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Summary of major changes in the 2017 tropical tuna assessments

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Executive Summary

The purpose of this information paper is to briefly summarise the major changes from the 2014 stock assessments for bigeye and yellowfin tunas to those undertaken in 2017. Further details of those changes are contained in the various working and information papers (see in particular: McKechnie et al., 2017; Tremblay-Boyer et al., 2017).

We focus on changes to assessment data and model structure. Proposed changes were discussed during the 2017 Pre-Assessment Workshop held in April in Noumea (Pilling and Brouwer, 2017). These include some related to remaining recommendations from the 2011 Independent Review of the Bigeye Assessment, which have also been applied to the yellowfin assessment where appropriate.

Data and model changes

Component	Approach
Spatial structure	• A new spatial configuration was proposed for the bigeye and yellowfin assessments, whereby the northern boundary of tropical regions 3 and 4 were lowered from 20°N to 10°N. This was based upon the results of tagging studies that indicated little tropical/temperate movement, and the spatial distribution of the tropical purse seine fishery. The northern boundary of western region 7 was maintained at 20°N. • The 2014 spatial structure was modelled in parallel for direct comparison of the impacts on model quantities.
Fishery structure	• For the new regional structure, the US longline fleet around Hawaii was no longer split between two regions. The number of fisheries was therefore reduced by one in both assessments to 32 fisheries for that regional structure. • There was no change in fishery structure where the 2014 spatial structure was used (33 fisheries).
Biological assumptions	• New information on bigeye length-at-age, developed through collection and analysis of otoliths conducted under Project 35, was incorporated within the bigeye assessment. Alternative growth assumptions were also examined, including that assumed for the 2014 assessment. • Bigeye reproductive potential (maturity-at-age) was adjusted based upon new information on maturity-at-length collected under Project 35 and the growth assumed within the model run. • Alternative natural mortality-at-age functions were examined as sensitivity analyses in both assessments.
Catch	• New and updated catches through 2015 incorporated within both assessments. • Purse seine logsheet catch data, including that from the Japanese fleet, were corrected for species composition based upon observer sampling species composition data (Project 60) in both assessments. • A sensitivity analysis to examine potential implications of longline underreporting of bigeye catches was performed for bigeye tuna.
Longline and purse seine size data	• Data series were extended through 2015.

Tagging data	• New release events for 2013-2015 and updated recaptures through 2015 incorporated within both assessments. • New tagging data available from the Japanese tagging programme included as a sensitivity run within both assessments. • The impact of different weightings of the tagging data likelihood was examined in both assessments.

Longline CPUE data	• The extensive longline logsheet data set collated with agreement and support of DWFNs and SPC members provided an extended time series of data for CPUE standardisation through 2015.
	• In addition to repeating the CPUE standardisation approach used in the 2014 assessments for each model region, two alternative standardised CPUE time series were developed as sensitivity analyses in each assessment, using the following refinements:
	  ○ Proxies for individual vessels developed based on operational factors, for the historical period when vessel identifiers were frequently missing;
	  ○ Geo-statistical analysis approach to standardise CPUE time series developed.

MULTIFAN-CL assumptions	• The bigeye review recommendation to assume annual recruitment was related to annual mean spawning biomass was incorporated (quarterly assumption modelled as a sensitivity analysis). • A new Dirichlet multinomial likelihood approach to weighting the size composition data within the model fit was examined as a sensitivity analysis.

Reporting assessment results

The pre-assessment workshop discussed the best approach to presenting the uncertainty within stock assessment results presented to Scientific Committee, noting that the use of a single model run as the basis for management advice was not necessarily appropriate, given that uncertainty.

In previous assessments, SPC has presented a 'reference case' model run as a specific basis for displaying model diagnostics and against which to compare the results of one-off sensitivity runs. In 2017 this run has been re-named the 'diagnostic case'. The PAW recommended that the uncertainty grid of model runs (or SC's selection from within the uncertainty grid) be used as the basis of management advice.

References

McKechnie, S., Pilling, G. and Hampton, J. (2017). Stock assessment of bigeye tuna in the western and central Pacific Ocean. WCPFC-SC13-2017/SA-WP-05.

Pilling, G. and Brouwer, S. (2017). Report from the SPC pre-assessment workshop, Noumea, April 2017. WCPFC-SC13-2017/SA-IP-02.

Tremblay-Boyer, L., McKechnie, S., Pilling, G. and Hampton, J. (2017). Stock assessment of yellowfin tuna in the western and central Pacific Ocean. WCPFC-SC13-2017/SA-WP-06.