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Global Standard for Responsible Supply of Marine Ingredients

Fishery Assessment Methodology and Template Report V2.0



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Fishery Under Assessment	Yellowfin tuna <i>Thunnus albacares</i> FAO 77 Pacific Eastern Central
Date	May 2019
Assessor	Conor Donnelly

Application details and summary of the assessment outcome				
Name:				
Address:				
Country: Vietnam		Zip:		
Tel. No.:		Fax. No.:		
Email address:		Applicant Code		
Key Contact:		Title:		
Certification Body Details				
Name of Certification Body:		SAI Global Ltd		
Assessor Name	Peer Reviewer	Assessment Days	Initial/Surveillance/Re-approval	Whole fish/By-product
Conor Donnelly	Vito Romito	1	Surveillance 2	By-product
Assessment Period	2018-2019			

Scope Details	
Management Authority (Country/State)	Inter-American Tropical Tuna Commission (IATTC)
Main Species	Yellowfin tuna <i>Thunnus albacares</i>
Fishery Location	FAO 77 Pacific, eastern central
Gear Type(s)	Purse seine, floating object, longline
Outcome of Assessment	
Overall Outcome	Pass
Clauses Failed	None
Peer Review Evaluation	
Recommendation	Approve by-product

Assessment Determination
<p>The Eastern Pacific Ocean (EPO) stock of yellowfin tuna, which encompasses FAO 77, are managed by the Inter-American Tropical Tuna Commission. The Commission co-ordinate scientific research and stock assessment of the species within its remit.</p> <p>The stock is subject to a species-specific management regime and was assessed under clause C. As fishery removals of EPO yellowfin tuna are included in the stock assessment process and the stock can be considered, in its most recent assessment, to have a biomass above its limit reference point it passes clause C.</p> <p>Yellowfin tuna is categorised as near threatened on IUCN's Red List of Threatened Species and is not listed on CITES (https://www.iucnredlist.org/species/21857/9327139, global assessment undertaken in 2011).</p> <p>Yellowfin tuna in the EPO are recommended for approval as by-product under the IFFO RS Standard.</p>
Peer Review Comments
<p>The 2017 statistical age-structured stock assessment model used for EPO yellowfin tuna includes all available catch information. Biomass appears to be slightly above the BMSY level in the base case model (and not far below it in the more pessimistic model assuming a stock recruitment relationship in the stock, but with the spawning biomass predicted to rise above the MSY level in the next two years). Accordingly, yellowfin tuna in the EPO is likely to be above biomass limit reference point levels.</p> <p>The Peer Reviewer agrees that the yellowfin tuna EPO stock should be approved as by-product under the IFFO RS Standard.</p>

Notes for On-site Auditor

Note: This table should be completed for whole fish assessments only.

Species-Specific Results

Category	Species	% landings	Outcome (Pass/Fail)	
Category A			A1	
			A2	
			A3	
			A4	
Category B				
Category C	Yellowfin tuna <i>Thunnus albacares</i>	N/A	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	<i>Thunnus albacares</i>	EPO	N/A	IATTC	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 <i>Thunnus albacares</i>	
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			
<p>This by-product assessment is of the Eastern Pacific Ocean (EPO) stock of yellowfin tuna. Yellowfin are distributed across the Pacific Ocean, but the bulk of the catch is made in the eastern and western regions. Purse-seine catches of yellowfin are relatively low in the vicinity of the western boundary of the EPO at 150°W. The majority of the catch in the EPO is taken in purse-seine sets on yellowfin associated with dolphins and in un-associated schools. The regional fidelity found in tagging studies and geographic variation in phenotypic and genotypic characteristics of yellowfin shown in some studies, suggests that there might be multiple stocks of yellowfin in the EPO and throughout the Pacific Ocean. However, the stock assessment assumes a single stock of yellowfin in the EPO (Minte-Vera <i>et al</i>, 2018).</p> <p>The stock was last assessed in 2017 (Minte-vera <i>et al</i>, 2018) using an integrated statistical age-structured stock assessment model (Stock Synthesis Version 3.23b). Only the data used in the model has been updated for the 2018 assessment. The assessment requires a significant amount of information including data on retained catch, discards, catch per unit of effort (CPUE), and size compositions of the catches from several different fisheries.</p> <p>Minte-Vera <i>et al</i>, 2018 note that there is uncertainty about recent and future levels of recruitment and biomass. There may have been three different recruitment productivity regimes since 1975, and the levels of maximum sustainable yield (MSY) and the biomasses corresponding to the MSY (BMSY¹,</p>			

¹ Where B = recent biomass of fish aged 3 quarters and older, i.e. total stock

SMSY²) may differ among the regimes. The recruitment was below average until 1982, mostly above average from 1983 to 2002, and then mostly below average until 2014. The annual recruitments for 2015 and 2016 were estimated to be at or above average, as is the annual recruitment for 2017. The spawning biomass ratio (the ratio of the current spawning biomass to that of the unfished population, SBR) was at or below the MSY level from 2005 through 2017, except during 2008-2010. However, at the start of 2018 it was above the MSY level, following the large recruitments of 2015 and 2016. Under the current (2015-2017 average) fishing mortality, the SBR is predicted to increase in the next two years, and level off at about the MSY level if recruitment is average.

The fishing mortality (F) is estimated to be slightly above the level that would support the MSY, based on the current distribution of effort among the different fisheries (F multiplier = 0.99), but the confidence intervals are wide and recent catches are below that level. The current spawning biomass (S) is estimated to be above that level ($S_{\text{recent}}/\text{SMSY} = 1.08$), as is the recent biomass of fish aged 3 quarters and older (B) ($B_{\text{recent}}/\text{BMSY} = 1.35$). Minte-Vera *et al*, 2018, note that these interpretations are uncertain, and highly sensitive to the assumptions made about the steepness parameter (h) of the stock recruitment relationship, the average size of the oldest fish (L2), and the rate of natural mortality (M). The results are more pessimistic if a stock-recruitment relationship is assumed, if a higher value is assumed for L2, or if lower rates of M are assumed for adult yellowfin, but the spawning biomass is predicted to rise above the MSY level in the next two years (see Figure 1).

In conclusion, fishery removals of yellowfin tuna in the EPO are included in the stock assessment process and, based on the available information, the species is considered, in its most recent stock assessment, to have a biomass above the limit reference point. It passes clause C.

² Where S = the current spawning biomass, i.e. spawning stock

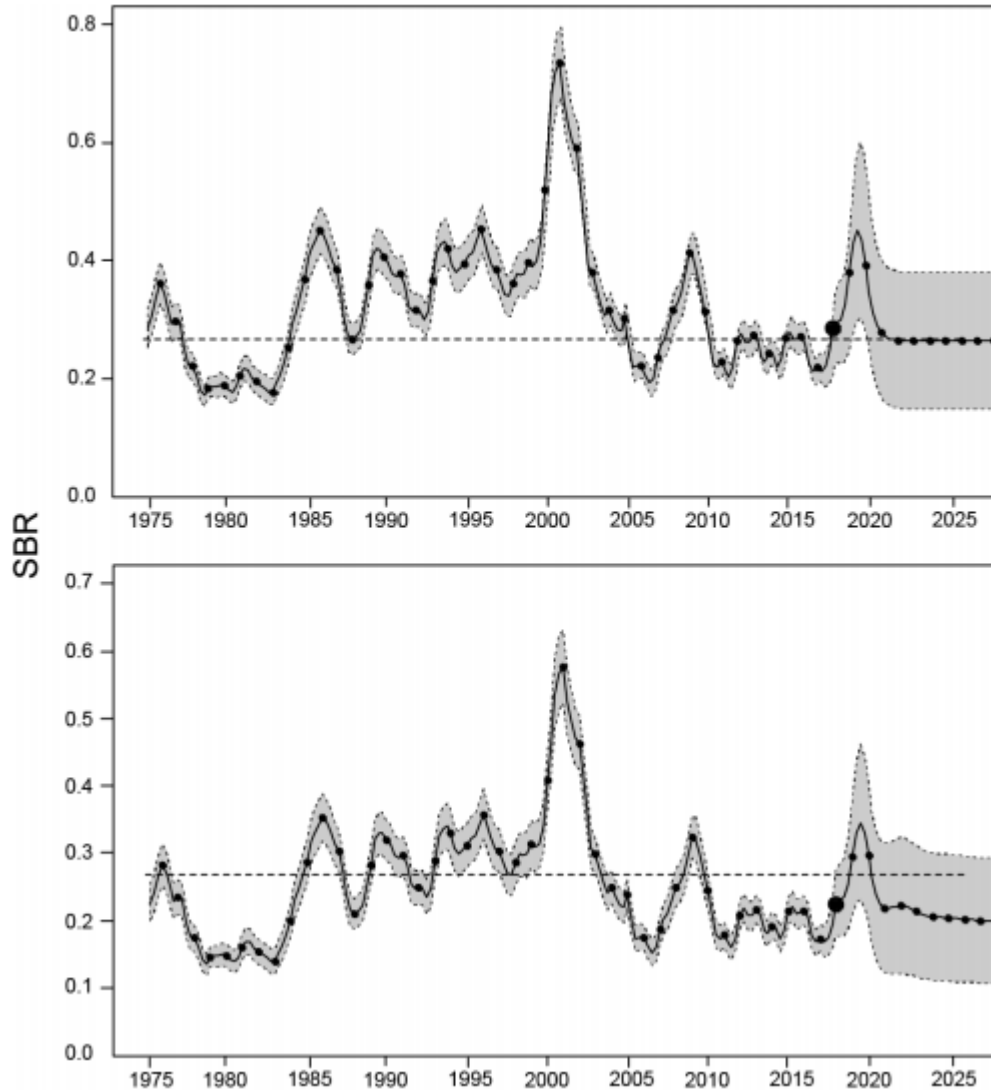


Figure 1. Spawning biomass ratios (SBRs) for yellowfin tuna in the EPO, including projections for 2018-2028 based on average fishing mortality rates during 2015-2017, from the base case (top) and the sensitivity analysis that assumes a stock-recruitment relationship ($h = 0.75$, bottom). The dashed horizontal line (at 0.27 and 0.35, respectively) identifies the SBR at MSY. The solid curve illustrates the maximum likelihood estimates, and the estimates after 2018 (the large dot) indicate the SBR predicted to occur if fishing mortality rates continue at the average of that observed during 2015-2017, and average environmental conditions occur during the next 10 years. The shaded area indicates the approximate 95% confidence intervals around those estimates. Source: Minte-Vera *et al*, 2018.

References

Minte-Vera, C.V., Maunder, M. N. & Aires-da-Silva, A. (2018). Status of yellowfin tuna in the Eastern Pacific Ocean in 2017 and outlook for the future. IATTC Stock Assessment Report 19, prepared for the 9th meeting of the IATTC Scientific Advisory Committee in May 2018.

https://www.iattc.org/PDFFiles/StockAssessmentReports/English/No-19-2018_Status%20of%20the%20tuna%20and%20billfish%20stocks%20in%202017.pdf

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Mora, A., Viera Hazin, F.H., Hinton, M., Juan Jorda, M., Minte Vera, C., Miyabe, N., Montano Cruz, R., Masuti, E., Nelson, R., Oxenford, H., Restrepo, V., Salas, E., Schaefer, K., Schratwieser, J., Serra, R., Sun, C., Teixeira Lessa, R.P., Pires Ferreira Travassos, P.E., Uozumi, Y. & Yanez, E. 2011. *Thunnus albacares*. The IUCN Red List of Threatened Species 2011: e.T21857A9327139. <http://dx.doi.org/10.2305/IUCN.UK.2011-2.RLTS.T21857A9327139.en>. Downloaded on 17 May 2019.

Standard clauses 1.3.2.2

CATEGORY D SPECIES

In a whole fish assessment, Category D species are those which make up less than 5% of landings and are not subject to a species-specific management regime. In the case of mixed trawl fisheries, Category D species may make up the majority of landings. In a by-product assessment, Category D species are those which are not subject to a species-specific management regime. In both cases, the comparative lack of scientific information on the status of the population of the species means that a risk-assessment style approach must be taken.

The process for assessing Category D species involves the use of a Productivity-Susceptibility Analysis (PSA) to further subdivide the species into 'Critical Risk', 'Major Risk' and 'Minor Risk' groups. If there are no Category D species in the fishery under assessment, this section can be deleted.

Productivity and susceptibility ratings are calculated using a process derived from the APFIC document "Regional Guidelines for the Management of Tropical Trawl Fisheries, which in turn was derived from papers by Patrick *et al* (2009) and Hobday *et al* (2007). Table D1 should be completed for each Category D species as follows:

- Firstly, the best available information should be used to fill in values for each productivity and susceptibility attribute.
- Table D2 should be used to convert each attribute value into a score between 1 and 3.
- The average score for productivity attributes and the average for susceptibility attributes should be calculated.
- Table D3 should be used to determine whether the species is required to meet the requirements of Table D4. A species which does not need to meet the requirements of D4 is automatically awarded a pass.
- Table D4 should be used to assess those species indicated by Table D3 to determine a pass/fail rating.
- Any Category D species which has been categorised by the IUCN Red List as Endangered or Critically Endangered, or which appears in the CITES appendices, automatically results in a fail.

D1	Species Name:		
	Productivity Attribute	Value	Score
	Average age at maturity (years)		
	Average maximum age (years)		

	Fecundity (eggs/spawning)		
	Average maximum size (cm)		
	Average size at maturity (cm)		
	Reproductive strategy		
	Mean trophic level		
	Average		
	Productivity Score		
	Susceptibility Attribute	Value	Score
	Overlap of adult species range with fishery		
	Distribution		
	Habitat		
	Depth range		
	Selectivity		
	Post-capture mortality		
	Average		
	Susceptibility Score		
	PSA Risk Rating (From		
	Table D3)		
	Compliance rating		
References			
Standard clauses 1.3.2.2			

Table D2 - Productivity / Susceptibility attributes and scores.

Productivity attributes	Low productivity/ High risk	Medium productivity/ Medium risk	High productivity/ Low risk
	Score 3	Score 2	Score 1
Average age at maturity (years)	>4	2 to 4	<2
Average maximum age (years)	>30	10 to 30	<10
Fecundity (eggs/spawning)	<1 000	1 000 to 10 000	>10 000
Average maximum size (cm)	>150	60 to 150	<60
Average size at maturity (cm)	>150	30 to 150	<30
Reproductive strategy	Live bearer, mouth brooder or significant parental investment	Demersal spawner "berried"	Broadcast spawner
Mean trophic level	>3.25	2.5–3.25	<2.5

Susceptibility attributes		High susceptibility/ High risk	Medium susceptibility/ Medium risk	Low susceptibility/ Low risk
		Score 3	Score 2	Score 1
Availability	1) Overlap of adult species range with fishery	>50% of stock occurs in the area fished	Between 25% and 50% of the stock occurs in the area fished	<25% of stock occurs in the area fished
	2) Distribution	Only in the country/fishery	Limited range in the region	Throughout region/global distribution
Encounterability	1) Habitat	Habitat preference of species make it highly likely to encounter trawl gear (e.g. demersal, muddy/sandy bottom)	Habitat preference of species make it moderately likely to encounter trawl gear (e.g. rocky bottom/reefs)	Depth or distribution of species make it unlikely to encounter trawl gear (e.g. epi-pelagic or meso-pelagic)
	2) Depth range	High overlap with trawl fishing gear (20 to 60 m depth)	Medium overlap with trawl fishing gear (10 to 20 m depth)	Low overlap with trawl fishing gear (0 to 10 m, >70 m depth)
Selectivity		Species >2 times mesh size or up to 4 m length	Species 1 to 2 times mesh size or 4 to 5 m length	Species <mesh size or >5 m length
Post capture mortality		Most dead or retained Trawl tow >3 hours	Alive after net hauled Trawl tow 0.5 to 3 hours	Released alive Trawl tow <0.5 hours

Note: Availability 2 is only used when there is no information for Availability 1; the most conservative score between Encounterability 1 and 2 is used.

D3		Average Susceptibility Score		
		1.00 – 1.75	1.76 – 2.24	2.25 – 3.00
Average Productivity Score	1.00 – 1.75	PASS	PASS	PASS
	1.76 – 2.24	PASS	PASS	TABLE D4
	2.25 – 3.00	PASS	TABLE D4	TABLE D4

D4	Species Name		
	Impacts On Species Categorised as Vulnerable by D1-D3 - Minimum Requirements		
	D4.1	The potential impacts of the fishery on this species are considered during the management process, and reasonable measures are taken to minimise these impacts.	
	D4.2	There is no substantial evidence that the fishery has a significant negative impact on the species.	
Outcome:			
Evidence			
References			
Standard clause 1.3.2.2			