



## New England Fishery Management Council

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### MEMORANDUM

**DATE:** January 8, 2016  
**TO:** Northeast Region Coordinating Council  
**FROM:** Tom Nies  
**SUBJECT:** Discard Methodology Review Draft Terms of reference

We received several comments on the draft Discard Methodology Review Terms of reference (TORs) from our Scientific and Statistical Committee (SSC) members. Several SSC members commented that the TORs do not appear comprehensive enough and are not clear enough to describe the work that will be accomplished and reviewed. The suggested TOR edits shown on the attached document are an attempt to address, in part, the concerns of the SSC. It may be worth discussing the general thrust of many of the comments before making specific recommendations.

The proposed TORs focus in large measure on how the data for any fishery should be stratified in order to get accurate, unbiased estimates of discards. Specific stratification elements identified include sectors (draft TOR 1a), gear (TOR 1a), and season (TOR 1c). In the view of many SSC members, optimum stratification should be informed by an analysis of the persistent patterns and causes of discards in each relevant fishery. In addition to the three factors identified in the draft TORs, this might include fishery, location and time. The first step for this meeting should be an analysis of the factors that influence the variability in fishery discards in order to inform the choice of a stratification scheme.

The proposed TORs (TOR 1) indicate that a comparison will be made between the current methodology and alternate methods. What is not clear is how the performance of each will be evaluated. Presumably discard estimates will be examined for accuracy and precision, but if so this should be clearly stated in the TORs. Other metrics may also be needed. For example, the resource demands of the methodologies should be considered, both in terms of the collection of data necessary to use the method and the effort needed for the calculation (e.g. calculating a daily rate would seem unreasonable). In addition, the methodology used for in-season quota monitoring should return results that are similar to the discards estimated in stock assessments. This is necessary to make sure that quota-monitoring is consistent with stock assessments and the determination of ABCs/ACLs. While it is unlikely that two different methods will produce the

exact same results, any accepted method should produce only minor differences from the assessment estimates.

TOR 2 suggests that Bayesian methods may be explored, but little detail is provided. The SSC suggested several items that could be added to clarify what this means.

The introduction and TOR 3 refer to weighing "...the balance between the risk of premature fishery closures and the risk of exceeding catch allocations." The incorporation of risk into these analyses does not seem well defined and it is unclear what work will be performed to answer this question. It does not appear from the draft TORs that any information will be brought to this meeting that will address the concept of risk in a thorough manner. The concept of risk includes not only the probability of an undesirable outcome, but the negative impact of the outcome. At a minimum, the negative impacts of exceeding catch allocations depend on the status of the stock and the size of the overage. Similarly, the negative impacts of a premature fishery closure depend in part on the value of the fishery and the timing of the closure. The TORs do not indicate any information on these factors will be brought to the meeting. It does not appear that any of these factors will be considered in this meeting. Weighing risk is also policy issue and not a subject for a technical meeting. For this reason, the TORs should be streamlined to focus on the technical questions related to the probability of a closure or exceeding a cap, and not attempt to weigh the value of the consequences.

It is possible that different methodologies may perform differently in different fisheries. The TORs should explicitly recognize that recommended approaches may need to be specific to a fishery.

PEER REVIEW OF CATCH CAP ACCOUNTING METHODS  
NRCC Discussion Paper  
November 2015

## **Background**

The peer-reviewed cumulative discard methodology was developed in 2010 to support discard estimation in the NE multispecies fishery. The method has been extended to other fisheries that require discard estimation, including the scallop fishery (yellowtail flounder), herring fishery (haddock), longfin squid fishery (butterfish), and herring/mackerel fisheries (river herring). The 2010 peer review noted that the performance of the methodology might be reviewed after several years. In addition, constituents within the multispecies, scallop, longfin squid and herring fisheries have requested re-evaluation of the methodology to address specific concerns. The cumulative method smooths catch rates over the year, and continually recalculates the discards back to the beginning of the fishing year as more data are accumulated. The cumulative method is robust to changes in seasonal trends and variations in stratification, and results in enhanced precision and accuracy of discard estimates overall. However at finer-scale resolution the methodology can pose problems for fleets when the number of samples is low. There are several concerns:

- The continual recalculation makes it difficult for harvesters to know where they stand in relation to their sector allocations or overall fishery caps. Some sector managers have suggested that an annual fixed discard rate should be evaluated.
- The use of an annual cumulative value causes concern for the longfin fishery because of the seasonal differences in butterfish discard rates. It has been suggested that this fishery might benefit from cumulative rates by season.
- The use of broad area stratum causes concern for the scallop fishery because they find it inconsistent with scallop area management. It has been suggested that the fishery might benefit from separate cumulative rates for smaller areas.

The fishery issues noted above all boil down to the same basic concern: we need to evaluate how well the discard methodology performs.

## **Current Plans**

We have been planning for a peer review of the discard methodology early in 2016, and included the task on a list of reviews submitted to the CIE. We have archived weekly catch data and discard rates produced by the current methodology since January 2014 to provide a database that can be used to see how various revised approaches perform in comparison to the current methodology when using the actual information available in near real-time. The archived data encompasses a full fishing year for all of the regional fisheries.

## **Proposed Terms of Reference**

1. For each fishery subject to in-season quota monitoring, identify the major factors that lead to variability in discards. Factors that should be examined include fishery, gear, area, season, volume of catch, etc.

2. Identify methods for in-season estimation of discards. Alternatives identified should include:
  - a. Existing cumulative discard methodology and stratification schemes.
  - b. Pooling data across sectors or gears.
  - c. Computation of sampling requirements to achieve various levels of precision by including those strata which in aggregate constitute a target fraction of total stock-specific discards (i.e., excluding strata with negligible discard totals).
  - d. Stratification of data by season, fishery, area and gear.
  
3. Compare methods for estimating discards identified in TOR 2 using the following metrics:
  - a. Accuracy of the discard estimate, documenting the direction and magnitude of any bias.
  - b. Precision of the discard estimates for a given level of observer coverage, including the confidence interval around CVs.
  - c. Consistency of discard estimates calculated over the course of the fishing year.
  - d. Sensitivity to outliers, missing data, or erroneous data<sup>1</sup>.
  - e. Consistency with the results using the discard methodology used for stock assessments.
  - f. Administrative demand for performing the calculations.
  
4. Evaluate methods for including data from past years, and evaluate the need for and performance of an assumed initial value (Bayesian methods).
  - a. Use of archived data to set the prior information for each parameter.
  - b. Use of alternate historical data for setting priors on parameters.
  - c. Justification of prior distributions selected and strength of prior used in the analysis.
  - d. Whether use of Bayesian methodology increases the stability of the calculations through the year and/or how strong do they have to make the prior before adequate stabilization is reached.
  
5. Use the archived data to simulate in-season behavior (with various time steps and discarding patterns) and recommend a preferred method for each fishery with consideration of the following:
  - a. Uncertainty in the assignment of landing of species to stocks.
  - b. Feasibility, particularly the implications of stratum size and within-year pattern of precision for sector sub-ACL management.
  - c. The probability and timing of premature closure (i.e. false positive).
  - d. The probability and magnitude of exceeding a cap (i.e. false negative).

### **Staffing and Target Date**

This will be a joint GARFO/NEFSC project, with GARFO staff taking the lead on analyses that utilize the archived data sets. NEFSC staff will assist in developing methods to evaluate the risks of overharvest and premature closure. Due to the other activities being undertaken by staff

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<sup>1</sup> In-season groundfish discard estimation uses preliminary data that is sometimes revised by later audits.

in GARFO and NEFSC, including the fishery dependent data visioning project and electronic technology initiatives, the first feasible target date for the peer review is fall 2016.