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SCIENTIFIC ADVISORY COMMITTEE

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RECOMMENDATIONS OF THE REVIEW PANEL ON THE IATTC ASSESSMENT OF YELLOWFIN TUNA

In October 2012 a panel of outside experts was convened to review the methodology and techniques used by the Commission staff in its assessment of yellowfin tuna. The panel made the following recommendations, extracted from its full report.

Based on discussions, presentations and alternative model runs conducted during the review, the following recommendations are suggested for the upcoming 2013 yellowfin tuna assessment. It is assumed that the next assessment for yellowfin tuna will be conducted using the Stock Synthesis platform.

1) Stock Structure:

   a) Break this assessment into Northern and Southern regions (using 5°N as a dividing line). This can be done using either two regions in Stock Synthesis (if you are able to have independent recruitment deviates and movement coefficients), or develop two independent Stock Synthesis models.

   b) It will be necessary to develop a CPUE standardization protocol for the Northern dolphin fishery as this index will be the basis with which to fit the northern model.

   c) Partition the Inshore dolphin fishery (DEL-I; fishery 8) at 5°N. This fishery, as it is currently defined, spans the Northern and Southern regions.

   d) For the time being, assume that growth in the Southern and Northern regions is the same (see recommendation 3d below).

2) Fisheries Structure:

   a) Where possible with regard to a two-area model, use the recommendations based on Cleridy Lennert-Cody's (Document YFT-01-02) analysis of the fishery data to partition the datasets by area.

3) Uncertainty in Growth:

   a) Short-term: Use results from the integrated growth (LEP, Laslett, 2002[1]) model to parameterize the standard deviation in length-at-age as a function of length inside the SS model.

[1] Laslett, G., Eveson, J., and Polacheck, T. (2002). A flexible maximum likelihood approach for fitting growth curves to tag recapture data. Canadian Journal of Fisheries and Aquatic Sciences, 59(6):976–986.

b) Short-term: Use parameters from the integrated growth (LEP) model if the fits to the size composition data are improved over the base-case model (which uses parameter estimates from a previous assessment conducted using A-SCALA).

c) Long-term: Incorporate the new integrated growth model (LEP, using the penalized likelihood option) into Stock Synthesis; explore the use of a multinomial distribution based on the age structure in the predicted population for estimating the ages in mark-recapture data. Note that this will require adding the year dimension to the otolith data collected in the Wild (1986) study.

d) Long-term: collect growth information (growth increment from tagging and otolith data) from the South and use area-specific growth models in the multi-area assessment.

e) Short-term: Fix the mean length-at-age growth curve based on the integrated model and internally estimate the standard deviation in length-at-age (or coefficient of variation as a linear function of length in the model) while assuming a reasonable prior.

4) Stock-recruitment relationship:

a) Continue to provide steepness options (h=1, h=0.75) and provide likelihood profiles over steepness.

b) Explore the use of an informative prior for steepness if convergence problems continue using Stock Synthesis.

c) Provide summary plots of the ln(R/S) versus spawners (connect lines, or use heat colors for points), and a time series of ln(R/S) as a visual diagnostic tool for evidence of changes in productivity (juvenile survival rates and carrying capacity).

5) CPUE standardization and data weighting:

a) Obtain operational parameters for the Japanese longline fleet and use these for standardization of their CPUE series.

b) Develop a CPUE standardization protocol for the Northern dolphin fishery. Examine literature on standardizing purse-seine fishery data and consider technological factors affecting catchability.

c) In both the assessment document and the presentation of model results, present residual plots of the relative abundance indices being fitted to better show the serial autocorrelation and fits to the data (log(observed CPUE)-log(predicted CPUE).

d) As with 5c, present a table of assumed/estimated CVs, along with root mean square error for both relative abundance indices and the recruitment deviates (*i.e.*, expand Table 4.3).

e) Report parameter correlations for key quantities that define population scaling and productivity.

f) Report parameter estimates, standard deviations, and bounds in a single table such that reviewers can be sure parameters are not sitting on or near bounds.

6) Selectivity curves:

a) Explore the use of age-specific coefficients (constant, or random walk over time) for the floating-object fisheries.

b) Plot a time series of fishery-specific observed median lengths; best if this is overlaid onto of bubble plots of the raw size composition data.

c) Continue to explore the use of time-varying selectivity and aggregating the data from the floating-object fisheries into a single fishery for each of the Northern and Southern regions (*i.e.*, continue the work presented in YFT-01-06).

7) Natural mortality:

   a) Estimate male and female natural mortality rates based on sex-specific age-composition data (outside the model).

   b) Examine sex ratio data from other fleets (it appears the original *M* work was done on very little information).

   c) If growth is estimated internally, then a re-examination of length-based natural mortality and maturity is necessary within the model; *i.e*. to take account of the new estimates of mean length-at-age.

8) Uncertainty:

   a) Explore structural uncertainty on a grid of all the equally plausible options for the assumptions made.

   b) Present information to managers in a decision table framework that attempts to integrate over the structural uncertainty.

9) Shorten the time series:

   a) Starting the model in the year 2000 should be considered if natural mortality and growth are assumed fixed in the model and allowing for time-varying selectivity. The advantages are large reductions in computational time, and very likely, similar policy advice. It may also be possible to do Markov chain Monte Carlo analysis.

   b) It may be necessary to re-introduce the historical time-series data for stock status calculations (Kobe plots) to ensure the mean recruitment value reflects all of the productivity regimes.