RESPONSIBLE
SUPPLY

IFFO RS ASSURED

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

Fishery Under Assessment	Round sardinella *Sardinella aurita* FAO 34 Eastern Central Atlantic
Date	February 2020
Assessor	Jim Daly
Stock Pass	FAO 34
Stock Fail	

Application details and summary of the assessment outcome				
Name: Laayoune Protein				
Address:				
Country: Morocco		Zip:		
Tel. No.:		Fax. No.:		
Email address:		Applicant Code:		
Key Contact:		Title:		
Certification Body Details				
Name of Certification Body:		SAI Global Ltd		
Assessor	Peer Reviewer	Assessment Days	Initial/Surveillance/ Re-approval	Whole fish/ By-product
Jim Daly	Vito Romito	0.5	SURV 1	By-product
Assessment Period	2020			

Scope Details	
Management Authority (Country/State)	Ministre de l'Agriculture et de la Pêche maritime (Maroc); EU; Russia
Main Species	Round sardinella *Sardinella aurita*
Stock:	FAO 34
Fishery Location	Eastern Central Atlantic
Gear Type(s)	Seine, pelagic trawl, artisanal
Outcome of Assessment	
Peer Review Evaluation	AGREE
Recommendation	APPROVE

Assessment Determination
If any species is categorised 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 IFFO RS raw material. Round sardinella does not appear as Endangered or Critically Endangered on IUCN's Red List, nor does it appear in CITES appendices; therefore, Round sardinella is eligible for approval for use as IFFO RS by-product raw material. One stock forms part of this assessment: 1) FAO 34 Atlantic, Eastern Central Fishery removals of the stock are considered in the various stock assessment processes so the stock **PASSES** Clause C1.1. For Round sardinella in the assessment area the most recent estimated spawning stock biomass (SSB) is at 0.25 B_{MSY}. The FAO Working Group concluded that because of inadequate data provided by countries with major sardinella fisheries, results of analytical assessments do not provide reliable estimates of the current level of fishing mortality, nor of the amount of effort reduction required to bring exploitation back to a sustainable level. The stock **FAILS** Clause C1.2. According to IFFO RS procedures a stock that does not meet minimum requirements of a Category C assessment (Clauses C1.1; C1.2) should be re-assessed as Category D. The species has passed this risk-based assessment (**Table D3**). Round Sardinella in the assessment area is approved by SAI Global assessors for the production of fishmeal and fish oil under the IFFO-RS v 2.0 by-products standard.
Peer Review Comments
Notes for On-site Auditor

HOW TO COMPLETE THIS ASSESSMENT REPORT
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
Round sardinella	*S. aurita*	FAO 34	N/A	Ministre de l'Agriculture et de la Pêche maritime (Maroc); EU; Russia	C, D

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	Round sardinella *S. aurita*		
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.	**FAIL**
Clause outcome:			**FAIL**
C1.1 **Evidence** This assessment covers Round Sardinella including the area outlined in **Figure 1.** FAO considers a single stock unit ranging from south of Senegal to Morocco's northern border. Round sardinella are exploited in the artisanal and industrial small pelagic fisheries of Morocco, Mauritania, Senegal and Gambia.			
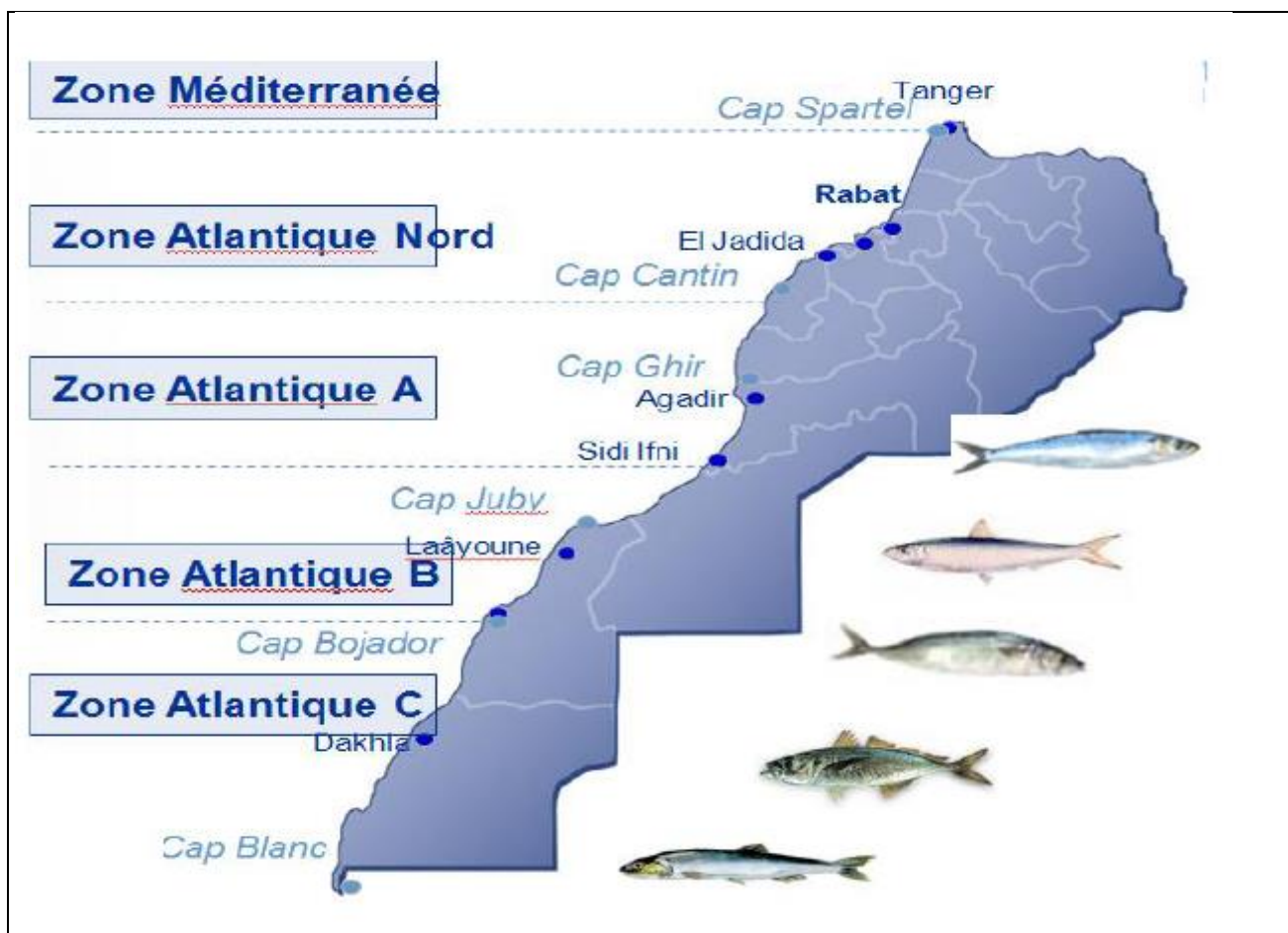
Figure 1: Fishing zones for management purposes off the Moroccan Coast **R1**

The round sardinella fishery is managed as a multi-species fishery with two management zones:
a) The zone 'Atlantique centre' (central zone, zones A+B) and b) The zone 'Atlantique sud' (south zone, zone C) (**Figure 1**).

Licensed vessels are required to submit logbooks and landings declarations, there appear to be good statistics on catch and effort.

The Committee for Eastern Central African Fisheries (CECAF) and the Institut National de Research Halietique (INRH) conduct annual acoustic surveys onboard the (Moroccan) research vessel N/V Al Amir Moulay Abdellah.

In the absence of reliable long-term series of abundance indices, the FAO Working Group (2018) could not apply the Biodyn production model. For the 2018 assessment the Working Group trialled the SPICT model; a production model that can utilize multiple series of (incomplete) abundance indices.

SPICT is a state space model fitting a surplus production model in a statistical framework based on estimation by maximum likelihood. SPICT uses small time steps (1/16 of the year) and is therefore considered in "continuous time".

C1.2
Evidence
Since 2010, biomass of Round sardinella has been decreasing continuously to reach very low levels in recent years, at around 0.25 BMSY (**Figure 2**):
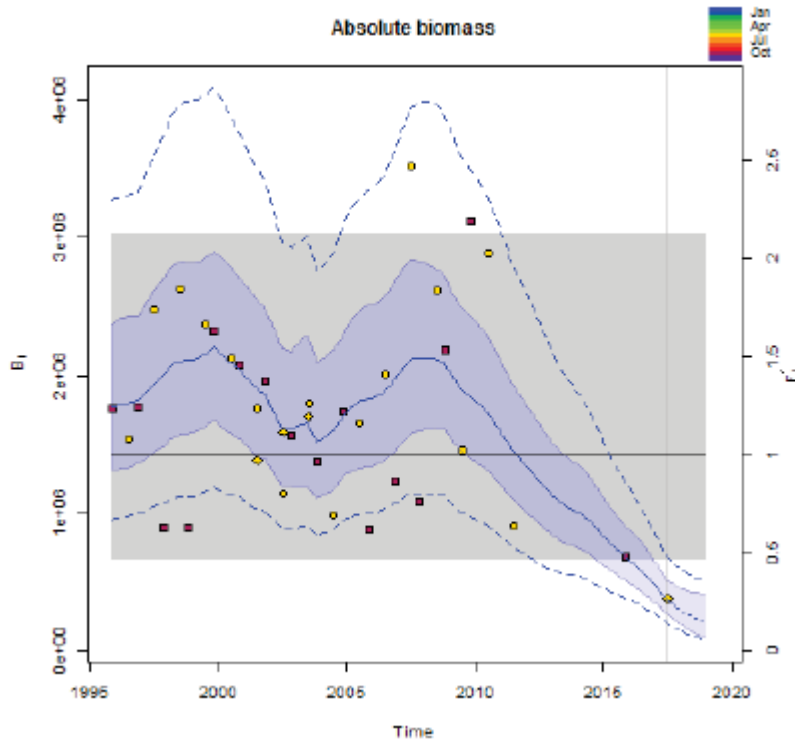
Figure 2: Output of the SPICT assessment. Estimated trend in B (Left hand side) and B/BMSY (Right hand side) with 50%, 90% confidence intervals. Survey indices values (red squares: acoustic autumn, yellow circles: acoustic summer, yellow squares: Dutch CPUE). Confidence interval of Bmsy (blue horizontal band) **R2.**

Stock trajectory in the Kobe plot shows that the stock has moved from the status of under exploitation to a status of heavy overexploitation. This diagnostic however is highly uncertain, as there are large uncertainties both in stock trajectory and reference points estimates (**Figure 3**):
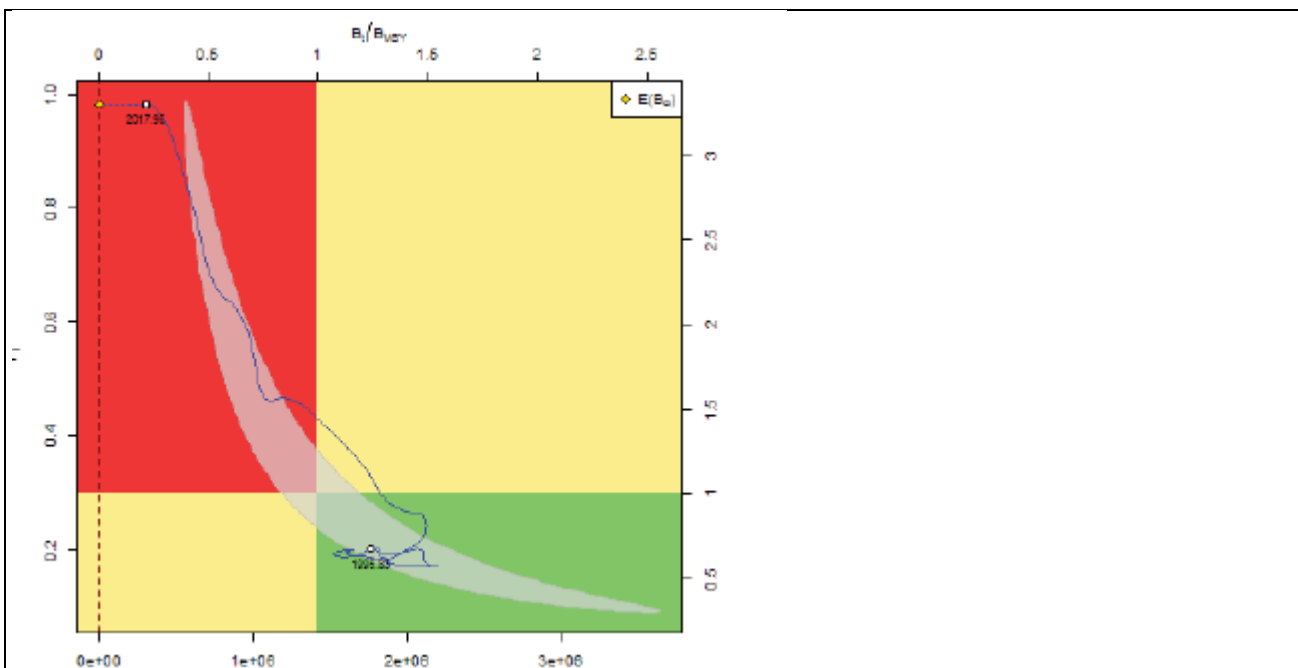
Figure 3: Kobe plot showing the trajectory of the stock with respect to B/B$_{MSY}$ (horizontal) and F/F$_{MSY}$. **R2**

Fishing mortality is calculated to be well above F$_{MSY}$ (**Figure 3**).

The Working Group have concluded that because of inadequate data provided by countries with the major sardinella fisheries, results of the analytical assessments do not provide reliable estimates of the current level of fishing mortality, nor of the amount of effort reduction required to bring exploitation back to a sustainable level.

Sardinellas are considered overfished throughout the entire West African region. Additional reference points for *Sardinella aurita* were not available. It was not possible to determine if the species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy). The stock has failed the Category C assessment.

References
R1: Moroccan Sardine FIP Assessment in relation to the MSC Standard (2016) Consultant Jo Gascoigne 28pp pdf https://fisheryprogress.org/fip-profile/morocco-sardine-pelagic-trawl-and-seine-maroc-sardine-chalut-pelagique-et-senne

R2: FAO WORKING GROUP ON THE ASSESSMENT OF SMALL PELAGIC FISH OFF NORTHWEST AFRICA Banjul, the Gambia June 2018 336pp http://www.fao.org/documents/card/en/c/ca4121b

R3: Fishbase Round Sardinella:
https://www.fishbase.in/Summary/SpeciesSummary.php?ID=1043&AT=round+sardinella

Standard clauses 1.3.2.2

D1	Species Name:	Round Sardinella	*Sardinella aurita*	
	Productivity Attribute		**Value**	**Score**
	Average age at maturity (years)*		2.7	2
	Average maximum age (years)		7	1
	Fecundity (eggs/spawning) *		26,550	1
	Average maximum size (cm)		36	1
	Average size at maturity (cm)		14.4	1
	Reproductive strategy		Broadcast	1
	Mean trophic level		3.4	3
		Average Productivity Score		**1.43**
	Susceptibility Attribute		**Value**	**Score**
	Overlap of adult species range with fishery		No data	-
	Distribution		Global	1
	Habitat		Not used	-
	Depth range		0-350m	1
	Selectivity		>2 mesh	3
	Post-capture mortality		Short tows	2
		Average Susceptibility Score		**1.75**
		PSA Risk Rating (From Table D3)		**PASS**

References:

Life History Tool R3

This Category D assessment covers Round Sardinella included in the area outlined in **Figure 1**.

Stock Distribution Attribute:

Figure 4: Global distribution Round Sardinella **R3**

Life History Data on *Sardinella aurita*
Round sardinella

Family:	Clupeidae — Herrings, shads, sardines, menhadens
Max. length (Lmax):	36.0 cm TL
L infinity (Linf):	= 37.0 cm TL [Recalculate]
K:	0.26 /year $\emptyset'$ = 2.55 [Recalculate] [Growth & mortality data] Median $\emptyset'$ value with related Linf. and K.
to:	-0.61 years Estimated from Linf and K.
Natural mortality (M):	0.49 s.e. 0.32 – 0.74 /year [Recalculate] Estimated from Linf., K and annual mean temp. = 17.5 °C
Life span (approx.):	10.9 years Estimated from Linf., K and to. [Max. age & size data]
Generation time:	3.1 years Estimated from Lopt, Linf., K and to.
Age at first maturity (tm):	2.7 years Estimated from Lm, Linf., K and to.
L maturity (Lm):	21.4 s.e. 16.0 - 28.7 cm TL Estimated from Linf. [Maturity data]
L max. yield (Lopt):	22.9 s.e. 19.4 - 27.1 cm TL Estimated from Linf.
Length-weight:	37.0 cm TL => 413.2 g (wet weight) [Recalculate] [Length-weight data] W = 0.0062 * L ^ 3.07600
Nitrogen & protein:	Weight 414 (g) => whole-body nitrogen (N) 11.1 (g) => whole-body crude protein 69.3 (g) [Recalculate]
Reproductive guild:	nonguarders: open water/substratum egg scatterers [Reproduction]
Fecundity:	26,555 [9,700-72,700] Estimated as geometric mean. [Fecundity]
Relative Yield per Recruit (Y'/R):	0.0311 Estimate Y'/R from M/K, Lc/Linf and E. Lc=14.8 cm TL E=0.50 /year Emsy 0.63 /year Eopt 0.57 /year Fmsy 0.83 /year Fopt 0.65 /year [Recalculate]

Figure 5: Life history data *Sardinella aurita* **R3**