Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien
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IOTC–2012–WPTmT04–INF06

Received: 20 August, 2012

To: Working Part on Temperate Tuna
From: Dr. Rishi Sharma, IOTC Stock Assessment Scientist
Date: 20th August, 2012.
Re: CPUE Standardizations for Taiwan,China for the Albacore Assessment and ASPM review

Some of the key issues that were pertinent to the Japanese and Taiwanese analysis from 2011 seem to still remain in the analysis done by Taiwan,China, the key one being the 5 degree grid data resolution and not using operational data to discern any signal. As such the following probably need to be addressed in some manner before the use of this data is possible in an overall assessment:

1) What is historic task 2 data series?
2) It isn't clear whether targeting of other species is primarily the reason for the decline (like Japan), or is it a real effect. Likewise, the consequential increase isn't entirely clear whether it is targeting of a species effect or some other reason.
3) It would be useful to see the parameter values of the fits to understand the effect that the variable has in the overall direction of the standardization (positive or negative).
4) The overall residual plots (Figure 6). Other CPUE standardizations indicate leptokurtic fits and it is probable that this is the same, which means the tails are poorly explained.
5) If each area analyzed is indicating that there is a bycatch effect of directed target at other species, how large of an effect is this (I.e. if using a continuous measure, how much does this explain of the overall variance). Why did you use this in all areas, when you state that the effect is only visible in some areas (more for yellowfin or more for swordfish than other areas).
6) Is this an unbalanced data-set? If this is the case, order of the analysis would be highly influential in the outcome. As these models are quite complicated, and are most probably of an unbalanced design, how did you deal with the order and interaction terms in the final model? Please present the results along with parameter estimates as we can see the effect of time, area, etc.
7) Large divergence in 2010 from the Japanese data set. This point should be checked as it may be due to incomplete data or some other effect.

As suggestions I would examine the full model and then standardize the signal obtained from the full model. In addition, I would examine the effect of using the delta distribution, or negative Binomial. The use of Delta distribution (delta lognormal model, Pennington et. al. 2002, Lo et. al. 1992) can lead to more efficient estimators of mean and variance because non-zeros are assumed to follow a log normal distribution and zeros are treated separately. In addition examining a Negative binomial Model would be useful as well. Examining this as a Poisson model treating each observation as counts and using effort as a covariate may be another alternative. In addition, using things such as the Box-Cox transformation to justify application of the log-normal as the appropriate response may the best way to go.

Finally, examining a sub-set of the log-book data may be more informative then using all the data especially when other species were being targeted if that information is available (parsing out the data after 1995 when the number of hooks

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per basket data is available would be informative as 15 years of data is decent to give some measure of the direction of the standardization). Comparing the results from the shorter time series with the longer one will help in understanding if what is done here is sufficient As far as possible; you want to have a data-set that is invariant to these external factors that determine the CPUE. If this can be examined, along with some continuous covariates (in a richer dataset if available, if depth, vessel type, etc. was available) then the analysis may give a very different picture (Maunder and Punt 2004). Finally, how you weigh this data in a final assessment will eventually determine the outcome of the stock assessment (Schnute and Richards 2001).

ASPM Review

The model is well explained and documented which is great. It is easy to understand how it is used and what parameters may affect the overall outcome. Key parameters of interest, however that are not mentioned much are the catchability parameter that we know should not stay constant over time but is assumed to do so. In addition, values of M that seem to be low and a dome shaped selectivity may be the reason for a large number of fish that are mature and not caught thereby giving the impression of a healthy stock. This seems somewhat contrary to the declining trends seen in the CPUE data with some stabilization in recent years. Definitely sensitivity to the M and selectivity is a must for this analysis. Other things that need to be addressed are the following:

1) Why does the data fit the Japanese CPUE better than the Taiwan,China CPUE?
2) What parameter values were obtained for the selectivity curve? 0.58 versus 0.99 is going to have a huge influence on the outcome of the analysis for the older age classes as these have the largest biomass and are the largest contributors to spawning. Why was this done, as reasons presented here are not entirely clear?
3) Finally projection runs should use effort of F measures to control the overall catch and not catch controls as quota measure are non-existent in these fisheries. The analysis should be redone with that, and phase plots (Kobe-II) should be presented as well.

References

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