Methodology for the 2013 Butterfish Mortality Cap for the Longfin Squid Fishery

January 2013

This document summarizes the 2013 methodology for the butterfish mortality cap on the longfin squid fishery that was implemented through Amendment 10 to the Atlantic Mackerel, Squid, and Butterfish (MSB) Fishery Management Plan (FMP). The butterfish mortality cap is one of several measures implemented through Amendment 10 to reduce fishing mortality on butterfish and other finfish in the longfin squid fishery. This methodology was developed by a working group composed of staff from the Northeast Regional Office (NERO), the Northeast Fisheries Science Center (NEFSC), and the Mid-Atlantic Fishery Management Council (MAFMC) in 2010. With the exception of one minor adjustment[i], the methodology is unchanged from that used in the 2011 and 2012 fishing years.

The allocations in this document reflect the final 2013 MSB specifications implemented on January 16, 2013.

Background

The butterfish mortality cap is intended to limit butterfish catch (landings and discards) on trips that land greater than or equal to 2,501 lb of longfin squid. **The 2013 butterfish mortality cap for the longfin squid fishery is 4,464 mt (9,841,435 lb).** All butterfish catch on trips that land greater than or equal to 2,501 lb longfin squid after January 1, 2013, are counted against the butterfish mortality cap. The butterfish mortality cap is allocated by trimester: Trimester I – 65%; Trimester II – 3.3%; Trimester III – 31.7% (see Table 1). The remaining 3,936 mt of the butterfish ABC (total ABC = 8,400 mt) will account for butterfish catch in other fisheries, including trips landing less than or equal to 2,500 lb of longfin squid.

Table 1 summarizes the landings allocation for the longfin squid fisheries, and the butterfish mortality cap allocations for the longfin squid fishery for the 2013 fishing year. The NERO Analysis and Program Support Division (APSD) staff monitors the following allocations on a weekly basis:

1) Longfin squid landings (on all trips that land longfin squid) against the longfin squid trimester closure thresholds;
2) Extrapolated butterfish catch on trips that land greater than or equal to 2,501 lb of longfin squid against the butterfish mortality cap thresholds during Trimesters I and III; and
3) Butterfish landings on all trips that land butterfish (specified as domestic annual harvest (DAH)) against the annual butterfish closure threshold.

Table 1. Longfin squid and butterfish landings and butterfish mortality cap allocations (mt) for 2013.

		Trimester I (Jan-Apr)	**Trimester II** (May-Aug)	**Trimester III** (Sep-Dec)
Longfin squid Quota 22,049 mt total	**Allocation**	9,481	3,748[ii]	8,820
	Closure Threshold Directed Longfin Fishery	8,532 (90%*9,481)	3,373 (90%*3,748)	20,947 (95%*22,049)
Butterfish Cap 4,477 mt total	**Allocation**	2,902	147	1415
	Closure Threshold[iii] Directed Longfin Fishery	2,322 (80%*2,902)	3,348 (75%*4,464)	4,018 (90%*4,464)

The mortality cap program results in a new range of potential closure scenarios for the longfin squid fishery. The directed longfin squid fishery will close if the butterfish mortality cap is harvested during Trimesters I and III. Overages and underages from the Trimester I butterfish catch cap will apply to Trimester III. The butterfish cap will be tracked during Trimester II, but catch overages or underages will be applied to Trimester III. The annual cap allocation is tracked in Trimester III.

There are a few minor changes to the longfin squid and butterfish mortality cap closure thresholds, intended to prevent closures in the last 1-2 weeks of each Trimester, and to prevent the butterfish mortality cap from be used up entirely during Trimester II. These changes were implemented in 2013 MSB specifications, are detailed in the text.

For longfin squid:

- During Trimester I, the directed longfin fishery is closed if:
  - Longfin squid landings are projected to reach 8,532 mt (from January 1 to April 15) -OR-
  - Longfin squid landings are projected to 9,007 mt (from April 15 to April 30) -OR-
  - The butterfish mortality cap reaches 2,322 mt (from January 1 to April 15) -OR-
  - The butterfish mortality cap reaches 2,612 mt (from April 15 to April 30)
- During Trimester II, the directed longfin fishery is closed if:
  - Longfin squid landings are projected to reach 3,373 mt (from May 1 to August 15, unless this allocation is increased due to under-harvest in Trimester I) -OR-
  - Longfin squid landings are projected to reach 3,561 mt (from August 15 to August 30, unless allocation is increased from Trimester I under-harvest) -OR-
  - The butterfish mortality cap reaches 3,348 mt (75% of the annual butterfish mortality cap allocation)
- During Trimester III, the directed longfin fishery is closed if:
  - Longfin squid landings are projected to reach 20,947 mt (annual threshold) -OR-
  - The butterfish mortality cap reaches 4,018 mt (annual threshold)

The tracking of the butterfish catch against the butterfish mortality cap (based on observed trips) and the butterfish quota (DAH, based on dealer reports) will occur simultaneously. The permit

holder letter for the 2013 fishing year describes the closure scheme for the directed butterfish fishery.

Data

In order to monitor the butterfish mortality cap, APSD staff will rely on a number of sources of data. The data sources used to monitor the mortality cap during the 2013 fishing year are summarized below, with particular attention to the timeframe over which the data becomes available for catch cap monitoring purposes.

Northeast Fisheries Observer Program Data. The Northeast Fishery Observer Program (NEFOP) collects and processes data and biological samples obtained during commercial fishing trips. Butterfish catch estimates from observed fishing trips that land greater than or equal to 2,501 lb of longfin squid will be used to extrapolate total butterfish catch for all trips that land greater than or equal to 2,501 lb of longfin squid. Preliminary (partially audited) observer data is available to APSD for catch cap monitoring purposes within 7 days of the end of the observed fishing trip.

Federal Dealer Data. Federally permitted longfin squid dealers are required to submit reports that document, among other things, the weight of each species purchased from vessels during a given reporting week by midnight of the first Tuesday following the end of a reporting week. Reports are submitted through the Standard Atlantic Fisheries Information System (SAFIS), and are available to APSD upon submission. Federal dealers are able to purchase longfin squid and butterfish from both federally permitted vessels and non-federally permitted vessels. Thus, information on all trips where greater than or equal to 2,501 lb of longfin squid is sold to federally permitted dealers should be available within 10 days of landing for mortality cap monitoring, regardless of whether the vessel holds a federal longfin squid/butterfish moratorium permit.

Vessel Trip Report (VTR) Data. Federally permitted vessels are required to submit fishing vessel trip reports (VTRs) detailing the weights of each species kept and discarded. VTRs will be used as a substitute for dealer data in the cases where dealer reports are unavailable. Currently, MSB permit holders are only required to submit VTRs on a monthly basis (within 15 days after the end of the reporting month). However, vessels that hold Northeast multispecies permits, Atlantic herring permits, or Tier 3 mackerel permits are required to submit VTRs on a weekly basis (first Tuesday following the Sunday to Saturday reporting week). For the 2012 permit year, 95.5% of longfin squid/butterfish permit holders (limited access and incidental) also held active multispecies permits or herring permits, thus a majority of vessels landing longfin squid and butterfish are expected to submit VTRs on a weekly basis.

Additional data. A small percentage of trips that land greater than or equal to 2,501 lb of longfin squid are taken by non-federally permitted vessels. From 2007 to 2009, between 2 and 6 percent of longfin squid landings were taken by non-federally permitted vessels landing greater than or equal to 2,501 lb of longfin squid. Though these landings and any associated butterfish catch may be difficult to monitor, they are likely not significant enough to change the estimate of butterfish catch rates. Most states with active longfin squid and butterfish dealers submit trip-

level dealer information to SAFIS throughout the fishing year. However, submissions of state dealer data do not happen as quickly as federal dealer data submissions, and trip-level data is not always available.

Observer coverage

The Northeast Fisheries Observer Program (NEFOP) allocates observer sea days to monitor bycatch in commercial fisheries along the Atlantic coast, from Maine to North Carolina. Because of limitations in funding, observer sea days are allocated to fleet sectors with similar characteristics (*e.g.* gear type, region) rather than to fisheries defined by target species. The longfin squid fishery is primarily prosecuted using small-mesh otter trawls, and thus, observer sea days are actually allocated quarterly to small-mesh otter trawls (< 5.5 inch codend mesh) by region (i.e., Mid-Atlantic versus New England ports).

To facilitate the placement of observers on longfin squid trips, Amendment 10 also established a trip notification requirement. As of February 15, 2013, vessels are required to notify NMFS at least 48 hours (instead of 72 hours as was required previously), but no more than 10 days, prior to embarking on a fishing trip in order to possess 2,501 lb or more of longfin squid. The trip notification requirement became effective on January 1, 2011, at which point NEFOP began assigning observers to longfin squid vessels following the trip notification based on availability.

Butterfish catch estimation

Catch estimation. Total butterfish catch is estimated by using data from observed hauls on longfin squid trips to extrapolate to unobserved longfin squid trips. The rate of butterfish catch is estimated as the ratio of observed butterfish catch (kept and discards) to the kept catch of all species on observed trips that land greater than or equal to 2,501 lb of longfin squid. Total butterfish catch (in weight) is derived by multiplying the catch rate by total pounds of all kept species on all trips that land greater than or equal to 2,501 lb of longfin squid.

The formula for estimating total butterfish catch for a given trimester is:

$$\frac{Observed\ butterfish\ catch}{Observed\ kept\ catch\ (all\ species)} \times Kept\ catch\ (all\ species, all\ longfin\ squid\ trips)$$

$$= Total\ estimated\ butterfish\ caught$$

Many vessels with longfin squid landings greater than or equal to 2,501 lb target a range of species, thus in order to account for butterfish encounters for these trips, the estimator is a ratio of butterfish catch to total weight of all kept species on observed hauls on trips that land greater than or equal to 2,501 lb of longfin squid. Using all species retained as the denominator reduces bias in the ratio estimator, and is consistent with the peer-reviewed methodology that has been implemented to estimate discards in other fisheries.

The butterfish catch rate is the year-to-date sum of all observed butterfish catch divided by the year-to-date sum of the observed weight of all kept species on trips that land greater than or equal to 2,501 lb of longfin squid. The catch rate changes as more data from observed trips

becomes available throughout the year. The catch rate is multiplied by the cumulative dealer-reported landings of all species on the relevant 2,501 lb longfin squid trips (observed and unobserved) to estimate total butterfish catch by all trips landing greater than or equal to 2,501 lb of longfin squid. It is important to note that the estimate of butterfish catch will change from week to week; the butterfish catch estimate may be lower or higher than the previous week as the estimated butterfish catch rate changes.

A transition method is applied at the beginning of the year when there are not enough in-season observed trips (i.e., fewer than five trips) to reliably estimate the butterfish catch rate. The transition method uses the previous year's catch rate as an assumed rate. For example, for Trimester I of the 2013 fishing year, the annual 2012 butterfish catch rate will be used as the assumed catch rate, with a transition to the in-season rate as data from observed trips 1 to 4 becomes available. Once data for observed trip number 5 becomes available the transition to the in-season data is complete. After the transition to in-season data is complete, the remainder of Trimester I, and Trimesters II and III, will use the cumulative catch rate that is calculated using in-season data.

The formula for the transition rate is:

$$\left(\frac{0.7}{Trip\ Count}\right) * Assumed\ Rate + \left(1 - \left(\frac{0.7}{Trip\ Count}\right)\right) * In\_Season\ Rate$$

In this formula, trip count is 1 to 4. This transition rate is currently being used to estimate discard rates for the Northeast multispecies fishery.

2012 Review of the Butterfish Morality Cap Methodology

Prompted by industry concern that Trimester II butterfish discard estimates for the longfin squid fishery were not reflective of actual discard amounts, NERO conducted an internal review of potential changes to the butterfish mortality cap methodology. The internal review culminated in a public meeting on November 6, 2012.

The current discard methodology (described above in the "Butterfish catch estimation" section) is based on the Cumulative Discard Methodology (http://nefsc.noaa.gov/groundfish/discard/), which is used for a number of Northeast Region catch caps and was developed through a peer-review process to estimate in-season discards. The Cumulative Discard methodology was first used in 2010, and moved away from the35-day rolling average that was previously used to a simple, robust, unbiased way of calculating discards that minimizes the difference between the quota monitoring method and the estimate used in assessments.

As the fishing year progresses, information from each observed longfin squid trip throughout the fishing year updates the current estimate of the butterfish catch rate. Depending on the amount of information given by new observed trip in relation to the amount of previous information held from prior observed trips, the annual butterfish catch rate can be adjusted up, down or remain the same. As more information is gained from the observed trips, the catch rate becomes more stable and robust with the amount of information from prior observed trips out weighing a new

observed trip. Related to the industry, this also means that, if a lower butterfish catch rate is observed during Trimester II, that low rate is influenced by any higher rates observed during Trimester I.

Industry requested that NERO evaluate whether it may be more appropriate to apply the methodology so each individual trimester has its own individual catch rate, in the same way that the quota is divided. Industry members suggested that, if each trimester had its own individual catch rate, the methodology would be more reflective of on-the-water observations of lower butterfish incidental catch during Trimester II, and would also mirror an approximate fishing shift moving from inshore to offshore.

NERO staff performed an initial review of the number of observed longfin squid trips and the resulting butterfish catch rates for the calendar years 2007 through 2012 by month and location (inshore versus offshore). The review confirmed that the data suggests that there may be a significant difference between butterfish catch rates on longfin squid trips in different trimesters. This potential difference should be investigated further. More importantly, the initial exploratory analysis of the data illuminated several important issues that would need more thorough investigation before any recommendation to change the butterfish mortality cap methodology. These issues were illustrated during both the internal review and the public meeting and are both statistical and programmatic in nature.

These issues include, but are not limited to, the following:

- Is the apparent difference between the trimester catch rates statistically different and valid? If so, which trimesters are different?
- If there is a statistical difference between catch rates in each trimester, does the statistical difference present enough of a practical difference to warrant a change in methodology?
- Does the current data collection method support the change in methodology? Does a change in method require a change in observer data collection? Is an increase of observed trips required?
- If there is a difference in trimester catch rates, is the difference consistent from year to year? Does the initial start period vary from year to year? Would overlap of inshore/offshore observed trip based on starting from a fixed date bias the determined catch rate?
- If the difference in trimesters exists and is different from year to year, which method is more robust?
- How should the initial catch rate be determined?

The Butterfish Mortality Cap Working Group concluded that a change is not appropriate at this time because a trimester-by-trimester stratification of the butterfish mortality cap estimation is inconsistent with the current peer-reviewed cumulative discard methodology. The butterfish mortality cap methodology will not be changed for the 2013 fishing year.

A three-year review of the cumulative methodology is planned for summer or fall 2013, after the end of groundfish fishing year in May. Because the initial review suggests a significant difference between the butterfish trimester catch rates, the analysis to determine the validity of

stratifying the butterfish mortality cap rate by season (winter/fall vs summer) or area (inshore vs offshore) will be included in that peer-review.

Annual Review

Amendment 10 states that the SSC will annually review the performance of the butterfish mortality cap program during the specifications process, and that their review should include, among other things, 1) the CV of the butterfish discard estimate; and 2) the estimate of butterfish fishing mortality.

The Year-end Butterfish Mortality Cap Report for the 2012 fishing year will likely be completed by May 2013, and will be available for consideration for the 2014 specifications process.

[i] In late 2012, the methodology was altered from previous versions to clarify that only trips with greater than or equal to 2,501 lb of longfin squid will be counted in the cap for the 2012 fishing year. This change makes the methodology consistent with the original intent of Amendment 10, and has been applied retroactively to the entire 2012 fishing year.

[ii] This allocation may be increased if there is substantial under-harvest in Trimester I.

[iii] Extrapolated butterfish catch on trips that land greater than or equal to 2,500 lb of longfin squid; observer data.