



New England Fishery Management Council

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**To:** Deirdre Boelke, Chair, Scallop Plan Development Team  
**From:** Dr. Steve Cadrin, Chair, Scientific and Statistical Committee  
**Date:** February 18, 2009

**Subject: Technical guidance on methods for deriving Acceptable Biological Catch**

The SSC was asked to review and provide input on methods for deriving Acceptable Biological Catch (ABC), Annual Catch Limit (ACL), and Annual Catch Target (ACT). On February 6 2009, the SSC reviewed the Council request, an overview presentation by the scallop PDT, and background documents (Scallop Amendment 15 DEIS – Description of alternatives under consideration). The SSC provided recommendations on this to the Council on February 11. Technical details associated with those recommendations are provided here.

SSC recommendations to the Council were:

- *Managing the current fishery so that fishing mortality is less than  $F_{max}$  complies with National Standard 1 (preventing overfishing while achieving the optimum yield on a continuing basis).*
- *At this time, no analysis has been provided to demonstrate that the proposed ABC complies with National Standard 1 Guidelines. Uncertainty in the estimate of OFL has not been quantified, and performance of alternative ABC methods with respect to preventing overfishing has not been evaluated. Therefore, a method to derive ABC will be recommended at a later date.*

In response to the Council's request to review alternatives under consideration to modify the overfishing definition used in the Scallop FMP, the SSC recommended the following:

- *Recognizing that there is no change to the proposed overfishing definition, and the target is based on methods recently reviewed by the SSC, the SSC repeats its October 2008 endorsement that the proposed method for deriving the target catch is scientifically sound. Using a time-averaged rate of fishing mortality is a reasonable approach to deriving target catch, provided that the Annual Catch Target (ACT) is less than or equal to the Annual Catch Limit (ACL).*
- *With respect to the overfishing definition, the SSC repeats its advice from October 2008: "Although  $F_{max}$  may be a reasonable proxy for  $F_{MSY}$ , the SSC recommends more explicit consideration of long-term sustainable yield, rather than maximizing yield-per-recruit. For example, aspects of long-term sustainable yield include: non-equilibrium conditions, stock-recruit relationship, conservation of spawning potential, density dependence, and environmental influences; all of which should be monitored as a condition of managing the fishery based on  $F_{max}$ ."*

The SSC recognizes that the scallop stock assessment is one of the most informative assessments in the region, and the fishery is one of the most successfully managed. The positive status of the stock and the management system reflect the high-quality of science being produced by the Scallop PDT. The SSC also acknowledges that the draft Amendment document was developed before the final National Standard Guidelines were published (January 16 2009).

Several aspects of the proposed method for determining ABC are valuable for the transition to ACL-based management. The qualitative evaluation of scientific uncertainty and management uncertainty and the general approach to the OFL-ABC-ACL-ACT process in the draft Amendment document are appropriate. The SSC offers below minor comments on those aspects of the proposal. More importantly, the SSC feels that the proposal to use 90% of  $F_{max}$  as a basis for ABC is not entirely consistent with the final guidelines. With the intention of working with the PDT to develop an ABC determination process, the SSC also provides technical details involved with measures of uncertainty.

#### Technical Feedback:

1. The SSC generally agrees with the revised OFL-ABC-ACL-ACT process proposed by the PDT (Figure 1, below). Note that this revision corrects the figure in the draft Amendment document (section 3.2.5.2) that bypassed the need for an ABC determination.
2. The qualitative evaluation of scientific uncertainty and management uncertainty (section 3.2.3) is essential for the next step of quantifying uncertainty. The SSC offers several suggested revisions to the PDT's qualitative evaluation.
  - a. A minor editorial comment is that the term 'biological uncertainty' should be replaced with the phrase 'scientific uncertainty' to reflect the final guidelines and more clearly account for non-biological sources of uncertainty (e.g., selectivity, discards).
  - b. Uncertainty in natural mortality has a greater effect on outcome of the assessment than indicated.
  - c. Uncertainty in growth is greater than indicated, because age structure is not routinely monitored.
  - d. Uncertainty in the shell height-meat weight relationship is greater than indicated, because of spatio-temporal patterns that are not accounted for in the assessment.
  - e. Additional sources of uncertainty include a stock-recruit relationship and density dependence.
3. Most importantly, the SSC requests a quantified estimate of uncertainty in OFL (including uncertainty in the  $F_{MSY}$  proxy as well as the projected stock biomass). A distribution of the projected value of OFL (the projected catch associated with  $F_{max}$ ) will allow the SSC to use a lower quantile of the projected OFL such that ABC is lower, but not significantly different than OFL. In general, stochastic projection would be an appropriate approach to estimating uncertainty in OFL, but the SSC feels that the Scallop PDT is the most qualified group to determine the most appropriate method.
4. Eventually, the SSC would like to base its ABC recommendation on an evaluation of how alternative ABC methods perform with respect to preventing overfishing. Performance of alternative ABC methods should be based on the frequency of overfishing ( $F > F_{MSY}$ ) and the frequency of depleting the stock to less than  $\frac{1}{2} B_{MSY}$ . Performance of alternative ABC methods as well as ACL and ACT methods could be assessed using management strategy evaluation. Such methods could also be used to transition from a  $F_{max}$  overfishing definition to a  $F_{MSY}$  overfishing definition. Alternative ABC methods could include:

- a. a series of reductions from OFL (e.g., 95%OFL, 90%OFL, ...),
- b. a smaller buffer when the stock is abundant to reflect the low risk (or ‘vulnerability’) of the resource being overfished (e.g.,  $x\%OFL$  if  $B < B_{MSY}$ ,  $x/2\%OFL$  if  $B > B_{MSY}$ ).
- c. an ‘operating model’ could reflect the spatial heterogeneity in the scallop resource and fishery to evaluate the effect of rotational harvest strategies and their effect on risk of overfishing.

The SSC appreciates the progress made by the Scallop PDT in transitioning to an ACL-based management system. The SSC looks forward to working with the PDT and learning how best to manage the scallop fishery in conformance to the new guidelines. Please contact me or Dr. Patrick Sullivan (the SSC lead for scallops) as these methods and analyses develop.

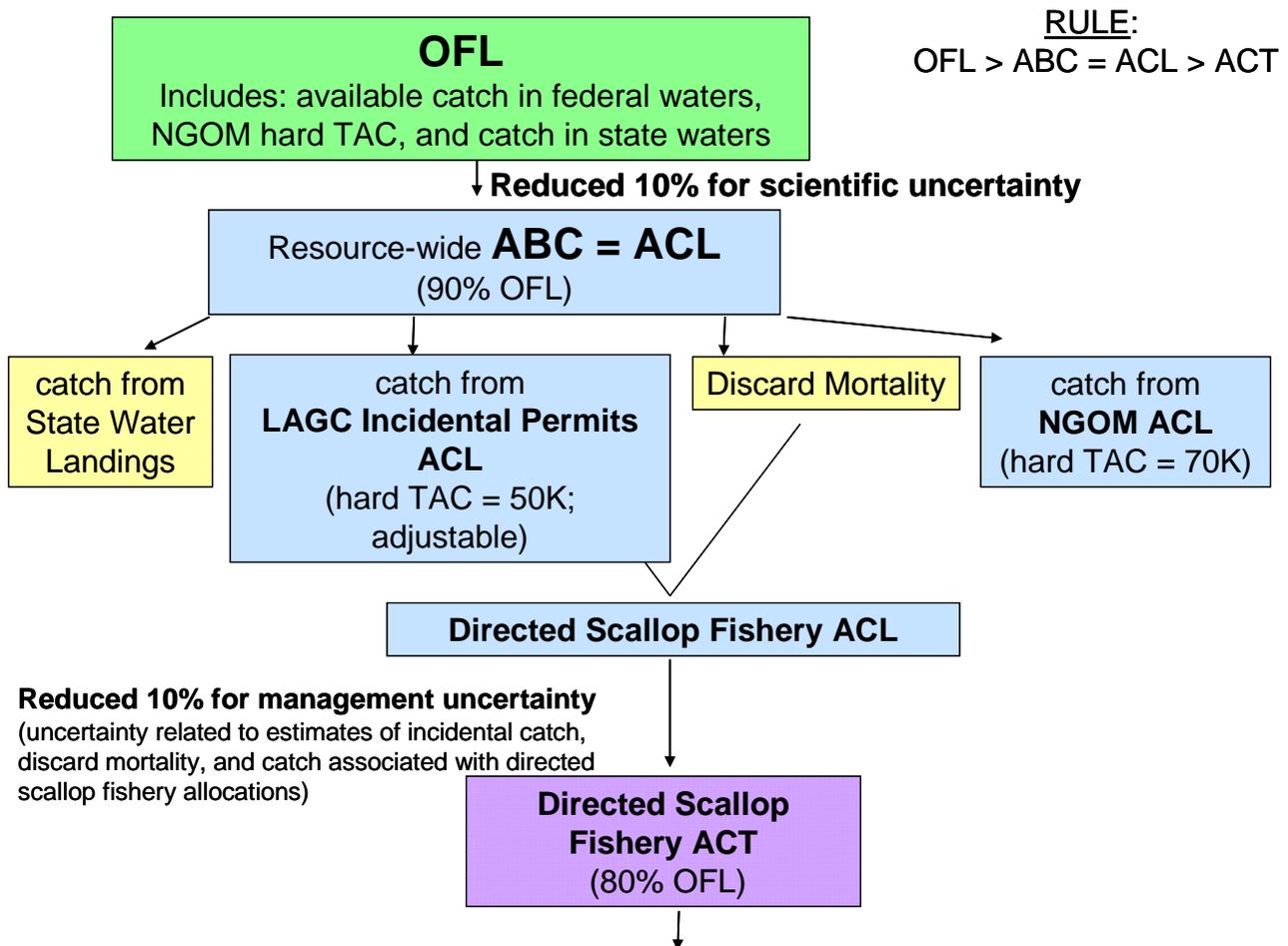


Figure 1. Schematic description of the revised general process for deriving OFL, ABC, ACL and ACT presented by the PDT.