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IFFO RS
Global Standard for Responsible Supply
of Marine Ingredients

IFFO RS Limited

T: +44 (0) 2030 539 195
E: Standards@iffors.com
W: www.iffors.com

Unit C, Printworks | 22 Amelia Street
London, SE17 3BZ | United Kingdom



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



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Fishery Under Assessment	Sardine <i>Sardina pichardus</i> FAO 34 (Zones A,B,C)
Date	September 2019
Assessor	Jim Daly

Application details and summary of the assessment outcome

Name: Laayoune Proteins	
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 Name	Peer Reviewer	Assessment Days	Initial/Surveillance/Re-approval	Whole fish/By-product
Jim Daly	Conor Donnelly	0.5	SURV 1	By-product
Assessment Period	2019			

Scope Details

Management Authority (Country/State)	Ministre de l'Agriculture et de la Pêche maritime (Maroc); EU; Russia
Main Species	Sardine <i>Sardina pichardus</i>
Fishery Location	FAO 34. Zones A, B, C only
Gear Type(s)	Seine, pelagic trawl, artisanal
Outcome of Assessment	
Overall Outcome	PASS
Clauses Failed	NONE
Peer Review Evaluation	APPROVE
Recommendation	PASS

Assessment Determination

In Morocco the small pelagic fishery has a range of target species of which sardine is by far the most important. The sardine fishery is managed as part of a multi-species fishery with two management zones: The zone 'Atlantique centre' (central zone, zones A+B) and the zone 'Atlantique sud' (south zone, zone C) (Figure 1). According to the latest assessment (see below) the stock of Sardine (*Sardina pilchardus*) in Zones A+B and C are considered not-fully exploited.

The latest FAO Working Group was held in Mauritania (May 2017). The Group assessed the status of small pelagic resources in Northwest Africa and made projections on future effort and catch levels. Advice for stocks is given in relation to agreed target and limit reference points (F0.1, B0.1, FMSY, and BMSY) and on the basis of projections for the next four or five years. The 2017 Working Group recommends that catches of sardine in zone (A+B) should be limited and should not exceed 550, 000 tonnes. Sardine in Zone C is also considered not fully exploited.

This stock is influenced by environmental factors and shows fluctuations independent of fishing. Considering the fluctuations in biomass, the Working Group recommended that total catch should be adjusted according to observed natural changes that influence this stock. Stock structure and abundance should be closely monitored by fishery independent methods covering the complete distribution area.

Sardine (*Sardina pilchardus*) remains the dominant species in recorded catches from the assessment area, constituting about 40% of overall catch of main small pelagic species in 2016 (Table 1). Catches have been increasing about 18% from 2015 to 2016 with catches of 1,068, 000 tonnes in 2016 and 908, 000 tonnes in 2015. Fishery removals of the species in the fishery under assessment are included in the stock assessment process.

Results of the assessment (Stock A & B) indicate that current stock biomass is higher than target biomass B0.1; current fishing mortality is less than F0.1. For Stock 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 current fishing mortality is far less than mortality F0.1. The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy).

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 26.09.19)

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

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	<i>Sardine <i>Sardina pilchardus</i></i>	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
Sardine	<i>Sardina pilchardus</i>	FAO 34	N/A	Ministre de l' Agriculture et de la Pêche maritime (Maroc); EU; Russia	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		Sardine <i>Sardina pilchardus</i>	
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

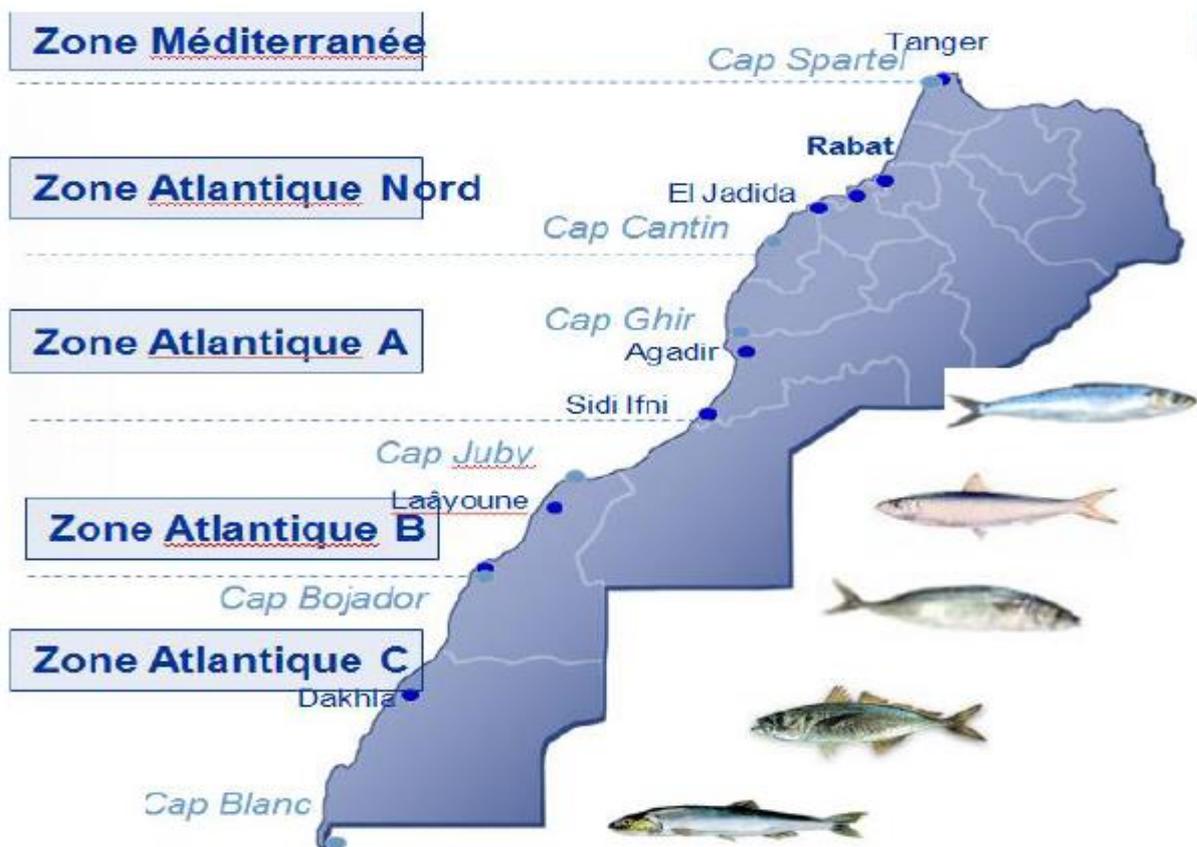


Figure 1 Fishing zones for management purposes off the Moroccan Coast **R4**

Evidence

C1.1:

Three fleets prosecute this fishery (Figure 1): The coastal seiner fleet (all zones); the Refrigerated Sea Water (RSW) trawler fleet (zone C) and the EU / Russian freezer trawler fleet operating under agreements with Morocco (zone C). The fishery in zone C is managed under a plan which includes a TAC (all pelagic species combined), bycatch limits, species restrictions, spatial zoning and closed areas. The fishery in zones A+B is also managed via a management plan but using limits on effort rather than a TAC.

Licensed vessels are required to submit logbooks and landings declarations, and there appear on this basis to be good statistics on catch and effort. There is no evidence of significant problems of fishing by unlicensed vessels. One issue may be the under-declaration of catch by the artisanal fleet, which is usually very difficult to monitor (small vessels landing mixed catches at many small landing sites). There is regular sampling of length composition in the catch.

Sardine (*Sardina pilchardus*) remains the dominant species in recorded catches from the assessment area, constituting about 40% of overall catch of main small pelagic species in 2016 (Table 1). Catches

have been increasing about 18% from 2015 to 2016 with catches of 1,068, 000 tonnes in 2016 and 908, 000 tonnes in 2015:

In Morocco catches of this species have fluctuated over the time series, with an average catch of around 716, 000 tonnes (1990-2016). Catches in 2016 were 987, 000 tonnes, an increase of 11% as compared to 2015 (888, 000 tonnes) and one of the highest catches in the time series.

Morocco is the only country in the CECAF North region that conducted acoustic surveys in 2016 (November-December 2016 and December 2016-January 2017 respectively in Cap Cantin to Cap Bojador and Cap Bojador to Cap Blanc areas (Figure 1). In 2016, a recruitment survey was also carried out.

The Committee for Eastern Central African Fisheries (CECAF) and INRH use a Schaefer dynamic production model to evaluate stocks but have also experimented with other models and may expand to use more up-to-date Bayesian analysis techniques in the future. For the production model, the Working Group used total sardine catches in Zones A+B and Zone C for the years 1995 to 2016:

Table 1: Catches by Zone (2002-2016) **R4**

Zone	Fleet	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
North (35°45'–32°N)	Moroccan coastal purse seiners	18 516	20 655	21 451	17 363	18 484	13 399	11 072	9 100	7 045	9 794	11 190	11 806	11 320	13 879	27 072	
	Spanish purse seiners						240	282	382	116	57			4	896	440	
	Total North	18 516	20 655	21 451	17 363	18 484	13 639	11 354	9 482	7 161	9 851	11 190	11 806	11 324	14 775	27 512	
A (32°N–29°N)	Moroccan coastal purse seiners	23 206	74 578	60 471	25 160	25 618	11 725	32 791	10 793	25 476	15 844	34 124	22 464	23 715	36 915	40 479	
	Total A	23 206	74 578	60 471	25 160	25 618	11 725	32 791	10 793	25 476	15 844	34 124	22 464	23 715	36 915	40 479	
B (29°N–26°N)	Moroccan coastal purse seiners	610 872	517 271	473 987	528 071	363 297	356 810	446 141	589 703	479 161	339 170	355 973	331 279	550 189	329 978	400 006	
	Spanish purse seiners																
	Total B	610 872	517 271	473 987	528 071	363 297	356 810	446 141	589 703	479 161	339 170	355 973	331 279	550 189	329 978	400 006	
A+B (32°N–26°N)	Total A+B	634 078	591 849	534 458	553 231	388 915	368 535	478 932	600 496	504 637	355 014	390 097	353 743	573 904	366 894	440 485	
C (26°N–South)	Moroccan coastal purse seiners and RSW	21 527	43 903	76 249	108 331	148 779	134 536	136 388	163 480	239 866	175 636	275 180	322 473	252 104	449 855	469 435	
	Spanish purse seiners																
	Ukrainian and other pelagic trawlers ⁽¹⁾			476	6 599	33 290	16 071	15 100	12 732								
	Russian pelagic trawlers ⁽²⁾			2 902	10 575	31 334	32 461	10 673	11 863	31 953	26 160	132	2 854	20 057	25 523	21 410	
	Other pelagic trawlers ⁽²⁾																
	European Union ⁽³⁾						7 780	31 142	17 341	22 252	8 698			10 935	31 213	28 536	
	Mauritanian (artisanal)														5		
	Mauritanian coastal purse seiners					45										1 678	20 357
	Others Mauritania ⁽⁴⁾	9 783	32 853	25 359	25 597	53 472	68 363	64 778	74 351	83 720	133 662	34 165	13 176	15 194	16 359	23 135	
	European Union ⁽⁴⁾	27 789	50 703	55 471	39 597	20 190	16 889	16 440	30 287	41 734	71 555	50 164	9 866	45 583		35 735	
	Senegalese (artisanal)	507			14 212	10 170	12 191	3 758	6 302	18	3 391	10	317	173	1 414	1 061	
	Senegalese (industrial)				666			4	276	1 242							
	The Gambia																
	Total C	59 605	127 459	160 457	205 622	297 235	288 295	278 555	317 598	419 544	419 102	359 651	348 686	344 051	526 041	599 689	
	TOTAL (all fleets and zones)	712 199	739 963	716 366	776 216	704 634	670 469	768 842	927 576	931 342	783 967	760 938	714 235	929 279	907 710	1 067 666	
Canary Islands (Spain)	Spanish purse-seiners												303	258	506	523	

(1) Data obtained from COPACE/PACE SERIES 90/50 tables A 3 (page 31) and A 7 (page 35); (2) Data obtained from COPACE/PACE SERIES 97/60 Table 9 page 15; (3) Data from from 1983-1999 obtained from COPACE/PACE/SERIES 97/60 Table 9, Page 15. For the period 1996-1999 the data are Russian statistics from statistical subdivisions 34.1.3 and 34.3.1. For these years Russia did not fish in Senegal; (4) Data obtained from IMROP statistics; (5) Moroccan statistics (DNRH)

Fishery removals of the species in the fishery under assessment are included in the stock assessment process. The species passes clause C.1.1

C1.2:

Results of the assessment (Stock A & B) indicate that current stock biomass is higher than target biomass B0.1; current fishing mortality is less than F0.1:

Table 2: Results of fitting the Schaefer dynamic production model for the Stock A+B of *Sardina pilchardus* **R4**

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) / <i>Al Amir Moulay Abdellah</i> index in 2015 and 2016	152%	138%	99%	40%	44%

For Stock 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 $B_{0.1}$ and current fishing mortality is far less than mortality $F_{0.1}$:

Table3: Results of fitting the Schaefer dynamic production model for the Stock A+B of *Sardina pilchardus* **R4**

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%

B_{cur}/B_{MSY} : Ratio between the estimated biomass for the last year of the series and the biomass corresponding to $F_{0.1}$.

$B_{cur}/B_{0.1}$: Ratio between the estimated biomass for the last year of the series and the biomass corresponding to $F_{0.1}$.

F_{cur}/F_{Sycur} : 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.

F_{cur}/F_{MSY} : 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.

$F_{cur}/F_{0.1}$: Ratio between the fishing mortality coefficient observed for the last year of the series and $F_{0.1}$.

Zoning, biological rest and vessel monitoring systems, as well as favourable hydro-climatic conditions are credited for improving the status of small pelagic stocks in the North-West Africa area (INRH 2016). Trends for the majority are assessed as positive; and different stocks of sardine are indicated to be in conditions of full or less than full exploitation, except for the Mediterranean stock, which is deemed overexploited. The INRH considers sardines and mackerel in the Central Zone to be in a state of non-full exploitation.

The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy) and passes Clause C 1.2.

References

R1 FAO Fishery and Aquaculture Profiles <http://www.fao.org/fishery/facp/MAR/fr>

R2 Fishsource (2018) *S. pilchardus* NW Africa Stock https://www.fishsource.org/stock_page/781

R3 Ministre de l'Agriculture et de la Pêche maritime <http://www.agriculture.gov.ma/>

R4 FAO WORKING GROUP (2018) ON THE ASSESSMENT OF SMALL PELAGIC

FISH OFF NORTHWEST AFRICA 298pp Nouadhibou, Mauritania

<http://www.fao.org/3/i8896b/I8896B.pdf>

R5 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>

R6 FAO Casablanca Morocco (2011) Working group on the assessment of small pelagic fish off northwest Africa 267pp <http://www.fao.org/docrep/017/i3135b/i3135b.pdf>
R7 Jo Gascoigne Moroccan Sardine FIP Assessment in relation to the MSC Standard (2016) 28pp pdf
Standard clauses 1.3.2.2