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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	**August 2019**
Assessor	**Jim Daly**

Application details and summary of the assessment outcome				
Name: Orizon Ltd et al				
Address:				
Country: Chile		**Zip:**		
Tel. No.:		**Fax. No.:**		
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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**
Jim Daly	V. Polonio	3	SURV 1	Whole fish
Assessment Period	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	Approve
Recommendation	Pass

Assessment Determination

Stock assessments are conducted by IMARPE (Peru) and IFOP (Chile) using information from scientific surveys conducted at least twice a year, in order to evaluate the biomass of the stock and oceanographic conditions. IFOP's assessment model covers the entire stock, considering fishery and biological data from Chile and Peru. Evidence has been provided that the precautionary approach is being taken in allocating TAC'S.

Chilean anchovy fisheries are divided into three management units (Figure 1):

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

This report refers to Anchovy Regions XV-II and III-IV.

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 management approach used undergoes 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.

Anchovy XV-II:
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 is not currently over-fished ($F2018<F_{RMS}$) with a 6% probability that the stock is over-exploited ($BD_{2018}<BD_{RMS}$).

Anchovy III-IV:
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.

Management Plan:
A management plan for the fishery was approved (April 2018) for the Northern stock (XV-II). It presents 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. Use of on-board cameras to identify and quantify bycatch discards has been implemented in Chile.

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. A Management Committee is required to elaborate and implement recovery plans under Article 9 of this Act.

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 (Category C, D) when caught in the fishery.

Another bycatch species in this fishery is the South American Pilchard (*Sardinops sagax)* stock (XV-II). Evidence is provided that the bycatch volume allowed in this fishery 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.

Peruvian anchovy (*Engraulis ringens*); Jack mackerel (Global stock) (*Trachurus murphyi*) and Chub mackerel (*Scomber japonicus)*; 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 16.08.19).

South American Pilchard (*Sardinops sagax)* has been assessed as a species of least concern on the IUCN Red List and is currently not listed on the CITES appendix of endangered species (accessed 16.08.19).

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
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	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 MINECON	A
South American Pilchard	*Sardinops sagax*	FAO 87 XV - IV region Chile	2	Species-specific. Multi pelagic fisheries MINECON	C
Chilean Jack Mackerel	*Trachurus murphyi*	FAO 87 XV-IV region Chile	2	Species-specific. Multi pelagic fisheries MINECON	C
Pacific Chub Mackerel	*Scomber japonicus*	FAO 87 XV – IV Regions Chile	1	Species-specific. Multi pelagic fisheries MINECON	D

MANAGEMENT

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

M1	Management Framework – Minimum Requirements		
	M1.1	There is an organisation responsible for managing the fishery	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 Jack mackerel is coordinated by the South Pacific Regional Fisheries Management Organisation (SPRFMO). Currently overall TAC's are agreed by the SPRFMO 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 (Chilean 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).

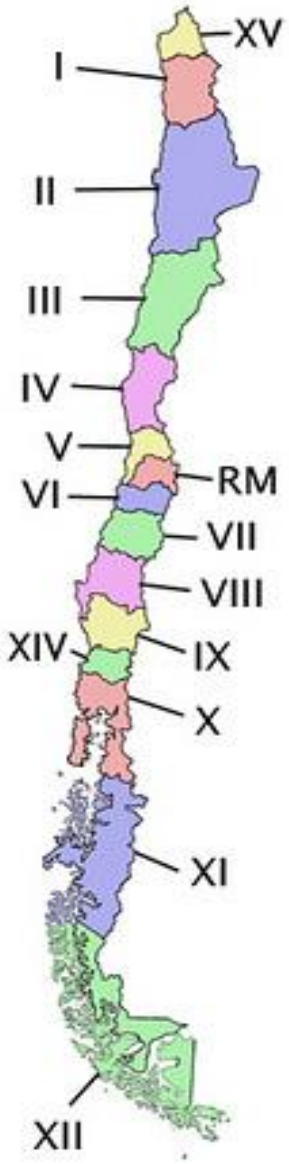

Figure 1 Regional Government Areas in Chile corresponding to fishery management units. Adapted from https://pepeschile.com/es/regiones-chilenas-de-que-son-todos-estos-numeros/ **R28**

R1-R7

References

R1 Ministerio de Economía, Fomento y Turismo MINECON
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 Comité Científico de Pesquerías de Pequeños Pelágicos (CCT-PP):
http://www.subpesca.cl/portal/616/w3-propertyvalue-51142.html
R6 Law on Fisheries and Aquaculture No 20.657:
http://www.subpesca.cl/normativa/605/articles-764_documento.pdf
R7 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.

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 artisanal segments of the fishery, allegedly selling fish locally for human consumption. These vessels have been the subject of a number of punitive prosecutions.

No evidence was provided in the 2014 paper on any alleged illegal activity in the Southern Peru/Northern Chile shared fishery. 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.

R3-R4, R6, R7-R11.

References

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. Resolución Exenta No 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

A 1.1:

Anchovy XV-II Southern Peru/Northern Chile

The stock is managed separately by these countries. However, since 2010, a statistical catch-at-size model used by IFOP considers the whole stock.

For the 2018 assessment landings data from Jan-March 2018 was included; spawning stock (daily egg production method) from April-June 2017 and recruitment estimates from acoustic surveys undertaken in the North of Chile from Nov-Dec 2017. In addition, increased growth rates of the stock observed in 2017 were considered when determining the biologically acceptable catch (BAC) for 2018. Fishing mortality data was included in the determination of biological reference points for this stock.

Anchovy III-IV: Central Chile

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

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.

IFOP started a program since 2013 to collect information on bycatch in demersal and pelagic fisheries. Last updated in September of 2016 the report shows reported data of total composition of catch from skippers. These data will be analyzed to manage the bycatch coming from different types of gears and fisheries.

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

A1.2:

Since 2010, a statistical catch-at-size model used by IFOP considers the whole XV-II stock. Differentiation by fleet addresses different size structures of catches. Data input to the model conducted in 2018 included:

- Landings from both southern Peru and northern Chile (1984-first semester 2018).
- Acoustic biomass from southern Peru (1990-2016), recruitment biomass southern Peru (1998 and 2002-2015) and recruitment biomass northern Chile (1997-2002 and 2007-2018).
- Spawning biomass from the Egg Production Method from northern Chile (1992-2017).

- Size structure from landings from southern Peru (1984-2016) and northern Chile (1984-2018), and size structure from research survey from northern Chile (2000-2002 and 2007-2018).
- Maturity ogive by size.
- Size-weight relationship.
- Life-history traits.
- Fixed natural mortality of 2.2

The IFOP model used (2018) incorporated several improvements with respect to previous years' assessments, namely the incorporation of 10 records of acoustic biomass from Peru, the estimation of spawning biomass using the "Lo" methods instead of the "multinomial" method and the employment of the Ricker stock-recruitment relationship, instead of the Beverton & Holt alternative.

As in previous years, IMARPE also conducted an analytical stock assessment using a Biomass Dynamic model.

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

R12-R15

References

R12 Fishsource: Chilean Anchovy SE Pacific: Southern Peru/Northern Chile https://www.fishsource.org/stock_page/1384 (accessed 16.08.19)

R13 Espíndola et al., (2018) IFOP Estatus y posibilidades de explotación biológicamente sustentables de los principales recursos pesqueros nacionales año 2018 175pp: Anchoveta XV - II Regiones pdf 131 pp https://www.researchgate.net/publication/328560540_Estatus_y_posibilidades_de_explotacion_biologicamente_sustentables_de_los_principales_recursos_pesqueros_nacionales_ano_2019_Anchoveta_XV-II_Regiones

R14 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

R15 IMARPE (2019): Desarrollo de la pesquería de anchoveta en la región sur del Perú desde julio hasta diciembre 2018 y perspectivas de explotación para el periodo enero-junio 2019 http://www.imarpe.gob.pe/imarpe/archivos/informes/pesqueria_anchoveta_y_proyeccion2019.pdf

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

A2.1:

Stock assessments are conducted by IFOP using information from scientific surveys conducted at least twice a year, in order to evaluate biomass of the stock and oceanographic conditions. IFOP's assessment model covers the entire stock, considering fishery and biological data from Chile and Peru. The biomass and fishing mortality reference points are dynamic and recalculated annually. Stock assessment conducted by IMARPE covers only the Peruvian part of the stock and do not form part of this assessment. A joint Peruvian-Chilean assessment workshop bringing together Chile's IFOP and Peru's IMARPE (Institute of the Sea) was held from 1982 to 2011 to evaluate both anchovy and sardine and restarted in 2015. The last one was held in December 2018.

A stock assessment is conducted at least once every 3 years.

R13, R15

A2.2

Anchovy XV-II:

According to last IFOP stock assessment (**R13**) that included the stock shared by Peru and Chile, parts of the stock, the virginal spawning stock biomass is 1,800,000 tonnes and current estimated spawning stock biomass 1,132,000 tonnes which is 22% above the target reference point ($50\%SSB_0$) estimated at 931,000 tonnes, and almost 2.5 times above the limit reference point ($25\%SSB_0$) estimated at 465,500 tonnes:

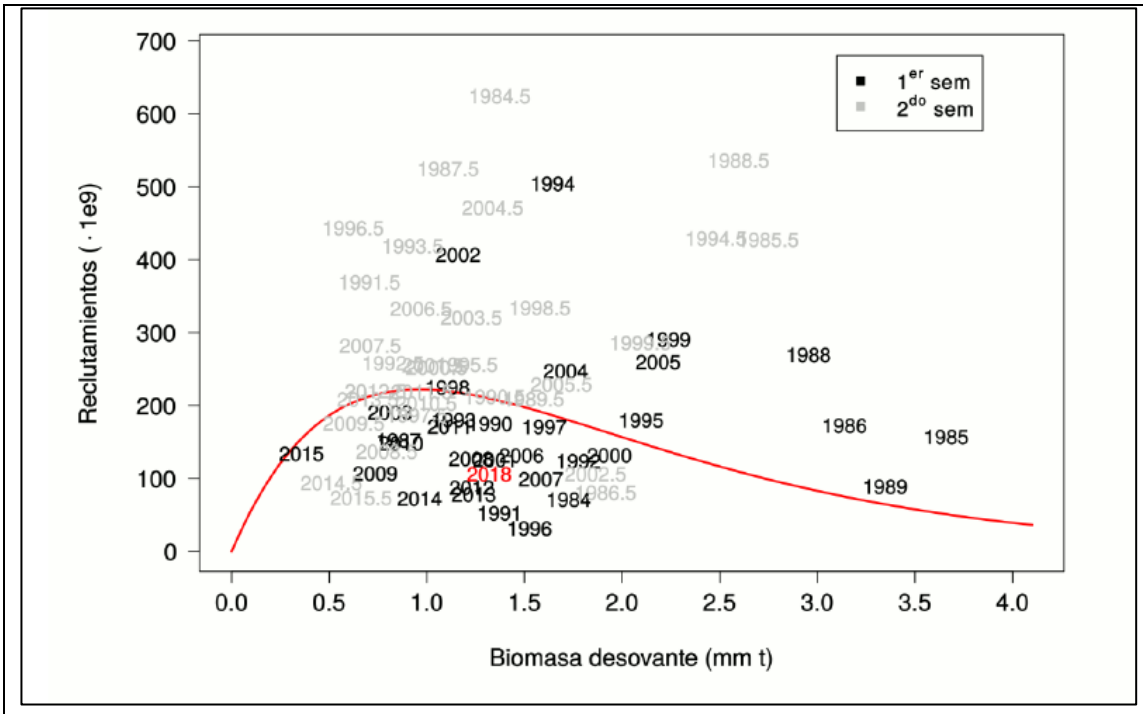

Figure 2: Spawning stock (x-axis) and Recruitment (y-axis) ratio (Red line represents use of the Ricker stock-recruitment model). Numbers in black represent 1st semester 2018 recruitment; numbers in grey 2nd semester recruitment. 2018 assessment in red. **R13**

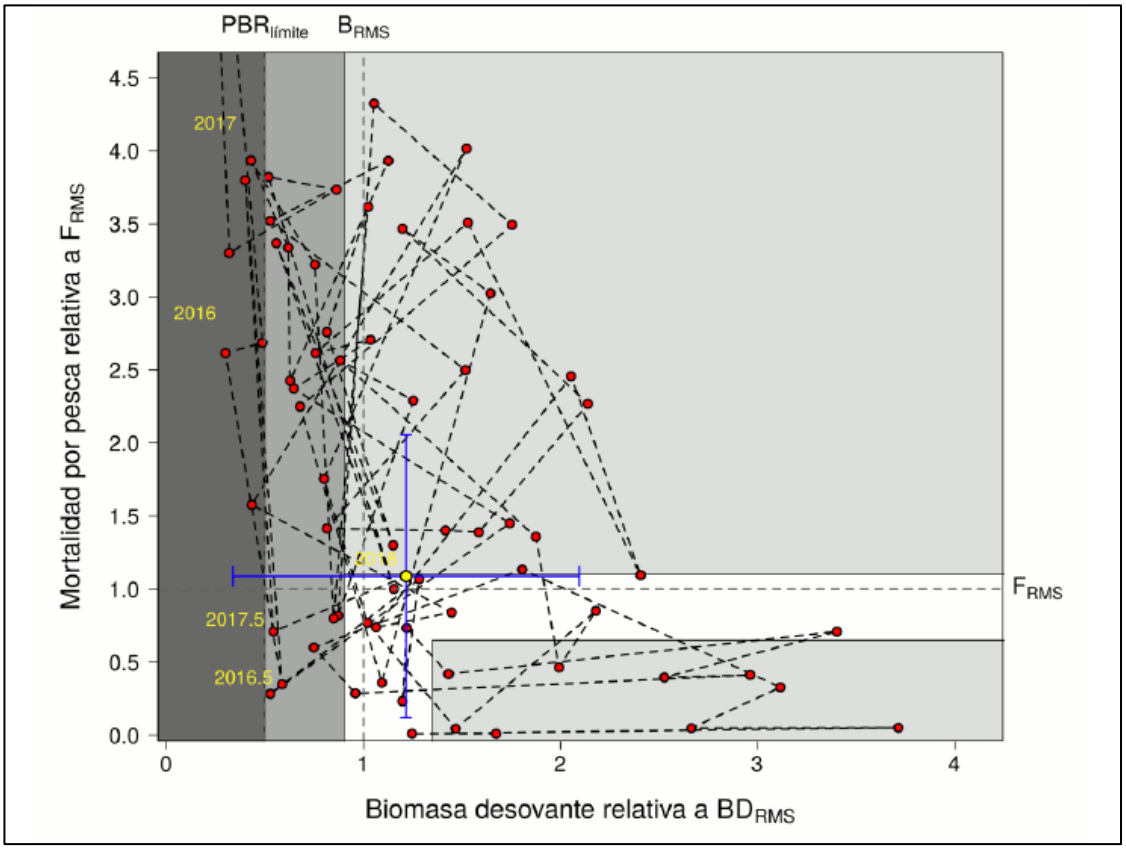

Figure 3: SSB/SSBmsy (x-axis) and F/Fmsy (y-axis) for the Southern Peru and Northern Chile anchovy stock (XV-II). Blue lines represent 95% confidence limits for latest assessment 2018 assessment in yellow. **R13**

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 (XV, II) is not currently over-fished (F2018<FRMS) with a 6% probability that the stock is over-exploited (BD_{2018}<BD_{RMS}).
R13).

Estimated biomass is well above Bmsy and the exploitation levels adopted in the last years in Peru have been below the target reference point Fmsy. IMARPE state that the exploitation rate (F proxy) in Peru should be not be higher than 0.35.

The assessment provides an estimate of the status of the biological stock relative to reference points or proxies.
R13, R15

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.
Reference points set up during the last stock assessment and management plan are listed below:
a) BDRMS = 60%BDPR (BDPR = Spawning biomass per recruit)
b) BDlímite = 27.5%BDo
c) FRMS =F60% BDPR = 0.46

The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.
R14

A 2.3
Anchovy XV-II:
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. BLIM now represents 27.5% of BD0. In addition, fishing mortality proxy to FMSY now corresponds to the fishing mortality that in the long term produces 55% of spawning biomass per recruit (= F55% SBPR).

CCT-PP recommended for 2018 a Biologically Acceptable Catch (BAC) of 760,000t, maintaining the 2017 figure based on the precautionary principle. According to the LGPA the BAC range for the stock was calculated as 608,000t -760.000t. The industrial fleet were allocated from this a quota in 2018 of 636,115t

Anchovy III-IV

In 2017 total biomass showed a slight increase. SSB was estimated at management target level (41,300t). Fishing mortality below the target F_{RMS} was 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. CCT-PP then recommended a TAC of 40,000t for 2018.

The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status**. R13-R15**

A2.4-A 2.5:
The stock assessment and management approach used in the small pelagic fisheries, provided by IFOP, undergoes detailed peer review through the Scientific Committee and Management Committee (Comité Científico Técnico de Pesquerías de Pequeños Pelágicos, CCT-PP).

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.
The assessment is subject to internal or external peer review; the assessment is made publically available
R4, R5, R15

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

A3.1: Anchovy XV-II and III-IV

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 seasons, 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.

By Chilean Law (LGPA Law No. 20.657) recommendations are provided as a TAC range with the lower limit as 20% of the actual TAC recommendation.

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.

There is a mechanism in place by which total fishing mortality of this species is restricted.

A 3.2: Anchovy XV-II and III-IV

In its stock assessment report IFOP considers a range of sources of uncertainty, e.g. variability in CPUE data, environmental factors, and 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. Historically landings have always been below both Chilean and Peruvian set TAC's (IFOP 2016; SUBPESCA 2018a).
Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment.

A3.3:

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).

A resource recovery plan implies reductions in fishing mortality at levels below or equal to FRMS/FMSY. The recovery plan mandates fixed and mobile temporal closures to protect spawning stock and juveniles. Catches are reported annually. Catch limits are modified in an adaptive way during the year to account for updated scientific data.

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.

According to the Chilean Fisheries Act (LGPA) fisheries are not closed when below limits biomass for social and economic reasons and also in order to monitor the recovery of the resource according to a recovery plan.

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. Despite the existence of a potential condition below the cut-off point, there is a BAC recommendation based on an 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. Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy. **R6, R8-R9; R13-R15**
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

Anchovy XV-II:

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 is not currently over-fished (F2018<FRMS) with a 6% probability that the stock is over-exploited (BD2018<BDRMS**).**

Anchovy III-IV:

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.

The Anchovy stock (XV-II; III-IV) is at or above the target reference point.

R13-R15

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.

CCT-PP (March 2019) have established a precautionary approach for 2019 (LGPA article 153), Catches can be between 4000-5000t for the northern stock and 1400-1750t for the other stock.

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. **R14, R16**

References

R16 SUBPESCA (March 2019) Estado de situación de las principales pesquerias chilenas 104pp http://www.subpesca.cl/portal/618/articles-103742_recurso_1.pdf

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: Jack mackerel XV-X

C1.1:

The fishery (FAO 87) is currently MSC approved. 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.

C1.2:

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 4, 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:

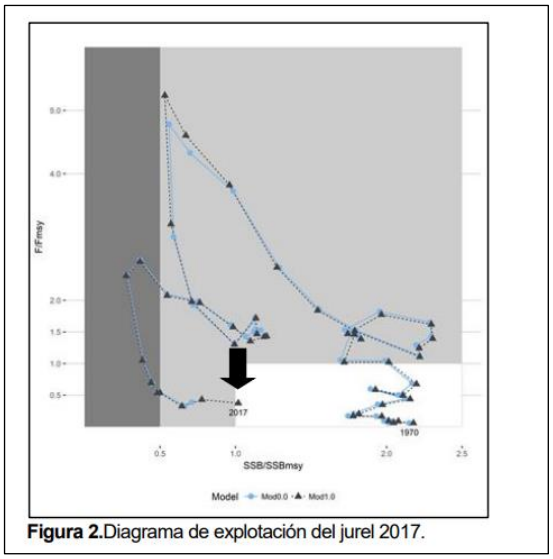

Figura 2. Diagrama de explotación del jurel 2017.

Figure4.Kobe plot for Chilean jack mackerel (annual data until 2017 presented) **R17**

Update on Chilean jack mackerel stock status (SPRFMO 2019): **R30**

The Scientific Committee (October 2019 SC 07) concluded that estimated biomass increased from 2018 to 2019 in all model configurations (including one-stock and two-stock hypotheses) and are now well above BMSY. In their opinion catches should be limited to a fishing mortality of FMSY and recommended recommends a catch limit of 680,000 t for 2020.

The SC has initiated a process for the revision of the Harvest Control Rule. It is anticipated that preliminary results of an evaluation of an updated management strategy will be available at the 2021 Commission meeting.

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.

R17

R7, R17 Subpesca (2018**)** Estado de Situación de las Principales Pesquerías Chilenas, 2017: http://www.subpesca.cl/portal/618/w3-article-100052.html

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). .

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

R19 Fishbase**:** Pacific Chub Mackerel (*Scomber japonicus*)
http://www.fishbase.org/summary/117
R 20 Fishsource: Pacific Chub Mackerel (*Scomber japonicus)*
https://www.fishsource.org/stock_page/2105

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

F1.1-F1.3:

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.

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. 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.

R21-R24

References

R21 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 PDF

BirdLife International, 2012. *Spheniscus humboldti*. In: IUCN 2013. IUCN Red List of Threatened Species, Version 2013.1.

R22 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

R23 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.PDF

R24 SUBPESCA Technical Report No 95 61pp Discard and Incidental Bycatch Reduction Plan in the Chile Small Pelagics Fishery http://www.subpesca.cl/portal/616/w3-search.html

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-F2.3:

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. 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.

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.

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 (**Figure 1**). 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.

The Reserve Zone 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 only during specific periods.

Information on catches and discards of industrial vessels in the reserve zone, which have been sanctioned through agreements with the artisanal sector, has been requested from the Competent Authority and will be included in future assessments.

There is no substantial evidence that the fishery has a significant negative impact on physical habitats.
R25 – R27

References

R25 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 PDF

R26 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.PDF

R27 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

F3.1-F3.3:

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 considered 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 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, 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.

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. The SAP has been delayed in publication. The program is expected to be launched in March 2020.

The plan is expected to provide the basis for implementing a coordinated series of measures aimed at greater protection of fish stocks (including juveniles of shared stocks between Peru and Chile) and the improved protection of coastal and marine habitats. However, the plan will not impact the Central-Southern stocks (V-X) of anchovy.

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.
R29

References

R28 Pepe's Chile Mapa de las Regiones Chilenas: https://pepeschile.com/es/regiones-chilenas-de-que-son-todos-estos-numeros/

R29 GEF-UNDP-Humboldt Project https://news.iwlearn.net/the-humboldt-project#

R30 SPRFMO SC7 Report 2019 (103pp): https://www.sprfmo.int/assets/2019-SC7/Reports/SPRFMO-SC7-Report-2019-V2.pdf

Standard clause 1.3.3.3