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Global Standard for Responsible Supply of Marine Ingredients

Fishery Assessment Methodology and Template Report V2.0

Fishery Under Assessment	**Bigeye Tuna (*Thunnus obesus*) FAO 51 (Western Indian Ocean)**
Date	**October 2019**
Assessor	**Jim Daly**

Application details and summary of the assessment outcome				
Name: Marine Biotechnology Products Ltd				
Address: Riche Terre, Port Louis				
Country: Mauritius		**Zip:**		
Tel. No.:		**Fax. No.:**		
Email address:		**Applicant Code**		
Key Contact: Arasen Moodelly		**Title:** Quality Manager		
Certification Body Details				
Name of Certification Body:		**SAI Global Ltd**		
Assessor Name	**Peer Reviewer**	**Assessment Days**	**Initial/Surveillance/ Re-approval**	**Whole fish/ By-product**
Jim Daly	Conor Donnelly	0.5	Re-approval	By-product
Assessment Period	**2019**			

Scope Details	
Management Authority (Country/State)	IOTC
Main Species	Bigeye tuna (*Thunnus Obesus*)
Fishery Location	FAO Area 51(Western Indian Ocean)
Gear Type(s)	Longline, Purse seine, artisanal
Outcome of Assessment	
Overall Outcome	Category C PASS
Peer Review Evaluation	APPROVE
Recommendation	PASS

Assessment Determination
No new stock assessment was carried out for bigeye tuna in 2018, thus, stock status is determined on the basis of the 2016 assessment and other indicators presented in 2018. The 2016 assessment used a range of quantitative modelling methods (ASAP, ASPIC, BDM, BSPM, SCAA and SS3). Stock status is based on the SS3 model formulation using a grid designed to capture uncertainty on stock recruitment relationship and the influence of tagging information. Unreported catches and uncertainty in total catches are known to occur in the fishery. These uncertainties are included in the stock assessment risk analysis. Fishery removals are included in the stock assessment process; the species passes Clause C1.1. Considering quantified uncertainties, which are conservative, the 2016 assessment indicates that, with high likelihood, SB2015 is above SBMSY and F2015 below FMSY. Declines in longline effort since 2007, particularly from the Japanese, Taiwan, China and Rep. of Korea longline fleets have lowered the pressure on the Indian Ocean bigeye tuna stock, indicating that current fishing mortality would not reduce the population to an overfished state in the near future. The 2016 assessments indicated that, with high likelihood, SB2015 is above SBMSY and F2015 below FMSY. Average catches over the previous five years (2013‑2017; ≈95,997 t) remain below estimated MSY2016 (104,000t). On the weight-of-evidence available in 2018, the bigeye tuna stock is determined to be not overfished and is not subject to overfishing. The IUCN has rated bigeye tuna (global stock) as vulnerable. Bigeye tuna from the assessment area is not on the current CITES checklist of endangered species (websites accessed 08.10.19). The assessment team recommends the approval of this by-product material for the production of fishmeal and fish oil under the IFFO-RS v 2.0 standard for by-products (Category C assessment).
Peer Review Comments
Notes for On-site Auditor

Species-Specific Results

Category	Species	% landings	Outcome (Pass/Fail)	
Category A			A1	
			A2	
			A3	
			A4	
Category B				
Category C	Bigeye tuna (*T. obesus*)	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
Bigeye tuna	*Thunnus obesus*	FAO 51	N/A	IOTC	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		**Bigeye Tuna *Thunnus obesus***	
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.	Yes
	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.	Yes
		Clause outcome:	**PASS**

Evidence

C1.1

No new stock assessment was carried out for bigeye tuna in 2018, thus, stock status is determined on the basis of the 2016 assessment and other indicators presented in 2018. The 2016 assessment used a range of quantitative modelling methods (ASAP, ASPIC, BDM, BSPM, SCAA and SS3). Stock status is based on the SS3 model formulation using a grid designed to capture uncertainty on stock recruitment relationship and the influence of tagging information. Spawning stock biomass in 2015 was estimated to be 38% of unfished levels and 129% (107-151%) of the level that can support MSY.

Declines in longline effort since 2007, particularly from the Japanese, Taiwanese and Rep. of Korea longline fleets have lowered pressure on the stock, indicating that current fishing mortality would not reduce the population to an overfished state in the near future.

IOTC report that the main fleets prosecuting the fishery (Average catch 2013-17) are: Indonesia ≈27%; Taiwan, China ≈18%; European Union ≈17% (EU, Spain: ≈12%; EU-France: ≈5%); Seychelles ≈13%:

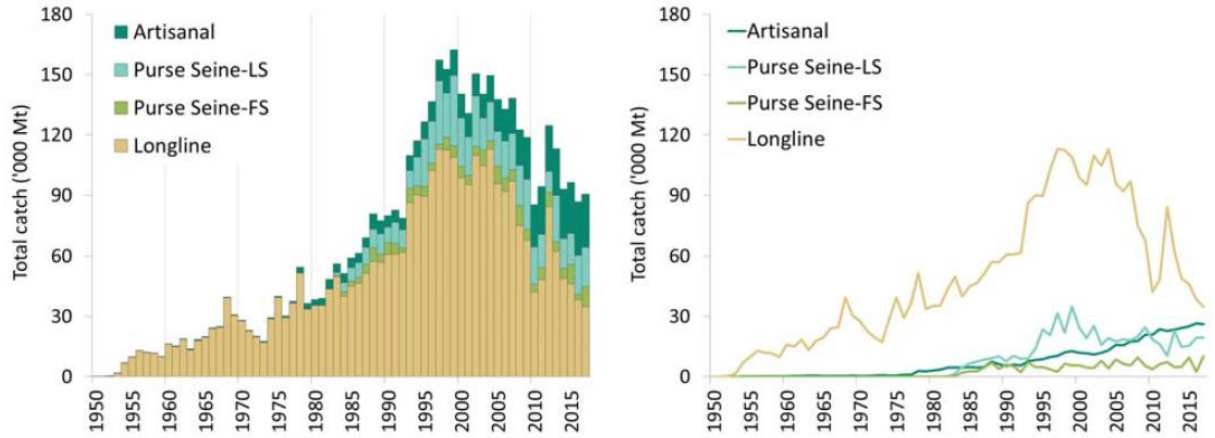

Figure 1 (a-b). Annual catches of bigeye tuna by gear (1950–2017). Data as of September 2018. **R1**

There are currently 31 Contracting Parties (Members), the majority of which are Nation States. Conservation and Management Measures are binding on Commission Members.

There have been compliance issues with some countries regarding accurate reporting of catch and effort data. Notably, there is uncertainty surrounding catches from the pole and line fishery in the Maldives, the Iranian and Pakistan gillnet fisheries, gillnet and longline combination fisheries of Sri Lanka and from Indonesian, Comoros and Madagascar artisanal fisheries. These uncertainties are included in the assessment risk analysis.

Fishery removals of Bigeye tuna in FAO 51 are included in the stock assessment process. The species passes Clause C1.1.

C1.2

Considering quantified uncertainty, which is conservative, the assessment indicates that, with high likelihood, SB_{2015} is above SB_{MSY} and F_{2015} is below F_{MSY} (Figure 2, Table 1). Declines in longline effort since 2007, particularly from the Japanese, Taiwan, China and Rep. of Korea fleets have lowered the pressure on the stock, indicating that current fishing mortality would not reduce the population to an overfished state in the near future.

The Kobe strategy matrix (based on the plausible model runs from SS3 in 2016) illustrates the levels of quantified risk associated with varying catch levels over time and could be used to inform future management actions (Figure 1). SS3 projections from the 2016 assessment show that there is a low risk of exceeding MSY-based reference points by 2025 if catches are maintained at current levels of 86,586 t:

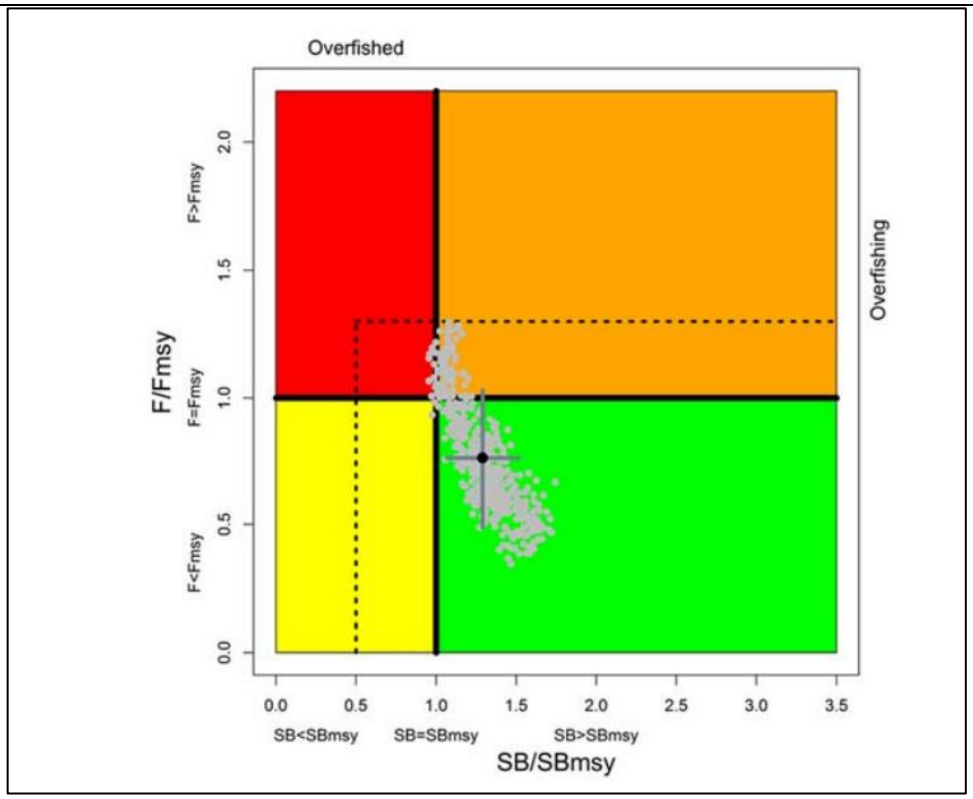

Figure 2. Bigeye tuna: SS3 Aggregated Indian Ocean assessment Kobe plot. Dotted black lines are the interim limit reference points adopted by the Commission via Resolution 15/10. The grey points represent 500 estimates of 2015 stock status from the six model options. The black point represents the average of the six model options with associated 80% confidence interval. Source: IOTC (2018) **R1**

2018 Indicators:

Table 1: Status of bigeye tuna (Thunnus obesus) in the Indian Ocean IOTC (2018) R1

Area[1]	Indicators		2018 stock status[3] determination
Indian Ocean	Catch in 2017[2]: Average catch 2013–2017:	90,050 t 95,997 t	**83.7%***
	MSY (1,000 t) (80% CI): F_{MSY} (80% CI): SB_{MSY} (1,000 t) (80% CI): F_{2015}/F_{MSY} (80% CI): SB_{2015}/SB_{MSY} (80% CI): SB_{2015}/SB_0 (80% CI):	104 (87-121) 0.17 (0.14-0.20) 525 (364-718) 0.76 (0.49-1.03) 1.29 (1.07-1.51) 0.38 (n.a. – n.a.)	

[1] Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence.
[2] Proportion of catch estimated or partially estimated by IOTC Secretariat for catches in 2017: 21%
[3] The stock status refers to the most recent years' data used in the last assessment conducted in 2016.
* Estimated probability that the stock is in the respective quadrant of the Kobe plot (shown below), derived from the confidence intervals associated with the current stock status. The confidence intervals for SB_{2015}/SB_0 were not estimated for the models used.

Colour key	Stock overfished ($SB_{year}/SB_{MSY}< 1$)	Stock not overfished ($SB_{year}/SB_{MSY}\geq 1$)
Stock subject to overfishing ($F_{year}/F_{MSY}> 1$)	**2.1%**	13.8%
Stock not subject to overfishing ($F_{year}/F_{MSY}\leq 1$)	0.4%	83.7%
Not assessed/Uncertain		

Average catches over the previous five years (2013-17; ≈95,997 t) remain below estimated MSY (104,000t, Table 1). On the weight-of-evidence available in 2018, the bigeye tuna stock is determined to be not overfished and is not subject to overfishing.

The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy; clause C1.2 is passed.

References

R1 IOTC 2018. Executive summary: Status of the Indian Ocean bigeye tuna (BET: *Thunnus obesus*) resource https://www.iotc.org/sites/default/files/documents/science/species_summaries/english/Bigeye_tuna_Supporting_information.pdf

R2 Fishsource Bigeye Tuna: https://www.fishsource.org/fishery_page/2146

R3 IUCN Red List http://www.iucnredlist.org/details/21859/0

R4 IOTC, 2014. Status of the Indian Ocean bigeye (BET*: Thunnus obesus*) resource. IOTC-2014-SC17-ES02 Chiang, H., Hsu, C., Wu, G. C., Chang, S., Yang, H. 2008. Short communication Population structure of bigeye tuna (*Thunnus obesus*) in the Indian Ocean inferred from mitochondrial DNA, Fisheries Research 90: 305–312

Standard clauses 1.3.2.2