



## New England Fishery Management Council

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Dr. John F. Quinn, *Chairman* | Thomas A. Nies, *Executive Director*

**To:** Tom Nies, Executive Director  
**From:** Scientific and Statistical Committee  
**Date:** November 22, 2017

**Subject:** Overfishing limit (OFLs) and acceptable biological catch (ABC) recommendations for sea scallops.

The SSC met on October 12, 2017 in Boston, Massachusetts, to address the following terms of reference (TORs):

1. Review the work of the Scallop PDT on updated projections for the scallop resource and provide the Council with OFL and ABC recommendations for fishing years 2018 and 2019 (default).
2. Review changes to the growth and meat weight parameters used to estimate and model biomass in portions of the Nantucket Lightship and Elephant Trunk areas, and provide the Council with a recommendation as to whether or not these changes are appropriate. These include:
  - a. Fine scale weight estimates
  - b. L infinity assumptions in high density areas
3. Review any changes from benchmark formulation (SARC 59), and provide the Council with a recommendation as to whether or not these changes are appropriate.
  - a. Shell height/meat weight parameters
  - b. Scaling of SAMs to CASA model

To meet these TORs, the SSC considered the following documents:

- 1.1 Terms of Reference for Sea Scallops; October 12 2017, SSC Meeting
- 1.2 SSC Final Report on OFL and ABC for Scallop Framework 28, November 10, 2016
- 1.3 Scallop PDT recommendations for 2018 and 2019 (default) OFL and ABC
- 1.4 Hart, D.R. Quantifying the tradeoff between precaution and yield in fishery reference points. ICES Journal of marine Science, doi.10.1093/icesjms/fss204.
- 1.5 Hennen, D.R. and Hart, D.R. Shell Height-to-Weight Relationships for Atlantic Sea Scallops (*Placopecten magellanicus*) in Offshore U.S. Water. Journal of Shellfish Research, 31(4):1133-1144. 2012.
- 1.6 Hart, D.R. and Chute, A.S. 2009. Estimating von Bertalanffy growth parameters from growth increment data using a linear mixed-effects model, with an application to the sea scallop *Placopecten magellanicus*. ICES Journal of Marine Science, 66: 2165-2175.
- 1.7 Sea scallop assessment summary for 2014 (SARC59, July 2014)
- 1.8 Draft Framework 29 measures under consideration
- 1.9 Summary of PDT working group on follow-up to survey peer-review

- 1.10 Risk Policy Matrix - Atlantic Sea Scallops
- 1.11 Scallop PDT recommendations for 2016-2017 (default) ABC, dated October 9, 2015
- 1.12 Scallop PDT recommendations for 2017-2018 (default) ABC, dated October 12, 2016
- 1.13 Yochum, N. and DuPaul, W.D. Journal of Shellfish Research, Vol. 27, No.2, 265-271, 2008.
- 1.14 Scallop PDT Meeting Summaries
  - a. August 29/30, 2017
  - b. September 12, 2017

The SSC addressed TORs 2 and 3 first, given that the response would affect the response to TOR1. Spatial differences in growth of scallops have been observed previously, and there is strong empirical evidence that the growth rate is different in certain areas (namely the Nantucket Lightship and Elephant Trunk areas) as previously discussed by the SSC. Additionally, some of the shell height to meat weight models were re-examined because it was determined that the existing dataset had some errors in it. The SSC considered potential causative mechanisms for the differing growth patterns, including high densities, lower food availability in the deeper water of the Nantucket Lightship area, and cooler temperatures. The SSC also discussed the effects of these changes on the model output. When taking both the growth and shell height to meat weight differences in tandem with the use of the unweighted average of the surveys (namely looking at the influence of the dredge survey and the uncertainties associated with its efficiency, particularly in high density areas), there is roughly a 20% effect on the model output. The current choices for providing catch advice use conservative assumptions. The SSC discussed on the growth model parameters. The PDT chose to alter the  $L_{\infty}$  parameter in the growth model, rather than the K parameter, noting that the two parameters are often correlated to each other and it is difficult to determine which parameter is controlling the shape of the growth curve. Despite the discussion, the SSC agreed with the recommendation of the PDT to alter the  $L_{\infty}$  parameter for the current configuration, but suggested that this topic be further investigated during the benchmark assessment process. In response to TOR2, **the SSC supports use of the different growth models in different stock areas, and supports the use of the updated shell height to meat weight information for the current development of catch advice**, as recommended by the PDT. The SSC also recommends that **additional research be conducted to further elucidate the drivers and rates of growth and shell height to meat weight differences between the areas**, which would be appropriate to explore during the next benchmark assessment process.

The SSC reviewed another change to the benchmark formulation that was used for the current update. The change examined was not scaling the SAMS model to the CASA model as was done in the benchmark. The assessment team (lead by Dr. Hart of the NEFSC) and PDT stated that the original scaling procedure was not meant to have been the official benchmark formulation and if they were to scale the models, they would need to do so using the previous year's information. Given these two facts, they recommended approving not implementing the scaling procedure. In response to TOR 3, **the SSC approved all of the changes made by the assessment team when conducting the update assessment**.

The SSC greatly appreciated the effort made by the PDT to address several issues raised by the SSC in 2016. Many of these recommendations referred to the way the surveys were treated within the assessment. The SSC also recommended the additional investigations in to the causative factors for the differential growth. The PDT addressed these recommendations to the best of their ability in the intervening year, but the SSC agrees with the PDT to continue these investigations as the assessment team enters in to the benchmark process so the issues can be fully vetted.

Finally, the SSC agreed that, despite the uncertainties regarding growth and recruitment affecting the estimates underlying the catch advice, and also due to the fact that the catch advice is expected to be revisited and possibly revised next year based on updated information and a benchmark stock assessment, the SSC approves the ABC and OFL calculations as recommended by the PDT.

Therefore, in response to TOR1, **OFL and ABC values resulting from these deliberations are as follows:**

Year	ABC - Landings	ABC - Discards	ABC Total	OFL - Landings	OFL - Discards	OFL - Total
2018	45,950	14,018	59,968	55,573	16,482	72,055
2019	45,805	12,321	58,126	55,336	14,297	69,633

An additional area of discussion had to do with the harvest control rules (HCRs) for scallops. The updated assessment time series offers an opportunity for evaluating the performance of the control rule for achieving optimum yield while avoiding overfishing. The control rule appears to be effective for avoiding overfishing, but considering the relatively low estimate of average fishing mortality (F) and strong spatial fishing patterns, more investigation is needed to evaluate performance for achieving optimum yield. The upcoming benchmark provides a good opportunity to evaluate overfishing reference points and the control rule for effectively managing scallops. One of the main considerations is the spatial nature of management of the scallop resource. The overall F rate calculated for the resource was averaged across multiple discreet areas, each of which may have higher or lower F rates specific to its local area. This averaging may not be ideal for this very important resource, therefore this should be revisited and discussed while the opportunity exists.

#### Summary of recommendations

- 1. The SSC approves the variations in growth and the updated shell height to meat weight ratios used for the update assessment. Further, the SSC also approves not using the scaling procedure between the SAMS and CASA models.**
- 2. OFL for sea scallops is 72,055 mt in 2018 and 69,633 mt in 2019 (default).**
- 3. ABC for sea scallops should not exceed 59,968 mt in 2018 and 58,126 mt in 2019 (default).**
- 4. The SSC recommends that the PDT continue to investigate alternate weighting scenarios for combining the three surveys used in the analysis and vet these analyses during the 2018 benchmark stock assessment process. This investigation could include examining geostatistical methods for biomass estimation from this information and should look in to dredge efficiency issues in high density scallop areas.**
- 5. Finally, the SSC supports continuing investigation into the different growth rates found in different scallop harvesting areas, and recommends investigating these growth differences as a standard procedure for the annual update of the scallop analyses.**