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Global Standard for Responsible Supply of Marine Ingredients

Fishery Assessment Methodology and Template Report V2.0

Fishery Under Assessment	**Chilean jack mackerel, Jurel (*Trachurus murphyi*) Chile EEZ XV-X**
Date	**June 2020**
Report Code	**2020 - 101**
Assessor	**Vito Romito**
Stock (s) Pass	**PASS**
Stock (s) Fail	

Application details and summary of the assessment outcome				
Name: Blumar and others				
Address:				
Country: Chile		**Zip:**		
Tel. No.:		**Fax. No.:**		
Email address:		**Applicant Code**		
Key Contact: Chile		**Title:**		
Certification Body Details				
Name of Certification Body:				
Assessor Name	**Peer Reviewer**	**Assessment Days**	**Initial/Surveillance /Re-approval**	**Whole fish/ By-product**
Vito Romito	Virginia Polonio	3	1st Surveillance	Whole fish
Assessment Period	2020			

Scope Details	
Management Authority (Country/State)	SUBPESCA & SERNAPESCA, Chile EEZ; SPRFMO International Waters
Main Species	Chilean jack mackerel *Trachurus murphyi*
Fishery Location	Chile EEZ VX-X
Gear Type(s)	Purse seine, hand-line
Outcome of Assessment	
Peer Review Evaluation	**APPROVE**
Recommendation	**APPROVE**

Assessment Determination

The Northern Chile fishery (XV-II) is mostly within the Chilean EEZ; while the Central-Southern fishery (III-X) is within the Chilean EEZ and also straddles international waters. The Central-Southern fishery is used mainly for the reduction fishery for Chilean Jack mackerel. The IFFO RS assessment area fishing zones XV-X incorporate Management Units Region XV-II (**North**) and III-X (**Central-South**). This report uses data derived from the industrial reduction fishery for Chilean Jack mackerel.

The Northern fleet catch Chilean Jack mackerel as bycatch in the fishery targeting anchovy (*Engraulis ringens*). In the Central-Southern fishery Pacific Chub mackerel (*Scomber japonicus*) is the main bycatch of the targeted Chilean Jack mackerel fishery; constituting around 1% of catches (Source PCR Report for MSC April 2019).

The season starts later in the year as the larger Chilean Jack mackerel move South and offshore. International management is coordinated by the South Pacific Regional Fisheries Management Organisation (SPRFMO). In 2013, Chile introduced a new Law which consented to adopt SPRFMO established Total Allowable Catch (TAC) limits and Conservation and Management Measures (CMM) within the Chilean EEZ and establish fixed quotas for industrial and artisanal fleets for 20 years.

The Chilean Jack mackerel fishery is currently MSC certified (Unit of Certification III-X).

In Chile all catches are reported in logbooks and in catch and effort landing returns. On-board observer coverage contributes to monitoring, cross checking and verification of catches and landings with vessels logbooks. Industrial vessels operate under mandatory VMS monitoring. SERNAPESCA Inspectors carry out audits of capture fisheries during landings (including accurate weigh outs); implementing surveillance and control of compliance in ports. Within their EEZ the Chilean Navy monitor an area covering approximately
4,542,990 km^2.

The latest SPRFMO Scientific Committee (SC) meeting (i.e. SC7) to discuss stock assessment results for Chilean jack mackerel took place in 2019. The analyses updated the model and assumptions from SC6 (the last full assessment in 2018), and a preferred model configuration was agreed upon at the workshop. For the Jack mackerel stock, fishing appears to be a major cause of the population trend, with the current level at around 48% of what is estimated to have occurred had there been no fishing. The key results in summary are that the stock looks healthy with the biomass being estimated to be above the level that generates MSY. Recent recruitments are estimated to have been high compared to the average level experienced over the previous 10 years. Landings are also higher while fishing mortality has decreased for all fleets except the far north fleet. Fishing mortality rates at age (combined fleets) were high starting in about 1992 but have declined in the past years.

Jack mackerel *Trachurus murphyi* (Global stock) is currently listed as data deficient on the IUCN website;

Pacific Chub mackerel *Scomber japonicus* and Blue fathead Pez medusa *Cubiceps caeruleus*; are currently listed as species of least concern on the IUCN website; Snoek *Thyrsites atun* is currently not listed on the IUCN website.

Chilean Jack mackerel *Trachurus murphyi* is approved by the SAI Global assessor for the production of fishmeal and fish oil under the IFFO RS v 2.0 whole fish standard.

Pacific Chub mackerel Caballa *Scomber japonicus* Blue fathead Pez medusa *Cubiceps caeruleus;* and Snoek Sierra *Thyrsites atun* are also approved by the SAI Global assessor for the production of fishmeal and fish oil under the IFFO-RS v 2.0 by-products standard.

Peer Review Comments

Results in the last stock assessment from the period 2019 published in March 2020 has changed from the results obtained in 2018.
CPUE dataset have been updated following the procedures used to evaluated similar species in EU. The main difference has been that the SSB index has increased over the last 5 years therefore the biomass has bene above limits and fishing mortality has shown results below 1. The plot B/F has shown levels close to MSY. Therefore the stock is above limits. Regarding other species affected by the fishery the PSA has indicated a pass for this species and percentage of catches are low.

ETP species have not shown negative impacts caused by the fishery. Habitats are not affected as the gear used is an epipelagic gear fishing in the water column and no negative impacts have been recorded, interactions with the seafloor are negligible.
Ecosystems are well managed as the index have presented that the fishery is well managed and above limits, therefore, key structure of the ecosystems are not affected by the fishery.

Having said that, the PR agrees with the conclusions reached by the assessor and so the fishery of Chilean jack mackerel in Chile EEZ VX-X is **APPROVED** for the production of fishmeal and fish oil under the IFFO-RS v 2.0 by-products standard.

Notes for On-site Auditor

Note: This table should be completed for whole fish assessments only.

General Results

General Clause	Outcome (Pass/Fail)
M1 - Management Framework	PASS
M2 - Surveillance, Control and Enforcement	PASS
F1 - Impacts on ETP Species	PASS
F2 - Impacts on Habitats	PASS
F3 - Ecosystem Impacts	PASS

Species-Specific Results

Category	Species	% landings	Outcome (Pass/Fail)	
Category A	Chilean Jack mackerel *Trachurus murphyi* III-X	98	A1	Pass
			A2	Pass
			A3	Pass
			A4	Pass
Category D	1. Pacific Chub mackerel Caballa (*Scomber japonicus);* 2. Blue fathead Pez medusa (*Cubiceps caeruleus),* 3. Snoek Sierra (*Thyrsites atun)*	<2%	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.

Landings data from PCR Report for MSC Fisheries Certification Chilean Jack mackerel fishery April 2019 R1

Common name	Latin name	Stock	% of landings	Management	Category
Chilean Jack mackerel Jurel	*Trachurus murphyi*	Chile XV-X SPRFMO Convention Area	98%	MINECON	A
Pacific Chub mackerel Caballa	*Scomber japonicus*	Chile XV-X	1%	MINECON	D
Blue fathead Pez medusa	*Cubiceps caeruleus*	Chile XV-X	<1%	MINECON	D
Snoek Sierra	*Thyrsites atun*	Chile XV-X	<1%	MINECON	D

MANAGEMENT

The two clauses in this section relate to the general management regime applied to the fishery under assessment. A fishery must meet all the minimum requirements in every clause before it can be recommended for approval.

M1	Management Framework – Minimum Requirements		
	M1.1	There is an organisation responsible for managing the fishery	Pass
	M1.2	There is an organisation responsible for collecting data and assessing the fishery	Pass
	M1.3	Fishery management organisations are publically committed to sustainability	Pass
	M1.4	Fishery management organisations are legally empowered to take management actions	Pass
	M1.5	There is a consultation process through which fishery stakeholders are engaged in decision-making	Pass
	M1.6	The decision-making process is transparent, with processes and results publically available	Pass
		Clause outcome:	**PASS**

Evidence

M1.1:
MINECON:
Actions of Chile's Ministry of Economy, Development and Tourism (MINECON) involve promoting the development of the fisheries sector, along with the protection, conservation, and full use of resources and the marine environment. Chile's institutional structure governing the fisheries sector centres around three key organisations, with several other institutions providing additional research and enforcement:

- The Subsecretaria de Pesca (Undersecretariat of Fisheries, SUBPESCA or SSP); positioned within MINECOM; is tasked with the objectives of regulating and managing fishing and aquaculture activity, through policies, regulations and administration measures, under a precautionary and ecosystem approach that promotes the conservation and sustainability of hydrobiological resources for the productive development of the sector.

- The Servicio Nacional de Pesca (National Fisheries Service, SERNAPESCA) is also based within MINECOM. Responsible for executing fisheries policy through enforcement, and monitoring operators' activities, catches and quotas.
- The Instituto de Fomento Pesquero (Fisheries Development Institute, IFOP) is the research arm of the institutional framework and the primary source of scientific advice to SUBPESCA.

Fisheries Management Committee (FMC):
Management Committees are composed of SUBPESCA and SERNAPESCA members, artisanal and industrial fishermen and the processing industry. The Chilean Jack mackerel Fishery Management Committee (FMC) is one of 16 current FMCs (there are also 20 algae and invertebrates Committees). As of June 2020, the Jack Mackerel FMC is composed of 20 members1 representing management and industry from various regions.

National Fisheries Council:
A National Fisheries Council; created by the Fisheries and aquaculture Law LGPA No. 18.892, ensures the participation of all stakeholders in the fisheries and aquaculture sector. The Chilean jack mackerel stock is managed as a single stock from Arica and Parinacota (AyP) in the North (XV) to Los Lagos in the Central/South (X). Regional Government Areas in Chile corresponding to fishery management units have been defined (Figure 1).

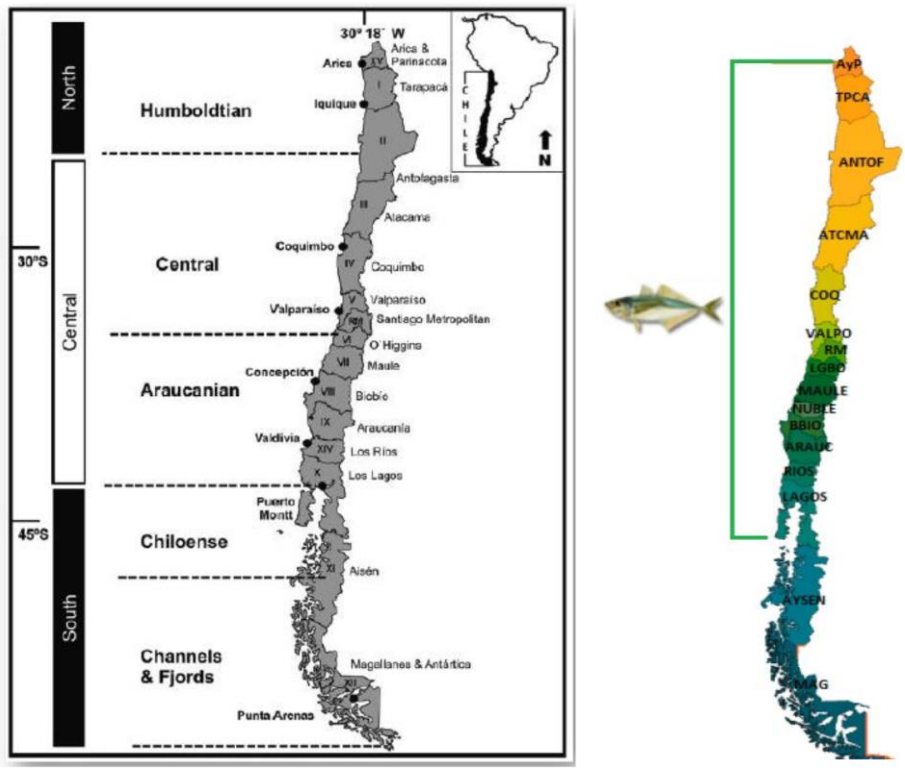


Figure 1. (Left) Administrative boundaries and marine ecoregions in Chile. Roman numerals and names are given for administrative regions on land R1. (Right) Management Units for Chilean Jack Mackerel R2.

International management of Chilean Jack mackerel is coordinated by the South Pacific Regional Fisheries Management Organisation (SPRFMO)2. Overall, Biological Acceptable Catches (BACs) are

[1] http://www.subpesca.cl/portal/616/w3-propertyvalue-52832.html#collapse00
[2] https://www.sprfmo.int/about/

agreed for the species, with a part under Conservation and Management Measures (CMMs) applying to international waters outside Chile's EEZ:

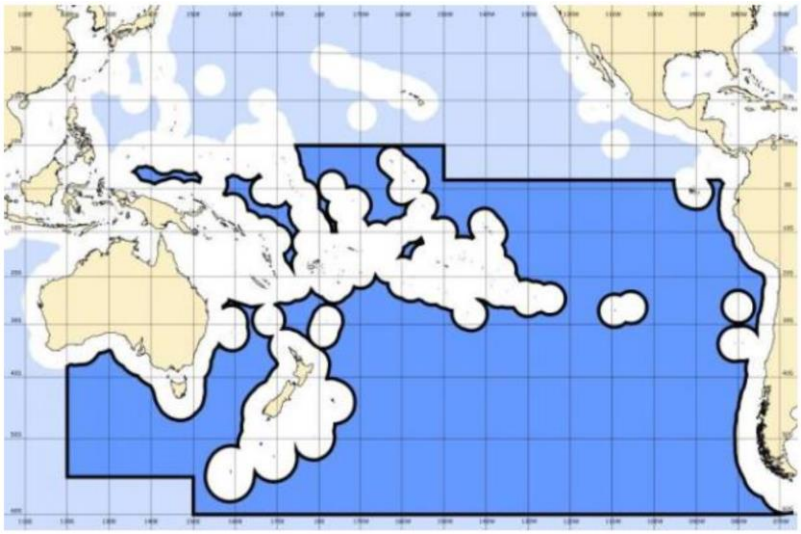


Figure 2. SPRMFO Convention Area Map marked in blue R6

M1.2:
Instituto de Fomento Pesquero (IFOP):
IFOP is the organization responsible for sampling stocks and carrying out annual acoustic surveys3. IFOP is a non-profit organisation created in 1964 under a joint agreement between the Chilean government, the FAO, and the UN Development Program (UNDP). IFOP's public role is to support sustainable development of Chile's fishing sector.

Instituto de Investigación Pesquera (INPESCA):
INPESCA is a privately funded organisation which undertakes scientific studies in many areas, including fisheries research. INPESCA is a private institution that since its creation in 1989, has carried out its activities as an intermediary body between the regional fishing industry and state and university institutions that are dedicated to research in fishery resources4. INPESCA currently has a team of 60 staff which includes researchers, technicians and administrators.

Scientific and Technical Committees:
The Chilean Jack mackerel Scientific and Technical Committee (Comité Científico Técnico de Pesquerías de Pequeños Pelágicos Jurel, CCT-PP) currently has 12 members (and one vacancy). The committee is made up of 5 institutional members (IFOP and SUBPESCA), 2 non-voting members and 6 members nominated through public contest (including three current vacancies)5. The CCT-PP analyse updates on stock status and catch projections provided by IFOP Scientists and make official recommendations on harvest controls to the Competent Authorities in SUBPESCA. These recommendations are termed Biologically Acceptable Catches (BAC, CBA in Spanish). BACs are set up annually following scientist recommendations and data from historical series and biannual surveys. BACs are divided into three categories: research, industrial and artisanal. The number of commercial landings permitted are subject to change depending on survey results.

South Pacific Regional Fisheries Management Organisation (SPRFMO):

[3] https://www.ifop.cl/en/quienes-somos/plan-estrategico/
[4] https://www.geofisica.udec.cl/mundo-laboral/instituto-de-investigacion-pesquera-inpesca/
[5] http://www.subpesca.cl/portal/616/w3-propertyvalue-51143.html#collapse00

International management of Chilean Jack mackerel is coordinated by the South Pacific Regional Fisheries Management Organisation (SPRFMO). Overall BACs are agreed for the species, with a part under Conservation and Management Measures (CMMs) applying to international waters outside Chiles EEZ within SPRFMO's Convention Area (Figure 2).

M1.3
As laid down in the LGPA (see M1.4) one of the main objectives of the Act is to guarantee sustainability of Chile's marine resources. Long term management plans, which reference the Act, ensure rules are in place to achieve this objective. MINECON's mission statement, available on their website, is to generate feasible and sustainable development, with stable progressive equality in the allocation of economic interests.

M1.4
Legal instruments:
Adopted in 2013, the primary legal instrument for fisheries management in Chile has been la Ley General de
Pesca y Acuicultura (LGPA) No. 20.6576. The LGPA is a modification of previous fisheries legislation, and includes:

- Commitments convened to manage the sustainable use and conservation of marine resources.
- Commitments convened to make key decisions on conservation measures based on scientific information above all other considerations. Recommendations of CCT-PP's have been made mandatory for all stakeholders.

The LGPA also includes commitments to develop management plans for any fishery with restricted access, and to review and update these plans every five years. The last Jack mackerel management plan was published in in December 20177. Article 5 of the LGPA states that SUBPESCA should determine Biological Reference Points (BRPs) for all targeted stocks. Biologically Acceptable Catches (BACs) and resource recovery plans are implemented under Article 9.

SUBPESCA resolution No 291/20158 states that all stocks should be exploited around MSY, and that MSY is the objective to be considered when quotas are established. The LGPA does not legislate for catch restrictions when stocks are below limit biomass. Fisheries are not closed below this limit for social and economic reasons, and in order to monitor the recovery of the resource according to recovery plans. Recovery plans imply reductions in fishing mortality at levels below or equal to FMSY according to the expected time of recovery established by Management Committees.

M1.5
Management Plans set lines of action to address biological, economic, social and ecological matters. There is consultation and evaluation of a series of harvest control rules and definitions of robust rules to allow viable mixed fisheries. Minutes of these and other CCT-PP meetings are published on relevant websites.

SONAPESCA
Sociedad Nacional de Pesca (SONAPESCA) (http://www.sonapesca.cl) represent the client group which are named on the current MSC Fisheries Certificate for the Chilean Jack mackerel fishery (Unit of Certification III-X). Representatives of SONAPESCA take part in FMC Meetings (M1.1).

[6] https://www.leychile.cl/Navegar?idNorma=1048776
[7] http://anfitrion.cl/GobiernoTransparente/pesca/res_ne.html
[8] http://www.subpesca.cl/portal/615/w3-article-86859.html

M1.6:
Stock-recruitment and spawning periods are closely monitored by IFOP, per region. Results of acoustic surveys are published in monthly bulletins (Informes) which also contain details of closed seasons by area and general information on stock status. Regulations on quota swaps between different fleet sectors and quota distribution through fishing regions are also made available online[9]. The system is transparent; all information is available in official websites.

R1-R12, R16-R17, R24

References
Pages 34, 35

Standard clauses 1.3.1.1, 1.3.1.2

M2	**Surveillance, Control and Enforcement - Minimum Requirements**		
	M2.1	There is an organisation responsible for monitoring compliance with fishery laws and regulations	Pass
	M2.2	There is a framework of sanctions which are applied when laws and regulations are discovered to have been broken	Pass
	M2.3	There is no substantial evidence of widespread non-compliance in the fishery, and no substantial evidence of IUU fishing	Pass
	M2.4	Compliance with laws and regulations is actively monitored, through a regime which may include at-sea and portside inspections, observer programmes, and VMS.	Pass
	Clause outcome:		**Pass**

Evidence

M2.1
Compliance both within and outside Chile's EEZ is monitored by a number of different entities:

- **SERNAPESCA**:
  I. Carry out audits of capture fisheries; implement surveillance and control of compliance with all legal provisions relating to fisheries.
  II. Health and environmental monitoring of aquaculture. Develop strategies and procedures for prevention, surveillance and control of high-risk diseases.
  III. Information and sectoral statistics. Managing fisheries and aquaculture records.
- **Chilean Navy**:
  - Within Chile' s Exclusive Economic Zone (EEZ) the Navy monitor an area covering approximately 4,542,990 km^2 helping to ensure the prevention of depredation of natural resources by protecting the ecosystem from unauthorized activities.
- **Observer Programme:**
  - Within the Convention Area until SPRFMO adopts an Observer Programme, in accordance with Article 28 of the Convention, all Members and CNCP's (Co-operating Non-Contracting Parties) participating in the fishery are required to ensure a minimum of 10% scientific observer coverage of trips for vessels flying their flag and ensure that such observers collect and report data to the Competent Authority.

[9] http://anfitrion.cl/GobiernoTransparente/pesca/res_ne.html

SPRFMO Conservation and Management Measures (CMM) compliance is documented yearly. The last report was published in January 2019[10]. This report notes some issues (no further action required) with VMS data transmission for 6 Chilean vessels during 2017/2018, and full compliance in regard to port inspection requirements.

M2.2

Infractions, Penalties and Procedures are set out under "Title IX" in the LGPA (2013). Article 108 sets out measures that can be applied. They include administrative and judicial sanctions, examples include:

- Fines;
- Suspension or removal of the Captains licence
- Removal of quota;
- Seizure of gear and means of transporting gear;
- Confiscation of catch and fines in multiples above the value of the confiscated fish;
- Additional penalties, e.g. doubling of fines, extended periods of sanctioning, if an offence is committed within 2 years of an initial offence;
- Closure of fishing and processing facilities.

In the previous IFFO RS assessment of this fishery, published in December 2019, SERNAPESCA staff confirmed the most likely non-compliance within the fishery is landing of under-size fish and under-reporting. These are usually identified at shore inspections and result in warnings. The low value associated with small Chilean Jack mackerel is considered to be an incentive not to land undersize fish and 100% monitoring of landings, including accurate weigh outs, are also considered to provide incentive for accurate reporting of catches. The potential confiscation of catch, high fines and removal of quota are considered strong deterrents. There are no reports from SERNAPESCA of this being actioned.

M2.3

In 2005, a national action plan was approved with the aim of preventing, deterring and eliminating IUU fishing. The fishery is monitored and there is no currently no evidence of widespread IUU fishing activities.

Chile is now involved in an international program to avoid illegal fishing; `***'Acuerdo sobre medidas del Estado rector del Puerto "(Port State Measures)***. This program obliges landings from other Countries to be controlled by Chile and applies to foreign flagged vessels fishing in the SPRFMO Convention Area. A list of vessels conducting illegal, unreported or unregulated (IUU) activities was adopted at the 3rd SPRFMO Commission meeting in 2015 and has continued to be published on an annual basis. The list refers to fishing in the SPRFMO Convention Area without authorisation. The 2020 SPRFMO IUU Vessel List included the name of one vessel flying a Russian flag, called Aurora11. This is in contrast to the three vessels identified in 2019, one of which was identified as the Aurora12.

[10] https://www.sprfmo.int/assets/2019-Annual-Meeting/COMM-7/Report/ANNEX-4-COMM7-2019-Final-Compliance-Report.pdf

[11] https://www.sprfmo.int/assets/0-2020-Annual-Meeting/Reports/COMM8-Report-Annex-5-2020-SPRFMO-IUU-Vessel-List.pdf

[12] https://www.sprfmo.int/assets/2019-Annual-Meeting/COMM-7/Report/2019-SPRFMO-Final-IUU-Vessel-List-15Nov2019.pdf

M2.4

In Chile all catches are reported in logbooks and in catch and effort landing returns. On-board observer coverage (minimum 10% of trips for trawlers and purse seiners flying their flag) contributes to monitoring, cross checking and verification of catches and landings with vessels logbooks. Industrial vessels operate under mandatory VMS monitoring. SERNAPESCA Inspectors carry out audits of capture fisheries during landings (including accurate weigh outs); implementing surveillance and control of compliance in ports. Within their EEZ the Chilean Navy monitor an area covering approximately 4,542,990. Km^2.

There is a specific CMM for the Chilean Jack mackerel fisheries which is revised annually. CMM No 01-2018 sets the TAC of Chilean Jack mackerel in the SPRFMO Convention Area and agreed percentage allocations and quotas for each Member and CNCPs. These have been set and agreed for the period 2018 to 2021. In the event that a Member or CNCP reaches 70% of its catch limit, the SPRFMO Secretariat is required to be notified by the Member or CNCP, with a copy to all other Members and CNCPs, and, that Member or CNCP is required to close the fishery for its flagged vessels when the total catch of its flagged vessels is reached and notify the Executive Secretary of the date of the closure. As mentioned above, SPRFMO Conservation and Management Measures (CMM) compliance is documented yearly. The last report was published in January 2019[13]. This report notes some issues (no further action required) with VMS data transmission for 6 Chilean vessels during 2017/2018, and full compliance in regard to port inspection requirements.

R5, R9, R22, R13-15

References

Pages 34, 35

Standard clause 1.3.1.3

[13] https://www.sprfmo.int/assets/2019-Annual-Meeting/COMM-7/Report/ANNEX-4-COMM7-2019-Final-Compliance-Report.pdf

CATEGORY A SPECIES

The four clauses in this section apply to Category A species. Clauses A1 - A4 should be completed for **each** Category A species. If there are no Category A species in the fishery under assessment, this section can be deleted. A Category A species must meet the minimum requirements of all four clauses before it can be recommended for approval. If the species fails any of these clauses it should be re-assessed as a Category B species.

Species Name		**Chilean Jack mackerel, Jurel (*Trachurus murphyi*)**	
A1	**Data Collection - Minimum Requirements**		
	A1.1	Landings data are collected such that the fishery-wide removals of this species are known.	Pass
	A1.2	Sufficient additional information is collected to enable an indication of stock status to be estimated.	Pass
		Clause outcome:	**Pass**

Evidence

A1.1

Landings data are collected such that the fishery-wide removals of this species are known.

During the period between 2013 and 2018, an increase of jack mackerel catches has been observed because of the consumption of quota allocated to our country and, on the other hand, of the transfers of jack mackerel from other fishing nations. The main catches concentrate during the first half of each year (80% in average of the annual quota). In this same period, there is a decreasing trend in the catches of jack mackerel within the SPRFMO area, with the exception of 2015 where such catches corresponded to 20% of the total captured in such year. During the first half of 2019, 2,283 tons of jack mackerel have been captured within the SPRFMO area.

Besides jack mackerel, the national fleet also registered chub mackerel catches which totalled 30,871 tons until June 2019. These catches have shown a reduction during the last 3 years and they are expected to maintain such trend. In the same line, catches of chub mackerel will not surpass 1% of the total capture of this resource within the SPRFMO area (Figure 3)[14].

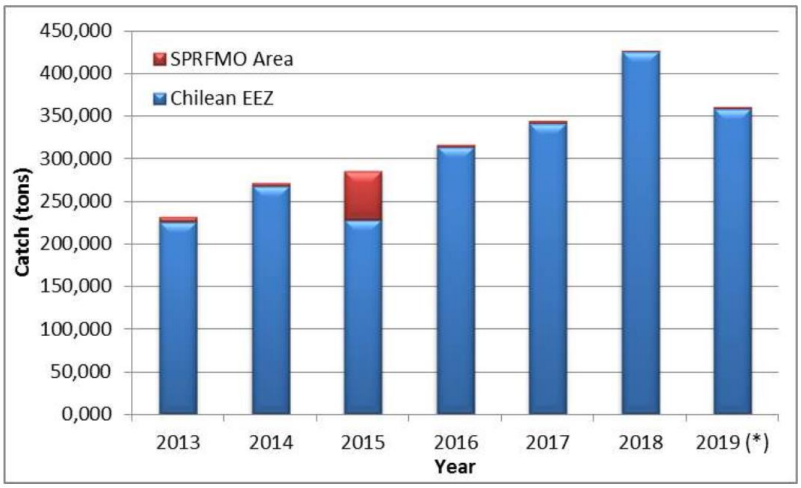


Figure 3. Total annual jack mackerel catch within the Chilean EEZ and the SPRFMO area with purse seine nets for the period 2013 - June 2019 (*) preliminary.

[14] https://www.sprfmo.int/assets/2019-SC7/Meeting-Docs/SC7-Doc29-Chile-Annual-report-2019-Jack-mackerel.pdf

A1.2

Sufficient additional information is collected to enable an indication of stock status to be estimated.

Biological sampling. Biological information is obtained on a regular basis from samples collected along the Chilean coast for jack mackerel and its associated species. Sampling is conducted on a daily basis, mainly at landing sites and processing plants, and is also complemented with information gathered by scientific observers on board fishing vessels. Information collected includes fork length measurements, otolith collection, total weight, gutted weight, gonad weight, and sex and maturity stages. The amount of size and biological samples obtained for jack mackerel during 2018 was 39,599 and 23,762 specimens, respectively. For the industrial fleet, samples included at-sea sampling as well as port sampling, covering the whole range of activity reported for this fishery in Chile. The main landing ports were Caldera and Coquimbo in the northern area, and Coronel-Lota and Talcahuano in the center-south area of the fishery.

Hydroacoustic assessment. Hydroacoustic assessment of jack mackerel between Arica-Parinacota and Valparaíso regions, took place from March 17 through April 26, 2019, and included an exploration area located between the northern boundary of the country and Valparaiso (33° 00' SL) in perpendicular transects to the coast, reaching up to 100nm off the coast. As a result, the estimated jack mackerel biomass in the prospection area was 1,459,000 tons[15].

This data (and other) was used in the statistical catch-at-age model employed to evaluate the Jack mackerel stocks[16]. The JJM ("Joint Jack Mackerel Model") is implemented in ADMB and considers different types of information, which corresponds to the available data of the Jack mackerel fishery in the South Pacific area from 1970 to 2019.

R18-R20

References

Pages 34, 35

Standard clause 1.3.2.1.1

[15] https://www.sprfmo.int/assets/2019-SC7/Meeting-Docs/SC7-Doc29-Chile-Annual-report-2019-Jack-mackerel.pdf

[16] https://www.sprfmo.int/assets/2019-SC7/Reports/SC7-Report-Annex-8-JM-Tech-Annex-Rev1.pdf

A2	Stock Assessment - Minimum Requirements		
	A2.1	A stock assessment is conducted at least once every 3 years (or every 5 years if there is substantial supporting information that this is sufficient for the long-term sustainable management of the stock), and considers all fishery removals and the biological characteristics of the species.	Pass
	A2.2	The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.	Pass
	A2.3	The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status.	Pass
	A2.4	The assessment is subject to internal or external peer review.	Pass
	A2.5	The assessment is made publically available.	Pass
Clause outcome:			**Pass**

Evidence

A2.1. A stock assessment is conducted at least once every 3 years and considers all fishery removals and the biological characteristics of the species.

The latest SPRFMO Scientific Committee (SC) meeting (i.e. SC7[17]) to discuss stock assessment results for Chilean jack mackerel took place in 2019. The analyses updated the model and assumptions from SC6 (the last full assessment in 2018), and a preferred model configuration was agreed upon at the workshop. A summary of discussions during the workshop can be found on the SC7 meeting webpage. The model was updated with new data, and subsequently accepted at the SC7 meeting. Discussions at SC7 focused on the following topics:

- Review and update of data sets;
- Assumptions on selectivity and catchability for the fisheries and surveys;
- The need for safeguards for weight-at-age data templates to reduce the likelihood of erroneous inputs.

Fishery removals and biological characteristics were used in the 2019 statistical catch-at-age model to evaluate the Jack mackerel stocks. The JJM ("Joint Jack Mackerel Model") is implemented in ADMB and considers different types of information, which corresponds to the available data of the Jack mackerel fishery in the South Pacific area from 1970 to 2019, as shown below:

Table 1. Years and types of information used in the JJM assessment models.

Fleet	Catch-at-age	Catch-at-length	Landings	CPUE	Acoustic	DEPM
North Chile purse seine	1975-2019	-	1970-2019	-	Index: 1984-1988; 1991; 2006-2019 Age comps: 2006-2019	Index: 1999-2008 Age comps: 2001-2008
South-central Chile purse seine	1975-2019	-	1970-2019	1983-2019	1997-2009 Age comps: 1997-2009	-
FarNorth	-	1980-2019	1970-2019	2002-2019	1985-2013	-
International trawl off Chile	1979-1991; 2000-2004; 2006-2018	2007-2015*	1970-2019	China, EU, Korea, Russia, & Vanuatu (2008-2018)	-	-

(*) Are converted to age using age-length keys of central-southern area off Chile

[17] https://www.sprfmo.int/assets/2019-SC7/Reports/SC7-Report-Annex-8-JM-Tech-Annex-Rev1.pdf

A2.2 The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.

A summary of the time series stock status (spawning biomass, F, recruitment, total biomass) for the single-stock hypothesis is shown below[18]. For the Jack mackerel stock, fishing appears to be a major cause of the population trend, with the current level at around 48% of what is estimated to have occurred had there been no fishing. The key results in summary are that the stock looks healthy with the biomass being estimated to be above the level that generates MSY. Recent recruitments are estimated to have been high compared to the average level experienced over the previous 10 years. Landings are also higher while fishing mortality has decreased for all fleets except the far north fleet. Fishing mortality rates at age (combined fleets) were high starting in about 1992 but have declined in the past years. Short, medium and long-term SSB predictions using Model 1.00 (single-stock hypothesis) are shown below.

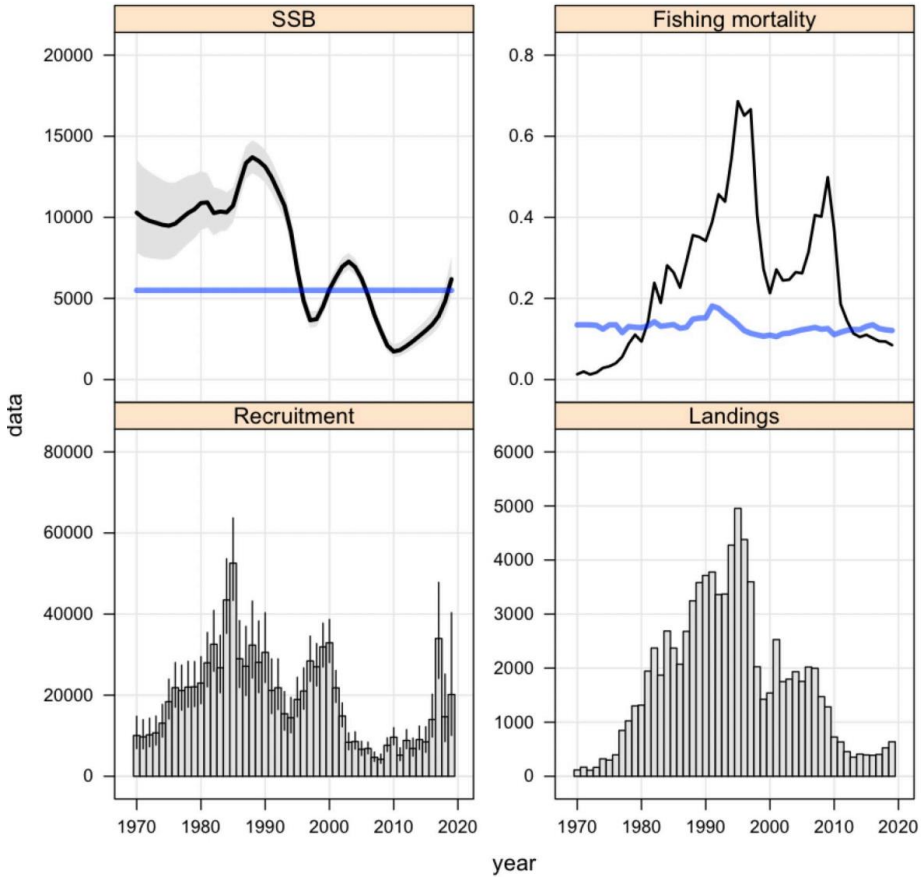


Figure 4. Model 1.00—single-stock hypothesis—summary estimates over time showing spawning biomass (kt; top left), recruitment at age 1 (millions; lower left) total fishing mortality (top right) and total catch (kt; bottom right). Blue lines represent the provisional BMSY (upper left) and dynamic estimates of FMSY (upper right).

The JJM assessment model was also run under the 2-stock hypothesis, and a summary figure of the northern (far-north) and southern stocks can be found in the next figure below. Conditions of the Jack mackerel stock in its entire distribution range in the southeast Pacific shows a continued recovery

[18] https://www.sprfmo.int/assets/2019-SC7/Reports/SC7-Report-Annex-8-JM-Tech-Annex-Rev1.pdf

since the timeseries low in 2010. It is noted that under the two-stock model, the northern unit shows stable and relatively low biomass over the last decade, while the southern unit shows an increasing trend. The southern unit showed similar results to that of the single-stock hypothesis, although SSB was estimated slightly higher under the former scenario. Estimates of stock size and exploitation rate for the Northern stock were comparable to previous years and show a small increase in stock size in the last year while fishing mortality is low[19].

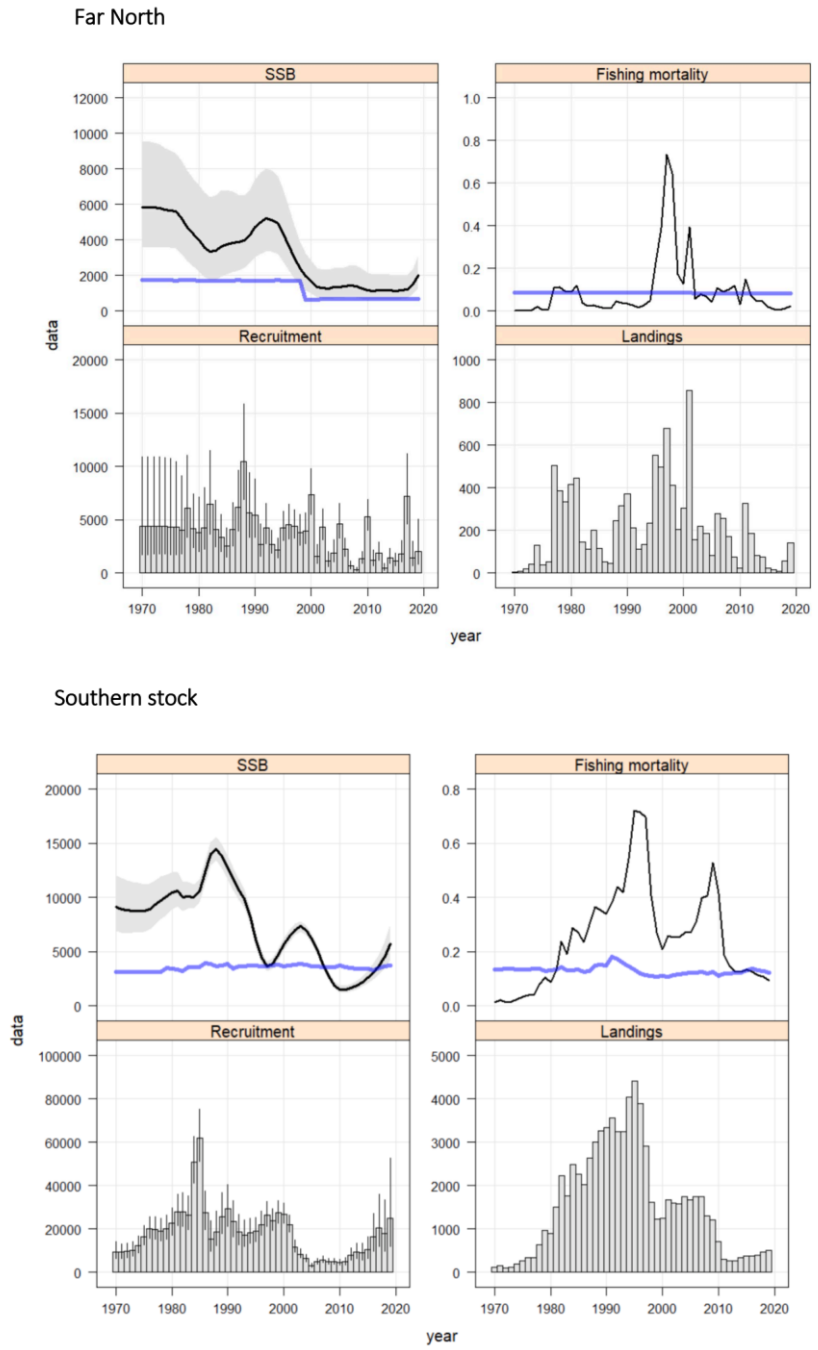


Figure 1. Model 1.00 —two-stock hypothesis— summary estimates over time showing spawning biomass (kt; top left), recruitment at age 1 (millions; lower left) total fishing mortality (top right)

[19] https://www.sprfmo.int/assets/2019-SC7/Reports/SC7-Report-Annex-8-JM-Tech-Annex-Rev1.pdf

and total catch (kt; bottom right) for the "Far North" stock (top set) and for the "Southern" stock (bottom set).

The SPRFMO SC agreed that the forecast would be run with both the single stock and two-stock model and the most precautionary result will be used to generate advice to the Commission[20].

A2.3. The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status. As shown above, landings since the mind 1990s up to 2010 have decreased considerably. Currently, landings are relatively low and appear to be appropriate to the current stock status. In 2020 the total catch of *Trachurus murphyi* in the area to which this CMM applies shall be limited to 618,001 tonnes[21]. Members and CNCPs are to share in this total catch in the tonnages set out in the Table below.

Table 2. Permitted tonnages in the 2020 Pacific Jack Mackerel fishery.

Member / CNCP	Tonnage
Chile	439 034
China	43 164
Cook Islands	0
Cuba	1 517
Ecuador	8 594
European Union	41 538
Faroe Islands	7 539
Korea	8 719
Peru (HS)	13 793
Russian Federation	22 321
Vanuatu	31 782
Total	618 001

A2.4. The assessment is subject to internal or external peer review.

In Chile stock assessments and the management approach used in the fishery undergo detailed peer reviews through Fisheries Management Committee meetings. These reviews can be considered both internal and external as members of committees' present may also be outside the assessment process. Both IFOP and SUBPESCA have also commissioned external peer reviews, for example, a series of workshops were convened with experts from Peru. The Chilean authorities have also invited international experts to evaluate their setting of biological reference points within the MSY framework.

A2.5: The assessment is made publicly available.

Reports of stock assessments and advice on BAC's can be found on IFOP, SUBPESCA, and SPRFMO websites. ACTAS published on SUBPESCA's website give summaries of the stock assessment process and confirm final decisions on BAC's. Stock-recruitment and spawning periods are closely monitored

[20] https://www.sprfmo.int/assets/2019-SC7/Reports/SPRFMO-SC7-Report-2019-V2.pdf
[21] https://www.sprfmo.int/assets/Fisheries/Conservation-and-Management-Measures/2020-CMMs/CMM-01-2020-Trachurus-murphyi-31Mar20.pdf

by IFOP and published in monthly bulletins (INFORMES) which also contain details of closed seasons by area and general information on current stock status. All the information is available. **R19-R21**
References Pages 34, 35
Standard clause 1.3.2.2, 1.3.2.1.2, 1.3.2.1.4

A3	Harvest Strategy - Minimum Requirements		
	A3.1	There is a mechanism in place by which total fishing mortality of this species is restricted.	Pass
	A3.2	Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment. Where a specific quantity of removals is recommended, the actual removals may exceed this by up to 10% ONLY if the stock status is above the limit reference point or proxy.	Pass
	A3.3	Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy (small quotas for research or non-target catch of the species in other fisheries are permissible).	Pass
	Clause outcome:		**Pass**

Evidence

A3.1:

The Biological Allowable Catch (BAC) is set up every year following scientist recommendations and data from historical series of data and biannual surveys. BAC's are divided into three categories: research, industrial and artisanal. The number of commercial landings permitted are subject to change depending on survey results. Normally BAC's are set up for two fishing seasons, effort may be controlled depending on the period of the year.

By Chilean Law (LGPA Law No. 20.657) recommendations are provided as a range with the lower limit as 20% of actual recommendations. Annual temporal closures protect spawning stock and juveniles. These closures are mobile and depend on monitoring of biological indicators. A minimum landing size of 26 cm fork length is in force. The percentage of juveniles in number from each landing or transport that are less than 26 cm fork length is 35%. New entrants to the fishery are prohibited. A plan to reduce discarding and accidental by-catch in the fishery is underway.

For adequate management of Jack mackerel over its range the SPRFMO has requested in 2020 the update of the management procedure for Jack mackerel used to control total fishing mortality. This work has begun (via contract within the EU) and comprises a new Management Strategy Evaluation (MSE)[22].

A first step in developing this evaluation is to reconsider the Commission's overarching management objectives. Presently, the harvest control rule is designed to be precautionary with a primary objective to rebuild the stock to above the interim Bmsy (5.5 million t) level. Since this objective is presently estimated to have been achieved, the SPRFMO advised the analysts could start with an overarching specification that:

Ensures that a candidate management procedure provides a spawning biomass greater than Bmsy with 50% probability in 2030 and is above Blim (point to avoid, taken to be the value in 2010) with 95% probability over the period 2025-2040.

Alternative management procedures shall be tuned (via testing within the simulation routines) so that these overarching objectives are met.

[22] https://www.sprfmo.int/assets/0-2020-Annual-Meeting/Reports/Annex-8b-JM-MSE-Management-Objectives.pdf

A3.2:
Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment.

In December each year, the Chilean Undersecretariat for Fisheries and Aquaculture establishes the catch quotas for each resource in full exploitation regimes to be implemented next year. The jack mackerel quota established by the Undersecretariat for Fisheries and Aquaculture in December 2018, for the 2019 season, was 381,572 tons (Exempt Decree N° 541/2018). Preliminary catches in 2019 were just above 350,000 t, and within the TAC[23]. The 2019 IFFO RS reports for this fishery shows that all the catches prior to 2019 back to 2011 were within the advised maximum catch levels.

A3.3. Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy (small quotas for research or non-target catch of the species in other fisheries are permissible).

The stock is currently above BMSY. In Chile Blim or a Proxy is used to inform management decisions rather than prohibit fishery removals. The Fisheries Act (LGPA) does not establish catch restrictions when stocks are below limit biomass (for social and economic reasons and to facilitate further research). Instead a resource recovery plan must be implemented. Management committees are required to elaborate and implement such recovery plans (Article 9 LGPA); implying reductions in fishing mortality at levels below or equal to FRMS.

Other management strategies include the obligatory use of vessel monitoring systems (VMS), temporal closures (SUBPESCA and IFOP recommendations) and the recent mandatory use of on-board cameras to identify and quantify discards.

IFOP produce outputs which indicate the level of risk associated with potential fishery management actions. IFOP consider a range of sources of uncertainty, e.g. variability in CPUE data, environmental factors, stock aggregation for habitat or reproduction and acoustic biomass estimation parameters. Life history parameters are also considered (growth, mortality and maturity) as is the process error inherent in the evaluation model and the short history of the fishery. Evidence has been provided that the precautionary approach is being taken in allocating BAC's and in controlling catches to be within scientific advice.

SERNAPESCA is responsible for supervising enforcement and ensuring proper application of rules and regulations on fishing**.**

R1, **R7, R8, R19, R23**

References
Pages 34, 35

Standard clause 1.3.2.1.3

	Stock Status - Minimum Requirements

[23] https://www.sprfmo.int/assets/2019-SC7/Meeting-Docs/SC7-Doc29-Chile-Annual-report-2019-Jack-mackerel.pdf

A4	A4.1	The stock is at or above the target reference point, OR IF NOT: The stock is above the limit reference point or proxy and there is evidence that a fall below the limit reference point would result in fishery closure OR IF NOT: The stock is estimated to be below the limit reference point or proxy, but fishery removals are prohibited.	Pass
		Clause outcome:	**Pass**

Evidence

A4.1. The stock is at or above the target reference point.

As shown under clause A2.2, the key 2019 stock assessment results in summary are that the jack mackerel stock looks healthy with the biomass being estimated to be above the level that generates MSY. Recent recruitments are estimated to have been high compared to the average level experienced over the previous 10 years[24].

R19-R21

References

Pages 34, 35

Standard clause 1.3.2.1.4

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.

[24] https://www.sprfmo.int/assets/2019-SC7/Reports/SC7-Report-Annex-8-JM-Tech-Annex-Rev1.pdf

- 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:	Pacific Chub mackerel *Scomber japonicus*	
	Productivity Attribute	**Value**	**Score**
	Average age at maturity (years)*	2	2
	Average maximum age (years)*	7.9	1
	Fecundity (eggs/spawning) *	86,616-213,422	1
	Average maximum size (cm)	30	1
	Average size at maturity (cm)*	22	1
	Reproductive strategy	Open water / substratum egg scatterers	1
	Mean trophic level	3.4	3
	Average Productivity Score		**1.43**
	Susceptibility Attribute	**Value**	**Score**
	Overlap of adult species range with fishery	>50% of stock occurs in area fished	3
	Distribution	Not scored when overlap scored (table D2)	Not scored
	Habitat	Coastal pelagic	Not scored
	Depth range (Targeted by mid-water pelagic gear)	50-200m	1
	Selectivity	Up to 4m in length	3
	Post-capture mortality	Short tows	2
	Average Susceptibility Score		**2.25**
	PSA Risk Rating (From Table D3)		**Pass**

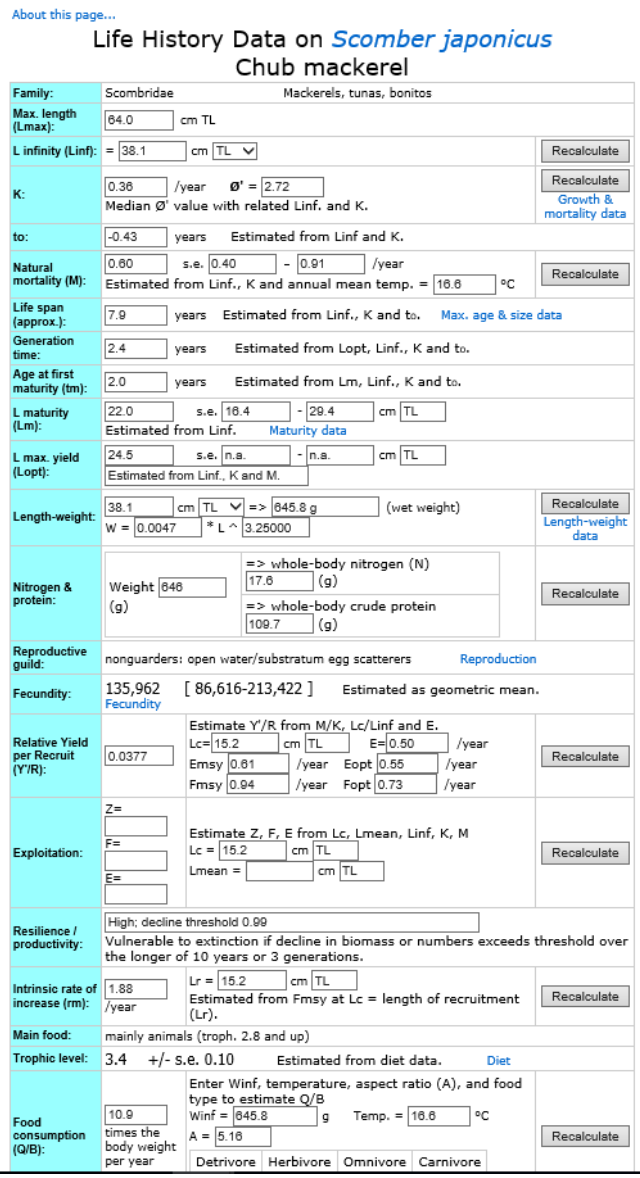
The fishery for pacific chub mackerel passes based on Productivity and Susceptibility ratings calculated (Table D1, D3). In Chile there is no information on stock status.

*References: Life history tool (Fishbase):

References

Distribution:

Figure D1. Distribution of Scomber japonicus (Chile stock). (Source:Fishbase)



About this page...

Life History Data on *Scomber japonicus*
Chub mackerel

Family:	Scombridae Mackerels, tunas, bonitos	
Max. length (Lmax):	64.0 cm TL	
L infinity (Linf):	= 38.1 cm TL	Recalculate
K:	0.36 /year Ø' = 2.72 Median Ø' value with related Linf. and K.	Recalculate Growth & mortality data
to:	-0.43 years Estimated from Linf and K.	
Natural mortality (M):	0.60 s.e. 0.40 - 0.91 /year Estimated from Linf., K and annual mean temp. = 16.6 °C	Recalculate
Life span (approx.):	7.9 years Estimated from Linf., K and to. Max. age & size data	
Generation time:	2.4 years Estimated from Lopt, Linf., K and to.	
Age at first maturity (tm):	2.0 years Estimated from Lm, Linf., K and to.	
L maturity (Lm):	22.0 s.e. 16.4 - 29.4 cm TL Estimated from Linf. Maturity data	
L max. yield (Lopt):	24.5 s.e. n.a. - n.a. cm TL Estimated from Linf., K and M.	
Length-weight:	38.1 cm TL => 645.8 g (wet weight) W = 0.0047 * L ^ 3.25000	Recalculate Length-weight data
Nitrogen & protein:	Weight 646 (g) => whole-body nitrogen (N) 17.6 (g) => whole-body crude protein 109.7 (g)	Recalculate
Reproductive guild:	nonguarders: open water/substratum egg scatterers Reproduction	
Fecundity:	135,962 [86,616-213,422] Estimated as geometric mean. Fecundity	
Relative Yield per Recruit (Y'/R):	0.0377 Estimate Y'/R from M/K, Lc/Linf and E. Lc= 15.2 cm TL E= 0.50 /year Emsy 0.61 /year Eopt 0.55 /year Fmsy 0.94 /year Fopt 0.73 /year	Recalculate
Exploitation:	Z= F= E= Estimate Z, F, E from Lc, Lmean, Linf, K, M Lc = 15.2 cm TL Lmean = cm TL	Recalculate
Resilience / productivity:	High; decline threshold 0.99 Vulnerable to extinction if decline in biomass or numbers exceeds threshold over the longer of 10 years or 3 generations.	
Intrinsic rate of increase (rm):	1.88 /year Lr = 15.2 cm TL Estimated from Fmsy at Lc = length of recruitment (Lr).	Recalculate
Main food:	mainly animals (troph. 2.8 and up)	
Trophic level:	3.4 +/- s.e. 0.10 Estimated from diet data. Diet	
Food consumption (Q/B):	10.9 times the body weight per year Enter Winf, temperature, aspect ratio (A), and food type to estimate Q/B Winf = 645.8 g Temp. = 16.6 °C A = 5.16 Detrivore Herbivore Omnivore Carnivore	Recalculate

Figure D2: *Scomber japonicus* life history. (Source: Fishbase)

D1 Fishbase**:** Pacific Chub Mackerel (*Scomber japonicus*)
http://www.fishbase.org/summary/117

D2 Fishsource**:** Pacific Chub Mackerel Chile (*Scomber japonicus)*
https://www.fishsource.org/stock_page/1647

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

D1	Species Name:	Blue fathead Pez medusa *Cubiceps caeruleus*	
	Productivity Attribute	**Value**	**Score**
	Average age at maturity (years)*	1.1	1
	Average maximum age (years)*	4.4	2
	Fecundity (eggs/spawning)	<1000	3
	Average maximum size (cm)	28.5	1
	Average size at maturity (cm)*	18.1	1
	Reproductive strategy	Egg scatterers	1
	Mean trophic level	3.6	3
	Average Productivity Score		**1.71**
	Susceptibility Attribute	**Value**	**Score**
	Overlap of adult species range with fishery Global distribution	<25%	1
	Distribution		Not scored
	Habitat		Not scored
	Depth range Targeted by Pelagic Gear	20-250	1
	Selectivity	Up to 4m	3
	Post-capture mortality	Short tows	2
	Average Susceptibility Score		**1.75**
	PSA Risk Rating (From Table D3)		**PASS**

References

*Blue fathead Life History **Figure D3**

D3 Fishbase Blue fathead:

https://www.fishbase.se/Summary/SpeciesSummary.php?ID=8397&AT=Blue+fathead

About this page...

Life History Data on *Cubiceps caeruleus*

Blue fathead

Family:	Nomeidae Driftfishes	
Max. length (Lmax):	28.5 cm TL	
L infinity (Linf):	= 30.7 cm TL	Recalculate
K:	0.65 /year Ø' = 2.79 Median Ø' value with related Linf. and K.	Recalculate Growth & mortality data
to:	-0.25 years Estimated from Linf and K.	
Natural mortality (M):	1.20 s.e. 0.79 - 1.81 /year Estimated from Linf., K and annual mean temp. = 25.0 °C	Recalculate
Life span (approx.):	4.4 years Estimated from Linf., K and to. Max. age & size data	
Generation time:	1.2 years Estimated from Lopt, Linf., K and to.	
Age at first maturity (tm):	1.1 years Estimated from Lm, Linf., K and to.	
L maturity (Lm):	18.1 s.e. 13.5 - 24.2 cm TL Estimated from Linf. Maturity data	
L max. yield (Lopt):	19.0 s.e. n.a. - n.a. cm TL Estimated from Linf., K and M.	
Length-weight:	30.7 cm TL => 8.5 g (wet weight) W = 0.0052 * L ^ 2.16100	Recalculate Length-weight data
Nitrogen & protein:	Weight 9 (g) => whole-body nitrogen (N) 0.2 (g) => whole-body crude protein 1.3 (g)	Recalculate
Reproductive guild:	nonguarders: open water/substratum egg scatterers Reproduction	
Fecundity:	[no value (min.)-no value (max.)] Estimated as geometric mean. Fecundity	
Relative Yield per Recruit (Y'/R):	0.0321 Estimate Y'/R from M/K, Lc/Linf and E. Lc= 12.3 cm TL E= 0.50 /year Emsy 0.63 /year Eopt 0.57 /year Fmsy 2.04 /year Fopt 1.59 /year	Recalculate
Exploitation:	Z= F= E= Estimate Z, F, E from Lc, Lmean, Linf, K, M Lc = 12.3 cm TL Lmean = cm TL	Recalculate
Resilience / productivity:	High; decline threshold 0.99 Vulnerable to extinction if decline in biomass or numbers exceeds threshold over the longer of 10 years or 3 generations.	
Intrinsic rate of increase (rm):	4.08 /year Lr = 12.3 cm TL Estimated from Fmsy at Lc = length of recruitment (Lr).	Recalculate
Main food:	mainly animals (troph. 2.8 and up)	
Trophic level:	3.6 Estimated from diet data. Diet	

Figure D3: Blue fathead Life history **D3**

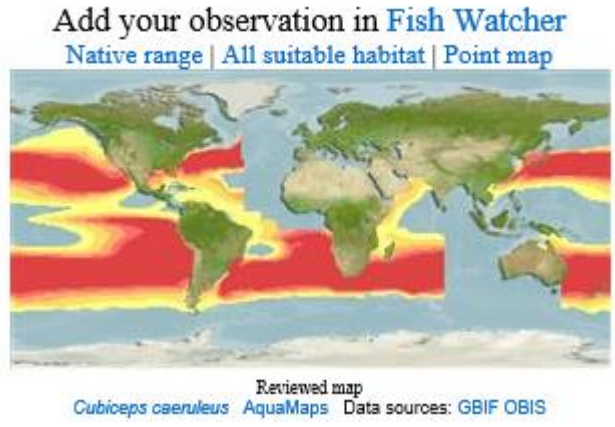


Figure D4: Blue fathead distribution **(D3)**

Standard clauses 1.3.2.2

D1	Species Name:	Snoek Sierra *Thyrsites atun*	
	Productivity Attribute	**Value**	**Score**
	Average age at maturity (years)*	2.8	2
	Average maximum age (years)*	13.9	2
	Fecundity (eggs/spawning)	<1000	3
	Average maximum size (cm)	200	3
	Average size at maturity (cm)*	99	2
	Reproductive strategy*	Egg scatterers	1
	Mean trophic level	3.6	3
	Average Productivity Score		**2.29**
	Susceptibility Attribute	**Value**	**Score**
	Overlap of adult species range with fishery	<25%	1
	Distribution	Not used	-
	Habitat	Not used	-
	Depth range >70	100-500	1
	Selectivity	Up to 4m	3
	Post-capture mortality Form schools near the bottom or midwater	Alive after hauled	2
	Average Susceptibility Score		**1.75**
	PSA Risk Rating (From Table D3)		**PASS**

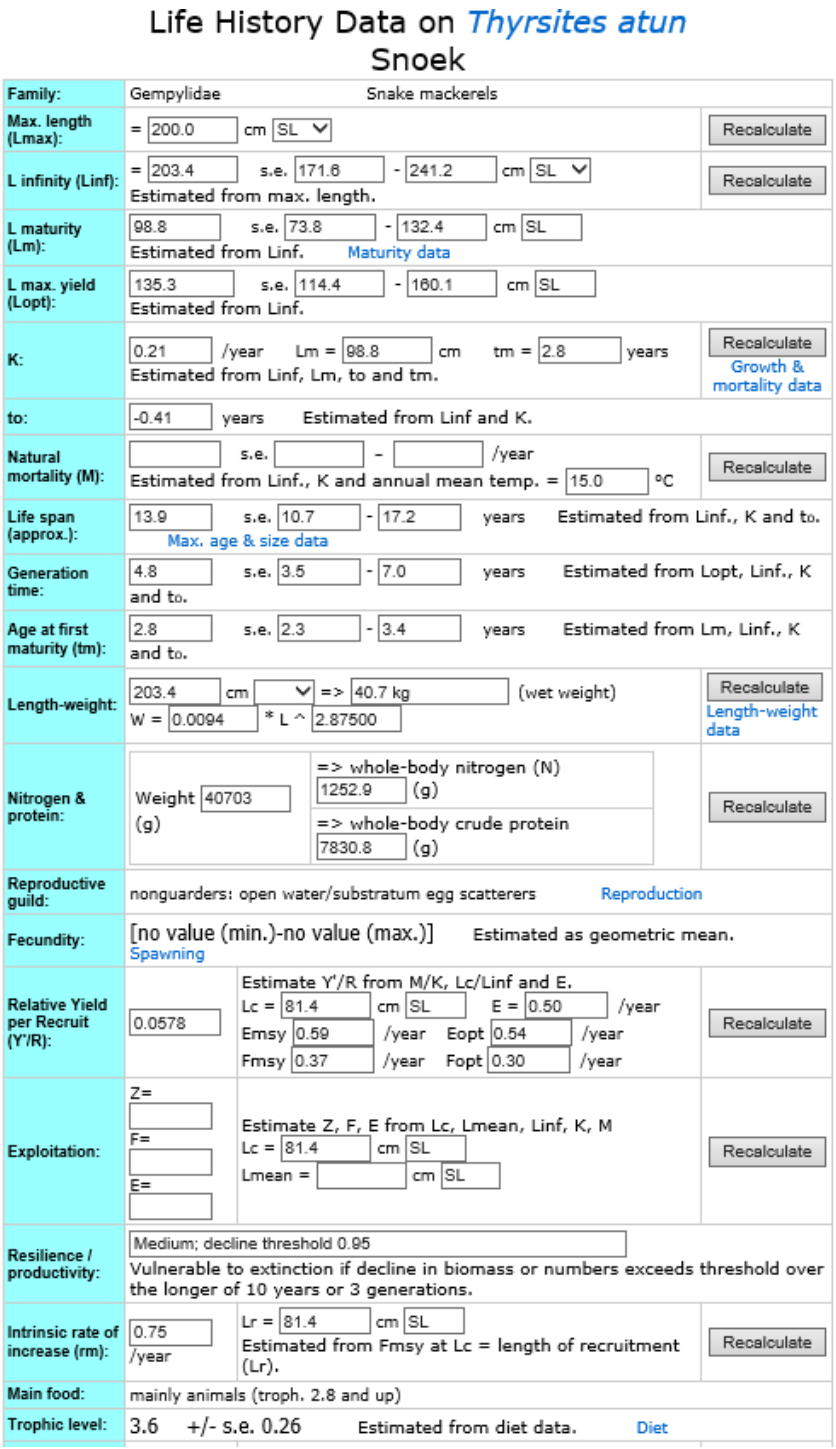
***Snoek life history tool **Figure D6**

References:

D4 Fishbase Snoek https://www.fishbase.se/summary/SpeciesSummary.php?ID=489&AT=snoek

Distribution attribute:

* **Figure D5:** Snoek distribution **D4**



Life History Data on *Thyrsites atun*
Snoek

Family:	Gempylidae Snake mackerels	
Max. length (Lmax):	= 200.0 cm SL	Recalculate
L infinity (Linf):	= 203.4 s.e. 171.6 - 241.2 cm SL Estimated from max. length.	Recalculate
L maturity (Lm):	98.8 s.e. 73.8 - 132.4 cm SL Estimated from Linf. Maturity data	
L max. yield (Lopt):	135.3 s.e. 114.4 - 160.1 cm SL Estimated from Linf.	
K:	0.21 /year Lm = 98.8 cm tm = 2.8 years Estimated from Linf, Lm, to and tm.	Recalculate Growth & mortality data
to:	-0.41 years Estimated from Linf and K.	
Natural mortality (M):	s.e. - /year Estimated from Linf., K and annual mean temp. = 15.0 °C	Recalculate
Life span (approx.):	13.9 s.e. 10.7 - 17.2 years Estimated from Linf., K and to. Max. age & size data	
Generation time:	4.8 s.e. 3.5 - 7.0 years Estimated from Lopt, Linf., K and to.	
Age at first maturity (tm):	2.8 s.e. 2.3 - 3.4 years Estimated from Lm, Linf., K and to.	
Length-weight:	203.4 cm => 40.7 kg (wet weight) W = 0.0094 * L ^ 2.87500	Recalculate Length-weight data
Nitrogen & protein:	Weight 40703 (g) => whole-body nitrogen (N) 1252.9 (g) => whole-body crude protein 7830.8 (g)	Recalculate
Reproductive guild:	nonguarders: open water/substratum egg scatterers Reproduction	
Fecundity:	[no value (min.)-no value (max.)] Estimated as geometric mean. Spawning	
Relative Yield per Recruit (Y'/R):	0.0578 Estimate Y'/R from M/K, Lc/Linf and E. Lc = 81.4 cm SL E = 0.50 /year Emsy 0.59 /year Eopt 0.54 /year Fmsy 0.37 /year Fopt 0.30 /year	Recalculate
Exploitation:	Z= F= E= Estimate Z, F, E from Lc, Lmean, Linf, K, M Lc = 81.4 cm SL Lmean = cm SL	Recalculate
Resilience / productivity:	Medium; decline threshold 0.95 Vulnerable to extinction if decline in biomass or numbers exceeds threshold over the longer of 10 years or 3 generations.	
Intrinsic rate of increase (rm):	0.75 /year Lr = 81.4 cm SL Estimated from Fmsy at Lc = length of recruitment (Lr).	Recalculate
Main food:	mainly animals (troph. 2.8 and up)	
Trophic level:	3.6 +/- s.e. 0.26 Estimated from diet data. Diet	

Figure D6: Snoek Life history tool **D4**

Standard clauses 1.3.2.2

FURTHER IMPACTS

The three clauses in this section relate to impacts the fishery may have in other areas. A fishery must meet the minimum requirements of all three clauses before it can be recommended for approval.

F1	Impacts on ETP Species - Minimum Requirements		
	F1.1	Interactions with ETP species are recorded.	Pass
	F1.2	There is no substantial evidence that the fishery has a significant negative effect on ETP species.	Pass
	F1.3	If the fishery is known to interact with ETP species, measures are in place to minimise mortality.	Pass
		Clause outcome:	**Pass**

Evidence

F1.1. Interactions with ETP species are recorded.

The fishery is known to interact with several ETP species: sea turtles, marine mammals, seabirds and sharks, most of which are released just after being caught. Among these, are the Humboldt Penguin *Spheniscus humboldti* ("Vulnerable"- IUCN[25]), Peruvian Diving Petrel *Pelecanoides garnotii* ("Endangered"- IUCN[26]) and Smooth Hammerhead *Sphyrna zygaena* ("Vulnerable"- IUCN[27]).

Since April 2019, the fishery has been subject to a compulsory Reduction Plan aimed to eliminate discards and to reduce the interaction and catch of seabirds, marine mammals and sea turtles. The discard Law´s requirements (Law N° 20.625, 2012[28]) and compliance with reduction plan´s measures will be monitored by electronic monitoring systems (EMS) onboard all vessels of the industrial fleet, while artisanal boats longer than 15 m will be required to carry EMS 3 years after. The EMS specific regulations have been enacted in 2017 and it is expected to have the system fully implemented in the industrial fleet in early 2020.

In spite of the existence of incidental catch in the jack mackerel fishery, the mortalities are considered to be low since most specimens are released alive, except for Pink- footed shearwater were mortalities observed were 100%. The only species of marine mammal affected was the southern sea lion, although mortalities are low, not exceeding 3% of the specimens caught. In the case of the vulnerable marine ecosystems indicators (VME), there is no record of interactions with the Jack mackerel purse seine fishery in the EEZ and in the high seas. Data recorded in the past 3 years[29] is presented below:

[25] https://www.iucnredlist.org/species/22697817/132605004
[26] https://www.iucnredlist.org/species/22698280/152637428
[27] https://www.iucnredlist.org/species/39388/2921825
[28] https://www.leychile.cl/Navegar?idNorma=1044210
[29] https://www.sprfmo.int/assets/2019-SC7/Meeting-Docs/SC7-Doc29-Chile-Annual-report-2019-Jack-mackerel.pdf

Table 3. Capture and incidental mortality by species in the jack mackerel industrial fleet. Source: data collected by observers onboard from 207 fishing sets during 2016.

Common name	Scientific name	N° Caught	N° Killed	ICR[1]	IMR[2]
Southern sea lion	*Otaria flavescens*	912	4	4,406	0,019
Dominican gull	*Larus dominicanus*	2	0	0,010	0
Peruvian pelican	*Pelecanus thagus*	3	0	0,014	0
Pink-footed shearwater	*Ardenna creatopus*	13	13	0,063	0,063
Black shearwater	*Ardenna grisea*	1	1	0,005	0,005
Unidentified swallow	Hydrobatidae	1	1	0,005	0,005

Table 4. Capture and incidental mortality by species in the jack mackerel industrial fleet. Source: data collected by observers onboard from 416 fishing sets during 2017.

Common name	Scientific name	N° Caught	N° Killed	ICR[1]	IMR[2]
Southern sea lion	*Otaria flavescens*	256	7	0,615	0,017
Sea swallow	*Oceanites oceanicus*	18	1	0,043	0,002
Dominican gull	*Larus dominicanus*	18	1	0,043	0,002
Peruvian pelican	*Pelecanus thagus*	7	0	0,017	0
Humboldt Penguin	*Spheniscus humboldti*	13	1	0,031	0,002
Gray-headed Albatross	*Thalassarche chrysostoma*	8	0	0,019	0
Pink-footed shearwater	*Ardenna creatopus*	1	1	0,002	0,002
Black shearwater	*Ardenna grisea*	45	0	0,108	0

Table 5. Capture and incidental mortality by species in the jack mackerel industrial fleet. Source: data collected by observers onboard from 717 fishing sets during 2018.

Common name	Scientific name	N° Caught	N° Killed	ICR[1]	IMR[2]
Southern sea lion	*Otaria flavescens*	267	3	0,372	0,004
Unidentified penguin	*Spheniscus Spp*	1	1	0,001	0,001
Black-browed Albatross	*Thalassarche melanophris*	1	1	0,001	0,001
Antarctic giant petrel	*Macronectes giganteus*	8	0	0,011	0
Large black shearwater	*Procellaria aequinoctialis*	1	1	0,001	0,001

Incidental Capture Rate (**ICR$_1$**): Number of dead animals/Number of sets observed;

Incidental Mortality Rate (**IMR$_2$**): Number of dead animals/ Number of sets observed.

F1.2. There is no substantial evidence that the fishery has a significant negative effect on ETP species.

As shown above, through available data, in spite of the existence of incidental catch in the jack mackerel fishery, the mortalities are low since most specimens are released alive, except for Pink-footed shearwater were mortalities observed were 100% in 2016 (13 dead birds) and 2017 (1 dead bird), with no mortalities recorded in 2018. The only species of marine mammal affected was the southern sea lion, although mortalities are low, not exceeding 3% of the specimens caught.

As of April 2019, the fishery is subject to a compulsory Reduction Plan aimed to eliminate discards and to reduce the interaction and catch of seabirds, marine mammals and sea turtles. In May 2020, jointly carried out by a researchers group from Fisheries Development Institute (IFOP) and Albatross Task Force (ATF-Chile) demersal's discard project, an identification guide for seabirds guide contains approximately 50 species of pelagic and coastal seabirds, with morphological characteristics that help their identification, was developed[30]. This material's main objective is to support scientific observers, researchers and fishermen in the identification of incidentally caught seabirds in commercial fishing operations, to improve Chilean fisheries bycatch information collection, together with contributing to the knowledge of this important group of species and the necessary actions to reduce such mortality. Additional information on affected species is presented below.

South American Sea Lion (*Otaria flavescens / O. byronia*):

The Chilean population is reported to be increasing in northern areas, with population trends uncertain for central and southern Chile; the overall Chilean population is however reported to be increasing steadily. The Chilean population is estimated to be approximately 197,000 animals (Venegas et al. 2001, Bartheld et al. 2008, Sepúlveda et al. 2011, Oliva et al. 2012, Contreras et al. 2014) (IUCN 2016[31]).

Pink-footed shearwater (*Ardenna creatopus*):

This species is not listed in CITES appendices. IUCN report its status as "vulnerable" (IUCN 2018[32]). It is listed in the Agreement on the Conservation of Albatrosses and Petrels (ACAP 2018). Pink footed shearwaters have a very small breeding range, limited to Robinson Crusoe and Santa Clara in the Juan Fernandez Islands, and on Isla Mocha off the coast of Arauco (Chile). Trends are unknown, although long-term breeding season monitoring on Robinson Crusoe and Santa Clara islands (2002-present) and Mocha (2010-2016) suggest stable populations. In addition, a comparison of burrow count data from 2003 and 2016 for all colonies in Juan Fernández indicates that burrow numbers have remained stable during that time (P. Hodum unpubl. data). Further research is needed to determine if introduced predators and herbivores on Robinson Crusoe Island, rats Rattus spp., dogs and feral cats (*Felis catus*) and harvesting of chicks on Isla Mocha, as well as fisheries bycatch are having any impact. There may c. 29,573 breeding pairs (Muñoz and P. Hodum unpubl. data), which would imply around 150,000 individuals (IUCN 2018).

F1.3. If the fishery is known to interact with ETP species, measures are in place to minimise mortality.

As noted above, ETP species interactions appear to be relatively limited. In addition to that we note that the Juan Fernández Islands were designated as a national park in 1935 (protected from 1967) and a UNESCO Biosphere Reserve in 1977. The Chilean government began a habitat restoration programme in 1997 that concluded in 2003. The islands have been nominated for World Heritage listing. The distribution of colonies of Pink-footed shearwater on Robinson Crusoe and Santa Clara was determined in 2002-2006 and resurveyed in 2016 while Mocha was surveyed in 2009 and again in 2016. The colony on Mocha is within a national reserve, which has had a management plan since 1998 and two reserve guards.

[30] https://www.ifop.cl/en/ifop-y-atf-chile-desarrollan-guia-de-identificacion-de-aves-marinas-en-las-zonas-de-pesca-del-mar-chileno/
[31] https://www.iucnredlist.org/species/41665/61948292#population
[32] https://www.iucnredlist.org/species/22698195/132633266

Since 2011 park guards have worked with the federal police to enforce the prohibition on chick harvesting. At-sea observer programmes have been used to monitor bycatch around Mocha, in small-scale Peruvian fisheries and on some commercial fisheries in Chile. Community-based education and conservation programmes have been underway since 2002 on Robinson Crusoe Island and since 2010 on Isla Mocha (IUCN 2016).

Developments by the authorities in collaboration with stakeholders designed to improve knowledge of potential impacts of the fishery on ETP species include:

- A software platform developed for the registry of incidental fishing in the operation of industrial fleets (XV-X).
- On-board vessel protocols for the release and treatment of ETP fauna have been distributed
- For the Chilean Jack mackerel fishery ecological risk assessments (ERAs) will determine the impact of the fishery on bycatch species. These are to be conducted by SPRFMO in the Convention area and will include an observer programme. At the time of writing of this report (June 2020) no progress had yet been reported by SPRFMO on this initiative. One of the studies proposed by SPRFMO during 2019 (Scientific Committee Multi-Annual Work Plan) is to evaluate available observer data on seabird interaction rates in several fisheries including Chilean Jack mackerel and to determine where estimates can be improved[33].
- A manual of good practices to avoid discarding and incidental capture of ETP species has been provided to all stakeholders active in the fishery.
- A manual of good practices and treatment of ETP species is also under development in the artisanal fisheries (sea lions).
- Workshops have been undertaken to present manuals and best practice training to stakeholders in the fishery.

R1, R24-R30

References

Pages 34, 35

Standard clause 1.3.3.1

[33] https://www.sprfmo.int/assets/0-2020-Annual-Meeting/Reports/Annex-8a-Scientific-Committee-Multi-Annual-Workplan.pdf

F2	Impacts on Habitats - Minimum Requirements		
	F2.1	Potential habitat interactions are considered in the management decision-making process.	Pass
	F2.2	There is no substantial evidence that the fishery has a significant negative impact on physical habitats.	Pass
	F2.3	If the fishery is known to interact with physical habitats, there are measures in place to minimise and mitigate negative impacts.	Pass
Clause outcome:			**Pass**

Evidence

F2.1: Potential habitat interactions are considered in the management decision-making process.

No direct habitat damage is known to occur in the mid-water trawl and purse seine fisheries. Such damage is unlikely due to the gear types used (Source SPRFMO 2014). Artisanal purse seines can reach dimensions of 30 fathoms depth by 240 fathoms length (approx. 55 m x 249 m) while industrial purse seines can reach up to 60 × 500 fathoms (approx. 110 m x 915 m).

In general, the impact of this fishing gear on the seafloor is not a subject under technical or scientific debate, since these nets are usually deployed at depths where bottom contact does not occur. The purse seine gear is therefore not considered a gear with the potential to have significant negative impacts on physical habitats.

F2.2 There is no substantial evidence that the fishery has a significant negative impact on physical habitats.

As mentioned in the clause F2.1 above there are no indications of any interactions between the fishery and benthic habitats. Purse seine gear is not designed for interaction with the seabed, and the industrial fleet operate offshore in waters typically more than 400 m deep. Gear loss is reported to be very rare in the fishery.

In the case of the vulnerable marine ecosystems indicators (VME), there is no record of interactions with the Jack mackerel purse seine fishery in the EEZ and in the high seas.

F2.3. If the fishery is known to interact with physical habitats, there are measures in place to minimise and mitigate negative impacts.

As mentioned above, there is no information regarding interaction with benthic habitats as the purse seine fishery is typically an epipelagic fishery occurring in the water column, so there is no evidence of negative impact with physical habitats.

However, the overall management regime for protecting marine habitats and ecosystems within the Chilean EEZ and in the SPRFMO Convention area has some specific measures and strategies relating to marine habitats. There are more than 50 Marine Protected Areas (MPA) within the Chilean EEZ (Atlas of Marine Protection 2018), there are also include 5 Marine Reserves and 7 Marine Parks defined close to the fishing grounds where the fishery takes place. Although there are measures to protect the vulnerable areas as closures to fishing activities.

Since 2010, Chile has designated more than 400,000 square miles (over 1,000,000 km²) of its EEZ as marine parks where all extractive activities are prohibited (National Geographic News 2017). This is equivalent to more than 25% of the Chilean EEZ.

The Servicio Nacional de Pesca y Acuicultura (National Fisheries and Aquaculture Service, SERNAPESCA) is responsible for the management of Marine Parks and Reserves. Therefore, even though, measures are in place to protect habitats, the purse seine gear is not considered a gear with the potential to have significant negative impacts on physical habitats. **R1, R7, R24-R31**
References Pages 34, 35
Standard clause 1.3.3.2

F3	Ecosystem Impacts - Minimum Requirements		
	F3.1	The broader ecosystem within which the fishery occurs is considered during the management decision-making process.	Pass
	F3.2	There is no substantial evidence that the fishery has a significant negative impact on the marine ecosystem.	Pass
	F3.3	If one or more of the species identified during species categorisation plays a key role in the marine ecosystem, additional precaution is included in recommendations relating to the total permissible fishery removals.	Pass
		Clause outcome:	**Pass**

Evidence

F 3.1: The broader ecosystem within which the fishery occurs is considered during the management decision-making process.

As a consequence of the large size of Chilean Jack mackerel and its important role as both predator and prey, this species is likely an important node in Pacific Ocean predator-prey networks However, Chilean Jack mackerel is not considered, according to the MSC criteria, as a key low trophic level (LTL) stock (Report for MSC April 2019).

Article 2, "Objective", of the SPRFMO Convention, is relevant to ecosystem consideration in the decision making process, and states: "… through the application of the precautionary approach and an ecosystem approach to fisheries management, ensuring the long-term conservation and sustainable use of fishery resources and, in so doing, safeguarding marine ecosystems in which these resources occur."

Finally, the fact that the fishery is above MSY provides some confidence that exploitation is relatively controlled to the point where predator species could be assumed to have sufficient food source for their needs.

F3.2. Based on the above information there is no substantial evidence that the fishery has a significant negative impact on the marine ecosystem, both in terms of bycatch, ETP species or habitat interaction, or in terms of foodweb dynamics.

F3.3: If one or more of the species identified during species categorisation plays a key role in the marine ecosystem, additional precaution is included in recommendations relating to the total permissible fishery removals.

The fact that the jack mackerel fishery is above MSY provides some confidence that this stock exploitation is relatively controlled to the point where predator species could be assumed to have sufficient food source for their needs. Between 2011 and 2016, IFOP and IMARPE (Peru) in collaboration with ONGs, implemented the GEF-UNDP Project "Towards an Ecosystem Approach to Management of the Large Marine Ecosystem of the Humboldt Current[34]". As a result, a Strategic

[34] https://www.thegef.org/project/towards-ecosystem-management-humboldt-current-large-marine-ecosystem

Action Program (SAP) was prepared; during 2017 the design of the plan was developed. The SAP has been delayed in publication. The program is expected to be launched in 2020.

The SAP is expected to provide the basis for implementing a coordinated series of measures aimed at greater protection of fish stocks (including juveniles of shared stocks between Peru and Chile) and the improved protection of coastal and marine habitats. In XV-II improved conservation of anchovy (targeted) and Chilean Jack mackerel (by-catch) are some objectives of the SAP.

In the assessment area anchovy and sardine are considered dominant Low Trophic Level (LTL) species and as such transfer a very large proportion of total primary production through the higher part of the food web. There are well defined Harvest Control Rules (HCRs) in place that ensure that exploitation rates are reduced as the PRI (Point at which Recruitment is Impaired) is approached. HCR's are expected to keep stocks fluctuating around a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs. This condition is expected to be achieved in 4 years (source: MSC report April 2019).

R1; R24, R32

References

R1 Public Certification Report (PCR) Chile Purse Seine Jack Mackerel April 2019 405pp Lloyds Register https://fisheries.msc.org/en/fisheries/chilean-jack-mackerel-industrial-purse-seine-fishery/@@assessments

R2 SUBPESCA March 2019. Estado de situación de las principales pesquerías chilenas, año 2019. Jurel pp 21-23 http://www.subpesca.cl/portal/618/articles-107314_recurso_1.pdf

R3 Ministerio de Economía, Fomento y Turismo MINECON http://out.easycounter.com/external/minecon.gov.cl

R4 SUBPESCA http://www.subpesca.cl/portal/616/w3-channel.html

R5 SERNAPESCA www.sernapesca.cl

R6 SPRMFO Convention Area Map: https://www.sprfmo.int/about/illustrative-map-of-sprfmo-area-2/

R7 IFOP https://www.ifop.cl/en/

R8 LGPA Law on Fisheries and Aquaculture No 20.657: http://www.subpesca.cl/normativa/605/articles-764_documento.pdf

R10 SUBPESCA resolution No 291/2015: http://www.subpesca.cl/portal/615/w3-article-86859.html

R11 SUBPESCA Acts and Resolutions issued by this Ministry: http://anfitrion.cl/GobiernoTransparente/pesca/res_ne.html

R12 SPRFMO 2019 Conservation and Management Measures Chilean Jack mackerel 6pp: https://www.sprfmo.int/assets/Fisheries/Conservation-and-Management-Measures/2019-CMMs/CMM-01-2019-5Mar2019.pdf

R13 SPRFMO 2019 Final Compliance Report: https://www.sprfmo.int/assets/2019-Annual-Meeting/COMM-7/Report/ANNEX-4-COMM7-2019-Final-Compliance-Report.pdf

R14 SPRFMO 2019 IUU Vessel List: https://www.sprfmo.int/assets/2019-Annual-Meeting/COMM-7/Report/2019-SPRFMO-Final-IUU-Vessel-List-15Nov2019.pdf

R15 SPRFMO 2020 IUU Vessel List: https://www.sprfmo.int/assets/0-2020-Annual-Meeting/Reports/COMM8-Report-Annex-5-2020-SPRFMO-IUU-Vessel-List.pdf

R16 Comité Científico de Pesquerías de Pequeños Pelágicos (CCT-PP):Técnica Report No 5 (Oct 2019) http://www.subpesca.cl/portal/616/w3-propertyvalue-51142.html
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R18 SPRFMO Jack mackerel stock assessment (2016) 53pp https://www.sprfmo.int/assets/Meetings/Meetings-2013-plus/SC-Meetings/4th-SC-Meeting-2016/SC04-report/SC-04-tech-annex-7.pdf
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R21 SPRFMO 7TH SCIENTIFIC COMMITTEE MEETING REPORT: https://www.sprfmo.int/assets/2019-SC7/Reports/SPRFMO-SC7-Report-2019-V2.pdf
R22 SPRFMO CMM 01-2020 Conservation and Management Measure for Trachurus murphyi (supersedes CMM 01-2019): https://www.sprfmo.int/assets/Fisheries/Conservation-and-Management-Measures/2020-CMMs/CMM-01-2020-Trachurus-murphyi-31Mar20.pdf
R23 SPRFMO COMM 8 – Report ANNEX 8b Jack Mackerel MSE Management Objectives: https://www.sprfmo.int/assets/0-2020-Annual-Meeting/Reports/Annex-8b-JM-MSE-Management-Objectives.pdf
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R27 Rigby, C.L., Barreto, R., Carlson, J., Fernando, D., Fordham, S., Herman, K., Jabado, R.W., Liu, K.M., Marshall, A., Pacoureau, N., Romanov, E., Sherley, R.B. & Winker, H. 2019. Sphyrna zygaena. The IUCN Red List of Threatened Species 2019: e.T39388A2921825. Downloaded on 10 June 2020.
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Standard clause 1.3.3.3

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.