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Global Standard for Responsible Supply of Marine Ingredients

Fishery Assessment Methodology and Template Report V2.0

Fishery Under Assessment	**European pilchard (*Sardina Pilchardus*) FAO area 34**
Date	**February 2019**
Assessor	**Jim Daly**

Application details and summary of the assessment outcome				
Name: TC Union Ltd				
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	V.Polonio	0.5	Surveillance YR 2	By-product
Assessment Period	2018			

Scope Details	
Management Authority (Country/State)	**Morocco, Mauritania, Senegal**
Main Species	**European pilchard (*Sardina Pilchardus)***
Fishery Location	**FAO area 34**
Gear Type(s)	**Pelagic gears**
Outcome of Assessment	
Overall Outcome	**PASS**
Clauses Failed	**NONE**
Peer Review Evaluation	**AGREE**
Recommendation	**APPROVE**

Assessment Determination

This by-product is imported into Thailand from vessels fishing in FAO 34 (NW African, Central and Southern, **Figure 1**). Management is supported by species specific data collection and stock assessment, A FAO Working Group (reviewed periodically by the Committee for Eastern Central African Fisheries CECAF) provides annual assessments and a detailed assessment undertaken in 2018 of the entire small pelagic fishery in the Sub-region (FAO, 2018a). A Fishery Improvement Project (FIP) targeting pelagic trawl and purse seine fisheries is in operation. Current progress in the FIP is rated A. An update report was due in January 2019.

West African stocks are captured in industrial and artisanal small pelagic fisheries in Morocco, Mauritania, Senegal, and the Gambia that also target European anchovy *Engraulis encrasicolus*, Sardinella *Sardinella spp*., Horse mackerel *Trachurus* spp. and Chub mackerel *Scomber japonicus*

Research surveys are undertaken by vessels from Morocco's Institut National de Research Halietique (INRH). There is a Sub-Regional Fisheries Commission (Commission Sous-Régionale des Pêches, CSRP; including Mauritania and Senegal) that, jointly with Morocco, has conducted efforts to assess and manage transboundary small pelagic stocks shared within the Sub-region. Fishery removals of the species in the fishery under assessment are included in the stock assessment process. **The species passes Clause C1.1.**

Support should be given to CSRP in their efforts to develop strategic plans for the management of small pelagics fisheries. Management plans should include species specific TACs, joint setting of TACs, and consideration of how environmental variability may affect stock status.

A CECAF expert panel review of the FAO working group's methods (used to assess the status of the *S.pilchardus* stock in 2012) recommended that, given the apparent large influence of environmental effects on the stock, inclusion of sea surface temperature in the model would improve its usefulness with regard to management advice. The FAO working group, meanwhile, has recently recommended improvements in age and effort data to support more robust assessments (FAO 2018a).

The total sardine catch in the North region in 2016 went up by 18% compared to that of 2015 from around 908,000 tonnes to over 1,067,000 tonnes. More than 69% of catches are taken in the Moroccan zone, over 9% from the Mauritanian zone. The FAO Working Group (2018) considers that the *S.pilchardus* stock in Area A, B, (**Figure 1**) is not fully exploited. However, the instability of the resource vis-à-vis hydroclimatic

changes requires the adoption of a precautionary approach and a reduction in sardine catches in this zone; limiting the sardine catch in this zone to not exceeding 550,000 tonnes.

For this stock in Area C (**Figure 1**) the low level of fishing mortality shows the stock is not fully exploited. However given that this stock has experienced large fluctuations in biomass indices since 1995 (FAO Annual Reports), not due to the fishery but possibly linked to environmental changes, it is recommended to monitor the state of this stock by methods independent of the fishery in the zone. The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy). **The species passes Clause C1.2.**

Interaction of the Moroccan and Mauritanian small pelagic fisheries with protected species is poorly documented, and further study is needed. There are no related MSC Certifications.

The European pilchard (*Sardina Pilchardus)* is a species of least concern (IUCN Red List) and is not on the current list of CITES endangered species (websites accessed 04.02.19)

The European pilchard (*Sardina Pilchardus)* is approved by the assessment team for the production of fishmeal and fish oil under the IFFO-RS v 2.0 standard (by-products).

Peer Review Comments
Agree
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	European pilchard (*Sardina Pilchardus*)	N/A	Morocco, Mauritania, Senegal	
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
Pilchard	*Sardina pilchardus*	FAO 34 NW African Central and Southern	N/A	Morocco, Mauritania, Senegal	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		**European pilchard** *Sardina pilchardus*	
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

C1.1:

The Moroccan National Fisheries Research Institute (Institut National de Recherche Halieutique, INRH) conducts regular research on the status of exploited marine resources. Stock assessments and advised catch limits have typically been performed by a FAO working group but the INRH has also been publishing stock status reports in recent years. The latest summary FAO report was published in 2018 (FAO, 2018a).

The Mauritanian Institute of Oceanographic Research and Fisheries (Institut Mauritanien de Recherches Océanographiques et des Pêches, IMROP) also performs scientific campaigns to assess the status of the exploited stocks in the country.

The West African European pilchard profiles reflect two assessment units delineated by the FAO (FAO 2018a): one in zones "A + B" (Central) and another in zone "C" (Southern, **Figure 1**), Other recent work supports the distinction of these two stock units.

The FAO Working Group also observed a slight decrease in total catch of the main small pelagic fish species in the region from 2014-2015, from around 2.5 million tonnes in 2014 to around 2.4 million tonnes in 2015, constituting a 5% decrease. In 2016, an increase of 13% in relation to 2015 catches was observed. Sardine (*Sardina pilchardus*) remains the dominant species, constituting about 40% of overall catches in 2016.

Morocco is the only country in the CECAF North region that conducted acoustic surveys in 2016 (November-December) and December 2016-January 2017 respectively. From 2003 to 2016, nine surveys to study the recruitment of small pelagics were carried out in winter covering predominantly the area between Cape Cantin (32 °N) in the North to Saint-Louis in the South (16 °N) by the RV Atlantida **(Figure 1**). The Working Group has, in general, favoured the use of abundance estimates from the scientific acoustic surveys as the abundance index for the models, but unfortunately, regional survey estimates have not been available for the last few years (FAO, 2018a). The main model used by the Working Group was the dynamic version of the Schaefer (1954) model.

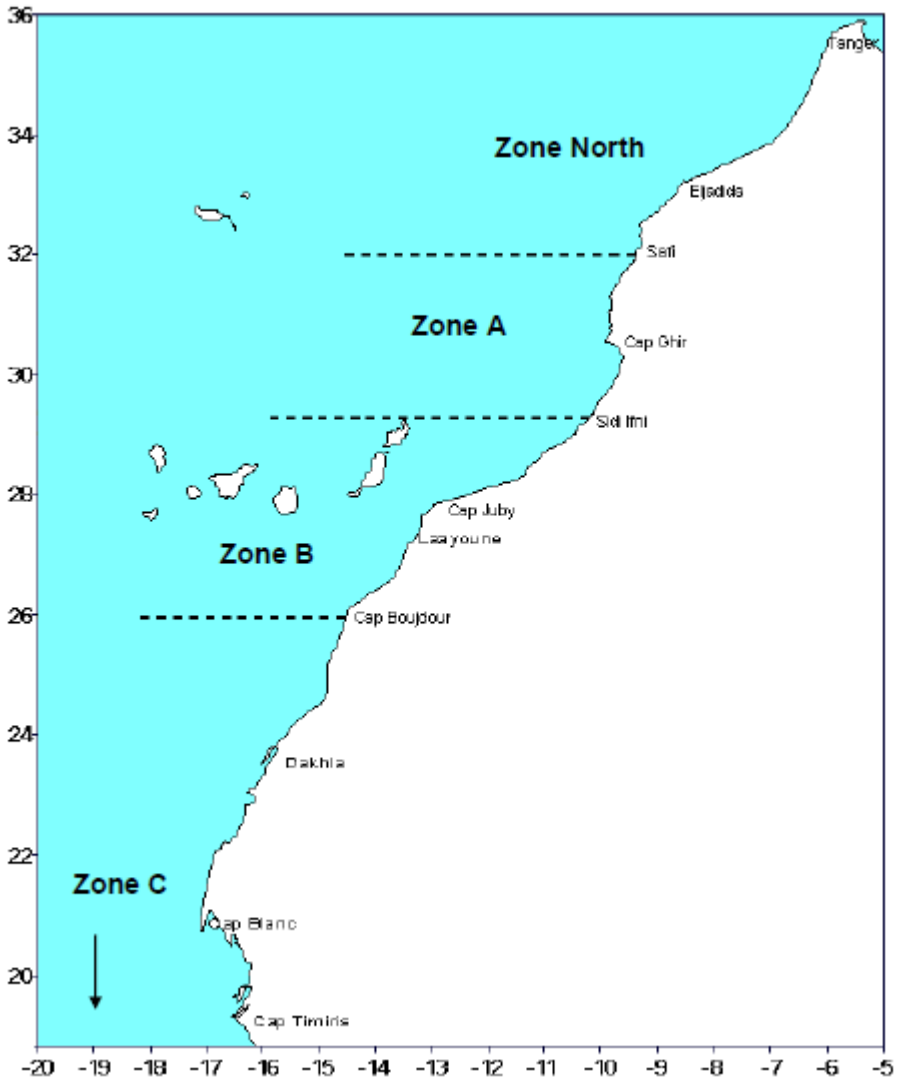

Figure 1: Stock Units and Sardine Fisheries **R2**

Under fishing agreements, Morocco has authorized Russian fishing vessels to operate in the zone south of the 28°00 parallel North beyond 15 nautical miles from the coast under the Morocco-Russia fishing agreement. With regard to the European fleet, fishing licences are granted to purse seiners to operate mainly north of 34°18'00"N, beyond two nautical miles and to pelagic trawlers to operate south of 29°00 latitude North beyond 15 nautical miles and beyond 8 nautical miles for the pelagic freezer trawlers and RSW (Refrigerated Sea Water) pelagic trawlers respectively (**Figure 1**).

The total sardine catch in the North region in 2016 went up by 18% compared to that of 2015 from around 908,000 tonnes to over 1,067,000 tonnes. More than 69% of catches are taken in the Moroccan zone, over 9% taken from the Mauritanian zone. The catch from the Senegalese zone is small (0.3 percent) (FAO 2018a).

The biological sampling programme in Moroccan ports was continued in 2016 on landings in the main ports of the different fishery zones (Zone North, Zone A+ B and Zone C).
Fishery removals of the species in the fishery under assessment are included in the stock assessment process.
The species passes clause C 1.1.

C 1.2:

Reference points resulting from the application of the dynamic production model (Zones A & B) show that the current biomass level is higher than target biomass B0.1 and fishing mortality is below the mortality F0.1 (**Table 1**):

Table 1: Results of fitting the Schaefer dynamic production model for the Stock A+B of sardine *Sardina pilchardus* ***R2***

Stock/abundance index	B_{cur}/B_{MSY}	$B_{cur}/B_{0.1}$	F_{cur}/F_{Sycur}	F_{cur}/F_{MSY}	$F_{cur}/F_{0.1}$
Sardine, Zones A+B/ Nansen (1995-2016) / *Al Amir Moulay Abdellah* index in 2015 and 2016	152%	138%	99%	40%	44%

The results of the LCA model for assessing the stock in Zone C were not conclusive and were not retained by the Working Group. The results of the dynamic production model using the two series of indices were satisfactory for the stock in Zone C. Reference points derived from the application of the model for this stock show that the current biomass level is far above the target biomass B0.1 and the current fishing mortality is far less than the mortality F0.1:

Table 2: Summary of results of fitting the Schaefer dynamic production model for Stock C of sardine *Sardina pilchardus* **R2**

Stock/abundance indices	B_{cur}/B_{MSY}	$B_{cur}/B_{0.1}$	F_{cur}/F_{Sycur}	F_{cur}/F_{MSY}	$F_{cur}/F_{0.1}$
Sardine, Zone C/ Nansen (1995-2015)	152%	138%	110%	53%	58%
Sardine, Zone C/ Nansen (1995-2016)	144%	131%	111%	62%	69%

Where:

Bcur/BMSY : Ratio between the estimated biomass for the last year of the series and the biomass corresponding to F0.1.
Bcur/B0.1: Ratio between the estimated biomass for the last year of the series and the biomass corresponding to F0.1.
Fcur/FSycur : Ratio between the observed fishing mortality coefficient for the last year of the series and that which would give a sustainable catch for the current biomass.
Fcur/FMSY : Ratio between the observed fishing mortality coefficient for the last year of the series and that which would give a maximum sustainable yield over the long-term.
Fcur/F0.1 : Ratio between the fishing mortality coefficient observed for the last year of the series and F0.1.

***S.pilchardus* Stock in Zones A + B:**

The biomass level in 2016 which is higher than the target biomass B0.1 attests to an improvement in the central sardine stock (A+B) similar to 2014 and 2015. The FAO Working Group (2018a) considers that this stock is not fully exploited. However, the instability of the resource vis-à-vis hydroclimatic changes requires the adoption of a precautionary approach and a reduction in sardine catches in this zone; limiting the sardine catch in this zone to not exceed 550, 000 tonnes.

***S.pilchardus* Stock in Zone C:**

For stock in Zone C, the biomass level in 2016 was still higher than the biomass B0.1 and the fishing mortality level Fcur below F0.1 although the acoustic biomass decreased in 2016. This low level of fishing mortality shows the stock is not fully exploited. However, given that this stock has experienced large fluctuations in biomass indices since 1995 (FAO Reports), which are not due to the fishery but possibly linked to environmental changes, it is recommended to monitor the state of this stock by methods independent of the fishery in the zone.

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

The species therefore passes Clause C1.2.

References

R1 Fishsource *S.pilchardus* https://www.fishsource.org/stock_page/782
R2 FAO. 2018a. Report of the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa. Nouadhibou, Mauritania, 22‑27 May 2017. 284 pp. Rome, Italy. http://www.fao.org/3/i8896b/I8896B.pdf
R3 Ministre de l'Agriculture et de la Pêche maritime http://www.agriculture.gov.ma/
R4 Institut National de Research Halietique (INRH) 2016. Etat des stocks et des pêcheries Marocaines http://www.inrh.ma/fr/publications/etat-des-stocks-et-des-p%C3%AAcheries-marocaines-2016
R5 Jo Gascoigne Moroccan Sardine FIP Assessment in relation to the MSC Standard (2016) 28pp pdf https://fisheryimprovementprojects.org/wp-content/uploads/Sustainability-evaluation-Fev2016.pdf
R6 CITES Species Endangered list: http://checklist.cites.org/#/en
R7 IUCN Red list: http://www.iucnredlist.org/search
R8 Fishery Progress.org: https://fisheryprogress.org/fip-profile/morocco-sardine-pelagic-trawl-and-seine-maroc-sardine-chalut-p%C3%A9lagique-et-senne

Standard clauses 1.3.2.2