

MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

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M E M O R A N D U M

DATE: 31 May 2011

TO: Richard B. Robins, Jr., Chairman, Mid-Atlantic Fishery Management Council

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

Subject: Report of May 2012 Meeting of the MAFMC Scientific and Statistical Committee

The Scientific and Statistical Committee (SSC) of the Mid-Atlantic Fishery Management Council (MAFMC) met on 23-24 May 2011 to review stock assessment information and develop acceptable biological catch (ABC) recommendations for four species under the management purview of the MAFMC: *Loligo* squid, *Illex* squid, butterfish, and Atlantic mackerel. The SSC also discussed the 2012 RSA project selection process, reviewed the butterfish cap methodology as requested by the Council, and discussed the next step in providing ecosystem science advice to the Council (the meeting agenda is attached).

A total of 14 SSC members were in attendance, which represented a quorum each day as defined by the SSC standard operating procedures. Also in attendance were representatives of the MAFMC, MAFMC staff, and the public. Stock assessment scientists from the NMFS Northeast Fisheries Science Center and staff from the NMFS Northeast Regional Office participated by phone during the ABC discussions (see attached attendance list).

The Council requested that the SSC review the longfin squid and *Illex* squid multiyear ABC recommendation set at the May 2011 SSC meeting to determine if any changes are necessary for 2013 based on the current best available science. If changes are deemed necessary, then the generic terms of reference should be followed. Based on updated catch and survey information presented by MAFMC and NEFSC staff, the SSC reaffirms the multi-year ABC levels it recommended last year for longfin squid (**23,400 mt**) and *Illex* squid (**24,000 mt**). Therefore, no further action by the SSC on these two species was necessary.

For butterfish and mackerel, MAFMC staff described the assessment history, the most recent survey and landings information, and comments from the Advisory Panel and Monitoring Committee. Scientists from the NEFSC were then asked to comment, followed by the SSC species lead on socioeconomics

then the SSC species lead on biology. The public was then invited to comment. The SSC species lead for biology led the SSC discussion on selection of an ABC for the 2013 fishing year (and beyond in some cases). Once the discussion was completed, the SSC provided the following consensus statements in response to the terms of reference provided by the MAFMC. All supporting materials are now posted on the SSC's website.

Butterfish

1) *The materials considered in reaching its recommendations:*

- *MAFMC staff memorandum from Jason Didden to Chris Moore, "2013 Atlantic Mackerel, *Illex*, Longfin squid, and Butterfish (MSB) OFL/ABC Recommendations," dated May 9, 2012. 20 pp.
- *Northeast Fisheries Science Center. 2010. 49th Northeast Regional Stock Assessment Workshop (49th SAW) Assessment Report. Ref. Doc. 10-03; 383 pp.
- *SARC 49 review panelist reports
- E-mail from Garden State Seafood Association, dated 22 May 2012.
- E-mail from Geir Mosen, dated 22 May 2012.
- *MAFMC Staff Report: Butterfish AP Informational Document, dated April 2011. 21 pp.
- *Miller, T., and P. Rago. 2012. Empirical exploration of feasible bounds on butterfish stock size and fishing mortality rates, 1975-2011. Report to the Mid-Atlantic Fishery Management Council Scientific and Statistical Committee. 14 pp.
- *MAFMC Staff. 2012. Butterfish indices numbers-per-tow spreadsheet.
- Pikitch, E., Boersma, P.D., Boyd, I.L., Conover, D.O., Cury, P., Essington, T., Heppell, S.S., Houde, E.D., Mangel, M., Pauly, D., Plagányi, É., Sainsbury, K., and Steneck, R.S. 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs. Lenfest Ocean Program. Washington, DC. 108 pp.
- Patterson, K. (1992). Fisheries for small pelagic species: an empirical approach to management targets. *Reviews in Fish and Fisheries* 2:321-338.

*Available on the MAFMC SSC website prior to the meeting.

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 version of the proposed Omnibus Amendment submitted to the Secretary of Commerce:*

Tier 4. No accepted OFL for the stock resulting from SAW/SARC. No accepted biological reference points resulting from SAW/SARC.

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

An estimate of OFL was not available from the most recent stock assessment (49th SAW). The SSC used guidance from the literature, which recommended considering the ratio of the fishing mortality rate to the natural mortality rate (F:M) for small pelagic species. The SSC adopted a F:M ratio of 67% (Patterson 1992). For an assumed $M = 0.8$, this translates to an $F = 0.536$ as a maximum fishing mortality threshold (MFMT) proxy. Using the Miller and Rago table provided to the SSC at the meeting (attached), the lowest catch which achieves a median $F = 0.536$ is **16,800 mt**. This serves as an OFL proxy.

The SSC notes the following: (1) butterfish remains a level 4 species; (2) the MFMT proxy was derived from a meta-analysis of data for small pelagic species and is not specific to butterfish; (3) there is considerable variability and uncertainty in biomass trajectories for this species; (4) the reliability of the MFMT proxy is unknown, however, the estimates of catchability (q) and M used in the Miller and Rago analysis (Miller and Rago 2012) make the transition from the MFMT proxy to the OFL proxy conservative.

4) The level of catch (in weight) associated with the acceptable biological catch (ABC) for the stock:

The SSC recommends an ABC of **8,400 mt** based on 50% of the OFL-proxy. In level 3 species, the SSC uses 75% of the OFL as a default for ABC, which would serve as the upper bound for a level 4 species. Additional buffering to 50% of the OFL-proxy was justified based on the observations that the short life history of butterfish gives limited time for management to respond to adverse patterns; recruitment of butterfish is highly variable and uncertain; the stock status of butterfish is unknown; and the susceptibility of butterfish to environmental and ecosystem variability, in particular inter-annual variability in natural mortality.

5) Specify the number of fishing years for which the OFL and/or ABC specification applies and, if possible, identify interim metrics which can be examined to determine if multi-year specifications need adjustment prior to their expiration:

The OFL and ABC are intended as a single-year specification. The SSC notes a new assessment is likely in 2013.

6) If possible, the probability of overfishing associated with the OFL and ABC catch level recommendations (if not possible, provide a qualitative evaluation):

Not possible, given available information, but likely low.

7) The most significant sources of scientific uncertainty associated with determination of OFL and ABC:

- No accepted reference points;
- The use of the F:M ratio as a foundation for OFL-proxy determination;
- The use of the Miller and Rago “envelope analysis” for biomass and catch determination;
- Model-based estimates of biomass and F are generally imprecise;
- Discards remain imprecisely estimated;
- Probable large role of environmental drivers (including predation);
- Survey efficiency and stock area coverage;
- The imprecision of estimates of natural mortality;
- Possible low survey catchability (pelagic fish); and
- Conflicting trends among surveys.

8) 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 considerations in the assessment model. Because of the short life span, the stock size is highly variable. This variability is likely more directly influenced by environmental factors and variation in predation mortality than it is for longer-lived species. Additionally, consumptive demand by other species was considered.

9) *List high priority research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendation:*

- Evaluate the potential for age structured assessment model and reference points;
- Evaluate sub-annual time step in assessment model;
- Re-evaluate natural mortality rate for formal inclusion in assessment model;
- Further analyze covariation and consistency of trends among surveys, to include analysis of spatial patterns in survey data to examine potential for changes in spatial distribution of population;
- Analyze additional estimation of consumptive demand of predators to identify critical periods of overlap of predators and prey;
- Continue support of habitat modeling to refine survey estimates;
- Reconsider stock structure and degree of exchange with south Atlantic stock component; and
- Calculate age- and size-structured efficiencies to convert R/V ALBATROSS estimates to R/V BIGELOW.

10) *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.

The Council also asked the SSC to reaffirm the 2012 butterfish ABC recommendation with the justification requirements specified in MSB Framework 6. The SSC reaffirms its 2012 specification. The SSC notes that the most recent biomass indices appear to be without trend and increased for the last year, and that the ABC is not expected to result in overfishing. The SSC's justification for the ABC recommendation for the 2013 fishing year also support the conclusion that the **3,622 mt** ABC recommendation for 2012 fishing year is not expected to result in overfishing.

Atlantic Mackerel

1) *The materials considered in reaching its recommendations:*

- *MAFMC staff memorandum from Jason Didden to Chris Moore, "2013 Atlantic Mackerel, *Illlex*, Longfin squid, and Butterfish (MSB) OFL/ABC Recommendations," dated May 9, 2012. 20 pp.
- *MAFMC Staff Report: Mackerel AP Informational Document, dated April 2012. 18 pp.
- *Transboundary Resources Assessment Committee. 2010. Atlantic mackerel in the Northwest Atlantic - 2009 (NAFO Subareas 2 – 6). Summary of Status Report 2010/01. 12 pp.
- *Deroba, J. J., G. Shepherd, F. Gregoire, J. Nieland, and J. Link. 2010. Stock assessment of Atlantic mackerel in the Northwest Atlantic – 2009. Transboundary Resource Assessment Committee. Reference Document 2010/01. 64 pp.
- E-mail from Garden State Seafood Association to John Boreman, dated 22 May 2012.
- E-mail from Geir Mosen to John Boreman, dated 22 May 2012.
- Cope, J. M., and A. E. Punt. 2009. Drawing the lines: resolving fishery management units with simple fisheries data. Canadian Journal of Fisheries and Aquatic Sciences 66, 1256-1273.

*Available on the MAFMC SSC website prior to the meeting.

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 version of the proposed Omnibus Amendment submitted to the Secretary of Commerce:*

Level 4: an OFL was not provided in the most recent stock assessment (2010 TRAC).

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

An estimate of OFL was not provided in the most recent stock assessment (2010 TRAC), and thus the SSC cannot provide a catch in weight associated with OFL.

4) *The level of catch (in weight) associated with the acceptable biological catch (ABC) for the stock. The ABC will be selected based on the overfishing definition contained in the FMP and to reflect the level of scientific uncertainty inherent in the stock assessment such that the recommended ABC is less than or equal to the overfishing limit in line with the Act and the National Standard 1 Guidelines to the Act:*

The SSC recommends an ABC of **80,000 mt**, based on the results of the TRAC. No information was presented to the SSC to cause the SSC to deviate from the TRAC recommendation. Survey data are inconclusive because of potential changes in catchability in the change from R/V ALBATROSS to R/V BIGELOW have yet to adequately specified, particularly, the current lack of estimates of length-specific catchability. Also, concerns remain over the extent to which the survey provides a reliable index of abundance given changes in availability. Mackerel catch data may be inconclusive because catch may not be a reliable index of abundance owing to concerns related to availability and the short duration of the fishing season; high fuel prices may have continued to limit the flexibility of the fishery to search for mackerel; and interactions with the herring fishery, acting through herring catch caps, may have limited the activity of the mackerel fleet

5) *Specify the number of fishing years for which the OFL and/or ABC specification applies and, if possible, identify interim metrics which can be examined to determine if multi-year specifications need adjustment prior to their expiration:*

The SSC recommends a three-year specification to be in place through the 2015 fishing year, subject to SSC annual review. The SSC notes that a new Canadian assessment is forthcoming shortly, and that a US assessment is tentatively scheduled for 2014.

6) *If possible, the probability of overfishing associated with the OFL and ABC catch level recommendations (if not possible, provide a qualitative evaluation):*

No OFL is available for this stock, and thus it is not possible to provide a quantitative estimate of the probability of overfishing. Also, the SSC is unable to specify in a qualitative sense the level of risk assumed by the adoption of the recommended ABC.

7) *The most significant sources of scientific uncertainty associated with determination of OFL and ABC:*

- Disparate trend between NEFSC trawl survey and both the commercial CPUE trend and landings;
- Apparent, but not fully explainable changes in survey catchability, which may alias a number of unidentified factors;

- Lack of quantification of the linkage between US and Canadian catches;
- Surveys cover an unknown portion of entire range (variable availability);
- No Canadian discard information and poor precision of U.S. discard and recreational estimates (though likely low);
- Using a bottom trawl survey gear for a semi-pelagic species may induce variation in the indices of abundance and obscure the signal;
- Conflicting catch-at-age and survey information;
- No satisfactory explanation of model retrospectives;
- Natural mortality is highly uncertain and source of predation are not fully quantified; and
- The constant catch approach to setting ABC becomes more risky the further out from a previous assessment one considers.

8) 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:

The assessment used a variable natural mortality (M) at age (estimates of M at age averaged among years from the ASAP predation model) to account for predation. The SSC notes that this approach may not fully account for all predation losses. The SSC also notes that the assessment was not accepted.

9) List high priority research or monitoring recommendations that would reduce the scientific uncertainty in the ABC recommendation:

- Explore patterns in consumption as an additional index of abundance;
- Collaborate with industry to explore the spatial and temporal pattern and variability in catch to evaluate issues of abundance and availability;
- Consider tagging studies to directly evaluate movement patterns;
- Examine covariation among survey and fishery-dependent indices (Cope and Punt 2009);
- Examine growth trajectories from different areas of the stock to evaluate possible stock structure
- Evaluate spatial catch patterns in the small pelagic fisheries to identify “hot spots” of co-occurrence; and
- Explore management complementarities among small pelagic fisheries (e.g., mackerel, herring and river herring).

The SSC also endorses the following research recommendations developed during the 2010 TRAC:

- Explore opportunities for the development of alternative indices of abundance.
- Attempt to develop total stock abundance.
- Initiate broad scale international egg surveys covering potential spawning habitat that is consistently representative of the total stock area, including the shelf break. Investigate potential to conduct work in cooperation with commercial fishing industry (priority: high, long term).
- Explore spatial distribution of stock relative to the mixing of the northern and southern ‘contingents’ of mackerel i.e. tagging, genetics, chemical assay, microchemistry of otoliths (priority: high, medium-long term).
- Explore influence of environmental factors on spatial distribution of the stock e.g. rate of mixing and distribution of stock relative to the survey area (high priority, short term).
- Extend predation estimates to include DFO data and entire predator spectrum (marine mammals, highly migratory species).
- Examine methodology for incorporating consumptions estimates in the assessment.
- Quantify the magnitude of additional sources of mortality in Canada including the bait fishery,

recreational catch and discards (high priority; short term).

- Explore bottom trawl characteristics for catchability of mackerel.
- Participate with industry in investigating the contemporary overlap of survey stock area, commercial fishery, and mackerel distribution and explore historical databases for the same purpose to better understand interpretation of abundance indices (survey, cpue) (medium term).
- Collaborate with industry to investigate alternative sampling gear (i.e. jigging) to survey adult abundance (long term)
- Explore MARMAP database relative to spatial distribution of survey indices.
- Investigate alternative assessment models that incorporate spatial structure (i.e. northern and southern contingents, different age groups).
- Explore alternative assessment models that incorporate covariates.
- Initiate a technical TRAC WG in order to advance and monitor progress of research recommendations.

10) 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.

Review of the Butterfish Mortality Cap

Amendment 10 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan implemented a butterfish mortality cap on the longfin squid (*Loligo*) fishery in order to rebuild the butterfish stock. The longfin squid fishery has recently accounted for most butterfish mortality given the lack of a currently operating large-scale directed butterfish fishery. The original plan was to base the cap on a rebuilding F ($F = 0.1$) applied to the most recent butterfish biomass estimate and to have the SSC review the operation of the cap “to assure the rebuilding of the butterfish stock.” Given the findings of the most recent assessment, there is currently no butterfish biomass estimate and no rebuilding target. As such, it is not possible for the SSC to comment on how the cap may be facilitating butterfish rebuilding. However, a review of the methodology to estimate the cap is appropriate. Therefore, the Council asked the SSC to review the implementation of the butterfish cap to determine if it is controlling fishing mortality, and to provide recommendations for improving the estimation methodology, as appropriate.

After a briefing on the topic by MAFMC staff (Jason Didden), the SSC concluded that the butterfish cap is controlling what it is supposed to be controlling, but it does not cover all sources of fishing mortality on the species in the mid-Atlantic. In particular, it does not cover the small mesh non-capped fishery. The SSC recommends that the butterfish mortality cap should be extended to include the small-mesh fishery or that expected butterfish mortality in the small mesh non-capped fishery be addressed by setting aside a portion of the ABC so that overall ABC overages are avoided and/or minimized.

RSA Project Selection Process

Recent decisions by the Council call for more involvement of SSC members in the oversight of projects supported with research set-aside funds. The SSC members agreed to individually rank the topics of the proposals submitted for funding this year, promising to keep the topics and their rankings confidential. SSC members who are affiliated with one or more of the proposals should recuse themselves from the ranking process.

Ecosystem Approaches to Fishery Management Guidance Document

Jason Link and Rich Seagraves briefed the SSC on the current draft of a proposed outline for the subject document. The SSC decided that a special meeting of the Ecosystems Subcommittee is necessary so that a full day of discussion can be devoted to improving the outline and identifying informational sources for the topics to be addressed in the document. The SSC also suggested that the subcommittee consider splitting the document into a source document, containing background information on the ecosystem, and a guidance document for fishery management.

Attachments

cc: MAFMC SSC members, R. Seagraves, L. Anderson, J. Didden, J. Saunders

Mid-Atlantic Fishery Management Council
Scientific and Statistical Committee Meeting¹
May 23-24, 2012
Agenda

May 23, 2012

- 1000 Butterfish ABC recommendation
- 1200 Lunch
- 1300 Butterfish ABC cont.
- 1500 Review butterfish mortality cap program performance
- 1700 Adjourn

May 24, 2012

- 0830 Atlantic mackerel ABC recommendation
- 1030 Review 2012-2014 Loligo and Illex ABC Recommendations
- 1130 Review 2012 RSA Program Funded Projects
- 1200 Ecosystem Subcommittee Report (review and comment on EAFM Guidance Document Outline)

¹ Pier V Hotel, 711 Eastern Avenue, Baltimore MD 21202, (410-539-2000)

MAFMC Scientific and Statistical Committee Meeting
Baltimore, MD

May 23-24, 2011

SSC Members in Attendance

<u>Name</u>	<u>Affiliation</u>
John Boreman (SSC Chairman)	North Carolina State University
Tom Miller (SSC Vice-Chair)	University of Maryland - CBL
Mike Wilberg	University of Maryland - CBL
Robert Latour	Virginia Institute of Marine Science
David Tomberlin	NMFS/S&T
Dave Secor	University of Maryland - CBL
Doug Lipton	University of Maryland - College Park
Cynthia Jones	Old Dominion University
Wendy Gabriel	NMFS/NEFSC
Ed Houde	University of Maryland - CBL
Doug Vaughan	North Carolina
Marty Smith	Duke University
Jason Link	NMFS/NEFSC
Mike Frisk	SUNY Stony Brook

Others in attendance

Rich Seagraves	MAFMC staff
Jason Didden	MAFMC staff
Rick Robins	MAFMC Chair
Fred Serchuk	NMFS/NEFSC
Jeff Kaelin	Lunds Fisheries
Greg DiDomenico	Garden State Seafood Association
Kristen Cervoli	Pew Foundation

By phone

Lisa Hendrickson (May 24 only)	NMFS/NEFSC
Kiersten Curti (May 23 only)	NMFS/NEFSC
Tim Miller (May 23 only)	NMFS/NEFSC
Aja Peters-Mason	NMFS/NERO
Charles Adams	NMFS/NEFSC
Lindsey Feldman	NMFS/NEFSC