



## Mid-Atlantic Fishery Management Council

800 North State Street, Suite 201, Dover, DE 19901  
Phone: 302-674-2331 | Toll Free: 877-446-2362 | FAX: 302-674-5399 | www.mafmc.org  
Richard B. Robins, Jr., Chairman | Lee G. Anderson, Vice Chairman  
Christopher M. Moore, Ph.D., Executive Director

# MEMORANDUM

**Date:** May 8, 2013  
**To:** Dr. Chris Moore, Executive Director  
**From:** Jason Didden *JDD*  
**Subject:** Mackerel, Squid, and Butterfish (MSB) 2014 Acceptable Biological Catch (ABC) Staff Memo

### Summary

Related to the biological life history of the MSB species, there is very high uncertainty about the actual productivity of the MSB resources. Staff examined past productivity, Council policies, and recent data to recommend a reasonable starting point for discussion by the Scientific and Statistical Committee (SSC). A summary for each species is below, followed by more detailed information and references to related supporting documents.

### Atlantic Mackerel

The status of mackerel is currently “unknown” with respect to both fishing mortality rates and stock size. The date for the next assessment is unknown. For 2014, staff recommends a total (U.S. plus Canada) ABC of 33,000 metric tons (mt). This is the approximate average total (U.S. plus Canada) catch from 1992-2001, a period of 10 years when catch was relatively stable and spawned the 1999 year class that facilitated robust catches in the early- and mid-2000s. The recommendation also considers: a) the low recent mackerel harvests; b) that the 2012 Canadian mackerel stock assessment recommended a catch limit of 9,000 mt for the Canadian contingent; c) the possibilities that environmental/distributional shifts and/or earlier fishing may be driving the apparent low availability and/or low abundance of mackerel; and d) the general nature of the MAFMC risk policy to be more risk averse when uncertainty is higher. Of the MSB species, uncertainty is likely highest for mackerel in terms of stock abundance and productivity.

### **Illex Squid**

The status of *Illex* is currently “unknown” with respect to both mortality rates and stock size. For 2014, staff recommends continuing the multi-year ABC specification of 24,000 mt previously set for 2012-2014 by the SSC. This was based on the observation that landings of 24,000-26,000 MT do not appear to have caused harm to the *Illex* stock based on indices and landings in years following when landings were in the range of 24,000 mt-26,000 mt. Landings and indices continue to vary within typical levels.

### **Longfin Squid**

The status of longfin squid (formerly referred to as *Loligo*) is currently “unknown” with respect to mortality rates and "not overfished" with respect to stock size. For 2014, staff recommends continuing the multi-year ABC specification of 23,400 mt previously set for 2012-2014 by the SSC. This was based on the catch in the year with the highest observed exploitation fraction (catch divided by the estimated biomass) during a period of apparent light exploitation (1976-2009) according to the 2010 longfin squid assessment. Landings and indices continue to vary within typical levels.

### **Butterfish**

The status of butterfish is currently “unknown” with respect to mortality rates and stock size. A benchmark assessment is being conducted in 2013. Applying the methodology used by the SSC last year, which would be to assume that the 2014 butterfish stock size will be similar to the previous known 7 years (2006-2012) and select an OFL that corresponds to a bootstrapped median  $F$  of 0.536 (67% of  $M$  of 0.8) results in an OFL of 18,200 mt and an ABC of 9,100 mt. While no longer classified as overfished, technically butterfish remains under a rebuilding plan that specifies an  $F = 0.1$  be applied to the most current estimate of biomass. Accordingly, for 2014 staff recommends status quo: 16,800 mt as an OFL and 8,400 mt as an ABC. An empirical ad hoc evaluation of the Miller-Adams-Rago 2013 analysis revealed that contemporary estimates of stock size in year  $t$  were correlated with lagged abundance from previous years. In particular, stock size in year  $t$  was more closely correlated with the average stock sizes in years  $t-2$  to  $t-5$  (a four-year running average) than with a seven-year running average (i.e., years  $t-2$  to  $t-8$ ). A catch of 8,400 mt is associated with a median  $F$  of 0.11 in the 2009-2012 (most recent four years) bootstrapping exercise, which given the generally conservative assumptions of the Miller-Adams-Rago 2013 analysis would likely result in an actual realized  $F$  of less than 0.1.

### **Introduction – Applies To All Species In This Memo**

The Magnuson Stevens Act (MSA) as currently amended requires each Council's Scientific and Statistical Committee (SSC) to provide, among other things, ongoing scientific advice for fishery management decisions, including recommendations for ABC, preventing overfishing, and maximum sustainable yield. The SSC recommends ABCs to the Council that address scientific uncertainty such that overfishing is unlikely to occur. The Council's ABCs recommendations to NMFS for the upcoming fishing year(s) cannot exceed the ABC recommendation of the SSC. In this memorandum, information is presented to assist the SSC in developing recommendations for the Council to consider for 2014 ABCs.

Once the SSC meets and decides on the ABCs, the Squid-Mackerel-Butterfish Monitoring Committee will meet to discuss if consideration of changes to other management measures should be recommended as these may depend on the ABC specifications. These measures would include Annual Catch Limits (ACLs), Annual Catch Targets (ACTs), and Accountability Measures (AMs) among others. Based on the SSC and Monitoring Committee's recommendations, the Council will make a recommendation to the NMFS Northeast Regional Administrator. Based on its evaluation of that recommendation, NMFS will publish a Proposed Rule for the 2014 specifications and then a Final Rule, which may change from the Proposed Rule based on public comment.

## **Atlantic Mackerel (“mackerel” hereafter)**

### **Summary**

- The status of mackerel is currently “unknown” with respect to both fishing mortality rates and stock size.
- For 2014, staff recommends a total (U.S. plus Canada) ABC of 33,000 metric tons (mt), down from the current 80,000 mt combined US. and Canadian ABC.
- A summary of available biological information is available in a document provided by the NMFS Northeast Fisheries Science Center (NEFSC), available at: <http://www.mafmc.org/ssc-meetings/april-30-2013>. A link from that page to the 2012 SSC meeting materials contains materials from recent assessments.
- A landings history and other fishery information are provided in the fishery information document, also available at: <http://www.mafmc.org/ssc-meetings/april-30-2013>.
- The 2012 SSC recommendations, available here: <http://www.mafmc.org/s/SSC-Report-23-24-May-2012-rev.pdf>, document the SSC's previous rationale and also summarize the major sources of scientific uncertainty.
- A Fishery Performance Report designed to inform the specifications process from the perspective of the MSB Advisory Panel is available at: <http://www.mafmc.org/ssc-meetings/april-30-2013>.

### **Catch and Landings**

Mackerel's landing history is characterized by high foreign catches in the 1970s (up to 400,000 mt or almost 900 million pounds) followed by domestication of the fishery with lower catches. Following the highpoint of the domestic fishery (which was still a fraction of the foreign fishery) in the mid-2000s, the domestic fishery experienced a sharp decline from 2006 to almost nothing in 2011. Landings were very low in 2012 and 2013 appears to also be a year of very low landings. Discards are believed to be just a few percent of catch.

### **Regulatory Review**

The 2013 ABC for mackerel is 80,000 mt which translates into a domestic ACL of 43,781 mt after Canadian catch is accounted for. The fishery has just come under a tiered limited access system. The primary directed commercial fishery closes at 95% of domestic annual harvest (DAH = 33,821 mt). Incidental trips limits of 20,000 pounds are allowed if the directed fishery closes. A recreational fishery exists but generally catches a small amount of mackerel relative to the commercial fishery.

### **Biological Reference Points, Stock Status, and Projections**

The full mackerel stock was last assessed in 2010 (utilizing data through 2008) via a joint U.S. - Canadian Transboundary Resource Assessment Committee (TRAC). The TRAC was unable to resolve uncertainties in the analyses to an acceptable degree so there are no accepted reference points. Accordingly, the status of mackerel is currently “unknown” with respect to mortality rates or stock size. No projections are available.

### **2014 OFL/ABC Recommendations**

The status of the mackerel stock is very uncertain. On one hand catches have faltered in recent years, the 2010 TRAC assessment suggested low productivity and biomass in 2008, industry reports very few larger mackerel, and a recent Canadian assessment suggested low productivity and biomass in Canadian waters. On the other hand, NEFSC survey indices have remained relatively high (if driven by small fish) and temperature based analyses suggest mackerel may be just more spread out and less available in densities that inspire sustained effort given high fuel prices (Overholtz et al 2011 available at <http://www.tandfonline.com/doi/pdf/10.1080/19425120.2011.578485>). European fisheries have also experienced significant northward distributional shifts in recent years.

#### **OFL**

An overfishing level likely cannot be determined.

#### **ABC**

Four possible scenarios seem most likely:

- 1) The mackerel stock may be in trouble due to fishing pressure or environmental conditions and reducing catches would help the stock rebuild or be maintained, so catches should be restricted. Given recent low catches this would mean essentially a moratorium on fishing.
- 2) Mackerel populations may be low due to environmental conditions and reducing catch will not really have much impact - the fishery will self-regulate in the sense that high fuel costs will preclude much directed fishing unless mackerel are sufficiently abundant.
- 3) Mackerel may be out there somewhere but just not being caught (not "available").
- 4) Some mix of 1-3 is occurring.

The risk of a high quota is that not restricting catch may prevent rebuilding. The risk of a low quota is that a fishing opportunity presented by a sudden high abundance/availability of mackerel would be missed. The Magnuson Act states that annual catch limits (ACLs) should be specified “such that overfishing does not occur in the fishery.” Since the Council’s ACLs are equal to or less than the SSC’s ABC, it follows that ABCs should be specified “such that overfishing does not occur in the fishery.” For mackerel this seems impossible to know given the level of uncertainties involved for any catch level above very low levels, especially since recent catches have been very low. The Council Risk Policy also suggests that more precaution be applied in highly uncertain situations.

Given the above, the available evidence leads staff to conclude that mackerel abundance will remain at low levels until favorable environmental conditions lead to either a high recruitment event or migration of mackerel back into U.S. waters. However both the recent U.S. and Canadian assessments suggest that high mackerel catches have been associated with an occasional strong year class. If this is the case, and only occasionally strong year classes are expected, it would seem to make sense to limit fishing mortality on such year classes since mackerel can live up to 17 years. For 2014, staff recommends a total (U.S. plus Canada) ABC of 33,000 metric tons (mt). This is the approximate average total (U.S. plus Canada) catch from 1992-2001, a period of 10 years when catch was relatively stable and spawned the 1999 year class that facilitated robust catches in the early- and mid-2000s. The recommendation also considers: a) the low recent mackerel harvests; b) that the 2012 Canadian mackerel stock assessment recommended a catch limit of 9,000 mt for the Canadian contingent; c) the possibilities that environmental/distributional shifts and/or earlier fishing may be driving the apparent low availability and/or low abundance of mackerel; and d) the general nature of the MAFMC risk policy to be more risk averse when uncertainty is higher. Of the MSB species, uncertainty is likely highest for mackerel in terms of stock productivity. This recommendation seeks to strike a balance between being overly precautionary (i.e. implementing a moratorium) while acknowledging that there are a variety of signals that mackerel productivity may have been overestimated in the past and low in the present.

## **Illex Squid**

The status of *Illex* is currently “unknown” with respect to both mortality rates and stock size. For 2014, staff recommends continuing the multi-year ABC specification of 24,000 mt previously set for 2012-2014 by the SSC. This was based on the observation that landings of 24,000-26,000 MT do not appear to have caused harm to the *Illex* stock based on indices and landings in years following when landings were in the range of 24,000 mt-26,000 mt. Landings and indices continue to vary within typical levels. The full rationale for the SSC's previous decision is available at: [http://www.mafmc.org/s/SSC\\_Report\\_25-26\\_May\\_2011.pdf](http://www.mafmc.org/s/SSC_Report_25-26_May_2011.pdf), and that report also summarizes the major sources of uncertainty. A summary of available biological information is available in a document provided by the NMFS Northeast Fisheries Science Center (NEFSC), available at: <http://www.mafmc.org/ssc-meetings/april-30-2013>. A link from that page to the 2012 SSC meeting materials contains materials from recent assessments. A landings history and other fishery information are provided in the fishery information document, also available at: <http://www.mafmc.org/ssc-meetings/april-30-2013>. A Fishery Performance Report designed to inform the specifications process from the perspective of the MSB Advisory Panel is available at: <http://www.mafmc.org/ssc-meetings/april-30-2013>.

## **Longfin Squid**

The status of longfin squid (formerly referred to as *Loligo*) is currently “unknown” with respect to mortality rates and "not overfished" with respect to stock size. For 2014, staff recommends continuing the multi-year ABC specification of 23,400 mt previously set for 2012-2014 by the SSC. This was based on the catch in the year with the highest observed exploitation fraction (catch divided by the estimated biomass) during a period of apparent light exploitation (1976-2009) according to the 2010 longfin squid assessment. Landings and indices continue to vary within typical levels. The full rationale for the SSC's previous decision is available at: [http://www.mafmc.org/s/SSC\\_Report\\_25-26\\_May\\_2011.pdf](http://www.mafmc.org/s/SSC_Report_25-26_May_2011.pdf), and that report also summarizes the major sources of uncertainty. A summary of available biological information is available in a document provided by the NMFS Northeast Fisheries Science Center (NEFSC), available at: <http://www.mafmc.org/ssc-meetings/april-30-2013>. A link from that page to the 2012 SSC meeting materials contains materials from recent assessments. A landings history and other fishery information are provided in the fishery information document, also available at: <http://www.mafmc.org/ssc-meetings/april-30-2013>. A Fishery Performance Report designed to inform the specifications process from the perspective of the MSB Advisory Panel is available at: <http://www.mafmc.org/ssc-meetings/april-30-2013>.

## **Butterfish**

### **Summary**

-The status of butterfish is currently “unknown” with respect to mortality rates and stock size. The most recent assessment did conclude that the butterfish stock was experiencing a long-term declining trend through 2009 but that overfishing appeared unlikely and that fishing mortality appeared quite low and was not a substantial driver of butterfish's decline. A benchmark assessment is scheduled for 2013.

-NMFS has recently notified the Council that because butterfish is technically under a rebuilding plan, the expected F should be at or below the rebuilding F, which equals 0.1.

-For the 2014 fishing year, staff recommends an OFL proxy of 16,800 mt and an ABC of 8,400 mt (status quo) based on the updated Miller-Adams-Rago analysis available in a document provided by the NMFS Northeast Fisheries Science Center (NEFSC), available at: <http://www.mafmc.org/ssc-meetings/april-30-2013>.

-A landings history and other fishery information is provided in the fishery information document, available at: <http://www.mafmc.org/ssc-meetings/april-30-2013>. A link from that page to the 2012 SSC meeting materials also contains materials from recent assessments.

-The 2012 SSC recommendations, available here: <http://www.mafmc.org/s/SSC-Report-23-24-May-2012-rev.pdf>, document the SSC's previous rationale and also summarize the major sources of scientific uncertainty.

-A Fishery Performance Report designed to inform the specifications process from the perspective of the MSB Advisory Panel is available at: <http://www.mafmc.org/ssc-meetings/april-30-2013>.

### **Catch and Landings**

Butterfish's landing history is characterized by high foreign catches in the 1970s (peaking at about 33,000 mt or 70 million pounds) followed by domestication of the fishery with lower catches. Landings in recent years have been capped to less than 1,000 mt due to perceived low productivity. Discards are imprecisely estimated but appear substantial. The longfin squid fishery has a discard cap to limit butterfish discarding so that ACLs are not exceeded. 2013 is the first year since 2004 when a directed butterfish fishery has been allowed, but catches have been slow to date (see fishery performance report).

### **Regulatory Review**

The 2013 ABC for butterfish is 8,400 mt which resulted in a U.S. DAH of 2,570 mt after discards and management uncertainty were accounted for by the Council. The fishery operates under limited access and the "directed fishery" closes via buffers that vary depending on how much of the year is left. There is some minor recreational take of butterfish, primarily for bait.

The butterfish cap on the Longfin squid fishery is a major aspect of butterfish catch regulation. While the 2010 assessment and the Miller-Adams-Rago analysis may call into question rebuilding, the butterfish cap would still be necessary to track and manage butterfish under ACLs/AMs since discarding of butterfish is likely to occur in the Longfin squid fishery, and an uncontrolled overage and related paybacks could negatively impact both longfin squid and butterfish fishing in future years.

NMFS recently notified the Council that since the SSC is applying an F in its recommendations, the utilized F needs to be consistent with the existing rebuilding plan for butterfish, which specifies that an F of 0.1 be utilized. An associated letter and email that clarifies NMFS's intent behind sending the letter has been posted to <http://www.mafmc.org/ssc-meetings/april-30-2013>.

### **Biological Reference Points**

The butterfish stock was most recently assessed at SARC 49 (2010). The SARC review panel did not accept the adequacy of the proposed redefined BRPs or the BRPs used for stock status determination in the 2004 butterfish assessment. The review panel questioned the application of MSY theory to a short-lived recruitment-dominated population, particularly the use of equilibrium methods when trends in the data suggest the stock is declining even with low fishing mortality.

### **Stock Status and Projections**

SARC 49 concluded that overfishing was not likely occurring and that the decline in the butterfish stock through 2009 appeared to be driven by environmental processes and low recruitment. Determination of an overfished versus not overfished condition was not resolved at the meeting, which left the overfished status of butterfish as unknown.

## **2014 OFL/ABC Recommendations**

### **OFL**

The Miller-Adams-Rago updated 2013 analysis suggests that overfishing is very unlikely below the status quo OFL proxy of 16,800. Given there is a benchmark assessment pending, staff recommends maintaining the status quo OFL of 16,800.

### **ABC**

While no longer classified as overfished, technically butterfish remains under a rebuilding plan that specifies an  $F = 0.1$  be applied to the most current estimate of biomass. Accordingly, for 2014 staff recommends status quo: 16,800 mt as an OFL and 8,400 mt as an ABC. An empirical ad hoc evaluation of the Miller-Adams-Rago 2013 analysis revealed that contemporary estimates of stock size in year  $t$  were correlated with lagged abundance from previous years. In particular, stock size in year  $t$  was more closely correlated with the average stock sizes in years  $t-2$  to  $t-5$  (a four-year running average) (.54) than with a seven-year running average (i.e., years  $t-2$  to  $t-8$ ) (.35). While not an unexpected result given the above findings, there was almost no correlation (.02) between stock size in year  $t$  and lagged abundance from the first 3 years averaged from the seven-year running average (i.e., years  $t-6$  to  $t-8$ ).

A catch of 8,400 mt is associated with a median  $F$  of 0.11 in the 2009-2012 (most recent four years) bootstrapping exercise, which given the generally conservative assumptions of the Miller-Adams-Rago 2013 analysis would likely result in an actual realized  $F$  of less than 0.1. An Excel spreadsheet with the correlations described above is posted at: <http://www.mafmc.org/ssc-meetings/april-30-2013>.

Note: A rebuilding  $F$  generally implies that we know where we are, where we want to go, and we have a particular time frame in mind. Since we are very likely above the old Bmsy from the 2003/4 assessment that drove the rebuilding amendment, in one respect it makes little sense to impose a very restrictive  $F$ . However, the idea of the 0.1 rebuilding  $F$  was to maintain a low  $F$  until a more justifiable path is apparent and as of the writing of this memo, the Council is apparently bound by it until it is changed. Presumably the 2013 benchmark butterfish assessment will provide such a path.