Mid-Atlantic Fishery Management Council
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Michael P. Luisi, Chairman | P. Weston Townsend, Vice Chairman
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M E M O R A N D U M

Date: May 26, 2022

To: Michael P. Luisi, Chairman, MAFMC

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

Subject: Report of the May 2022 SSC Meeting

Executive Summary

Harvest Control Rule

- The SSC responded to the Council's request to review and rank the five options under the Council's HCR Amendment and Commission Addendum by forming a work group and holding three public meetings.
- The SSC determined that the HCR will not have any effects on ABC determination in the first year of application, but could influence future ABCs in subsequent years if uncertainty of catch data increases.
- The SSC noted that the HCR could not be considered to be a formal control rule because it does not consider specific outcomes for harvest. Instead, it specifies directional changes in potential harvest rates. The absence of specific details on the measures that might be undertaken prevented the SSC from ranking the alternatives as requested by the Council.
- The SSC evaluated the pros and cons of each option. Key concerns included the binning of responses within defined ranges of stock status, the introduction of potential time lags, and the possibility of feedback loops that might induce wide swings in population status or regulatory measures across years.
- Even when management measures are appropriate, lack of compliance or understanding of regulations can reduce their efficacy. Some of the measures replicate the approaches used by the SSC to derive the ABC in the first place. This circumstance has the potential to induce additional variability in fishery performance and increase future uncertainty for determination of ABCs. Overages by recreational harvesters may cause problems of equitability of allocation with the commercial sector.

- The expected two-year frequency of updated stock assessments and associated management adjustments for the Amendment species, will offset to some extent, the concerns highlighted for the various measures
- The SSC cautions that stability of regulations is not the same as stability of catch. If regulations are properly set to achieve a target F, then catches and CPUE will be expected to fluctuate with stock biomass. It is possible to set a constant catch policy, but harvest limits under such a policy would likely have to be substantially lower than the ABC (and its attendant RHL) to account for interannual variability in population processes and angler avidity.

Illex Squid-Scientific Advances from Research Track Assessment

New information on ageing, statolith microchemistry, oceanographic drivers, generalized depletion models. The SSC appreciated learning about these promising research results and looked forward to their incorporation into future stock assessments.

Butterfish update Scientific Advances from Research Track Assessment

A wide variety of ecosystem topics were considered for inclusion in the butterfish assessment. These included predictive models for spatial distribution patterns over time, the influence of environmental drivers, the potential magnitude of natural mortality by marine mammal, bird and fish populations, and comparative analyses of trends in recruitment and condition factor for a broad range of fish species.

A new state space model was developed and applied to Butterfish to estimate current stock size, rates of removal and biological reference points. Using data through 2019, the stock is not overfished and overfishing is not occurring. The new biological reference point for fishing mortality is much higher than earlier values but this is due in part to updated information on maturity at age, and revised selectivity patterns from 2014 onward. The realism of the high reference point will be considered by the SSC when it receives results of the upcoming Management Track Assessment for Butterfish.

Ecosystem and Socio-Economic Profiles

The SSC received a basic overview of methods for linking oceanographic drivers to stock assessments. The hypothesis-driven age-structured approach was viewed as promising by the SSC.

Atlantic Surfclam and Ocean Quahogs

Catches for Surfclams and Ocean Quahogs were updated but no new fishery independent data were available for either species. Catches continued to be below existing quotas. **The SSC recommended continuation of previously approved quotas for 2023. These are 42,237 mt for Surfclams and 44,082 for Ocean Quahogs.**

Longfin Squid

Catches of Longfin Squid for 2021 were updated along with NEFSC bottom trawl survey indices. **The SSC recommended continuation of previously approved quota of 23,400 mt for 2023.**

Chub Mackerel

No new information was available to inform specification of a multiyear ABC for Chub Mackerel. The current ABC is based on recent catch history and expert judgment. A research project relying on age samples from commercial landings is underway. Little is known about Chub Mackerel dynamics in the Mid-Atlantic but large fisheries for this widely distributed species and similar species exist elsewhere in the world. Detailed research recommendations for future assessments are provided, however prospects for conventional stock assessment approaches are limited for the foreseeable future. **The SSC recommends continuation of the existing quota ABC = 2,300 mt for the period 2023-2025.**

Multi-year ABCs

Averages of ABCs defined by the P* approach can be problematic when the stock is above Bmsy or when strong trends in biomass are expected. Under these conditions, the average of consecutive ABCs may exceed the target overfishing limit in one or more years. The SSC reviewed initial work from a subcommittee to review alternative methods for computing a constant catch that meets the requirements of the Council's Risk Policy. The SSC will continue collaboration with the NEFSC to develop software that interfaces with the existing AgePro software and new methods under development using the Woods Hole Assessment Model (WHAM).

Background

The SSC met via webinar from 10th-11th May 2022, addressing the following topics:

- Review of Harvest Control Rule per the Council's request
- Overview of key scientific advances from the Research Track Assessments for *Illex* squid and Butterfish.
- Overview of Ecosystem and Socio-Economic Profiles
- Review of previously approved ABCs for 2023 for Atlantic Surfclams, Ocean Quahogs, and Longfin squid.
- Setting ABCs for Chub Mackerel for 2023-2025
- Review guidance and approaches for multi-year average ABC calculations

See Attachment 1 for the meeting's agenda. An Executive Summary provides a quick summary of the primary conclusions of the SSC.

All SSC members were able to participate for all or part of the meeting (Attachment 2). Other participants included Council members, Council staff, NEFSC and GARFO staff, and representatives of industry, stakeholder groups, and the general public. Council staff provided outstanding technical support throughout the process. A special thanks to Brandon Muffley who guided the SSC's work before, during, and after the meeting. Within the SSC, Thomas Miller's leadership on the Harvest Control Rule was a significant factor in the success of the working group's review. I thank SSC members and Council staff for their comments on an earlier draft of this report.

All documents referenced in this report can be accessed via the SSC's meeting website https://www.mafmc.org/ssc-meetings/2022/may 10-11. A comprehensive guide to the acronyms in this report may be found in Attachment 3.

Harvest Control Rule

As noted in the March 2022 SSC meeting report:

"The HCR amendment is a complex set of measures designed to regulate recreational harvest of summer flounder, scup, black sea bass, and bluefish. The overall objective is to prevent overfishing by employing controls that account for stock status and its uncertainty. To the extent possible the measures are to be governed by angler preferences and a desire for stability of measures across jurisdictions and over time."

The Council's request to the SSC is stated below:

> *Request that the SSC provide a qualitative evaluation, in time for final action at the June 2022 Council/Policy Board meeting, regarding the potential effect of each of the five primary alternatives in the Harvest Control Rule Addendum/Framework on the SSC's assessment and application of risk and uncertainty in determining ABCs. The intent is to provide the Council and Policy Board with information to consider the tradeoffs among*

the different alternatives with respect to the relative risk of overfishing, increasing uncertainty, fishery stability, and the likelihood of reaching/remaining at Bmsy for each approach at different biomass levels (e.g., for ½ Bmsy < B < Bmsy, the relative risk among alternatives is (highest to lowest) E > C > B > A>D).

A subcommittee consisting of Tom Miller (chair), Lee Anderson, Cynthia Jones, Paul Rago, Brian Rothschild, and Alexei Sharov met three times to discuss the SSC response and draft a summary report. All meetings were open to the public. This report was made available to all SSC members prior to the meeting.

The report is structured to address four key questions:

- What is the impact of the proposed Addendum / Framework on the SSC's assessment and application of risk and uncertainty in determining ABCs?
- Does the proposed Addendum / Framework represent a Harvest Control Rule?
- What are some of the implications of the proposed Addendum / Framework?
- What are the benefits and challenges of each proposed action within the proposed Addendum / Framework?

During the meeting this draft served as a template for discussions. Changes to the document were made by Tom Miller as the topics were discussed. As such, the subcommittee's final report captures all of the comments made by the committee and will not be repeated here. The Executive Summary provides an overview of the primary conclusions of the SSC.

Overview of *Illex* Research Track Stock Assessment

The recently completed Research Track Assessment for *Illex* included a number of scientific advances that could improve future management of *Illex*. The SSC received an overview of these advances via presentations from Lisa Hendrickson, NEFSC, Sarah Salois, NEFSC, and John Manderson, Open Ocean Research. The purpose of these presentations was to introduce the SSC to these improvements before Management Track Assessments later this year and to lay the basis for potential changes in future *Illex* assessments.

Lisa Hendrickson reported on various analyses of biological samples collected by industry. Analyses included age estimation, sex and maturity status, and micro-element analysis of transects along statoliths. Samples were collected between May to October in 2019 and 2020. Samples were aged using funding from both NEFSC and the Council. A total of 725 squid were aged; although total numbers are modest by finfish standards, these data represent one of the largest samples of *Illex* aging in the world. The spring-summer fishery is primarily supported by recruits born between November and April. Post fishery samples from October indicated these squid were born between May and July of the same year. A post-doctoral fellow, Jessica Jones analyzed strontium, calcium, and other elements along statolith transects. The ultimate aim of this research is to help distinguish among seasonal cohorts and possibly identify spawning areas and times. Results of these research efforts will be prepared for publication in the scientific literature.

Sarah Salois summarized work conducted by the "Squid Squad", a group of oceanographers, biologists, commercial fishers and processors who met weekly during 2021 and 2022 to highlight potential oceanographic features influencing availability of *Illex* to fishing areas on the shelf break. The group developed a useful general framework for testing hypotheses about oceanographic processes and squid availability. Ultimately it is hoped that these insights will support real-time forecasts of *Illex* availability for management. Key factors include the dynamics of ocean fronts, the frequency and attributes of warm core rings, bottom temperatures and composition of slope water. This hypothesis framework aids in development of Generalized Additive Models (GAM).

One of the factors hampering application of assessment models is the dynamic nature of seasonal migration patterns into and out of the fishing area. John Manderson highlighted his recent work to apply a Generalized Depletion Model (GDM) to *Illex*. The GDM was developed and first applied to squid fisheries in the Falkland Islands (Roa-Ureta 2012)[1]. An important feature of the GDM is that it allows for differences among fleets and migrations. Migrations are characterized by pulses of recruits to and from the fishing area during the fishing season. Pulses are currently identified based on abrupt changes in catch per unit effort (CPUE). Future refinements of the model could ultimately allow inclusion of other information, such as seasonal length and weight frequencies.

The SSC appreciated the information provided by the assessment team and looks forward to the final reports from the RTA.

Overview of Butterfish Research Track Stock Assessment

Scientific advances in the Research Track Assessment for Butterfish included extensive consideration of the influence of environmental and ecosystem factors on population dynamics, and the application of a state space modeling approach. Laurel Smith and Charles Adams, both NEFSC, provided detailed summaries of these advances.

Laurel Smith provided an overview of a number of working papers on ecosystem factors. Changes in decadal patterns of spatial distribution were explained in part by bottom and surface temperatures and bottom type. Sources of natural mortality include marine mammals, birds, and fish were low relative to overall Butterfish catch rates. Estimated total consumption by seals was less than 9% of total commercial catch. Consumption of Butterfish by seabirds is negligible based on available data. Average consumption of butterfish by other fish species was about 3,300 mt but ranged up to 30,000 mt.

Condition factor of Butterfish and many other species dropped markedly around 2000 and

1 Roa-Ureta, R.H. 2012 Modelling in-season pulses of recruitment and hyperstability-hyperdepletion in the *Loligo gahi* fishery around the Falkland Islands with generalized depletion models. ICES Journal of Mar. Sci. 69:1403-1415.

remained low for about a decade. Changes in the relative abundance of small vs large copepods showed a similar pattern and may be responsible for the temporal changes in condition.

In the Mid-Atlantic, the Butterfish assessment will be the first to use a state-space model to characterize stock status. Butterfish have a very high natural mortality rate (M~1.0) State-space models use the same basic equations as age-structured models but treat parameters as unobserved states with variance over time. This allows parameters to vary over time while simultaneously estimating fewer parameters. The new Woods Hole Assessment Model (WHAM) can implement random effects for interannual transitions in numbers at age, natural mortality and selectivity. These changes result in realistic increases in uncertainty; state space models often have reduced retrospective patterns.

SSC members commented on the very high Fmsy proxy (>6/yr) estimated by the WHAM model. Dr. Adams explained that this was due to the very young age at maturity (~0.7 years) and the selectivity pattern of the fishery. The force of mortality on an age group is the product of the maximum F and the selectivity at age. The WHAM model uses two selectivity stanzas that begin in 1989 and 2014, respectively. Selectivity estimates may vary as additional years of data are added to the relatively short second stanza. The SSC commented that the so-called 2/3 M rule developed via a meta analysis by Patterson did consider a number of small pelagic fishes that had collapsed. The realism of the high reference point in the WHAM model will be considered by the SSC when it receives results of the upcoming Management Track Assessment for Butterfish.

The SSC sought clarification about differences between WHAM and ASAP model runs. One of the notable features of WHAM is the ability to use autoregressive models for recruitment. This is a commonly observed property of historic recruitment estimates for Mid-Atlantic stocks. The SSC will revisit the comparisons between WHAM and ASAP models when it reviews the results of the Management Track Assessment for Butterfish later this year.

Ecosystem and Socio-Economic Profiles for Stock Assessments

NEFSC scientists Scott Large, Abby Tyrell, Ricky Tabandera led a discussion on Ecosystem and Socio-Economic Profiles (ESP) for Stock Assessments. ESPs are viewed as a way of operationalizing the results of the State of the Ecosystem (SOE) report and stock assessments. Key features of ESP include leveraging of knowledge pathways, inclusion of a broad range of factors, standardized reporting of results and transparency (data, algorithms, availability). The ESP development begins with a problem statement followed by a conceptual model. Suitable indicators are identified and analyzed to develop summary recommendations. An example application of ESPs to Sablefish in the Pacific was presented.

The SSC inquired about specific examples of problem statements. Reference point selection for Atlantic mackerel was considered as an example. Analyses of the utility of using patterns for multiple species to strengthen inferences about single species was also suggested by the SSC.

SSC encouraged future work on ESP and looked forward to receiving applications to Mid-Atlantic stock assessments currently being developed for Bluefish, Black Sea Bass, and Atlantic Mackerel.

Atlantic Surfclam and Ocean Quahog

Jessica Coakley, MAFMC, provided an overview of current landings patterns and issues of concern from the Advisory Panel for each species. Catches of both Atlantic Surfclam and Ocean Quahog continue to be well below the current quotas and both fisheries' footprints have been moving to the north and east over the past decades. LPUE trends for Ocean Quahog have been relatively stable, but Atlantic Surfclam LPUEs have shown steady declines as the overall stock approaches Bmsy levels. Catches of Surfclams on Georges Bank and in Southern New England constitute an increasing fraction of landings since 2011. The Advisory Panel noted the need for updated regulations on Georges Bank consistent with new FDA guidelines. The Advisory Panel also requested Council action and research on access to Nantucket Shoals and Great South Channel. Joint action with the New England Fishery Management Council would be desirable.

Previous model results for Ocean Quahog suggest stable abundance trends at about two times Bmsy since 1980. Overall LPUE trend supports this result although like Atlantic Surfclams, fishing patterns have shifted northward and eastward over time.

The SSC commented on increased Surfclam catches in the Southern Virginia area. Dan Hennen, NEFSC, noted that this trend is likely to be short-lived, owing to increased temperature in recent decades. Concerns about future effects of wind energy development were also expressed. Continued patterns of landings below the ABCs sparked a discussion on the definition of "optimum yield" but no conclusions were drawn.

Catches for Atlantic Surfclams and Ocean Quahogs were updated but no new fishery independent data were available for either species. Per the most recent benchmark assessment neither stock is overfished and overfishing is not occurring. Catches continued to be below existing quotas. Council staff recommended no changes to the existing ABCs. **The SSC recommended continuation of previously approved quotas for 2023. These are 42,237 mt for Atlantic Surfclams and 44,082 for Ocean Quahogs.**

Longfin Squid

Jason Didden, MAFMC, summarized 2021 landings and bottom trawl survey indices from NEFSC. Both fall and spring bottom trawl survey indices for Longfin Squid were above averages for the last 10 years. Catches have been well below the TAC since 2000. Prices dropped sharply in 2020 due to lower demand, rebounded in 2021 but remained well below peak prices in 2019. Landings in 2022 thus far are above comparable estimates in 2021 but remain well below the first trimester cap. Harvesters reported high fuel prices are likely to reduce effort. Concerns

about pending turtle bycatch measures, exclusion from future wind energy areas, and potential changes in stock assessment methodology were expressed by the Advisory Panel.

SSC members inquired about the status of the next Research Track Assessment for Longfin Squid (Spring 2026). A representative from the public noted that examination of new assessment methods prior to that would be desirable. The SSC noted that improved, higher frequency data collections and processing of biological samples should begin now to lay the basis for the next RTA.

No compelling evidence was provided to adjust the previously approved ABC. **The SSC recommended continuation of previously approved Longfin Squid quota of 23,400 mt for 2023.**

Chub Mackerel

Julia Beaty, MAFMC, opened with a summary of recent recreational and commercial catches. Total catches were well below the current ABC of 2,300 mt, but recreational catches have been increasing. This may be due to ongoing efforts to improve identification of the Chub Mackerel by APAIS staff. Chub Mackerel remain a relatively rare species in angler intercept surveys and precision of estimates is low.

There are no quantitative assessments of Chub Mackerel in the Mid-Atlantic or adjacent regions. Stock status is unknown, but since 2018 the SSC has assumed that this relatively unfished stock is at or above Bmsy. Monitoring of commercial landings for length and age composition is ongoing but there are no fishery-independent indices of relative abundance. Commercial landings come primarily from vessels targeting *Illex* squid near the shelf break. Chub Mackerel are occasionally targeted when economic factors are favorable (e.g., low *Illex* availability, high Chub Mackerel prices). No unusual patterns were reported for 2021. Advisory Panel members reported increasing prevalence, perhaps due to climate change. Council staff recommended a continuation of the current ABC for 2023 to 2025.

The SSC noted that despite the paucity of data and lack of assessment methodology, reviews of assessments and basic biological data for other Chub Mackerel stocks and similar species stocks could lay a basis for future assessments. Continuation of research programs to monitor commercial landings was encouraged. A member of the public also commented on the utility of fishery dependent data collection programs.

Following the presentation and general discussion, the SSC addressed the Terms of Reference (standard font) for Chub Mackerel Responses by the SSC (*italics*) to the Terms of Reference provided by the MAFMC are as follows:

Terms of Reference

For Chub Mackerel, the SSC will provide a written report that identifies the following for the 2023-2025 fishing years:

1) The level of catch, in weight, associated with the acceptable biological catch (ABC) for the stock. Provide any rationale for the specified ABC and, if possible, identify any interim metrics that can be examined to determine if multi-year specifications need reconsideration prior to their expiration;

   The SSC recommends 2,300 mt (= 5.07 million pounds) as ABC be continued for fishing years 2023-2025. This value reflects limited new information available to the SSC to justify any change in ABC, and the low landings in both commercial and recreational sectors since 2017. This value does not exceed the observed highest catch in the fishery (2013). The expert judgment of the SSC is that this level of catch is unlikely to result in overfishing given the general productivity of this species in fisheries throughout the world, combined with the relatively low fishery capacity in our region.

2) The most significant sources of scientific uncertainty associated with determination of the ABC;
   - *Stock size and productivity cannot be determined, there is no information to determine reference points for stock biomass levels, and little information exists to determine reference points for fishing mortality rates.*
   - *Low levels of landings curtails the quantity and quality of fishery-dependent data.*
   - *Public outreach efforts may have led to improved identification of scombrids in recreational catches, possibly altering catch estimates.*
   - *There is a perception that climate change may be altering patterns of availability of Chub Mackerel.*
   - *There is no information about the source of recruits; it is unknown whether Chub Mackerel are episodic in the Mid-Atlantic, whether this is a range expansion with localized spawning, or neither. Early life stages of this species are found in the Gulf of Mexico, South Atlantic and Mid-Atlantic, suggesting a broad distribution. However, stock structure is poorly described.*
   - *There is no information on predation mortality, and limited information on the role of Chub Mackerel in predator diets.*
     - Council-funded study on predator diets: chub mackerel were determined to be an exceptionally small component of the diets of tunas and marlins (Golet work)
   - *There is very high uncertainty in recreational landings and discards.*
   - *Observer coverage on fisheries likely to catch Chub Mackerel may be low (Illex fleet, Mid-Atlantic small mesh bottom trawl).*

3) Research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendation;

- *The SSC requests specific data collection in association with this species to support future ABC specification. Limited fishery-dependent data on age and size distributions are available. However, the limited commercial harvests since 2017 have reduced sampling. The SSC would benefit from improved data on catch, age and length composition and effort in the directed Chub Mackerel fishery. An expanded fishery would allow for the collection of more information on how this stock responds to fishing in our region – but the data do not suggest the fishery is currently constrained by the ABC.*
- *Comprehensive analysis of spatial (and temporal) patterns in catch from all sources – commercial and recreational catches, observer data – could lead to improved understanding of population variability.*
- *We lack a fishery independent survey. The feasibility of acoustic surveys for Chub Mackerel (and other pelagic species) should be explored.*
- *Aging precision and validation.*
- *Consider a synthesis of survey data in the Mid-Atlantic, South Atlantic and Gulf of Mexico (such as EcoMon) on early life history stages to assess density and distribution of Chub Mackerel as a first step in an evaluation of whether egg production methodologies could provide a foundation for reference point determination.*
- *Synthesis of stock structure and dynamics of other Chub Mackerel stocks and stocks of related scombrid species, such as listed in the supplemental documents, to evaluate feasible assessment approaches and evaluate fished stock dynamics. Explore whether existing ecosystem models (e.g., Buchheister et al. 2017) may provide indications of potential ranges of population biomass and mortality rates.*
- *Information on Chub Mackerel diet that may help establish links to ecosystem productivity to assess potential stock productivity.*

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

- *Staff memo: 2023-2025 ABC Recommendations and Considerations*
- *2022 Chub Mackerel Advisory Panel Fishery Performance Report*
- *2022 Chub Mackerel Fishery Information Document*
- *Supplementary materials from SSC meeting web site*
  - *Stock Assessment and Fishery Evaluation (SAFE) Document for Pacific Council Coastal Pelagic Species FMP*
  - *Pacific mackerel stock assessment June 2019*
  - *ICES Workshops on Chub Mackerel: Workshop 1 (2020), Workshop 2 (2021)*
  - *FAO Summary of Atlantic Chub Mackerel Landings by Region, 2010-2019 (see Table B-37, page 324; Source: FAO 2019 Yearbook of Fishery and Aquaculture Statistics)*
  - *Characterization of the Atlantic Chub Mackerel Fishery and Stock, Robert Leaf, University of Southern Mississippi (2020)*
  - *Age and Growth of Atlantic Chub Mackerel (Scomber colias) in the Northwest Atlantic (Daley and Leaf, 2019)*
  - *Chub Mackerel Literature Review (2017)*
  - *NEFSC survey data on chub mackerel (2017)*

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

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

Guidance and Approaches for Constant/Average ABC Calculations

Multi-year catch limits based on constant catches are often considered desirable by both managers and industry. The Mid-Atlantic Fishery Management Council has requested consideration of multi-year specifications based on average catches for a number of stocks. At the July 21-23, 2021 meeting of the SSC, two Council members proposed average catch options could not be considered because the average ABC catch policy resulted in P* values above 0.5 over the specification period. P* is the probability of a given quota exceeding the overfishing threshold. The Council requested that the SSC develop an alternative process to apply during these situations that would allow the SSC to still provide constant ABC recommendations.

The SSC formed a small team to address the technical basis of this impediment and to seek clarification of applicable policy constraints related to the Council's Risk Policy. Michael Wilberg presented an overview of recommendations from a subgroup that also included Brandon Muffley and Paul Rago.

Potential options for addressing the Council's request include continuation of the status quo, developing a new optimization approach, or using a single year projection to set catches for a multiyear specification procedure. Continuation of the status quo approach would result in rejection of any policy that resulted in a P* greater than 0.5. The optimization approach would build on a method outlined in a white paper prepared by Paul Rago. The method entails using a constrained nonlinear optimization that maximizes average ABC over the specification period, subject to constraints imposed by the Council's Risk Policy. Unpublished simulation studies by Wilberg in support of the Wiedenmann et al (2017) paper have shown that the use of single year projection to characterize a multiyear quota yield results comparable to quotas based on multi-year projections.

Irrespective of the approach selected, a common set of code was recommended for use by analysts. The current approach is time consuming and can be error prone when multiple scenarios are under consideration. The SSC encouraged the development of common code for application all P* calculations for both AgePro and WHAM applications. Work with the NEFSC to link existing software with new R code "wrappers" was suggested as a way forward.

The SSC noted that multi-year projections are often overly optimistic because recruitment tends to be overly estimated, especially when contemporary levels are low. For short term projections,

the implications of future recruitment are less important. Instead, current stock structure, particularly when strong year classes are present, should be factored into multi-year projections. Hence multi-year projections based on single year projection were considered less useful and not recommended for general application.

The SSC recommended consultation with other Councils' SSCs for their multi-year forecast practices, a review of previous applications by the SSC, development of new software in collaboration with the NEFSC to automate the process, and obtaining additional policy guidance from the Council and GARFO on admissible risk constraints.

Other Business

The Scientific Coordination Subcommittee will be hosting a workshop of the Fishery Management Council's Scientific and Statistical Committees August 15th-17th in Sitka, Alaska. Sarah Gaichas will be presenting a keynote address. The focus of the meeting will be inclusion of ecosystem information in stock assessments. In addition to Brandon Muffley, the following SSC members will be attending: Olaf Jensen, Yan Jiao, and Alexei Sharov.

The July 25-26 meeting of the SSC will be a hybrid meeting in Baltimore.

Attachment 1

Mid-Atlantic Fishery Management Council

Scientific and Statistical Committee Meeting

May 10 – 11, 2022

UPDATE: Due to recent Covid developments, the meeting will now be 100% virtual with no in-person participation

Hybrid Meeting:
Royal Sonesta Harbor Court Baltimore (550 Light Street, Baltimore, MD 21202)
or via Webex webinar

This meeting will be conducted as a hybrid meeting. SSC members, other invited meeting participants, and members of the public will have the option to participate in person at the Royal Sonesta Baltimore or virtually via Webex webinar. Webinar connection instructions and briefing materials will be available at Council's website: https://www.mafmc.org/council-events/2022/may-2022-ssc-meeting

AGENDA

Tuesday, May 10, 2022

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

12:35 SSC guidance on the Recreational Harvest Control Rule Framework/Addenda
- Review draft response document developed by SSC HCR sub-group (T. Miller)
- SSC feedback and input on document for consideration by Council

2:00 Break

2:15 Introductory overview of *Illex* Research Track stock assessment information
- Age, length, intra-annual cohort identification and preliminary trace elemental analysis results (L. Hendrickson)
- Oceanographic indictors for *Illex* in Northwest Atlantic (S. Salois)
- Generalized depletion modeling of *Illex* fishery (J. Manderson)

3:15 Introductory overview of Butterfish Research Track assessment information
- Butterfish condition, environmental drivers, and consumptive removals (L. Smith)
- Introduction to WHAM – application to Butterfish, comparison to ASAP, and other considerations (C. Adams)

4:15 Break

4:30 Ecosystem and Socio-Economic Profiles (ESP) for stock assessments (S. Large)
- Overview of ESPs – process, content, application
- Draft examples for bluefish and black sea bass

5:30 Adjourn

Wednesday, May 11, 2022

8:30 Atlantic Surfclam and Ocean Quahog data and fishery update: review of previously recommended 2023 ABC (J. Coakley)

9:30 Longfin squid data and fishery update: review of previously recommended 2023 ABC (J. Didden)

10:15 Break

10:30 Chub Mackerel ABC specifications for 2023-2025 fishing years
- Review of staff memo and 2023-2025 ABC recommendations (J. Beaty)
- 2023-2025 SSC ABC recommendations (G. Fay)

12:00 Guidance and approaches for constant/average ABC calculations
- Review draft approach developed by SSC sub-group
- SSC input and feedback for Council consideration

12:45 Other Business

1:00 Adjourn

Note: agenda topic times are approximate and subject to change

Attachment 2

MAFMC Scientific and Statistical Committee

May 10-11, 2022

Meeting Attendance via Webinar

Name	Affiliation
SSC Members in Attendance:	
Paul Rago (SSC Chairman)	NOAA Fisheries (retired)
Tom Miller	University of Maryland – CBL
Ed Houde	University of Maryland – CBL (emeritus)
Dave Secor	University of Maryland – CBL
John Boreman	NOAA Fisheries (retired)
Lee Anderson	University of Delaware (emeritus)
Jorge Holzer (May 10th only)	University of Maryland
Yan Jiao	Virginia Tech University
Rob Latour	Virginia Institute of Marine Science
Brian Rothschild	Univ. of Massachusetts-Dartmouth (emeritus)
Olaf Jensen	U. of Wisconsin-Madison
Sarah Gaichas	NOAA Fisheries NEFSC
Wendy Gabriel	NOAA Fisheries (retired)
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
Mike Frisk	Stony Brook University
Mark Holliday	NOAA Fisheries (retired)
Others in attendance (only includes presenters and members of public who spoke):	
Kiersten Curti (May 10th only)	NEFSC
Jason Didden	MAFMC staff
Brandon Muffley	MAFMC staff
Julia Beaty	MAFMC staff
Jeff Kaelin	Lund's Fisheries
Jessica Coakley	MAFMC staff
Chuck Adams	NEFSC
Lisa Hendrickson (May 10th only)	NEFSC
John Manderson (May10th only)	Open Ocean Research
Michelle Duval	MAFMC
Abby Tyrell (May 10th only)	NEFSC
Scott Large (May 10th only)	NEFSC
Dan Hennen (May 11th only)	NEFSC
Sarah Salois (May 10th only)	NEFSC
Ricky Tabandera (May 10th only)	NEFSC
Laurel Smith (May 10th only)	NEFSC

Attachment 3. Glossary

ABC—Acceptable Biological Catch
AIC—Akaike's Information Criterion
Bmsy—Biomass at maximum sustainable yield
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
FDA—Food and Drug Administration
GARFO—Greater Atlantic Region Fisheries Office
HCR—Harvest Control Rule
MRIP—Marine Recreational Information Program
MTA—Management Track Assessment
MSC—Marine Stewardship Council
MSE—Management Strategy Evaluation
OFL—Overfishing Limit
P*—Probability of overfishing
RHL—Recreational Harvest Limit
RSA—Research Set Aside
RSC—Research Steering Committee
RTA—Research Track Assessment
R/V—Research Vessel
SSBmsy—Spawning stock biomass at maximum sustainable yield
SSC—Scientific and Statistical Committee