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

Fishery Under Assessment	**Sardine (European pilchard) *Sardina pilchardus* FAO 27 Excl Subarea VII**
Date	**May 2019**
Assessor	**Jim Daly**

Application details and summary of the assessment outcome				
Name: Sarval				
Address:				
Country: Spain		**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	Virginia Polonio	0.5	SURV 1	By-product
Assessment Period	2018			

Scope Details	
Management Authority (Country/State)	EU
Main Species	Sardine (European pilchard) *Sardina pilchardus*
Fishery Location	FAO 27 excluding Subarea VII
Gear Type(s)	Pelagic trawl and purse seine
Outcome of Assessment	
Overall Outcome	Pass FAO 27 (excluding Subarea VII and Cantabrian Sea stock)
Clauses Failed	C1.2 Cantabrian Sea stock
Peer Review Evaluation	Agree with the conclusions
Recommendation	Pass selected stocks only

Assessment Determination

European pilchard comprises a single genetic stock in the Celtic Sea, English Channel and Bay of Biscay; further research is needed to take into account migration to the Iberian pilchard stock. No analytical stock assessment is performed, since the time-series of age-structure data from the relevant ICES areas are too short and absent from ICES area VII.

The comparative lack of scientific information on the status of the population (Northeast Atlantic) means that a risk-assessment style approach must be taken. The fishery was assessed using the risk-based Productivity, Susceptibility Analysis (PSA) as per IFFO-RS v 2.0 procedures for Category D species. The species has passed this risk-based assessment (Table D1).

Two stocks of sardine Bay of Biscay (ICES Divisions VIII a-b and VIII d) and Cantabrian Sea and Atlantic Iberian waters (VIII c and IX a) have a species-specific management regime in place under the EU's Common Fisheries Policy and have been assessed under Clause C of the by-product assessment.

Sardine in the Bay of Biscay (VIII a-b, VIII d): Fishery removals are included in the stock assessment process and the stock is considered, in its most recent assessment, to have a biomass above the limit reference point. Consequently, it passes Clauses C1.1 and C1.2.

Sardine in the Cantabrian Sea and Atlantic Iberian waters (VIII c, IX a): This stock, in its most recent stock assessment, does not have a biomass above limit reference point (or proxy); removals by the fishery under assessment are not considered by scientific authorities to be negligible. This stock fails Clause C1.2. Fishing mortality has to be reduced significantly from the present level if the stock should recover in the medium term.

Sardine (NE Atlantic, European stock) is listed as near threatened on the IUCN Red list (accessed April 2019) and is not currently listed by CITES.

With the exception of Sardine harvested from the Cantabrian Sea and Atlantic Iberian waters this species is recommended for approval under the IFFO RS Standard v 2.0 (by-product only).

Peer Review Comments

Notes for On-site Auditor
Ensure material from the Cantabrian Sea stock is not processed with other IFFO-RS approved material.

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	*Sardina pilchardus Bay of Biscay (VIII a-b, VIII d)*	N/A	**Pass**	
Category C	*Sardina pilchardus Cantabrian Sea and Atlantic Iberian waters (VIII c and IX a):*	N/A	**Fail**	
Category D	*Sardina pilchardus*	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** 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 / Pilchard	*Sardina pilchardus*	FAO 27 Excl VIIa	N/A	EU/Spain	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		Sardine (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. **Bay of Biscay (VIII a-b, VIII d)** **Cantabrian Sea and Atlantic Iberian waters (VIII c and IX a):**	 **Pass** **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. **Bay of Biscay (VIII a-b, VIII d)** **Cantabrian Sea and Atlantic Iberian waters (VIII c and IX a):**	 **Pass** **Fail**
Clause outcome: Bay of Biscay (VIII a-b, VIII d)			**Pass**
Clause outcome: Cantabrian Sea and Atlantic Iberian waters (VIII c and IX a)			**Fail**

Evidence

C1.1-C1.2:

Member States of the European Union implement the Common Fisheries Policy (CFP) in their waters. With regard to resource management, the CFP regulations comprise:

- A traditional management tool based on Total Allowable Catches (TACs) and quotas;
- Technical measures relating to gear or catch;
- Effort-related management, based on vessel engine power and the number of days at sea.
- Control measures including the introduction of a ban on discarding at sea for EU flagged vessels.

Two stocks are assessed by ICES: Bay of Biscay (ICES Divisions VIII a-b and VIII d) and Cantabrian Sea and Atlantic Iberian waters (ICES divisions VIII c and IX a).

Bay of Biscay (VIII a-b, VIII d)

Commercial catch data is used in the ICES stock assessment (international landings, ages and length frequencies from catch sampling); three survey indices (PELGAS (acoustic biomass), BIOMAN (egg counts), Daily Egg Production Method (DEPM, Triennial survey) and age composition in the PELGAS survey. The stock was benchmarked in February 2017 at the Benchmark Workshop of Pelagic Stocks (WKPELA). Fishery removals of the species in the fishery under assessment are included in the stock assessment process. Clause C1.1 is met for this stock.

The spawning–stock biomass (SSB) is above MSY $B_{trigger}$. Fishing mortality steeply increased in 2010–2012 and has been above F_{MSY} but below F_{lim} since then. Recruitment has been variable over time. Recruitment in 2016 and 2017 is above the time-series average (**Figure** 1). The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point. Clause C1.2 is met for this stock:

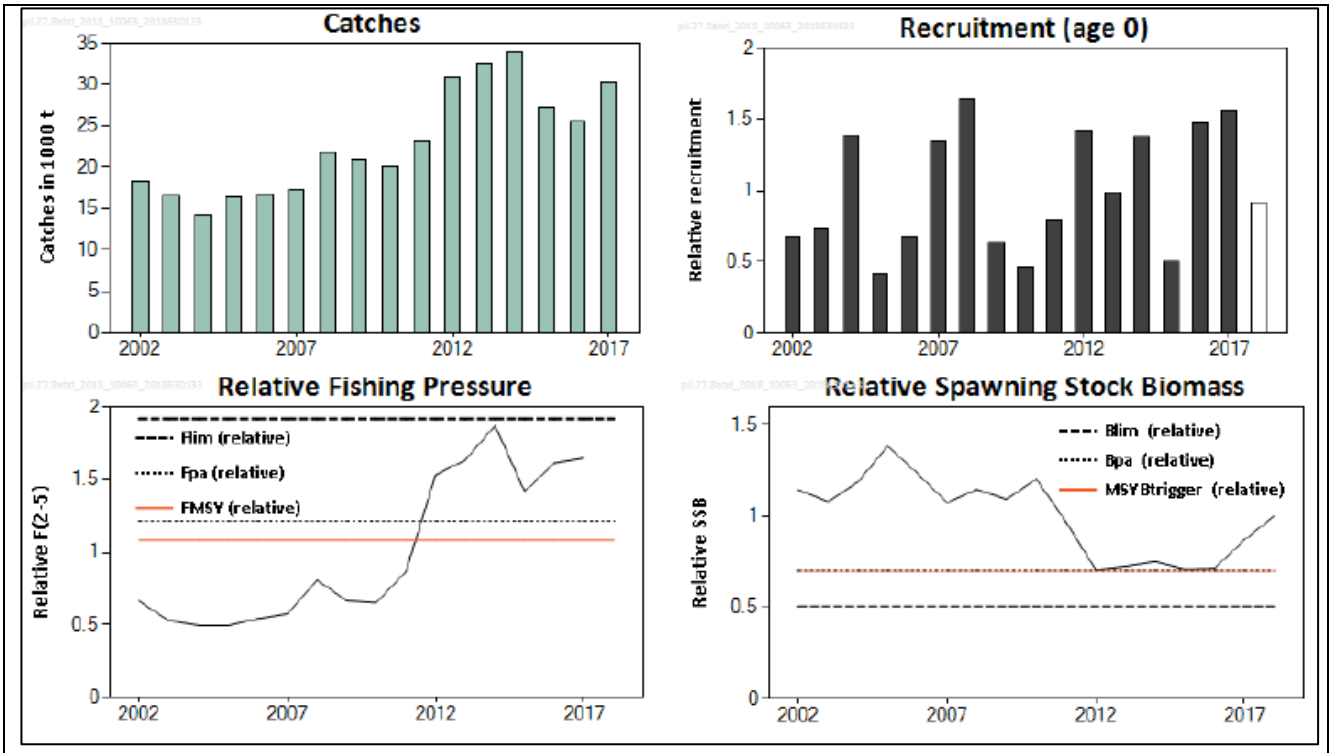

Figure 1. Sardine in Divisions VIII a–b and VIII d. Summary of the stock assessment. Recruitment and SSB are estimated at the beginning of the year. The unshaded value for the 2018 recruitment is the geometric mean (2002–2017). R, F, and SSB are expressed relative to the average of the time-series (2002–2018 for SSB, and 2002–2017 for F and recruitment) **R1.**

Cantabrian Sea and Atlantic Iberian waters (VIII c and IX a):

Input data is based on commercial catches (international landings, ages from catch sampling); annual acoustic spring survey indices (ages from PELAGO and PELACUS), triennial spawning‑stock biomass (SSB) indices (PT-DEPM and SP-DEPM); triennial stock weights and maturity data from DEPM (PT-DEPM and SP-DEPM), interpolated for other years and natural mortalities based on the Gislason formula. Fishery removals of the species in the fishery under assessment are included in the stock assessment process. Clause C1.1 is met for this stock.

The biomass of age 1 and older fish has decreased since 2006, has been below B_{lim} since 2009, and has stabilized to a historical low since 2012. Recruitment has been below the long-term average since 2005 and in 2017, it was estimated as the lowest in the time-series. Fishing mortality has been above F_{lim} for most of the time-series but has been decreasing from a peak in 2011. In 2017, it is the lowest in the time-series and around F_{pa} (Figure 2). This stock, in its most recent stock assessment, does not have a biomass above the limit reference point (or proxy) and removals by the fishery under assessment are not considered by scientific authorities to be negligible. Consequently, it does not meet the minimum requirements of clause C1.2 and fails (**Figure 2):**

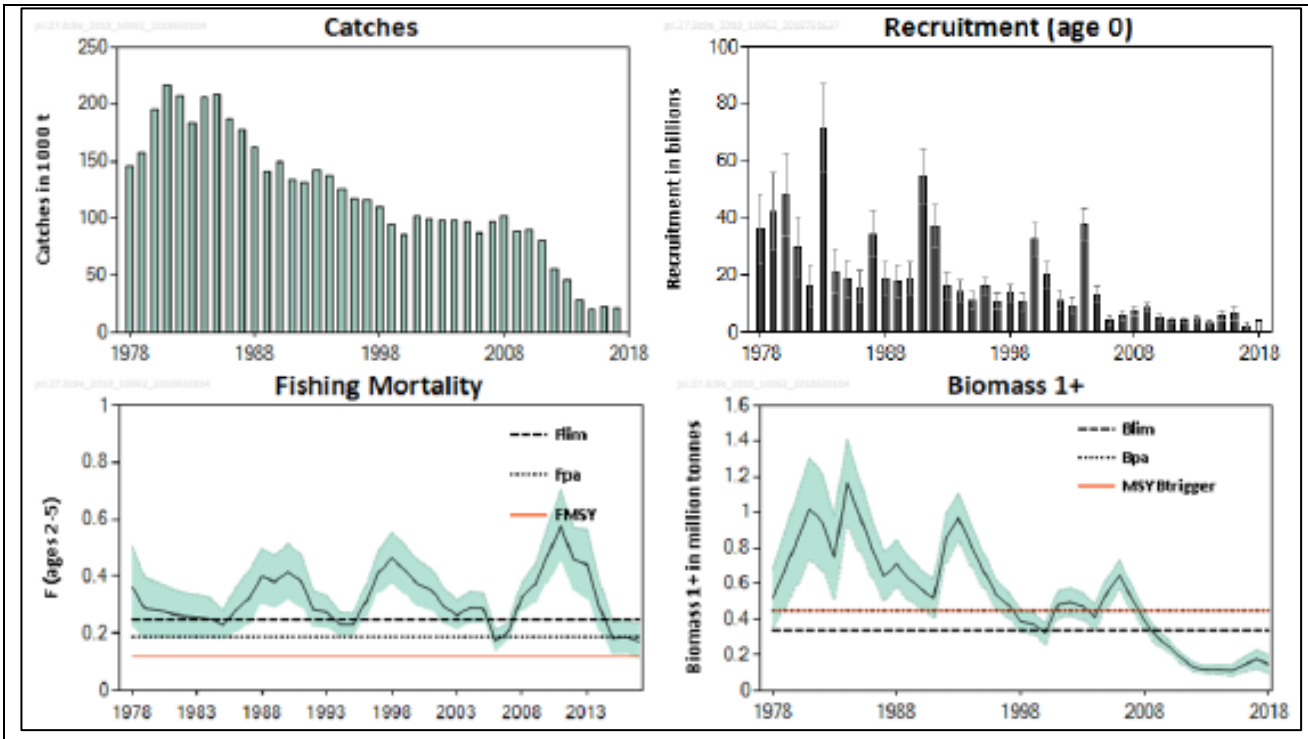

Figure 2. Sardine in divisions VIII c and IX a. Summary of the stock assessment. Recruitment in 2018 assumed to be equal to the geometric mean of 2013–2017. Recruitment, fishing mortality and biomass have 95% confidence intervals. Reference points are based on the stock–recruitment relationship in the period 1993–2015 **R2**.

References

R1 ICES, 2018a. ICES Advice on fishing opportunities, catch, and effort Bay of Biscay and the Iberian Coast Ecoregion. Sardine (*Sardina pilchardus*) in Divisions VIII a-b and VIII d (Bay of Biscay). Published 13 July 2018.
http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/pil.27.8abd.pdf

R2 ICES, 2018b. ICES Advice on fishing opportunities, catch, and effort Bay of Biscay and the Iberian Coast Ecoregion. Sardine (Sardina pilchardus) in divisions VIII c and IX a (Cantabrian Sea and Atlantic Iberian waters). Published 13 July 2018.
http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/pil.27.8c9a.pdf

R3 ICES 2017. ICES Advice on fishing opportunities, catch, and effort Sardine (*Sardina pilchardus*) in Subarea 7 (Southern Celtic Seas, and the English Channel)
http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/pil.27.7.pdf

R4 IUCN Red List: www.iucn.org

R5 Fishsource: European Pilchard Southern Celtic Sea and English Channel:
https://www.fishsource.org/stock_page/777

Standard clauses 1.3.2.2

Common name	Latin name	Stock	% of landings	Management	Category
Pilchard	*Sardina pilchardus*	North East Atlantic Excl: VIIa, VIII a-b; VIII d; VIII c; IX a	N/A	No species specific management regime	D

Species Name:	**European Pilchard** *Sardina pilchardus*	
Productivity Attribute	**Value**	**Score**
Average age at maturity (years)	<2	1
Average maximum age (years)	<10	1
Fecundity (eggs/spawning)	50,000-60,000	1
Average maximum size (cm)	20 cm	1
Average size at maturity (cm)	14.8	1
Reproductive strategy	Open water batch spawning	1
Mean trophic level	3.1	2
Average Productivity Score		**1.14**
Susceptibility Attribute	**Value**	**Score**
Overlap of adult species range with fishery	Full overlap	3
Distribution	N/A	
Habitat	Neritic-Pelagic	1
Depth range	10-100m	1
Selectivity	Mesh size towed gear 16-31mm	3
Post-capture mortality	Alive when hauled	2
Average Susceptibility Score		**2.00**
PSA Risk Rating (From Table D3)		**PASS**

References:

R6 Fishbase http://www.fishbase.org/summary (accessed May 2019)

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.

D3	**Average Susceptibility Score**		
	1.00 – 1.75	**1.76 – 2.24**	**2.25 – 3.00**
1.00 – 1.75	PASS	PASS	PASS
1.76 – 2.24	PASS	PASS	TABLE D4
2.25 – 3.00	PASS	TABLE D4	TABLE D4