

ABC Control Rule Implementation and Application in New England

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The New England SSC developed ABC recommendations to meet the 2010-2011 deadlines for Annual Catch Limits, but the basis of ABC recommendations and conformance to NS1 guidelines vary among FMPs, and formal ABC control rules have not been developed for all stocks. Eventually, all FMPs should include ABC control rules that account scientific uncertainty in OFL and the Council's desired risk tolerance. In June 2010, the SSC reviewed all of its ABC recommendations with specific terms of reference:

1. Review ABC control rules or methods for deriving ABC in each FMP with respect to their expected performance for avoiding overfishing (i.e., conformance with the Act)
2. Identify the information needed to develop ABC control rules that account for scientific uncertainty in OFL and the Council's desired risk tolerance (i.e., conformance with NS1 guidelines).

Sea Scallop – The ABC is based on a stochastic estimate of F_{MSY} and projection. Based on the probability of overfishing and the projected loss in yield relative to F_{MSY} (Figure 1). The SSC recommended that ABC be based on 25% probability of overfishing. The optimal combination of risk and probability of overfishing is a management option to be determined by the Council, with input from the Scallop Plan Team and the SSC on scientific consequences of alternative degrees of risk. For illustration purposes, alternative projections of fishing mortality and yield at alternative probabilities of overfishing were initially provided and $P^*=25\%$ was accepted. ABC is based on a nominal probability of overfishing, but further scientific information is needed for a more strategic decision on risk tolerance, and Management Strategy Evaluation would help to quantify model error. A more comprehensive measure of risk (R) would include multiple risks, expressed as the probability (P) of an event i (e.g., overfishing, overfished, foregone yield, accountability measures) and consequences or costs (C):

$$R = \sum_i P_i \times C_i$$

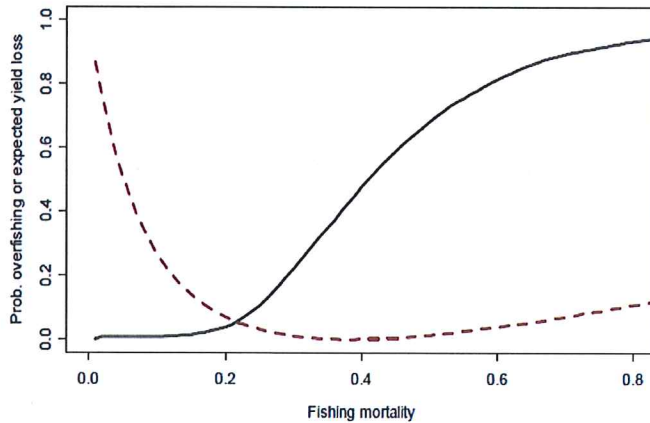


Figure 1. Multiple risks of probability of overfishing and foregone yield (from 50th Northeast Stock Assessment Workshop).

Groundfish – In the absence of better information on what an appropriate buffer should be between OFL and the ABC, a relatively simple ABC was applied to all groundfish stocks, because of retrospective inconsistencies in most groundfish assessments precluded a probabilistic approach to ABCs. Given the guidance for specifying ABC as the lesser of $75\%F_{MSY}$ or $F_{rebuild}$, and the definition of optimum yield in the current Multispecies Fishery Management Plan as that associated with $75\%F_{MSY}$, the SSC recommended that the Council consider this ABC specification be applied to all groundfish stocks. Performance of $75\%F_{MSY}$ has only been generically evaluated for other stocks and situations (e.g., principal groundfish in the late 1990s). A recent ‘benchmark’ assessment indicated a low probability of exceeding F_{MSY} (e.g., conditional $P < 10\%$ for pollock). Most stocks need reliable stochastic projections (or MSEs) and a decision on risk tolerance needed from Council.

Monkfish – Considerable uncertainties in the monkfish assessment model preclude its use to determine probability of exceeding the projected OFL. The SSC recommended an interim method for determining Acceptable Biological Catch based on average exploitation rate during the recent period of increase in both management units and the most recent estimate or index of exploitable biomass. Recommended ABCs were approximately twice the 2009 landings, so the SSC recommended that the Council consider Annual Catch Targets that allow incremental increases in catch while monitoring stock response. The recent exploitation rate appeared to be sustainable, but the probability of overfishing is not well estimated. Projections from the updated assessment indicate low probability of overfishing in the southern area, but high probability of overfishing in the northern area if catch=ABC based on previous assessment. Stochastic projections or MSEs are needed to initiate discussion about risk tolerance.

Skates – OFL of skates cannot be determined, because overfishing reference points are survey proxies, and estimates of F or F_{MSY} reference points are not available. Status of each skate species will continue to be monitored, but the fishery will be managed using a multispecies catch limit, supplemented with additional management actions. The interim ABC is derived as the multispecies skate catch associated with the median of the observed series of a catch/biomass exploitation index and the most recent 3-year average of the multispecies skate survey index. The multispecies ABC is being supplemented with a prohibition on possessing thorny skate. The expected performance for avoiding overfishing is unknown,

Strategic options for New England ABCs are being considered in November 2010. The general options are:

1. Continue to provide ABC recommendations for each management action. This current practice is responsive to Council's needs, fishery and resource conditions, but may lead to inconsistencies among FMPs and management actions.
2. Develop ABC control rules that account for scientific uncertainty in OFL and the Council's desired risk tolerance for each FMP separately. This option includes more explicit risk decisions and conformance to guidelines, but requires improvement of many northeast stock assessments and interaction between the SSC and the Council on policy development.
3. Develop a common approach to ABC control rules for all New England stocks. This option would provide a consistent approach among FMPs and management actions, but would be less tailored to the strengths and weaknesses of science and management situations among fisheries.

but the recent exploitation rate appears to be sustainable for most skate species. Reliable assessment methods are needed or MSE of a simple ABC control rule.

Herring – The ABC recommendation was initially based on magnitude of retrospective inconsistency in exploitable biomass (40% buffer between OFL and ABC), but the Council asked the SSC to consider a smaller buffer (17%) based on recent retrospective inconsistency. The SSC responded that a 17% buffer was not appropriate. The SSC recognized that the stock complex does not appear to be overfished and overfishing does not appear to be occurring. In the context of uncertainties, it would not be appropriate to allow catches to increase, and recent catch was recommended as an interim ABC. Performance of the interim ABC for avoiding overfishing is unknown, but recent catches appear to be sustainable. Reliable assessment and stochastic projections needed, and a benchmark assessment is scheduled for 2012.

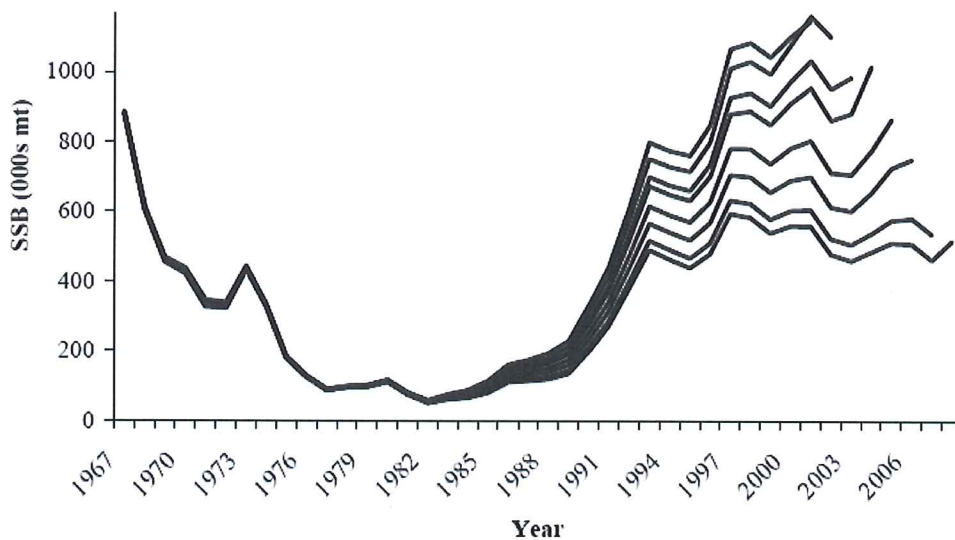


Figure 2. Retrospective estimates of herring spawning biomass, from the 2009 Transboundary Assessment Review Committee.

Deep-Sea Red Crab – MSY was initially approximated from depletion-adjusted average catch, and OFL was defined as MSY, and 70%OFL was recommended as an interim ABC. The Plan Team demonstrated that the depletion-adjusted average catch model developed by the Data Poor Stocks Working Group provides an estimate of sustainable yield that underestimates MSY. Therefore, the information available for red crab is insufficient to estimate MSY or OFL. In lieu of an estimate of OFL, the SSC recommendation for an interim ABC is based on the long-term average landings of males, which is the same result as provided by Depletion Adjusted Average Catch model that assumes no depletion. Two exploratory survey estimates of abundance and their variance do not provide evidence of significant depletion from 1974 to 2003-2005. The SSC concluded that an interim ABC based on long-term average landings is safely below an overfishing threshold and adequately accounts for scientific uncertainty. Expected performance of the interim ABC for avoiding overfishing is unknown, but average catch appears to be sustainable. Reliable assessment and stochastic projections or MSE of simpler ABC control rule are needed to inform a decision on risk tolerance from the Council