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Global Standard for Responsible Supply of Marine Ingredients

Fishery Assessment Methodology and Template Report V2.0

Fishery Under Assessment	**Chilean Anchovy (*Engraulis ringens)* Regions XV-IV**
Date	**December 2018**
Assessor	**Deirdre Hoare (Re-assessment Jim Daly)**

Application details and summary of the assessment outcome				
Name: Orizon Ltd et al				
Address:				
Country: Chile		**Zip:**		
Tel. No.:		**Fax. No.:**		
Email address:		**Applicant Code**		
Key Contact:		**Title:**		
Certification Body Details				
Name of Certification Body:		**SAI Global, Ireland**		
Assessor Name	**Peer Reviewer**	**Assessment Days**	**Initial/Surveillance/Re-approval**	**Whole fish/ By-product**
Deirdre Hoare/Jim Daly	V. Polonio	7	Re-approval	Wholefish
Assessment Period	2017-2018			

Scope Details	
Management Authority (Country/State)	Chile
Main Species	Anchovy (*Engraulis ringens*)
Fishery Location	Regions XV - IV
Gear Type(s)	Purse seine
Outcome of Assessment	
Overall Outcome	Pass
Clauses Failed	None
Peer Review Evaluation	Pass
Recommendation	Approve

Assessment Determination

Chile has a robust legal and administrative framework for fisheries, where decisions are informed by annual surveys and fishery-dependent data. The available evidence suggests that the fishery is well monitored; management actions are largely based on best available scientific advice while there is high uncertainty in the assessments. 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. Historically landings have always been below both Chilean and Peruvian set TAC's.

The stock assessment and management approach used undergo peer review through the Scientific and Management Committees of the Chilean Subsecretariat de Pesca (SUBPESCA). Peer reviews are internal and external as members of these Committees may also be outside of the assessment process.

Oct 2018 update:
The Chilean Fisheries Act (2017) 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. The Management Committee is required to elaborate and implement recovery plans under Article 9 of this Act.
A review of the Act has been undertaken recently (2016). A team of fisheries experts assisted Government with an extensive review of a new fisheries law in a bid to help the administration address public concerns. Future assessments should note the implementations by Government of proposals contained in the review.

A management plan has been approved (April 2018) by Chile for the Northern anchovy stock (XV-II). It presents the challenges and agreed actions to improve stock status, reduce bycatch and also increase social aspects of the fishery. A major challenge in recent years (South Peru/Northern Chile stock) has been the prevalence in commercial catches of juveniles.

Jack mackerel (*Trachurus murphyi*) (Category C) and Chub mackerel (*Scomber japonicus)* (Category D) form part of the bycatch when Anchovy is targeted in the Northern Fishery (XV-IV). Both are approved under the IFFO-RS v 2.0 Standard when caught in the fishery (XV-IV) targeting Anchovy (*Engraulis ringens).* Another bycatch species in this fishery, the South American Pilchard (*Sardinops sagax)* stock (XV-II) is currently collapsed. Evidence is provided that the remaining catch allowed is considered negligible by scientific authorities.

Between 2011 and 2016, the Chilean Fisheries Development Institute (IFOP) and Peru's 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) and coastal and marine habitats.

Anchovy (*Engraulis ringens*); Jack mackerel (*Trachurus murphyi*) and Chub mackerel (*Scomber japonicus)*; are reported on the IUCN Redlist as species of least concern. Both species are currently not listed on the CITES appendix of endangered species (both sites accessed 29.08.18). South American Pilchard (*Sardinops sagax)* has not yet been assessed for the IUCN Red List and is currently not listed on the CITES appendix of endangered species.

The assessment team recommends the approval of Anchovy XV-IV (Whole-fish (Category A)) for the production of fishmeal and/or fish oil under the current IFFO-RS Standard (v 2.0).
Peer Review Comments
A research program is underway to obtain estimates of under-reporting in this fishery. Future stock assessments should include these estimates when published. Additional evidence should be gathered to enable more accurate determination of Biological Reference Points (BRP's) in order to reduce the current high level of uncertainty and use of proxies in the stock assessments. A review of the 2013 Fisheries Act has been undertaken recently (2016). A team of fisheries experts assisted Government with an extensive review of a new fisheries law in a bid to help the administration address public concerns. Future assessments should note implementations by Government of proposals contained in this review when published.
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	Anchovy	95	A1	Pass
			A2	Pass
			A3	Pass
			A4	Pass
Category C	South American Pilchard, Jack mackerel	4	Pass	
Category D	Chub mackerel	1	Pass	

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

HOW TO COMPLETE THIS ASSESSMENT REPORT

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

Whole Fish

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

1. ALL ASSESSMENTS: Complete the Species Characterisation table, to determine which categories of species are present in the fishery.
2. ALL ASSESSMENTS: Complete clauses M1, M2, M3: Management.
3. IF THERE ARE CATEGORY A SPECIES IN THE FISHERY: Complete clauses A1, A2, A3, A4 for **each** Category A species.

4. IF THERE ARE CATEGORY B SPECIES IN THE FISHERY: Complete the Section B risk assessment for **each** Category B species.
5. IF THERE ARE CATEGORY C SPECIES IN THE FISHERY: Complete clause C1 for **each** Category C species.
6. IF THERE ARE CATEGORY D SPECIES IN THE FISHERY: Complete Section D.
7. ALL ASSESSMENTS: Complete clauses F1, F2, F3: Further Impacts.

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

By-products

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

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

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

SPECIES CATEGORISATION

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

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

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

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

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

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

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

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

Common name	Latin name	Stock	% of landings	Management	Category
Anchovy	*Engraulis ringens*	FAO 87 XV – IV Regions Chile	95	Species-specific. Multi pelagic fisheries IFOP	A
South American Pilchard	*Sardinops sagax*	FAO 87 XV - IV region Chile	2	Species-specific. Multi pelagic fisheries IFOP	C
Chilean Jack Mackerel	*Trachurus murphyi*	FAO 87 XV-IV region Chile	2	Species-specific. Multi pelagic fisheries IFOP	C
Pacific Chub Mackerel	*Scomber japonicus*	FAO 87 XV – IV Regions Chile	1	Species-specific. Multi pelagic fisheries IFOP	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	Yes
	M1.2	There is an organisation responsible for collecting data and assessing the fishery	Yes
	M1.3	Fishery management organisations are publically committed to sustainability	Yes
	M1.4	Fishery management organisations are legally empowered to take management actions	Yes
	M1.5	There is a consultation process through which fishery stakeholders are engaged in decision-making	Yes
	M1.6	The decision-making process is transparent, with processes and results publically available	Yes
		Clause outcome:	**Pass**

Evidence

The Chilean institutional structure governing the fisheries and aquaculture sector centres around three key organisations, with a number of other institutions providing additional research and enforcement support (such as the Navy). These three organizations have a degree of operational independence while performing a crucial and interlinked function within the broad institutional framework.

- **MINECON:** Chilean Ministry of Economy, Development and Tourism in accordance with DL 2442 of 1978, its responsibilities include establishing the basic policies for managing and coordinating the State's activities relating to the fisheries sector. Actions involve promoting the development of the fisheries sector, along with the protection, conservation, and full use of the resource and the marine environment. The fishing law establishes that the MINECON should establish the fishing law

regulations and establish administrative measures based on the SUBPESCA report. The Ministry states that sustainable growth is part of its mission on its website.

- The Subsecretariat de Pesca (Undersecretariat of Fisheries, **SUBPESCA** or SSP) is positioned within the Chilean Ministry of Economy, Development and Tourism and was created under Law No. 1.626 on the 21st of December 1976. It provides the policy settings and regulatory framework for the domestic management of the sector. It also manages policy direction and provides input into international fisheries issues. Law 20.657 created eight scientific-technical fisheries committees within SUBPESCA, to act as advisory bodies in the formulation of all reference points, quotas, and other technical measures. The law also rendered their technical recommendations mandatory – thus there is a legal requirement for scientific advice to be adopted. The mission statement has a 'participatory and territorial approach aimed at the sustainable development of the national fisheries and aquaculture activity.'
- The Servicio Nacional de Pesca (National Fisheries Service, **SERNAPESCA**) is also based within the Ministry of Economy, Development and Tourism. It is responsible for executing national fisheries policy, for supervising its enforcement and for ensuring proper application of the legal rules and regulations on fishing. **SERNAPESCA** also administer the fishery registries, with registration enabling extractive activities to take place, as well as collect and process fish landing and hydrobiological resource processing data. In practice, compliance is checked by Intertek Caleb Brett Chile SA, acting on behalf of **SERNAPESCA**.
- The Instituto de Fomento Pesquero (Fisheries Development Institute, **IFOP)** is the research arm of the institutional framework. A non-profit organisation created in 1964 under a joint agreement between the Chilean government, the FAO, and the UN Development Program, it is the primary source of scientific advice to the SSP on fisheries and aquaculture agreement issues. Its work includes stock assessment, advising on total allowable catch levels for the wild fisheries, and the environmental and health aspects of aquaculture production. It draws a proportion of its funding from SUBPESCA but also has to compete for funding from a range of public funding sources. According to its website The Fisheries Development Institute (IFOP) is a non-profit Private Law Corporation whose public role is to support the sustainable development of the country's fishing & aquaculture sector'.
- 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 IFOP's updates on stock status and catch projections and make official recommendations to the Chilean authority on TAC's.

Fisheries councils

The National Fisheries Council was created by the Fisheries and aquaculture Law 18.892 for the purpose of managing the participation of all stakeholders in the fisheries and aquaculture sector. It is a ruling, advisory and consultative body for dealing with Fisheries and Aquaculture plans and Laws as well as for development proposals for small scale fishing. There are also five Zonal Fisheries Councils aimed at contributing to the decentralization of management measures to be taken by authorities, and to enhance regional participation of fisheries and aquaculture stakeholders. They communicate new and amended regulations through regional bulletins and acts published several times a year to fishery stakeholders.

Regional Fisheries Councils are aimed at studying fisheries and aquaculture problems affecting their zones and to propose solutions and management measures to SUBPESCA. Until 2013 the Councils were responsible for approving the SUBPESCA-recommended TAC; however, the introduction of Law 20.657 in February 2013 adjusted this arrangement to render the Council as a purely consultative body for the purposes of TAC-setting. This results in a decision making process that is very transparent with the results being publicly available on-line.

South Pacific Regional Fisheries Management Organisation (SPRFMO):

As a widely distributed species, international management of Chilean small pelagics (including Jack mackerel) is coordinated by the South Pacific Regional Fisheries Management Organisation (SPRFMO). Currently overall TAC's are agreed by the 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 (Jack mackerel *Trachurus murphyi*) due to its (Chile's) express consent.

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 the sustainable use and conservation of marine resources.
- A commitment to make key decisions on conservation measures on the basis of scientific information above all other considerations. To this end, the recommendations of SUBPESCA's scientific-technical committees have been made mandatory.

A commitment to develop management plans for any fishery with restricted access, and the review and updating of these plans every five years. Regional Government Areas in Chile corresponding to fishery management units offshore (**Figure 1**).

Figure 1 Regional Government Areas in Chile corresponding to fishery management units. Adapted from https://pepeschile.com/es/regiones-chilenas-de-que-son-todos-estos-numeros/ **R36**

References

R1 Ministerio de Economía, Fomento y Turismo http://out.easycounter.com/external/minecon.gov.cl
R2 Subpesca http://www.subpesca.cl/portal/616/w3-channel.html
R3 Sernapesca www.sernapesca.cl
R4 IFOP https://www.ifop.cl/en/
R5 Law on Fisheries and Aquaculture No 20.657: http://www.subpesca.cl/normativa/605/articles-764_documento.pdf
R6 South Pacific Regional Fisheries Management Organisation https://www.sprfmo.int/

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	Yes
	M2.2	There is a framework of sanctions which are applied when laws and regulations are discovered to have been broken	Yes
	M2.3	There is no substantial evidence of widespread non-compliance in the fishery, and no substantial evidence of IUU fishing	Yes
	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.	Yes
		Clause outcome:	**Pass**

Evidence

Enforcement of fisheries legislation is the responsibility of **SERNAPESCA**. Industrial vessels operate under mandatory VMS monitoring.

The guiding instrument of fisheries management in Chile is the General Law on Fisheries and Aquaculture (LPGA). No. 18.892 (1989) Act. This Act, as amended (Decree 430), plus other intermediate laws, regulated the activities of fisheries and aquaculture until February 9, 2013 when the new Law on Fisheries and Aquaculture No. 20,657, was published; amending the previous one in the fields of sustainability of aquatic resources, access to industrial fisheries and regulations for the research and monitoring of fishing activity.

SERNAPESCA:

- Carry out audits of capture fisheries and implement the surveillance and control of compliance with legal provisions relating to the 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.
- 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 in an effort to protect the ecosystem from unauthorized activities.
- In 2014 Chilean fishing trips carried observers on 9.1% of high seas trips and 15.2% of trips within the Chilean EEZ.

Historically, landings have always been below both Chilean set TAC *(IFOP 2016; SUBPESCA 2018a)*. There is however evidence in the literature of some catch under-reporting. *(Mendo and Wosnitza-Mendo 2014)* estimated correction factors for unreported catches in Peru, from 1950 to 2010, including discards of excess

catch and juveniles, loss of fish blood, underestimation through misreporting by processing plants; illegal landings and irregular sales. Industrial anchovy correction factors varied mostly between 15% and 35%, peaking in the early 1970s at well over 30%. A research program is underway to obtain estimates of under-reporting in this fishery. Future stock assessments should include these estimates when published (2018).

In 2010, estimates for undeclared anchovy catches by fishing companies was 10%, confirming that the data gathering system needs improvement. The small and artisanal fleets' correction factor is on average 35%, it has been reported that catches are also illegally sold for indirect human consumption.

In Peru there are no restrictions to the production of fish meal with anchovy in the South because there are no canning or cured factories in the Arequipa, Moquegua y Tacna regions. However a number of fishing boats operate illegally in the small scale and artisan segments of the fishery, allegedly selling fish locally for human consumption. These vessels have been the subject of a number of punitive prosecutions.

There are no estimates for under-reporting from the Chilean fishery (IFOP, 2016), but a research program is underway to obtain such estimates. The data collection will last for two years *(MEFT 2016b)*.

In 2005, a National Action plan was approved with the aim of preventing, deterring and eliminating Illegal, unreported and unregulated (IUU) fishing. There are some instances of non-compliance with SPRFMO's Conservation and Management Measures, particularly as to timely reporting. A final list of (IUU) vessels was adopted at the 3rd SPRFMO Commission meeting in 2015 and comprised two vessels. In 2016 three IUU vessels were reported for conducting unauthorized activities.

R5, R7-R11

References

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

R8 IFOP. 2016. Informe 1 de Estatus. Convenio de Desempeño 2016. Estatus y posibilidades de explotación biológicamente sustentables de los principales recursos pesqueros nacionales año 2017: Anchoveta XV - II Regiones. Page 149.

R9 SUBPESCA. 2018a. Informe Sectorial de Pesca y Acuicultura Enero 2018. Departamento de Análisis Sectorial. - Fisheries and Aquaculture sectorial report. Page 18. http://www.subpesca.cl/portal/618/articles-99750_documento.pdf

R10 Mendo, J., and C. Wosnitza-Mendo. 2014. Reconstruction of total marine fisheries catches for Peru: 1950-2010. Fisheries Centre The University of British Columbia Working Paper Series Working Paper #2014 – 21. 24 pp. http://publications.oceans.ubc.ca/webfm_send/377

R11 MEFT. 2016b. Resolucón Exenta N° 978-2016. Autoriza Programa de Investigación del Descarte y Pesca Incidental para pesquería Industrial y Artesanal de Anchoveta y su fauna Acompañante, XV-II Regiones. Page 3. http://www.subpesca.cl/institucional/602/articles-92842_documento.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		**Anchovy (*Engraulis ringens) XV-II; III-IV***	
A1	**Data Collection - Minimum Requirements**		
	A1.1	Landings data are collected such that the fishery-wide removals of this species are known.	Yes
	A1.2	Sufficient additional information is collected to enable an indication of stock status to be estimated.	Yes
		Clause outcome:	**Pass**

Evidence

Anchovy has a wide geographical distribution in the South Eastern Pacific Ocean, from Talara (4°30' S) in Northern Peru to Chiloé (42°30' S) in Southern Chile. There are 3 different anchovy (*Engraulis ringens*) stocks):

- The Northern-Central Peruvian stock, managed by Peru.
- The Southern Peru/ Northern Chile stock, managed by both Peru and Chile.
- The "Central-Southern Chile stock", managed by Chile.

There is some evidence based on reproductive population parameters that two independent populations may exist in Central-Southern Chile, however it is more likely based on genetic and other studies that there is only one stock.

Chilean anchovy fisheries are divided into three management units;

- Regions XV- II
- Regions III and IV
- Regions V – X

This report refers to the Anchovy Regions XV-II and III-IV (**Figure 1**). The Southern Peru/ Northern Chile stock (includes Chile regions XV-II) is distributed along Chilean and Peruvian waters, but is managed separately by these countries. There is a no discard policy in place for Chilean fisheries, meaning all by-catch is landed, but only target species appear to be sampled by SERNAPESCA. However, IFOP has started a program since 2013 to collect information on bycatch in demersal and pelagic fisheries. Last updated in September of 2016 the report shows the reported data of total composition of catch from the skippers. These data will be analyzed to manage the bycatch coming from different types of gears and fisheries.

The management of the Regions XV-II and III-IV fishery as separate populations assumes minimal interaction between these and other anchovy populations.

Scientific institutions of Peru and Chile, IMARPE and IFOP, undertake scientific surveys at least twice a year, in order to evaluate the biomass of the stock and oceanographic conditions. Anchovy stock assessment is conducted separately for each fishery unit and quotas issued at Regional level. Data inputs to the model include commercial landings data, such as size sampling from both Chile and Peru, relative estimates of

biomass and recruitment obtained from acoustic surveys (Peruvian and Chilean) and estimates from the Daily Egg Production Method (DEPM).

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** was prepared and during 2017 the design of the plan was developed and measures are to be developed between both countries until the year 2022. It is expected to provide the basis for implementing a coordinated series of measures aimed at greater protection of fish stocks and coastal and marine habitats *(CIAM 2018)*.

R12-R13

References

R12 CIAM. 2018. CIAM aporta a la protección del Gran Ecosistema Marino de la Corriente de Humboldt. http://www.ciamchile.cl/ciam-aporta-al-plan-de-accion-estrategico-para-proteger-el-gran-ecosistema-marino-de-la-corriente-de-humboldt/.

R13 Fishsource: Chilean Anchovy SE Pacific: https://www.fishsource.org/stock_page/1384 (accessed 22.10.18)

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 sufficient for the long-term sustainable management of the stock), and considers all fishery removals and the biological characteristics of the species.	Yes
	A2.2	The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.	Yes
	A2.3	The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status.	Yes
	A2.4	The assessment is subject to internal or external peer review.	Yes
	A2.5	The assessment is made publically available.	Yes
		Clause outcome:	**Pass**

Evidence

IFOP conducts a stock assessment every year; acoustic surveys are carried out at least twice a year. 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.

A **Strategic Action Programme** between authorities in Chile and Peru has resulted in a lowering of the permitted TAC (South Peru/Northern Chile stock) in recent years.

Anchovy XV–II:

Biomass target reference point (BMSY proxy) is defined as a % of the virgin spawning stock biomass (SSB0; estimates (187 x 10^3t - 1,030 X 10^3t in 2017). Given the high uncertainty on biomass estimates, neither target biomass reference point (Btarget = 50%B_0) nor limit biomass reference point (Blim =25%B_0) could be defined for 2018.

The reference points set up during the most recent stock assessment are listed below:

a) BD_{RMS} = 50%BD0 (BMSY)
b) BDlímite = 25%BD0 (BLIM, Spawning Stock Biomass Limit)
c) F_{RMS} =F55% BDPR (FMSY)

Given the high uncertainty the committee recommended followed the precautionary approach, maintaining the status quo of 760,000t. The share for the industrial and artisanal fleets is around 636,500t and 115,300t, respectively. The CCT-PP has continued to implement a status quo in catch advice from 2016 for both 2017 and 2018. Historically, landings have always been below both Chilean and Peruvian set TAC's. **R24**

Gestión Pesquera	Propósito	Normativa
Comité Científico Técnico	Nombra miembros de los Comités Científico Técnico Pesqueros contemplados en la LGPA. Pesquerías de pequeños pelágicos.	D. Ex. N°1035/2013; D. Ex. N°1386/2013 y D. S N°143/2015; D.S N°639/2017: D.S N°113/2017
Comité de Manejo	Oficializa nominación de miembros titulares y suplentes para el Comité de Manejo de Anchoveta y Sardina española XV-II Regiones y abre periodo extraordinario de nominación para cargos declarados vacantes.	Sector privado R. Ex N°2.818/2015 Sector público R. Ex N°2.685/2015

Table 1: Management authorities, composition of management teams and corresponding legislation (Anchovy XV-II) **R24**

October 2018 update on data previously presented in March 2018
Calculations were based on biological reference points used during the previous stock assessment; catch data (XV-II) for the Northern stock to end March 2018; biomass estimates (DEPM) to end June 2017 and recruitment estimates from acoustic surveys undertaken (Northern Chile) to end 2017.

A report has been provided by IFOP in 2018 (Espindola et al). The BMSY is considered as 50% virgin biomass (BD0). BLIM now represents 27.5% of BD0. In addition, the fishing mortality proxy to FMSY now corresponds to the fishing mortality that in the long term produces 55% of the spawning biomass per recruit (= F55% SBPR).

Fishing mortality was calculated at 95% less than the maximum permitted F_{RMS} from the management plan with a biomass calculation 39% greater than that permitted by the management plan. These data were used to conclude, with 100% probability, that this anchovy stock (XV, II) is not currently over-fished (F2018<FRMS) with a 6% probability that the stock is over-exploited (BD_{2018}<BD_{RMS}):

A management plan (April 2018) for the Northern anchovy (XV, I, II) stock presents challenges and agreed actions to improve stock status, reduce bycatch and increase social aspects of the fishery. As with the Peruvian stock in recent years commercial landings have contained high numbers of juveniles in the catches, forcing a number of temporal closures in the fishery.

October 2018 update:
Anchovy III-IV
Indirect assessment is conducted using a statistical catch-at-age model allowing the incorporation of supplementary information, such as Spawning Stock Biomass (SSB), Catch Per Unit of Effort (CPUE), Fishing mortality (F), catch-by-age and year and recruitment indices. Since 2010, a bi-annual model has been performed to assess stock vulnerability due to climatic phenomena (e.g. El Niño) and biological characteristics of the species.

Most updated assessment reports, based in each of the surveys, are made available upon request. Executive summaries of these assessment by CCT-PP are published. Up to three recommendations may be issued for anchovy in any year. A proportion of discards is now discounted from the advised TAC, as foreseen in the fisheries law.

The reference points set up during the last stock assessment and management plan are listed below:

a) BD_{RMS} = 60%BDPR (BDPR = Spawning biomass per recruit)
b) BDlímite = 27.5%BDo
c) F_{RMS} =F60% BDPR = 0.46

In 2015, spawning stock biomass (SSB) was 35% below target level and fishing mortality estimate (F) was 39% over the fishing mortality target reference point. Total biomass and SSB were lower than historical averages, and recruitment reached one of the lowest values of the historical series. The decreasing biomass observed in 2012-2015 was explained by an inflow of weak annual classes rather than by the removal of fish.

During 2016, this trend was substantially modified by increasing recruitment levels at more than five times above the historical average which was sustained in 2017. In 2017, the total biomass showed a slight increase. SSB was estimated at the management target level (41,300t). Fishing mortality below the target F_{RMS} set through the management plan at 0.46. Therefore the stock was described as being under exploited. For 2017, a preliminary TAC was set at 50,700t due to an increase in recruitment levels. Set TACs were in line with the upper limit of the advised TAC range. The Committee then recommended a TAC of 40,000t for 2018.

A management plan for this stock (III, IV) stock presents challenges and agreed actions to improve stock status, reduce bycatch and increase social aspects of the fishery.

The stock assessment and management approach used in the small pelagic fisheries undergoes detailed peer review through the Scientific Committee and Management Committee. This peer review can be considered to be both internal and external as members of the committees may be outside the assessment process. In addition, both IFOP and SUBPESCA have commissioned external peer reviews, for example, the series of workshops convened with Peru, invited international experts to evaluate the setting of biological reference points within the MSY framework.

The reports can be found on the IFOP and SUBPESCA websites. All the information is available.

R14-R16; R24

References

R14 Espíndola et al., (2018) IFOP Convenio de Desempeño 2017 Estatus y posibilidades de explotación biológicamente sustentables de los principales recursos pesqueros nacionales año 2018 175pp: Anchoveta XV - II Regiones pdf 131 pp

R15 IFOP. 2017. Segundo Informe de Estatus. Convenio de Desempeño 2016. Estatus y posibilidades de explotación biológicamente sustentables de los principales recursos pesqueros nacionales año 2017: Anchoveta XV - II Regiones. Page 144.

R16 CCT-PP. 2017a. Determinación del Estado de Situación y Rango de Captura Biológicamente Aceptable de Recursos Pelágicos pequeños, Año 2018. Comité Científico Técnico de Pesquerías de Pequeños Pelágicos. Page 25. INFORME TÉCNICO CCT-PP. http://www.subpesca.cl/portal/616/articles-98717_documento.pdf

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.	Yes
	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.	Yes
	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).	Yes
		Clause outcome:	**Pass**

Evidence

The TACs are established depending on the types of fishery, therefore it's a measure to control where the removals are occurring. The TAC is estimated in three categories, for research and after that the TAC resulting is split to industrial and artisanal. TACs mechanism simplifies monitoring where the catches are coming from. Normally, the TAC is set up to two fishing season, therefore following the scientific recommendations the effort may be controlled depending on the period of the year. This fact makes it easy to put measures in place when spawning is taking place.

October 2018 update:

To counteract the effects of the purse seine fishery on juvenile anchovy populations' close seasons are implemented to protect the main recruitment period. Workshops have been provided by Government to stakeholders in order to demonstrate best fishing practice including minimising discards and bycatch.

In the Northern anchovy fishery acoustic equipment is used by the fleet to select for fish size before setting the fishing gear. However this equipment is only used on a small number of vessels and its reliability and accuracy is still under discussion.

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.

In its stock assessment report IFOP takes into account a range of sources of uncertainty, eg. variability in CPUE data, environmental factors, stock aggregation for habitat or reproduction, acoustic biomass estimation parameters. Life history parameters are also taken into account (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.

By Chilean Law (Law N020.657) recommendations are provided as a TAC range with the lower limit as 20% of the actual TAC recommendation.

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.

No evidence could be found that commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy. Instead Biologically Acceptable Catches (BAC's) and a resource recovery plan must be implemented. The Management Committee is required to elaborate and

implement recovery plans under Article 9 of the Fisheries Act (LGPA). The stock status of this fishery is currently uncertain and precautionary reference points are in place. The management of Regions XV-II and III-IV of the Anchovy fishery as separate populations assumes minimal interaction between these and other anchovy populations.

October 2018 update:
Specifically according to the Chilean Fisheries Act fisheries are not closed when below limit biomass for social and economic reasons and also in order to monitor the recovery of the resource according to a recovery plan. Recovery implies reductions in fishing mortality at levels below or equal to F_{RMS} according to the expected time of recovery established by the Management Committee.

A review of the 2013 Act has been undertaken recently. A team of international and local fisheries experts assisted the Chilean government with an extensive review of a new fisheries law in a bid to help the administration address public concerns. Although the FAO's Ecosystem Approach to Fisheries Management (EAFM) had been declared as a principle, it has not been implemented in practice. The review was delivered to Government in October 2016 and now constitutes a basis for ongoing discussion about reforms in the Law.

Fishing removals are established based on the determination of Acceptable Biologically Catches (ABC) through simulation analysis in the stock assessment model using FRMS proxies. Therefore, despite the existence of a potential condition below the cut-off point, there is an ABC recommendation based on a MSY proxy approach. Low levels of catch are necessary to maintain the level of monitoring of the resource when biological closures are applied or when studies are underway for the determination and mitigation of discarding and incidental fishing.
R14- R17; R24

References
R17 Vega et al IFOP (October 2016) INFORME DE AVANCE Convenio de Desempeño 2016 Programa de Observadores Científicos 319pp pdf

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.	Yes
		Clause outcome:	**Pass**

Evidence
The latest stock assessment, using an alternative Stock Synthesis model, suggest that biomass is at MSY and exploitation below target level. However, the estimates are highly uncertain. Due to this uncertainty it cannot be said that the minimum requirements in stock status mentioned above have been met. A sustained drop in length and average weight that has been observed in the last 7 years. This may be indicating a process of juvenilization of the population, presumably due to fishing pressure or unfavourable environmental conditions mainly associated to a prolonged El Niño 2015-2016, or a combined effect of both factors. Several models were run by IFOP, using historical and recently estimated growth and productivity parameters. Spawning stock biomass (SSB) estimates ranged from 187 x 10^3t to 1,030 x 10^3t (IFOP 2017b).

Landings of anchovy during the historical series have shown large fluctuations over the years in both the Chilean and Peruvian fisheries, mainly owing to inter-annual changes in the abundance of this resource. In 2016 landings were 425,400 tonnes, the lowest in almost two decades. In 2017, landings increased again to around 733,000 tonnes (SUBPESCA 2018a).

October 2018 update:
Anchovy XV-II Stock Assessment:
Fishing mortality was calculated at 95% less than the maximum permitted FRMS from the management plan with a biomass calculation 39% greater than that permitted by the management plan. These data were used to conclude, with 100% probability, that this anchovy stock is not currently over-fished (F2018<FRMS) with a 6% probability that the stock is over-exploited (BD2018<BDRMS**).**

Anchovy III-IV Stock Assessment:
In 2017 total biomass showed a slight increase. SSB was estimated at the management target level (41,300t). Fishing mortality was below target; therefore the stock was described as being under exploited. For 2017, a preliminary TAC was set at 50,700t due to an increase in recruitment levels. Set TACs were in line with the upper limit of the advised TAC range. The Committee recommended a TAC of 40,000t for 2018.

The Anchovy stock (XV-II; III-IV) is at or above the target reference point. **R14-R15; R18-R21; R24**

References

R18 IFOP 2017b. Informe 1 de Estatus. Convenio de Desempeño 2017. Estatus y posibilidades de explotación biológicamente sustentables de los principales recursos pesqueros nacionales año 2018: Anchoveta XV - II Regiones. Page 131. http://www.portaltransparencia.cl/PortalPdT/ingreso-sai-v2?idOrg=843

R19 SUBPESCA. 2018a. Informe Sectorial de Pesca y Acuicultura Enero 2018. Departamento de Análisis Sectorial. - Fisheries and Aquaculture sectorial report. Page 18. http://www.subpesca.cl/portal/618/articles-99750_documento.pdf

R20 IMARPE. 2017a. Desarrollo de la pesquería de anchoveta en la región sur de Perú desde julio hasta diciembre 2017 y perspectivas de explotación para el periodo enero-junio 2018. http://www.imarpe.gob.pe/imarpe/archivos/informes/informe_desarrollo_pesca_anchoveta_sur_2018.pdf

R21 CCT-PP. 2018a. Reporte no.1 de la primera sesión del Comité CientíficoTécnico Pesquerías de Pequeños Pelágicos. , 11 al 12 de enero. Subsecretaría de Pesca y Acuicultura, Chile. Page 33. SUBPESCA. http://www.subpesca.cl/portal/616/articles-99610_documento.pdf

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		South American Pilchard XV-II *(Sardinops sagax)*	
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.	Yes
	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.	Yes
		Clause outcome:	**Pass**

Evidence

Fishery removals of Sardine are included in the stock assessment programme. There is a no discard policy in place for Chilean fisheries, meaning all by-catch is landed, but only target species appear to be sampled by SERNAPESCA. However, IFOP has started a program since 2013 to collect information on bycatch in demersal and pelagic fisheries.

The stock is currently collapsed due to environmental and physical factors unfavourable to the stock. Therefore, it is not possible to estimate biological reference points. According to the precautionary approach the Committee recommended for 2017 a biologically acceptable catch range of between 2,000 and 2,500 tonnes.

October 2018 update:

For 2018 a TAC of 2,500t was published (1,757t industrial, 743t artisanal). The stock is considered to be fully exploited. New entrants to the fishery are prohibited. The Fisheries Act does not legislate for catch restrictions when stocks are below the limit biomass. However a resource recovery plan must be implemented; the Management Committee of the fishery is also required to elaborate and implement a recovery plan under Article 9 of the Fisheries Act (LGPA).

A Management Committee (Anchovy, Sardine XV-II) is in place. In October the CCT-PP met to establish biological reference points, stock status and recommended biologically acceptable captures within this management unit (XV-II) for *Sardinops sagax*. It was not possible to determine biological reference points due to the poor state of the stock, said to be due to adverse environmental conditions. Unable to establish BMSY the Committee used the precautionary approach to establish a biologically acceptable catch range (see above).

Sardinops sagax was caught together with anchovy in the past (CeDePesca 2010). The stock has collapsed, associated with adverse physical and biological environmental conditions for the resource. The highest rates of exploitation of this species occurred in the early 1990s, when the stock was already declining significantly. In 2015 reported catches were 338t; well below the set TAC.

Removals by the fishery under assessment are considered by scientific authorities to be negligible. **R22-R24**

References

R22 SUBPESCA. 2017b. Informe Sectorial de Pesca y Acuicultura Enero 2016. Departamento de Análisis Sectorial. 20 pp. SUBPESCA. http://www.subpesca.cl/publicaciones/606/articles-92231_documento.pdf

R23 CeDePesca. 2010. Anchoveta (sur del Perú/norte de Chile) Engraulis ringens: Ficha Técnica de la Pesquería [in spanish]. Mar del Plata, Argentina, December 2010. 20 pp. [In Spanish]. http://cedepesca.net/wp-content/uploads/2013/01/anchoveta_stock_sur_Peru-norte_Chile_Informe_CeDePesca_diciembre_2010.pdf

R24 Estado de Situación de las Principales Pesquerías Chilenas, 2017 (The situation in leading Chilean fisheries, 2017): http://www.subpesca.cl/portal/618/w3-article-100052.html
Standard clauses 1.3.2.2

Species Name		**Chilean jack Mackerel (*Trachurus murphyi*) XV-II**	
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

The fishery (FAO 87) is currently undergoing MSC assessment. 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 SPRFMO. The model runs consider two working hypotheses on stock structure: 1) two separate stocks, Peruvian/northern stock and Chilean/southern stock that straddle the high seas; 2) a single shared stock that straddles the high seas. Hypothesis 2 has been used as the basis for the advice, as it provides a more precautionary biomass estimate.

Following the latest stock assessment results from the Committee, the following reference points were established for jack mackerel (XV-X):

- BD_{RMS} = 5,198,000 tons (B_{MSY})
- BD_{limit} = 1,300,000 tons (B_{LIM})
- F_{RMS} = 0.197 year -1 ($F_{MS}Y$)

Stock Status (XV-X):

Chilean jack mackerel presents a spawning biomass with a tendency for growth during the last 5 years, reached MSY biomass levels (BD_{RMS}) during 2017 (**Figure 2, SSB V F**) due to a reduction in fishing mortality and stronger annual classes appearing in 2015-2016. Fishing mortality has been reduced since 2011 from levels close to the F_{RMS}, until reaching an F = 0.073 ($F < F_{RMS}$) in 2017. The fishery has been classified as in full exploitation. No new entrants to the fishery are allowed; a minimum landing size is in operation and a Global TAC (2018) for Chile (XV-X) of 371,887t announced:

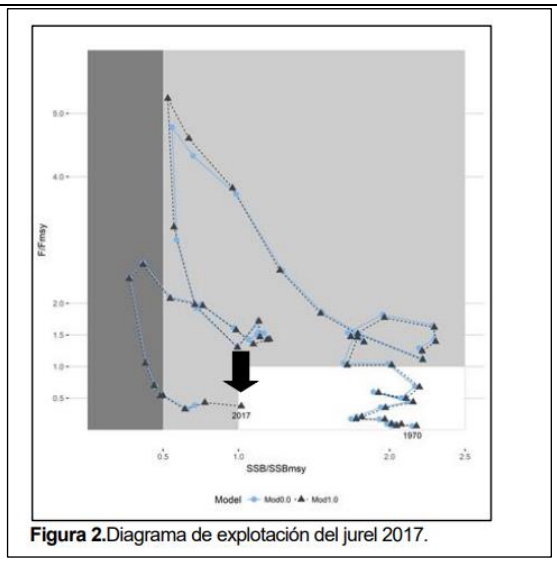

Figura 2.Diagrama de explotación del jurel 2017.

Figure 2.Kobe plot for Chilean jack mackerel (annual data until 2017 presented)
Source: IFOP (2017): Estado de Situación de las Principales Pesquerías Chilenas **R24**

XV-II:

SPRFMO conduct joint assessments with the Chilean authorities since 2011. Global catch limits are agreed for the high seas in accordance with scientific recommendations. A recovery plan has been adopted in 2014. The stock assessment model continues to be revised and improved. Data, information and decisions from all fishing countries are integrated in the assessment process. Fishing mortality has been decreasing and is well below the target level. Reference points are provisional, a harvest control rule is not yet in place. Important environmental events, such as the strong 2015-2016 El Niño, influences the spatial distribution of the species, but effects on the overall population productivity is unclear.

Based on the rebuilding plan for Jack mackerel and given the stock status, catches could be potentially increased but considering the uncertainties in the assessment and under the one stock hypothesis, the Scientific Committee of the SPRFMO adopted the precautionary approach and recommended catches for 2018 at or below 576,000t for the entire range of the stock and at 517,782t under the SPRFMO convention area and Chilean fisheries operating in their national waters. The quota established by the Undersecretariat for Fisheries and Aquaculture (Chile) for 2018 was 371,887t.

R23-R25

References

R25 IFOP. 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 y sardina V -X Regiones. Noviembre 2017.

Standard clauses 1.3.2.2

CATEGORY D SPECIES

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

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

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

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

D1	**Species Name:**	**Pacific chub mackerel *Scomber japonicus***	
	Productivity Attribute	**Value**	**Score**
	Average age at maturity (years)	2	2
	Average maximum age (years)	10.5	2
	Fecundity (eggs/spawning)	86,616-213,422	1
	Average maximum size (cm)	45.7	1
	Average size at maturity (cm)	30.25	2
	Reproductive strategy	Open water / substratum egg scatterers	1
	Mean trophic level	3.4	3
		Average Productivity Score	**1.71**
	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	1
	Depth range	0-300m, usually 50-200m	3
	Selectivity	Up to 4m in length	3
	Post-capture mortality	Most dead or retained	3
		Average Susceptibility Score	**3**
		PSA Risk Rating (From Table D3)	**Pass**
		Compliance rating	**Medium**

The fishery for pacific chub mackerel is given a medium compliance rating based on the Productivity and susceptibility ratings calculated (Table D1 and **Figure 3**).

In Ecuador fishing of small pelagic fishes is banned two months per year to allow the recovery of the species. There is also a regulation on mesh size and some spatial protection measures have been adopted to protect reproductive phases. There is no information on stock status and there has been no recent stock assessment (most recent was conducted in 2000). In Chile there is no information on stock status.

References

R26 Fishbase: Pacific Chub Mackerel (*Scomber japonicus*)
http://www.fishbase.org/summary/117

R27 Fishsource: Pacific Chub Mackerel (*Scomber japonicus)*

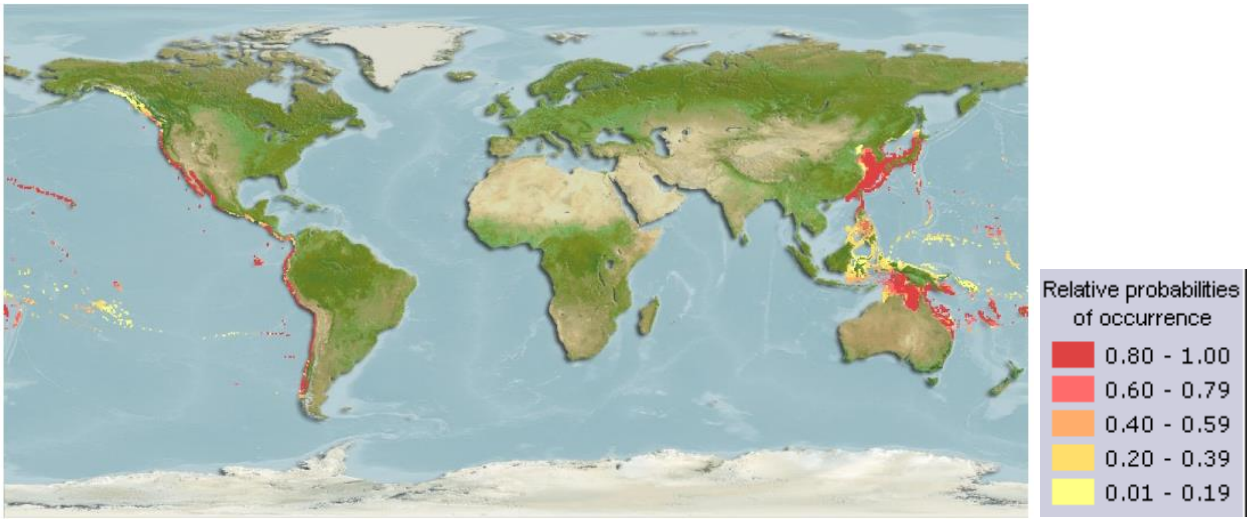

Figure 3: Reviewed distribution maps for *Scomber japonicus* (Chub mackerel) www.aquamaps.org, version of Aug. 2016. Web. Originally accessed 17.04.18.

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.

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

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 a mass escape through the net, even of the smallest-sized juvenile specimens of anchovy or sardine found in summer (as small as 5 cm total length).

There is currently no evidence in the fleet that acoustic equipment can be used to select for species size. Fishermen's experience may allow the 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 when necessary.

The fishery for anchovy 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). The greatest impact of this fishery might be the decrease in the availability of anchovy, as it is an important prey for many of the species mentioned above (CeDePesca, 2010).

Bertrand et. al. (2012) found out that the foraging efficiency of breeding seabirds may be significantly affected by not only the global quantity, but also the 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 also 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 feed extensively on anchovy.

Available information suggests impacts from purse seines are low (Arata and Hucke-Gaete, 2005), however there is limited research and no current information on the impact of this fishery on the species mentioned above.

- Specific logbooks for bycatch, incidental and ETP species capture according to the FAO and ORP protocol (2017-2018).
- A software platform was developed for the registry of incidental fishing in the operation of industrial fleets (XV-X).
- There are on board vessels 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.

R28-R29

References

R28 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
BirdLife International, 2012. *Spheniscus humboldti*. In: IUCN 2013. IUCN Red List of Threatened Species, Version 2013.1.
R29 INOP (March 2018) Manual de ingreso de datos pesqueros flota de cerco de la octava región (Software platform for the registry of incidental fishing) 5pp
R30 Vega R, L Ossa, B Suárez, A González, S Henríquez, R Ojeda, MF Jiménez, A Ramírez, J Le-Bert, A Simeone, C Anguita, M Sepúlveda, MJ Pérez, M Santos & H Araya. 2017**.** INFORME FINAL. Programa de observadores científicos 2017-2018. Programa de investigación del descarte y captura de pesca incidental en pesquerías pelágicas. Programa de monitoreo y evaluación de los planes de reducción del descarte y de la pesca incidental 2017-2018. Subsecretaria de Economía y EM. Instituto de Fomento Pesquero (IFOP), Valparaíso, Chile. 241 p + Anexos.
R31 SUBPESCA Technical Report No 95 61pp Discard and Incidental Bycatch Reduction Plan in the Chile Small Pelagics Fishery

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

Anchovy is a pelagic species distributed at water depths ranging between 15 and 70 m during the day and between 5 and 20 m at night. 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 (Chuenpagdee et al., 2003). Industrial operations are not allowed within the first five nautical miles offshore.

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 (Cury et al., 2000; Gatica et al., 2007; IFOP, 2015).

The Marine Reserves are located and 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 also to protect aquatic vertebrates such as dolphins and penguins.

Also, since the enactment of the General Law on Fisheries and Aquaculture in 1991, a Reserve Zone for Artisanal Fishing has been established by law. It extends over 5 nautical miles measured from the coast from the I Region to 41º28,6'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. This measure, besides justifying the development and promotion of the artisanal fishing activity, 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 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. **R32-R35**

References

R32 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.

R33 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.

R34 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.

R35 Environment for Development Initiative (EFD, 2017) Scientists review controversial Chilean fisheries law. http://www.efdinitiative.org/our-work/policy-interactions/scientists-review-controversial-chilean-fisheries-law

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

As mentioned the purse seine fishery has no impacts in the key structure of the ecosystems. However 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 control the predation of these species the models have been adapted and in recent years ecosystems consideration have been taken into account to set up the total removals with no impact in the key roles of these species in the ecosystems.

As mentioned herein, the availability of sardine and anchovies as prey is considered to be 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. 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 (Cury et al., 2000; Gatica et al., 2007).

A Program for the reduction of discards and mitigation of ETP species within the framework of the Management Plan is under development. A program for evaluating the impact of the jack mackerel fishery in the ecosystem under an ecological risk assessment (ERA) is still under development within the framework of the SPRFMO. However, due to the low percentage of bycatch in the fishery and the neritic and oceanic character of fishing operations, a minimum risk is considered. There are several world fisheries for jack mackerel with both midwater and purse seine that demonstrate the low ecological impact of this fishery.

A task team of international and local fisheries experts recently assisted the Chilean government with an extensive review of a new fisheries law, in a bid to help the administration address public concerns. The Chilean government had called on the regional office of the United Nations' Food and Agriculture

Organization (FAO) to draw together a team of specialists in economic, public, and social management of the fisheries sector, in order to assist with a review of the General Fisheries and Aquaculture Law (GFAL). Although the FAO's Ecosystem Approach to Fisheries Management had been declared as a principle, it was not implemented in practice in Chilean Law. Future assessments should determine the result of this review and the level of implementation of proposed changes.

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. **R30-R35**

References

R36 Pepe's Chile Mapa de las Regiones Chilenas: https://pepeschile.com/es/regiones-chilenas-de-que-son-todos-estos-numeros/

Standard clause 1.3.3.3