Members of the Scientific and Statistical Committee’s (SSC) coastal pelagic species (CPS) subcommittee met on October 7th at the Pacific Fishery Management Council (Council) office in Portland, Oregon to review the recently completed stock assessment for Pacific sardine. The review occurred during a joint session that also included members of the CPS Management Team (CPSMT) and the CPS Advisory Subpanel (CPSAS). Results of the sardine stock assessment were presented by Dr. Kevin Hill, the lead member of the Stock Assessment Team (STAT), while Dr. André Punt chaired the meeting, and Dr. Stephen Ralston rapporteured.

The sardine assessment was conducted as an update to a stock assessment that had undergone a full stock assessment review (STAR) in 2007. Updates are appropriate in situations where no alterations to a stock assessment model have occurred, other than to incorporate recent data. In this case the newly incorporated data included: (1) 2007-08 catches from the Pacific Northwest (PNW), California, and northern Baja fisheries, (2) 2007-08 compositional information (lengths and age-at-length data) from the PNW and California fisheries, and (3) a daily egg production method (DEPM) estimate of spawning biomass from a survey conducted during the spring of 2008. In addition the STAT made minor corrections to the 2006-07 catch statistics.

As specified in the “Terms of Reference for Coastal Pelagic Species Stock Assessment Review Process,” the review focused on two central questions: (1) did the update maintain complete fidelity to the last full stock assessment, and (2) are the new input data and model results sufficiently consistent with previous data and results that the updated assessment can form the basis for Council decision-making. The subcommittee determined that, although the update closely followed the exact structure of the 2007 model, results from the update were inconsistent with those from the previous assessment. For example, the new assessment results in a major drop in the estimate of the peak age-1+ biomass that the sardine stock reached, dropping from 1,713,280 mt in last year’s assessment to 1,002,330 mt in the updated model, i.e., a 41 percent reduction. Dr. Hill showed by incrementally adding the new data (see Table 9 of the assessment document) that the principal reason for this was the inclusion of the 2007-08 length composition data from the PNW fishery. It was not possible to fully understand why adding one new length-frequency sample should impact the results of the assessment so markedly, although a significant change to the selectivity curves estimated for PNW fishery for 2004-08 appeared to affect the estimates of recruitment for the entire period considered in the assessment.

The subcommittee considered a number of ways of proceeding, including: (a) accepting the substantial change in results and recommending that the update assessment represents the best
available science, (b) requesting that a new full assessment be conducted and reviewed prior to setting the sardine harvest guideline, (c) developing a model that incorporates only a portion of the new data, and (d) using the accepted 2007 assessment model and projecting this forward using only the updated catch information. The subcommittee concluded that Option A was an inappropriate course of action due to the unexplained and unexpected changes in model results (use of this model would require much more review than was possible during the meeting), Option B was not feasible given the timeframe concerned, and Option C was undesirable because it would involve incorporating data for use in the assessment simply because the data concerned had not impacted the assessment outcomes. The subcommittee therefore requested that Dr. Hill conduct a run that used the 2007-STAR approved model (without any model tuning or variance adjustments), with a simple update of the 2006-08 catches. The results from this run were virtually identical to those from the 2007 base model (as expected) and the subcommittee therefore concluded that it represented the best available scientific information on the current status of the sardine stock and recommended that it be used by the Council for setting the harvest guideline. In particular, the model estimated 586,369 mt of age-1+ biomass in 2008, which results in a harvest guideline of 56,946 mt when the control rule for Pacific sardine is applied.

Given that a formal “update” could not be completed with the data collected during the last year, the subcommittee recommends that the sardine assessment model be evaluated by a full STAR Panel in September 2009. That Panel should explore the possibility of cohort targeting in the Pacific Northwest fishery, as well as consider using the results of the Pacific Northwest Sardine Survey. However, use of the survey results can only occur if the methodology on which it is based has been previously reviewed, for example during the Pacific mackerel STAR Panel scheduled for May 2009.

The subcommittee wishes to emphasize that, although it was able to select a model for Council decision making, the considerable sensitivity of the outcomes from the model to what should be minor changes to the data inputs highlights the substantial uncertainty regarding sardine stock status. Moreover, it notes that although considerable progress has been made to collect data on abundance by the Pacific Northwest Sardine Survey, it is not yet possible to include these data in the assessment, owing to: (1) the lack of formal review of the survey methodology, (2) the fact that the 2008 effort was a localized pilot survey, and (3) constraints imposed on update assessments with respect to including new types of data. Finally, the subcommittee notes that inclusion of the DEPM estimate for 2008 in the assessment leads to a slightly lower estimate of age-1+ biomass than the run in which just the catches are updated.

The subcommittee would like to compliment Dr. Hill for his thorough documentation and his willingness to conduct supplemental analyses during the meeting, which allowed the subcommittee to quickly identify a model which represents the best available science concerning the status of Pacific sardine.

PFMC
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