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

IFFO RS
Global Standard for Responsible Supply
of Marine Ingredients

Fishery Under Assessment	Yellowfin tuna *Thunnus albacares* FAO 71 West Central Pacific Ocean
Date	December 2018
Assessor	Jim Daly

Application details and summary of the assessment outcome				
Name: TCF Co Ltd & others				
Address:				
Country: Thailand		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
Jim Daly	Virginia Polonio	0.5	Surveillance	By-product
Assessment Period	2018			

Scope Details	
Management Authority (Country/State)	Western and Central Pacific Fisheries Commission (WCPFC); Thailand Department of Fisheries (DOF)
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

Thailand

The Thailand Department of Fisheries (DOF) is the primary fishery management organisation in Thailand. The DOF is responsible for the implementation of Thai fishery legislation, the undertaking of fishery and aquaculture research, fishery control and enforcement, the management of international fishery affairs, and the engagement of fishery and aquaculture stakeholders.

The current Thai fisheries management objectives are set out in The Master Plan – Marine Fisheries Management in Thailand. The Master Plan applies for the ten years beginning in 2009. The Plan includes five major strategies, the third of which is "Development and Promotion of Responsible and Sustainable Fisheries". Thailand is a member of the Indian Ocean Tuna Commission (IOTC) and a co-operating non-member of the Western and Central Pacific Fisheries Commission (WCPFC).

International

Many tuna stocks are managed by Regional Fisheries Management Organisations (RFMOs) which coordinate the scientific output and management approach of their member states with regards to tuna. The Indian Ocean Tuna Commission (IOTC) resolutions include the limitation of fishing capacity, a ban on discarding, and establishment of target and limit reference points, and a number of measures aimed at ensuring the accurate recording of catch and effort data.

The Western and Central Pacific Fisheries Commission (WCPFC) has also implemented species-specific measures, including a target fishing mortality (at or below F_{MSY}) and a ban on discards. The RFMO in charge of FAO 71 is the WCPFC.

Scientific advice and management recommendations are made by the WCPFC's Scientific Committee (SC) and stock assessments undertaken by the Oceanic Fisheries Programme of the Pacific Community (South Pacific Conference SPC). The last published yellowfin assessment was posted on WCPFC'S website under Scientific Committee (SC) Report No. 13-SA-WP-06. (WCPFC 2017).

The 14th Regular Session of the Scientific Committee was held in Korea (August 2018, SC 14). Yellowfin catches for 2017 (670,890 mt) were the highest recorded (more than 35,000 mt higher than the previous record catch of 2016), mainly due to increased catches in the purse seine fishery. No stock assessment was conducted for Western and Central Pacific Ocean (WCPO) yellowfin tuna in 2018.

SC14 also noted that under recent fishery conditions, the yellowfin stock was initially projected to increase as recent estimated relatively high recruitments support adult stock biomass, and then decline slightly. Noting the level of uncertainties in the current assessment it appears that the stock is not experiencing overfishing (96% probability) and the stock is not in an overfished condition (92% probability).

SC13 reiterates its previous advice (from SC10) that WCPFC could consider measures to reduce fishing mortality from fisheries that take juveniles, with the goal to increase to maximum fishery yields and reduce any further impacts on spawning potential for this stock in tropical regions.

The Parties to the Nauru Agreement (PNA) fishery for skipjack and yellowfin in the assessment area is currently MSC certified.

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 list of endangered species (websites accessed 10.12.18).

Yellowfin tuna in the WCPO (FAO 71) are recommended for approval as by-product under the IFFO RS Standard V 2.0 for the production of fishmeal and fish oil.

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, Thailand	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

C1.1:

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 annually. A framework for the participation of fishing entities in the Commission which legally binds fishing entities to the provisions of the Convention is in place.

Yellowfin tuna stock assessment is undertaken by the Oceanic Fisheries Programme part of the Fisheries, Aquaculture and Marine Ecosystems (FAME) Division of the Pacific Community (SPC). The 14th Regular Session of the Scientific Committee was held in Korea (August 2018, SC 14). Yellowfin catches for 2017 (670,890 mt) were the highest recorded (more than 35,000 mt higher than the previous record catch of 2016), mainly due to increased catches in the purse seine fishery.

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.

Fishery removals of the species in the fishery under assessment are included in the stock assessment process **R2-R3**

C1.2: 2016 Assessment:

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; fishing mortality reference points and a limit reference point (**Table 1**).

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 (**Figure 1**). Majuro plots summarizing the results for each of the models in the structural uncertainty grid retained for management advice are shown in **Figures 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:

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: **R2**

|	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
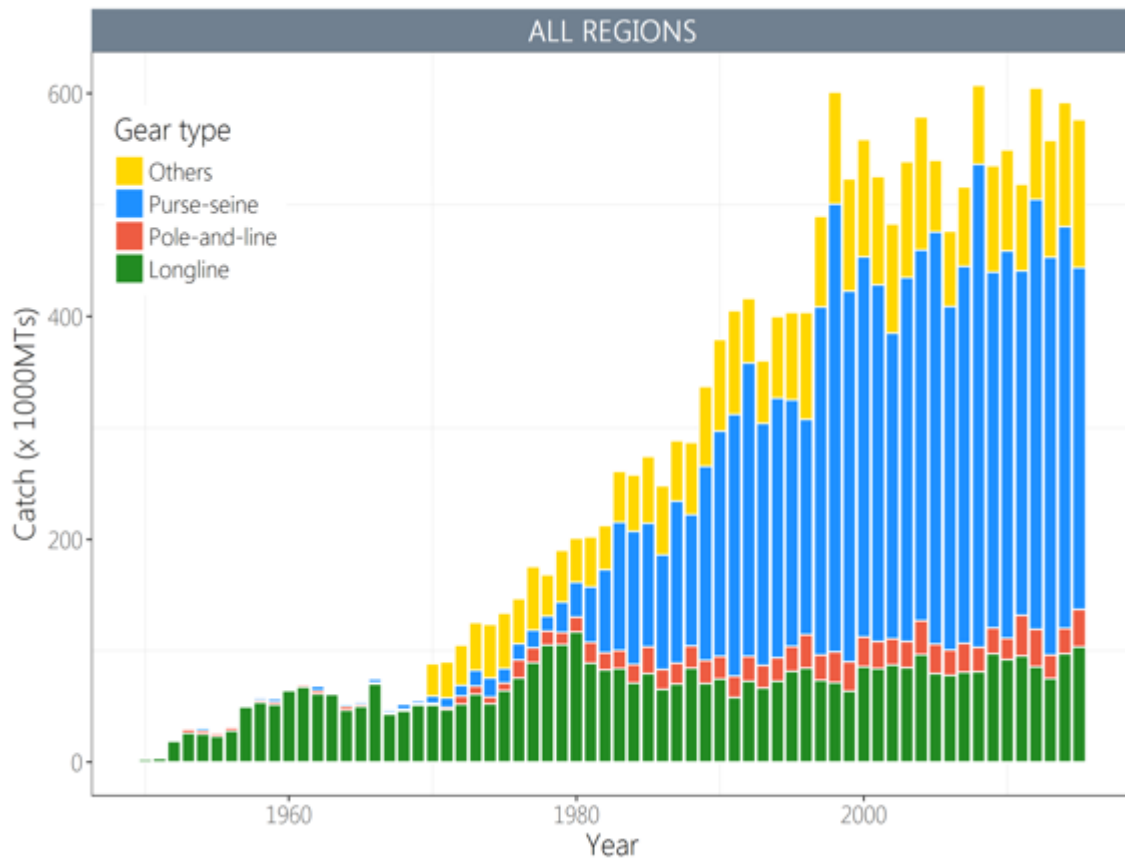
Figure 1. Time series of total annual catch (1000's mt) by fishing gear for the diagnostic case model over the full assessment period. Source: **R2** .
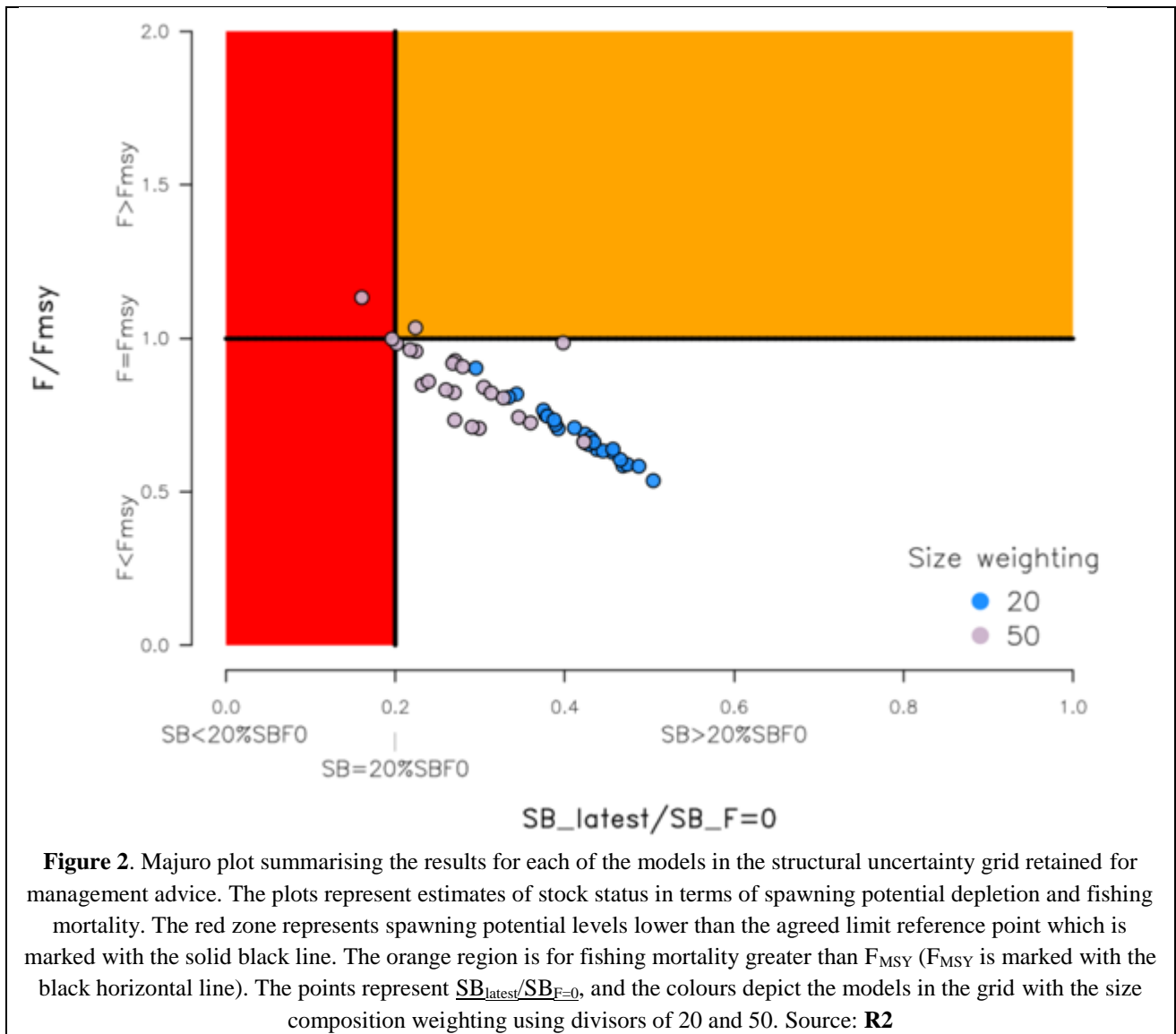
Figure 2. Majuro plot summarising the results for each of the models in the structural uncertainty grid retained for management advice. The plots represent estimates of stock status in terms of spawning potential depletion and fishing mortality. The red zone represents spawning potential levels lower 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 $\underline{SB_{latest}/SB_{F=0}}$, and the colours depict the models in the grid with the size composition weighting using divisors of 20 and 50. Source: **R2**
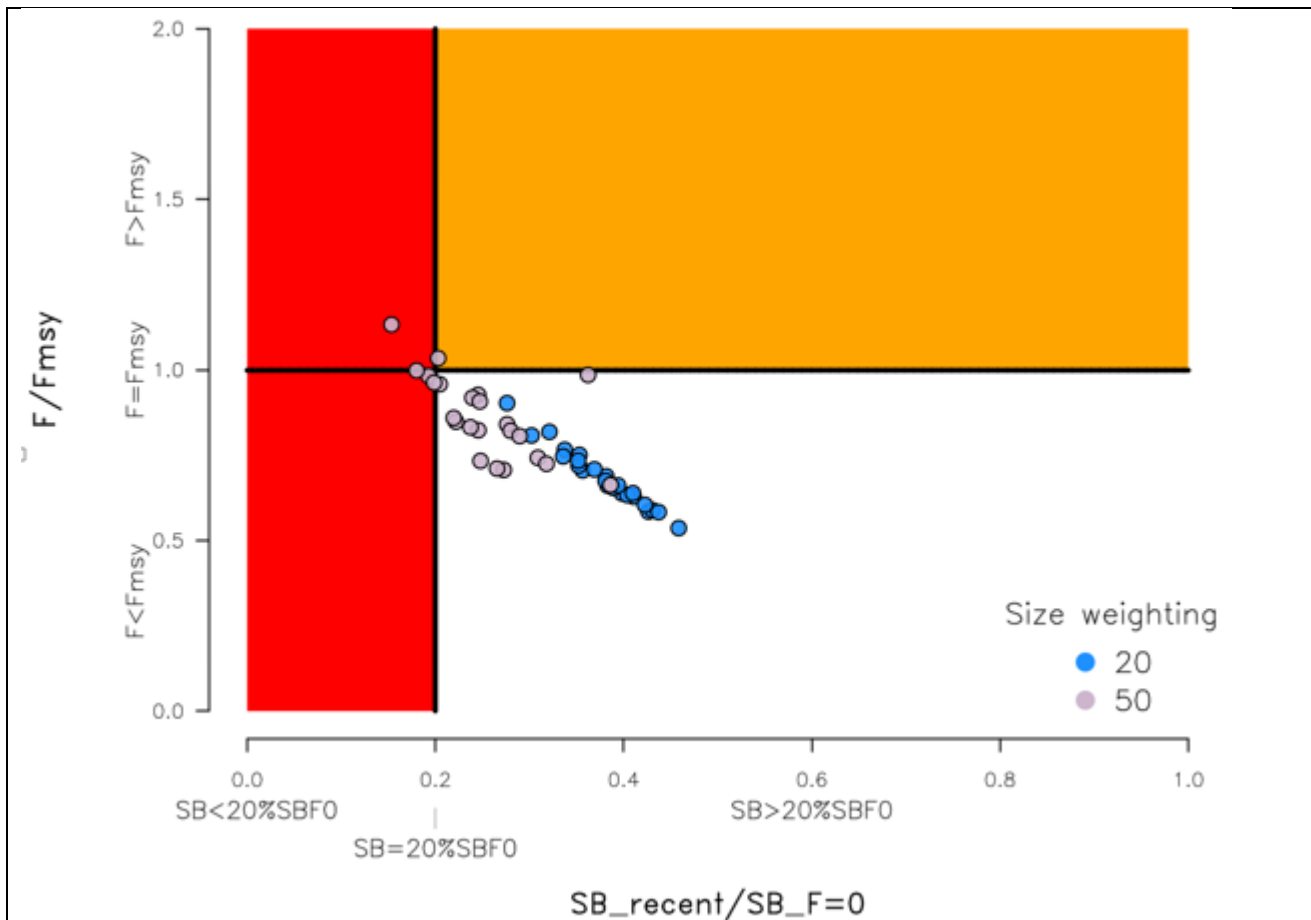
Figure 3. Majuro plot summarising the results for each of the models in the structural uncertainty grid retained for management advice. The plots represent estimates of stock status in terms of spawning potential depletion and fishing mortality. The red zone represents spawning potential levels lower 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: **R2**

The Scientific Committee (SC 13) 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) **R2**

SC14 noted that under recent fishery conditions, the yellowfin stock was initially projected to increase as recent estimated relatively high recruitments support adult stock biomass, and then decline slightly. Median $F_{2019}/F_{MSY} = 0.63$; median $SB_{2019}/SB_{F=0} = 0.37$; median $SB_{2019}/SB_{MSY} = 1.51$. Risk that $SB_{2019} < LRP = 6\%$.

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**.**

References
R1 Marine Fisheries Management Plan of Thailand (2016) ppt 26pp
R2 WCPFC 2017. Thirteenth Regular Session of the Scientific Committee. (Cook Islands) August, 2017.
https://www.wcpfc.int/meeting-folders/scientific-committee

R3 WCPFC 2018 Fourteenth Regular Session of the Scientific Committee (Busan, Korea) August 2018 305pp
https://www.wcpfc.int/meetings/14th-regular-session-scientific-committee
R4 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
R5 Fishsource Yellowfin tuna (Western Pacific Ocean) https://www.fishsource.org/stock_page/1133
R6 IUCN Red List Yellowfin Tuna https://www.iucnredlist.org/
R7 CITES Checklist Yellowfin tuna http://checklist.cites.org/#/en

Standard clauses 1.3.2.2