MarinTrust Standard V2

By-product Fishery Assessment
Mauritius Bigeye Tuna
FAO Area 51

Table 1 Application details and summary of the assessment outcome.

Fishery Under Assessment	Species:	Bigeye Tuna, *Thunnus obesus*
	Geographical area:	FAO Area 51 Indian Ocean western
	Country of origin of the product:	Mauritius (Flag Country)
	Stock:	Indian Ocean Bigeye Tuna
Date	April 2022	
Report Code	BP_MUS02	
Assessor	Ivan Mateo, Ph.D.	
Country of origin of the product - PASS	Mauritius (Flag Country)	
Country of origin of the product - FAIL	NA	

Application details and summary of the assessment outcome			
Company Name(s): Marine Biotechnology Products Ltd.			
Country: Mauritius			
Email address:		Applicant Code:	
Certification Body Details			
Name of Certification Body:		Global Trust	
Assessor	Peer Reviewer	Assessment Days	Initial/Surveillance/ Re-approval
Ivan Mateo, Ph.D.	Conor Donnelly	0.5	Surveillance 2
Assessment Period	To April 2022		

Scope Details	
Main Species	Bigeye Tuna, *Thunnus obesus*
Stock	Indian Ocean
Fishery Location	FAO Area 51 Indian Ocean Western
Management Authority (Country/ State)	Indian Ocean Tuna Commission/Mauritius Ministry of Fisheries
Gear Type(s)	Purse seine and longlines
Outcome of Assessment	
Peer Review Evaluation	Agree with recommendation
Recommendation	APPROVED

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Table 2. Assessment Determination.

Assessment Determination
If any species is categorized as Endangered or Critically Endangered on IUCN's Red List, or if it appears in the CITES appendices, it cannot be approved for use as Marin Trust raw material. Bigeye tuna, *Thunnus obesus* does not appear as Endangered or Critically Endangered on IUCN's Red List, nor does it appear in CITES appendices, therefore bigeye tuna, (*Thunnus obesus*) is eligible for approval for use as Marin Trust by-product raw material. Bigeye tuna in the western Indian Ocean is managed at the international level by the Indian Ocean Tuna Commission (IOTC) which is an intergovernmental organization responsible for the management of tuna and tuna-like species in the Indian Ocean. In 2019 a new stock assessment was carried out for Bigeye Tuna in the IOTC area of competence to update the stock status undertaken in 2016. Therefore, the stock is subject to specific management regime and reference points are available to define the stock status relative to. Therefore, it was assessed under Category C. The most recent assessment (2019) indicates that the stock status determination changed qualitatively in 2019 to not overfished but subject to overfishing. In order to be approved, the stock assessed must achieve a pass in both clauses C1.1 and C1.2. Therefore, bigeye tuna, *Thunnus obesus* in FAO Area 51 Indian Ocean Western is **APPROVED** by the assessor for the production of fishmeal and fish oil under the current MarinTrust v 2.0 by-products standard.
Fishery Assessment Peer Review Comments
The assessor correctly classified bigeye tuna, *Thunnus obesus* in FAO Area 51 Indian Ocean Western as category C, the stock is managed, and reference points are defined to assess the stock status against. Fishery removals from the stock are considered in the stock assessment process. The most recent stock assessment shows that the stock is considered to have a biomass above the limit reference point (SB2018 is above SBMSY with high probability (65.4%), fishing mortality is above FMSY also with high probability, hence stock is not overfished but subject to overfishing). Therefore, bigeye tuna, *Thunnus obesus* in FAO Area 51 Indian Ocean Western passes both C1.1 and C1.2 and is approved.
Notes for On-site Auditor

Species Categorisation

NB: If any species is categorised as Endangered or Critically Endangered on the IUCN Red List, or if it appears in CITES Appendix 1, it **cannot** be approved for use as an MarinTrust raw material.

IUCN Red list Category

By-product material from a species listed by IUCN (the International Union for Conservation of Nature) under the Red List for the following categories shall immediately fail the assessment;

- EXTINCT (E) AND EXTINCT IN THE WILD (EW)

- CRITICALLY ENDANGERED (CR) facing an extremely high risk of extinction in the wild.

- ENDANGERED (EN) facing a very high risk of extinction in the wild.

By-product material may be used from the following categories provided that all clauses in the MarinTrust standard are passed.

- VULNERABLE (VU) facing a high risk of extinction in the wild.

- NEAR THREATENED (NT) does not qualify for above now, but is close or is likely to qualify for, a threatened category in the near future.

- LEAST CONCERN (LC) Widespread and abundant.

- DATA DEFICIENT (DD) and NOT EVALUATED (NE)

Table 3. Species Categorisation Table.

Common name	Latin name	Stock	Management	Category	IUCN Red List Category[1]	CITES Appendix 1[2]
Bigeye Tuna	*Thunnus obesus*	Indian Ocean	IOTC	C	VU	No

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[1] https://www.iucnredlist.org/
[2] https://cites.org/eng/app/appendices.php

CATEGORY C SPECIES

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. Where a species fails this Clause, it should be assessed as a Category D species instead.

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.	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:	

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.

The fisheries removals are reported as commercial catches. Data are considered to be relatively reliable for the main industrial fleets targeting bigeye tuna, with the proportion of catches estimated or adjusted by the IOTC Secretariat relatively low. Therefore, each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards.

Therefore, fishery removals are considered in the stock assessment and it **PASSES** clause C1.1.

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.

In 2019 a new stock assessment was carried out for bigeye tuna in the IOTC area of competence to update the stock status undertaken in 2016. Two models were applied to the bigeye stock (JABBA and Stock Synthesis (SS3)). The stock assessment selected to provide scientific advice was carried out using SS3, a fully integrated model used to provide scientific advice for the three tropical tunas stocks in the Indian Ocean. The reported stock status is based on the SS3 model formulation using a grid of 18 model configurations designed to capture the uncertainty on stock recruitment relationship, the influence of tagging information and selectivity of longline fleets. Due to concerns on the reported catch data for 2018, the stock status is based on SS3 model formulations using the best catch estimate by the Scientific Committee (for details see WPTT report).

Spawning biomass in 2018 was estimated to be 31% of the unfished levels in 2018 (Table 3) and 122% (82–181%) of the level that can support MSY. The assessment outcome is qualitatively different to the stock assessment conducted in 2016 due to the increase of catch of small size, changes in modelling assumptions about longline selectivity, and the abundance index developed in 2019. Considering the characterized uncertainty, the assessment indicates that SB2018 is above SBMSY with high probability (65.4%) and that fishing mortality is above FMSY also with high probability (72.8%). The median value of MSY from the model runs presented with SS3 was 87,000 t with a range between 75,000 and 108,000 t (a median level 16% lower than the estimate in 2016). Catches in 2018 (~81,413 t) remain lower than the estimated median MSY values from the stock assessment conducted in 2019 but within the range of estimated MSY. The average catch over the previous five years (2014–18; ~89,717 t) is just above the estimated median MSY and within the range of estimated values. Thus, on the weight-of-evidence available in 2019, the bigeye tuna stock is determined to be **not overfished** but **subject to overfishing.**

The SS3 projections from the 2019 assessment show that there is a risk of breaching MSY-based reference points by 2021, and 2028 if catches are maintained at 2018 levels at the2018 selectivity and therefore size distribution of catch (Table 1). Should the management objective of maintaining biomass at levels higher than SBMSY with more than 50% probability in 2028 be pursued, the overall catch should be reduced 10% from 2018 levels (73,272 MT).

Table 3. Bigeye Tuna: Stock Synthesis base case Indian Ocean assessment Kobe II Strategy Matrix. Probability (percentage) of violating the MSY-based target (top) and limit (bottom) reference points for constant catch projections (relative to average catch level from 2018 (81,413 MT); -10%, -20%, -30%, -40%) projected for 3 and 10 years. Source: IOTC stock assessment 2019.

Reference point and projection timeframe	Alternative catch projections (relative to the catch level from 2018) and weighted probability (%) scenarios that exceed reference point				
	60% (48,848 t)	70% (56,990 t)	80% (65,130 t)	90% (73,272 t)	100% (81,413 t)
$SB_{2021} < SB_{MSY}$	51.1	53.3	54.2	57.1	58.9
$F_{2021} > F_{MSY}$	7.3	17.8	32	47.9	62.8
$SB_{2028} < SB_{MSY}$	8	19.5	35.1	49.1	60.8
$F_{2028} > F_{MSY}$	1.1	6.9	19.8	37.7	55.6
Reference point and projection timeframe	Alternative catch projections (relative to the catch level from 2018) and probability (%) of violating MSY-based limit reference points ($SB_{Lim} = 0.5\ SB_{MSY}$; $F_{Lim} = 1.3\ F_{MSY}$)				
	60% (48,848 t)	70% (56,990 t)	80% (65,130 t)	90% (73,272 t)	100% (81,413 t)
$SB_{2021} < SB_{Lim}$	0	0	0	0	0
$F_{2021} > F_{Lim}$	6.0	11.0	17.0	28.0	39.0
$SB_{2028} < SB_{Lim}$	0.0	0.0	6.0	11.0	22.0
$F_{2028} > F_{Lim}$	0.0	6.0	17.0	22.0	39.0

Following the information in the table above and the results of the Kobe plot from 18 models, the median stock status has showed that the stock is not overfished, therefore, it is above biomass reference point and it **PASSES** clause C1.2.
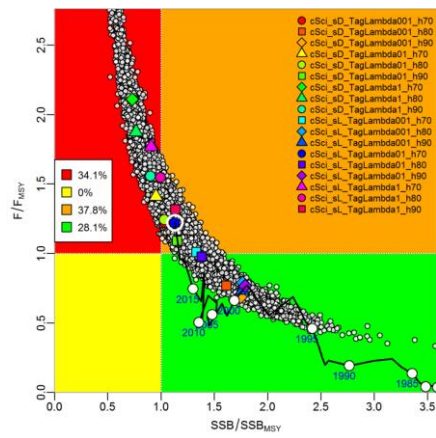

Figure 1. Bigeye Tuna: SS3 Aggregated Indian Ocean assessment Kobe plot. The coloured points represent stock status estimates from the 18 model options. The grey dots represent 5,000 estimates of 2018 stock status from the multivariate normal approximation from the mean and variance-covariance of the 18 model options. The legend indicates the estimated probability of the stock status being in each of the Kobe quadrant. The white circle (around the blue dot) represents the median stock status in 2018.

References	
Indian Ocean Tuna Commission. 2019 Stock Assessment Appendix 9 executive summary: Bigeye Tuna (2020). https://www.iotc.org/science/status-summary-species-tuna-and-tuna-species-under-iotc-mandate-well-other-species-impacted-iotc	
Links	
MarinTrust Standard clause	1.3.2.2
FAO CCRF	7.5.3
GSSI	D.3.04, D5.01

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CATEGORY D SPECIES

Category D species are those which 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. 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.

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**
Availability (area overlap)			
Encounterability (the position of the stock/species within the water column relative to the fishing gear)			
Selectivity of gear type			
Post-capture mortality			
		Average Susceptibility Score	
		PSA Risk Rating (From Table D3)	
		Compliance rating	
Further justification for susceptibility scoring (where relevant) *For susceptibility attributes, please provide a brief rationale for scoring of parameters where there may be uncertainty affecting your decision*			
References			
Standard clauses 1.3.2.2			

Table D2 - Productivity / Susceptibility attributes and scores.

Productivity attributes	Low productivity/ High risk — Score 3	Medium productivity/ Medium risk — Score 2	High productivity/ Low risk — 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 — Score 3	Medium susceptibility/ Medium risk — Score 2	Low susceptibility/ Low risk — 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 - 1.75	**1.76 - 2.24**	**2.25 - 3**
Average Productivity Score	**1 - 1.75**	PASS	PASS	PASS
	1.76 - 2.24	PASS	PASS	TABLE D4
	2.25 - 3	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

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.

References

Links	
MarinTrust Standard clause	1.3.2.2, 4.1.4
FAO CCRF	7.5.1
GSSI	D.5.01