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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 / sardine *Sardina pilchardus***
Date	**March 2018**
Assessor	**Conor Donnelly**

Application details and summary of the assessment outcome				
Name: Sarval Bio-Industries				
Address:				
Country: Spain & Portugal		**Zip:**		
Tel. No.:		**Fax. No.:**		
Email address:		**Applicant Code**		
Key Contact:		**Title:**		
Certification Body Details				
Name of Certification Body:		**SAI Global**		
Assessor Name	**Peer Reviewer**	**Assessment Days**	**Initial/Surveillance/Re-approval**	**Whole fish/ By-product**
Conor Donnelly	Deirdre Hoare	1	Initial	By-product
Assessment Period	2017-2018			

Scope Details	
Management Authority (Country/State)	EU
Main Species	European pilchard / sardine *Sardina pilchardus*
Fishery Location	FAO 27 Northeast Atlantic
Gear Type(s)	Purse seines, set nets, lampara nets, drift nets
Outcome of Assessment	
Overall Outcome	Pass (Subarea 7 and div. 8.a, b and d). Fail (Div. 8.c, 9.a)
Clauses Failed	C1.2 (Div. 8.c, 9.a stock)
Peer Review Evaluation	Agree with recommendation
Recommendation	Approve 2 stocks (Subarea 7 and division 8.a b and d). Do not approve Division 8.c, 9.a stock

Assessment Determination

There are three stocks of European pilchard / sardine in the Northeast Atlantic:

- ICES division 8.c, 9.a (Cantabrian Sea and Atlantic Iberian waters)
- ICES subarea 7 (Southern Celtic Seas and English Channel)
- ICES division 8.a, b and d (Bay of Biscay)

Division 8.c and 9.a: Current biomass is considered well below Blim and has been since 2009. **Consequently this stock fails C1.2 and is not recommended for approval**.

Subarea 7: Reference points are not available or this stock so it is assessed under clause D using a Productivity Sensitivity Analysis (PSA). **It passes but with low compliance given uncertainty around stock and because catches have been significantly higher than scientific advice. It is recommended for approval.**

Division 8.a, b and d: Current biomass is above the limit reference point and MSY Btrigger. **This stock passes clause C and is recommended for approval.**

European pilchard is listed as near threatened in Europe on the IUCN Red List http://www.iucnredlist.org/details/198580/1 (accessed 12 April 2018) and is not listed on CITES.

Peer Review Comments

Notes for On-site Auditor

Division 8.c, 9.a stock of European pilchard / sardine are not recommended for approval and consequently need to be segregated from IFFO RS approved stock. The client has confirmed it is possible to separate the stocks.

Species-Specific Results

Category	Species	% landings	Outcome (Pass/Fail)	
Category A			A1	
			A2	
			A3	
			A4	
Category B				
Category C	European pilchard *Sardina pilchardus*. Div. 8.c, 9.a	NA	Fail	
Category C	European pilchard *Sardina pilchardus*. Div. 8.a, b, c	NA	Pass	
Category D	European pilchard *Sardina pilchardus*. Subarea 7	NA	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
European pilchard	*Sardina pilchardus*	ICES Divisions 8.c, 9.a		Species – specific management under CFP, EU	C
European pilchard	*Sardina pilchardus*	Subarea 7		CFP, EU but no reference points defined	D
European pilchard	*Sardina pilchardus*	Divisions 8.a, b, c		Species – specific management under CFP, EU	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/ Fail
		Clause outcome:	Pass/ Fail

Evidence

There are three stocks in the northeast Atlantic:

- ICES division 8.c, 9.a (Cantabrian Sea and Atlantic Iberian waters)
- ICES subarea 7 (Southern Celtic Seas and English Channel)
- ICES division 8.a, b and d (Bay of Biscay)

Division 8.c and 9.a

Commercial catch data is used in the assessment. Reference points are identified (limit, precautionary and MSY). Current biomass is considered well below Blim and has been since 2009 (see figure 1) (ICES 2017a). **Consequently this stock fails C1.2**.

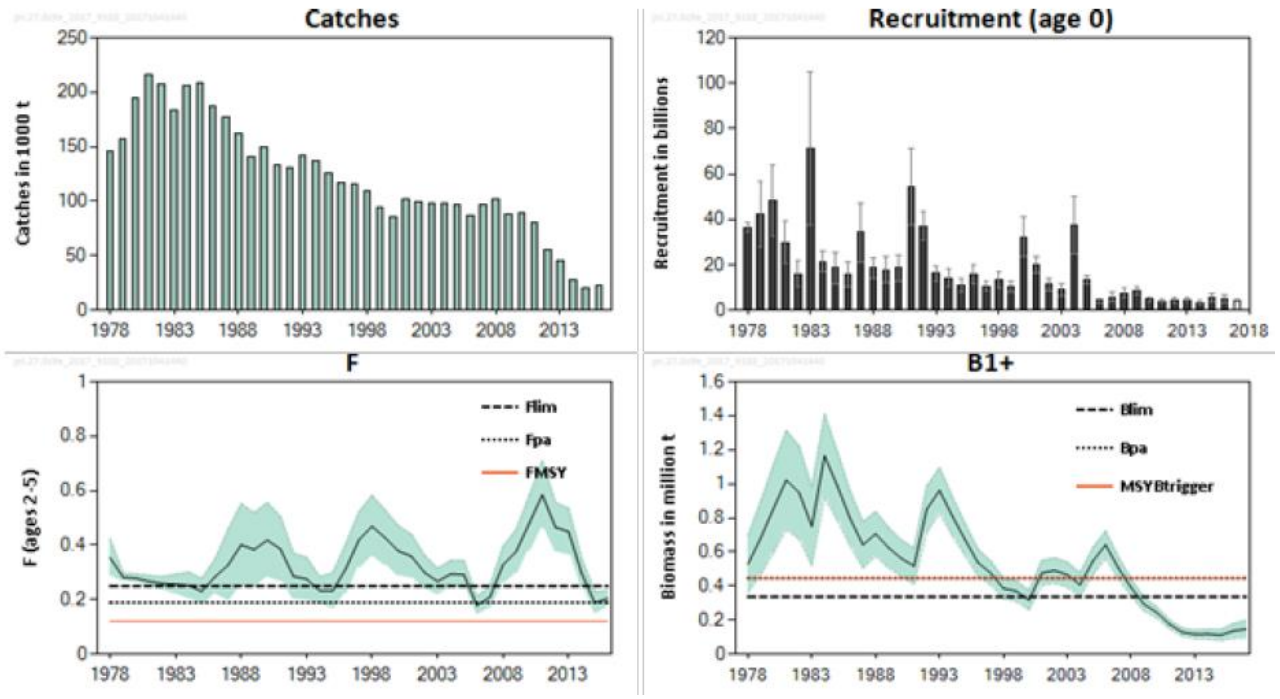


Figure 1. Summary of ICES stock assessment. Recruitment in 2017 assumed to be equal to the geometric mean of 2012–2016 (unshaded bar). Recruitment, fishing mortality and biomass have 95% confidence intervals. Reference points are based on the stock-recruitment relationship in the period 1993 – 2015. Source: ICES, 2017a

Subarea 7

Landings data is available but incomplete and considered highly uncertain. No reference points are defined for the stock (ICES, 2017b). **Consequently this stock needs to be assessed under clause D using a Productivity Susceptibility Analysis.**

Division 8.a, b and d

Commercial catch data is used in the assessment. Reference points are identified (limit, precautionary and MSY). Current biomass is above the limit reference point and MSY Btrigger, however, it should be noted that fishing mortality is significantly above Fmsy and Fpa (see figure 2) (ICES 2017c). **This stock passes clause C.**

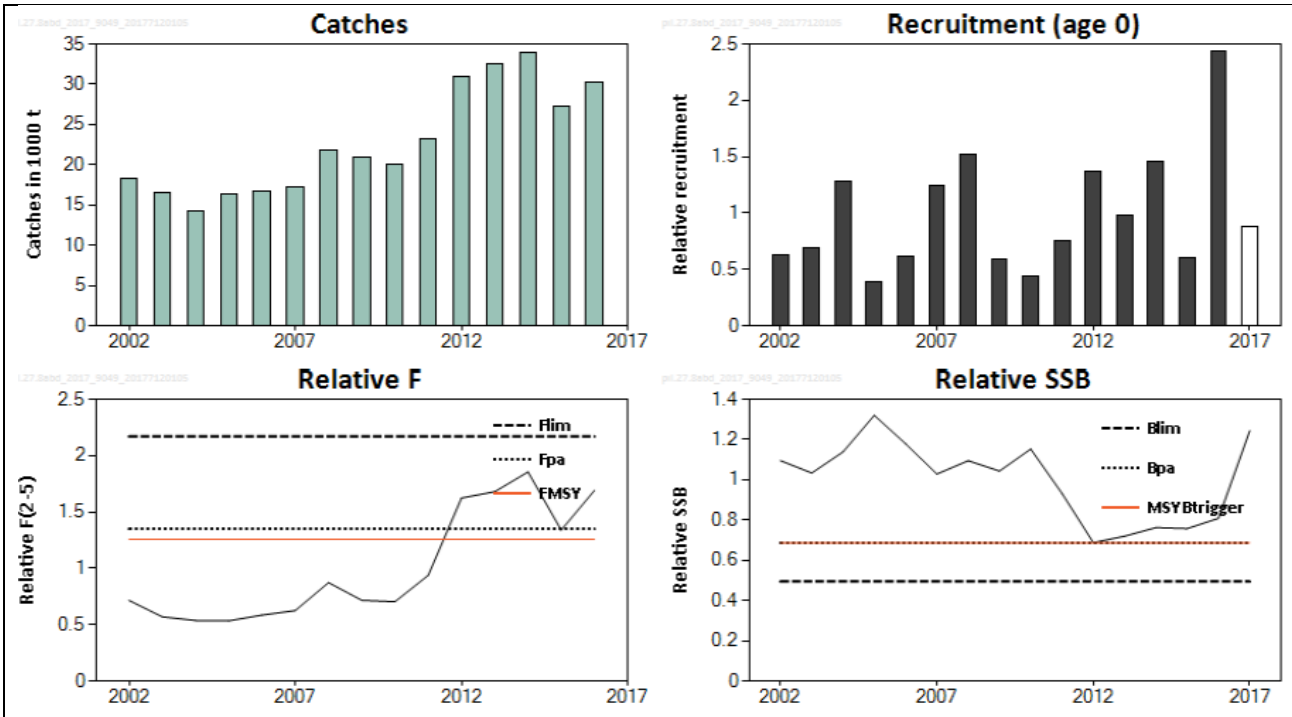


Figure 2. Summary of the stock assessment. Recruitment and SSB are estimated at the beginning of the year. The assumed recruitment value is unshaded. R, F, and SSB are expressed relative to the average of the time-series (2002–2017 for SSB, and 2002–2016 for F and recruitment). Source: ICES, 2017c.

References

ICES, 2017a. ICES Advice on fishing opportunities, catch, and effort Bay of Biscay and the Iberian Coast Ecoregion. Sardine (*Sardina pilchardus*) in divisions 8.c and 9.a (Cantabrian Sea and Atlantic Iberian waters). Published 20 October 2017. http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/pil.27.8c9a.pdf

ICES, 2017b. ICES Advice on fishing opportunities, catch, and effort Celtic Seas Ecoregion. Sardine (*Sardina pilchardus*) in Subarea 7 (Southern Celtic Seas, and the English Channel). Published 14 July 2017. http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/pil.27.7.pdf

ICES, 2017c. ICES Advice on fishing opportunities, catch, and effort Bay of Biscay and the Iberian Coast Ecoregion Sardine (*Sardina pilchardus*) in divisions 8.a–b and 8.d (Bay of Biscay). Published 14 July 2017. http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/pil.27.8abd.pdf

Standard clauses 1.3.2.2

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 the majority of 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.

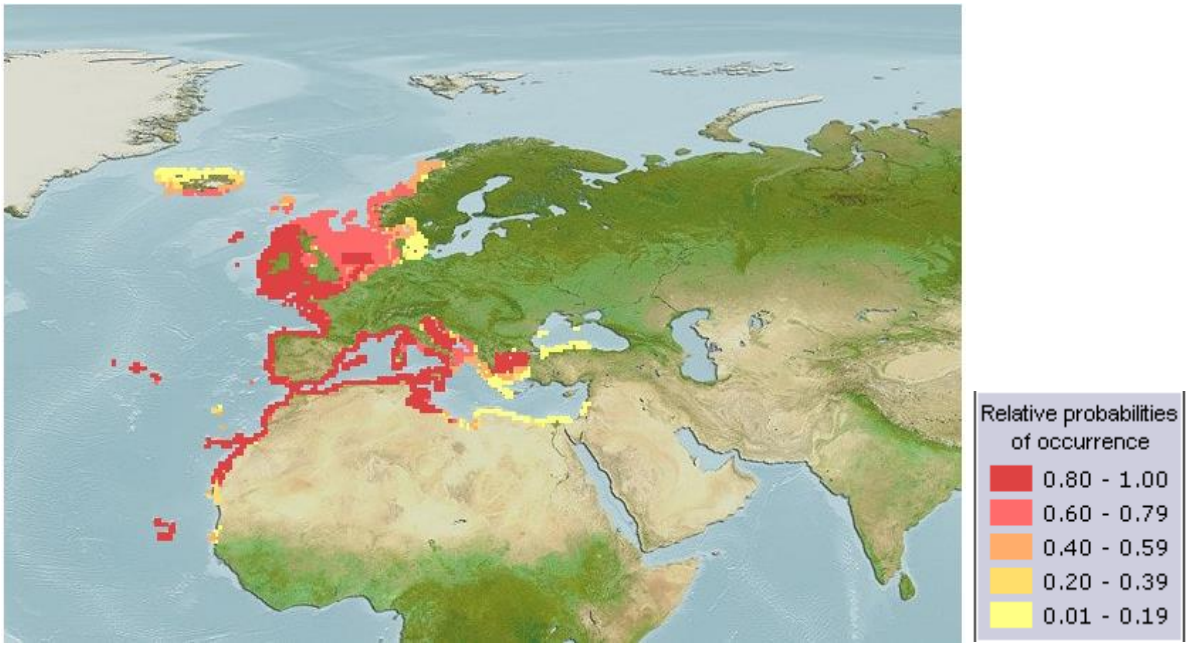
The process for assessing Category D species involves the use of a Productivity-Susceptibility Analysis (PSA) to further subdivide the species into 'Critical Risk', 'Major Risk' and 'Minor Risk' groups. If there are no Category D species in the fishery under assessment, this section can be deleted.

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:**	**European pilchard *Sardina pilchardus* Subarea 7**	
	Productivity Attribute	**Value**	**Score**
	Average age at maturity (years)	1.74	1
	Average maximum age (years)	9.8	1
	Fecundity (eggs/spawning)	50,000-60,000	1
	Average maximum size (cm)	21.1	1
	Average size at maturity (cm)	15.18	1
	Reproductive strategy	Open water / substratum egg scatterers	1
	Mean trophic level	3.1	2
		Average Productivity Score	**1.14**
	Susceptibility Attribute	**Value**	**Score**
	Overlap of adult species range with fishery	>50% of the stock occurs in the area fished	3
	Distribution	Not scored (see table D2)	Not scored
	Habitat	Pelagic	1
	Depth range	10-100m, usually 25-100m	3
	Selectivity	Up to 4m in length	3
	Post-capture mortality	Most dead or retained	3
		Average Susceptibility Score	**3**
		PSA Risk Rating (From Table D3)	**Pass**
		Compliance rating	**Low**
References			

Overlap with fishery



Reviewed distribution maps for *Sardina pilchardus* (European pilchard), with modelled year 2100 native range map based on IPCC A2 emissions scenario. www.aquamaps.org, version of Aug. 2016. Web. Accessed 12 Apr. 2018. http://www.aquamaps.org/receive.php?type_of_map=regular

Habitat

http://www.iucnredlist.org/details/198580/1

Other attributes

http://www.fishbase.org/summary/1350

Compliance

Low rating given due to the significant uncertainty around the stock and current advice from ICES is that a precautionary reduction in catches should be implemented. However, landings have been significantly higher than scientific advice in every year since ICES started providing advice (2014). See table 5a of ICES 2017b:

Table 5a Sardine in divisions 8.a–b and 8.d and Subarea 7. ICES advice and official landings. All weights are in tonnes.

Year	ICES Advice	Predicted catch corresp. to advice	Official landings	ICES catches
2010	None		32592	32224
2011	None		28847	30847
2012	None		37214	37214
2013	None		40971	39681
2014	20% Reduction of catches (average of last 3 years)	< 27554	45312	40254
2015	No new advice, same as for 2014	< 27554	36928	36598
2016	Precautionary approach (increase catches by no more than 20%)	≤ 33065	47324	49587
2017	Precautionary approach (same advised catch value as given for 2016)	≤ 33065		

Table 5b Sardine in Subarea 7. ICES advice and official landings. All weights are in tonnes.

Year	ICES Advice	Predicted catch corresp. to advice	Official landings	ICES catches
2018	Precautionary approach: 20% reduction in catch relative to the 2014–2016 average	Value not quantified		
2019	Precautionary approach: Same advice as for 2018	Value not quantified		

ICES, 2017b. ICES Advice on fishing opportunities, catch, and effort Celtic Seas Ecoregion. Sardine (*Sardina pilchardus*) in Subarea 7 (Southern Celtic Seas, and the English Channel). Published 14 July 2017.

http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/pil.27.7.pdf
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.

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

D4	Species Name		
	Impacts On Species Categorised as Vulnerable by D1-D3 - Minimum Requirements		
	D4.1	The potential impacts of the fishery on this species are considered during the management process, and reasonable measures are taken to minimise these impacts.	
	D4.2	There is no substantial evidence that the fishery has a significant negative impact on the species.	
		Outcome:	
Evidence			
References			
Standard clause 1.3.2.2			

SOCIAL CRITERION

In addition to the scored criteria listed above, applicants must commit to ensuring that vessels operating in the fishery adhere to internationally recognised guidance on human rights. They must also commit to ensuring there is no use of enforced or unpaid labour in the fleet(s) operating upon the resource.

Appendix A - Determining Resilience Ratings

The assessment of Category B species described in this assessment report template utilises a resilience rating system suggested by the American Fisheries Society. This approach was chosen because it is also used by FishBase, and so the resilience ratings for many thousands of species are freely available online. As described by FishBase, the following is the process used to arrive at the resilience ratings:

"*The American Fisheries Society (AFS) has suggested values for several biological parameters that allow classification of a fish population or species into categories of high, medium, low and very low resilience or productivity (Musick 1999). If no reliable estimate of r_m (see below) is available, the assignment is to the lowest category for which any of the available parameters fits. For each of these categories, AFS has suggested thresholds for decline over the longer of 10 years or three generations. If an observed decline measured in biomass or numbers of mature individuals exceeds the indicated threshold value, the population or species is considered vulnerable to extinction unless explicitly shown otherwise. If one sex strongly limits the reproductive capacity of the species or population, then only the decline in the limiting sex should be considered. We decided to restrict the automatic assignment of resilience categories in the Key Facts page to values of K, t_m and t_{max} and those records of fecundity estimates that referred to minimum number of eggs or pups per female per year, assuming that these were equivalent to average fecundity at first maturity (Musick 1999). Note that many small fishes may spawn several times per year (we exclude these for the time being) and large live bearers such as the coelacanth may have gestation periods of more than one year (we corrected fecundity estimates for those cases reported in the literature). Also, we excluded resilience estimates based on r_m (see below) as we are not yet confident with the reliability of the current method for estimating rm. If users have independent r_m or fecundity estimates, they can refer to Table 1 for using this information*."

Parameter	**High**	**Medium**	**Low**	**Very low**
Threshold	0.99	0.95	0.85	0.70
r_{max} (1/year)	> 0.5	0.16 – 0.50	0.05 – 0.15	< 0.05
K (1/year)	> 0.3	0.16 – 0.30	0.05 – 0.15	< 0.05
Fecundity (1/year)	> 10,000	100 – 1000	10 – 100	< 10
t_m (years)	< 1	2 – 4	5 – 10	> 10
t_{max} (years)	1 - 3	4 – 10	11 – 30	> 30

Taken from the FishBase manual, "Estimation of Life-History Key Facts":
http://www.fishbase.us/manual/English/key%20facts.htm#resilience]

Appendix B – Background on the 5% catch rule

The proposed fishery assessment methodology uses a species categorisation approach to divide the catch in the assessment fishery into groups. These groups are:

- **Category A:** "Target" species with a species-specific management regime in place.
- **Category B:** "Target" species with no species-specific management regime in place.
- **Category C:** "Non-target" species with a species-specific management regime in place.
- **Category D:** "Non-target" species with no species-specific management regime in place

The distinction between 'target' and 'non-target' species is made to enable the assessment to consider the impact of the fishery on all the species caught regularly, without requiring a full assessment be conducted for each. Thus 'target' species are subjected to a more detailed assessment, while 'non-target' species are considered more briefly. For the purposes of the IFFO RS fishery assessment, 'target' and 'non-target' species are defined by their prevalence in the catch, by weight. Applicants must declare which species are considered 'target' species in the fishery, and the combined weight of these must be at least 95% of the annual catch. The remaining 5% can be made up of 'non-target' species. Note also that ETP species are considered separately, irrespective of their frequency of occurrence in the catch.

The proposed use of 5% as a limit for 'non-target' species is one area in which feedback is being sought via the public consultation. The decision to propose a value of 5% ensures consistency with other fishery assessment programmes, such as the MSC which uses 5% to distinguish between 'main' and 'minor' species (see MSC Standard, SA3.4 and GSA3.4.2); and Seafood Watch, which uses 5% when defining the 'main' species for the assessment (see Seafood Watch Standard, Criterion 2). The value is also consistent with the approached used in Version 1 of the IFFO RS Standard, in which up to 5% of the raw material could be comprised of 'unassessed' species.

Comments on this proposition are welcomed along with any other feedback on the proposed approach.