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IFFO RS
Global Standard for Responsible Supply
of Marine Ingredients

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



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Fishery Under Assessment	Chilean jack mackerel, Jurel (<i>Trachurus murphyi</i>) Chile EEZ XV-X
Date	December 2019
Assessor	Jim Daly

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:		Title:		
Certification Body Details				
Name of Certification Body:		SAI Global Ltd		
Assessor Name	Peer Reviewer	Assessment Days	Initial/Surveillance/ Re-approval	Whole fish/ By-product
Jim Daly	Conor Donnelly	3	SURV 1	Whole fish
Assessment Period	2019			

Scope Details	
Management Authority (Country/State)	SUBPESCA & SERNAPESCA, Chile EEZ; SPRFMO International Waters
Main Species	Chilean jack mackerel <i>Trachurus murphyi</i>
Fishery Location	Chile EEZ VX-X
Gear Type(s)	Purse seine, hand-line
Outcome of Assessment	
PASS	Chilean Jack mackerel Jurel <i>Trachurus murphyi</i>
Clauses Failed	NONE
PASS	Pacific Chub mackerel Caballa <i>Scomber japonicus</i>
Clauses Failed	NONE
PASS	Blue fathead Pez medusa <i>Cubiceps caeruleus</i>
Clauses Failed	NONE
PASS	Snoek Sierra <i>Thyrsites atun</i>
Clauses Failed	NONE

Peer Review Evaluation	APPROVE
Recommendation	PASS

Assessment Determination
<p>The Northern fishery (XV-II) is mostly within the Chilean EEZ; 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, Figures 1a-b). This report uses data derived from the industrial reduction fishery for Chilean Jack mackerel.</p> <p>The Northern fleet catch Chilean Jack mackerel as bycatch in the fishery targeting anchovy (<i>Engraulis ringens</i>). In the Central-Southern fishery Pacific Chub mackerel (<i>Scomber japonicus</i>) is the main bycatch of the targeted Chilean Jack mackerel fishery; constituting around 1% of catches (Source PCR Report for MSC April 2019).</p> <p>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) (Figure 2). 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.</p> <p>The Chilean Jack mackerel fishery is currently MSC certified. (Unit of Certification III-X).</p> <p>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 km².</p> <p>Dynamic values of FMSY and BMSY are estimated. In 2017 BMSY was 5,198,000 tonnes, and FMSY 0.197. An estimated increase in biomass to 90% of interim BMSY resulted from fishing mortality rates decreasing to 0.09 in 2018, well below FMSY, along with a slight recruitment improvement. SUBPESCA announced (March 2019, 2018 data) a BMSY of 7,074,000 tonnes; BLIM of 1,768,000 tonnes and FMSY of 0.195 (Management area XV-X within Chile EEZ). SUBPESCA (March 2019) consider the stock, in their latest assessment, to be over-exploited but not over-fished. Current biomass is above 0.5 BMSY proxy threshold (reference Management Plan).</p> <p>Jack mackerel <i>Trachurus murphyi</i> (Global stock) is currently listed as data deficient on the IUCN website; Pacific Chub mackerel <i>Scomber japonicus</i> and Blue fathead Pez medusa <i>Cubiceps caeruleus</i>; are currently listed as species of least concern on the IUCN website; Snoek <i>Thyrsites atun</i> is currently not listed on the IUCN website.</p> <p>Chilean Jack mackerel <i>Trachurus murphyi</i> is approved by the SAI Global assessment team for the production of fishmeal and fish oil under the IFFO RS v 2.0 whole fish standard; Pacific Chub mackerel Caballa <i>Scomber japonicus</i> Blue fathead Pez medusa <i>Cubiceps caeruleus</i>; and Snoek Sierra <i>Thyrsites atun</i></p>

are approved by the SAI Global assessment team for the production of fishmeal and fish oil under the IFFO-RS v 2.0 by-products standard.
Peer Review Comments
AGREE
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

The Central-Southern fishery (III-X) for Chilean Jack mackerel is used mainly to produce fishmeal; this is where the species is targeted. The Northern Chilean fleets (Area XV-II) catch Jack mackerel as bycatch in the fishery targeting anchovy. % landings shown in the Species-specific table reflect the fisheries:

Species-Specific Results

Category	Species	% landings	Outcome (Pass/Fail)	
Category A	Chilean Jack mackerel <i>Trachurus murphyi</i> III-X	98	A1	Pass
			A2	Pass
			A3	Pass
			A4	Pass
			A3	Pass
			A4	Pass
Category D		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.

The Central-Southern fishery (III-X) for Chilean Jack mackerel is used mainly to produce fishmeal; this is where the species is targeted. The main by-catch species in this area is Pacific Chub mackerel *Scomber japonicus*. Northern fleets (Area XV-II) catch Pacific Jack mackerel as bycatch in the fishery targeting anchovy.

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	<i>Trachurus murphyi</i>	Chile XV-X SPRFMO Convention Area	98%	MINECON	A
Pacific Chub mackerel Caballa	<i>Scomber japonicus</i>	Chile XV-X	1%	MINECON	D
Blue fathead Pez medusa	<i>Cubiceps caeruleus</i>	Chile XV-X	<1%	MINECON	D
Snoek Sierra	<i>Thyrstites atun</i>	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
<p>Evidence:</p> <p>M1.1:</p> <p>MINECON:</p> <p>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.</p> <p>Chile's institutional structure governing the fisheries sector centres around three key organisations, with several other institutions providing additional research and enforcement:</p> <ul style="list-style-type: none"> ▪ The Subsecretaria de Pesca (Undersecretariat of Fisheries, SUBPESCA or SSP); positioned within MINECOM; provides policy settings and regulatory framework, including harvest control rules. ▪ The Servicio Nacional de Pesca (National Fisheries Service, SERNAPESCA) is also based within MINECOM. Responsible for executing fisheries policy through enforcement. ▪ 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 17 current FMCs. In this instance 7 regional representatives participate on behalf of artisanal fishers (although one vacancy was open at the time of writing this report); 3 members from SONAPESCA represent the industrial sector; the processing sector is represented by 1 member from within regions XV-X. A Management Plan for Chilean Jack mackerel is due to be reviewed in 2020.

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.

Regional Government Areas in Chile corresponding to fishery management units have been defined (**Figure 1a, b**)

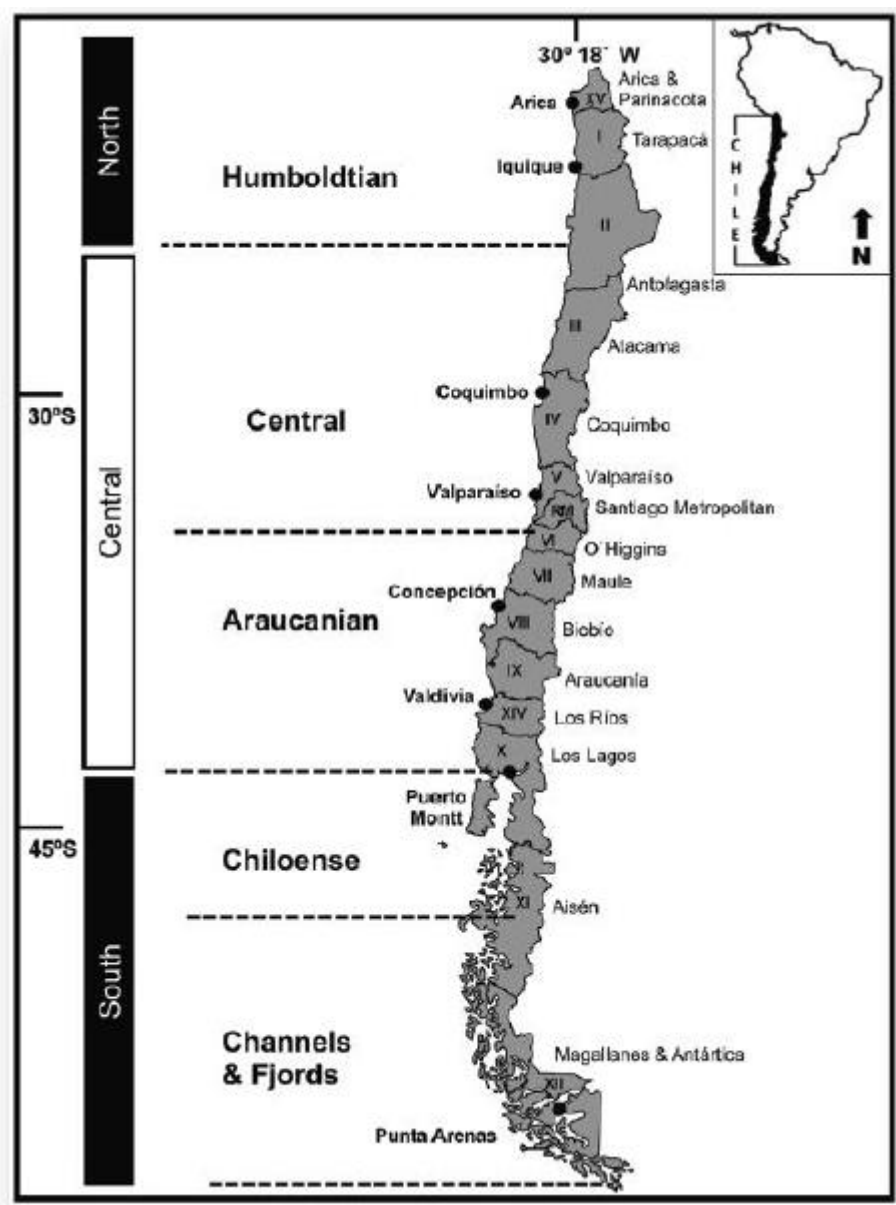


Figure 1a Administrative boundaries and marine ecoregions in Chile. Roman numerals and names are given for administrative regions on land **R1**

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):

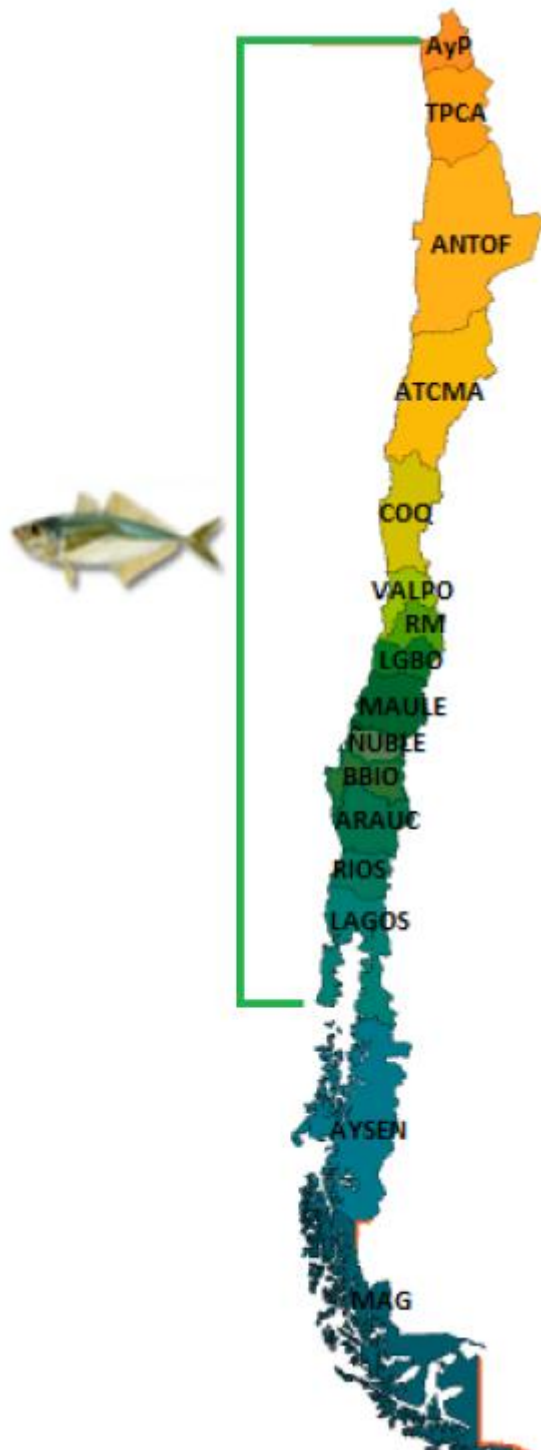


Figure 1b Management Units for Chilean Jack mackerel **R2**

International management of Chilean Jack mackerel is coordinated by the South Pacific Regional Fisheries Management Organisation (SPRFMO). Overall BAC's are agreed for the species, with a part under Conservation and Management Measures (CMM's) applying to international waters outside Chile's EEZ:

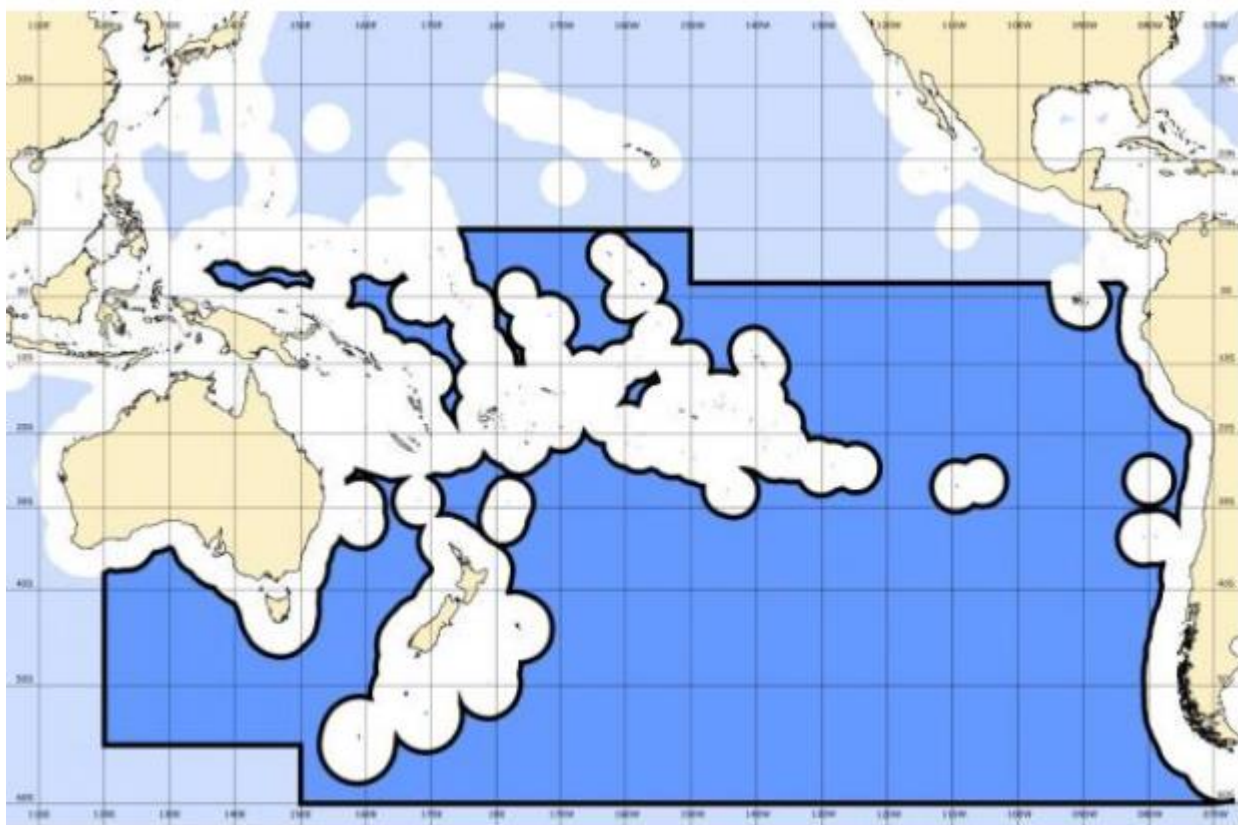


Figure 2 SPRMFO Convention Area Map R6

M1.2:

IFOP: (Instituto de Fomento Pesquero):

IFOP is the organization responsible for sampling stocks and carrying out annual acoustic surveys. 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.

INPESCA

INPESCA is a privately funded organisation which undertakes scientific studies in many areas, including fisheries research. 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. Six are elected through a public contest. Two each are from SUBPESCA and IFOP. Two additional members from fisheries institutes INPESCA and INPESNOR also participate but do not have voting rights. 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).

BAC's are set up annually following scientist recommendations and data from historical series 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.

South Pacific Regional Fisheries Management Organisation (SPRFMO):

International management of Chilean Jack mackerel is coordinated by the South Pacific Regional Fisheries Management Organisation (SPRFMO). Overall BAC's are agreed for the species, with a part under Conservation and Management Measures (CMM's) applying to international waters outside Chile's 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. 20.657

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. An update of the current management plan for Chilean anchovy in the assessment area is due in 2020. Article 5 of the LGPA states that SUBPESCA should determine Biological Reference Points (BRP's) for all targeted stocks. Biologically Acceptable Catches (BAC's) and resource recovery plans are implemented under Article 9.

SUBPESCA resolution No 291/2015 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).

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.

The system is transparent; all information is available in official websites. Should more details be needed they can be obtained under request.

R1-R11**References p33**

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:**
 - Carry out audits of capture fisheries; implement surveillance and control of compliance with all legal provisions relating to fisheries.
 - Health and environmental monitoring of aquaculture. Develop strategies and procedures for prevention, surveillance and control of high-risk diseases.
 - 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 km² 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.

Compliance with SPRFMO Conservation and Management Measures (CMM) applicable to the Chilean jack mackerel fisheries is good, although late reporting of vessels which have participated in fishing activities in the Convention Area or late submission of compliance reports by some SPRFMO CNCP's have been noted (SPRFMO 2018). The SPRFMO Secretariat informs Members and CNCPs of the outcome of monthly catch reporting verification exercises and of any possible discrepancies.

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.

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 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.

M2.4

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.

Members and CNCPs (SPRFMO Convention Area) participating in the Chilean Jack mackerel fishery are required to implement a vessel monitoring system (VMS), in accordance with CMM 06-2018 (VMS) and, provide a list of vessels authorised to fish in the Convention Area, in accordance with CMM 05-2016 (Record of Vessels). They are also required notify the SPRFMO Secretariat of vessels actively fishing or engaged in

transshipment in the Convention Area each month. The Secretariat maintains and publishes a list of the vessels on the SPRFMO website.

Until SPRFMO adopt an Observer Programme, in accordance with Article 28 of the Convention, all Members and CNCPs participating in the jack mackerel fishery are required to ensure a minimum of 10% scientific observer coverage of trips for trawlers and purse seiners flying their flag and ensure that such observers collect and report data, as described in CMM 02-2018

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. Km².

R5, R9

References p33

Standard clause 1.3.1.3

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 (<i>Trachurus murphyi</i>)	
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	Enough additional information is collected to enable an indication of stock status to be estimated.	Pass
Clause outcome:			Pass
A1.1. Catch limits have been agreed for the entire assessment area including the SPRFMO Convention area in accordance with scientific recommendations. The assessment model continues to be revised. Data information and decisions from all fishing countries are integrated into this assessment process. Catches were preliminarily reported at 472,966 tonnes in 2018 for the entire assessment area (Chile EEZ and SPRFMO Convention Area). For 2019 SPRFMO advice for the whole assessment unit only (Chile EEZ and SPRFMO Convention Area combined) was provided. A stock re-building plan is in place. The management plan is due to be revised in 2020. 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. Cross referencing of VMS data with logbooks, observer and aerial and at-sea surveillance reports ensures that fish is reported from the correct area of capture. All vessels have to hail in and out before leaving or returning to port. All landings are monitored by independent dockside monitors. Vessels have to advise SERNAPESCA before discharging and are subject to regular monitoring, including accurate weigh outs, by Enforcement Officers in the ports.			

A1.2

Chile has a management plan in place for the stock which covers Management Units XV-X. IFOP Scientists perform annual assessments and have estimated annual allowable catches through a size-structured model. IFOP use information associated with life history parameters, such as natural mortality, growth and maturity data. These are all factored into the modelling process for predicting potential future harvest rates. There is a no-discard policy in place.

Hydro acoustic surveys are conducted biannually since 1999 by means of two cruises: RECLAS in January (summer season; over the recruitment period) and PELACES in May (autumn season). As this method does not consider stock reproductive dynamics, assessments of SSB for small pelagic fish with partial spawning (e.g. Common sardine) are conducted through the Daily Egg Production Method (DEPM).

A benchmark assessment of the Chilean Jack mackerel fishery was conducted in 2016 (SPRFMO, 2016b). This assessment included sensitivity runs using alternative model configurations, evaluating sample size of data sources used in the assessment and incorporating new fisheries selectivity settings to reduce the number of parameters to be estimated in the assessment models. The incremental addition of updated 2015 and new 2016 data was evaluated. Over 18 alternative model configurations were tested to evaluate consistency of the model. Evaluation models are mainly based on catch per unit effort (CPUE) of the South-Central Chile fleet and Chinese vessels CPUE fishing within the SPRFMO Convention Area.

R9-R12**References p33**

Standard clause 1.3.2.1.1

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 enough 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

A2.1

Joint Chilean Jack mackerel stock assessments have been conducted since 2010. Fisheries independent and fisheries dependent data from each fishing country are applied to a statistical catch-at-age model performed by SPRFMO’s Scientific Committee (SC). Models consider the two working hypotheses on stock structure:

1) two separate stocks, Peruvian/northern stock and Chilean/southern stock which straddle the high seas;

2) a single shared stock which straddles the high seas.

Hypothesis 2 has been used as the basis for advice. A benchmark assessment of the Chilean Jack mackerel fishery was conducted in 2016. Since then annual assessments are undertaken through biannual surveys and collection of logbook data by electronic means and by vessel inspections during landings.

A2.2

Dynamic values of FMSY and BMSY are estimated annually. In 2017 BMSY was 5,198,000 tonnes, and FMSY was 0.197. An estimated increase in biomass to 90% of interim BMSY resulted from fishing mortality rates decreasing To 0.09 in 2018, well below FMSY, along with a slight recruitment improvement. SUBPESCA

announced (March 2019, 2018 data) a BMSY of 7,074,000 tonnes; BLIM of 1,768,000 tonnes and FMSY of 0.195 (Management area XV-X within Chile EEZ).

Conditions for the Chilean Jack mackerel stock in its entire distribution range in the southeast Pacific shows a continued recovery since the time-series low in 2010 and increasing trend. Current fishing mortality (0.07) is estimated to be well below candidate FMSY levels. A sustainable exploitation of the Chilean Jack mackerel population in the short-term is associated with an FMSY of around 0.14. Under more optimistic recruitment scenarios, sustainable exploitation can be associated with an FMSY around 0.21 under the single stock hypothesis (source Report for MSC April 2019).

SUBPESCA (March 2019) consider the stock, in their latest assessment, to be over-exploited but not over-fished. Current biomass is above the 0.5 BMSY proxy threshold. Fishing mortality in 2018 was estimated at 0.086 ($F < F_{MSY}$); $SSB_{2018}/SSB_{BMSY} = 0.712$ and $F_{2018}/F_{MSY} = 0.441$.

Population biomass was estimated to be well below the level which would achieve MSY. In order to rebuild the stock and fishery towards sustainable targets, the SPRFMO requested an evaluation of a proposed harvest control rule (HCR) and if possible, to design and evaluate alternatives (A2.4).

The Kobe diagram for the stock (XV-X) shows biomass above 0.5 BMSY proxy limit threshold (black arrow):

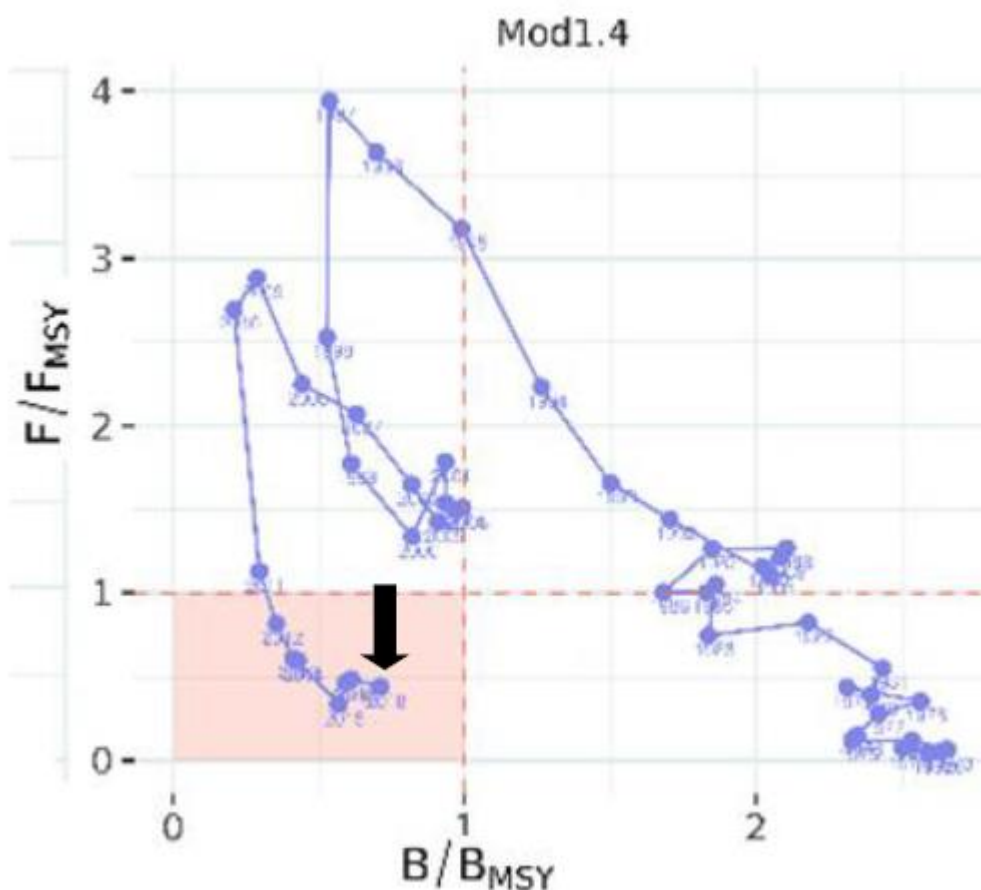


Figure 3: Exploitation of the Chilean Jack Mackerel stock 2018 (Source SPRFMO) **R10**

A2.3:

A 2019 BAC of 381,572t was announced (March 2019) for management units XV-X:

- Research quota: 200t
- Incidental by-catch: 3,815t
- Human consumption: 3,815t
- Artisanal hand line fishery: 153t
- Quota remaining: 373,589
 - Artisanal: 34,557t
 - Industrial: 339,032t

This amount applicable to the fishery within Chile's EEZ and high seas (international waters) fishery combined. Annual TAC's are described as explicitly precautionary (source Report for MSC 2019) while applied harvest control rules define how fishery managers must respond to changes in stock status.

SPRFMO announced (March 2019) a TAC (2019 fishery, Chile EEZ and SPRFMO Convention Area) of 531,061 tonnes of which 381,572t was assigned to Chile.

A2.4

In Chile stock assessments and the management approach used in the fishery undergo detailed peer reviews through Fisheries Management Committee meetings (Artisanal fishers; three members from SONAPESCA and a representative of the processing sector are joined by Government Officials from SUBPESCA and SERNAPESCA). 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.

SPRFMO requested a re-evaluation of the provisional HCR (Rebuilding Plan) adopted at the 2nd meeting of the SPRFMO and also an evaluation of other potential plans. A number of HCR designs were constructed by the authors of the MSC PCR Report (April 2019) and evaluated using a Management Strategy Evaluation (MSE) framework that implemented HCRs in a simulation model taking uncertainties on stock dynamics, fisheries and TAC setting procedures into account. A rebuilding plan adopted by SPRFMO showed a moderate increase in SSB compared to other runs with moderate catches being a factor of 1 - 1.25 as large as the 2014 proposed catches.

A2.5:

Reports of stock assessments and advice on BAC's can be found on IFOP and SUBPESCA 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 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.

R9-R10**References p33**

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
<p>A3.1:</p> <p>The 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.</p> <p>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 26cm fork length is in force. The percentage of juveniles in number from each landing or transport that are less than 26cm 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.</p> <p>Workshops have been provided by Government to demonstrate best fishing practice including minimising discards and bycatch. Temporary closure orders have been issued by Government when high proportions of juveniles have been detected. When large quantities of juveniles are detected closure orders may be extended for periods of one week to fifteen days or more.</p> <p>In the event that a SPRFMO 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. That Member or CNCP is required to close the fishery for its flagged vessels when total catch of its flagged vessels is reached and notify the SPRFMO Executive Secretary of the date of the closure.</p> <p>A3.2:</p> <p>Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment:</p>			

Table 1: Advised and reported catches of Chilean jack mackerel. (* = preliminary data.) Chilean EEZ and SPFMO Convention Area combined **R1**

Year	Advised Maximum Catch	Reported Catch
2008		1,472,631
2009		1,283,474
2010		726,573
2011	711,783	634,580
2012	520,000	454,774
2013	441,000	353,123
2014	440,000	395,085
2015	460,000	394,212
2016	460,000	388,575
2017	493,000	402,050*

Preliminary catch data for 2018 was reported as 472,966 tonnes.

A3.3:

In Chile Blim or 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.

SERNAPESCA is responsible for supervising enforcement and ensuring proper application of rules and regulations on fishing. **R1, R7, R10**

References p34

Standard clause 1.3.2.1.3

A4	Stock Status - Minimum Requirements		
	A4.1	The stock is at or above the target reference point, OR IF NOT:	PASS
		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.	
Clause outcome:			PASS
A 4.1 Stock status estimates for 2018 are based on complete information; these data were considered when assessing the Biologically Acceptable Catch (BAC) for 2019. The Kobe diagram for the stock (XV-X) shows biomass above the 0.5 BMSY proxy threshold (A2.2). R1, R10-R11			
References p34			
<i>Standard clause 1.3.2.1.4</i>			

CATEGORY D SPECIES

In a whole fish assessment, Category D species are those which make up less than 5% of landings and are not subject to a species-specific management regime. In the case of mixed trawl fisheries, Category D species may make up the majority of landings. In a by-product assessment, Category D species are those which are not subject to a species-specific management regime. In both cases, the comparative lack of scientific information on the status of the population of the species means that a risk-assessment style approach must be taken.

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

Productivity and susceptibility ratings are calculated using a process derived from the APFIC document “Regional Guidelines for the Management of Tropical Trawl Fisheries, which in turn was derived from papers by Patrick *et al* (2009) and Hobday *et al* (2007). Table D1 should be completed for each Category D species as follows:

- Firstly, the best available information should be used to fill in values for each productivity and susceptibility attribute.
- Table D2 should be used to convert each attribute value into a score between 1 and 3.
- The average score for productivity attributes and the average for susceptibility attributes should be calculated.
- Table D3 should be used to determine whether the species is required to meet the requirements of Table D4. A species which does not need to meet the requirements of D4 is automatically awarded a pass.
- Table D4 should be used to assess those species indicated by Table D3 to determine a pass/fail rating.
- Any Category D species which has been categorised by the IUCN Red List as Endangered or Critically Endangered, or which appears in the CITES appendices, automatically results in a fail.

D1	Species Name:	Pacific Chub mackerel <i>Scomber japonicus</i>	
	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) **D2**

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	$\emptyset' = 2.72$	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	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 - 28.4 cm TL	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 \Rightarrow 645.8 g (wet weight)	Recalculate Length-weight data
	W = 0.0047	* L \wedge 3.25000	
Nitrogen & protein:	Weight 646 (g)	\Rightarrow whole-body nitrogen (N) 17.6 (g) \Rightarrow 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 Detritivore Herbivore Omnivore Carnivore	Recalculate

Figure D2: *Scomber japonicus* life history D1

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 <i>Cubiceps caeruleus</i>	
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...](#)

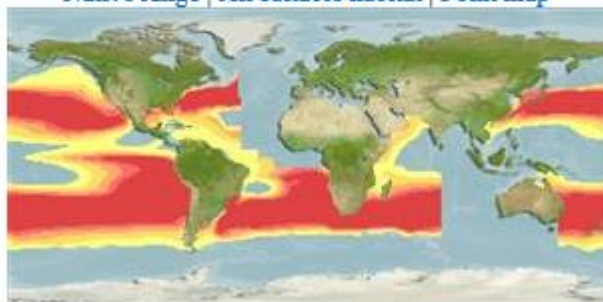
Life History Data on *Cubiceps caeruleus* Blue fathead

Family:	Nomeidae Driftfishes	
Max. length (Lmax):	28.5 cm TL	
L infinity (Linf):	= 30.7 cm TL	Recalculate
K:	0.65 /year $\phi' = 2.79$ Median ϕ' 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) $W = 0.0052 * L^3 \cdot 2.18100$	Recalculate Length-weight data
Nitrogen & protein:	Weight 9 g (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):	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

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Reviewed map
Cubiceps caeruleus AquaMaps Data sources: GBIF OBIS

Figure D4: Blue fathead distribution (D3):

Standard clauses 1.3.2.2

D1	Species Name:	Snoek Sierra <i>Thyrsites atun</i>	
	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**

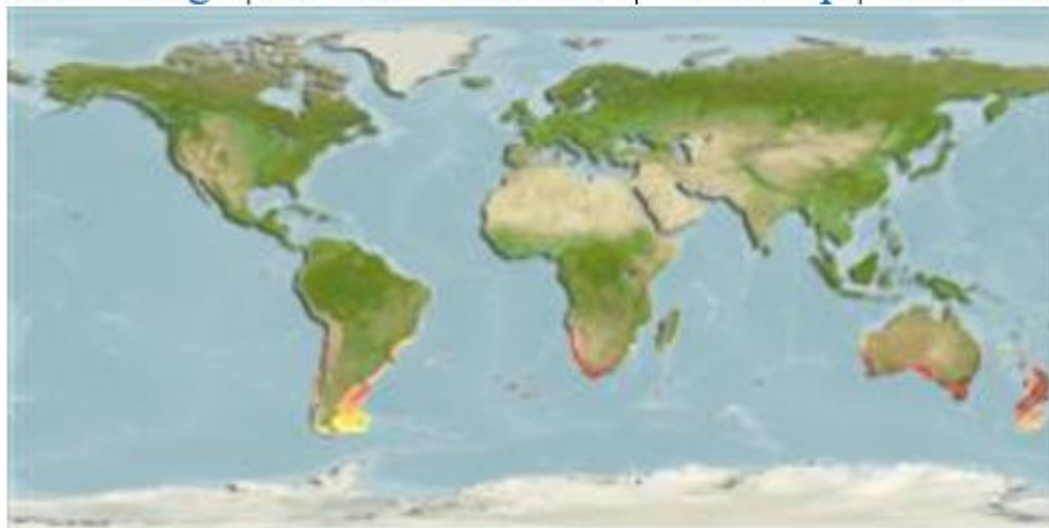
References:

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

Distribution attribute:

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This map was computer-generated and has not yet been reviewed.

Thyrsites atun [AquaMaps](#) Data sources: [GBIF](#) [OBIS](#)

* **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		Recalculate
Estimated from max. length.			
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		Recalculate Growth & mortality data
Estimated from Linf, Lm, to and tm.			
to:	-0.41 years	Estimated from Linf and K.	
Natural mortality (M):	s.e. - /year		Recalculate
Estimated from Linf., K and annual mean temp. = 15.0 °C			
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
<p>Evidence:</p> <p>F 1.1</p> <p>Lists of nationally protected species are maintained by SEREMI (Health Ministry) and SERNAPESCA. Records of number of birds, mammals and marine reptiles recorded by scientific observers in the Chilean jack mackerel purse seine fishery from January 2015-December 2016 include ETP species (IFOP 2017, F1.2).</p> <p>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 <i>Spheniscus humboldti</i> (“Vulnerable”- IUCN), Peruvian Diving Petrel <i>Pelecanoides garnotii</i> (“Endangered”- IUCN) and Smooth Hammerhead <i>Sphyrna zygaena</i> (“Vulnerable”- IUCN).</p> <p>Specific logbook data for recording bycatch, incidental and ETP species capture according to FAO and ORP protocol (2017-2018) are available on request. A summary report on these data has been requested (Dec 2019) by the SAI Global assessment team from IFOP through the IFFO RS stakeholder. These data will be included in the next fisheries assessment report. IFOP is also developing three discard programmes for demersal and pelagic fisheries. When implemented results of these programmes will be available on their website.</p> <p>F1.2:</p> <p>One of the objectives of the observer programme (IFOP 2017) was to quantify and evaluate bycatch of birds, mammals and marine reptiles. The results of these observations are shown (Table 2). The ETP species most frequently observed in purse seine nets was the South American sea lion (<i>Otaria flavescens</i>). Sea lions are reported to actively prey upon fish from within the purse seine net and then jump out of the net as it is recovered; hence the very low mortality rate (4 individuals) compared to observations of 1,228 individuals in net hauls over this period.</p>			

Table 2 Records of number of birds, mammals and marine reptiles recorded by scientific observers in the jack mackerel purse seine fishery from January 2015-December 2016 **R13**

Nombre común	Nombre científico	Captura	Muertos	Mort (%)	TCI	TMI
Lobo marino común	<i>Otaria flavescens</i>	1,228	4	0,3	2,7	0,009
Gaviota dominicana	<i>Larus dominicanus</i>	224	0	0	0,5	0
Albatros de ceja negra	<i>Thalassarche melanophris</i>	214	0	0	0,5	0
Pelicano peruano	<i>Pelecanus thagus</i>	98	3	3,1	0,2	0,007
Albatros chico sin identificar	<i>Thalassarche spp.</i>	61	0	0	0,1	0
Albatros de cabeza gris	<i>Thalassarche chrysostoma</i>	28	0	0	0,06	0
Fardela blanca	<i>Ardenna creatopus</i>	13	13	100	0,03	0,03
Petrel moteado	<i>Daption capense</i>	8	0	0	0,02	0
Fardela negra grande	<i>Procellaria aequinoctialis</i>	7	0	0	0,02	0
Fardela negra	<i>Ardenna grisea</i>	1	1	100	0,002	0,002
Tortuga laúd	<i>Dermochelys coriacea</i>	1	0	0	0,002	0
Golondrina sin identificar	<i>Hydrobatidae</i>	1	1	100	0,002	0,002
Albatros errante	<i>Diomedea exulans</i>	1	0	0	0,002	0

Mort (%) = Mortalidad = Número de animales muertos/Número de animales capturados

Tasa Captura Incidental (TCI) = Número de animales capturados/Número de lances observados

Tasa Mortalidad Incidental (TMI) = Número de animales muertos/Número de lances observados

The species recorded by scientific observers in the IFOP 2017 study have been assessed against the MSC criteria for determining ETP species (PCR Report for MSC April 2019).

The following were assessed as ETP species in the assessment area by the MSC Assessment Team:

- *Otaria flavescens* South American Sea Lion.
- *Thalassarche melanophris* Black Browed Albatross.
- *Thalassarche chrysostoma* Grey-Headed Albatross.
- *Dermochelys coriacea* Leatherback Turtle.
- *Diomedea exulans* Wandering Albatross.
- *Ardenna creatopus* Pink-footed Shearwater.
- *Procellaria aequinoctialis* White Chinned Petrel.

Of these ETP species mortalities were recorded for *Otaria flavescens* South American Sea Lion (4) and *Ardenna creatopus* Pink-footed Shearwater (13).

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” (IUCN 2015). The population in central Chile (between regions V and X) is reported to be over 16,000 animals (IFOP 2017).

Pink-footed shearwater (*Ardenna creatopus*):

This species is not listed in CITES appendices. IUCN report its status as “vulnerable” (IUCN 2016c). 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). There are estimated to be about 30,000 breeding pairs on these sites, indicating a population of around 100,000 - 150,000 individuals. Studies have shown that the greatest overlap with a fishery in terms of interaction was with the driftnet fishery.

F1.3:

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.

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 2016c).

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 (Dec 2019) 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.
- 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, R13

References p34

Standard clause 1.3.3.1

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:			
The purse seine is a non-selective fishing gear in relation to fish size, since the mesh size used is small enough (1/2" or 9/16") to prevent mass escapes, even of the smallest-sized juvenile specimens of anchovy or common sardine found in summer (as small as 5 cm total length).			
There is a rather strong possibility that species to be caught can be previously selected, since both fishermen's experience and the use of echo sounders and sonar may allow species to be identified with some accuracy before setting the net. On some occasions the catch trapped in the sack is released by opening the net. This would appear to be the best action to take which allows the release of incidental catches of juveniles or non-targeted species.			
A recently convened Habitat Monitoring Working Group (HMWG) under the auspices of SPRFMO and ICES has as its terms of reference to provide indicators obtained from the monitoring of the environment that could			

be used as a future management tool. Information will be derived from the Chilean Jack mackerel fishery, biannual pelagic acoustic surveys (scientific and from the fishery), oceanographic and biological surveys and remote sensing data.

At a recent meeting of the HMWG (2019, Galway, Ireland) a description of habitat design and analysis was given for the Peruvian anchovy (*E. ringens* North-Central stock). In addition to expected relationships between fish and the environment, the plasticity and tolerance of anchovy to changing conditions were evaluated. Some of the methods and models used could be applied to the Chilean Jack mackerel fishery in the assessment area.

Trophic interactions include microzooplankton (e.g. krill) and mesopelagic fish, among which lantern fish (*Vinciguerria lucetia*) is the most important species in the assessment area. In the case of the northern Humboldt Current System some studies exist on this species distribution, behaviour patterns and biology.

F2.2:

Until such time as SPRFMO adopt an Observer Programme, in accordance with Article 28 of the Convention, all Members and CNCPs participating in the Chilean Jack mackerel fishery are required to ensure a minimum of 10% scientific observer coverage of trips for trawlers and purse seiners flying their flag and also ensure that such observers collect and report data, as described in SPRFMO CMM 02-2018.

For the Jack mackerel fishery an assessment of the impact of fishing on non-target, associated or dependent species has been proposed for all fleets operating in the Convention area, including an observer's program and ecological risk assessments (ERAs) to determine the impact of the fishery on bycatch species and habitat. No progress on this project was found on the SPRFMO's website (accessed 06.12.19).

No direct habitat damage is known 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 x 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.

F2.3:

A Reserve Zone for Artisanal Fishing has been established by Chilean fisheries law. This regulation is also in force around oceanic islands and inland waters. This measure prevents the industrial fleet from entering the coastal zone to carry out extractive fishing operations. It has also become a conservation measure for the bulk of fishery resources that spawn near the coast and inland waters. This regulation is designed to protect coastal pelagic resources, being of benefit mainly to anchovy and common sardine fisheries.

However reserve zones may be temporarily suspended through authorizations for research fishing and dredging that allow temporary entries of industrial vessels into zones only in specific areas and only during specific periods. Information on catches and discards of industrial vessels in the reserve zone, which have been sanctioned through agreements with the artisanal sector, has been requested from the Competent Authority and will be included in future assessments.

R1, R7, R13-R14

References p34

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
<p>Evidence:</p> <p>F 3.1:</p> <p>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. Depletion of the stock would likely cause unpredictable, substantial and enduring changes in the abundances of its predators and prey, which may not be easily reversible by a reduction of fishing mortality. 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).</p> <p>Article 2, “Objective”, of the SPRFMO Convention, states:</p> <p>“... 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.”</p> <p>In Chile a plan to reduce discards and incidental by-catch is underway. Chile has implemented five marine reserves (see below) with the objective of conserving natural banks of scallops, oyster and mussel, but also of dolphins and penguins.</p> <p>Fish stocks are known to be highly dependent on recruitment which in turn changes with environmental conditions and oceanographic conditions in the Chilean upwelling ecosystems like the El Niño and La Niña. Biannual acoustic surveys are designed to capture changes in recruitment and assist in predicting future biologically acceptable catches (BAC's).</p> <p>F 3.2:</p> <p>A recently convened Habitat Monitoring Working Group (HMWG) under the auspices of SPRFMO has as its terms of reference to provide indicators obtained from the monitoring of the environment that will inform future stock assessments of the Chilean Jack mackerel resource. When these indicators are published they and the supporting data will be included in future SAI Global fisheries assessments.</p> <p>IFOP is currently developing three discard reduction programmes for demersal and pelagic fisheries. The first serves demersal, shellfish, hake and hoki fisheries. The second serves discarding in purse seine fisheries of targeted anchovy and sardine fisheries (V- X) both in industrial and artisanal fleets. The third will focus on discarding in purse seine fisheries of Chilean Jack mackerel, both in industrial and artisanal fleets.</p> <p>The IFOP observer programme (Jan 2015 – Dec 2016) for the Chilean Jack mackerel fishery examined activities of vessels fishing from Region VIII. A total of 74 observer trips aboard industrial vessels targeting Chilean Jack mackerel took place, covering 5.7% of fishing trips. In 2015 a discarding rate of around 1% was reported by both observers and a self-reporting programme; in 2016 observers reported a discarding rate of just over 6% whilst the self-reporting programme showed no significant change in discarding rates from 2015.</p> <p>Incidents causing mortality were recorded for 5 species: South American sea lion (<i>Otaria flavescens</i>); Peruvian pelican (<i>Pelecanus thagus</i>); pink-footed shearwater (<i>Ardenna creatopus</i>); sooty shearwater (<i>Ardenna grisea</i>); and a single unidentified northern storm petrel (family Hydrobatidae).</p>			

The significance of observed species interactions was considered (Report for MSC April 2019) by raising these data to the fleet level; enabling annual mortality for the fleet to be estimated (**Table 3**)

Table 3: Estimate of annual level of interactions and mortality for the Chilean jack mackerel fleet **R1**

Species	Common name	Observer data ³		Estimate for fleet (p.a.) ⁴	
		Interactions	Mortality	Interactions	Mortality
<i>Otaria flavescens</i>	South American sea lion	1,228	4	10,712	35
<i>Larus dominicanus</i>	Kelp gull	224	-	1,954	-
<i>Thalassarche melanophris</i>	Black-browed albatross	214	-	1,867	-
<i>Pelecanus thagus</i>	Peruvian pelican	95	3	829	26
<i>Thalassarche spp.</i>	Albatross species	61	-	532	-
<i>Thalassarche chrysostoma</i>	Grey-headed albatross	28	-	244	-
<i>Ardeana creatopus</i>	Pink-footed shearwater	13	13	113	113
<i>Daption capense</i>	Cape Petrel	8	-	70	-
<i>Procellaria aequinoctialis</i>	White chinned petrel	7	-	61	-
<i>Ardeana grisea</i>	Sooty shearwater	1	1	9	9
<i>Dermochelys coriacea</i>	Leatherback turtle	1	-	9	-
Hydrobatidae	Northern storm petrel	1	1	9	9
<i>Diomedea exulans</i>	Wandering albatross	1	-	9	-

F 3.3:

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". As a result, a Strategic 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 March 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.

A Reserve Zone for Artisanal Fishing has been established by law; extending over 5 nautical miles measured from the coast from the I Region to 41°28,6' S (located in the first third of the X Region) and from south of 41° 28,6' up to 5 nm west of the straight baselines. This regulation is also in force around the oceanic islands and in inland waters.

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 Report to MSC April 2019).

R1; R13

References

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<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:
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- R9** SPRFMO 2019 Conservation and Management Measures Chilean Jack mackerel 6pp:
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- R14** **SPRFMO** HABITAT MONITORING WORKING GROUP 2019 Report 2pp
<https://www.sprfmo.int/assets/Fisheries/Habitat-Monitoring-WG/2019/30-Apr-2019-HMWG-meeting-report-with-participants1.pdf>

Standard clause 1.3.3.3