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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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<b>Fishery Under Assessment</b>	<b>Pacific cod</b> <i>Gadus macrocephalus</i> <b>FAO 67</b>
<b>Date</b>	<b>May 2019</b>
<b>Assessor</b>	<b>Jim Daly</b>

Application details and summary of the assessment outcome				
Name: Thein Quynh Ltd				
Address:				
Country: Vietnam		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	
<b>Management Authority (Country/State)</b>	USA
<b>Main Species</b>	Pacific cod <i>Gadus macrocephalus</i>
<b>Fishery Location</b>	FAO 67
<b>Gear Type(s)</b>	Trawl, longline, pot
Outcome of Assessment	
<b>Overall Outcome</b>	Pass
<b>Clauses Failed</b>	None
<b>Peer Review Evaluation</b>	Approve
<b>Recommendation</b>	Pass

Assessment Determination
<p>There are three stocks of Pacific cod within FAO area 67; Eastern Bering Sea (EBS), Aleutian Island (AI) and Gulf of Alaska (GOA) Pacific cod. The stocks are managed by the US North Pacific Fishery Management Council (NPFMC) with stock assessments undertaken by the Alaska Fisheries Science Center, part of the National Marine Fisheries Service (NMFS, part of NOAA) in Federal waters (3-200 nm). Separate assessments are provided for EBS, AI and GoA by AFSC.</p> <p>It is not listed on the IUCN Red List of Threatened Species nor listed by CITES (accessed 21.05.19).</p> <p>There are MSC approved fisheries for Pacific cod in this area.</p> <p>Pacific cod in EBS, AI and GOA assessment area is recommended for approval as by-product material under the IFFO RS Standard.</p>
Peer Review Comments
PR agrees with the conclusions raised in the report.
Notes for On-site Auditor

## Species-Specific Results

Category	Species	% landings	Outcome (Pass/Fail)	
Category A			A1	
			A2	
			A3	
			A4	
Category B				
Category C	Pacific cod <i>Gadus macrocephalus</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.

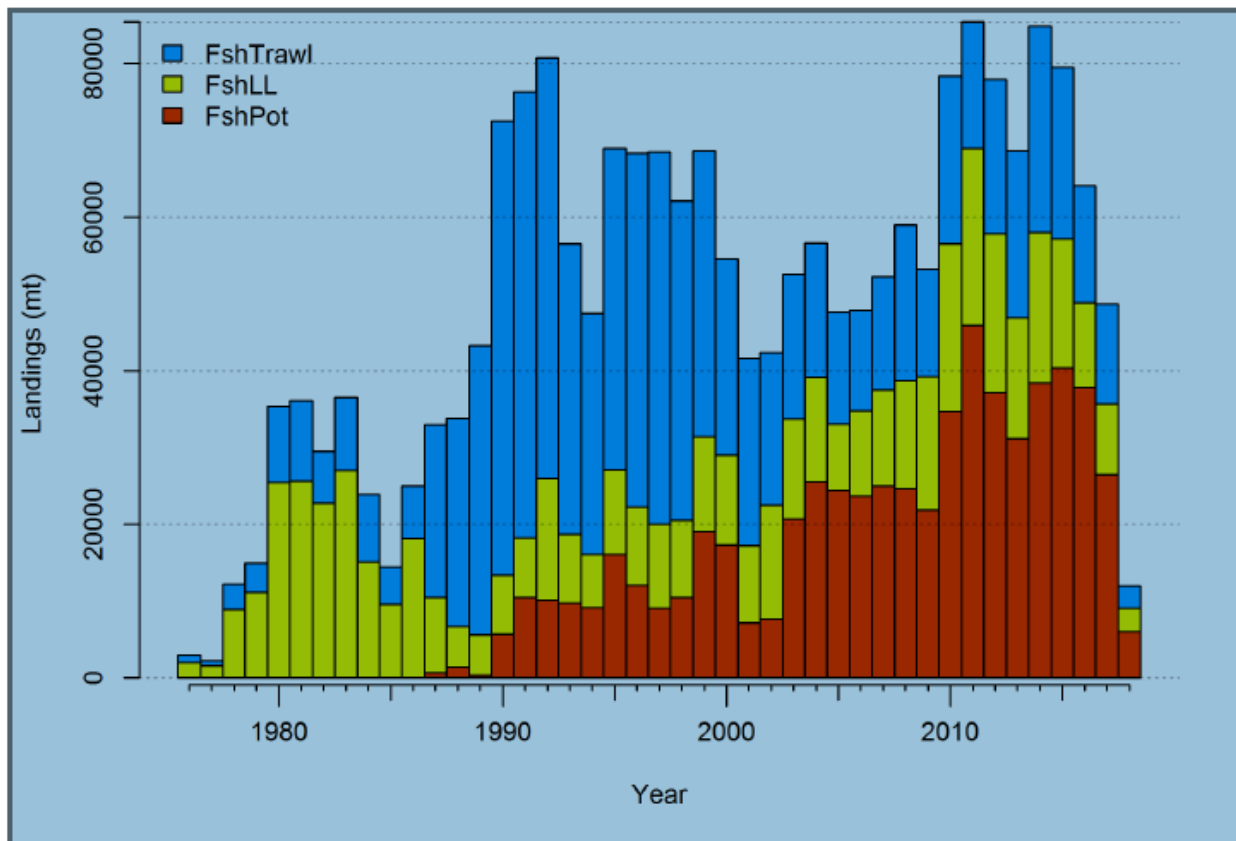
Common name	Latin name	Stock	% of landings	Management	Category
Pacific cod	<i>Gadus macrocephalus</i>	EBS, AI, GOA	N/A	USA	C

**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		Pacific cod <i>Gadus macrocephalus</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
Evidence C1.1:			
Gulf of Alaska (GOA); Eastern Bering Sea (EBS), Aleutian Island (AI) Stocks:			
Pacific cod in GOA is managed as a single stock. The latest assessment is from Dec 2018 (Barbeaux <i>et al</i> , <b>R1</b> ). Input data includes Federal and State catch data from 2018 ( <b>Figure 1</b> ); commercial size composition data; AFSC bottom trawl survey abundance index and length composition data to 2018 and AFSC longline survey Pacific cod abundance index and length composition data to 2018.			

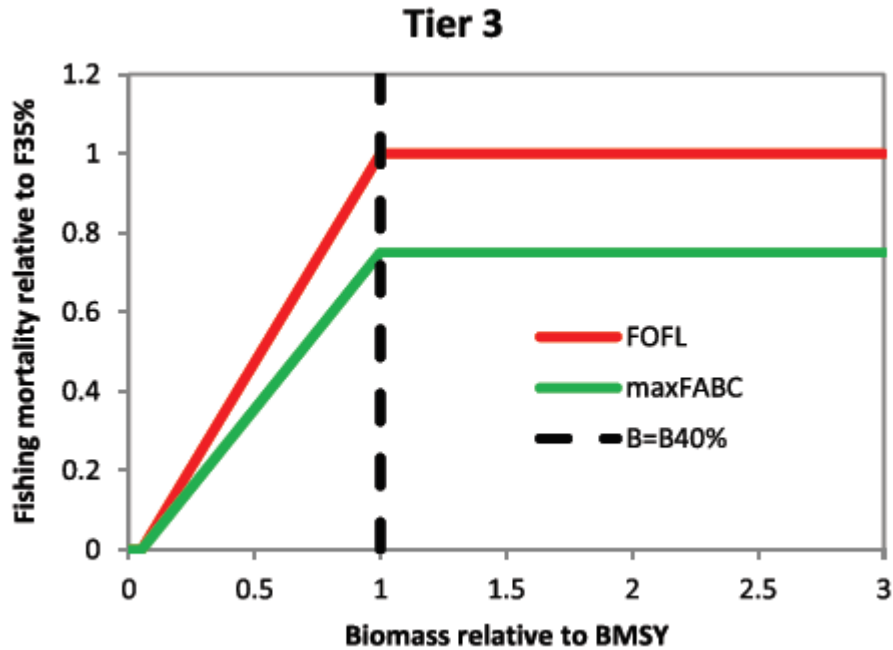


**Figure 1.** Gulf of Alaska Pacific cod catch from 1977-2018 Source: Barbeaux *et al*, 2018.**R1**

MSY-based reference points cannot be reliably defined so estimates of reference points related to spawning per recruit are available. Consequently Pacific cod is classed as a Tier 3 stock under Amendment 56 to the GOA Groundfish Fishery Management Plan and uses B40%, F35% and F40% reference points (**Figure 2**):

- B40% = 40% of the equilibrium spawning biomass that would be obtained in the absence of fishing
- F35% = fishing mortality rate that reduces the equilibrium level of spawning per recruit to 35% of the level that would be obtained in the absence of fishing.
- F40% = fishing mortality rate that reduces the equilibrium level of spawning per recruit to 40% of the level that would be obtained in the absence of fishing.

Management is in place to protect prey species of the endangered Steller sea lion such that the directed fishery closes if biomass falls below B20%. Pacific cod is one of the 4 main prey items of the sea lion so this measure applies to it.



**Figure 2.** Example  $F_{OFL}$  and  $maxF_{ABC}$  control rules for Tier 3 stocks. Source: Livingston *et al.* **R2**

Pacific cod in the EBS is managed as a single stock. The latest assessment is from 2018 (**R3**) The assessment involved several models. Input data includes commercial catch biomass and size composition from 1977-2018; commercial catch age composition from 2013-216 and EBS shelf bottom survey abundance and size composition information from 1982 - 2018 and age composition from 1992-2016.

Pacific cod in the AI is managed as a single stock. Catch data for 1991-2017 were updated, and preliminary catch data for 2018 were included. The biomass estimate from the 2018 AI bottom trawl survey (81,200 t, a 4% decrease from the 2016 value) was included. Shelf bottom trawl surveys have been undertaken from 1991-2018.

Fishery removals of the species (all stocks) in the fishery under assessment are included in the stock assessment process. The stock passes Clause C1.1.

#### **Evidence C1.2:**

##### **Gulf of Alaska (GOA); Eastern Bering Sea (EBS), Aleutian Island (AI) Stocks:**

##### **GOA:**

A summary of the latest assessment is shown in **Table 1**. Definition of terms are as follows:

- **OFL:** Overfishing limit is any amount of fishing in excess of a prescribed maximum allowable rate. Fishing at or above the OFL jeopardizes the stock's capacity to replenish. The OFL is prescribed through a set of six tiers that correspond to the amount and type of information available.
- **ABC:** Acceptable Biological Catch is the annual catch limit and description of the acceptable harvest (or range of harvests) for a given stock. Its derivation focuses on the status and dynamics of the stock, environmental conditions, other ecological factors, and prevailing technological characteristics of the fishery. Conservative fishing mortality rates are used to calculate ABC.

- The TAC is the annual catch target for a stock or stock complex, derived from the ABC by considering social and economic factors and management uncertainty (i.e., uncertainty in the ability of managers to constrain catch so the annual catch limit is not exceeded, and uncertainty in quantifying the true catch amount).
- Groundfish stock management focuses on the ABC and OFL. The ABC is lower than the OFL. The TAC can equal but not exceed the ABC. The sum of the ABCs is larger than the sum of the TACs.  $TAC < ABC < OFL$  (NMFS, 2017).

The models have data from three fisheries (longline, pot, and combined trawl fisheries) with a single season and two survey indices (post-1990 GOA bottom trawl survey and the AFSC Longline survey indices). Length composition data were available for all three fisheries and both indices:

**Table 1:** Summary of stock assessment GOA Pacific Cod (**R1**)

Quantity	As estimated or specified last year for:		As estimated or specified this year for:	
	2018	2019	2019	2020
<i>M</i> (natural mortality rate)	0.49	0.49	0.50	0.50
Tier	3b	3b	3b	3b
Projected total (age 0+) biomass (t)	170,565	198,942	266,066	329,133
Female spawning biomass (t)				
Projected	36,209	34,424	34,701	34,774
<i>B</i> <sub>100%</sub>	168,583	168,583	172,240	172,240
<i>B</i> <sub>40%</sub>	67,433	67,433	68,896	68,896
<i>B</i> <sub>35%</sub>	59,004	59,004	60,284	60,284
<i>F</i> <sub>OFL</sub>	0.42	0.40	0.36	0.36
<i>maxF</i> <sub>ABC</sub>	0.34	0.32	0.29	0.29
<i>F</i> <sub>ABC</sub>	0.31	0.31	0.25	0.29
OFL (t)	23,565	21,412	23,669	26,078
maxABC (t)	19,401	17,634	19,665	21,592
ABC (t)	18,000	17,000	*17,000	21,592
Status	As determined this year for:			
	2016	2017	2017	2018
Overfishing	No	n/a	No	n/a
Overfished	n/a	no	n/a	No
Approaching overfished	n/a	no	n/a	No

\*Reduction from max to 17,000t to maintain stock above *B*<sub>20%</sub> in 2020 based on estimated end of year catch in 2018 of 13,096 t.

At no time since the separate State waters fishery began in 1997 has total catch exceeded ABC and it has never exceeded OFL. The stock is currently considered not to be subject to overfishing nor in an overfished or approaching an overfished state.

The stock (Pacific cod in GOA) can be considered, in its most recent assessment, to have a biomass above limit reference point. It passes clause C 1.2

#### **EBS:**

Total catch has been less than OFL in every year since 1993(**R3**). As shown in **Table 2**, the stock is currently considered not to be subject to overfishing nor in an overfished or approaching an overfished state. Consequently the stock can be considered, in its most recent assessment, to have a biomass above the limit reference point. It passes clause C1.2



**Table 2.** Summary of EBS Pacific cod assessment. Source: Thompson et al 2018 **R3**

Quantity	As estimated or <i>specified last year for:</i>		As estimated or <i>recommended this year for:</i>	
	2018	2019	2019*	2020*
<i>M</i> (natural mortality rate)	0.36	0.36	0.34	0.34
Tier	3a	3a	3a	3b
Projected total (age 0+) biomass (t)	918,000	762,000	824,000	683,000
Projected female spawning biomass (t)	292,000	262,000	290,000	246,000
<i>B</i> <sub>100%</sub>	593,000	593,000	658,000	658,000
<i>B</i> <sub>40%</sub>	237,000	237,000	263,000	263,000
<i>B</i> <sub>35%</sub>	207,000	207,000	230,000	230,000
<i>F</i> <sub>OFL</sub>	0.38	0.38	0.38	0.35
<i>maxF</i> <sub>ABC</sub>	0.31	0.31	0.31	0.29
<i>F</i> <sub>ABC</sub>	0.31	0.31	0.31	0.29
OFL (t)	238,000	201,000	216,000	164,000
maxABC (t)	201,000	170,000	181,000	137,000
ABC (t)	201,000	170,000	181,000	137,000
Status	As determined <i>last year for:</i>		As determined <i>this year for:</i>	
	2016	2017	2017	2018
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

\*Projections are based on assumed catches of 201,000 t, 181,000 t, and 137,000 t in 2018, 2019, and 2020, respectively.

**AI:**

Catch data for 1991-2017 were updated, and preliminary catch data for 2018 were included. The biomass estimate from the 2018 AI bottom trawl survey (81,200 t, a 4% decrease from the 2016 value) was included:

**Table 3:** Summary of stock assessment AI Pacific Cod (**R4**)

Quantity	As estimated or <i>specified last year for:</i>		As estimated or <i>recommended this year for:</i>	
	2018	2019	2019	2020
<i>M</i> (natural mortality rate)	0.36	0.36	0.34	0.34
Tier	5	5	5	5
Biomass (t)	79,600	79,600	80,700	80,700
<i>F</i> <sub>OFL</sub>	0.36	0.36	0.34	0.34
<i>maxF</i> <sub>ABC</sub>	0.27	0.27	0.255	0.255
<i>F</i> <sub>ABC</sub>	0.27	0.27	0.255	0.255
OFL (t)	28,700	28,700	27,400	27,400
maxABC (t)	21,500	21,500	20,600	20,600
ABC (t)	21,500	21,500	20,600	20,600
Status	As determined <i>last year for:</i>		As determined <i>this year for:</i>	
	2016	2017	2017	2018
Overfishing	No	n/a	No	n/a

The stock is currently considered not to be subject to overfishing and can be considered, in its most recent assessment, to have a biomass above the limit reference point. It passes clause C1.2

## References

**R1** Barbeaux, S., Aydin, K., Fissel, B., Holsman, K., Palsson, W., Shotwell, K., Yany, Q., Zador, S. (2017). Assessment of the Pacific cod stock in the Gulf of Alaska. Alaska Fisheries Science Centre, National Marine Fisheries Service, NOAA. December, 2018

<https://www.afsc.noaa.gov/REFM/Docs/2018/GOA/GOApcod.pdf>

**R2** Livingston et al. Designing and implementing annual catch limits for North Pacific Groundfish and crab stocks. Alaska Fisheries Science Center (AFSC), National Marine Fisheries Service (NMFS) poster.

[https://access.afsc.noaa.gov/pubs/posters/pdfs/pLivingston02\\_gf-crab-catch-limits.pdf](https://access.afsc.noaa.gov/pubs/posters/pdfs/pLivingston02_gf-crab-catch-limits.pdf)

**R3** Thompson et al (2018) Assessment of the Pacific Cod Stock in the Eastern Bering Sea Alaska Fisheries Science Centre, National Marine Fisheries Service, NOAA

<https://www.afsc.noaa.gov/REFM/Docs/2018/BSAI/EBSpcod.pdf>

**R4** Thompson and Palsson Dec 2018 Assessment of the Pacific Cod Stock in the Aleutian Islands Alaska Fisheries Science Centre, National Marine Fisheries Service, NOAA.

<https://www.afsc.noaa.gov/REFM/Docs/2018/BSAI/AIpcod.pdf>

*Standard clauses 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  $r_m$ . 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 approach used in Version 1 of the IFFO RS Standard, in which up to 5% of the raw material could be comprised of 'unassessed' species.