

## SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON PACIFIC SARDINE AND PACIFIC MACKEREL MANAGEMENT

### Pacific Sardine

The Scientific and Statistical Committee (SSC) reviewed the Pacific sardine stock assessment and Stock Assessment Review (STAR) Panel report. An overview of the stock assessment was provided to the SSC by Dr. Kevin Hill. Recent assessments of sardine were based on the forward projection age-structured assessment model (ASAP) and the September 2007 STAR Panel review focused on new assessment results based on the Stock Synthesis 2 (SS2) model platform. The STAR Panel concluded that the ASAP model had a number of difficulties that SS2 was able to overcome, including: 1) allowance for some sardine to spawn at age-0, 2) differences in timing of the fisheries throughout the range, 3) estimation of initial conditions, 4) variability in weight-at-age among fisheries and between the fishery and population, and 5) log-normal bias correction for the stock-recruitment relationship. Residual patterns in the fit to the length frequency data were also removed using SS2 and model fits to the survey index data were improved. Based on these improvements in the sardine model, the SSC concurs with the STAR and Stock Assessment Team (STAT) that results from SS2 providing a better basis for modeling sardine population dynamics.

Conversion of the Pacific sardine assessment into the SS2 modeling framework produced assessment results that are less optimistic about current stock status than that based on the 2006 ASAP assessment. In particular, age 1+ Pacific sardine biomasses are at lower levels and have declined more precipitously in recent years. This trend in biomass is largely driven by SS2 estimates of recruitment which show strong 1997 and 1998 cohorts and a weaker 2003 cohort. Recent cohorts estimated by SS2 appear to be weaker compared to the ASAP model estimates. Differences in 2007 SS2 and 2006 ASAP assessment results were identified to be largely driven by new data (a sharp decline in the daily egg production method [DEPM] index of abundance from 2006 to 2007). Treatment of the data (quarterly partition of the length and conditional age compositions) in SS2 as well as other factors including model structure, weighting, and a revised survey index also contributed to differences from the last assessment.

Major uncertainties in the assessment were identified. The assessment assumes that indices of spawning biomass for the “standard” survey area are linearly proportional to total spawning biomass, which has yet to be verified. The assessment lacks fishery independent data from the Pacific Northwest. A routine, coastwide survey would greatly improve the assessment of the sardine population. Historic information on sardine is extensive and efforts should be directed at evaluating and, if deemed reliable, incorporating it into future assessments.

Lack of catch data from Mexico makes total removals for recent years uncertain. Stock structure for sardine continues to be a major source of uncertainty, and southern sub-population catches may have contributed to the unusually high 1985 catches. Finally, the value of natural mortality is uncertain. Uncertainty in the assessment was captured by a lower and upper value for natural mortality,  $M=0.3$  and  $M=0.5$ .

The SSC acknowledges the improvement of the sardine assessment with the use of SS2 and commends the STAR on their work. The SSC endorses the sardine stock assessment as the best available science and its use for management. The STAR Panel recommended that consideration should be given to holding the next STAR Panel for sardine in 2009 rather than 2010. The SSC concurs with this.

#### Pacific Mackerel

The SSC reviewed the STAR Panel report for Pacific mackerel. The STAR Panel review held in September 2007 focused only on assessment methodology, specifically on whether future mackerel assessments should be conducted using the SS2 platform. The STAR Panel concluded that the use of SS2 would be preferred (in principle), but that model results produced unrealistically high exploitation rates. The SSC recommends that continued effort be directed at developing an acceptable SS2 model configuration. If sufficient progress is made, a new mackerel stock assessment could be scheduled for May 2009 to establish harvest guidelines for the 2009-2010 fishery season. The SSC agrees with the recommendations of the STAR Panel and notes that 2008 harvest guidelines have already been set by the Council based on the 2007 assessment conducted using ASAP.

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