting led to requests for more information on previous recalibrations as well as recalibration experiments currently underway. Insights into those studies will be provided the NMFS MRIP team at the September meeting of the SSC in Baltimore.

Other discussions during the meeting suggested a need to evaluate the utility of interim measures that are requested by the SSC for consideration during the catch specification period.

Attachment 1. Agenda

Mid-Atlantic Fishery Management Council

Scientific and Statistical Committee Meeting

July 23-25, 2024

Le Méridien Philadelphia (1421 Arch St, Philadelphia, PA)
or via Webex webinar

This will be an in-person meeting with a virtual option. SSC members, other invited meeting participants, and members of the public will have the option to participate in person at the Le Méridien Philadelphia or virtually via Webex webinar. Webinar connection instructions and briefing materials will be available at Council's website: https://www.mafmc.org/council-events/2024/ssc-july-23-25.

AGENDA

Tuesday, July 23, 2024

9:30 Welcome/Overview of meeting agenda (P. Rago)

9:35 Bluefish data and fishery update; review of previously recommended 2025 ABC (J. Montañez)

10:00 Summer Flounder data and fishery update; review of previously recommended 2025 ABC (K. Dancy)

10:30 Scup data and fishery update; review of previously recommended 2025 ABC (H. Hart)

11:00 Break

11:15 Blueline Tilefish ABC specifications for 2025 fishing year

- Review of staff memo and 2025 ABC recommendation (H. Hart)
- 2025 SSC Blueline Tilefish ABC recommendation (S. Gaichas)

12:30 Lunch

1:30 Golden Tilefish ABC specifications for the 2025-2027 fishing years

- Overview of 2024 Management Track assessment results (P. Nitschke, NEFSC)
- Review staff memo and 2025-2027 ABC recommendations (J. Montañez)

- 2025-2027 SSC Golden Tilefish ABC recommendations (A. Sharov)

5:30 Adjourn

Wednesday, July 24, 2024

9:00 Black Sea Bass ABC specifications for the 2025 fishing year
- Overview of 2024 Management Track assessment results (E. Liljestrand, NEFSC)
- Review staff memo and 2025 ABC recommendations (J. Beaty)
- 2025 SSC Black Sea Bass ABC recommendations (O. Jensen)

10:30 Break

10:45 Continue Black Sea Bass ABC recommendations

12:00 Lunch

1:00 Recreational Measures Setting Process Framework/Addenda
- Review and approve draft report by SSC sub-group (T. Miller)

2:45 Break

3:00 Butterfish ABC specifications for the 2025-2026 fishing years
- Overview of 2024 Management Track assessment results (C. Adams, NEFSC)
- Review staff memo and 2025-2026 ABC recommendations (J. Didden)
- 2025-2026 SSC Butterfish ABC recommendations (R. Latour)

5:30 Adjourn

Thursday, July 25, 2024

8:30 Atlantic Surfclam ABC specifications for the 2025-2028 fishing years
- Overview of 2024 Management Track assessment results (D. Hennen, NEFSC)
- Review staff memo and 2025-2028 ABC recommendations (J. Coakley)
- 2025-2028 SSC Atlantic Surfclam ABC recommendations (A. Scheld)

9:45 Break

10:00 Continue Atlantic Surfclam ABC recommendations

11:00 Ocean Quahog data and fishery update; review of previously recommended 2025 ABC (J. Coakley)

11:30 Overview of updated Surfclam genetics research (M. Hare, Cornell University)

12:30 Other Business
- Scientific Coordination Sub-Committee 8th National Workshop update
- Mid-Atlantic Council Inflation Reduction Act Request for Proposals

1:00 Adjourn

Attachment 2. Attendance

MAFMC Scientific and Statistical Committee

July 23-25, 2024

Meeting Attendance

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)
Jorge Holzer	University of Maryland
Yan Jiao	Virginia Tech University
Rob Latour	Virginia Institute of Marine Science
Olaf Jensen	U. of Wisconsin-Madison
Sarah Gaichas	NOAA Fisheries NEFSC
Mike Wilberg (Vice-Chairman)	University of Maryland – CBL
Cynthia Jones	Old Dominion University
Gavin Fay	U. Massachusetts-Dartmouth
Alexei Sharov	Maryland Dept. of Natural Resources
Geret DePiper	NOAA Fisheries NEFSC
Mark Holliday	NOAA Fisheries (retired)
Andrew Scheld	Virginia Institute of Marine Science
Others in attendance (only includes presenters and members of public who spoke):	
Paul Nitschke	NEFSC
Emily Liljestrand	NEFSC
Jason Didden	MAFMC staff
Brandon Muffley	MAFMC staff
Kiersten Curti	NEFSC
Julia Beaty	MAFMC staff
Jose Montañez	MAFMC staff
Kiley Dancy	MAFMC staff
Kristan Blackhart	NEFSC
Hannah Hart	MAFMC staff
Dewey Hemilright	F/V Tarbaby
Sam Truesdell	NEFSC
Laurie Nolan	F/V Sea Capture
Tony Wood	NEFSC
Dan Hennen	NEFSC
Jessica Coakley	MAFMC staff
Charles Adams	NEFSC
Phil Simon	Advisory Panel member
Scott Steinback	NEFSC
Matt Hare	Cornell University

Attachment 3. OFL CV Decision Criteria Table (updated June 2024)

Decision Criteria	Default OFL CV=60%	Default OFL CV=100%	Default OFL CV=150%
Data quality (Tier 1)	One or more synoptic surveys of the whole stock area for multiple years. High quality monitoring of landings and size and age composition. Long term, precise monitoring of discards. Landing 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 (Tier 1)	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 without indication of which scenario is most likely or no exploration of alternative model structures or sensitivities.
Retrospective analysis (Tier 1)	Minor retrospective patterns.	Moderate retrospective patterns.	No retrospective analysis or severe retrospective patterns (e.g., terminal year values adjusted and outside confidence region).
Comparison with empirical or experimental analyses (Tier 2)	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/ comparisons with other species (Tier 2)	Assessment considers habitat and ecosystem effects on stock productivity, distribution, mortality and quantitatively includes appropriate factors reducing uncertainty in short term predictions. And/or evidence outside the assessment suggests that ecosystem productivity and habitat quality are stable or accountable. And/or ecosystem events affecting stock in the short term are absent. And/or comparable species in the region have synchronous production characteristics and stable short-term predictions. And/or climate vulnerability analysis suggests low risk of change in productivity due to changing climate.	Assessment considers habitat/ecosystem factors but does not demonstrate either reduced or inflated short-term prediction uncertainty based on these factors. And/or evidence outside the assessment suggests that ecosystem productivity and habitat quality are variable. And/or acute ecosystem events are likely to have a low to moderate risk of affecting the stock in the short term. And/or mixed productivity and uncertainty signals among comparable species in the region. And/or climate vulnerability analysis suggests moderate risk of change in productivity from changing climate.	Assessment either demonstrates that including appropriate ecosystem/habitat factors increases short-term prediction uncertainty, or does not consider habitat and ecosystem factors. And/or evidence outside the assessment suggests that ecosystem productivity and habitat quality are variable and degrading. And/or acute ecosystem events are likely to have a high risk of affecting the stock in the short term. And/or comparable species in the region have high uncertainty in short term predictions. And/or climate vulnerability analysis suggests high risk of changing productivity from changing climate.
Appropriate stanzas in recruitment (Tier 2)	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.

Attachment 4. Final OFL CV Matrix for Golden Tilefish

Decision Criteria	Summary of Decision Criteria Considerations	Assigned OFL CV Bin (60/100/150)

Data quality
 	
TIER 1
	Surveys
	● No fishery-independent survey data are available for this stock
	  ● The SSC notes pilot fishery-independent surveys have been conducted in 2017, 2020 and 2023 and are planned for 2025
	● Four single fishery-dependent CPUE indices are available, but none are continuous throughout the time period
	  ● Fishery-dependent indices have been developed from longline fleet records:
	  ○ 1973-1981 Turner's DF CPUE series (collected during the development of the directed longline fishery in New Jersey)
	  ○ 1979-1993 Weighout DA LPUE series (collected from port agent's interview with captains from New Jersey)
	  ○ 1991-2022 VTR DA LPUE series (collected from logbook data, 1994-2022 from both New Jersey and New York and logbook data 1991-1994 from NY vessels)
	  ○ 2010-present & future CAMS DA LPUE series
	● New Incidental CPUE index from trawl was explored in research track, but not used in MT
	Landings and discards
	● Historical commercial landings data are available since 1915.
	● The assessment uses commercial landings data since 1970.
	● Commercial discard estimates are low, the median for 2014-2021 was 2.3 mt
	● New time series of rec catch for 1971-2022 is available. Recreational harvest was 0.3%-3.7% of the total catch in 2002-2022. 3.2% of total in 2022.
	● Improved collection and processing of age data to make year specific age length keys for the period after 2009 (see below).
	● Projections are sensitive to inclusion of unclassified market category (small sample of small fish) from recent years, which is the only indication of potential recruitment.
	● A number of years of age composition data are missing from CAA (1983-1994 & 2001-2002)
		150%

Model appropriateness and identification process **TIER 1**	● Previous management track assessment was completed in 2021, using ASAP. The stock was not overfished and overfishing was not occurring. ● This management track assessment uses WHAM following a recent 2024 research track assessment. ● This assessment updates commercial fishery catch data, recreational landings, commercial CPUE indices of biomass, and the analytical WHAM assessment model and reference points through 2023.	150%

	• Commercial discards from the directed and non-directed fisheries and recreational landings are included in this assessment which was a change from the previous management track. • Stock projections were updated through 2027. • The assessment included iid random effects on NAA and full selectivity was set in the second selectivity block at age 5 and 6. • Increased availability of age data allowed 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. Production aging is now used back to 2009 by adding the recently aged 2013 data. 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. • Short term projections of biomass were derived within WHAM. • The annual fishery selectivity, maturity ogive, and mean weights at age used in projection are the most recent 10 year averages; • A substantial number of alternative model structures were considered. Model identification process was a logical, careful, progressive approach that evaluated self-test diagnostics, and one-step ahead diagnostics. The diagnostic process stayed faithful to the State Space Model Research Track recommendations. All of these evaluations were done without consideration of stock status. • Model results were sensitive to inclusion of random effects. The lack of a fishery independent index likely contributed to high uncertainty with estimates of the dome shaped selectivity in the fishery. The stock status is also sensitive to the degree of doming in the fishery. • No single model formulation covers the true uncertainty in this assessment. • Highly uncertain above average age-1 recruitment estimates in 2021 and 2022 drive the FMSY projected catches above the long term MSY estimate of 775 mt. • The data available for this modeling exercise were at the exceed the limits of data availability in previous evaluations of the performance of WHAM.	
Retrospective analysis **TIER 1**	• Retrospective pattern was small, retro adjustments were not applied in the projections.	60%
Comparison with empirical or experimental analyses **TIER 2**	• Simple comparisons with scale of fishery- independent surveys are not possible for this stock • LPUE indices not used in the assessment model agree qualitatively with the patterns predicted in the model. • The catch-at-length distributions reflect a broad distribution of fish sizes caught in the fishery.	100%
Ecosystem factors/	• Analysis of ecosystem factors are not included in the assessment directly.	

comparisons to other species **TIER 2**	• Quantitative ecosystem indicators were analyzed in relation to larval data, a model-derived recruitment index and a new fishery-dependent catch per unit effort (CPUE) index derived from incidental catch. Linear regressions and generalized additive models (GAM) were used to determine the effects of ecosystem indicators on golden tilefish catch and recruitment. • Findings suggest that bottom temperature, salinity at depth, shelf water volume, and microplankton abundance may influence golden tilefish recruitment or mortality and may be of use as environmental covariates in future stock assessment models. • Golden Tilefish ranked as highly sensitive to climate risk. Highly susceptible to short term changes in bottom temperatures, may reflect sensitivity to longer term increases in temperature.	100%
Appropriate stanzas in recruitment **TIER 2**	• No clear trend or changes in recruitment patterns. Highly uncertain above average age-1 recruitment estimates in 2021 and 2022 drive the F_{MSY} projected catches above the long term MSY estimate of 775 mt. • 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.	100%

Narrative:

The SSC evaluated the six categories of information identified in our OFL CV process for Golden Tilefish. The SSC recommends a CV of 150% as the most appropriate value to reflect the characteristics and limitations of the data available for this species, and the sensitivity of the new WHAM assessment model for this species to different plausible assumptions about the prior history of the stock. The quality of data and model identification are central factors in determining the OFL CV. Although the SSC evaluated the uncertainty associated with other factors as moderate, these factors are of lesser importance and do not overcome the fundamental sources of scientific uncertainty inherent in the first two factors.

Attachment 5. Final OFL CV Matrix for Black Sea Bass

Decision Criteria	Summary of Decision Criteria Considerations	Assigned OFL CV Bin (60/100/150)
Data quality **TIER 1**	**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-1 fish 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. ● Survey indices enter the assessment after pre-processing using a spatio-temporal model (VAST) to create a single index each for north and south areas. ● The NEFSC bottom trawl survey in spring 2023 only surveyed on Georges Bank and therefore lacked index information for the Gulf of Maine, Southern New England, or the Southern region between Hudson Canyon to Cape Hatteras. ● There is no length information on fish in the unclassified market category since 2020, necessitating the use of earlier data to inform the lengths in this category. **Landings and discards** ● Large recreational component (~60-75% 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.	150%; due to high recreational data component and new MRIP uncertainty, uneven sampling of commercial data
Model appropriateness and identification process **TIER 1**	● Black Sea Bass uses a two-area state space model (Multi-WHAM) for assessment, with exchange between sub-areas (North/South). Integrated model that deals with all previously problematic issues in this assessment. ● A range of alternative model structures were presented at the 2023 Research Track assessment review. Most of this wide range of different models give qualitatively similar conclusions about stock status and trends in the more distant past but they differed in their trends over the most recent decade. ● Natural mortality continues to be an important source of uncertainty with conflicting estimates from different approaches (alternative life history correlates and tagging).	100%; many alternative model formulations with moderate agreement

Retrospective analysis **TIER 1**	• No retrospective adjustment needed. The new assessment framework eliminated the retrospective pattern in the northern area but not in the south. However, Mohn's rho is not particularly high even in the south and retrospective-adjusted values of SSB and F fall within the 90% CI.	60%; minor retrospective
Comparison with empirical or experimental analyses **TIER 2**	• Previous analyses of swept area have not been updated • No empirical estimates of biomass compared • Empirical estimate of mortality from tagging was used in an SS model to get priors on movement for WHAM	150%; no empirical estimates
Ecosystem factors/ comparisons to other species **TIER 2**	• A new (in the 2023 Research Track) environmental index of recruitment helps reduce uncertainty in recruitment estimates but reverts to a mean value for projections in the absence of projections for the environmental index. • 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).	60%; environmental covariate lowered uncertainty in recruitment, climate winner
Appropriate stanzas in recruitment **TIER 2**	• All years since 2000 used in projections	100%; OFL captures recent recruitment

Narrative:

Overall OFL CV based on Tier 1 criteria is 150% from the data criterion, based primarily on uncertainty in the MRIP recreational catch estimates that are dominant in this assessment. The new OFL CV process cannot set an OFL CV lower than the maximum OFL CV of Tier 1 criteria.

The Black Sea Bass assessment is based on a fully integrated state space model addressing many of the previous uncertainties with this stock, including different dynamics in the northern and southern portions of the stock, movement between these regions, and characterization of the commercial and recreational fleets. The model was developed during a research track assessment that comprehensively evaluated many potential ecosystem drivers of the Black Sea Bass stock, resulting in the inclusion of a winter bottom temperature time series as a covariate for the northern portion of the stock that reduces uncertainty in overall recruitment. Use of the WHAM modeling framework reduced the retrospective patterns observed in previous modeling frameworks and resulted in a generally more stable model, with results robust to the addition of additional years of data between the research track and management track assessments.

Notwithstanding the excellent efforts of the modeling team in developing a state of the art model which provides a basis for continuing to address the unique challenges with assessing this stock, uncertainty in the assessment is driven by the high proportion of recreational catch data and the inherent uncertainty of MRIP estimates of that catch. The SSC has observed substantial rescaling of all of the Mid-Atlantic assessments reliant on recreational catch data in the transition to updated MRIP estimates in 2019-2020. There is currently an analysis of MRIP methods that the SSC understands may lead to further rescaling of recreational catch estimates, which may have further impacts on recreationally-dependent stock assessments. Therefore, uncertainty in this important source of data drives the SSC evaluation of OFL CV.

Attachment 6. Final OFL CV Matrix for Butterfish

Decision Criteria	Summary of Decision Criteria Considerations	Assigned OFL CV Bin (60/100/150)
Data quality **TIER 1**	**Surveys** ● Data from the NEFSC fall Albatross, NEFSC fall and spring Bigelow, and spring and fall NEAMAP bottom trawl surveys were used to estimate indices, 1989-2023 ● Missing indices include: NEFSC Bigelow (2017 fall; 2020 spring, fall; 2023 spring) and NEAMAP (2017 spring, 2020 spring) ● The YOY indices were estimated from state survey data – ME/NH, MA, RI, CT, NJ, DE – by applying a hierarchical method (Conn 2010) to the state-specific indices to derive a single, combined time-series ● Uncertainties associated with the survey indices were well quantified and high in some years **Landings and discards** ● Landings from 1989-2023 spanned three phases of commercial fishing activity: the historic directed fishery (1989-2001), the bycatch fishery (2002-2011), and the recent directed fishery (2012-2023) ● Landings-at-age have been relatively stable within each of the three phases, with most harvested fish being ages 1-3 (majority age 2). Very few age 4+ fish appear in the landings ● During the historic directed and bycatch phases, the magnitude of discards often exceeded landings, however, during the recent directed fishery, discards have generally remained lower than landings. In the early part of the time-series, estimated precision of discards was poor, but since 2010, estimated precision has been relatively good ● Most discards are age 0-2 with some age 3 fish and very few age 4+ fish	100%
Model appropriateness and identification process **TIER 1**	● WHAM, 1989-2023, ages 0-4+ ● The assessment model is not able to resolve the scale of the population. Based on a habitat and gear efficiency analysis, a q of 0.2 for the fall Albatross survey was assumed/needed to reasonably scale the population. This implies 80% of the stock is not within the survey area despite butterfish being frequently captured throughout the survey ● The Fmsy proxy was estimated at 5.1, which is extremely high and results in very high estimated catches for 2025 and 2026 from the short-term projections ● The high estimated Fmsy proxy is due to: i) high assumed M, ii) rapid maturity of butterfish (~60% by age 1) with full fishery selectivity not until age 3, and iii) reference point calculations assume recruitment is unrelated to SSB which implies the same recruitment will enter the population each year. Within the model, the fishery has a negligible impact on SSB and recruitment	150%

Retrospective analysis **TIER 1**	• The assessment showed a minor retrospective pattern, but no adjustments were made	60%
Comparison with empirical or experimental analyses **TIER 2**	• Beyond the habitat and gear efficiency work, no additional empirical analyses were presented	150%
Ecosystem factors/ comparisons to other species **TIER 2**	• Previous peer-reviewed butterfish assessments included consideration of stomach contents data from NEFSC trawl surveys and studies on marine mammals and birds. The estimated consumption of butterfish by predators amounted to a small fraction of the estimated losses due to natural mortality. This result is odd given that butterfish is considered a forage species • For the 2021 research track assessment, an analysis of butterfish condition was conducted, and results showed a significant change point between 2010 and 2011. This analysis was updated for the 2022 management track, and results were the same. This analysis was again updated for the current assessment and results showed a significant change point between 2009 and 2010 • Analysis of butterfish habitat was used to estimate availability to the survey • Butterfish are considered "Low" vulnerability from Climate Vulnerability Assessment	60%
Appropriate stanzas in recruitment **TIER 2**	• The start year of the recruitment stanza used for short-term projections was changed from 2011 to 2010 based on an updated analysis of butterfish condition. Model results did not change substantially	100%

Narrative:

Attachment 7. Final OFL CV Matrix for Atlantic Surfclam

Decision Criteria	Summary of Decision Criteria Considerations	Assigned OFL CV Bin (60/100/150)
Data quality **TIER 1**	**Surveys** ● Efficiency of survey gear has been estimated through several experiments and is variable between experiments for any gear configuration ● Because new strata are larger there are now many fewer gaps in stratum sampling. This reduces the need for data "borrowing." ● The Georges Bank components are lower than previous estimates. Sampling intensity there has increased, and the commercial dredge used recently has higher efficiency. ● There is one shallow inshore component that is exploited but cannot be surveyed under current protocols. ● The new/restratification led to reduced survey area, and so area swept estimates are lower. The estimate of abundance is relatively unchanged. ● Age and length data were considered adequate. ● Large uncertainty envelope around survey data points may lead to overinterpretation of trends in indices. ● The 2020/2021 surveys were not conducted (COVID, vessel issues) **Landings and discards** ● Landings data are believed to be accurate, although there are substantial discrepancies between CAMS estimates of landings and historical estimation methods(CFDERS) for 2012-2015. CAMS was used to estimate landings and discards for 2020-2023. ● Regular observer coverage of the fishery was implemented in 2015. ● Estimated discards are low but may increase as distributions overlap with ocean quahog fishery. ● Length composition data are sparse for some years and areas in recent years.	60%; due to dedicated synoptic survey and accurate catch reporting
Model appropriateness and identification process **TIER 1**	● The assessment model is based on Stock Synthesis (SS) version 3.30.14. ● Potential concerns about domed selectivity (consequences and mechanisms). May be an artifact of parameter interactions that are not currently understood. ● The SS3 model structure in this assessment is a single model with two areas. ● Factors controlling recruitment are uncertain. ● The entire survey time series (stratified number per tow) was used for trend; swept area abundance estimates after 1997 were used for scale. Most recent series (MCD) was used for both scale and trend but only available for four years. ● Previous estimates of efficiency were used as an informative prior for q.	100%; due to uncertainty associated with natural mortality

	• A single F was estimated over the two areas as part of the population fishing mortality algorithms within the SS model. • The model incorporated time-varying growth as trends in L_{inf} and k parameters in the southern area and k parameter in the northern area over time, which improved fits to length composition data. • Model used conditional age at length rather than age composition. • Model sensitivities included evaluating effect on including length and age composition data on results, likelilhood profiles on R_0, effect of removing prior on catchabililty of modified commercial dredge and research dredge survey, comparison of domed vs. logistic selectivity of fishery and MCD survey, and evaluation of effect of time-varying M in the southern component of the stock and a variety of other features. • MCMC was used to evaluate uncertainties from 6 maximum likelihood estimates, with roughly similar results as for MLE. • There was some sensitivity to initial starting parameter values, which may have arisen from large variation in max and min starting values. This led to a 56% convergence rate. • Growth rates in both northern and southern areas show a decrease in L_{inf} over time, a decrease in k in the south, and an increase in k in the north. • Within the assessment model, fishing mortality does not appear to have a measurable effect on the population. • There is some evidence that the rate of natural mortality may be increasing rather than remaining constant. The base model does not include this time-varying component. Runs with estimated trend over time in the rate of natural mortality were inconsistent with life history.	
Retrospective analysis **TIER 1**	• Historical retrospective analysis showed approximately similar trends although different scales. This model scales biomass lower than previous ones. • Peels based on 6 years indicate minor internal retrospective patterns. Mohn's rho does not indicate the need for adjustment.	100%
Comparison with empirical or experimental analyses **TIER 2**	• Swept area biomass estimates and ratios of efficiency-corrected swept area/catch (F proxy) were of similar scale to model results; but both analyses make similar survey catchability assumptions. • Multiple empirical studies inform the assessment model catchability priors and do not reflect independent comparisons or have equal influence among areas in the model. • The observed rates of decline in abundance in exploited areas appear to be at odds with the assessment-estimated impact of fishing mortality on the stock, indicating uncertainty in the importance of fine-scale spatial dynamics.	NA; due to no independent empirical estimates
Ecosystem factors/ comparisons to other species	• Decreasing trends in growth parameters have been identified and included in the assessment, and the stock has been considered as two areal components. No other ecosystem factors were considered	150%; owing to high climate vulnerability

TIER 2	explicitly in the assessment. Most research on effects of changing temperature and ocean acidification has focused on larval stages. ● Climate vulnerability indicates a high risk. ● If distribution moves deeper as temperatures increase, that shift would be reflected in deeper survey strata that sample Ocean Quahog. ● Increasing ocean acidification may affect growth.	
Appropriate stanzas in recruitment TIER 2	● Declining trend, but not much information on recruitment. ● The full time-series average recruitment was used. Short-term OFL projections are insensitive to assumptions about recruitment because of the six year lag in recruitment to the fishery. ● Neither survey nor commercial operations select for young Surfclams. ● The effect of a single year's recruitment on stock size and stock status is likely small because of the large number of ages in the stock.	100

Narrative:

The overall CV based on the Tier 1 criteria is 100%, based primarily on the model appropriateness criterion, due to uncertainty in natural mortality.

The new OFL CV process cannot set an OFL CV lower than the maximum OFL CV of Tier 1 criteria. The quality of data has been excellent, but recently has declined in some areas: recent loss of two years of survey effort has a slightly larger impact on the assessment of this species than some others, because sampling is undertaken over a three-year cycle: in this case, loss of two years led to a four to five year gap between observations. This becomes important when the most recent observation is the lowest in the time series. Estimates of commercial landings for 2020-2023 have relied on the new CAMS system, which has shown large differences from the previous landings estimation method in 2012-2015. Recent commercial length sampling has decreased to well below average in the past three years in some cases to historical minima, although landings have also decreased recently.

The model structure continues to depend heavily on survey catchability, and prior distribution estimates are based on highly variable estimates. This can lead to substantial changes in scale from assessment to assessment when additional data are added to time series or model structure changes. Fishing mortality is low, with little contrast, so the commercial fishery contributes relatively little information, increases reliance on estimates of survey efficiency, and also makes scale estimates difficult. This shifting of scale has led to a set of biological reference points derived from SSB_0, a reference period of relatively high and stable stock size, and an MSE-generated baseline estimate of F_{msy}. Values of reference points to calculate OFL shift with each model update as scale changes.

The most recent assessment indicates about a 50% decline in stock biomass over 25 years, in the face of fairly constant recruitment and decreasing catch, with fishing mortality rates only 20% of F_{msy}. There currently is no mechanism to explain this drop.

Retrospective analyses involving the removal of data a year at a time lead to substantial differences in scale, although the general pattern of relative abundance remains stable. Aside from scale changes, retrospective patterns as indexed by Mohn's rho do not require adjustments.

Short-term projections are relatively robust to assumed recruitment patterns, because Surf Clams do not recruit to the fishery until age 5, after contributing to spawning stock biomass starting at age 1.

Attachment 8. Glossary

ABC—Acceptable Biological Catch
ALK – Age-Length Key
AOP—Assessment Oversight Panel
ASAP—Age Structured Assessment Program
B_{msy}—Biomass at maximum sustainable yield
CAA = Catch at Age
CAMS – Catch Accounting and Monitoring System
CPUE – Catch Per Unit Effort
CV—Coefficient of Variation
DFO—Department of Fisheries and Oceans, Canada
ESP—Ecosystem and Socio-economic Profiles
EAFM—Ecosystem Approach to Fisheries Management
F—Instantaneous rate of fishing mortality
FMAT—Fishery Management Action Team
FSV—Fishery Survey Vessel
GARFO—Greater Atlantic Region Fisheries Office
GLM – Generalized Linear Model
HCR—Harvest Control Rule
LIME—Length-based Integrated Mixed Effects
LPUE—Landings per Unit Effort
M—Instantaneous rate of natural mortality
MRIP—Marine Recreational Information Program
MTA—Management Track Assessment
MSE—Management Strategy Evaluation
NEFSC—Northeast Fisheries Science Center
OFL—Overfishing Limit
P*—Probability of overfishing
PDT—Plan Development Team
q – catchability coefficient
RE—Random Effects
RHL—Recreational Harvest Limit
RMSP—Recreational Measures Setting Process
RSA—Research Set Aside
RSC—Research Steering Committee
RTA—Research Track Assessment
R/V—Research Vessel
SADL – South Atlantic Deepwater Longline Survey
SCS—Scientific Coordination Subcommittee
SEDAR—Southeast Data, Assessment, and Review
SOE—State of the Ecosystem
SSB_{msy}—Spawning stock biomass at maximum sustainable yield
SSC—Scientific and Statistical Committee

TMB—Template Model Builder
TOR—Terms of Reference
VAST – Vector Autoregressive Spatio-Temporal Model
WHAM—Woods Hole Assessment Model