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Global Standard for Responsible Supply of Marine Ingredients

Fishery Assessment Methodology and Template Report V2.0

Fishery Under Assessment	**Common Sardine (*Strangomera bentincki*)**
Date	**August 2019**
Assessor	**Jim Daly**

Application details and summary of the assessment outcome				
Name: Alimentos Marinos 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	Virginia Polonio	3	SURV 1	Whole fish
Assessment Period	2018-2019			

Scope Details	
Management Authority (Country/State)	Subpesca & Sernapesca, Chile
Main Species	Common Sardine (Araucanian herring)
Fishery Location	Chile region V-X, Pacific area FAO 87
Gear Type(s)	Purse seine
Outcome of Assessment	
PASS	Common Sardine V-X (Araucanian herring) Strangomera *bentincki*
Clauses Failed	NONE
PASS	Peruvian anchovy V-X (*Engraulis ringens*);
Clauses Failed	NONE
PASS	Chub mackerel V-X (Global stock) (*Trachurus murphyi*)
Clauses Failed	NONE
Peer Review Evaluation	APPROVE
Recommendation	PASS

Assessment Determination
The Subsecretaria de Pesca (Undersecretariat of Fisheries, SUBPESCA or SSP); positioned within the Chilean Ministry (MINECOM) provide policy settings and regulatory framework for the domestic management of the sector. The Instituto de Fomento Pesquero (Fisheries Development Institute, IFOP) is the research arm of the institutional framework; providing scientific advice to SUBPESCA on fisheries and aquaculture issues. A management plan for anchovy and araucanian herring mixed small pelagic fishery (V-X) has been officially adopted. The plan sets lines of action to address biological, economic, social and ecological matters. Fixed and mobile temporal closures to protect the spawning stock and juveniles have also been included. Catches are reported every year. The annual catch limit is modified in an adaptive way during the year to account for updated scientific data and has been in accordance with scientific recommendations. Direct hydro-acoustic surveys have been conducted biannually since 1999. According to the latest assessment CCT-PP (Scientific and Technical Committee formed by IFOP and SUBPESCA) confirmed that the stock remains fully exploited with SSB0 5% below target reference point BD_{RMS} with F (2017-2018 data) corresponding to $F_{MSY.}$ The stock remains in the green area of the Kobe plot. Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment. CCT-PP in March 2019 recommended a Biologically Acceptable Catch (BAC) for common sardine (V-X) of between 219,525t-274,406t for the 2019 fishery in line with the first upper limit advised. A second TAC was published in May 2019, at 335,334 tonnes; coincident again with the upper limit recommended by CCT-PP The final (third) global TAC was defined in June 2018 at 344,535 tonnes. Indicators from the latest PELACES acoustic evaluation and stock assessment (August 2019 meeting minutes, provided by client) have shown that, based on IFOP and INPESCA reports, the stock of anchovy (V-X) is in the overexploitation zone and has moved away from the limit level of collapse (8% chance of being depleted). Anchovy biomass has advanced in its recovery and is now close to target biomass and indicators. The Kobe diagram for Chilean jack mackerel shows a spawning biomass with an increasing trend over the last 5 years, with biomass reaching levels around MSY (BD_{RMS}) in 2018. Both species are considered to have biomass above limit reference points (or proxy). The Common Sardine (Araucanian herring); Peruvian anchovy (*Engraulis ringens*); and Chub mackerel (*Trachurus murphyi*) are currently reported on the IUCN Red List as species of least concern. All are currently not listed on the CITES appendix of endangered species (both sites accessed 23.08.19). The assessment team recommends the approval of Common Sardine V-X Whole-fish (Category A)) for the production of fishmeal and/or fish oil under the current IFFO-RS Whole fish Standard (v 2.0) and of Chub mackerel (*Trachurus murphyi)* and Peruvian anchovy (*Engraulis ringens)* V-X under the current IFFO-RS by-product 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

Species-Specific Results

Category	Species	% landings	Outcome (Pass/Fail)	
Category A	Sardine *Strangomera bentincki*	95%	A1	Pass
			A2	Pass
			A3	Pass
			A4	Pass
Category B				
Category C	Anchovy (*Engraulis ringens*); Chub mackerel (*Trachurus murphyi*)	5%	Pass	
Category D				

[List all Category A and B species. List approximate total %age of landings which are Category C and D species; these do not need to be individually named here]

HOW TO COMPLETE THIS ASSESSMENT REPORT

This assessment template uses a modular approach to assessing fisheries against the IFFO RS standard.

Whole Fish

The process for completing the template for a **whole fish** assessment is as follows:

1. ALL ASSESSMENTS: Complete the Species Characterisation table, to determine which categories of species are present in the fishery.
2. ALL ASSESSMENTS: Complete clauses M1, M2, M3: Management.
3. IF THERE ARE CATEGORY A SPECIES IN THE FISHERY: Complete clauses A1, A2, A3, A4 for **each** Category A species.
4. IF THERE ARE CATEGORY B SPECIES IN THE FISHERY: Complete the Section B risk assessment for **each** Category B species.
5. IF THERE ARE CATEGORY C SPECIES IN THE FISHERY: Complete clause C1 for **each** Category C species.
6. IF THERE ARE CATEGORY D SPECIES IN THE FISHERY: Complete Section D.
7. ALL ASSESSMENTS: Complete clauses F1, F2, F3: Further Impacts.

A fishery must score a pass in **all applicable clauses** before approval may be recommended. To achieve a pass in a clause, the fishery/species must meet **all** of the minimum requirements.

By-products

The process for completing the template for **by-product raw material** is as follows:

1. ALL ASSESSMENTS: Complete the Species Characterisation table with the names of the by-product species and stocks under assessment. The '% landings' column can be left empty; all by-products are considered as Category C and D.
2. IF THERE ARE CATEGORY C BYPRODUCTS UNDER ASSESSMENT: Complete clause C1 for **each** Category C by-product.
3. IF THERE ARE CATEGORY D BYPRODUCTS UNDER ASSESSMENT: Complete Section D.
4. ALL OTHER SECTIONS CAN BE DELETED. Clauses M1 - M3, F1 - F3, and Sections A and B do not need to be completed for a by-product assessment.

By-product approval is awarded on a species-by-species basis. Each by-product species scoring a pass under the appropriate section may be approved against the IFFO RS Standard.

SPECIES CATEGORISATION

The following table should be completed as fully as the available information permits. Any species representing more than 0.1% of the annual catch should be listed, along with an estimate of the proportion of the catch each species represents. The species should then be divided into Type 1 and Type 2 as follows:

- **Type 1 Species** can be considered the 'target' or 'main' species in the fishery. They make up the bulk of annual landings and are subjected to a detailed assessment.
- **Type 2 Species** can be considered the 'bycatch' or 'minor' species in the fishery. They make up a small proportion of the annual landings and are subjected to relatively high-level assessment.

Type 1 Species must represent 95% of the total annual catch. Type 2 Species may represent a maximum of 5% of the annual catch (see Appendix B).

Species which make up less than 0.1% of landings do not need to be listed (NOTE: ETP species are considered separately). The table should be extended if more space is needed. Discarded species should be included when known.

The 'stock' column should be used to differentiate when there are multiple biological or management stocks of one species captured by the fishery. The 'management' column should be used to indicate whether there is an adequate management regime specifically aimed at the individual species/stock. In some cases it will be immediately clear whether there is a species-specific management regime in place (for example, if there is an annual TAC). In less clear circumstances, the rule of thumb should be that if the species meets the minimum requirements of clauses A1-A4, an adequate species-specific management regime is in place.

NOTE: If any species is categorised as Endangered or Critically Endangered on the IUCN Red List, or if it appears in the CITES appendices, it **cannot** be approved for use as an IFFO RS raw material. This applied to whole fish as well as by-products.

TYPE 1 SPECIES (Representing 95% of the catch or more)
Category A: Species-specific management regime in place.
Category B: No species-specific management regime in place.

TYPE 2 SPECIES (Representing 5% OF THE CATCH OR LESS)
Category C: Species-specific management regime in place.
Category D: No species-specific management regime in place.

Common name	Latin name	Stock	% of landings	Management	Category
Sardine	*Strangomera bentincki*	FAO 87 V-X region Chile	≥95%	Species-specific. Multi pelagic fisheries MINECON	A
Chub mackerel	*Trachurus murphyi*	FAO 87 V-X Central-southern Chile EEZ and high seas	≤5%	Species-specific. Multi pelagic fisheries MINECON	C
Anchovy	*Engraulis ringens*	FAO 87 V-X region Chile	≤5%	Species-specific. Multi pelagic fisheries MINECON	C

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:
The Chilean Ministry of Economy, Development and Tourism (MINECON) responsibilities include establishing basic policies for managing and coordinating State activities relating to the fisheries sector. Actions involve promoting the development of the fisheries sector, along with the protection, conservation,

and full use of resources and the marine environment. The fishing law (LGPA) establishes that MINECON should establish regulations and administrative measures based on SUBPESCA (see below) reports. The Ministry also states that sustainable growth is part of its mission.

The Chilean institutional structure governing the fisheries and aquaculture sector centres around three key organisations, with several other institutions providing additional research and enforcement support (such as the Navy).

These three have a degree of operational independence while also performing a crucial and interlinked function within the broad institutional framework:

- The Subsecretaria de Pesca (Undersecretariat of Fisheries, SUBPESCA or SSP); positioned within MINECOM; provides policy settings and regulatory framework for the domestic management of the sector.
- The Servicio Nacional de Pesca (National Fisheries Service, SERNAPESCA) is also based within the Ministry of Economy. Responsible for executing national fisheries policy, Supervising its enforcement and ensuring proper application of rules and regulations on fishing
- The Instituto de Fomento Pesquero (Fisheries Development Institute, IFOP) is the research arm of the institutional framework. The primary source of scientific advice to SUBPESCA on fisheries and aquaculture issues

Scientific Committee:
A Scientific and Technical Committee for Small Pelagic fisheries (Comité Científico Técnico de Pesquerías de Pequeños Pelágicos, CCT-PP), formed by IFOP and SUBPESCA, analyse updates on stock status and catch projections and make official recommendations to the authorities on TAC's.
FISHERIES COUNCILS:
The National Fisheries Council was created by the Fisheries and aquaculture Law LGPA No. 18.892 for managing the participation of all stakeholders in the fisheries and aquaculture sector.

SOUTH PACIFIC REGIONAL FISHERIES MANAGEMENT ORGANISATION (SPRFMO):
As a widely distributed species, international management of Chilean small pelagics (including Jack mackerel) is coordinated by SPRFMO. Currently overall TAC's are agreed by SPRFMO for certain stocks, with part of that under Conservation and Management Measures (CMM's) applying to international waters under SPRFMOs jurisdiction. SPRFMO also provide advice on TAC's in Chilean national waters for certain stocks (Jack mackerel *Trachurus murphyi*) due to Chile's express consent.

Management Plan:
The Management Committee for anchovy and araucanian herring mixed small pelagic fishery (V-X) is composed of SUBPESCA and SERNAPESCA members, artisanal and industrial fishermen and the processing industry. The Management Plan has been officially adopted.

Legal instruments:
Since February 2013, the primary legal instrument for fisheries management in Chile has been Law 20.657 (LGPA). The LGPA is a modification of the previous fisheries legislation, and includes:

- A commitment to sustainable use and conservation of marine resources.

- A commitment to make key decisions on conservation measures based on scientific information above all other considerations. To this end, the recommendations of Scientific and Technical committees have been made mandatory.

The LGPA also includes commitments to develop management plans for any fishery with restricted access, and review and updating of these plans every five years. Regional Government Areas in Chile corresponding to fishery management units offshore (Figure 1a-b):

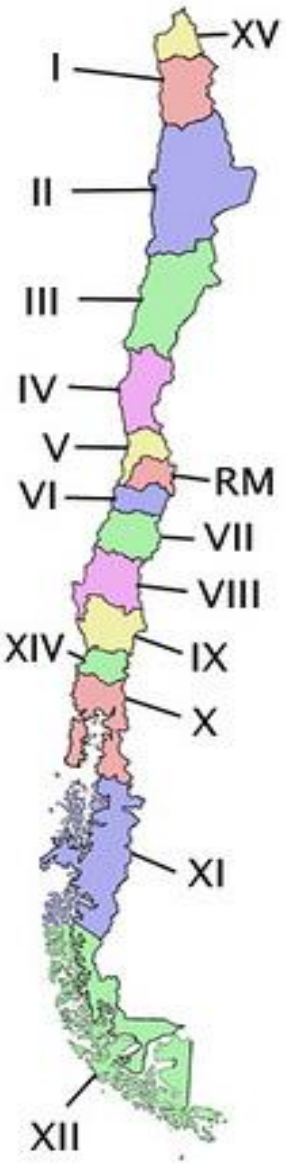

Figure 1a Regional Government Areas in Chile corresponding to fishery management units. Adapted from https://pepeschile.com/es/regiones-chilenas-de-que-son-todos-estos-numeros **R1**

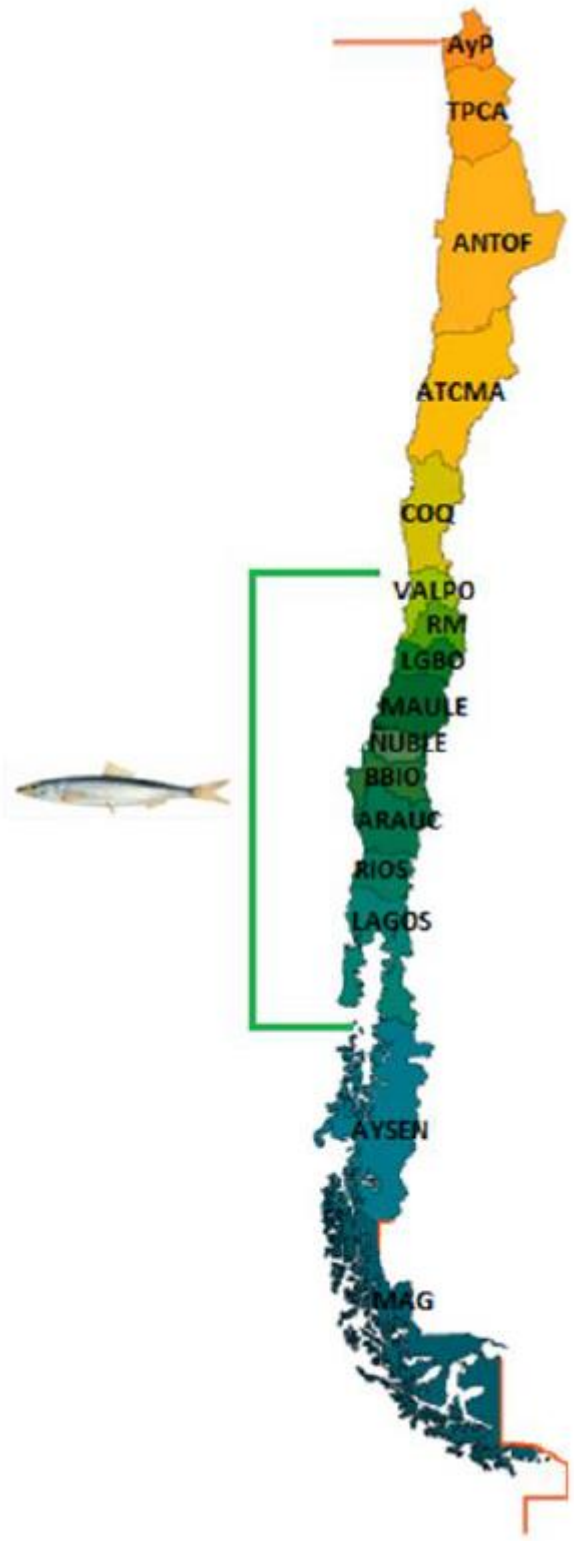

Figure 1b Management Unit for Common sardine *Strangomera bentincki* (Valpo-Valparaíso to Biobío (Lagos) R**11**

There is an organisation responsible for managing the fishery
R1-R11

M1.2:
IFOP is the organization responsible for sampling these stocks and for carrying out the acoustic surveys each year to collect data used in the projections to determine the TAC and stock status. IFOP is a non-profit organisation created in 1964 under a joint agreement between the Chilean government, the FAO, and the UN Development Program.

IFOP is the primary source of scientific advice to SUBPESCA on fisheries and aquaculture agreement issues. Its work includes the environmental and health aspects of aquaculture production. IFOP draws a proportion of its funding from SUBPESCA but also must compete for funding from a range of public funding sources. IFOP is a Private Law Corporation whose public role is to support sustainable development of the country's fishing & aquaculture sector.

There is an organisation responsible for collecting data and assessing the fishery.
R5

M1.3
Fisheries are regulated under the LGPA. Under this Act the main objective is the sustainability of the Chilean resources. Long term management plans ensure the conservation of fishing resources**.** The website of MINECON includes a public commitment to sustainability.

Fishery management organisations are publically committed to sustainability.
R2, R7

M1.4
The management system is aimed at the conservation of the fisheries stock in the Chilean regions. An explicit management plan has been put in place for each fishery. Article 5 of the LGPA states that SUBPESCA should determine Biological Reference points. These have been laid out in SUBPESCA resolution No 291/2015 which states that all stocks should be exploited around the MSY level, and that the 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. Instead Biologically Acceptable Catches (BAC's) and a resource recovery plan must be implemented. A Management Committee is required to elaborate and implement recovery plans under Article 9 of the LGPA.

Fishery management organisations are legally empowered to take management actions.
R7
M1.5
The Management Committee for the anchovy and araucanian herring mixed small pelagic fishery in V-X is composed of SUBPESCA and SERNAPESCA members, artisanal, industrial fishermen and the processing industry.

A Management Plan sets lines of action to address biological, economic, social and ecological matters. Fixed and mobile temporal closures to protect the spawning stock and juveniles have also been included. Among the actions planned, there is the evaluation of a series of harvest control rules and definition of a robust rule to allow a viable mixed fishery. Biological closures are accordingly applied considering the monthly bulletins published by IFOP with information gathered about recruitment and the spawning period. Regulations about quota swaps and distribution through the fishing regions are also made available here.

There is a consultation process through which fishery stakeholders are engaged in decision-making **R 9**

M1.6:

Stock-recruitment and spawning period are closely monitored by IFOP, per region, results are published in monthly bulletins (Informes) which also contain details of closed seasons by area and general information on stock status.

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

The decision-making process is transparent, with processes and results publically available.

R5, R15

References:

R1: Pepe's Chile Mapa de las Regiones Chilenas: https://pepeschile.com/es/regiones-chilenas-de-que-son-todos-estos-numeros

R2 Ministerio de Economía, Fomento y Turismo MINECON http://out.easycounter.com/external/minecon.gov.cl

R3 Subpesca http://www.subpesca.cl/portal/616/w3-channel.html

R4 Sernapesca www.sernapesca.cl

R5 IFOP https://www.ifop.cl/en/

R6 Comité Científico de Pesquerías de Pequeños Pelágicos (CCT-PP): http://www.subpesca.cl/portal/616/w3-propertyvalue-51142.html

R7 Law on Fisheries and Aquaculture No 20.657**:** http://www.subpesca.cl/normativa/605/articles-764_documento.pdf

R8 South Pacific Regional Fisheries Management Organisation https://www.sprfmo.int/

R9 Plan de manejo para la sardina común Subpesca 2017 72pp PDF http://www.subpesca.cl/portal/616/articles-94523_documento.pdf

R10 SUBPESCA Common sardine http://www.subpesca.cl/portal/616/w3-article-825.html#informes

R11 SUBPESCA March 2019. Estado de situación de las principales pesquerías chilenas, año 2018.pp 8-9 http://www.subpesca.cl/portal/618/articles-103742_recurso_1.pdf pp 31-35

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

SERNAPESCA:

- Carry out audits of capture fisheries and implement surveillance and control of compliance with legal provisions relating to fisheries.
- Health and environmental monitoring of aquaculture, surveillance. Developing strategies and procedures for prevention, surveillance and control of high-risk diseases.
- Information and sectoral statistics. Managing fisheries and aquaculture records.

Chilean Navy:

- Within the Exclusive Economic Zone, the Navy monitor an area covering approximately 4,542,990 km^2 ensuring the prevention of depredation of natural resources to protect the ecosystem from unauthorized activities.

Observer Programme:

- In 2014 Chilean fishing trips carried observers on 9.1% of high seas trips and 15.2% of trips within the Chilean EEZ.

Punitive proceedings are the responsibility of the Regional Director. In February 2013 a new Law on Fisheries and Aquaculture No. 20.657 was published in the Official Journal amending the previous one in the field of sustainability of aquatic resources, access to industrial, craft and regulations for research and monitoring of fishing activity.

There is an organisation responsible for monitoring compliance with fishery laws and regulations.

R4; R12-R13

M2.2

There is a framework allowing for the application of sanctions ranging from monetary fines to revocation of licence.

The LGPA defines a range of sanctions for offences including fishing with an unlicensed vessel, discarding, incorrect logbook use, failure to report landings, fishing in a region or fishery other than the one for which the vessel is licenced, and for industrial vessels which land more fish than they have quota for. Depending on the offence, sanctions can include one or a combination of monetary penalties dependant on tonnage; suspension of fishing licence; and revocation of licence entirely.

There is a framework of sanctions which are applied when laws and regulations are discovered to have been broken.

R7

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 evidence of IUU fishing activities. In May 2016 a new agreement between 30 countries was endorsed. 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 only to foreign flagged vessels fishing in Chilean waters.

There is no substantial evidence of widespread non-compliance in the fishery, and no substantial evidence of IUU fishing.

R12

M2.4

Industrial vessels operate under mandatory VMS monitoring. Also, Sernapesca carry out audits of capture fisheries; implementing surveillance and control of compliance with legal provisions. Within the Exclusive Economic Zone, the Chilean Navy also monitors an area covering approximately 4,542,990. Km^2 ensuring the prevention of depredation of natural resources to protect the ecosystem from unauthorized activities.

There are no estimates for under-reporting from the Chilean fishery. However a research program is underway to obtain such estimates. The data collection will last for two years.

Compliance with laws and regulations is actively monitored, through a regime which may include at-sea and portside inspections, observer programmes, and VMS

R2, R4; R12-R14

References

R 12 On port state measures to prevent, deter and eliminate illegal, unreported and unregulated fishing. FAO 2016 http://www.fao.org/3/a-i5469t.pdf

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		**Sardine (*Strangomera bentincki*)**	
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**

Evidence

A1.1.

Catches are reported every year. The annual catch limit is modified in an adaptive way during the year to account for updated scientific data and has been in accordance with scientific recommendation. Also, 1998-2001 landings were amended due to indications of under-reporting and the models updated to address these uncertainties.

SERNAPESCA reported (January 2019) total artisanal landings **(**Valparaíso to Los Lagos**)** of 329, 840t in 2018 representing catches of 101% of allocated quota; industrial landings at 11, 194t were 101.6 % of allocated quota. Total landings for 2018 (all sectors see A 2.3) were calculated at 346,913t.

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

A1.2

Direct hydro acoustic surveys have been 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, the assessment of SSB for small pelagic fish with partial spawning (case of Araucanian herring) is conducted through the robust Daily Egg Production Method (DEPM).

Indirect assessment is conducted using a statistical catch-at-age model allowing the incorporation of supplementary information, such as SSB, Catch Per Unit of Effort (CPUE), Fishing mortality (F), catch-by-age and year and recruitment indices.

Since 2010, a bi-annual model is performed to include data from the two surveys conducted, stock vulnerability due to climatic phenomena (e.g. El Niño) and biological characteristics of the species. Updated assessment reports, based in each of the surveys, were in the past made available upon request (Portal de Transparencia) but are currently included in the IFOP website and made available with a significant time lag.

A new assessment model was agreed at the 4th meeting of CCT-PP (2018). The main difference of applying regards a methodological change in the estimation of the sample sizes of age compositions and the consideration of the biological year (July-June); all input data were corrected accordingly.

Enough additional information is collected to enable an indication of stock status to be estimated.
R11; R14

References

R 13 SERNAPESCA (Jan 2019):
Informe Final Control Cuota Pesquerías Anchoveta (*Engraulis ringens*) y Sardina común Regiones de Valparaíso a Los Lagos (*Strangomera bentincki*), año 2018 46pp
http://www.sernapesca.cl/sites/default/files/informe_final_2018_pelagicos_anchoveta_y_sardina_comun_v-x.pdf

R14 Fishsource Araucanian herring *S. bentincki* *https://www.fishsource.org/stock_page/1822*

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**

Evidence

A2.1 .

IFOP conducts a stock status assessment which is presented every year and the acoustic surveys are carried out annually. A joint Peruvian-Chilean assessment workshop bringing together Chile's Fisheries Development Institute (IFOP) and the Peruvian Institute of the Sea (IMARPE) was held from 1982 to 2011 to evaluate both anchoveta and sardine and was restarted in 2015. This additional source of mortality resulted in a re-scale of biomass, fishing mortality and reference point estimates.
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.

A2.2 .

The following reference points were established by CCT-PP No 1 (2015):

a) BD_{RMS} = 60%BDPR or 55%BDo:
b) $BD_{límite}$ = 27,5%BDo
c) F_{RMS} =F60% BDR

A Biomass target reference point (B_{MSY} proxy) - is defined at 55% of the virgin spawning stock biomass (SSB0). A limit reference point (B_{lim} proxy) is set at 27.5% of SSB0.

According to the latest assessment CCT-PP confirm that the stock remains fully exploited with SSB0 5% below target reference point BD_{RMS} with F (2017-2018 data) corresponding to F_{MSY} (**Figure 2**):

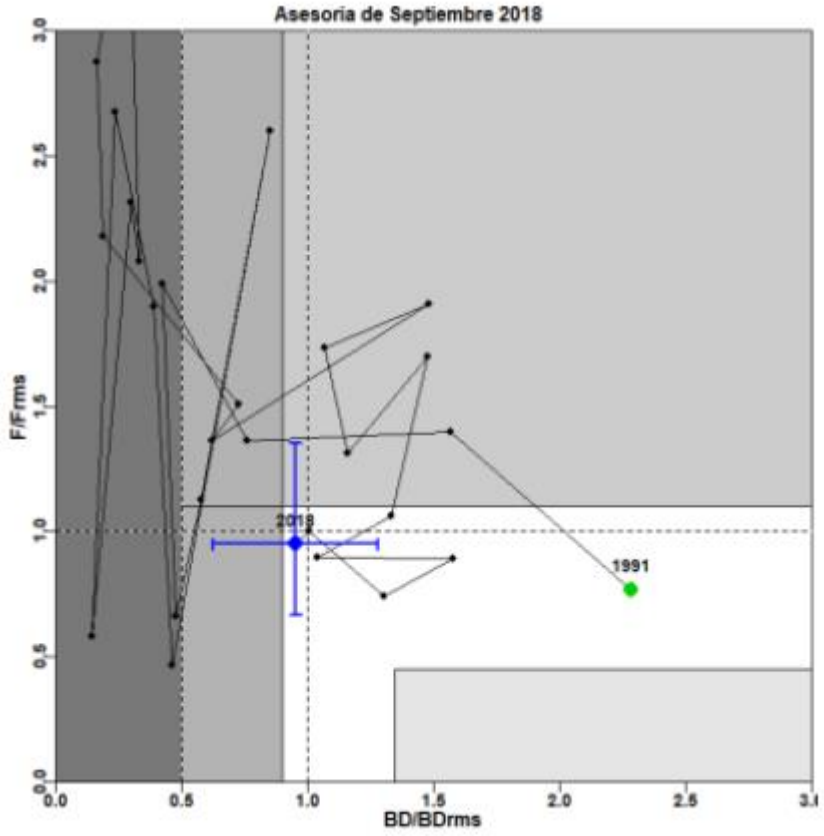

Figure 2: Kobe plot for Common sardine Valparíso-Los Lagos X axis F/F_{RMS} Y axis BD/BD_{RMS} **R11**

The stock remains in the green area of the Kobe plot.

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

R11
A2.3:
The following quota was published (Sernapesca Jan 2019): total allocation 344,535t

- Research quota : 180t
- Bycatch: 3,445t
- Human consumption : 3,445t
- Remaniant quota : 337,465t :
  Artisanal : 263,223t
  Industrial: 74,242t

CCT-PP in March 2019 recommended a Biologically Acceptable Catch (BAC) of between 219,525t-274,406t for the 2019 fishery in line with the first upper limit advised. A second TAC was published in May 2019, at 335,334 tonnes; coincident again with the upper limit recommended by CCT-PP.

The final (third) global TAC was defined in June 2018 at 344,535 tonnes but there were negotiations among both fleets' quotas, the industrial fleet gave 63,221 tonnes to the artisanal fleet, being the final partial quotas at 11,020 tonnes for the industrial fleet and 326,435 tonnes for the artisanal fleet; the final effective TAC was at 344,535 tonnes (SERNAPESCA 2019)

This catch option considers an average recruitment level, a 30% risk of not meeting the management objective and 2% of discards.

Assessments provide an indication of the volume of fishery removals which is appropriate for the current stock status.

R11, R13-R14

A2.4-A2.5:

Stock assessments and the management approach used in the fishery, undergo detailed peer review through CCT-PP. These peer reviews can be considered both internal and external as members of the committees may be outside the assessment process.

Both IFOP and SUBPESCA have commissioned external peer reviews, for example, the series of workshops convened with Peru and have invited international experts to evaluate the setting of biological reference points within the MSY framework.

Reports can be found on the IFOP and SUBPESCA websites. Stock-recruitment and spawning period are closely monitored by IFOP, per region 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.

The assessment is made publically available

R4-R5; R11; R15

References

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 TAC is set up every year following scientist recommendations and data from historical series of data and annual surveys. TAC'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 TAC'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 TAC range with the lower limit as 20% of actual TAC recommendations.

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 juvenile anchovy 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.

A maximum catch limit per owner regime has been established for industrial sector as well as an artisanal extraction regime for the artisanal sector of Regions V, VIII and X.

There is a mechanism in place by which total fishing mortality of this species is restricted.
R4, R7, R11-R13

A3.2:
Landings of this species are keeping below upper advised TAC's and are decreasing over the years (Figure 3**):**

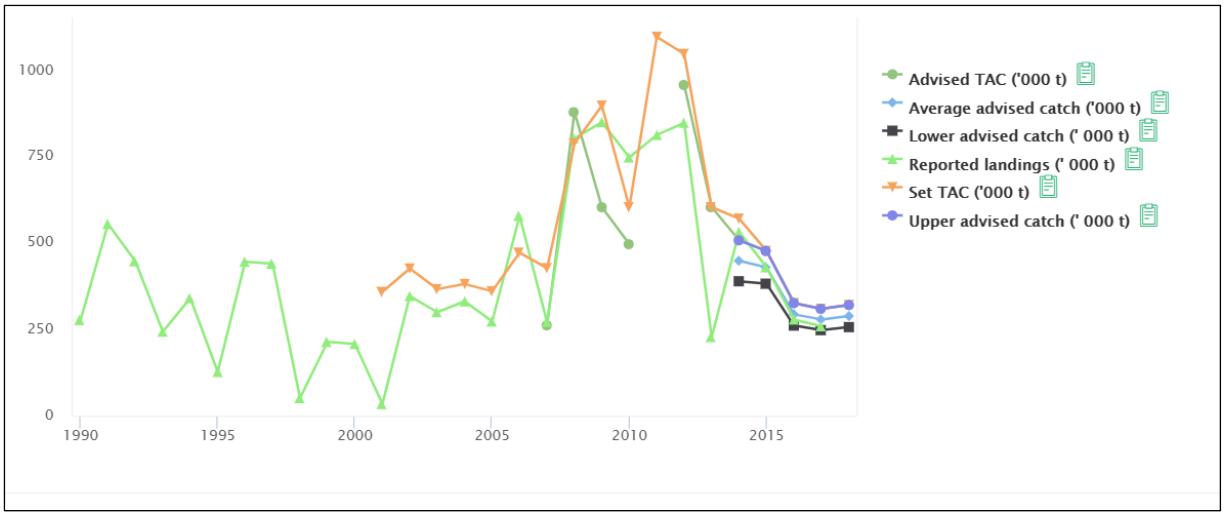

Figure 3. Catch and TAC from 1990-2015 of Common sardine (V-X, Chile) **R 14**

Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment.
R14
A3.3:
In its stock assessment reports IFOP considers a range of sources of uncertainty, e.g. variability in CPUE data, environmental factors, stock aggregation for habitat or reproduction, acoustic biomass estimation parameters. Life history parameters are also considered (growth, mortality and maturity), the process error inherent in the evaluation model and the short history of the fishery. IFOP also produces outputs which indicate the level of risk associated with potential fishery management actions. Small quotas for research or non-target catch of the species in other fisheries are permissible.

Evidence has been provided that the precautionary approach is being taken in allocating TAC's. Fishing removals are established based on the determination of Biologically Acceptable Catches (BAC's) through simulation analysis in the stock assessment model using F_{RMS} proxies. SERNAPESCA is responsible for supervising enforcement and ensuring proper application of rules and regulations on fishing.

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). **R5-R6, R9, R11-R13; R15**
References
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: 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:

A 4.1

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.

IFOP Informes give notice when fishing is permitted

R11; R15

References

R15 IFOP 2019 Small Pelagics INFORMES Closure notices: http://www.subpesca.cl/portal/616/w3-article-825.html

Standard clause 1.3.2.1.4

CATEGORY C SPECIES

In a whole fish assessment, Category C species are those which make up less than 5% of landings, but which are subject to a species-specific management regime. In most cases this will be because they are a commercial target in a fishery other than the one under assessment. In a by-product assessment, Category C species are those which are subject to a species-specific management regime and are usually targeted species in fisheries for human consumption.

Clause C1 should be completed for **each** Category C species. If there are no Category C species in the fishery under assessment, this section can be deleted. A Category C species does not meet the minimum requirements of clause C1 should be re-assessed as a Category D species.

Species Name		Anchovy (*Engraulis ringens*) Regions V-X	
C1	**Category C Stock Status - Minimum Requirements**		
	C1.1	Fishery removals of the species in the fishery under assessment are included in the stock assessment process or are considered by scientific authorities to be negligible.	Pass
	C1.2	The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy), OR removals by the fishery under assessment are considered by scientific authorities to be negligible.	Pass
Clause outcome:			**Pass**

Evidence

C1.1 .

Data used to estimate the status of this stock included:

- 1991-2016 landings from SERNAPESCA.
- 1997-2016 catch-at-age and weight-at-age data from the Monitoring Program of the Main National Fisheries (Pelagic Fisheries).
- Biomass time series of the acoustic surveys performed in summer (2000-2017) and autumn (2003-2017).

Other relevant information related to the species' life cycle from scientific articles is included. A new assessment model was used, as agreed in the 4th meeting of CCT-PP, which included a difference in size sample estimation of age compositions in surveys and catch.

Fishery removals of the species in the fishery under assessment are included in the stock assessment process, OR are considered by scientific authorities to be negligible

C1.2

Biomass target reference point - B_{MSY} proxy - is defined at 55% of the virgin spawning stock biomass (SSB0) and was estimated at 720,000 tonnes in 2017 (estimated at ~560,000 tonnes prior to including discards) and the limit reference point - B_{lim} proxy - set at 27.5% of SSB0, i.e. 360,000 tonnes; target fishing mortality is associated with the fishing intensity that maintains B_{MSY}, being estimated at F_{MSY} proxy = 0.39 (IFOP 2017). Reference points set up during the last stock assessment are listed below:

a) BD_{RMS} = 55%BDo - B_{MSY}
b) $BD_{límite}$ = 27,5%BDo - B_{LIM}
c) F_{RMS} =F60% BDPR - F_{MSY}

From 2013, recruitment of the stock to the fishery has shown a slight increase with values for 2017 and 2018 the highest in 10 years. Total biomass and spawning stock biomass (768,000t and 309,000t) for 2018 were 3.5% less and 26% greater, respectively, than the same figures reported in 2017. Total biomass remains below the target reference point $BD_{RMS.}$ Fishing mortality for 2018 (0.26) corresponded to that proposed for the Biologically Acceptable Catch for 2018: (Figure 4):

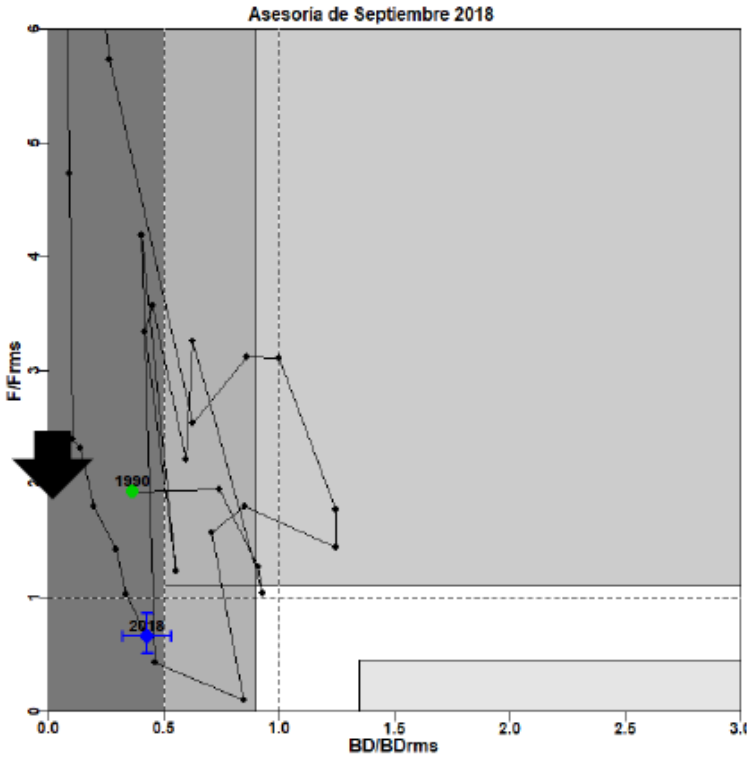

Figure 4. Kobe plot of anchovy V- X Regions, year 2018. **R11**

For 2019 CCT-PP recommended a BAC in the range 65,078-81,347t (article 153 of LGPA). Indicators from the latest PELACES acoustic evaluation and stock assessment (August 2019 meeting minutes, provided by client) have shown that, based on IFOP and INPESCA reports, the stock of anchovy is in the overexploitation zone and has moved away from the limit level of collapse (8% chance of being depleted). An important increase in the levels of spawning biomass was estimated during the Autumn 2019 surveys. Anchovy biomass has advanced in its recovery and is now close to target biomass and indicators. The BAC (2019) was revised to 101,720-133,508t.

The species is considered, in its most recent stock assessment, to have a biomass above limit reference point.

R11

References

Standard clauses 1.3.2.2

Species Name		Chilean jack Mackerel (*Trachurus murphyi*)	
C2	**Category C Stock Status - Minimum Requirements**		
	C2.1	Fishery removals of the species in the fishery under assessment are included in the stock assessment process, OR are considered by scientific authorities to be negligible.	Pass
	C2.2	The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy), OR removals by the fishery under assessment are considered by scientific authorities to be negligible.	Pass
Clause outcome:			**Pass**

Evidence

C2.1

Since 2010, a joint Jack mackerel stock assessment has been conducted, including fisheries independent and dependent data from each fishing country in a statistical catch-at-age model performed by the South Pacific Regional Fisheries Management Organization's (SPRFMO) Scientific Committee (SC). Chile is assigned a percentage of this global quota (outside Chile EEZ) annually.

Chile also has a management plan in place which covers Chile Regions XV-X. IFOP perform annual assessments and have estimated annual allowable catches through a size-structured model. The biology of the species is considered during assessments. IFOP utilises 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.

Stock assessments are carried out separately for each management unit which reflect current best scientific understanding of the biological stocks. Although all landings of Jack mackerel are recorded, information provided by IFOP indicates that there are issues with underreporting and misreporting of species. There is a no-discard policy in place and so this is unlikely to be a significant source of fishery removals

Fishery removals of the species in the fishery under assessment are included in the stock assessment process, OR are considered by scientific authorities to be negligible.

C2.2

Following the most recent results (published March 2019) CCT-PP established the reference points listed below:

- BD_{RMS} = 7,074,000 tons
- BD_{limit} = 1,768,000 tons
- F_{RMS} = 0.195 year $^{-1}$

The Kobe diagram (Figure 5) for the Chilean jack mackerel shows a spawning biomass with an increasing trend over the last 5 years, with biomass reaching levels around MSY (BD_{RMS}) in 2018:

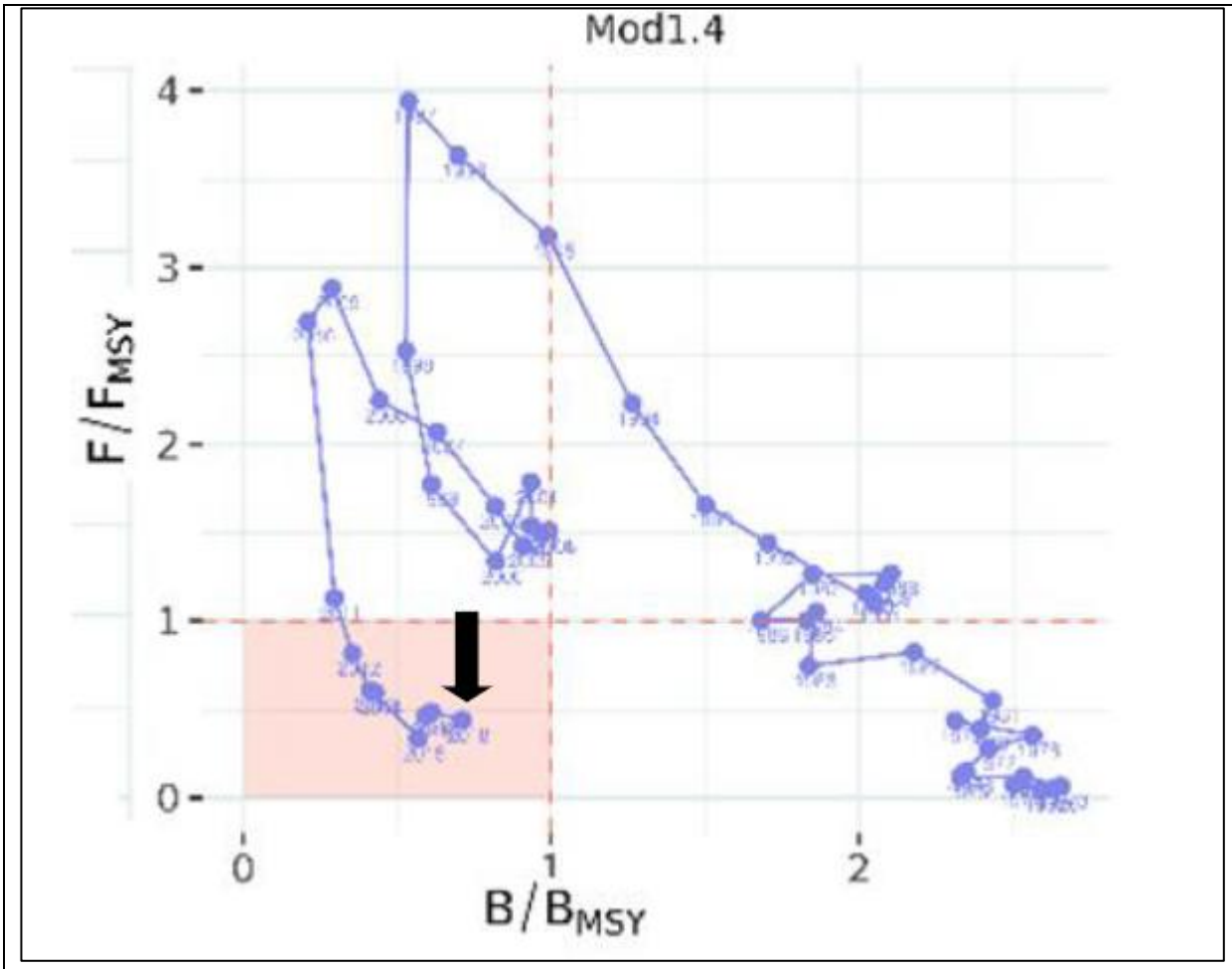

Figure 5. Kobe plot for Chilean jack mackerel. Source: SPRFMO (2018). BD2018/BDRMS = 0.712; F2018/FRMS = 0.44. **R11**

Fishing mortality has been reduced since 2011 from levels close to F_{RMS}, until the year 2018 reaching an F = 0.086 (F <FRMS). CCT-PP consider the stock, in their latest assessment, to be over-exploited but not over-fished. A quota (Chilean vessels only) for 2019 was established at 381,572t

The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy), OR removals by the fishery under assessment are considered by scientific authorities to be negligible.
R11

References

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: F 1.1-1.3:

The fishery for common sardine is known to interact with several ETP species of 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), Peruvian Diving Petrel *Pelecanoides garnotii* ("Endangered"- IUCN) and Smooth Hammerhead *Sphyrna zygaena* ("Vulnerable"- IUCN).

Foraging efficiency of breeding seabirds may be significantly affected by not only global quantities of the stock, but also temporal and spatial patterns of fishery removals, thus an ecosystem approach to fisheries management should limit the risk of local depletion around breeding colonies using, for instance, adaptive marine protected areas.

There are concerns about Burmeister's porpoise *Phocoena spinipinnis* whose status is unknown, the Guanay Cormorant *Phalacrocorax bougainvillii* ("Near Threatened" – IUCN) and green turtle *Chelonia mydas* ("Endangered"- IUCN) which may feed on sardine.

Available information suggests impacts from purse seines are low. However, there is limited research and no current information on the impact of this fishery on the species mentioned above.

Developments to improve knowledge of potential impacts of the fishery on ETP species include:

- Specific logbook data for bycatch, incidental and ETP species capture according to FAO and ORP protocol (2017-2018).
- 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.
- Training programs for crews of fishing vessels.

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.

There is no substantial evidence that the fishery has a significant negative effect on ETP species. If the fishery is known to interact with ETP species, measures are in place to minimise mortality.

R11, R14, R16

References

R16 Arata, J. and Hucke-Gaete, R., 2005. Pesca incidental de aves y mamíferos: Devastación Marina. Document no. 10. OCEANA. Santiago, Chile. March 2005. 81 pp

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: F2.1-2.2

In Chile, 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 greater depths, where bottom contact does not occur.

Marine Reserves are in operation; there are measures in place to control, manage and monitor them. There are five marine reserves: La Rinconada in the II Region, Isla Chañaral in the III Region, Isla Choros-Damas in the IV Region, Putemún and Pullinque in the X Region. The main objective of these reserves is to conserve natural banks of northern scallop (*Argopecten purpuratus*), Chilean oyster (*Tiostrea chilensis*) and giant mussel (*Choromytilus chorus*) among others, and to protect aquatic vertebrates such as dolphins and penguins.

F2.3:

A Reserve Zone for Artisanal Fishing has been established by law. This regulation is also in force around oceanic islands and in 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 in inland waters. This regulation is directly related to the opportunities of protecting and recovering coastal pelagic resources, being of benefit mainly to anchovy and common sardine. It may be temporarily suspended through authorizations for research fishing and dredging that allow the temporary entry of industrial vessels into the reserve zone, in specific areas and during specific periods.
R17-R19

References

R17 Cury, P., A. Bakun, R. Crawford, A. Jarre, R. Quiñones, L. Shannon & H. Verheye. 2000. Small pelagics in upwelling systems: patterns of interaction and structural changes in "wasp-waist" ecosystems. ICES J. Mar. Sci., 57: 603-618.

R18 Gatica, C., Arteaga, M., Giacaman, J., Ruiz, P. 2007. Tendencias en la biomasa de sardina común (*Strangomera bentincki*) y anchoveta (*Engraulis ringens*) en la zona centro-sur de Chile, entre 1991 y 2005. Invest. Mar., Valparaíso, 35(1): 13-24.

R19 IFOP, 2015. Estatus y posibilidades de explotación biológicamente sustentables de los principales recursos pesqueros nacionales año 2016": Anchoveta V-X Regiones. September 2015. 118 pp.

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 - 3.2:

Due to the low trophic level of the species under consideration there can be an effect on other species which prey on the species under assessment. To account for the predation of these species' models have been adapted. In recent years ecosystem consideration has been considered to set up the total fishery removals to ensure no impact on key roles of these species in the ecosystems.

As mentioned the availability of sardine and anchovies as prey is one of the major threats to the Humboldt Penguin. Chile has implemented five marine reserves, with the objective of conserving natural banks of scallop, oyster and mussel, but also dolphins and penguins. Additionally, the introduction of the five-mile artisanal-exclusive zone near the shoreline has provided significant protection to spawners and other shallow-water organisms from industrial fishing activities.

However, it is likely that this benefit is significantly reduced by the consistently high levels of artisanal fishing in recent years which are much higher than removals by the industrial fleet over this period (Figure 6).

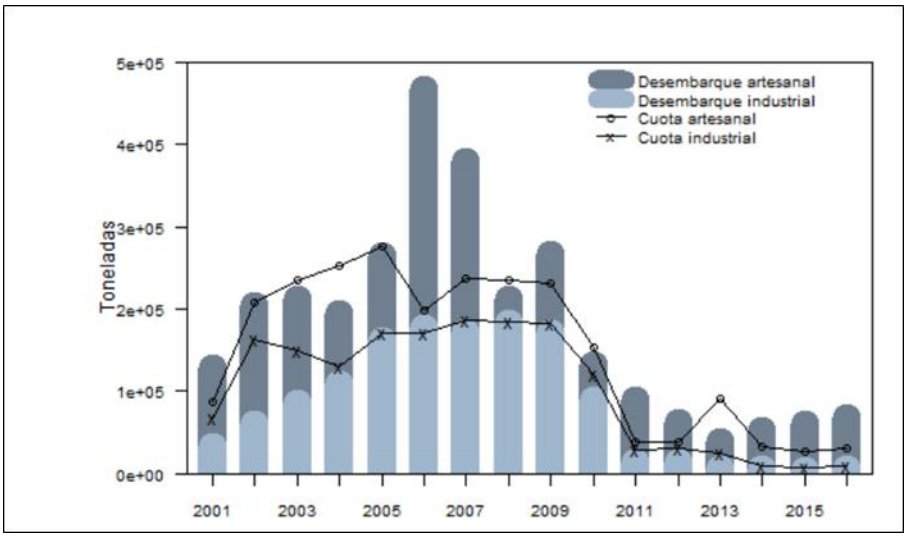

Figure 6. Anchovy landings and TACs per year and type of fleet. Source: **R13**

In addition, the stock is highly dependent on recruitment which in turn changes with environmental conditions and oceanographic conditions in the important Chilean upwelling ecosystem, like the El Niño and La Niña.

The broader ecosystem within which the fishery occurs is considered during the management decision-making process. There is no substantial evidence that the fishery has a significant negative impact on the marine ecosystem.

R11, R13-R14

F 3.3:

Between 2011 and 2016, IFOP and IMARPE, in collaboration with ONGs, have implemented the GEF-UNDP Project "Towards an Ecosystem Approach to Management of 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, and measures implemented between both countries until 2022. It is expected to provide the basis for implementing a coordinated series of measures aimed at greater protection of fish stocks (including juveniles) that play a key role in coastal ecosystems; and the protection of coastal and marine habitats.

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

R17-R18; R20.

References

R20 FOP. 2017. Informe 1 de Estatus. Convenio de Desempeño 2017. Estatus y posibilidades de explotación biológicamente sustentables de los principales recursos pesqueros nacionales, año 2018: Anchoveta V -X Regiones. Noviembre 2017. Page 234.

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.