SCIENTIFIC COMMITTEE
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Implications and Recommendations taken from the Peer Review of the Bigeye 2011 Stock Assessment

WCPFC-SC8-2012/ SA-WP-11

ISG1[1]

[1] SSC8 Informal working Group 1

Implications and Recommendations taken from the Peer Review of the Bigeye 2011 Stock Assessment

Timing	Priority/Importance
1 = ongoing 2 = next assessment 3 = longer term	**1 = highest 2 - 4 = moderate 5 = lowest**

Review recommendation	SPC-OFP response	Implications for SC to consider	Timing	Priority	Responsibility	Applicability to other species
1) When moving from one reference model to a modified one, care should be taken to change only one factor at a time to ensure the impact of changes can be fully understood.	Agree.		1	2	SPC	SKJ/YFT
2) The way the fisheries are linked should be more fully documented in the assessment report, and the implications of such linkage should be more fully evaluated.	Agree and will include a table like Table E1 in future assessment reports.		2	3	SPC	SKJ/YFT

3) A Pacific-wide assessment should be conducted soon to evaluate whether the past conclusion that the results from a WCPO-only assessment are consistent with expectations from a Pacific-wide assessment remains true.	Agree	This represents another stock assessment and therefore needs to be prioritized with other assessment requests.	3	1	SPC	None
		It will require collaboration and travel resources to work with the IATTC.				
4) Pacific-wide assessments should be conducted regularly (~ every five years) to confirm the assumption that a WCPO-only assessment will provide robust estimates of stock status.	Agree	See above		2	SPC	None

5) Continue tagging programs to allow estimates of movement rates to be obtained for a wide range of environmental conditions	Agree, and emphasise that this is also of importance to yellowfin and skipjack tuna which are predominantly taken in surface fisheries. It has been shown that assessments using integrated statistical models for WCPO skipjack in particular are at best unreliable and at worst impossible without good quality and high volume tagging data.	This will have considerable budgetary implications. The costs (including tag recovery, database and analytical support) of an annual three month pole-and-line based tagging cruise in the western WCPO and an annual 4-6 week tagging cruise in the central Pacific Ocean (targeting BET) are around USD1.5 million.	3	2	Commission, CCMs, SPC	SKJ/YFT
6) High volume small-fish fisheries (e.g., Philippines and Indonesia) should be retained in the model to ensure their catches are removed from the population correctly with respect to length. However, the model should be formulated so that the data for such fisheries do not have a	Agree, although we note that data from these areas continue to improve and become more informative, and stock assessments should respond to this evolution over time.		1	2	Commission, CCMs, SPC	SKJ/YFT/BET

large impact on estimates of population trend and size.						
6b) spatial variation in biological parameters should form a focus for future model development	Agree		3	2	SPC	SKJ/YFT
7) To better address the assumption of homogeneity in tag-recapture data, split region 3 into two regions and examine whether region 5 should be split into two regions for tagging off eastern Australia.	Agree		2	1	SPC	SKJ/YFT
8) Further explore methods for weighting purse seine length frequencies by catch.	Agree		2	3	SPC	SKJ/YFT
9) Further explore methods for the calculating longline size-composition data by weighting spatial data by	Agree		2	3	SPC	SKJ/YFT

long-term average catches.						
10) Length-frequency data for the Japanese longline fishery should be omitted from the reference model until these data are better understood and can be shown to be compatible with the associated weight-frequency data.	Agree	A request will be needed from SC/WCPFC to Japan to seek access to these data.	2	2	SPC and NRIFSF	None at this time
		If access to these data requires travel to Japan then additional funds will be required. Also avaiability of such data to be explored beforehand.				

11) Separate the training vessel length frequency data from the commercial data and create a "survey" length composition series to be included in the model. Analysts should gain access to how training vessel trips and any other sampling programs are undertaken, and analyze the available data at the set-by-set level before these length-frequency data are considered for re-inclusion in the assessment.	Agree, this is a good idea. It is an approach adopted in the skipjack assessment to utilize longline training vessel data.	See above	2	2	SPC and NRIFSF	Possibly YFT
12) A more appropriate method should be used to calculate the CVs for the Japanese CPUE indices (e.g. Francis' canonical method or prediction-based methods)	Agree		2	3	SPC	Apply to all longline fisheries

13) Drop the region 5 tagging data unless the model can be re-structured to make the area where the Australian tagging took place in region 5 a separate region.	Agree. Drop or consider spatial restructuring instead. We also plan to carefully examine tagging data and model fits for both recent and historical tagging to determine if other issues exist. This will be complimented with analyses of mixing rates to determine the best way to model tagging data.		2	1	SPC	YFT
14) Available data on tag shedding should be examined and be used to provide a value for use in the assessment, noting that this may be challenging given the possibility of correlation between tag loss for each tag for double-tagged animals.	Agree. To date, modeling of double tagging data has not indicated continuous longer-term shedding to be an issue. Tag shedding is currently included (along with non-reporting, etc) in a general instant-aneous tag loss component.		3	5	SPC	SKJ/YFT

15) Tag loss and tagging-induced mortality should be modeled separately	Agree, although we note that specific estimates of tagging-induced mortality are not available.		3	5	SPC	SKJ/YFT
16) Future analysis of operational CPUE data should focus on how to identify targeting and investigate year-area interactions and the implications of increasing numbers of year-area cells without data.	Agree, and also note the additional point made in the main body of the report regarding the development of models to interpolate catch rates for cells with no data.	Analyses of Japanese operational data have been undertaken in collaboration with NRIFSF. Further discussion with NRIFSF in 9.2012	2	1	CCMs, SPC	YFT
16b)Removing these unidentified vessels from the latter period is advised '(Japanese LL operational data)		These trips to Japan are expensive and do not provide the best environment to analyze these important data (i.e. the trips are short and we cannot retain the data for follow-up analysis).	2	2	NRIFSF, SPC	YFT

16c) further developments of this very useful tool. Multifan Cl The additional outputs provided in R (e.g. graphs of mean and variation in length and weight composition over time) were also very useful.		If access to these data requires travel to Japan then additional funds will be required.	1	3		Not applicable
17) Use methods that simultaneously use both age-length and growth increment data, ideally within MFCL.	Agree, and note that this is important for other assessments, notably South pacific albacore.		3	3	SPC	SKJ/YFT/SPALB
18) Continue seeding experiments due to the impact that reporting rates have on the present model configuration and estimation.	Agree, and this is being done with the cooperation of national observer programmes across the region.	These costs will be included within existing tagging programs while the funds are available.	1	3	SPC	SKJ/YFT
19) Sensitivity analyses should continue to be shown to the assumed value for steepness and an appropriate means (e.g., a decision table) used to summarize the management implications of uncertainty regarding steepness.	Agree		Clarify with Panel		SPC and sec	SKJ/YFT/SPALB

20) The size of the stock recruitment penalty should be selected which allows the asymptote of the stock-recruitment relationship to be estimated, but is otherwise uninformative about stock size.	Agree		Done		SPC	SKJ/YFT/SPALB
21) Moved to MFCL - Consider fitting the stock-recruitment relationship to the annual rather than seasonal recruitments.	Agree, and note that this capability currently exists in MFCL.				SPC	
22) The statistical weights for each data component (e.g., size composition, tagging, effort deviations) should be re-evaluated and revisited with each subsequent assessment.	Agree		2	3	SPC	SKJ/YFT/SPALB
23) Future assessments should include both standard and historical retrospective analyses.	Agree		2	2	SPC	SKJ/YFT/SPALB
24) Methods should be developed to provide output which accounts for uncertainty regarding the values for the factors considered in the structural analysis.	Agree, and this is been developed in the context of the 2012 oceanic whitetip and silky shark assessments.		2	2	SPC	SKJ/YFT/SPALB

25) Stochastic yield functions should be presented because they may not indicate the same values for management reference points such as *F*MSY and *B*MSY.	This can be done, and we are currently finalizing coding for stochastic projections which could be used to generate stochastic yield functions.		3	4	SPC	SKJ/YFT/SPALB
26) Projections considering MSY estimates should account for fishery-specific changes (i.e., likely proportional catches by fishery).	Agree, and note that this is currently done as a matter of course in projections, and fishery selectivity can be re-computed for each time step of the projection.		1	3	SPC	SKJ/YFT/SPALB

Recommendations that specifically refer to MULTIFAN-CL

Definitions: Timing	**Definitions: Priority/Importance**
1 = immediate, 2 = 2013, 3 = 2014+	**1 = highest, 2 – 4 = moderate, 5 = lowest**

Review comment	**SPC-OFP response**	**Timing**	**Priority**	**Responsibility**
a. Test the options for time-varying selectivity – allowing for time-varying selectivity may address some of the issues related to the sometimes poor fits to the length- and weight-frequency data.	This is currently possible by specifying time breaks in fisheries, but we agree a more elegant solution using time blocks as in Stock Synthesis would be better.	2	2	SPC
b. Allow the length bins to be of different widths. One might, for example, want many narrow length bins for the smaller lengths, but fewer but wider length bins for the larger lengths. Allowing for a more flexible length bin structure should also reduce computational times as well as better reflect the available data.	Agree this would be useful.	3	3	SPC

c. Allow for long-term and initial tag-loss. Currently initial tag-loss is implemented by reducing the number of animals tagged when inputting data to the model and no account can be taken of long-term tag-loss.	Initial tag loss is also allowed through the reporting rate parameter. But agree that the addition of long-term tag loss, while it is not seen to be significant in the double tagging data available, would be useful.	3	4	SPC
d. Include an option which allows the tagging data to inform movement only rather than movement and mortality.	A tag likelihood conditional on tag recapture exists in MFCL but has not been used for WCPO tuna assessments.	2	3	SPC
e. Allow conditional age-at-length data to be included in the likelihood function. This will allow the ageing data from current sampling (e.g. WCPFC-SC6-2010/GN IP-04) to be formally included in the assessment.	Agree that this is a priority. Likewise for tag length-increment data.	2	2	SPC

f. Extend MFCL to allow gender to be explicitly represented. This will allow the impacts of differences in growth and natural mortality between the sexes to be represented. The current approach to modeling, for example, length-specific natural mortality (e.g. WCPFC-SC4-2008/ ME-WP-1) seems unnecessarily complicated given the lack of gender-structure in the model.	This development is close to completion in MFCL.	1	1	ns and SPC
g. Create an output table which lists all of the likelihood components by fleet and automates the process of computing effective samples sizes (and other summary statistics related to model fit).	Agree	2	1	SPC

h. Allow for more general selectivity options, including selectivity patterns where the first age for which selectivity is non-zero is pre-specified. This should help to avoid selectivity being non-zero owing to the functional form for selectivity rather than data.	Agree	3	3	SPC
i. Include a "tail compression" option, which would pool all length- and weight-data for large and small sizes based on a specified percentage (e.g. all lengths would be pooled so that the "plus" length-class contained 0.1% of the length-frequency).	We probably need to discuss the merits of this further with the reviewers.	3	5	
j. Add an option which allows the analyst to assume a multinomial likelihood for the compositional data in the first phases and only transition to the robust normal likelihood in the later phases.	Agree	2	2	SPC

k. When maturity data are based on length, converting to ages should be done within the model. Presently, the maturity-at-age is based on a fixed age-length relationship.	Agree	3	3	SPC
l. An option to add a likelihood weight to the tagging data component should be added.	Agree, although to an extent this exists through the over-dispersion parameter of the negative binomial.	2	3	SPC
m) moved from general rec #21. Consider fitting the stock-recruitment relationship to the annual rather than seasonal recruitments.	Agree, and note that this capability currently exists in MFCL.	2	3	SPC