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

M E M O R A N D U M

Date: April 17, 2014

To: Dr. Chris Moore, Executive Director

From: Jason Didden

Subject: Mackerel, Squid, and Butterfish (MSB) Acceptable Biological Catch (ABC) Staff Memo

Summary

Related to the life history of the MSB species, there is relatively high uncertainty about the actual productivity of the MSB resources. Staff examined past productivity, Council policies, and recent data to recommend a 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

In 2015 mackerel will be in "Year 3" of three-year specifications. Absent a change, the 2015 ABC for mackerel will be 80,000 metric tons (mt). 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 but a research plan is being developed. U.S. and Canadian total catches have been low in recent years, but stable near 13,000 mt over 2011-2013. 2014 appears similar to 2013 from the U.S. perspective. A new 2014 Canadian mackerel assessment recommends limiting catch to 800 mt for the Canadian contingent. There are several hypotheses regarding mackerel. One is that the lack of catch is a distributional issue and that the mackerel may be deeper, further north, and/or more spread out. A second is that the stock has been overfished or is in a state of reduced productivity due to environmental conditions, and catch should be reduced. A combination of factors is possible.

Staff recommends a total (U.S. plus Canada) ABC of 33,400 mt for 2015-2017. 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 takes into account the general nature of the Council risk policy to be more risk averse (precautionary) when uncertainty is higher. Of the MSB species, uncertainty is likely highest for mackerel when stock abundance,

productivity, and the potential for fishing to impact long term stock size are considered in combination. This recommendation assumes that recent catches (~13,000 mt) should not be negatively impacting the mackerel stock, but that if and when mackerel return, it would be prudent to ramp up catches incrementally. A total ABC of 33,400 mt would likely translate into a U.S. domestic commercial landings quota in the 10,000-20,000 mt range depending on a variety of management considerations. While mackerel does have one more year of a three-year cycle, the administrative efficiencies of aligning all MSB species on the same three-year cycle warrant consideration of new 3-year specifications (regardless of the exact ABC recommended by the SSC), and would set up May 2017 as a target to have developed better abundance information for mackerel.

Illex Squid

The status of *Illex* is currently "unknown" with respect to both mortality rates and stock size. Staff recommends setting a new 2015-2017 multi-year ABC specification of 24,000 mt (the same as was previously set for 2012-2014 by the SSC). This is 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 vary within a wide range, although 2013 landings were low and indices have been trending lower in recent years and were below the long-term median in 2013.

Longfin Squid

The status of longfin squid (formerly named *Loligo*) is currently "unknown" with respect to mortality rates and "not overfished" with respect to stock size. Staff recommends setting a new 2015-2017 multi-year ABC specification of 23,400 mt (the same as was previously set for 2012-2014 by the SSC). This is based on the catch in the year with the highest observed exploitation fraction (catch divided by the estimated biomass) during a period of apparent relatively light exploitation (1976-2009) according to the 2010 longfin squid assessment. Landings and indices vary within a wide range.

Butterfish

A new butterfish assessment passed the Stock Assessment Review Committee (SARC) process. Staff recommends setting a new 2015-2017 multi-year ABC of 28,309 mt. This is based on: a) the assessment's conclusion that the butterfish stock size is above the size that produces maximum sustainable yield (Bmsy) and has been for the entire time series of the assessment (1989-2012); b) the projections produced by the Northeast Fisheries Science Center; c) the use of a 100% coefficient of variation (C.V.) for the overfishing level (OFL) to

account for additional uncertainty, d) requiring a 65% probability of not overfishing (35% chance of overfishing) since certain aspects of butterfish life history have not been fully addressed through the stock assessment and biological reference point development process. In addition, instead of using the three catch outputs of the projections given the above constraints (2015: 29,815 mt, 2016: 28,637 mt, 2017: 28,309 mt), staff recommends a constant ABC of 28,309 mt (the lowest of the three) to add a small degree of additional precaution given that catches have been below 5,000 mt since 2002 and below 12,500 mt for the entire time series of the assessment.

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 ABC 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 2015-2017 ABCs.

Once the SSC meets and decides on the ABCs, the Squid-Mackerel-Butterfish Monitoring Committee will meet (May 13 and 27) 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 2015 (and 2016/2017 if appropriate) 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 2015-2017, staff recommends a total (U.S. plus Canada) ABC of 33,400 mt, down from the current 80,000 mt combined US. and Canadian ABC.

-A summary of updated biological information is available in a document provided by the NMFS Northeast Fisheries Science Center ("NEFSC Mackerel Biological Update"), available at: http://www.mafmc.org/ssc-meetings/2014/may-7-8-2014. A link from that page to the 2012 SSC meeting materials contains materials from past assessments.

-A landings history and other fishery information are provided in the fishery information document, also available at: http://www.mafmc.org/ssc-meetings/2014/may-7-8-2014.

-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/2014/may-7-8-2014.

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. U.S. and Canadian total catches have been low in recent years, but stable near 13,000 mt over 2011-2013. 2014 also appears to be a year of low landings from the U.S. perspective (Canadian landings occur later in the year). Discards are believed to be just a few percent of catch.

Regulatory Review

The 2014 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 recently 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. A recently implemented river herring and shad cap can now close the mackerel fishery if observer and landings data estimate that 236 mt of combined river herring and shad are caught by trips landings 20,000 pounds or more mackerel.

Unlike most fisheries, the performance of the mackerel fishery (a winter/spring fishery) in one year is generally known before specifications are made for the next year. This means that a change in abundance or other issues can be reacted to relatively quickly (i.e. for the next year) through the standard specifications process.

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. A recent Canadian assessment of the Canadian mackerel contingent recommended that catch be limited to 800 mt. A full assessment document for the Canadian assessment is not available, but the summary is available at: http://www.mafmc.org/ssc-meetings/2014/may-7-8-2014.

2015-2017 OFL/ABC Recommendations

The status of the mackerel stock is uncertain. On one hand catches have faltered in recent years, the 2010 TRAC assessment suggested low productivity and biomass in 2008, industry reports few larger mackerel, and recent Canadian assessments have 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 slightly below the long term median in 2013). Temperature based analyses also suggest mackerel may be just more spread out and less available in densities that inspire sustained fishing 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

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. Both the TRAC and recent 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 appropriate to limit initial fishing mortality on such year classes since mackerel can live up to 17 years. If the issue is primarily distributional, it may still make sense to limit fishing mortality on the pioneers that first return to U.S. waters.

Accordingly, for 2015-2017, staff recommends a total (U.S. plus Canada) ABC of 33,400 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 2014 Canadian mackerel stock assessment recommended a catch limit of 800 mt for the Canadian contingent; c) the possibility 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 Council risk policy to be more risk averse (precautionary) when uncertainty is higher.

This recommendation seeks to strike a balance between being overly precautionary (e.g. 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.

While mackerel does have one more year of a three-year cycle, the administrative efficiencies of aligning all MSB species on the same three-year cycle warrant consideration of new 3-year specifications (regardless of the exact ABC recommended by the SSC), and would set up May 2017 as a target to have developed better abundance information for mackerel.

Illex Squid

Summary

-The status of *Illex* is currently "unknown" with respect to both fishing mortality rates and stock size.

-For 2015-2017, staff recommends extending the current multi-year ABC specification of 24,000 mt previously set for 2012-2014 by the SSC.

-A summary of updated biological information is available in a document provided by the NMFS Northeast Fisheries Science Center (NEFSC Squids Biological Update), available at: http://www.mafmc.org/ssc-meetings/2014/may-7-8-2014. A link from that page to the "2012 SSC Meeting Materials" contains materials from past (but not accepted) assessments.

-A landings history and other fishery information are provided in the fishery information document, also available at: http://www.mafmc.org/ssc-meetings/2014/may-7-8-2014.

- 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/2014/may-7-8-2014.

Catch and Landings

Landings and indices vary within a wide range, although 2013 landings were low and indices have been trending lower in recent years and were below the long-term median in 2013. The fishery information document available at http://www.mafmc.org/ssc-meetings/2014/may-7-8-2014 details the landings history. The NEFSC Squids Biological Update at the same site details the NEFSC indices.

Regulatory Review

The 2014 ABC for *Illex* is 24,000 mt which results in a U.S. DAH of 22,915 mt after discards are subtracted. There is no recreational fishery. The fishery operates under limited access and the directed fishery closes at 95% of domestic annual harvest (DAH). Incidental trips limits would be allowed if the directed fishery closes.

Biological Reference Points, Stock Status, and Projections

The *Illex* stock was most recently assessed at SARC 42 (2006). The SARC 42 report became publically available in 2006 and included data through 2004. There are no reliable current estimates of stock biomass or fishing mortality rate.

2015-2017 OFL/ABC Recommendations

OFL

An overfishing level likely cannot be determined.

ABC

For 2015-2017, staff recommends extending the current 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. The full rationale for the SSC's previous decision is available at: http://www.mafmc.org/s/SSC_Report_25-26_May_2011.pdf, and that report also summarizes the major sources of uncertainty.

Longfin Squid

Summary

-The status of longfin squid is currently “unknown” with respect to fishing mortality rates and "not overfished" for stock size.

-For 2015-2017, staff recommends extending the current multi-year ABC specification of 23,400 mt previously set for 2012-2014 by the SSC.

-A summary of updated biological information is available in a document provided by the NMFS Northeast Fisheries Science Center (NEFSC Squids Biological Update), available at: http://www.mafmc.org/ssc-meetings/2014/may-7-8-2014. A link from that page to the "2012 SSC Meeting Materials" contains materials from past assessments.

-A landings history and other fishery information are provided in the fishery information document, also available at: http://www.mafmc.org/ssc-meetings/2014/may-7-8-2014.

-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/2014/may-7-8-2014.

Catch and Landings

Landings vary within a wide range. The fishery information document available at http://www.mafmc.org/ssc-meetings/2014/may-7-8-2014 details the landings history. The NEFSC Squids Biological Update at the same site details the NEFSC indices.

Regulatory Review

The 2014 ABC for longfin squid is 23,400 mt which results in a U.S. DAH of 22,049 mt after discards are subtracted. There is a recreational fishery but no catch estimates are available and it is believed to be minor relative to the ABC. The commercial fishery operates under limited access and the directed fishery closes at 95% of domestic annual harvest (DAH). The annual quota is divided up into 3 four-month trimesters 43% (Trimester 1 Jan-April) - 17% (Trimester 2 May-Aug) - 40% (Trimester 3 Sept-Dec). Trimesters 1 and 2 close when 90% of the Trimester quota is used. There is a 1 7/8" minimum mesh required in Trimester 2 and a 2 1/8" mesh at other

times. There is a butterfish discard cap which can close the longfin squid fishery, but the current cap does not appear to be constraining (several bycatch avoidance efforts have commenced since implementation of the cap).

Biological Reference Points, Stock Status, and Projections

The longfin squid stock was most recently assessed at SARC 51 (2010). The SARC 51 findings were made available in 2010 and included data through 2009. There are no reliable current estimates of fishing mortality rates but a Bmsy target of 42,405 mt was accepted along with a Bthreshold of ½ of the target = 21,302 mt. The Bmsy target was derived assuming that the 1976-2008 median biomass estimate represents 90% of the stock's carrying capacity "K" (SAW/SARC 42 concluded that the stock appears "lightly exploited") and the Bmsy target is ½ of K.

2015-2017 OFL/ABC Recommendations

OFL

An overfishing level likely cannot be determined.

ABC

Staff recommends setting a new 2015-2017 multi-year ABC specification of 23,400 mt (the same as was previously set for 2012-2014 by the SSC). This is based on the catch in the year with the highest observed exploitation fraction (catch divided by the estimated biomass) during a period of apparent relatively light exploitation (1976-2009) according to the 2010 longfin squid assessment. The full rationale for the SSC's previous decision is available at: http://www.mafmc.org/s/SSC_Report_25-26_May_2011.pdf, and that report also summarizes the major sources of uncertainty.

Butterfish

Summary

-There is a new accepted assessment for butterfish (SAW-SARC 58). The status of butterfish is "no overfishing occurring" and "not overfished." The butterfish stock size is above the size that produces maximum sustainable yield (Bmsy) and has been for the entire time series of the assessment (1989-2012). The new assessment documents and the assessment summary are available at: http://www.mafmc.org/ssc-meetings/2014/may-7-8-2014.

-For 2015-2017, staff recommends an ABC of 28,309 mt.

-A landings history and other fishery information are provided in the fishery information document, also available at: http://www.mafmc.org/ssc-meetings/2014/may-7-8-2014.

-A Fishery Performance Report designed to inform the specifications process from the perspective of the MSB Advisory Panel is also available at: http://www.mafmc.org/ssc-meetings/2014/may-7-8-2014.

Catch and Landings

The fishery declined in the 1990s due to lack of availability and market forces. Landings since 2005 have been restricted by regulations. 2013 began a limited re-establishment of a directed fishery, but landings in 2013 were low compared to the quota for a variety of reasons (see fishery performance report). Discards appear to be sufficiently controlled by the discard cap in the longfin squid fishery and/or accounted for sufficiently in the management system.

Regulatory Review

A three-tier system for landings was implemented in 2013. The fishery begins with an unlimited trip limit for the directed fishery and then a series of two lower trip limits are implemented as the fishery uses up the annual landings quota. Discards are controlled primarily by a discard cap in the longfin squid fishery, and additional catch is set-aside for discards in other fisheries.

Biological Reference Points, Stock Status, and Projections

The assessment summary provides a succinct summary of reference points and stock status, and may be found at http://www.mafmc.org/ssc-meetings/2014/may-7-8-2014. The NEFSC ran additional projections, provided below:

Projection results are based on the 2014 SARC 58 assessment stock sizes estimated for 2012. If the preliminary estimate of 2013 total catch (2,489 mt) is taken, the median F in 2013 is projected to be 0.04 (CV = 0.26), which is below the overfishing reference point F_{MSY} proxy 2/3 M = 0.81 (CV = 0.05) accepted by SARC 58. The median projection of SSB in 2013 is 51,746 mt (CV = 0.28), which is above the biomass reference point SSB_{MSY} proxy 45,616 mt (CV = 0.25) accepted by SARC 58. If the 2014 ABC (9,100 mt) is assumed for the 2014 catch, the median projection of F in 2014 is 0.18 (CV = 0.20) and the median projection of SSB in 2014 is 53,580 mt (CV = 0.20).

The MAFMC SSC requested 5 projection scenarios for 2015-2017. Results for each are listed below:

1) Catch projections for 2015-2017 with a maximum probability of overfishing of 40 percent, assuming the recent assessment's probability distribution function for overfishing.

Total Catch (ABC), Fishing Mortality (F)
and Spawning Stock Biomass (SSB) in 2013-2017.
Catches and SSB in metric tons, (CV)

Year	ABC	F	SSB
2013	2,489	0.04 (0.26)	51,746 (0.28)
2014	9,100	0.18 (0.20)	53,580 (0.20)
2015	39,274 (0.18)	0.77 (0.23)	51,541 (0.27)
2016	35,528 (0.23)	0.76 (0.30)	47,901 (0.31)
2017	34,759 (0.24)	0.75 (0.33)	47,223 (0.32)

2) Catch projections for 2015-2017 with a maximum probability of overfishing of 35 percent, assuming the recent assessment's probability distribution function for overfishing.

Total Catch (ABC), Fishing Mortality (F)
and Spawning Stock Biomass (SSB) in 2013-2017.
Catches and SSB in metric tons, (CV)

Year	ABC	F	SSB
2013	2,489	0.04 (0.26)	51,746 (0.28)
2014	9,100	0.18 (0.20)	53,580 (0.20)
2015	38,360 (0.18)	0.75 (0.23)	51,860 (0.27)
2016	35,556 (0.23)	0.75 (0.30)	48,142 (0.31)
2017	33,751 (0.24)	0.73 (0.32)	47,656 (0.32)

3) Catch projections for 2015-2017 with a maximum probability of overfishing of 40 percent, assuming a 100% C.V. probability distribution function for overfishing.

Total Catch (ABC), Fishing Mortality (F)
and Spawning Stock Biomass (SSB) in 2013-2017.
Catches and SSB in metric tons, (CV)

Year	ABC	F	SSB
2013	2,489	0.04 (0.26)	51,746 (0.28)
2014	9,100	0.18 (0.20)	53,580 (0.20)
2015	33,278 (1.00)	0.63 (0.22)	53,621 (0.26)
2016	31,412 (1.00)	0.63 (0.29)	50,979 (0.30)
2017	30,922 (1.00)	0.63 (0.31)	50,359 (0.31)

4) Catch projections for 2015-2017 with a maximum probability of overfishing of 35 percent, assuming a 100% C.V. probability distribution function for overfishing.

Total Catch (ABC), Fishing Mortality (F)
and Spawning Stock Biomass (SSB) in 2013-2017.
Catches and SSB in metric tons, (CV)

Year	ABC	F	SSB
2013	2,489	0.04 (0.26)	51,746 (0.28)
2014	9,100	0.18 (0.20)	53,580 (0.20)
2015	29,815 (1.00)	0.56 (0.22)	54,802 (0.25)
2016	28,637 (1.00)	0.56 (0.28)	52,932 (0.29)
2017	28,309 (1.00)	0.56 (0.29)	52,444 (0.30)

5) Catch projections for 2015-2017 associated with fishing at 75 percent of the FMSY value.

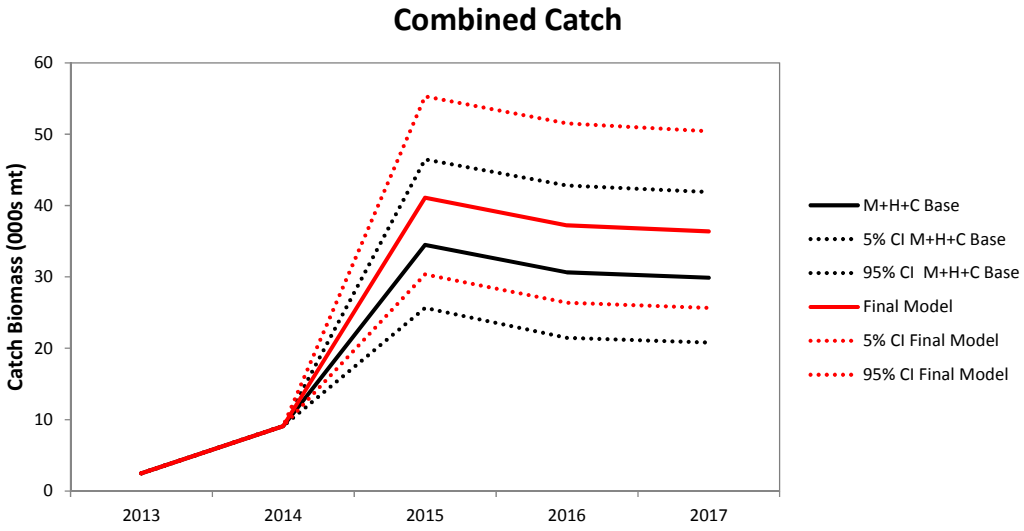
Total Catch (ABC), Fishing Mortality (F)
and Spawning Stock Biomass (SSB) in 2013-2017.
Catches and SSB in metric tons, (CV)

Year	ABC	F	SSB
2013	2,489	0.04 (0.26)	51,746 (0.28)
2014	9,100	0.18 (0.20)	53,580 (0.20)
2015	32,307 (0.18)	0.61	53,953 (0.22)
2016	30,595 (0.20)	0.61	51,454 (0.24)
2017	30,133 (0.20)	0.61	50,788 (0.24)

2015-2017 OFL/ABC Recommendations

OFL

Applying an F of 0.81 for projections for 2015-2017 (assuming the above 2013 and 2014 catches) results in OFLs of 41,092 mt, 37,236 mt, 36,365 mt (2015, 2016, and 2017 respectively).



ABC

Staff recommends setting a new 2015-2017 multi-year ABC of 28,309 mt. This is based on: a) the assessment's conclusion that the butterfish stock size is above the size that produces maximum sustainable yield (Bmsy) and has been for the entire time series of the assessment (1989-2012); b) the projections produced by the Northeast Fisheries Science Center; c) the use of a 100% coefficient of variation (C.V.) for the overfishing level (OFL) to account for additional uncertainty, d) requiring a 65% probability of not overfishing (35% chance of overfishing) since certain aspects of butterfish life history have not been fully addressed through the stock assessment and biological reference point development process (e.g. its role as forage, impacts of climate change). These criteria match projection #4 above. In addition, instead of using the three catch outputs of projection #4 above (2015: 29,815 mt, 2016: 28,637 mt, 2017: 28,309 mt), staff recommends a constant ABC of 28,309 mt (the lowest of the three years) to add a small degree of additional precaution given that catches have been below 5,000 mt since 2002 and below 12,500 mt for the entire time series of the assessment.