

## COASTAL PELAGIC SPECIES MANAGEMENT TEAM REPORT ON PACIFIC SARDINE HARVEST PARAMETERS WORKSHOP REPORT

The Coastal Pelagic Species Management Team (CPSMT) and Coastal Pelagic Species Advisory Subpanel (CPSAS) jointly received a presentation from Dr. André Punt regarding the Pacific sardine harvest parameters workshop held February 5-8, 2013. The CPSMT commends the chair and participants for a productive workshop. In particular, we acknowledge the analysts whose hard work and expertise contributed to the workshop's success.

### Risk Assessment Model

The CPSMT reviewed the suite of harvest control variants in Table 5 of the risk assessment modeling report (Agenda item I.1.b, Attachment 2). These variants covered a range of values for CUTOFF, MAXCAT, and FRACTION which in most cases, were linked to annual California Cooperative Ocean Fisheries Investigations (CalCOFI) sea surface temperature (SST) data. Based on a comparison of the results of the performance measures, the CPSMT notes the current harvest guideline (HG) control rule (option HG-J, #6) continues to meet Amendment 8 management objectives. For example, the percentage of years with biomass > 400,000 tons was 96 percent in Amendment 8, and is 95 percent in the current analysis. Likewise, the percentage of years with no catch was 0.5 percent in Amendment 8, and is 2.65 percent in this analysis.

However, to further examine the potential effects of using the CalCOFI SST data on model variant performance, the CPSMT is requesting additional model runs as described in the Attachment to this report. For a subset of model variants from the initial analysis, the CPSMT would like to compare performance measures, standardized by using current values for CUTOFF (150,000 tons) and/or MAXCAT (200,000 tons). These are listed in #3B-C in the Attachment below. In addition, recognizing that the environment affects reproductive success in the operating model, the CPSMT would like to compare performance measures in the presence and absence of management response to environmental variability. Along with the performance measures in Table 5, the CPSMT requests two additional measures that model the duration of low catch and low biomass periods.

Finally, the CPSMT identified variants in Table 5 not warranting further consideration, for reasons given in the Attachment.

### Temperature-Recruit Index

The sardine harvest parameters workshop analyzed several temperature indices. The CPSMT concurs with the workshop conclusions that both the 3-year mean Scripps Pier (SIO) and the annual CalCOFI SST data are correlated with sardine recruitment, but the CalCOFI data has a stronger relationship for the 1984-2008 time period. However, the CPSMT is not prepared to recommend the use of the CalCOFI data at this time in either the overfishing limit (OFL)/acceptable biological catch (ABC) or the HG control rules, pending additional analyses such as those in the Attachment.

### Distribution

The information presented at the workshop on the DISTRIBUTION term value of the Harvest Control Rule (HCR) did not support a change in this term at this time.

### Management Strategy Evaluation (MSE)

Several ecosystem models were presented at the workshop, but none were deemed adequately developed for use in a full MSE for sardine. The CPSMT concurs with the SSC that a full MSE that incorporates ecosystem factors is not currently possible.

In conclusion, the CPSMT requests additional analyses as listed in the Attachment below. The CPSMT also would like to request a meeting with the SSC CPS Subcommittee and relevant harvest policy analysts (Mr. Felipe Hurtado and Dr. André Punt) at the June Council meeting, regarding the requested analyses.

### Attachment: Recommendations for Additional Analyses

- 1 Provide detailed descriptions for all model variants, excluding those listed in Item 3D below.
- 2 For all model runs include the following additional performance measures: the mean and maximum number of consecutive years in which: 1) catch < 50,000 tons, and 2) biomass < 400,000 tons, 3) include all zero catch years when calculating mean catch.
- 3 Remove some harvest control variants from Table 5 of I.1.b, Attachment 2 and rerun the remaining subset of variants. The rationale is that because there are no proposals are in place to change these two parameters, we should only compare performance measures for model variants using current values for CUTOFF and MAXCAT.
  - A. Keep model 3 as is for comparison (this was in Amendment 8 comparison)
  - B. Run model 9 – cutoff same, set MAXCAT at 200K (example of high TOFF value)
  - C. Rerun models 13 and 14 using current values for CUTOFF and MAXCAT , 200K).
  - D. Remove from further consideration (with rationale):
    - Model 1 (there is no environmental link)
    - Models 2 & 4 (uses DEmsy, low mean B, no CUTOFF)
    - Model 5 (no environmental link, high CUTOFF)
    - Models 7-8, and 10-12 ( $B_0$  is not a static value when productivity is linked to the environment, little difference among these models, and there is currently no proposal to change CUTOFF)
4. Additional analyses. The rationale is to compare performance measures in the presence and absence of management response to environmental variability. Environmental forcing should be included in the following four simulations, but management is not responsive with A and only partly responsive with B.

With CUTOFF = 150K and MAXCAT = 200K:

  - A. Current (2011-13) HG - fixed Fraction (0.15), OFL/ABC - fixed Fmsy (0.18)
  - B. HG - fixed Fraction (0.15), OFL/ABC based on temperature-dependent Emsy (0-0.25), 0.25 being the upper quartile for full CalCOFI time series); use annual CalCOFI SST
  - C. HG w/ temperature-dependent Fraction (0.05-0.15), OFL/ABC based on temperature-dependent Emsy (0-0.25), 0.25 is upper quartile for full CalCOFI time series – annual CalCOFI SST
  - D. Repeat C using the 3-yr average CalCOFI SST