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: September 23, 2022

To: Michael P. Luisi, Chairman, MAFMC

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

Subject: Report of the September 2022 SSC Meeting

Executive Summary

Spiny Dogfish Specifications for 2023

The SSC received an update from Jason Didden on the status of the fishery and most recent information from the NEFSC Spring Bottom Trawl Survey. The spawning stock estimate for females is the lowest in the time series since 1982 and pup abundance was low. Survey estimates show a downward trend since 2016 despite catches that have been lower than the TAL since 2011. Preliminary analyses of new ageing data suggest lower productivity than previously thought. The work of the Research Track Assessment will be reviewed in December 2022 and will be followed by Management Track Assessment in 2023.

In absence of a stock assessment, the SSC developed an *ad hoc* approach that addresses the apparent recent decline in abundance pending confirmation in the upcoming assessment. The method reduced the previous ABC (defined in 2018) by first adjusting it to be consistent with the current Council Risk Policy. The adjusted ABC was then multiplied by the ratio of current average female spawning stock abundance (2021 and 2022) to the average for 2016 to 2018. T**he SSC recommended an ABC of 7,788 mt for the 2023 fishing year. This represents a 55% decrease from the 2022 ABC of 17,498 mt.**

Overview of Northeast Regional Habitat Assessment (NRHA)

The SSC received an update on a number of products developed by the NHRA. This collaborative multidisciplinary decision support system includes a broad array of data visualization and summarization tools to serve both scientific investigation as well as management needs. The SSC noted that this comprehensive project should support many

different and as yet unanticipated projects. The SSC recommended continuation of the project in future years and emphasized the importance of annual data updates.

Progress Update on SSC Work Group: Ecosystem

The Ecosystem Work Group reviewed a number of projects that began in 2022 and will continue into 2023. Methods to incorporate environmental covariates into estimation of the OFL CV were considered as well as development of multi-factor indices of ecosystem overfishing. This is an active area of research involving assessment, economic, and ecosystem scientists. The SSC anticipates significant progress in 2023.

Progress Update on SSC Work Group: Economics

The Economics Work Group reviewed their work over the past year, particularly with respect to the Research Set-Aside program. The WG played an important role in terms of comprehensively defining the advantages and liabilities of alternative approaches for a future RSA. The RSA exercise was envisioned as a proof-of-concept project. Future interactions with the Council are expected and will be driven by the expertise and interests of SSC members and needs of the Council.

Progress Update on SSC Work Group: ABC Averaging

The ABC Averaging Group outlined the conditions under which average ABC estimates would be problematic for violations of the Council's Risk Policy. Results from earlier analyses of using the first projection year estimate as a basis for a multiyear project were summarized. An initial optimization analysis suggested that a constant ABC could be maximized subject to constraints. The WG will be working with Council staff to refine the appropriate constraints.

Results and Findings of EAFM Recreational Summer Flounder MSE

Due to a scheduling conflict and the extended discussions on Spiny Dogfish, results of this project could not be reviewed within the allotted time. It will be reconsidered at a later date.

Background

The SSC met in person and via webinar from 13th -14th September 2022, addressing the following topics:

- Spiny Dogfish ABC Specifications for 2023
- Receive Update on Northeast Regional Habitat Assessment
- Review progress of three SSC Work Groups on Ecosystems, Economics, and ABC Averaging
- Discuss topics for joint meeting of SSC and Council
- Plans for 2023

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

Most SSC members were able to participate for all or part of the meeting (Attachment 2), but only three SSC members attended in person in Baltimore. Other participants included Council members, Council staff, NEFSC and GARFO staff, and representatives of industry, stakeholder groups, and the general public. Most participants were online rather than onsite. Outstanding technical support to implement the hybrid meeting was provided by Council staff. The hard work of Brandon Muffley to plan and effectively execute the hybrid meeting is especially appreciated.

Within the SSC, Yan Jiao's exceptional leadership on the Spiny Dogfish TOR allowed the SSC to craft management advice. I thank Sarah Gaichas for contributing her meeting notes to support preparation of this report.

I also 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/sep 13-14. A comprehensive guide to the acronyms in this report may be found in Attachment 3.

Spiny Dogfish Specifications for 2023

Jason Didden, MAFMC, began the discussion with an overview of the fishery in 2021 and a summary of the 2022 NEFSC Spring Bottom Trawl Survey (BTS). Landings in 2021 were below the Total Allowable Catch and the overall catch was below the ABC. This pattern has occurred since 2012. An initial analysis of CPUE patterns in the observer database revealed strong coherence with the patterns observed in the Spring BTS. Tow-by-tow information was examined for observed trips where dogfish were not targeted and sampling intensity was not reduced by COVID.

Apart from these trends, no new information was available for consideration by the SSC. Results from a Research Track Assessment were anticipated, but the assessment was delayed

because ageing studies were not available until recently. The assessment will be reviewed in December 2022 and results of a Management Track Assessment will be available to the SSC in 2023. These results will be used to set specifications for the 2024-25 fishing years. In the interim it is necessary to set 2023 regulations because current regulations expire at the end of the 2022 fishing year (April 30, 2023).

When faced with similar circumstances of a pending near-term assessment, the SSC has previously recommended *status quo* ABCs until the results of the stock assessment became available. Several considerations made this approach less desirable for spiny dogfish:

- Spring survey mature female biomass estimates in 2022 were the lowest on record.
- Pup indices were among the lowest on record.
- Despite recent catches being well below quotas, the stock as a whole appears to be declining.
- Revised growth estimates suggest slower growth than previously estimated. Overall productivity of the resource may therefore be lower than previously estimated.

Collectively, these factors suggested that reductions in previously specified ABCs were appropriate.

While there was consensus on the need to reduce ABCs in response to the new information, the magnitude of the reduction was not self-evident. A methodology based on recent average catches was proposed by Council staff. This had considerable empirical merit but was not linked directly to recent estimates of stock biomass estimates.

The SSC discussions focused on interpretation of the trends and various approaches for quantifying an appropriate change in the ABC.   Reductions in female spawning stock biomass were examined by using ratios of recent averages to averages in earlier periods. A regression analysis of local trends confirmed the magnitude of the ratios. The SSC debated the relative importance of the sharp drop in 2022. Discontinuities in the past, particularly a rapid increase in 2006, suggest the importance of environmental factors in the availability of spiny dogfish in the offshore sampling area.   Work of Sagarese et al. (2016) suggested that very cold years led to decreased availability in the past. Offshore temperatures have generally been warmer in recent years. Reduced pup abundance in recent years could be due to changes in availability in the water column and a narrow habitat range on the edge of the shelf.

SSC discussions eventually coalesced to an approach that mimics the manner in which OFLs had been set in the past. Essentially, the updated estimates of stock biomass are projected forward by using estimates of the population size structure, growth rates, natural mortality rate, and the F_{msy} proxy. This length and sex-based model could not be applied in 2022 because resources had to be focused on completing the Research Track Assessment.   However, it is possible to mimic the process of computing an ABC by examining the ratio of the current survey biomass estimate (i.e., the average of 2021 and 2022; 2020 data not available) to the biomass estimate used in 2018 to estimate the ABCs for 2020 to 2022.

The biomass estimate in 2018 was based on three years of data (2016-2018). Under the rather strong assumption that the size structure of the biomass estimates in 2018 and 2022 are equivalent, the ratio of the biomass estimates can be multiplied by the OFL or ABC in 2020 to obtain an OFL or ABC for 2023. Without loss of generality, one could also use the average biomass in 2018 as the basis for the ratio. After much debate, the SSC recommended that the ABC be adjusted by the ratio of the average of the spring BTS female spawning stock biomass for 2021 and 2022 to the average of the 2016 to 2018. Hence the adjustment relies entirely on the change in the survey estimates for non-overlapping periods. By adjusting the ABC directly, this approach also ignores the reduction in abundance that would have justified a larger reduction in catch if the Council's risk policy had been applied.

This scalar adjustment of the ABC does not take into account the Council's Risk Policy because the P* associated with the lower value of biomass in 2022 has not been accounted for. In other words, the risk is assumed to be equal to that used in 2018. The SSC examined another alternative based on a two-step process in which the OFL was first reduced by the biomass ratio and followed by an adjustment in P* given the revised ratio of stock size to B_{msy}. After further debate, the SSC agreed that the two-step process was less credible because it assumes that OFL for 2023 could be reliably approximated by the ratio method. Additional details on the discussion are included under the Terms of Reference.

Prior to addressing the Terms of Reference, members of the public were offered the opportunity to comment on the process. Several representatives of industry were opposed to the proposal to reduce catches in 2023. Recent catches have been below quotas due to economic factors rather than abundance. Fuel prices in particular have reduced profitability. Spiny dogfish are primarily exported to Germany. That market is sensitive to fluctuations in product availability and could be devastated by the sharp decline in US landings. Harvesters also argued that the earlier science was incorrect and the data supporting the SSC's recommendation is also likely to be wrong. One participant noted the potential utility of recreational CPUE from MRIP as a potential index of abundance; such indices have proven useful for Weakfish and Bluefish.

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

Terms of Reference

There are currently acceptable biological catch (ABC) specifications in place for Spiny Dogfish through the 2022 fishing year (May 1, 2022 – April 30, 2023). Spiny Dogfish is currently scheduled for a research track peer review in December 2022, followed by a management track assessment in mid-2023 with data through 2022 to inform future catch limit recommendations. Given the timing and availability of the 2023 management track assessment results, an ABC recommendation for the 2023 fishing year is needed. Depending on the timing of the 2023 management track assessment, there may be an opportunity to review and modify the 2023 ABC.

For Spiny Dogfish, the SSC will provide a written report that identifies the following for the 2023 fishing year:

1) *Utilizing the most recent fishery and NEFSC trawl survey information, specify a 2023 acceptable biological catch (ABC), in weight, and provide any rationale and justification for the recommended ABC;*

   A research track assessment for Spiny Dogfish was planned for July 2022, but has been delayed until late 2022. A Management Track Assessment is expected in 2023. It is anticipated the new research track assessment will consider uncertainties recognized from previous stock assessments and SSC discussions, which could reveal new scientific information about the stock.

   SSC has concerns about the low survey SSB estimate in 2022 (lowest among 1982-2022), lack of new assessment or an update of the previous stock assessment, which was done in 2018. Based on the stock projection from the 2018 benchmark assessment, the SSB was expected to increase in 2022 and a dramatic increase in 2023-2025 given the estimated MSY proxy level. However, the low index data from the 2022 NEFSC spring trawl survey, the way the index information is used in the assessment, and concerns about low recruitment under low SSB years, the SSC recommends an interim ABC before the new research track assessment is implemented.

   As a result of the lack of a current assessment, the SSC adopted an *ad hoc* approach to estimate an ABC for 2023. The SSC recalculated the 2019 ABC to account for the revised Council's risk policy. Subsequently, to generate an ABC for 2023, the SSC adjusted this 2019 ABC based on the change in female spawning stock biomass between 2018 to 2022 derived from recent survey data. The details of the calculation are presented in the table below.

Calculation of putative 2019 ABC for Dogfish				Source
OFL	21549	OFL(2019)	21,549	2018 assessment projection (Table 11a)
B/Bmsy	0.642515	SSBtarget	159.288	2018 assessment
CV	100%	SSB(2018)	102.345	3-yr trawl survey average
sigma	0.832555	SSB(2022) 2-yr trawl survey average	61.413	2-yr trawl survey average
P*	0.271	SSB(2022)/SSB(2018)	0.600059	
ABC	12978.48	ABC(2019) calculated to the left	12,978.48	
ABC/OFL	0.602277	SSBthreshold	79.644	2018 assessment
		2023 ABC = ABC(2019)*[SSB(2022)/SSB(2018)]	7,787.847	

   The SSC recommends an ABC for 2023 = 7,788 MT

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

- The biggest source of uncertainty in determining the 2023 ABC is the lack of an updated assessment.
- The lack of survey data in 2020 due to COVID restrictions introduces a gap into the survey time series. The SSC would like to have used a 3-year average survey index as a basis for the ABC adjustment. The SSC considered reconstructing the 2020 data estimate using a smoother or moving average, but rejected this, favoring a parsimonious approach of simply using observations from two years.

The SSC concurs with the list of sources of scientific uncertainty provided in the 2018 Spiny Dogfish Assessment Update. In addition, the SSC notes:

- The SSC noted changes in the size distribution of mature female dogfish might reflect changes in growth and reductions in stock productivity. This potential change in stock productivity is not included in the approach the SSC took to develop the 2023 ABC.
- The current assessment method does not include other surveys (e.g., NEAMAP, MRFSS) in the region, placing heavy reliance on the NEFSC trawl survey.

3) *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.*

To the best of the SSC's knowledge, these recommendations are based on the best available scientific information.

List of documents reviewed and used to provide the ABC recommendation:

SSC Terms of Reference for Spiny Dogfish
Staff Memo: 2023 Spiny Dogfish ABC Recommendations
2022 Advisory Panel Spiny Dogfish Fishery Performance Report
2022 Spiny Dogfish Fishery Information Document (includes 2022 NEFSC data update)
2019 NEFSC Spiny Dogfish Data Update
2018 Spiny Dogfish Stock Assessment Update
Excel worksheet for ABC Options

Supplementary material:

Sustainable Fisheries Association (SFA), Inc. Letter
C. Moore Response to SFA
Supplemental Staff Observer Data Analysis
Sagarese et al. 2016. Diel Variations in Survey Catch Rates and Survey Catchability of Spiny Dogfish and their Pelagic Prey in the Northeast U.S. Continental Shelf Large Marine Ecosystem. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 8:244–262.

The SSC emphasized that the need to develop an *ad hoc* approach for the spiny dogfish ABC was the direct consequence of not having a stock assessment update. This is not a criticism of NEFSC or RTA analysts, but instead reflects a failure of the management process to match schedules with available staffing. A consequence of chronic underinvestment in the management process is that similar adjustments by the SSC and Council will be required in coming years. The present process is too cumbersome, slow, and understaffed to produce reliable science in the timeframe needed.

Northeast Regional Habitat Assessment (NRHA)

Jessica Coakley (MAFMC), Michelle Bachman (NEFMC), Chris Haak (Monmouth University), Tori Kentner (MAFMC), and Laurel Smith (NEFSC) provided an overview of a comprehensive package (Northeast Regional Habitat Assessment) for evaluating fish habitats in the Northeast. The project is the culmination of a three-year effort to assemble fishery independent estimates of abundance and landings of key species. The data are georeferenced and abundance indices over time are based on current survey estimation procedures for each contributor. Contributors include the National Marine Fisheries Service, state agencies, and academic partners. The NRHA is designed to support decision makers across the region by providing comprehensive, coordinated, and timely information on habitat, species trends, and species and habitat vulnerability.

Chris Haak gave a detailed presentation on a number of modeling approaches for habitat and species distribution models. His work incorporated a wide range of physiological tolerances, ecological requirements, and biotic interactions. One of the goals is to develop joint distribution models for two or more species. Next steps include improved visualization methods, projection of future conditions, and potential incorporation into ecosystem models.

SSC questions focused on methods for estimating uncertainty, the treatment of time series data, and the simultaneous inclusion of both dynamic (e.g., temperature) and static (e.g., bottom type) factors. The influence of depth in the water column can be modeled as both a function of depth and the amount of incident solar radiation. The SSC also inquired about how annual means over multiple surveys (e.g., spring and fall BTS) were calculated. The SSC recommended consideration of earlier life stages, such as data from ECOMON cruises. Consideration of size classes or maturation status within species might also help refine definition of habitat as physiological requirements change with age. Concerns were expressed about the difficulty of maintaining the databases on an annual basis.

Overall, the SSC was impressed with the comprehensiveness of the project and the quality of science thus far and underway. The SSC as a whole supported the conclusions and recommendations of a special joint review of NRHA by NEFMC and MAFMC SSC members. The SSC looks forward to receiving updates from the NRHA via its integration with various projects on Essential Fish Habitat, State of the Ecosystem Reports, and, ultimately, single species assessments.

Progress of SSC Working Groups

Ecosystem

The three primary objectives of this WG are to: 1) expand and clarify the ecosystem portion of the SSC's OFL CV determination process; 2) develop prototype processes to provide multispecies and system-level scientific advice, especially when there are multispecies and multi-fleet tradeoffs; and 3) collaborate with SSC and stock assessment leads, and appropriate working groups to develop stock-specific Ecosystem and Socio-economic profiles.

Simulation studies are now underway at the University of Maryland and Rutgers University to simulate environmental effects on stock recruitment relations and its influence on assessment uncertainty. In turn, such research should help better inform appropriate OFL CV levels. This project builds upon earlier MSE studies for Summer Flounder and will be extended to cover a pelagic species. Further review will occur in late September when the WG convenes.

The Ecosystem WG reported on initial progress on developing multispecies ecosystem indicators of overfishing. An index method known as "Data Envelopment Analysis" (DEA) has been tested initially. Based on system outputs and model drivers, DEA has shown considerable promise and is expected to be further developed in the coming year.

Several members noted the value of seeing the components of aggregated indices because it is not always clear which factors are affecting composite indices.

SSC members asked about current plans for using the Atlantis Model. This model is currently being updated and will serve as a test bed for development of indicators. A supplementary food web model, written in R, may provide further validation. SSC members also noted that some of the static ecosystem models based on connectivity patterns (e.g., Ulanowicz) may prove helpful.

The WG is also considering how environmental variables might be incorporated into estimation of P*.

Economic

The Economic WG projects in 2021-22 fell into four basic categories: scientific review, scientific specifications, focused analyses, and scientific advice. Most of its efforts were directed towards an evaluation of the potential restart of the Research Set-Aside program. Multiple meetings with the Council's Research Steering Committee occurred over the last year. In addition, the WG participated in the development of the Summer Flounder MSE, the review of the Recreational Harvest Control Rule, and review of several models for recreational harvest specifications.

The WG noted that more economic data are needed in order to address many Council concerns. Ultimately the quality of the analyses will be governed by the availability of the data. As an example, future RSA programs, should they be approved by Council, will require individual bid information, similar to requirements for oil, gas, and timber leasing.

Moving forward, the SSC sees a more "organic" workflow process driven by the expertise and interests of SSC members and needs of the Council. Several such opportunities exist for further

RSA work and support of the Ecosystem WG. Similar opportunities exist for immediate analyses of harvest control rules in 2023 and longer-term analyses when updates to the Harvest Control Rule amendment begin in late 2023.

Members of the SSC inquired about potential linkages to other SSCs, particularly in the South Atlantic where many more species are primarily recreational rather than commercial.

SSC members urged consideration of contrasting fishery management systems such as management via catch shares, quota monitoring, and the role of public vs private influences in management. It was noted that the RSA program might benefit by partnering with SCEMFIS or ASMFC to serve as administrative entities. This type of creative relationship might help ensure innovative ideas are considered in the context of larger research objectives, and reduce some concerns about a *de novo* entity serving this function.

ABC Averaging

Average ABCs are often considered desirable by both managers and harvesters. However, such averages can be problematic with respect to the Council's Risk Policy and Magnuson-Stevens Act regulations. Depending on the expected trend in biomass and the initial population size with respect to B_{msy}, an average of consecutive ABC developed under the P* approach may violate the Council's Risk Policy. The ABC averaging work group has been investigating the properties of average ABCs and seeks to develop approaches that are consistent with both the Council's and National policies. The SSC reviewed some preliminary simulation work that suggests that multiyear constant ABCs based on the initial projection year may perform as well as more complex ABC averaging schemes. The SSC also examined an optimization model that can maximize the average ABC subject to constraints on overfishing and maximum acceptable risk. Further work on both approaches is necessary. Collaboration with the NEFSC Population Dynamics Branch is desirable and the Work Group will be seeking clarification of the policy constraints applicable to multiyear ABC specifications. The current schedule of increased frequency of MTAs should reduce the need for longer term ABCs since most species assessments will be updated every two years.

Other Business

The Scientific Coordination Subcommittee held a workshop of the Fishery Management Council's Scientific and Statistical Committees August 15th-17th in Sitka, Alaska. The focus of the meeting was inclusion of ecosystem information in stock assessments. Sarah Gaichas presented a keynote address. In addition to Brandon Muffley, the SSC was represented by Olaf Jensen, Yan Jiao, and Alexei Sharov. Participants highlighted the utility of interactions with other Council's SSC and the value of the informal comparisons of methodologies.

The SSC discussed potential topics for consideration at the October joint meeting of the Council and the SSC. Expected topics include reviews of progress of the Ecosystem Working Group and Economic Work Group.

Brandon Muffley updated the SSC about the effects of recent delays in Research Track Assessments for SSC deliberations. None of the recent changes are expected to affect the ability of the SSC to derive ABCs, but it was noted that the interval between completion of the RTA and initiation of the MTA will be undesirably short.

The SSC is seeking a chair for the review of the Spiny Dogfish and Bluefish RTA in December 2022. The Council is also seeking an SSC member to chair the Black Sea Bass RTA in February 2023. The July 2023 meeting of the SSC will require derivation of ABCs for at least six species, including Atlantic Mackerel, Spiny Dogfish, Summer Flounder, Scup, Black Sea Bass, and Bluefish. An SSC representative on the NRCC Research Steering Committee is also being solicited.

Attachment 1

Mid-Atlantic Fishery Management Council
Scientific and Statistical Committee Meeting

September 13 – 14, 2022

Hybrid Meeting:

Hyatt Place Baltimore Inner Harbor (511 S. Central Ave., Baltimore, MD 21202)
<u>or</u> 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 Hyatt Place Baltimore Inner Harbor 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/september-2022-ssc-meeting.

AGENDA

Tuesday, September 13, 2022

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

12:35   Spiny Dogfish specifications for the 2023 fishing year
- Review of staff memo and 2023 ABC recommendation (J. Didden)
- 2023 SSC ABC recommendation (Y. Jiao)

2:15   Break

2:30   Northeast Regional Habitat Assessment (NRHA)
- Overview of work products, decision support tools, and use and application (NHRA Core Team)
- SSC Q&A and feedback

5:00   Adjourn

Wednesday, September 14, 2022

8:30   SSC Work Group Updates
- Ecosystem WG (S. Gaichas)
- Economic WG (G. DePiper)
- ABC Averaging WG (P. Rago)

10:00   Break

10:15   Results and Findings from the EAFM Recreational Summer Flounder Management Strategy Evaluation (B. Muffley)

11:15   Other Business
- Joint Council/SSC meeting – discussion on meeting topics
- Report on the 7th National Scientific Coordination Sub-Committee Meeting

12:00   Adjourn

Note: agenda topic times are approximate and subject to change

Attachment 2

MAFMC Scientific and Statistical Committee
September 13-14, 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)
Jorge Holzer   University of Maryland
Olaf Jensen   University of Wisconsin-Madison
Mike Frisk (September 14th only)   Stony Brook University
Yan Jiao   Virginia Tech University
Brian Rothschild   Univ. of Massachusetts-Dartmouth (emeritus)
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
Mark Holliday   NOAA Fisheries (retired)

Others in attendance (only includes presenters, staff, and members of public who spoke):

Jason Didden   MAFMC staff
Dvora Hart   NOAA Fisheries NEFSC
Brandon Muffley   MAFMC staff
Jessica Coakley   MAFMC staff
Tori Kentner   MAFMC staff
Michelle Bachman   NEFMC staff
Chris Haak   Monmouth University
Laurel Smith   NOAA Fisheries NEFSC
Greg DiDomenico   Lund's Fisheries
John Whiteside   Sustainable Fisheries Association
Desmond Kahn
Mark Sanford
John Juillard
Scott MacDonald

Attachment 3

Glossary

ABC—Acceptable Biological Catch
Bmsy—Biomass at maximum sustainable yield
BTS—Bottom trawl survey
CPUE–Catch per unit effort
CV—Coefficient of Variation
DEA—Data Envelopment Analysis
ESP—Ecosystem and Socio-economic Profiles
EAFM—Ecosystem Approach to Fisheries Management
F—Instantaneous rate of fishing mortality
GARFO—Greater Atlantic Region Fisheries Office
MRIP—Marine Recreational Information Program
MTA—Management Track Assessment
MSE—Management Strategy Evaluation
NRCC—Northeast Region Coordinating Council
NRHA—Northeast Regional Habitat Assessment
OFL—Overfishing Limit
P*—Probability of overfishing
RSA—Research Set Aside
RTA—Research Track Assessment
R/V—Research Vessel
SCEMFIS—Science Center for Marine Fisheries
SSBmsy—Spawning stock biomass at maximum sustainable yield
SSC—Scientific and Statistical Committee