

MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

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M E M O R A N D U M

DATE: May 26, 2010
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 2010 Meeting of the MAFMC Scientific and Statistical Committee

The Scientific and Statistical Committee (SSC) of the Mid-Atlantic Fishery Management Council (MAFMC) met on 11-12 May 2010 to review stock assessment information and develop acceptable biological catch (ABC) recommendations for six species under the management purview of the MAFMC: surfclam, ocean quahog, *Loligo* squid, *Illex* squid, butterfish, and Atlantic mackerel. A total of 13 of the 18 SSC members were in attendance on May 11th and 14 members in attendance on the 12th, which represented a quorum for both days as defined by the SSC standard operating procedures. Also in attendance were representatives of the MAFMC, MAFMC staff, Northeast Fisheries Science Center scientists (NEFSC), and the public (see attached attendance list).

For each species, MAFMC staff described the assessment history, the most recent survey and landings information, and the basis for the most recent quota set by the MAFMC. Scientists from the NEFSC were then asked to comment, followed by the species lead for the SSC. The public was then invited to comment, but only on scientific uncertainty issues for the species. Following comments from the MAFMC staff, NEFSC scientists, the SSC species lead, and the general public in attendance, the SSC species lead led the SSC discussion on selection of an ABC for the 2011 (and beyond) fishing year. Once the discussion was completed, the SSC provided consensus statements in response to the terms of reference provided by the MAFMC. The terms of reference were the same for each of the six species. The SSC also determined which of the four tiers best described the status of assessment information for each species, based on the ABC control rule in the proposed omnibus amendment currently out for public comment.

The following represents the consensus responses by the SSC to the ABC terms of reference for each of the six species covered in the 11-12 May 2010 meeting.

Surfclams

1) The materials considered in reaching its recommendation;

- Mid-Atlantic Fishery Management Council. 2010. Overview of the Surfclam and Ocean Quahog Fisheries and Quota Considerations for 2011, 2012, and 2013. Mid-Atlantic Fishery Management Council. 38 p.

- Northeast Fisheries Science Center. 2010. 49th Northeast Regional Stock Assessment Workshop (49th SAW) Assessment Summary Report. Ref. Doc. 10-01; 41 p.
- Northeast Fisheries Science Center. 2010. 49th Northeast Regional Stock Assessment Workshop (49th SAW) Assessment Report. Ref. Doc. 10-03; 383 p.
- SARC 49 panelist reports
- Updates on survey indices and landings data

2) The level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold;

The F_{MSY} proxy = 0.15 ($F=M=0.15$). Projected catches at $F = F_{MSY}$ are:

2010	129,300 mt
2011	114,000 mt
2012	102,300 mt
2013	93,400 mt

Catches in 2010 are not expected to be at F_{MSY} levels, however. Thus, available biomass to support catches in 2011-2013 would be expected to be somewhat greater, so these projections may be underestimates.

3) 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 intent of the Act and the National Standard 1 Guidelines;

Catches at F_{MSY} proxy have a high probability of leading to stock declines below the B_{MSY} proxy target level in 2015, and are projected to lead to high probabilities of overfishing in 2015. Thus, the ABC should be significantly lower than the OFL.

The SSC recommends an ABC equal to the catch at $0.75 * F_{OFL} * \text{Biomass}$, based on Restrepo et al. (1998):

<http://www.nmfs.noaa.gov/sfa/NSGtkgd.pdf>:

$$\begin{aligned}
 &= 0.75 * 0.15 * 878,000 \text{ mt} \\
 &= 0.11 * 878,000 \text{ mt} \\
 &= \mathbf{96,600 \text{ mt}} \text{ (includes incidental mortality)}
 \end{aligned}$$

The range of optimum yields (OY) specified in the Fishery Management Plan is between 14,300 and 26,200 mt. The upper value has been used as a quota from 2005-2010.

The stock is currently not overfished, and overfishing is not occurring. However, Delmarva and New Jersey components are well below 50% of the 1999 biomass in the respective regions (= B_{MSY} proxy).

4) If possible, the probability of overfishing associated with catches associated with the OFL and ABC recommendations (if not possible, provide a qualitative evaluation);

See Table A1 from the assessment summary document:

Table A1. Decision table showing probabilities of a simulated surfclam stock with total biomass (120+ mm) at or lower than the target level ($B_{Target}=B_{1999}/2$), at or lower than the threshold level ($B_{Threshold}=B_{Target}/2$), and with fishing mortality rates at or higher than the threshold level ($F_{Threshold}=M$) during 2015. The analysis examines nine states of nature and four possible management approaches. Probabilities for states of nature are described as Low, Medium or High. The column “Pattern ID for dredge efficiency” is to help readers make comparisons among rows.

States of nature			Management actions				Pattern ID for dredge efficiency
Natural mortality	Survey dredge efficiency	Probability for state of nature	FMP minimum	Industry estimate	FMP maximum	F_{MST} proxy	
<i>Probability of stock biomass below B_{MST} proxy target level in 2015</i>							
Low	Low	Low	0	0	0	0.612	
Low	Medium	Medium	0	0	0	0.982	
Low	High	Low	0	0	0.004	1	
Medium	Low	Medium	0	0	0	0.91	
Medium	Medium	High	0	0	0.002	0.952	
Medium	High	Medium	0.006	0.012	0.014	0.998	
High	Low	Low	0	0	0	0.618	
High	Medium	Medium	0	0.002	0.002	0.924	
High	High	Low	0	0.002	0.018	0.984	
<i>Probability of stock biomass below $B_{Threshold}$ level in 2015</i>							
Low	Low	Low	0	0	0	0	
Low	Medium	Medium	0	0	0	0	
Low	High	Low	0	0	0	0.894	
Medium	Low	Medium	0	0	0	0	
Medium	Medium	High	0	0	0	0.002	
Medium	High	Medium	0	0	0	0.268	
High	Low	Low	0	0	0	0	
High	Medium	Medium	0	0	0	0	
High	High	Low	0	0	0	0.294	
<i>Probability of overfishing in 2015</i>							
Low	Low	Low	0	0	0	0.908	
Low	Medium	Medium	0	0	0	1	
Low	High	Low	0	0	0	1	
Medium	Low	Medium	0	0	0	0.312	
Medium	Medium	High	0	0	0	0.948	
Medium	High	Medium	0	0	0	1	
High	Low	Low	0	0	0	0.002	
High	Medium	Medium	0	0	0	0.196	
High	High	Low	0	0	0	0.996	

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

- Heterogeneity of life history and production parameters over the range of the stock means that model results may be accurate on average, but inaccurate in any particular region (e.g., regional differences in surplus production). This is exacerbated by uncertainty in the distribution of future fishing effort on GB (currently closed to fishing for surfclams) and fact that effort is currently not distributed uniformly.
- The use of $F=M$ as an FMSY proxy is not supported by recent apparent negative surplus production: growth and recruitment are insufficient to compensate for natural and fishing mortalities. There is no sustainable yield. Even in the absence of fishing mortality, the stock will not increase, especially in southern areas.
- Uncertainty in using F_{msy} proxy = M (no uncertainty characterization in OFL);
- Uncertainty in M (there are no direct estimates of natural mortality);
- If surfclams in the George's Bank region are near carrying capacity, then their surplus production could be low;
- Survey dredge efficiency is highly variable;
- Georges Bank role with respect to recruitment contribution is unclear. It is unavailable to exploitation; and
- Projections assumed 1999 biomass = virgin biomass.

6) *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.

Tier specification

Level 3: OFL exists, but no probability distribution of OFL is available. (Approximation of F_{msy} by M has no probability distribution.)

Ocean Quahog

1) *The materials considered in reaching its recommendation;*

- Mid-Atlantic Fishery Management Council. 2010. Overview of the Surfclam and Ocean Quahog Fisheries and Quota Considerations for 2011, 2012, and 2013. Mid-Atlantic Fishery Management Council. 38p.
- Northeast Fisheries Science Center. 2010. 48th Northeast Regional Stock Assessment Workshop (48th SAW) Assessment Summary Report. Ref. Doc. 09-10; 58 p.
- Northeast Fisheries Science Center. 2010. 48th Northeast Regional Stock Assessment Workshop (48th SAW) Assessment Report. Ref Doc. 09-15 834 p.
- SARC 48 panelist reports
- Updates on survey indices and landings data

2) *The level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold;*

The OFL is based on B_{2008} (exploited area only), and F_{msy} proxy = $F_{45\%} = 0.0219$; 2011-2013 OFL = 34,800 mt

3) *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 intent of the Act and the National Standard 1 Guidelines;*

The SSC recommends and ABC for 2011-2013 = 75% F_{msy} proxy * B_{2008} (exploited area); ABC = **26,100 mt**.

4) *If possible, the probability of overfishing associated with catches associated with the OFL and ABC recommendations (if not possible, provide a qualitative evaluation);*

Not possible, given available information.

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

- **Data Uncertainties:** The abundance surveys and dredge efficiency estimates are sources of uncertainty. Survey abundance estimates have a quite low coefficient of variation (10 to 21% in 12 survey years), suggesting they are reliable. Data on recruitment is uncertain; there apparently have been some regional recruitment events but these are not well defined. Natural mortality must be low, but there are no estimates. Underlying age structure and growth rate are unknown.
- **Model Uncertainties:** Lacking estimates, proxies for B_{msy} and F_{msy} , and associated F reference levels, are adopted. Sensitivity analysis and probabilities of B and F levels are derived from stochastic runs of KLAMZ for assumed M levels. Accurate knowledge of M would reduce uncertainty in the assessment and projections. KLAMZ does not provide explicit threshold or target reference points for ocean quahog.

- **Stock Status and Reference Points:** Trends in stock are well documented, by region and for the total stock. New reference points recommended by SARC 48 are more conservative than previous reference points. Uncertainties in fishing mortality estimates, based on catch data and swept area biomass estimates, were evaluated by region. Confidence intervals on the estimated (modeled) stock biomass are quite high and thus a source of uncertainty. Overall, the stock seems to be in good shape at present, although the long-term prognosis for this unproductive stock is uncertain.
- A source of uncertainty is the Georges Bank component of stock that is not now fished, but might be fished in the future. How should it be included in assessments and in evaluation of uncertainty? Fully 45% of the ocean quahog stock is on Georges Bank.
- **Forecasting:** Projections of stock status under different fishing mortality rates and assumed natural mortality rates were conducted to year 2015. Projections in that 5-yr timeframe do not suggest biomass will decline rapidly at present F level. But, if fishing mortality increases to the new proposed $F_{\text{threshold}}$ level, the projections indicate that overfishing is highly probable at $F_{45\%}$ by 2015. At F_{present} the risk of overfishing is low.
- The long-term sustainability of a low-productivity stock like ocean quahog is a source of uncertainty. It is not known if MSY concepts and theory apply to ocean quahog, and whether sustainable fishing is possible under usual circumstances and assumptions. The SSC offers precautionary advice that even (very) low F levels probably not sustainable in the long term, given its life history and associated population dynamics (i.e., slow growing, very long-lived, recruitment possibly sporadic). The next SARC should reconsider BRPs (F_{msy} proxy = $F_{45\%}$ may not be appropriate)

6) *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.

Tier specification

Level 3: OFL exists, but no probability distribution (approximation of F_{msy} by $F_{45\%}$ has no probability distribution).

Loligo Squid

1) *The materials considered in reaching its recommendation;*

- Assessment documents from SARC 34 (containing data through 2000); a benchmark assessment is scheduled for Fall 2010
- Updates of landings and survey index data

2) *The level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold;*

32,000 mt. The revised F threshold value is $F = 1.24$, which equates to an OFL of 32,000 mt when applied to the 2003-2007 average fall survey biomass estimate. The revised F threshold value was derived from SARC 34's advice and was the 75th percentile of achieved F s over the period 1987-2001, a period when the *Loligo* stock appeared to be relatively resilient.

3) *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 intent of the Act and the National Standard 1 Guidelines;*

The SSC recommends **24,000 mt**, which represents 75% of the catch associated with $F_{\text{threshold}}$, and is also close to catch derived from the SARC 34 recommended methodology (24,700 mt).

4) *If possible, the probability of overfishing associated with catches associated with the OFL and ABC recommendations (if not possible, provide a qualitative evaluation);*

Not possible, given available information.

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

- Surveys cover unknown portion of entire range (variable availability). Range may extend beyond survey coverage, but less likely an issue for *Loligo* than *Illex*.
- Poor precision of U.S. discard estimates;
- Using a bottom trawl survey gear for a semi-pelagic species may induce variation in the indices of abundance and obscure the true signal;
- Erratic survey trends;
- High, and highly variable, natural mortality;
- Extremely short life-span (less than 1 year), and unknown but likely high impact of environmental factors on recruitment; and
- No biomass reference points as per SARC 34 advice (only fishing mortality).

6) *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.

Tier specification

Tier 3: No probability distribution for the OFL is available.

Illex Squid

1) *The materials considered in reaching its recommendation;*

- Assessment Documents (SARC 21, SARC 37, and SARC 42 (no new benchmark assessment are currently scheduled)
- Updates of landings and survey index data

2) *The level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold;*

The SSC determined it was not possible to provide an OFL given currently available scientific information.

3) *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 intent of the Act and the National Standard 1 Guidelines;*

24,000 mt. The 24,000 mt for *Illex* is not an assessment-based ABC. Even though trawl survey CPUE and landings have varied, there do not appear to be any long-term trends; changes in landings could be the result of changes in abundance, availability, and/or market conditions. Additionally, there is no available evidence that landings of 24,000-26,000 MT have caused harm to the *Illex* stock.

4) *If possible, the probability of overfishing associated with catches associated with the OFL and ABC recommendations (if not possible, provide a qualitative evaluation);*

Not possible, given available information.

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

- Surveys cover an unknown portion of entire range (variable availability);
- Poor precision of U.S. discard estimates (but of low magnitude);
- Using a bottom trawl survey gear for a semi-pelagic species may induce variation in the indices of abundance and obscure the true signal;
- LPUE values are sensitive to availability;
- High, and highly variable natural mortality;
- Extremely short life-span (less than 1 year), and unknown but likely high impact of environmental factors on recruitment; and
- No available estimates of biological reference points (F & B), and no estimates of recent biomass and/or fishing mortality.

6) *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.

Tier specification

Tier 4: No available estimates of biological reference points (F & B), and no estimates of recent biomass and/or fishing mortality.

Butterfish

1) *The materials considered in reaching its recommendation;*

- Mid-Atlantic Fishery Management Council. 2010. 2011 Atlantic mackerel, *Loligo*, and *Illex* Squid and Butterfish Staff ABC White Paper. Mid-Atlantic Fishery Management Council. 31p.
- Northeast Fisheries Science Center. 2010. 49th Northeast Regional Stock Assessment Workshop (49th SAW) Assessment Summary Report. Ref. Doc. 10-01; 41 p.
- Northeast Fisheries Science Center. 2010. 49th Northeast Regional Stock Assessment Workshop (49th SAW) Assessment Report. Ref. Doc. 10-03; 383 p.
- Updates on survey indices and landings (2009)
- SARC 49 panelist reports

2) *The level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold;*

An estimate of OFL was not available from the most recent stock assessment (49th SAW).

3) *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 intent of the Act and the National Standard 1 Guidelines;*

The SSC recommends a *status quo* ABC, **1500 mt**. Assessment reports that abundance trends are in decline and at historically low levels. However F appears very low. SSC concluded that maintaining ABC levels at this time is warranted. Available information suggests stock improvement at 1500 MT ABC, if environmental conditions improve.

4) *If possible, the probability of overfishing associated with catches associated with the OFL and ABC*

recommendations (if not possible, provide a qualitative evaluation);

Not possible, given the available information, but likely low.

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

- Discards imprecisely estimated;
- Survey indices, except for the NEFSC fall survey;
- Model-based estimates of biomass and F are generally imprecise;
- No accepted reference points; and
- Probable large role of environmental drivers (including predation).

6) 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.

Tier specification

Tier 4: No estimates of the biological reference points are available.

Atlantic Mackerel

1) The materials considered in reaching its recommendation;

- Mid-Atlantic Fishery Management Council. 2010. 2011 Atlantic mackerel, *Loligo*, and *Illex* Squid and Butterfish Staff ABC White Paper. Mid-Atlantic Fishery Management Council. 31p.
- 2010 TRAC Summary and working papers
- Updates on survey indices and landings (2009)
- Letter from Sustainable Fisheries Coalition, dated 9 May 2010 (attached)

2) The level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold;

An estimate of OFL was not available from the most recent stock assessment (2010 TRAC).

3) 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 intent of the Act and the National Standard 1 Guidelines;

The SSC accepted the TRAC recommendation of **80,000 mt**. The SSC decided that the 2009 landings and survey index, in and of themselves, were not sufficient information to deviate from the TRAC recommendation.

4) If possible, the probability of overfishing associated with catches associated with the OFL and ABC recommendations (if not possible, provide a qualitative evaluation);

Not possible, given the available information.

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

- 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;
- Apparent, but not fully explainable changes in survey catchability, which may alias a number of unidentified factors.

6) 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.

Tier specification

Tier 4: No estimates of biological reference points are available.

Attachments

cc:

Members, MAFMC SSC

R. Seagraves

T. Hoff

J. Didden

ATTENDANCE

May 11, 2010

Rich Seagraves	MAFMC Staff
Tom Hoff	MAFMC Staff
Jose Montanez	MAFMC Staff
Mark Holliday	SSC Member - NOAA Fisheries
Lee Anderson	MAFMC Vice Chair
Rick Robins	MAFMC Chair
Chris Moore	SSC Member - NOAA Fisheries
John Boreman	SSC Member - NCSU
Mike Frisk	SSC Member - Stony Brook
Robert Latour	SSC Member - VIMS
Scott Crosson	SSC Member - NC DMF
Cynthia Jones	SSC Member - Old Dominion Univ
Brian Rothschild	SSC Member - U MASS
Bonnie McCay	SSC Member - Rutgers
Dave Secor	SSC Member - UMCES
Edward Houde	SSC Member - UMCES
Doug Lipton	SSC Member - UMCP
Wendy Gabriel	SSC Member – NEFSC
Fred Serchuk	SSC Liaison – NMFS/NEFSC
Joe Garvilla	BJ Clam
Pam Gromen	NCCMC
Michael LaVecchia	LaMonica Fine Foods
Joe Lacotte	Snow's/Bumble Bee Foods
Carolyn Creed	Rutgers
Sam Martin	Atlantic Cape Fisheries
Jeff Kaelin	Lund's Fisheries, Inc
Daniel Hennen	NEFSC
Toni Chute	NEFSC
Dave Wallace	Wallace & Associates
Pete Jensen	Wallace & Associates
Tom Alspach	Sea Watch International
Eric Powell	Rutgers

May 12, 2010

All SSC Members from May 11.

Mike Wilberg	SSC Member – UMCES
Fred Serchuk	SSC Liaison – NMFS/NEFSC
John Klinck	Old Dominion Univ
Dave Ellenton	Cape Seafoods, Inc & Western Sea Fishing Co.
Greg DiDomencio	GSSA
Pam Gromen	NCCMC
Jose Montanez	MAFMC Staff
Rich Seagraves	MAFMC Staff