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Global Standard for Responsible Supply of Marine Ingredients
Fishery Assessment Methodology and Template Report V2.0

Fishery Under Assessment	Yellowfin tuna *Thunnus albacares* FAO 71
Date	**April 2018**
Assessor	**Conor Donnelly**

Application details and summary of the assessment outcome				
Name: Thein Quynh Ltd				
Address:				
Country: Vietnam		Zip:		
Tel. No.:		Fax. No.:		
Email address:		Applicant Code		
Key Contact:		Title:		
Certification Body Details				
Name of Certification Body:		SAI Global		
Assessor Name	Peer Reviewer	Assessment Days	Initial/Surveillance/Re-approval	Whole fish/ By-product
Conor Donnelly	Sam Dignan	1	Initial	By-product
Assessment Period	2017-2018			

Scope Details	
Management Authority (Country/State)	Western and Central Pacific Fisheries Commission (WCPFC)
Main Species	Yellowfin tuna *Thunnus albacares*
Fishery Location	FAO 71 Pacific, western central
Gear Type(s)	Purse seine, longline, pole and line.
Outcome of Assessment	
Overall Outcome	Pass
Clauses Failed	None
Peer Review Evaluation	Agree with Assessor's determination
Recommendation	Approval

Assessment Determination
Western and Central Pacific Ocean (WCPO) stock of yellowfin tuna are managed by the Western and Central Pacific Fisheries Commission (WCPFC) with scientific advice and management recommendations made by its Scientific Committee and stock assessment undertaken by the Oceanic Fisheries Programme of the Pacific Community (SPC).
The stock is subject to a species-specific management regime and was assessed under clause C. As fishery removals of WCPO yellowfin tuna are included in the stock assessment process and the stock is considered, in its most recent assessment, to have a biomass above its limit reference point it passes clause C.
Yellowfin tuna is categorised as near threatened on IUCN's Red List of Threatened Species and is not listed on CITES (http://www.iucnredlist.org/details/21857/0, global assessment undertaken in 2011).
Yellowfin tuna in the WCPO are recommended for approval as by-product under the IFFO RS Standard.
Peer Review Comments
Agree with Assessor's determination.
Notes for On-site Auditor

Species-Specific Results

Category	Species	% landings	Outcome (Pass/Fail)	
Category A			A1	
			A2	
			A3	
			A4	
Category B				
Category C	Yellowfin tuna *Thunnus albacares*	NA	Pass	
Category D				

[List all Category A and B species. List approximate total %age of landings which are Category C and D species; these do not need to be individually named here]

HOW TO COMPLETE THIS ASSESSMENT REPORT

This assessment template uses a modular approach to assessing fisheries against the IFFO RS standard.

Whole Fish

The process for completing the template for a **whole fish** assessment is as follows:

1. ALL ASSESSMENTS: Complete the Species Characterisation table, to determine which categories of species are present in the fishery.
2. ALL ASSESSMENTS: Complete clauses M1, M2, M3: Management.
3. IF THERE ARE CATEGORY A SPECIES IN THE FISHERY: Complete clauses A1, A2, A3, A4 for **each** Category A species.
4. IF THERE ARE CATEGORY B SPECIES IN THE FISHERY: Complete the Section B risk assessment for **each** Category B species.
5. IF THERE ARE CATEGORY C SPECIES IN THE FISHERY: Complete clause C1 for **each** Category C species.
6. IF THERE ARE CATEGORY D SPECIES IN THE FISHERY: Complete Section D.
7. ALL ASSESSMENTS: Complete clauses F1, F2, F3: Further Impacts.

A fishery must score a pass in **all applicable clauses** before approval may be recommended. To achieve a pass in a clause, the fishery/species must meet **all** of the minimum requirements.

By-products

The process for completing the template for **by-product raw material** is as follows:

1. ALL ASSESSMENTS: Complete the Species Characterisation table with the names of the by-product species and stocks under assessment. The '% landings' column can be left empty; all by-products are considered as Category C and D.
2. IF THERE ARE CATEGORY C BYPRODUCTS UNDER ASSESSMENT: Complete clause C1 for **each** Category C by-product.
3. IF THERE ARE CATEGORY D BYPRODUCTS UNDER ASSESSMENT: Complete Section D.
4. ALL OTHER SECTIONS CAN BE DELETED. Clauses M1 - M3, F1 - F3, and Sections A and B do not need to be completed for a by-product assessment.

By-product approval is awarded on a species-by-species basis. Each by-product species scoring a pass under the appropriate section may be approved against the IFFO RS Standard.

SPECIES CATEGORISATION

The following table should be completed as fully as the available information permits. Any species representing more than 0.1% of the annual catch should be listed, along with an estimate of the proportion of the catch each species represents. The species should then be divided into Type 1 and Type 2 as follows:

- **Type 1 Species** can be considered the 'target' or 'main' species in the fishery. They make up the bulk of annual landings and are subjected to a detailed assessment.
- **Type 2 Species** can be considered the 'bycatch' or 'minor' species in the fishery. They make up a small proportion of the annual landings and are subjected to relatively high-level assessment.

Type 1 Species must represent 95% of the total annual catch. Type 2 Species may represent a maximum of 5% of the annual catch (see Appendix B).

Species which make up less than 0.1% of landings do not need to be listed (NOTE: ETP species are considered separately). The table should be extended if more space is needed. Discarded species should be included when known.

The 'stock' column should be used to differentiate when there are multiple biological or management stocks of one species captured by the fishery. The 'management' column should be used to indicate whether there is an adequate management regime specifically aimed at the individual species/stock. In some cases it will be immediately clear whether there is a species-specific management regime in place (for example, if there is an annual TAC). In less clear circumstances, the rule of thumb should be that if the species meets the minimum requirements of clauses A1-A4, an adequate species-specific management regime is in place.

NOTE: If any species is categorised as Endangered or Critically Endangered on the IUCN Red List, or if it appears in the CITES appendices, it **cannot** be approved for use as an IFFO RS raw material. This applied to whole fish as well as by-products.

TYPE 1 SPECIES (Representing 95% of the catch or more)
Category A: Species-specific management regime in place.
Category B: No species-specific management regime in place.

TYPE 2 SPECIES (Representing 5% OF THE CATCH OR LESS)
Category C: Species-specific management regime in place.
Category D: No species-specific management regime in place.

Common name	Latin name	Stock	% of landings	Management	Category
Yellowfin tuna	*Thunnus albacares*	WCPO	NA	WCPFC	C

CATEGORY C SPECIES

In a whole fish assessment, Category C species are those which make up less than 5% of landings, but which are subject to a species-specific management regime. In most cases this will be because they are a commercial target in a fishery other than the one under assessment. In a by-product assessment, Category C species are those which are subject to a species-specific management regime, and are usually targeted species in fisheries for human consumption.

Clause C1 should be completed for **each** Category C species. If there are no Category C species in the fishery under assessment, this section can be deleted. A Category C species does not meet the minimum requirements of clause C1 should be re-assessed as a Category D species.

Species Name		Yellowfin tuna *Thunnus albacares*	
C1	**Category C Stock Status - Minimum Requirements**		
	C1.1	Fishery removals of the species in the fishery under assessment are included in the stock assessment process, OR are considered by scientific authorities to be negligible.	Pass
	C1.2	The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy), OR removals by the fishery under assessment are considered by scientific authorities to be negligible.	Pass
		Clause outcome:	Pass

Evidence

Western Central Pacific Ocean (WCPO) yellowfin tuna are managed by the Western and Central Pacific Fisheries Commission (WCPFC) established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPF Convention) which entered into force on 19 June 2004. The Commission supports three subsidiary bodies; the Scientific Committee, Technical and Compliance Committee, and the Northern Committee, that each meet once during each year. A framework for the participation of fishing entities in the Commission which legally binds fishing entities to the provisions of the Convention (http://oceanfish.spc.int/en/tuna-fisheries/regional-bodies). WCPO yellowfin stock assessment is undertaken by the Oceanic Fisheries Programme part of the Fisheries, Aquaculture and Marine Ecosystems (FAME) Division of the Pacific Community (SPC).

For stock assessment purposes, yellowfin tuna are considered to constitute a single stock in the WCPO. The assessment was based on a diagnostic case model (MULTIFAN-CL settings) with input data covering the period up to the end of 2015 and including information on CPUE, tagging data, size frequencies. In addition to the diagnostic case model, the stock assessment undertook one-off sensitivity models to explore the relative impacts of key data and model assumptions for the diagnostic case model on the stock assessment results and conclusions. A structural uncertainty analysis (model grid) was also undertaken for consideration in developing management advice where all possible combinations of the most important axes of uncertainty from the one-off models were included. The assessors note that in comparison to previous assessments, little emphasis was placed on the diagnostic case model. Instead it was recommended that management advice was formulated from the results of the structural uncertainty grid. The uncertainty grid was used to characterize stock status, to summarize reference points, and to calculate the probability of breaching the adopted spawning biomass limit reference point ($0.2*SB_{F=0}$) and the probability of F_{recent} being greater than F_{MSY}.

Reference points defined for the stock comprise MSY biomass and fishing mortality reference points (table 1) and a limit reference point.

The median values of relative recent spawning biomass (2012-2015) ($SB_{recent}/SB_{F=0}$) and relative recent fishing mortality (F_{recent}/F_{MSY}) over the uncertainty grid were used to measure the central tendency of stock status. The values of the upper 90th and lower 10th percentiles of the empirical distributions of relative

spawning biomass and relative fishing mortality from the uncertainty grid were used to characterize the probable range of stock status.

Catch trend data is shown in figure 1. Majuro plots summarizing the results for each of the models in the structural uncertainty grid retained for management advice are shown in figure 2 and 3.

The Scientific Committee noted that the central tendency of relative recent spawning biomass was median $(SB_{recent}/SB_{F=0}) = 0.33$ with a probable range of 0.20 to 0.41 (80% probable range), and there was a roughly 8% probability (4 out of 48 models) that the recent spawning biomass had breached the adopted LRP with $Prob((SB_{recent}/SB_{F=0})<0.2) = 0.08$.

The Scientific Committee noted that, based on the uncertainty grid adopted by the Committee, the spawning biomass is highly likely above the biomass LRP and recent F is highly likely below F_{MSY}, and therefore noting the level of uncertainties in the current assessment it appears that the stock is not experiencing overfishing 96% probability) and it appears that the stock is not in an overfished condition (92% probability).

Consequently, fishery removals of WCPO yellowfin tuna are included in the stock assessment process and the stock is considered, in its most recent assessment, to have a biomass above its limit reference point. It passes clause C.

	Mean	Median	Min	10%	90%	Max
C_{latest}	611,982	612,592	606,762	607,517	614,237	614,801
MSY	670,658	670,800	539,200	601,480	735,280	795,200
$Y_{Frecent}$	646,075	643,400	534,400	586,120	717,880	739,600
F_{mult}	1.34	1.36	0.88	1.03	1.61	1.86
F_{MSY}	0.12	0.12	0.07	0.10	0.14	0.16
F_{recent}/F_{MSY}	0.77	0.74	0.54	0.62	0.97	1.13
SB_{MSY}	544,762	581,400	186,800	253,320	786,260	946,800
SB_0	2,199,750	2,290,000	1,197,000	1,366,600	2,784,500	3,256,000
SB_{MSY}/SB_0	0.24	0.24	0.15	0.18	0.28	0.34
$SB_{F=0}$	2,083,477	2,178,220	1,193,336	1,351,946	2,643,390	2,845,244
$SB_{MSY}/SB_{F=0}$	0.25	0.26	0.16	0.19	0.30	0.35
SB_{latest}/SB_0	0.33	0.34	0.18	0.23	0.42	0.45
$SB_{latest}/SB_{F=0}$	0.35	0.37	0.16	0.22	0.46	0.50
SB_{latest}/SB_{MSY}	1.40	1.39	0.80	1.02	1.80	1.91
$SB_{recent}/SB_{F=0}$	0.32	0.33	0.15	0.20	0.41	0.46
SB_{recent}/SB_{MSY}	1.40	1.41	0.81	1.05	1.71	1.93

Table 1. Summary of reference points over the 48 models in the structural uncertainty grid retained for management advice using divisors of 20 and 50 for the weighting on the size composition data. Note that $SB_{recent}/SB_{F=0}$ is calculated where SB_{recent} is the mean SB over 2012-2015 instead of 2011-2014 (used in the stock assessment report), at the request of the Scientific Committee. Source: WCPFC, 2017.
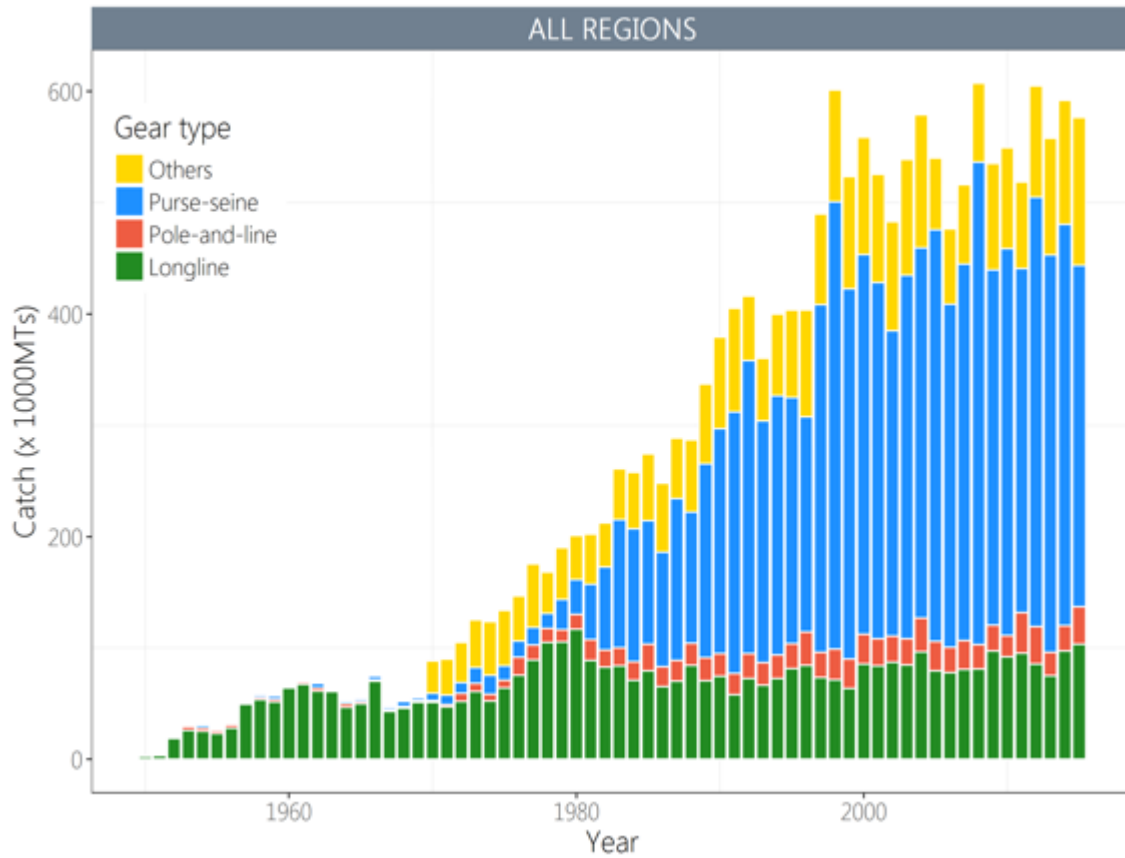
Figure 1. Time series of total annual catch (1000's mt) by fishing gear for the diagnostic case model over the full assessment period. Source: WCPFC, 2017.
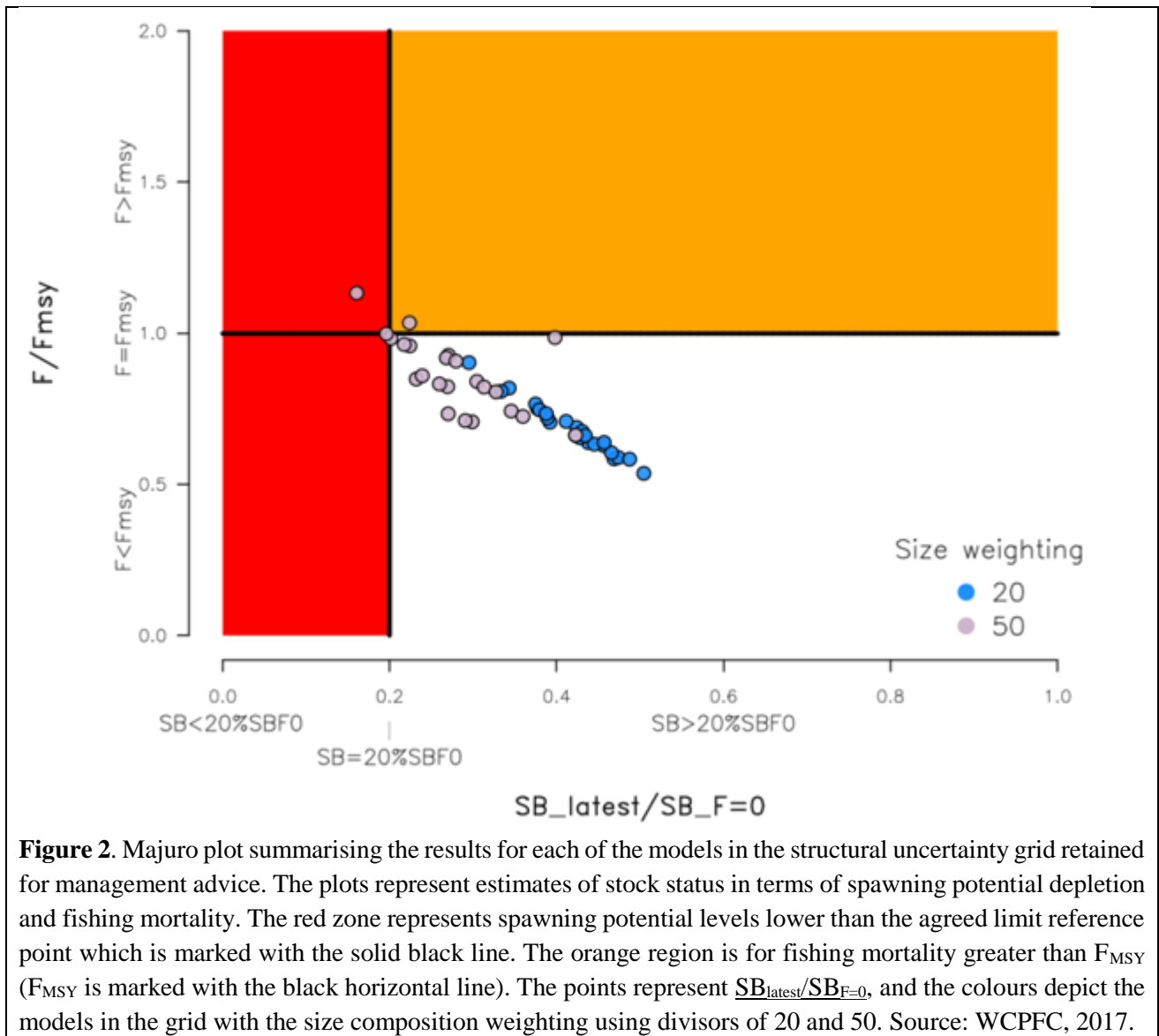
Figure 2. Majuro plot summarising the results for each of the models in the structural uncertainty grid retained for management advice. The plots represent estimates of stock status in terms of spawning potential depletion and fishing mortality. The red zone represents spawning potential levels lower than the agreed limit reference point which is marked with the solid black line. The orange region is for fishing mortality greater than F_{MSY} (F_{MSY} is marked with the black horizontal line). The points represent <u>SB_{latest}/$SB_{F=0}$</u>, and the colours depict the models in the grid with the size composition weighting using divisors of 20 and 50. Source: WCPFC, 2017.
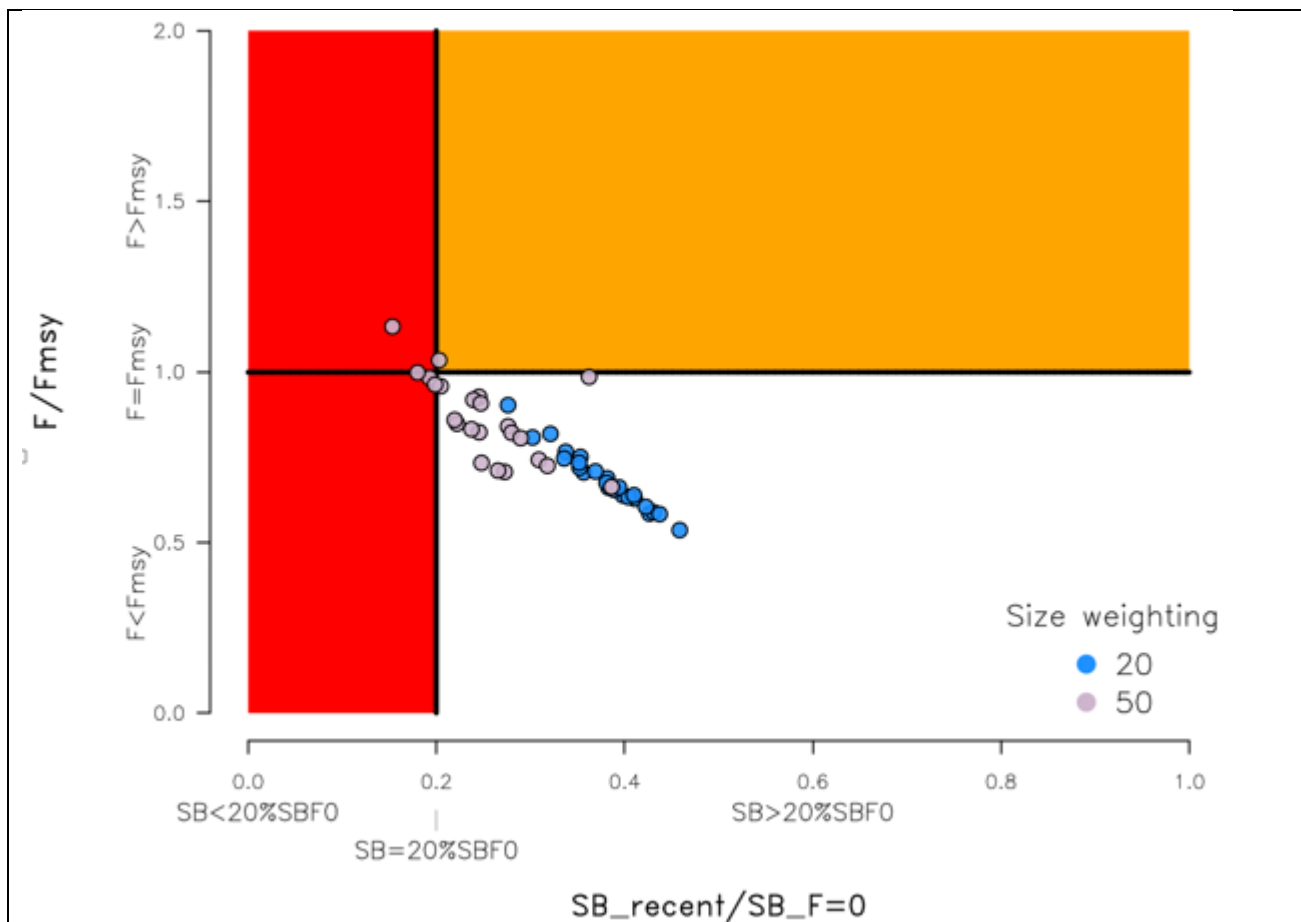
Figure 3. Majuro plot summarising the results for each of the models in the structural uncertainty grid retained for management advice. The plots represent estimates of stock status in terms of spawning potential depletion and fishing mortality. The red zone represents spawning potential levels lower than the agreed limit reference point which is marked with the solid black line. The orange region is for fishing mortality greater than F_{MSY} (F_{MSY} is marked with the black horizontal line). The points represent $SB_{recent}/SB_{F=0}$, and the colours depict the models in the grid with the size composition weighting using divisors of 20 and 50. Source: WCPFC, 2017.

References

WCPFC, 2017. The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. Summary Report. Thirteenth Regular Session of the Scientific Committee. Rarotonga, Cook Islands, 9-17 August, 2017.
https://www.wcpfc.int/meeting-folders/scientific-committee

Tremblay-Boyer, L., McKechnie, S., Pilling, G. and Hampton, J. (2017). Stock assessment of yellowfin tuna in the western and central Pacific Ocean. Thirteenth Regular Session of the Scientific Committee. Rarotonga, Cook Islands, 9-17 August, 2017. WCPFC-SC13-2017/SA-WP-06. Rev1 August 4th.
https://www.wcpfc.int/system/files/SC13-SA-WP-06%20YFT-stock-assessment_2017_REV1.pdf

Standard clauses 1.3.2.2

SOCIAL CRITERION

In addition to the scored criteria listed above, applicants must commit to ensuring that vessels operating in the fishery adhere to internationally recognised guidance on human rights. They must also commit to ensuring there is no use of enforced or unpaid labour in the fleet(s) operating upon the resource.

Appendix A - Determining Resilience Ratings

The assessment of Category B species described in this assessment report template utilises a resilience rating system suggested by the American Fisheries Society. This approach was chosen because it is also used by FishBase, and so the resilience ratings for many thousands of species are freely available online. As described by FishBase, the following is the process used to arrive at the resilience ratings:

"*The American Fisheries Society (AFS) has suggested values for several biological parameters that allow classification of a fish population or species into categories of high, medium, low and very low resilience or productivity (Musick 1999). If no reliable estimate of r_m (see below) is available, the assignment is to the lowest category for which any of the available parameters fits. For each of these categories, AFS has suggested thresholds for decline over the longer of 10 years or three generations. If an observed decline measured in biomass or numbers of mature individuals exceeds the indicated threshold value, the population or species is considered vulnerable to extinction unless explicitly shown otherwise. If one sex strongly limits the reproductive capacity of the species or population, then only the decline in the limiting sex should be considered. We decided to restrict the automatic assignment of resilience categories in the Key Facts page to values of K, t_m and t_{max} and those records of fecundity estimates that referred to minimum number of eggs or pups per female per year, assuming that these were equivalent to average fecundity at first maturity (Musick 1999). Note that many small fishes may spawn several times per year (we exclude these for the time being) and large live bearers such as the coelacanth may have gestation periods of more than one year (we corrected fecundity estimates for those cases reported in the literature). Also, we excluded resilience estimates based on r_m (see below) as we are not yet confident with the reliability of the current method for estimating rm. If users have independent r_m or fecundity estimates, they can refer to Table 1 for using this information.*"

Parameter	High	Medium	Low	Very low
Threshold	0.99	0.95	0.85	0.70
r_{max} (1/year)	> 0.5	0.16 – 0.50	0.05 – 0.15	< 0.05
K (1/year)	> 0.3	0.16 – 0.30	0.05 – 0.15	< 0.05
Fecundity (1/year)	> 10,000	100 – 1000	10 – 100	< 10
t_m (years)	< 1	2 – 4	5 – 10	> 10
t_{max} (years)	1 - 3	4 – 10	11 – 30	> 30

Taken from the FishBase manual, "Estimation of Life-History Key Facts":
http://www.fishbase.us/manual/English/key%20facts.htm#resilience]

Appendix B – Background on the 5% catch rule

The proposed fishery assessment methodology uses a species categorisation approach to divide the catch in the assessment fishery into groups. These groups are:

- **Category A:** "Target" species with a species-specific management regime in place.
- **Category B:** "Target" species with no species-specific management regime in place.
- **Category C:** "Non-target" species with a species-specific management regime in place.
- **Category D:** "Non-target" species with no species-specific management regime in place

The distinction between 'target' and 'non-target' species is made to enable the assessment to consider the impact of the fishery on all the species caught regularly, without requiring a full assessment be conducted for each. Thus 'target' species are subjected to a more detailed assessment, while 'non-target' species are considered more briefly. For the purposes of the IFFO RS fishery assessment, 'target' and 'non-target' species are defined by their prevalence in the catch, by weight. Applicants must declare which species are considered 'target' species in the fishery, and the combined weight of these must be at least 95% of the annual catch. The remaining 5% can be made up of 'non-target' species. Note also that ETP species are considered separately, irrespective of their frequency of occurrence in the catch.

The proposed use of 5% as a limit for 'non-target' species is one area in which feedback is being sought via the public consultation. The decision to propose a value of 5% ensures consistency with other fishery assessment programmes, such as the MSC which uses 5% to distinguish between 'main' and 'minor' species (see MSC Standard, SA3.4 and GSA3.4.2); and Seafood Watch, which uses 5% when defining the 'main' species for the assessment (see Seafood Watch Standard, Criterion 2). The value is also consistent with the approached used in Version 1 of the IFFO RS Standard, in which up to 5% of the raw material could be comprised of 'unassessed' species.