



New England Fishery Management Council

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To: Tom Nies, Executive Director
From: Scientific and Statistical Committee
Date: December 2, 2013

Subject: Sea scallop OFLs/ABCs, estimates of discard and incidental mortality, and stock assessment terms of reference.

The SSC met on November 15, 2013 to address the following terms of reference (TORs):

1. Recommend an OFL and ABC for Atlantic sea scallops consistent with the fishing mortality limit (FMSY or its proxy) and the ABC control rule or rebuilding program for fishing years 2014 and 2015 (default).
2. In considering the recommendations developed at the September 16, 2013 SSC meeting, the Council requests that the SSC review the calculation of discards and incidental mortality that the PDT will provide in more detail. The Council is not requesting that the SSC modify the assumptions or methods approved in the last benchmark assessment for estimating discard and incidental mortality.

Additionally, the SSC was asked for comments on the draft TORs for the upcoming sea scallop benchmark assessment to be conducted as part of SAW/SARC59.

The SSC considered the following documents in its deliberations:

1. November 15, 2013 SSC Meeting Terms of Reference for Sea Scallops
2. Hart, D.R. Quantifying the tradeoff between precaution and yield in fishery reference points. ICES Journal of Marine Science, doi.10.1093/icesjms/fss204.
3. 2013 Summary of Sea Scallop stock status and fishery since last assessment in 2010
4. Draft Framework 25 measures under consideration
5. Scallop PDT recommendations for 2014-2015(default) ABC with summary of relevant assumptions and calculations
6. SSC Memo to Council from September 16, 2013 SSC meeting
7. Summary of discard and incidental mortality calculation from benchmark assessment (SAW50)
8. Caddy, J.F. 1973. Underwater Observations on tracks of dredges and trawls and some effects of dredging on a scallop ground. J. Fish. Res. Board Can. 30: 173-180.
9. Murawski and Serchuk. 1989. Environmental effects of offshore dredge fisheries for bivalves. ICES Fish capture Committee
10. Hart, D.R. 2003. Yield and biomass per recruit analysis for rotational fisheries, with an application to the Atlantic sea scallop (*Plactopecten magellanicus*) Fish. Bull. 101:44-57
11. Draft Stock Assessment Terms of Reference for SAW/SARC59

The SSC ultimately endorsed the PDT recommendations for OFLs of 30,419mt in 2014 and 34,247mt in 2015, and ABCs of 26,240mt in 2014 and 29,683mt in 2015. Both these values include an estimate of discard and incidental mortality. In its deliberations, the SSC considered adopting the proposed 2014 figures for both 2014 and 2015 due to concerns about the implications of assumptions about the strength of incoming cohorts recruiting to the fishery on the estimated biomass. For other stocks the SSC has considered, some incoming cohorts thought to be very strong eventually proved to be more modest than originally expected. This led to overly optimistic assumptions about stock growth, quotas that were higher than they might have been with a more accurate perception of recruitment, and ultimately increased risk of overfishing. In order to minimize those risks, the SSC has for some stocks retained OFLs and ABCs from the first year for later years, despite expectations of stock growth.

Despite adopting that approach in the past, for sea scallops the SSC felt comfortable with increases from 2014 to 2015 for several reasons. First, the sea scallop assessment is data-rich and generally performs well. Second, stock status is strong, so risk of the stock becoming overfished is less than stocks beginning in a depleted state. Third, dredge and photographic surveys have both detected large numbers of animals in size classes of the incoming cohort for several years, which gave the PDT high confidence that the cohort is indeed still present and growing as expected.

The discussion about whether to adopt constant OFLs and ABCs or to allow each to increase for this stock and others did lead the SSC to conclude that consistent and transparent rules need to be developed for when projected biomass will be used and when it will not for later years in providing catch advice.

When discussing incidental mortality to address TOR2, the SSC found the review of studies dated between 1973 and 2001 provided by the PDT to be helpful. The SSC did not attempt to reach consensus on a best estimate for incidental mortality, but did identify the following considerations when doing so:

- Fishing gears have evolved, even since the most recent studies, and updated estimates might be needed using modern gear and accounting for changes in fishing behavior.
- There are likely to be size-specific differences in incidental mortality rates, which should be incorporated into stock assessments and development of catch advice.
- Available research suggests that incidental mortality rates are likely to differ among substrate types, and those differences should be better characterized and factored into stock assessments and development of catch advice.

Also, the importance of obtaining precise estimates of incidental mortality, include size- and/or substrate-specific rates, will depend upon the influence those estimates will have on model outcomes. Therefore, sensitivity analyses should be a first step in determining the need for additional research and updated estimates.

The upcoming sea scallop benchmark assessment during SAW/SARC59 would be a good forum in which to conduct the needed sensitivity analyses. TOR7.a. in the draft SAW/SARC59 TORs includes sensitivity analyses for those aspects of the assessment of most concern. In light of the ongoing discussion about incidental mortality, the SSC recommends that it be listed explicitly as a topic to be considered in the sensitivity analyses. However, the SSC did not discuss the full suite of issues that could be considered in the sensitivity analyses, and therefore is not prepared to comment on the importance of incidental mortality relative to other aspects that might be considered through

sensitivity analyses. Knowing that the assessment process does not have unlimited time, the SSC supports the assessment team using its judgment in determining the highest priority use of time.

The SSC endorses TOR3 regarding ecological and environmental drivers of recruitment as a productive direction that will help transition science and management toward ecosystem-based approaches. Also, the SSC felt that TOR6 regarding potential use of a new model needs to be clarified with respect to the type of model alluded to, the reason it is being considered, and the basis for decisions regarding a change in modeling approach.

A request was made by the NEFSC liaison for the SSC to prioritize its recommendations. The SSC did not have sufficient time to both evaluate and comment on its recommendations, and to engage in an adequate discussion about prioritization. However, knowing the time constraints under which the assessment process works, the SSC agrees that prioritization would be helpful. Therefore, the SSC recommends that more time be allocated at future meetings for discussion of SAW/SARC TORs if prioritization is requested. In the meantime, the SSC reiterates its support for the assessment team to use its judgment in determining how much time can be devoted to each TOR and how deeply it can delve into each. Those issues that cannot be adequately dealt with during the assessment process should be picked up as quickly as possible by the research track.

Finally, the SSC reiterates the following recommendations for benchmark assessment TORs developed at the September 16, 2013 meeting:

The Terms of Reference for the next benchmark assessment should include provisions for both pooled and regional assessment outputs so that mortality rates and the general health of the population can be examined regionally and as a whole. These could also include biological reference points if applicable.

At the next benchmark, it may be useful to examine the process by which days at sea are calculated in the context of stock projections. LPUE appears to be underestimated and a review may highlight methods that are more robust to uncertainties in these estimates.

Summary of recommendations

- 1. OFLs for sea scallops are 30,419mt in 2014 and 34,247mt in 2015, and ABCs are 26,240mt in 2014 and 29,683mt in 2015.**
- 2. Research and updated estimates of incidental mortality of sea scallops should be guided by sensitivity analyses. If warranted by those sensitivity analyses, attention should be paid to changes in estimates since earlier studies due to evolution of fishing gear, as well as size- and substrate-specific rates.**
- 3. Comments on TORs for SAW/SARC59 include:**
 - **The sensitivity analyses recommended above can be addressed via TOR7.**
 - **TOR3 regarding ecological and environmental drivers of recruitment is a worthwhile inclusion that will help move toward ecosystem-based approaches.**
 - **TOR6 regarding consideration of a new model needs additional clarification of the type of model referred to and the basis for making major changes.**
 - **Pooled and regional assessment outputs should be developed so that mortality and the health of the populations can be examined on multiple scales.**
 - **The process by which days at sea are calculated in the context of stock projections should be examined.**