

Memorandum

TO: John Boreman, Chair, Mid-Atlantic Fishery Management Council SSC

FROM: Joint SSC and NEFSC Surfclam OFL Working Group
(Members: Dan Hennen, Tom Miller, Paul Rago, Brian Rothschild and Mike Wilberg)

DATE: November 16, 2018

SUBJECT: Surfclam OFL Working Group Report and Meeting Summary

Introduction:

In May 2017, the Mid-Atlantic Fishery Management Council's (Council) Scientific and Statistical Committee (SSC) reviewed the results of the 2016 peer-reviewed stock assessment for Atlantic surfclam.¹ The SSC noted the substantial effort and improvement in the surfclam assessment; however, at that time, the SSC did not specify an overfishing limit (OFL) due to concerns noted in the assessment report regarding absolute estimates of stock abundance and fishing mortality. In response to this recommendation by the SSC and concerns raised by industry, the Council requested the OFL issue be evaluated further. In addition, the Council sent a letter to the Northeast Fisheries Science Center (NEFSC) requesting specific data and analyses, including swept area biomass calculations, be conducted and available for SSC consideration in 2018.

At the May 2018 meeting, the SSC reviewed updated survey and fishery performance data, the NEFSC's analyses and swept area biomass calculations to develop stock abundance estimates, as well as a possible method to approximate an OFL for surfclams using the swept area information. The SSC expressed interest in working with the NEFSC to continue to further develop and refine the analyses presented to develop an OFL and ABC recommendations. The Council also supported the continued development of this work of both the NEFSC and SSC and at their June 2018 meeting and passed the following motion:

“Move to have members of the SSC work with NEFSC to refine the OFL method provided so it can be considered for use with a P approach to estimating an ABC. A joint SSC/NEFSC working group will be established for this project with delivery of the results at a future SSC meeting, no later than February 2019.”*

This memo summarizes outcomes of the meetings and work conducted by the Surfclam OFL working group and provides recommendations for determining the OFL for SSC consideration at their December 6, 2018 webinar.

¹ Northeast Fisheries Science Center. 2017. 61st Northeast Regional Stock Assessment Workshop (61st SAW) Assessment Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 17-05; 466 p. doi: [10.7289/V5/RD-NEFSC-17-05](https://doi.org/10.7289/V5/RD-NEFSC-17-05)

Summary of Discussion and Outcomes from Working Group Meetings:

During the first conference call, the working group reviewed the May 2018 NEFSC report to the SSC² on swept area biomass estimates using the NEFSC clam survey data and the subsequent analyses to use those empirical methods to approximate an OFL. Based on the discussion and questions raised during the call, the group recommended some changes and additional information and analyses to be included in an updated report, to be reviewed again by the group at another meeting. Recommended modifications included:

- Greater detail and information on survey catchability and stock area, particularly for the Georges Bank area
- Swept area biomass estimates under different catchability assumptions (e.g. q of 1.0 and the q estimated from depletion experiments) to provide for a range/bounds of stock biomass
- Providing coefficient of variation and confidence intervals for biomass and OFL estimates

The group also discussed reconsidering the stock-wide biomass estimates from the stock assessment and the potential viability in deriving OFL recommendations. An evaluation of both the empirical and stock assessment results (biomass and OFL estimates) would be useful to the group in determining if an OFL could be recommended and, if so, what approach is most appropriate. The group agreed to review the benchmark assessment report with a focus on the stock biomass estimates and the uncertainty associated with those estimates. It was decided to also include pertinent information from the benchmark assessment in the updated report developed by the NEFSC.

The focus of the second working group call was to review the updated report from the NEFSC,³ discuss the outcomes and applicability of the 2016 benchmark assessment and, if appropriate, provide a surfclam OFL recommendation for 2019 and 2020. The working group noted several areas of concern to be considered when evaluating the appropriateness of specifying an OFL. For example, concerns were raised about the NEFSC clam survey data, specifically within Georges Bank, and the counter-intuitive results showing a decline in swept area biomass estimates after a more efficient survey platform was implemented in 2012. Also, discussed at great length, was a lack in the understanding of stock dynamics at smaller spatial scales and the link between the OFL and the reproductive potential and productivity of the stock. However, the working group felt the updated NEFSC report and empirical analyses were thorough, well-developed, and informative for the working group deliberations regarding a surfclam OFL, particularly when used in conjunction with the stock assessment information.

² The May 4, 2018 NEFSC report to the SSC can be found at: https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5af05693575d1fdd6b39b63f/1525700244200/Surfclam_Additional_Update2018_Version2.pdf

³ The updated NEFSC report, with minor editorial changes, is included as meeting material for the December 6, 2018 SSC webinar and can be found at: <http://www.mafmc.org/council-events/2018/december-ssc-webinar>

While some questions and concerns regarding the uncertainties associated with the stock assessment and empirical analysis remain, the working group concluded there was enough reliable corroborating information available from all sources to determine an OFL for Atlantic surfclam. Upon reviewing these additional analyses, the working group thought that the OFL point estimates from stock assessment should be considered best scientific information available. The empirical analysis using swept area biomass provided further support for the OFL estimates from the benchmark assessment. The 2019 and 2020 OFL estimates from the benchmark assessment are similar and within the confidence bounds of the OFL estimated from the empirical analyses.

Given these factors, the working group reached the following consensus statement regarding the justification in making an Atlantic surfclam OFL recommendation for SSC consideration:

At the time (May 2017), the SSC did not have the required confidence in the assessment results to allow for development an OFL for Atlantic surfclam for 2018-2020. As a result, the Council and SSC recommended additional analyses be conducted to further evaluate the issue of uncertainty in the stock assessment results. The results from subsequent analyses provided by the NEFSC have increased the working groups understanding and confidence in the results of the benchmark assessment and the ability to set an Atlantic surfclam OFL based on the assessment results.

Working Group Recommendations:

As noted above, the working group concluded that enough information was available to determine an OFL and the best approach is to use the outputs from the benchmark assessment to establish an Atlantic surfclam OFL in 2019 and 2020 (Table 1). However, the working group notes the high level of uncertainty associated with our knowledge of the stock. Consequently, the working group recommends using the point estimate of the OFL from the benchmark assessment and a coefficient of variation (OFL CV) of 150%. The working group also identified the following points as rationale for their recommendation:

- The “default” 100% OFL CV utilized by the SSC is based on a 50% CV from biomass estimates and 50% CV on the fishing mortality limit reference point (F). Results from the Atlantic surfclam stock assessment have biomass estimate CV’s alone that are greater than 50% and greater than 60% in most years.
 - The working group noted that it is not explicitly utilizing the CV’s from the stock assessment but used those CV’s to evaluate the overall uncertainty to consider in which OFL CV bin to place the assessment.
- Concerns about the NEFSC clam survey data and results from Georges Bank remain. Specifically, the unexpected pattern of lower efficiency and estimates of biomass in this region since the change in the survey platform to a more efficient industry vessel in 2012. A greater examination of this issue was conducted by the NEFSC (see Appendix 1 in NEFSC report) and concluded the previous survey of Georges Bank may not provide an accurate index of abundance.

While not part of the specific OFL recommendation, the working group also highlighted additional priority research/science needs that could help in future SSC deliberations regarding appropriate Atlantic surfclam OFL and ABC recommendations. The working group noted that the recently implemented changes to the NEFSC clam survey design may provide additional insight on some of these issues. Below is a list of research questions and needs discussed by the working group (not in priority order):

- Need for increased understanding in the link/relationship between the OFL and reproductive potential of the Atlantic surfclam stock
- Reproductive consequences of fishery operations and relationship of clam density (i.e. high concentration areas versus low density patches); clam density differences in Georges Bank and Southern Region
- Recovery potential of heavily fished areas
- Increased understanding of stock dynamics at smaller spatial scales – scale needed is likely finer than current survey gear and survey design. Evidence suggests that patch density in bivalves at small spatial scales can have a substantial impact on reproductive success.

Table 1. Atlantic surfclam OFL estimates for 2019 and 2020 based on the 2016 benchmark stock assessment. The associated ABCs were calculated assuming a typical stock and an SSC-modified OFL probability distribution and an assumed lognormal OFL distribution with three CV alternatives of 60%, 100% and 150%. The working group recommended OFL, OFL CV alternative and associated ABC for 2019 and 2020 are bolded and highlighted in **red**.

Year	OFL (mt)	OFL CV	ABC (mt)	ABC/OFL ratio	SSB/SSB _{threshold}
2019	74,281	60	64,546	0.869	3.0
2019	74,281	100	60,155	0.810	3.0
2019	74,281	150	56,419	0.760	3.0
2020	74,110	60	64,397	0.869	3.2
2020	74,110	100	60,017	0.810	3.2
2020	74,110	150	56,289	0.760	3.2