Mid-Atlantic Fishery Management Council
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Richard B. Robins, Jr., Chairman | Lee G. Anderson, Vice Chairman
Christopher M. Moore, Ph.D., Executive Director

MEMORANDUM

DATE: 23 September 2013

TO: Richard M. Robins, Jr., MAFMC Chairman

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

SUBJECT: Report of the September 2013 Meeting of the MAFMC SSC

The SSC met in Baltimore, MD, on 17-18 September 2013 for the purposes of developing ABC recommendations for Bluefish, Spiny Dogfish, Summer Flounder, Scup, and Black Sea Bass in response to terms of reference provided by the MAFMC (Attachment 1). All five species were under a multi-year ABC specification in which the SSC reserved the right to revisit the ABC recommendation each year during the multi-year period. The SSC also discussed a report from the Scientific Uncertainty Subcommittee on criteria for setting multi-year ABCs, the outcome of the workshop held by the MAFMC last winter, potential topics for the next National SSC Workshop, the suggested list of research priorities that will be submitted to the MAMFC at the upcoming meeting. The meeting agenda is attached (Attachment 2).

A total of 14 SSC members were in attendance (Attachment 3), and a quorum was present for both days. Also in attendance were staff from the NMFS Northeast Fisheries Science Center and Northeast Regional Office, Council members and staff, representatives from the fishing industry, environmental advocacy groups, and the public.

Updated assessments were available for Bluefish and Spiny Dogfish, and a benchmark assessment was available for Summer Flounder. Because no predetermined tolerance limits were set for the degree of change in biological reference points that would trigger a new ABC, the SSC decided to follow the generic terms of reference for Bluefish and Spiny Dogfish, since the updated assessments constituted the best scientific information available. The generic terms of reference were also used for Summer Flounder due to the recent benchmark assessment that was cleared by the SARC. For Scup and Black Sea Bass, the SSC determined that there was no compelling scientific evidence to support changing the previously recommended ABCs for the 2014 and 2015 fishing years.

All documents cited in this report can be accessed via the MAFMC SSC website (http://www.mafmc.org/ssc-meetings/september-2013).

Bluefish

The SSC will provide a written report that identifies the following for up to two fishing years (i.e., 2014-2015):

1) The materials considered in reaching its recommendations;

- Wood, A. D. 2013. Bluefish 2013 stock assessment update. Coastal Pelagic Working Group, Northeast Fisheries Science Center, NOAA Fisheries. 38 pp.
- Armstrong, J. 2013. Staff memorandum to Chris Moore, dated 11 September 2013, entitled: "Bluefish ABC and Management Measures for 2014." 8 pp.
- Armstrong, J. 2013. Staff memorandum to Chris Moore, dated 17 September 2013, entitled: "Bluefish ABC and Management Measures for 2014 - revised." 8 pp.
- MAFMC Staff. 2013. Bluefish AP information document – August 2013. Mid-Atlantic Fishery Management Council. 15 pp.
- MAFMC Staff. 2013. 2013 Bluefish fishery performance report. Mid-Atlantic Fishery Management Council. 2 pp.

2) The level (1-4) that the SSC deems most appropriate for the information content of the most recent stock assessment, based on criteria listed in the Omnibus Amendment;

The SSC designated the assessment as **Level 3**, because the structure of the assessment was unchanged from previous specification. There were no new estimates of uncertainties associated with maximum fishing mortality rate (OFL).

3) If possible, the level of catch (in weight) and the probability of overfishing associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold or, if appropriate, an OFL proxy;

The **OFL = 16,506 mt**, based on an F_{msy} of 0.19.

4) The level of catch (in weight) and the probability of overfishing associated with the acceptable biological catch (ABC) for the stock, the number of fishing years for which the ABC specification applies and, if possible, interim metrics that can be examined to determine if multi-year specifications need adjustment prior to their expiration;

The SSC recommends an **ABC = 11,082 mt** (24.4 million lb) for the 2014 fishing year, based on the control rule for Level 3 assessments. The SSC used an assumed CV of the OFL with a lognormal distribution of 100%, noting that the ratio of B/BMSY, based on mid-year estimates from 2013, is 0.8113, and that Bluefish exhibit a typical life history. The SSC applied the Council's policy of P* = 0.316. The projection is 67.1% of the catch at OFL. Since a benchmark assessment of Bluefish is scheduled for 2014, the SSC does not recommend ABCs for fishing years beyond 2014.

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

- There is a significant level of missing data involved in the age-length keys (ALKs), which are critical for development of the catch-at-age matrix;
- Concern exists about the application of aggregate trawl calibration coefficients (ALBATROSS IV vs BIGELOW), and their influence on the selectivity pattern and results of the assessment.

Also, some near shore areas previously sampled by the ALBATROSS IV are unavailable for sampling by the BIGELOW;
- Commercial discards are assumed to be insignificant, which may not be the case;
- Much of population biomass (~40%) is in the aggregated 6+ age group for which there is relatively little information;
- Questions have been raised about the uncertainty in the historical MRFSS/MRIP estimates in general, and are particularly relevant here given the highly episodic nature of Bluefish catches in the recreational fisheries coast wide; and
- The basis for the unusual bimodal selectivity curve used in the ASAP model is not well understood.
- The updated assessment shows a retrospective bias resulting in the model underestimating recruitment by upwards of 50% near the end of the time series.

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

No additional information pertinent to ecosystem considerations was explicitly included in selecting the ABC.

7) Prioritized research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendation;

- Evaluate amount and length frequency of discards from the commercial and recreational fisheries;
- Collect data on size and age composition of the fisheries by gear type and statistical area;
- Initiate fishery-dependent and fishery-independent sampling of offshore populations of Bluefish during the winter months (consider migration, seasonal fisheries, and unique selectivity patterns resulting in the bimodal partial recruitment pattern; consider if the migratory pattern results in several recruitment events); and
- Develop Bluefish index surveys (proof of concept), including abundance/biomass trend estimates for the offshore populations in winter.

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

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

Spiny Dogfish

The SSC will provide a written report that identifies the following for up to two fishing years (i.e., 2014-2015):

1) The materials considered in reaching its recommendations;

- Rago, P., and K. Sosebee. 2013. Update on the Status of Spiny Dogfish in 2013 and Projected Harvests at the Fmsy Proxy and Pstar of 40%. Northeast Fisheries Science Center, NOAA Fisheries. 51 pp.

- MAFMC staff memorandum from Jim Armstrong to Chris Moore: "Spiny dogfish ABC and Management Measures for 2014," dated September 12, 2013. 9 pp.
- MAFMC Staff. 2013 Spiny Dogfish AP information document – 2013. Mid-Atlantic Fishery Management Council. 14 pp.
- MAFMC Staff. 2013. 2013 Spiny Dogfish fishery performance report. Mid-Atlantic Fishery Management Council. 2 pp.

2) The level (1-4) that the SSC deems most appropriate for the information content of the most recent stock assessment, based on criteria listed in the Omnibus Amendment;

Level 3. The assessment provides plausible estimates of the absolute levels of biomass and abundances, and the assessment also provides a plausible set of reference points that together represent the best available science. The SSC notes that the biological reference points were calculated outside of the assessment model. The SSC also believes that important sources of uncertainty were not incorporated into estimates for the biological reference points. Both concerns prevent this assessment from achieving a higher rank.

3) If possible, the level of catch (in weight) and the probability of overfishing associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold or, if appropriate, an OFL proxy;

The F_{msy} proxy is calculated from a projection model for which the finite rate of population increase = 1.0. For Spiny Dogfish, the F_{msy} proxy = 0.2439. This is equivalent to a catch of **OFL = 32,166 mt**, based on the projected biomass in 2014 and the assumption that the catch in 2013 will be equal to 24,709 mt (the ABC = ACL from last year).

4) The level of catch (in weight) and the probability of overfishing associated with the acceptable biological catch (ABC) for the stock, the number of fishing years for which the ABC specification applies and, if possible, interim metrics that can be examined to determine if multi-year specifications need adjustment prior to their expiration;

The SSC applied the Council's risk policy for a typical life history[1], an estimated B_{2014}/B_{msy} ratio > 1, and a CV of the OFL distribution of 100% assuming a lognormal distribution. Using these parameters, the Council's risk policy implies a P* = 0.40. Applying this P* to the OFL produces an **ABC = 27,596 mt**.

The SSC notes that the stock biomass is projected to decline in the future because of poor recruitment in earlier years, before recovering again. Current projections suggest that the ratio of (median $B_{current}$)/B_{msy} may be <1 for 2018-2023. As a result, the P* value developed by the Council's risk policy will be lower, thereby leading to a reduced ABC for these years.

The SSC recommends a 2-year ABC specification. The SSC recommends that ABC be calculated based on a constant F policy, which translates to an ABC in the subsequent year 2015 of **28,310 mt**.

The SSC will examine Spiny Dogfish discard rates, survey abundance trends (size composition, sex ratio and pup size), average size and sex in commercial landings, agreement between observed and predicted catch and survey forecasts, changes in Canadian landings, and the spatial distributions of catch and survey abundances each year of the specification to determine if the multiyear ABC should be abandoned.

[1.] The SSC notes that the assessment for Spiny Dogfish has been structured to account for many aspects of the unique life

history of this species.

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

- The assessment relies heavily on an assumed efficiency of the survey gear in developing minimal swept area estimates of biomass.
- Inter-annual differences in availability of the stock to the survey gear.
- F_{msy} proxy is based on a projection model that relies on a time-invariant selectivity estimated from data up to 2008. The assessment assumes selectivity has not changed subsequently, but may be variable.
- Both the F_{msy} proxy and the projections rely on a model that assumes constant pup survival and pup production rates. Empirical evidence suggests pup survival correlates positively with maternal size.
- Inconsistency between the estimation model and the projection model.
- Potential changes in fishery selectivity. Large increases in catches could induce changes in the overall selectivity pattern in the fishery.
- Potential inconsistency between the life history-based estimates of fishing mortality rates and the biomass reference points derived from the Ricker stock recruitment curve.
- Total discard estimates and estimated mortality of discarded dogfish.
- The revised estimate of biomass reference point is uncertain with an asymptotic CV of about 30%.
- The updated assessment shows a retrospective bias resulting in the model underestimating recruitment by upwards of 50% near the end of the time series.

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

No explicit or specific ecosystem considers were included in the assessment. Furthermore, no additional ecosystem considerations were applied in calculating the ABC.

7) Prioritized research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendation;

- Revise the assessment model to investigate the effects of stock structure or distribution, sex ratio, and size of pups on birth rate and first year survival of pups.
- Continue large scale (international) tagging programs, including conventional external tags, data storage tags, and satellite pop-up tags, to help clarify movement patterns and migration rates.
- Investigate the distribution of spiny dogfish beyond the depth range of current NEFSC trawl surveys, possibly by using experimental research or supplemental surveys.
- Continue aging studies for Spiny Dogfish age structures (e.g., fins, spines) obtained from all sampling programs (include additional age validation and age structure exchanges), and conduct an aging workshop for Spiny Dogfish, encouraging participation by NEFSC, Canada DFO, other interested state agencies, academia, and other international investigators with an interest in dogfish aging (US and Canada Pacific Coast, ICES).
- Evaluate ecosystem effects on Spiny Dogfish acting through changes in dogfish vital rates.

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

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

Summer Flounder

The SSC will provide a written report that identifies the following for up to two fishing years (i.e., 2014-2015):

1) The materials considered in reaching its recommendations;

- Southern Demersal Working Group. 2013. Summer Flounder stock assessment report for 2013. Northeast Fisheries Science Center, NOAA Fisheries. 474 pp.
- Southern Demersal Working Group. 2013. Summer Flounder assessment summary for 2013. Northeast Fisheries Science Center, NOAA Fisheries. 11 pp.
- MAFMC Staff. 2013. Summer Flounder Advisory Panel information document. Mid-Atlantic Fishery Management Council. 16 pp.
- MAFMC Staff. 2013. Summer Flounder, Scup, and Black Sea Bass fishery performance reports September 2013. Mid-Atlantic Fishery Management Council. 6 pp.
- Dancy, K. 2013. Staff memorandum to Chris Moore, dated 5 September 2013, entitled: "Summer Flounder Management Measures for 2014 and 2015." 10 pp.
- Wadsworth, T. 2013. Memo to Jessica Coakley, dated 7 August 2013, entitled: "Species composition and landings from the 2012 North Carolina flynet fishery." North Carolina Department of Environment and Natural Resources. 1 pp.
- Jones, C. M., R. Cook, J. Simmonds, and H. Sparholt. 2013. Summary report of the 57th Northeast Regional Stock Assessment Review Committee (SARC 57). Northeast Fisheries Science Center, NOAA Fisheries. 47 pp.
- Cook, R. 2013. Report on the 57th North East Regional Stock Assessment Review Committee (SARC 57). Prepared for Center for Independent Experts. 41 pp.
- Simmonds, E. J. 2013. Center for Independent Experts (CIE) Peer Review Report of: 57th Northeast Regional Stock Assessment Review Committee (SARC 57) on striped bass and summer flounder. Center for Independent Experts. 38 pp.
- Sparholt, H. 2013. Center for Independent Experts (CIE) Peer Review Report of the 57th Northeast Regional Stock Assessment Review Committee (SARC 57). Center for Independent Experts. 40 pp.

2) The level (1-4) that the SSC deems most appropriate for the information content of the most recent stock assessment, based on criteria listed in the Omnibus Amendment;

The SSC determined the Summer Flounder assessment should be considered as a Level 3 assessment.

In a Level 1 assessment, the SSC would use the uncertainty around the OFL directly from the assessment. In a Level 2 assessment, the assessment provides an alternative level of uncertainty. In a Level 3 assessment, the SSC provides its own estimate of uncertainty. The SSC was not comfortable with defining the assessment as Level 1. Because no alternative level of uncertainty in OFL was provided in the assessment, the SSC is constrained to determine the Summer Flounder assessment as Level 3.

3) If possible, the level of catch (in weight) and the probability of overfishing associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold or, if appropriate, an OFL proxy;

The OFL for 2014 is **12,138 mt**, based on an F_{MSY} proxy of $F_{35\%}$=0.309. The probabilities of overfishing are provided in the response to TOR 4.

4) The level of catch (in weight) and the probability of overfishing associated with the acceptable biological catch (ABC) for the stock, the number of fishing years for which the ABC specification applies and, if possible, interim metrics that can be examined to determine if multi-year specifications need adjustment prior to their expiration;

The SSC determined the 2014 ABC to be **9,950 mt**.

In past Level 3 assessments, the SSC used a default CV for the OFL of 100%, based on a meta-analysis of statistical catch-at-age models. However, the SSC notes that, in contrast to other assessments presented to it, the Summer Flounder assessment has multiple sources of data, which are largely internally consistent, and it does a thorough job of exploring the impacts of sources of uncertainty on the estimated model fits. As a result, the SSC believes that the Summer Flounder stock assessment is considerably more accurate than other assessments of mid-Atlantic stocks and, therefore, considers use of the default CV=100% not appropriate. Accordingly, the SSC determined that it should use a CV = 60%. The SSC adopted this CV based on a presentation of the distribution of CVs in published simulation experiments in which the assessment model did fully reflect the underlying population dynamics.

The SSC recommends a three-year ABC specification. The approach to specifying ABC assumes the ABC was caught in the preceding year. The SSB in the current year is then updated based on the presumed catch, and the resulting SSB estimate is multiplied by the F_{MSY} proxy to provide the OFL for the current year. The Council's risk policy is applied to the OFL by using a 60% CV to calculate the ABC. Using this procedure, the relevant ABCs are:

Year	SSB	F	OFL	P* Value	**ABC**	Presumed Catch
2014	58,974	0.248	12,138	0.360	**9,950**	9,950
2015	61,709	0.255	12,275	0.378	**10,329**	10,329
2016	63,879	0.263	12,739	0.396	**10,999**	10,999

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

The most significant sources of uncertainty are:

- The potential for sex-specific differences in life history parameters.
- The existence of spatially distinct size distributions.
- NEFSC surveys and PMAFS fishery sampling confirm sexually-dimorphic and time-varying spatial differences in growth that are not fully accounted for in the stock assessment because not all fishery and survey catches are fully and independently sampled by sex.

- Landings from commercial fishery assume no under-reporting of Summer Flounder landings and so should be considered minimal estimates.
- The current assumption for M remains an ongoing source of uncertainty. M is highly influential on assessment results and impacts nearly all aspects of the assessment and evaluation of status.
- The stock-recruitment relationship could not be defined internally in the model and thus an F_{MSY} proxy was used to calculate the OFL.

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

No explicit or specific ecosystem considerations (for example, trophic interactions or habitat) were included in the assessment. No additional information pertinent to ecosystem considerations was included in selecting the ABC.

7) Prioritized research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendation;

The SSC recognizes the research recommendations provided in the assessment report. In addition, the SSC recommends research is conducted to:

- Evaluate uncertainties in biomass to determine potential modifications to OFL CV employed;
- Evaluate fully the sex- and size distribution of landed and discarded fish, by sex, in the Summer Flounder fisheries;
- Evaluate past and possible future changes to size regulations on retention and selectivity in stock assessments and projections; and
- Incorporate sex-specific differences in size at age into the stock assessment.

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

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

Scup

Review the extant multiyear ABC recommendations for Scup to determine if any changes are necessary based on the current best available science. If changes are deemed necessary, then the generic terms of reference would be followed.

The SSC determined that the available scientific evidence was not compelling enough to warrant a change to its ABC recommendations for 2014 and 2015. The SSC recommends an ABC of **16,325 mt** for 2014 and an ABC of **15,320 mt for 2015**.

The written materials the SSC considered in reaching this conclusion:

- MAFMC Staff. 2013. Scup Advisory Panel information document. Mid-Atlantic Fishery Management Council. 20 pp.

- MAFMC Staff. 2013. Summer Flounder, Scup, and Black Sea Bass fishery performance reports September 2013. Mid-Atlantic Fishery Management Council. 6 pp.
- Dancy, K. 2013. Staff memorandum to Chris Moore, dated 5 September 2013, entitled: "Scup Management Measures for 2014 and 2015." 10 pp.
- Linton, B., and M. Terceiro. 2013. Data Update of Scup (*Stenotomus chrysops*) for 2013. Northeast Fisheries Science Center. NOAA Fisheries. 99 pp.

Black Sea Bass

Review the extant multiyear ABC recommendations for Black Sea Bass to determine if any changes are necessary based on the current best available science. If changes are deemed necessary, then the generic terms of reference would be followed.

The SSC determined that the available scientific evidence was not compelling enough to warrant a change to its ABC recommendations for 2014 (ABC = **2,494 mt**). The SSC recommends extending this ABC level through the 2015 fishing season as well. The SSC also decided that the committee's responses to the last set of terms of reference for Black Sea Bass (Miller 2013) are still valid.

The written materials the SSC considered in reaching this conclusion:

- MAFMC Staff. 2013. Black Sea Bass Advisory Panel information document. Mid-Atlantic Fishery Management Council. 17 pp.
- MAFMC Staff. 2013. Summer Flounder, Scup, and Black Sea Bass fishery performance reports September 2013. Mid-Atlantic Fishery Management Council. 6 pp.
- Dancy, K. 2013. Staff memorandum to Chris Moore, dated 5 September 2013, entitled: "Black Sea Bass Management Measures for 2014 and 2015." 9 pp.
- Miller, T. 2013. Memorandum to Richard B. Robins, Jr., dated 30 January 2013, entitled: "Report of the January 23, 2013 Meeting of the MAFMC Scientific and Statistical Committee." 9 pp.

Additional SSC Comments Related to the ABC Recommendations

1. In light of the SSC's discussion of quality of the recent Summer Flounder assessment, the SSC tasked the Scientific Uncertainty Subcommittee with drafting additional guidance on how an assessment can be moved from a Level 3 to a Level 2. The current guidance is insufficient.
2. The SSC decided that more consistency is needed in how projections of stock biomass are done for the various species. The SSC Chair will name an *ad hoc* subcommittee to develop draft guidance for discussion at the winter 2014 meeting.
3. An *ad hoc* subcommittee was formed to investigate how to develop a satisfactory OFL for black sea bass, given that the recent assessment attempts have not been able to pass SARC review. The species is more model-challenged (or model-resistant) than data poor, but methods being considered by other SSCs for data poor stocks may be informative to the subcommittee's work. Members of the SSC who volunteered for the subcommittee are Tom Miller, Doug Vaughan, Olaf Jensen, and Mike Wilberg. The subcommittee is also hoping to add a member from the Northeast Fisheries Science Center who is familiar with stock assessment and data issues related to black sea bass (Jon Deroba or Gary Shepherd?).

Other Topics

Development of Criteria for Setting Multi-year ABCs

The SSC discussed the "rumble strip" approach developed by the SUN Subcommittee for evaluating the performance of multi-year ABC advice (http://www.mafmc.org/s/SUN-multi-year-report-8-30-13.pdf). The approach uses upper and lower bounds on multiple indices to determine if a stock is following an expected trajectory, similar to rumble strips along the sides of a road. The proposed indices for inclusion were kg/tow from the NMFS trawl survey, relative fishing mortality (catch divided by the trawl survey CPUE), and mean length in the NMFS trawl survey. Bounds are constructed for each index by calculating confidence intervals about a mean that represents the target value. If too many indices are outside their bounds, a re-evaluation is conducted to determine if any changes or responses are necessary with regard to the ABC recommendation. If a response is deemed necessary, it could include multiple options, such as alerting the Council that the stock is outside the expectations from the original ABC determination, requesting a new or updated stock assessment, or changing the ABC.

There was general agreement among the SSC members in attendance that the rumble strip approach looks promising, but several aspects could use refinement. Technical concerns were raised about the use of a potential default action of decreasing ABC if the stock appears worse than expected, with no symmetrical increase if stock conditions appear better than expected. Discussion revolved around the concern that the proposed ABC protocol would not address the National Standard 1 requirement of the Magnuson Stevens Act to achieve OY (i.e., the Council might miss taking advantage of situations where yield could be increased if rumble strips are triggered for positive reasons). Another issue raised was that, if ABC is constraining the catch, many of the indices could be highly correlated causing multiple indices to simply mirror the NMFS trawl survey. Other issues identified as requiring closer examination included choosing the appropriate confidence interval for rumble strip bounds (by species); identifying the base period when the stock was considered to be in a good condition (especially for data poor stocks); considering information from additional sources (i.e., NEAMAP, state surveys, etc.); identifying the number of rumble strips that, if triggered, would result in some response or action; and identifying the appropriate response or action.

There was general consensus on following points: during interim years of multi-year ABC specifications the SSC would evaluate the rumble strip analysis and, if triggered, the SSC would re-examine the multi-year ABC specification (i.e., take a closer look). [A suggested modification to the presented approach was that there would be no action required unless at least a 25% change in the ABC appeared to be warranted; if less than a 25% change was warranted, there would be no change to ABC but the SSC could request a new or updated stock assessment.] The SSC agreed that the SUN Subcommittee should continue work to refine the rumble strip analysis and identify appropriate responses based on the outcome of additional analysis. Next steps are to provide an update to the Council on work accomplished to date and to continue to refine the analysis. The SSC will review additional work conducted by the SUN at its winter 2014 meeting and a final report for Council consideration will be completed by April 2014.

Forage Workshop Overview and EAFM Update

The Council convened a workshop at its 11 April 2013 meeting in Raleigh, NC, to discuss the key issues relevant to forage fish assessment and management under the Magnuson-Stevens Act. Council staff

provided the SSC with an overview of the main points discussed at the workshop where a panel of experts discussed the role of forage species within ecosystems and best practices with respect to the harvest of forage species, taking their role(s) within ecosystems into account. This was the first of four workshops the Council intends to convene to discuss the major challenges it faces with respect to ecosystems approach to fisheries management (EAFM).

Understanding the roles that forage species play within ecosystems has emerged in the scientific literature as a key element in the development of EAFM. Forage species provide an important link between primary productivity and upper trophic levels within marine ecosystems. At the same time, forage species often support economically valuable fisheries through direct harvest. Recent scientific findings suggest that forage stocks may warrant special management consideration, especially with respect to achieving ecosystem level management goals and objectives. In addition, current National Standard 1 (NS1) guidelines recommend that consideration should be given to managing forage stocks for higher biomass than traditional MSY-based reference points (B_{msy}) to enhance and protect the marine ecosystem.

Dr. Ellen Pikitch (Stony Brook University) introduced the forage management issue and described the results of the Lenfest task force and other scientific research relative to forage fish exploitation and management. The Lenfest task force recommended reducing exploitation rates for forage stocks to about half of traditional MSY based reference points and to maintain forage stock biomass at about 40% of the unfished biomass to maintain their vital role in the ocean. Research published in *Science* (supported by the Marine Stewardship Council) reached similar conclusions.

Dr. Edward Houde (University of Maryland, SSC member) summarized the current scientific consensus on the need to manage forage fish more conservatively to preserve ecosystem structure and function, and then placed the issue within the context of Mid-Atlantic ecosystems. He briefly described Mid-Atlantic ecosystems and species that are likely important forage stocks (both managed and unmanaged). He also discussed options the Council should consider relative to the special management of forage species and described approaches to forage fish management taken by other Councils. The panel then discussed generic forage species definitions and concluded that it would be difficult to specify a universal forage fish definition, but endorsed the definition proposed by the Council's SSC. The panel also discussed the range of exploitation rates the Council should consider in development of an exploitation policy for forage stocks and the trade-offs between a more conservative exploitation policy for forage species and potential benefits for the ecosystem and higher trophic level predator species.

Dr. Robert Latour (Virginia Institute for Marine Studies, SSC member) discussed potential approaches the Council could take to assess and manage forage stocks. He noted the importance of articulating key ecosystem level objectives, as well as the limits of the data and science to support ecosystem-based management. He recommended that the Council build on current single species stock assessment models and incorporate predation mortality and climate drivers in stock assessments for forage species (this could be accomplished through stock assessment terms of reference). He also stressed the need for the Council to develop the science and policy aspects of forage fish assessment and management in harmony, and that the Council should carefully separate scientific and policy issues when developing its forage fish exploitation policy.

Dr. Sarah Gaichas (Northeast Fisheries Science Center) noted that the state of information, models, etc., currently available are sufficient to support an ecosystem approach to management and the development or forage management policy in the Mid-Atlantic. These models range from single species assessments, which treat predation mortality explicitly, to complex "end-to-end" ecosystem models. The challenge will be to bridge from single-species stock assessment models to multi-species models and, eventually,

to more sophisticated ecosystem level models. She also described other potential approaches to insuring adequate forage by managing at the level of functional groups. A key consideration that must be examined is an estimation of predator demands within the system and whether or not those demands are being met. The Council will be faced with a new level of policy when determining tradeoffs in predator consumption requirements when managing forage fish.

The workshop concluded with a discussion of possible paths forward for the Council in the development of forage fish management policy. Incorporation of consumption estimates by predators and species interactions in stock assessments could be accomplished through the addition of ecosystem terms of reference at the stock assessment level. The Council should also consider modification of its ABC control rules and risk policy with respect to forage species.
Based on the outcome of the discussion at the workshop, the Council has begun development of a forage exploitation policy, which will guide Council decision making at the FMP level as part of its EAFM Guidance Document. The EAFM Working Group reviewed and endorsed the following ABC control rule framework for forage species:

1. OFL determined based on MSA defined F_{msy} (or OFL Proxy)
2. SSC specifies ABC based on current risk policy with respect to "atypical" species (P* = 0.35) if M2 is not included in the stock assessment, otherwise set P* = 0.4.
3. Based on ecological/social/economic evaluation, Council could add additional ecosystem consideration buffer when specifying OY (aka "ecological set-aside") for forage stocks. The bounds for the ABC/OFL ratio under proposed OY framework for forage stocks become:
    a. 0.25 - 0.5 > ABC/OFL > 0.81 if M2 is adequately incorporated into stock assessment, else
    b. 0.25 - 0.5 > ABC/OFL > 0.726 (i.e., M2 is not adequately addressed). The Council could add additional buffers during specification of OY, but the lower bound would be 0.25 - 0.5.

The SSC reviewed the draft ABC protocol for forage species and generally endorsed the approach, but made several suggestions for the Council to consider as it moves forward on this issue. First, the Council should consider a range of ABC buffers for forage stocks in addition to the one proposed (i.e., apply the current ABC protocol for species with atypical life histories to forage species). For example, the 5% buffer for atypical stocks could be applied to forage stocks regardless of how M2 (predation mortality) is treated in the stock assessment, or even set larger buffers if appropriate. In addition, the Council could also consider modifying the biological reference points for forage stocks (i.e., establish more conservative fishing mortality rates that define overfishing). Regardless of the approach taken, the primary goal would be to maintain forage stocks at levels higher than B_{msy} as per the limited guidance provided in National Standard 1.

Next, staff provided an update on EAFM Guidance Document development. The Council has convened an EAFM working group whose members include S. Gaichas (NEFSC), J. Hare (NEFSC), T. Lederhouse (NMFS Habitat Division), K. Abrams (NMFS HQ), G. Depiper (NEFSC), and R. Seagraves (MAFMC) to assist in the development of the ecosystem guidance document. The EAFM WG has met once and discussed the major areas of emphasis within the EAFM Guidance Document. The current plan is to focus on four areas relevant to EAFM: species interactions (including forage fish assessment and management policy), climate change impacts, more fully incorporating habitat science in assessment and management, and incorporating social and economic considerations in future OY specifications and at the broader level of EAFM.

The next EAFM workshop is currently scheduled to be held in February 2014, and will examine issues related to climate change. The purpose of the workshop will be to provide the Council with the current state of knowledge relative to climate change and the expected range of impacts on living marine resources to assist the Council in the development of an adaptive fishery management framework that will effectively deal with ecosystem responses related to climate change. Results of the workshop will also inform the EAFM document concerning potential mechanisms to more fully account for climate change within the existing assessment and management system.

The SSC generally endorsed the current EAFM approach, but noted that the issue of fisheries within the context of the larger ecosystem and relative to competing uses of the ecosystem (offshore wind power development, petroleum extraction, etc.) was lacking in the current outline. One potential remedy would be to include examination of these issues under the social/economic section of the document. There was also considerable support by the SSC for the elevation of habitat science within the current process and especially within an ecosystem context.

cc: SSC Members, Lee Anderson, Chris Moore, Rich Seagraves, Kiley Dancy, Jim Armstrong, Jessica Coakley, Paul Rago, Mark Terceiro, Brian Linton, Tony Wood, Toni Kerns

Attachment 1

Mid-Atlantic Fishery Management Council
Scientific and Statistical Committee
September 17-19, 2013
Terms of Reference

A. Special Terms of Reference

Using information provided by September 3, 2013, the SSC will provide a written report that:

1) Reviews the extant multiyear ABC recommendations for spiny dogfish, bluefish, scup, black sea bass, and summer flounder to determine if any changes are necessary based on the current best available science. If changes are deemed necessary, then the generic terms of reference would be followed.

B. Generic Terms of Reference

The SSC will provide a written report that identifies the following for up to two fishing years (i.e., 2014-2015):

1) The materials considered in reaching its recommendations;
2) The level (1-4) that the SSC deems most appropriate for the information content of the most recent stock assessment, based on criteria listed in the Omnibus Amendment;
3) If possible, the level of catch (in weight) and the probability of overfishing associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold or, if appropriate, an OFL proxy;
4) The level of catch (in weight) and the probability of overfishing associated with the acceptable biological catch (ABC) for the stock, the number of fishing years for which the ABC specification applies and, if possible, interim metrics that can be examined to determine if multi-year specifications need adjustment prior to their expiration;
5) The most significant sources of scientific uncertainty associated with determination of OFL and ABC;
6) Ecosystem considerations accounted for in the stock assessment, and any additional ecosystem considerations that the SSC took into account in selecting the ABC, including the basis for those additional considerations;
7) Prioritized research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendation;
8) A certification that the recommendations provided by the SSC represent the best scientific information available.

Mid-Atlantic Fishery Management Council

Scientific and Statistical Committee

September 17-19, 2013

Admiral Fell Inn, Baltimore, MD; (410) 522-7380

Draft Agenda

Tuesday Sept 17, 2013

0900 SUN Subcommittee Report on interim multi-year specification metrics (Wilberg/Linton)

1200 Lunch

1300 Bluefish Multi-year ABC Evaluation (Jones/Armstrong/Wood)

1500 Spiny Dogfish Multi-year ABC Evaluation (Yiao/Armstrong/Rago)

1700 Adjourn

Wednesday September 18, 2013

0900 Summer flounder Multi-year ABC specification (Terceiro/Wilberg/Dancy)

1200 Lunch

1300 Scup Multi-year ABC evaluation (Gabriel/Dancy/Linton)

1430 Black sea bass ABC evaluation and future research/assessment (Miller/Dancy/Linton)

1630 Adjourn

Thursday September 19, 2013

0900 Review Forage Species ABC Protocol (Seagraves/Houde) and EAFM Progress Report

1000 Research needs prioritization (Seagraves)

1100 National SSC V – potential topics (Boreman/Seagraves)

1200 Meeting adjourns

Attachment 3

MAFMC Scientific and Statistical Committee
17-18 September 2013 Meeting
Baltimore, MD

Name	Affiliation
SSC Members in Attendance:	
John Boreman (SSC Chairman)	North Carolina State University
Tom Miller (SSC Vice-Chair)	University of Maryland - CBL
Mike Wilberg	University of Maryland - CBL
Doug Lipton	NMFS
Ed Houde	University of Maryland - CBL
Doug Vaughan	NMFS (retired)
Olaf Jensen	Rutgers
Tom Noji	NMFS Northeast Fisheries Science Center
Dave Secor	University of Maryland – CBL
Yan Jiao	Virginia Tech
Wendy Gabriel	NMFS Northeast Fisheries Science Center
Cynthia Jones	Old Dominion University
David Tomberlin (9/17 AM only)	NMFS Office of Science and Technology
Mark Holliday	NMFS Office of the Assistant Administrator
Others in attendance:	
Rich Seagraves	MAFMC staff
Kiley Dancy	MAFMC staff
Jose Montañez	MAFMC staff
Jim Armstrong (9/17 only)	MAFMC staff
Jessica Coakley (9/18 only)	MAFMC staff
Toni Kerns	ASMFC staff
Marin Hawke	ASMFC staff
Brian Linton	NMFS Northeast Fisheries Science Center
Mark Terceiro (9/18 only)	NMFS Northeast Fisheries Science Center
Paul Rago (9/17 only)	NMFS Northeast Fisheries Science Center
Tony Wood	NMFS Northeast Fisheries Science Center
Moira Kelly	NMFS Northeast Regional Office
Jenny Thompson	NMFS Sea Grant Fellow
Andrea Salute	University of Maryland – CBL
Rick Robins	MAFMC Chair
Lee Anderson	MAFMC Vice-chair
Greg DiDomenico	Garden State Seafood Association
Adam Nowalski (9/18 only)	MAFMC Advisor
Mike Luisi (9/18 only)	MAFMC member – MD DNR
Michael Schmidtke (9/18 only)	Old Dominion University
Antranik Kajajian (9/18 only)	Old Dominion University
Kristen Arnstead (9/18 only)	Old Dominion University
James Reinhardt (9/18 only)	Pew
Kirby Rootes-Murdy (9/18 only)	ASMFC staff
John Maniscalco (9/18 only)	NYDEC