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

Fishery Under Assessment	Bali sardinella (*Sardinella lemuru*) Pacific Central Northwest FAO areas 61,71
Date	October 2019
Assessor	Jim Daly

Application details and summary of the assessment outcome	
Name: TC Union	
Address:	
Country: Thailand	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
Jim Daly	Vito Romito	0.5	SURV 2	By-product
Assessment Period	2018-2019			

Scope Details	
Management Authority (Country/State)	International
Main Species	Bali sardinella (*S. lemuru*)
Fishery Location	Pacific Central Northwest FAO areas 61,71
Gear Type(s)	Pelagic gears
Outcome of Assessment	
Overall Outcome	PASS
Clauses Failed	NONE
Peer Review Evaluation	APPROVE
Recommendation	PASS

Assessment Determination

This by-product is imported into Thailand from vessels fishing mainly in the Pacific Central Northwest FAO areas 61, 71. A separate assessment is provided for the closely related Indian oil sardine *S. longiceps*.

There is a fishery management framework at the national level (Thailand) although this is not applied specifically to *Bali sardinella*. Fisheries management in general is supported by data collection and stock assessment, but species-specific research is extremely limited. There is no evidence of any species-specific management measures for *Bali sardinella* in FAO 61 or 71.

FAO catch statistics indicate large-scale annual fluctuations in the landings of this species, but at present global landings show no indication of a significant population decline. Further research is needed on the factors determining population fluctuations and recruitment levels, and to determine if localised or regional removals are occurring. Without regulation, fishing effort could exceed sustainable levels and become a major threat to the population. The number and geographical limits of *Bali sardinella stocks* is not clearly understood.

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 fishery is assessed and passes using the risk-based Productivity Susceptibility Analysis (PSA) as per IFFO-RS v 2.0 procedures for Category D (by-product) species.

Sardinella lemuru has been assessed as a near threatened species by the IUCN red list and is currently not listed on the CITES appendices of endangered or threatened species (websites accessed 27.09.19).

The assessment team recommends the approval of this material against the IFFO RS by-product standard V 2.0 to produce fishmeal and fish oil.

Peer Review Comments

The fishery here has been assessed through and passes the risk-based Productivity Susceptibility Analysis (PSA) as per IFFO-RS v 2.0 procedures for Category D (by-product) species.

The Peer Reviewer agrees with the assessment team to recommend the approval of this material against the IFFO RS by-product standard V 2.0 to produce fishmeal and fish oil.

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				
Category D	Bali sardinella (*Sardinella lemuru*)	N/A	**PASS**	

[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** 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
Bali sardinella	*Sardinella lemuru*	Pacific NW	N/A	International	D

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 most 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:	Bali sardinella *Sardinella lemuru*		
	Productivity Attribute		**Value**	**Score**
	Average age at maturity (years)		1.3	1
	Average maximum age (years)		3	1
	Fecundity (eggs/spawning)		Not known	-
	Average maximum size (cm)		23 cm	1
	Average size at maturity (cm)		14-15	1
	Reproductive strategy		Broadcast spawners	1
	Mean trophic level		2.5	1
		Average Productivity Score		**1**
	Susceptibility Attribute		**Value**	**Score**
	Overlap of adult species range with fishery		Species found mainly in FAO 61	3
	Distribution		Throughout region	1
	Habitat		Pelagic	2
	Depth range		15-100m	3
	Selectivity		1 to 2 times mesh size	2
	Post-capture mortality		Most dead / retained	3
		Average Susceptibility Score		**2.3**
		PSA Risk Rating (From Table D3)		**PASS**

References

R1 Marine Fisheries Management Plan of Thailand (2016) ppt 26pp

R2 FAO Species Fact Sheets S. lemuru: http://www.fao.org/fishery/species/2892/en

R3 Government of India. 2014. Report of the Technical Committee to Review the Duration of the Ban Period and to Suggest Further Measures to Strengthen the Conservation and Management Aspects. pdf 90 pp

R4 FishBase: https://www.fishbase.de/Summary/SpeciesSummary.php?ID=1510&AT=bali+sardinella

R5 Fishsource Bali sardinella: https://www.fishsource.org/stock_page/2041

R6 IUCN Red List http://www.iucnredlist.org/details/154989/

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.