SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON
PROCESS FOR REVIEW OF REFERENCE POINTS FOR MONITORED STOCKS

The Scientific and Statistical Committee (SSC) considered the three questions raised by the Council at the April 2017 meeting (Agenda Item G.2, April 2017), which are relevant to setting of reference points (MSY – the Maximum Sustainable Yield; B_{MSY} - the biomass corresponding to MSY; OFL – the overfishing limit; ABC - acceptable biological catch), with focus on the central stock of northern anchovy (CSNA).

(1) Review of the Current OFL Method

The current OFL is based on a bioeconomic analysis of northern anchovy conducted in 1991 by Jon Conrad (Agenda Item C.4, Attachment 1) and an assumption about the proportion of the CSNA in U.S. waters (Agenda Item C.4, Attachment 2). The advantage of the Conrad method is that it is the status quo. However, the SSC has major concerns with this method. In particular, the analysis is based on old data collected during dramatically different environmental and abundance conditions. Moreover, the assessment on which the OFL was based was informed by Daily Egg Production Method (DEPM) estimates, but the DEPM does not cover the distribution of the entire stock. In addition, the estimation method applied would not be considered standard today, and attempts to replicate Conrad's analysis have not been successful.

(2) Alternative Methods for Calculating Long-term MSY for the CSNA

In theory, long-term MSY can be calculated based on F_{MSY} (the fishing mortality corresponding to MSY) and B_{MSY}. The review and re-evaluation of Minimum Stock Size Threshold (MSST) for CPS finfish (Agenda Item E.1.a, Supplemental NMFS Report, September 2016) provides estimates of F_{MSY} and B_{MSY} based on eight alternative models. Unlike the Conrad method, the MSST report is based on the most recent stock assessment of northern anchovy and it uses modern statistical methods. Unfortunately, the information on which the MSST report is based is dated and the inputs also depend on the DEPM method.

The SSC did not identify any alternative methods to recommend for calculating a long-term MSY. The SSC has previously discussed and rejected the use of average catches to provide estimates of MSY (Agenda Item G.2.a, Joint SSC/CPSMT Report, April 2017) for coastal pelagic species. This is still the view of the SSC.

(3) Computing an OFL Based on the Results of the Acoustic Trawl Method (ATM) Survey

The SSC has endorsed the use of the ATM survey as a relative index of biomass for use in assessments and for direct setting of reference points (Agenda Item C.3.a, Supplemental SSC Report, April 2018). Prior to using ATM survey results in assessment or management of CSNA, it will be necessary to apply nearshore correction factors to the estimates for the survey area. While the SSC prefers that such a correction factor be based on sampling in the nearshore areas, the ATM review panel also suggested the use of extrapolation, which is also acceptable.

In the near-term, the results of the ATM survey (either the most recent estimate or an average of the 2016 and 2017 estimates) could be used to set an OFL by multiplying the biomass estimate by an estimate of F_{MSY} (expressed as a proportion). The buffer between the OFL and the ABC would need to be recalculated given that the current buffer is based on a long-term fixed OFL and not a recent estimate of biomass. There would be no need to apply a correction for the proportion of the CSNA in U.S. waters because the ATM estimate is for U.S. waters. Prior to the use of this approach, the SSC would need to evaluate whether the extent of extrapolation to account for nearshore areas is too large for the resulting value to be reliable for use in management. This approach would lead to OFLs and ABCs that could change over time – the frequency of revisions to OFLs and ABCs would need to trade off the impact of changing reference points less frequently against potentially increased risk associated with not basing reference points on the most recent data.

This approach is implicitly using the (corrected) estimate of biomass from the ATM survey as an absolute index, which contravenes the advice of the ATM Review Panel. This is justified, at least for the near-term, because the information available to the ATM Review Panel did not indicate bias, except in the case of nearshore areas. The effects of bias due to the uncertainties identified by the Panel would be accounted for when calculating the buffer between the OFL and ABC.

In 2-5 years, a Management Strategy Evaluation (MSE) should be conducted to evaluate the approach for computing OFLs, ABCs, and Harvest Guidelines. An MSE would require the development of models to represent a range of uncertainties (e.g., biological, sampling), and Council and advisory body input on candidate control rules and performance metrics. Such control rules would use the ATM survey results but also other potential indices of abundance, and could evaluate control rules that set the OFL and ABC for multiple years. In addition, the MSE could be used to assess which of the many uncertainties is likely to be most influential in terms of meeting Council objectives, and hence should be the focus for research, as well as to evaluate the consequences of different frequencies of conducting assessments for the design of surveys. The MSE would need to acknowledge more uncertainty than previous MSEs used by the Council owing to the lack of recent information on productivity, maturity, and selectivity.

In the longer term, a full stock assessment is generally the preferred approach when sufficient information are available and would provide a basis for more fully addressing any bias in the (corrected) ATM estimates and parameterizing/revising the MSE. However, a management approach that does not rely on frequent integrated assessments such as survey-based approaches may be more appropriate for a short-lived species such as northern anchovy and should be evaluated as part of the MSE.

PFMC
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