



New England Fishery Management Council

50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116

John Pappalardo, *Chairman* | Paul J. Howard, *Executive Director*

To: Paul J. Howard, Executive Director
From: Steve Cadrin, Chairman, Scientific and Statistical Committee
Date: September 20, 2010

Subject: Monkfish Biological Reference Points and Interim Acceptable Biological Catch

The Scientific and Statistical Committee (SSC) was asked to:

- 1) review the 2010 monkfish (goosefish) assessment from the 50th Stock Assessment Review Committee (SARC 50), including the recommendations for updating biomass reference points, and the approach to estimating the maximum sustainable yield (MSY) proxy, for purposes of developing an Acceptable Biological Catch (ABC) recommendation for the monkfish resource;
- 2) review the Monkfish Plan Development Team's updated calculation of overfishing limit (OFL) using SARC 50 results; and
- 3) develop a recommendation to the Council for an updated ABC that accounts for uncertainty in the estimate of OFL, including assessment model uncertainties and projection uncertainties.

In March 2009, the SSC concluded “*that the information currently available for monkfish does not support a conventional approach to determining OFL and ABC as provided in National Standard 1 guidelines*” and made the following recommendation to the Council as the ABC control rule for Amendment 5:

An interim Acceptable Biological Catch should be derived as the product of the average exploitation rate during the recent period of stable or increasing trend in biomass for each management unit and the most recent estimate of exploitable biomass. Therefore, the method of determining ABC should be considered an interim proxy until Overfishing Level of Catch and its uncertainty can be projected

On August 24, 2010 the SSC reviewed information and associated presentations developed by SARC 50, the Monkfish PDT and previous SSC reports:

- 1) SARC 50 Monkfish Assessment Summary Report
- 2) SARC 50 Monkfish Assessment Report
- 3) Monkfish PDT calculation of OFL and interim rule based ABC, using updated, SARC 50, results, and discussion of sources of uncertainty
- 4) March 2009 SSC Report to the Council
- 5) May 2009 SSC Report to the Council

The SARC 50 stock assessments of the northern and southern monkfish management units were reviewed and considered as a basis for ABC recommendations. The current biomass reference points for monkfish (developed by the 2007 Data Poor Stocks Working Group) are based on the lowest observed stock size as a proxy for the minimum stock size threshold, and average biomass

during the assessment series as a proxy for a rebuilding target. Advances in monkfish stock assessment methods from a data-poor approach to an analytical assessment (based upon the SCALE model) support the transition to biomass reference points that are consistent with MSY. The SCALE model is superior to the previously used survey-based approach because it allows for the integration of a wide array of information and for the exploration of uncertainties. The SARC 50 Panel recommended revised biomass reference points that are based on long-term F_{MSY} projections, in which the rebuilding target is B_{MSY} , and the minimum stock size threshold is $\frac{1}{2}B_{MSY}$. The SSC endorses the SARC 50 Panel recommendations, but also recommends further consideration of the recruitment assumptions in long-term projections and alternatives to F_{max} (e.g. $F_{40\%MSP}$) as a proxy for F_{MSY} . Using the SARC 50 projection methods at F_{MSY} , the OFL in 2011 is 19,557 mt for the northern management unit and 36,245 mt for the southern management unit.

The SSC also endorses the SARC 50 stock assessment as a basis for status determination. It is important to note that the monkfish management units are not overfished, as determined from either the current biomass reference points or those recommended by SARC 50. Therefore, rebuilding plans are not needed in either area, the ABCs do not need to meet rebuilding objectives, and the biomass reference points do not affect the SSC's recommendations.

Notwithstanding the assessment advances made, the SSC shares the SARC 50 Review Panel's "*serious concerns regarding the high levels of uncertainty throughout the assessment.*" These uncertainties include poor understanding of some important aspects of monkfish biology as well as model uncertainty which results in a large retrospective pattern, particularly in the northern management unit. These same uncertainties affect estimates of the proposed biomass reference points and in turn the calculated values of the OFLs. SARC 50 provided statistical estimates of uncertainty, evaluations of model sensitivity, retrospective inconsistency, and consideration of potential sources of bias. Much of the uncertainty in the assessment appears to result from model specification error, which can be diagnosed but not quantified by statistical measures of uncertainty in the OFL estimates.

The SSC considered ABC recommendations that are based on uncertainty in the OFLs. Although this approach was ultimately rejected by the SSC, all example ABCs that were considered demonstrate the difficulties in adopting the approach. Unfortunately, major sources of uncertainty are not represented in the projected distribution of the OFLs, so ABC cannot be derived from a percentile of the OFL distribution. When a probabilistic approach to ABC is not possible, ABC recommendations could be based on 75% F_{MSY} . If monkfish ABCs were based on 75% F_{MSY} , ABC in 2011 would be 15,400 mt for the northern management unit and 28,600mt for the southern management unit, which is near the maximum catch recorded in the northern area and substantially greater than the maximum catch recorded in the southern area. If the retrospective pattern in the northern area continues, an ABC of 15,400 mt in 2011 would produce a fishing mortality that is nearly two times greater than F_{MSY} . Similarly, a catch based on 75% of the OFL from the 2007 assessment would have produced a fishing mortality in the northern area that was much greater than F_{MSY} . If stock biomass estimates were adjusted for retrospective inconsistency, ABCs would be reduced by approximately half. These calculations imply that the OFL – ABC buffer needs to be considerably larger than 25% to take account of scientific uncertainties in the monkfish assessments.

The SSC also considered recommendations based upon the current interim ABC control rule developed by the PDT. Using average exploitation rates during the most recent periods of biomass increase (2006-2009 in the northern area; 2002-2009 in the southern area) and the most recent

estimate of exploitable biomass from SARC 50, 2010 ABC is 7,592 mt in the northern area and 12,316 mt in the southern area. These are about 40% and 34% of the OFLs for the northern and southern areas NMA and SMA respectively and highlight the large uncertainties in the assessments.

Given continued concerns about the monkfish assessment and the difficulties in evaluating uncertainty in the OFLs, the SSC repeats its previous conclusion that “*the information currently available for monkfish does not support a conventional approach to determining OFL and ABC as provided in National Standard 1 guidelines.*” Furthermore, the SSC concludes that the current ABC control rule, updated to reflect recent average exploitation rates and stock sizes, is a more appropriate basis for ABC recommendations than the OFL projections.

The SSC notes that the recommended ABCs are approximately twice the 2009 catch. The SSC thus recommends that the Council consider Annual Catch Targets that allow incremental increases in catch while monitoring stock response. Improvements are needed in the scientific basis of fishery management for monkfish to support catch advice that is based on estimates of scientific uncertainty and the Council’s desired risk tolerance.

The SSC recommends:

- 1. Biomass reference points for monkfish should be based on maximum sustainable yield expectations (i.e., a rebuilding target of B_{MSY} and a minimum stock size threshold of $\frac{1}{2}B_{MSY}$) in the next framework adjustment or amendment to the fishery management plan.**
- 2. Based on projections from the most recent peer reviewed stock assessments, the overfishing limit (OFL) is 19,557 mt for the northern management unit and 36,245 mt for the southern management unit. However, the calculated values of OFL are highly uncertain, and are affected by major sources of uncertainty in the assessment that currently cannot be quantified.**
- 3. Acceptable Biological Catch (ABC) cannot be derived from uncertainty in OFL estimates. Using the currently accepted ABC control rule, ABC is 7,592 mt in the northern area and 12,316 mt in the southern area.**
- 4. Annual Catch Targets should allow incremental increases in catch above 2009 levels while monitoring stock response.**