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Global Standard for Responsible Supply of Marine Ingredients

Fishery Assessment Methodology and Template Report V2.0

Fishery Under Assessment	**Peruvian Anchovy (*Engraulis ringens*) Chile V-X**
Date	**December 2018 (FPRC Update)**
Assessor	**Virginia Polonio**

Application details and summary of the assessment outcome				
Name: Orizon et al				
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Country:		**Zip:**		
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Email address:		**Applicant Code**		
Key Contact:		**Title:**		
Certification Body Details				
Name of Certification Body:		**SAI Global**		
Assessor Name	**Peer Reviewer**	**Assessment Days**	**Initial/Surveillance/Re-approval**	**Whole fish/ By-product**
V.Polonio	Conor Donnelly	5	Re approval	Whole fish
Assessment Period	2017			

Scope Details	
Management Authority (Country/State)	Chile Subsecretariat de Pesca SUBPESCA
Main Species	Anchovy (*Engraulis ringens*)
Fishery Location	Chile region V-X, Pacific area FAO 87
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 two annual surveys (January, April) and collection of fishery-dependent data. Available evidence suggests that the fishery is well monitored and management actions are largely based on best available scientific advice.

The CCT-PP (SUBPESCA Management Committee) met in October 2017 (and reported in April 2018) on an assessment of the state of the anchovy stock (V-X) and to determine a Biologically Acceptable Catch (BAC) for 2018. The stock remains at the limit of over-exploitation with spawning stock biomass 72% below estimated SSB_{MSY} and fishing mortality higher than F_{MSY}. However preliminary data (2017 fishery) for this stock show much improved estimates of biomass (B) and spawning stock biomass (SSB).

The CCT-PP recommended a Biologically Acceptable Catch (BAC) for 2018 of 49,440t (artisanal 37,676t); industrial 10,626t) in conformance with Article 153 c) of the LGPA. This range is precautionary as it takes into account established Biological Reference Points (BRP's) and the probability of exceeding these BRP's. New entrants to the fishery are prohibited. Closures are in operation to protect spawning stock and new recruits to the fishery.

The CCT-PP have recommended methods to improve data collection in the commercial fishery and to revise current BRP's which in the opinion of the working group do not take into account annual changes in species productivity.

In Chile commercial fishery removals are not prohibited when the stock has been estimated to be below the limit reference point or proxy. In this fishery B_{lim} or Proxy is used to inform management decisions rather than prohibit fishery removals. The Fisheries Act (LGPA) does not establish catch restrictions when stocks are below limit biomass (for social and economic reasons and to facilitate further research).

According to the LGPA a resource recovery plan must be implemented and the management committee of the fishery are required to elaborate and implement such recovery plans (Article 9). This would imply reductions in fishing mortality at levels below or equal to $F_{RMS.}$. Future assessments should monitor the introduction and implementation of this recovery plan and the effects on the anchovy stock in the area.

Management strategies currently in place include the obligatory use of vessel monitoring systems (VMS), temporal closures; recent mandatory use of on board cameras to identify and quantify discards and a maximum catch limit per vessel owner regime (industrial sector) and an artisanal extraction regime.

The program for the reduction of discards and mitigation of ETP species catch within the framework of the Management Plan (ANE V-X) is underway. Compliance with discard reduction plans will be monitored by electronic monitoring systems (EMS) on board all vessels of the industrial fleet, while artisanal boats larger than 15 m in length will be required to carry EMS by 2022. .

Historically, landings have always been below both Chilean and Peruvian set TAC. There is however evidence in the literature of some catch under-reporting for which correction factors have been applied (Peru fisheries, Mendo and Wosnitza-Mendo 2014). There are no estimates for under-reporting from the Chilean fishery but a research program (2016) is underway to obtain such estimates. The data collection will last for two years. Future IFFO-RS assessments should also verify that the introduced artisanal extraction regime has been fully implemented and is effective at maintaining landings from this sector within the sector's allocated TAC.

Compliance with laws and regulations is actively monitored, through a regime which may include at-sea and portside inspections, observer programmes, and VMS. Correction factors are applied in both the industrial and artisanal fisheries to account for under-reporting. A program for evaluating the impact of the fishery in the ecosystem under an ecological risk assessment (ERA) is still under development within the framework of the SPRFMO (Regional RFMO). The results of this program, when available, should be included in future assessments of this fishery under the IFFO – RS v 2.0 standard. Anchovy (*Engraulis ringens)* is listed on the IUCN website as a species of least concern and is currently not listed in CITES appendices of endangered or threatened species. The assessment team approves the use of anchovy (V-X) in the reduction fishery (fishmeal, fish oil) under the current IFFO-RS standard (v 2.0) for whole fish.
Peer Review Comments
This report has been updated, where necessary, based on comments received from the IFFO-RS External Fisheries Peer Review Committee.
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 B				
Category C	Jack Mackerel, Common Sardine	5%	Pass	
Category D				

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

HOW TO COMPLETE THIS ASSESSMENT REPORT

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

Whole Fish

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

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

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

By-products

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

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

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

SPECIES CATEGORISATION

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

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

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

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

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

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

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

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

Common name	Latin name	Stock	% of landings	Management	Category
Anchovy	*Engraulis ringens*	FAO 87 V-X region Chile	≥90%	Species-specific. Multi pelagic fisheries IFOP	A
Common sardine	*Strangomera bentincki*	FAO 87 V-X region Chile	≤5%	Species-specific. Multi pelagic fisheries IFOP	C
Jack mackerel	*Trachurus murphyi*	FAO 87 Central-southern Chile EEZ and high seas	≤5%	Species-specific. Multi pelagic fisheries IFOP	C

MANAGEMENT

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

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

Evidence

The species under assessment are regulated in the same assessment plan as a mixed pelagic fisheries the information is the same for the three species. The overall outcome is pass as the fishery complies with the minimum requirements established by IFFO-RS in terms of management systems.

M1.1 There is an organisation responsible for managing the fishery

Primary institutional framework:

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:

- The Subsecretaria de Pesca (Undersecretariat of Fisheries, **SUBPESCA SSP**) is positioned within the Chilean Ministry of Economy, and provides the policy settings and regulatory framework for the domestic management of the sector.
- The Servicio Nacional de Pesca (National Fisheries Service, **SERNAPESCA**) is also based within the Ministry of Economy.
- The Instituto de Fomento Pesquero (Fisheries Development Institute, **IFOP**) is the research arm of the institutional framework. Fisheries councils

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.

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.

Legal instruments:

Since February 2013, the primary legal instrument for fisheries management in Chile has been Law 20.657 (LGPA).

South Pacific Regional Fisheries Management Organisation (SPRFMO):

International management of Chilean small pelagics 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.

M1.2 There is an organisation responsible for collecting data and assessing the fishery

IFOP is the organization responsible for sampling these stocks and also for carrying out the acoustic surveys each year to collect data used in the projections to determine the TAC and stock status. 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 SUBPESCA 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.

M1.3 Fishery management organisations are publically committed to sustainability

The fisheries are regulated under the LGPA and the main objective is the sustainability of the Chilean resources. There are long term management plans to ensure the conservation of the fishing resources**.** A commitment to make key decisions on conservation measures on the basis of scientific information above all other considerations in stated in the LGPA. Recommendations of SUBPESCA's scientific-technical committees have been made mandatory.

Chile amended the LGPA through Law N° 20.625, known as the "discard law or ban". This amendment introduced exceptions to the discard ban, conditional on preparation of a minimum 2-year monitoring program to quantify and identify causes of discards and bycatch, and to develop and implement specific discard reduction plans.

M1.4 Fishery management organisations are legally empowered to take management actions

The management system is aimed at the conservation of the fisheries stock in the Chilean regions. An explicit management plan has been put in place for each fishery. Article 5 of the LGPA states that the Sub-secretary should determine the Biological Reference points. These have been laid out in the SUBPESCA resolution No:291/2015 which states that all stocks should be exploited around the MSY level, and that the MSY is the objective to be taken into account when quotas are established.

M1.5 There is a consultation process through which fishery stakeholders are engaged in decision-making

The fishery is evaluated through different committees with wide participation of different stakeholder groups who decide the main regulations for the fisheries. The Management Committee for the anchoveta and Araucanian herring mixed fishery in regions V-X - composed of SUBPESCA and SERNAPESCA members, artisanal and industrial fishermen and the processing industry developed a management plan, which has been officially adopted.

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

M1.6 The decision-making process is transparent, with processes and results publically available

The system is transparent and the information is available in official websites as it is mentioned in the above clause M 1.5.

Chilean Law No. 20.285 "on transparency of the Civil Service and access to information on the state administration," was put into force in 2009. Its two main principles are "active transparency" and "passive transparency":

- **Active transparency** means the administrative bodies of the state must make available to the general public a long list of information, to be posted permanently on their web sites and updated at least once a month.
- **Passive transparency** is the term used for the right of all citizens to request and receive information contained in minutes, resolutions, files, contracts and agreements, and to all information reports that have been paid for from the public purse. The information requested must be provided within 20 working days. Dissatisfied citizens can complain to the Transparency Council, an autonomous body under public law created to ensure enforcement of the law.

IFOP is a private corporation, non-profit, which does not belong to the organs of the State Administration to which is applied the 20,285 Law on Access to Public Information. However, some reports are published online and reports are available upon request.

R1-R10

Regional Government Areas in Chile corresponding to offshore fishery management units (**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/

References:

R1 LPGA: Law on Fisheries and Aquaculture No 20.657: http://www.subpesca.cl/normativa/605/articles-764_documento.pdf

R2 SUBPESCA: http://www.subpesca.cl/portal/616/w3-channel.html

R3 SERNAPESCA: www.sernapesca.cl

R4 IFOP: https://www.ifop.cl/en/

R5 SPRFMO: https://www.sprfmo.int/

R6 Estado de situación de las principales pesquerías chilenas, año 2017 (SUBPESCA) 95pp pdf

R7 Estatus y posibilidades de explotación biológicamente sustentables de los principales recursos pesqueros nacionales año 2017": Anchoveta V-X Regiones, 2017 SUBSECRETARÍA DE ECONOMÍA Y EMT / Julio 2017 (IFOP) http://www.subpesca.cl/portal/618/w3-article-100052.html

R8 SUBPESCA (2014) Management Plan (Anchovy and Common Sardine V-X) pdf 72pp

R9 Evaluación del stock desovante de anchoveta y sardina común entre la V y X Regiones, año 2016 (IFOP) **R10** Evaluación hidroacústica de pequeños pelágicos en aguas interiores de la X y XI Regiones, año 2017 (IFOP)
Standard clauses 1.3.1.1, 1.3.1.2

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

Evidence

M2.1 There is an organisation responsible for monitoring compliance with fishery laws and regulations

SERNAPESCA is the organisation in charge of monitoring compliance with the regulations in place and also enforcement**.**

Punitive proceedings are the responsibility of the regional director. The guiding instrument of fisheries management in Chile is the General Law on Fisheries and Aquaculture (LPGA). No. 18.892 of 1989 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 in the Official Journal amending the previous one in the field of sustainability of aquatic resources, access to industrial, craft and regulations for research and monitoring fishing activity.

M2.2 There is a framework of sanctions which are applied when laws and regulations are discovered to have been broken

There is a framework allowing for the application of sanctions ranging from monetary fines to revocation of licence. Due to the lack of evidence regarding its effectiveness a medium compliance rating is appropriate. The LGPA defines a range of sanctions for offences including fishing with an unlicensed vessel, discarding, incorrect logbook use, failure to report landings, fishing in a region or fishery other than the one for which the vessel is licenced, and for industrial vessels which land more fish than they have quota for. Depending on the offence, sanctions can include one or a combination of monetary penalties dependant on tonnage; suspension of fishing licence; and revocation of licence entirely.

M2.3 There is no substantial evidence of widespread non-compliance in the fishery, and no substantial evidence of IUU fishing

In 2005, a national action plan was approved with the aim of preventing, deterring and eliminating IUU fishing. The fishery is monitored and there is no evidence of IUU fishing activities. On the other hand, on May 2016 a new agreement between 30 countries was endorsed. Chile is now involved in an international program to avoid illegal fisheries. The agreement, "Acuerdo sobre medidas del Estado rector del puerto" (PSMA, English abbreviation). All the landings from other countries should be controlled and more effort to control the catches of these vessels will be realized. This regulation will apply only to foreign vessels to avoid IUU in Chilean waters.

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.

Industrial vessels operate under mandatory VMS monitoring. Also, 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.

R1; R11-R13

References

R11 Chilean Navyhttp://www.armada.cl/armada/site/edic/base/port/nuestra_armada.html

R12 CCT-PP. 2016b. Determinación del Estado de Situación y Rango de Captura Biológicamente Aceptable de Recursos Pelágicos pequeños, Año 2017. INFORME TÉCNICO CCT-PP. http://www.subpesca.cl/institucional/602/articles-94971_documento.pdf

R13 Port state measures to prevent, deter and eliminate illegal, unreported and unregulated fishing. FAO 2016 http://www.fao.org/3/a-i5469t.pdf

Standard clause 1.3.1.3

CATEGORY A SPECIES

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

Species Name		**Anchovy (*Engraulis ringens*) V-X**	
A1	**Data Collection - Minimum Requirements**		
	A1.1	Landings data are collected such that the fishery-wide removals of this species are known.	Pass
	A1.2	Sufficient additional information is collected to enable an indication of stock status to be estimated.	Pass
Clause outcome:			**Pass**

Evidence

A1.1 Landings data are collected such that the fishery-wide removals of this species are known.

The catches are reported every year and the annual catch limit is modified in an adaptive way during the year in result of updated scientific data and has been in accordance to recommendation.

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.

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 analysed to manage bycatch coming from different types of gears and fisheries.

Scientific institutions of Peru (IMARPE) and Chile (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).

A1.2 Sufficient additional information is collected to enable an indication of stock status to be estimated.

The data used to estimate the status of this stock included: 1991-2016 landings from SERNAPESCA; 1997-2016 catch-at-age and weight-at-age data from the Monitoring Program of the Main National Fisheries (Pelagic Fisheries); biomass time series of the acoustic surveys performed in summer (2000-2017) and autumn (2003-2017), from the scientific research cruises conducted annually; and other relevant information related to the species' life cycle from scientific articles. A new assessment model was used, as agreed in the 4th meeting of CCT-PP, which includes a difference in size sample estimation of age compositions in surveys and catch (IFOP 2017).

R14

References

R14 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 V -X Regiones. Noviembre 2017. Page 234.

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.	Pass
	A2.2	The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.	Pass
	A2.3	The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status.	Pass
	A2.4	The assessment is subject to internal or external peer review.	Pass
	A2.5	The assessment is made publically available.	Pass
	Clause outcome:		**Pass**

Evidence

A2.1 A stock assessment is conducted at least once every 3 years (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.

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

For Anchovy V-X IFOP conducted a hydro-acoustic survey in 2017 and an assessment of the fisheries which included an assessment of discarding and incidental by-catch in Area V.

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

Biomass target reference point - BMSY proxy - is defined at 55% of the virgin spawning stock biomass (SSB0) and was estimated at 720,000 tonnes in 2017 (estimated at ~560,000 tonnes prior to including discards) and the limit reference point - Blim proxy - is set at 27.5% of SSB0, i.e. 360,000 tonnes; target fishing mortality is associated with the fishing intensity that maintains BMSY, being estimated at FMSY proxy = 0.39 (IFOP 2017; CCT-PP 2018).

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

a) BD_{RMS} = 55%BDo (BMSY)
b) $BD_{límite}$ = 27,5%BDo (BLIM|)
c) FRMS =F60% BDPR (FMSY)

A2.3 The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status.

All the catches are reported and monitored. Discards estimates were included in the October 2017 stock assessment, at 4% in 2015 and at 2% in 2016 based on results from the discards research program 2014-2015. Correction factors are applied to account for unreported catches.

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

The stock assessment and management approach used undergoes detailed peer review through the Scientific Committee (SC) 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 a series of workshops convened with Peru, invited international experts evaluated the setting of biological reference points within the MSY framework.

A2.5 The assessment is made publically available.

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

R7, R15

References

Standard clause 1.3.2.2, 1.3.2.1.2, 1.3.2.1.4

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

Evidence

A3.1 There is a mechanism in place by which total fishing mortality of this species is restricted.

TACs are set to restrict fishing and have been on place since 2001. The fishery mortality is set up as a reference point but the last SUBPESCA report has shown that the fishery mortality has been higher. Fishing mortality of F for 2017 (0.511/ year), has exceeded the reference value associated with the FRMS (0.39 / year):

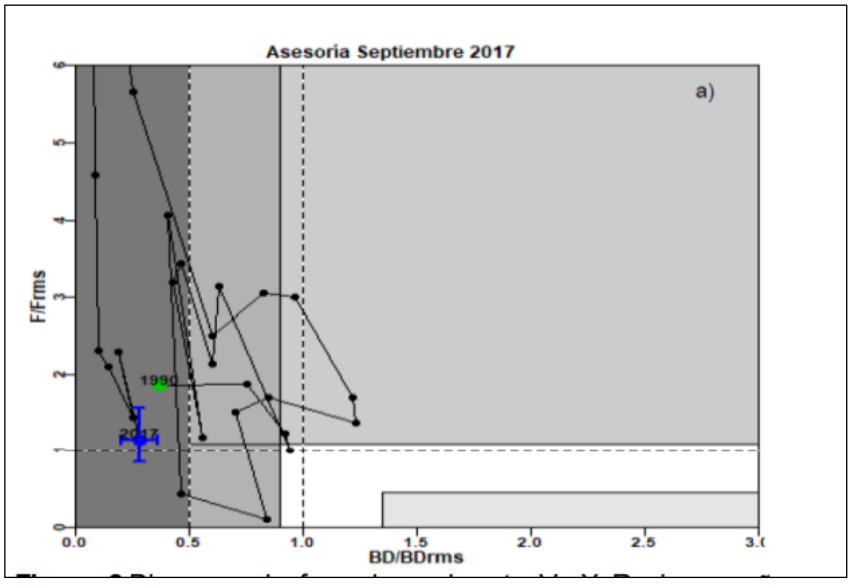

Figure 2. Kobe plot of anchovy V- X Regions, year 2017. Source: IFOP **R18**

Figure 2 shows BD/BD_{RMS} v F/F_{RMS} values with 2017 data highlighted. The CCT-PP met in October 2017 to establish biological reference points; state of the stock (V-X) and to determine a Biologically Acceptable Catch for 2018. Recruitment to the fishery (V-X) had shown a slight increase (2013-2016) with a higher degree of uncertainty of the data. Recruitment in 2017 has been estimated to have increased by 58% from the previous year and has been estimated at 66×10^9 individuals. Estimates of total (B) and spawning (SSB) biomass for the year 2017 are 623.9×10^3t and 195.7×10^3t respectively, being 21% and 36% higher than estimates of the previous year, respectively. These data will be verified during the 2018 acoustic surveys.

According to updated information the anchovy resource (V to X) Regions, remains in a situation of exhaustion and / or collapse with values of spawning biomass of the year most recent around 72% below the estimated value at MSY and fishing mortality higher than FMSY. The stock is at the limit of over-exploitation (**Figure 2**).

The CCT-PP recommended a Biologically Acceptable Catch (BAC) for 2018 of 49,440t in conformance with Article 153 c) of the LGPA. This catch to be divided between the fishmeal industrial (10,626t) and artisanal (37, 676t) fleets. This range is precautionary as it takes into account established biological reference points (BDRMS = 55%BDo (BMSY); FRMS =F60% BDPR (FMSY) and the probability of exceeding these reference points (A 2.2).

The CCT-PP have also recommended a revision of the model used to evaluate the stock and noted that information from the commercial sector on recruitment values did not match data received from the acoustic surveys.

The fishery has been declared as being fully exploited. New entrants to the fishery are prohibited. Closures are in operation to protect spawning stock and new recruits to the fishery.

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.**

TACs are in place since 2001 and are split to accommodate commercial (both industrial and artisanal sectors) and research purposes and are allocated to the industrial fishery in three periods (January-April, 85%, May-August 7% and September-December 7%) taking into account the seasonality of the catch and temporal closures to protect the spawning stock and recruits.

Currently, new access to this fishery is prohibited. Also, a Maximum Catch Limit per Vessel Owner regime has been established for the industrial sector and an Artisanal Extraction Regime for the artisanal sector, through which artisanal individual fishermen or associations may obtain catch quotas. TACs are set up initially and can be corrected after the acoustic surveys.

Catches reported in the last IFOP report have shown that the landing from artisanal fleet are higher than the TAC set up for this fishery and it has been happening consistently over the years (**Figure 3**).

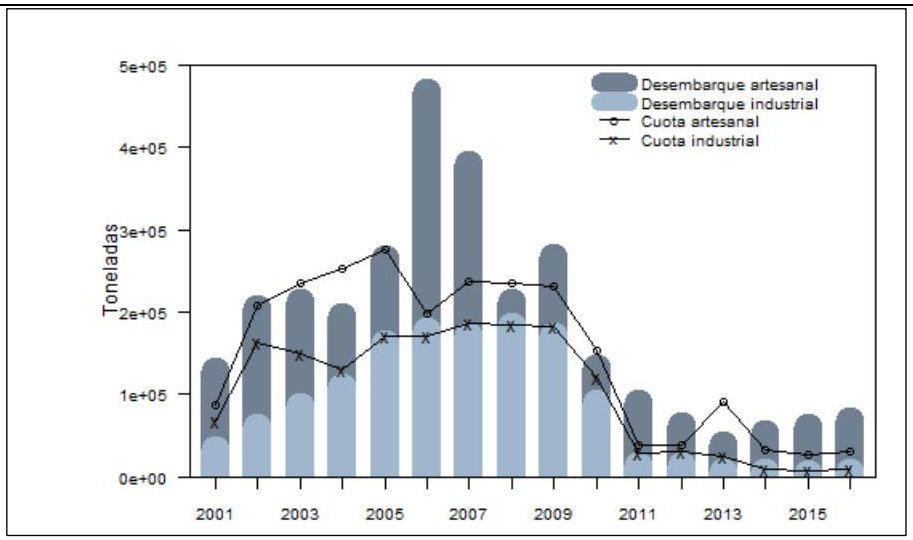

Figure 3. Landings and TACs per year and type of fleet. Source: IFOP

Future assessments should verify that the introduced artisanal extraction regime has been fully implemented and is effective at maintaining landings from this sector within the allocated TAC's.

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).

Estimates of total and spawning biomass for the year 2017 are 623.9 x 10^3t 195.7 x 10^3t respectively, being 21% and 36% higher than the estimate of the previous year, respectively. However, the stock which is the subject of this fishery is still in a collapsed condition and the fishing activities are still open with quota assigned for commercial activities. Therefore the fishery is not closed despite the stock being below its limit reference point.

<u>October 2018 update:</u>

In this fishery B_{lim} or Proxy is used to inform management decisions rather than prohibit fishery removals. The Fisheries Act (LGPA) does not establish catch restrictions when stocks are below limit biomass (for social and economic reasons and to facilitate further research). A resource recovery plan must be implemented and the management committee of the fishery are required to elaborate and implement such recovery plans (Article 9 LGPA). This would imply reductions in fishing mortality at levels below or equal to F_{RMS}. Other management strategies include the determination of Biologically Acceptable Catches (BAC's); obligatory use of vessel monitoring systems (VMS), temporal closures (SUBPESCA and IFOP recommendations) and recent mandatory use of on board cameras to identify and quantify discards.

The most recent stock assessment conducted in March 2018 (complete report not yet available) under colder environmental conditions, SSB was 50% below the target biomass reference point, BMSY proxy and below the limit reference point. In 2017, catches were 58,443t. Recruitment and reproductive parameters are considered as normal in the first quarter of 2018. There are signs of improvement in SSB compared to the decreasing period observed since 2005; associated to successful recruitments in 2016, 2017 and recent favourable oceanographic conditions and lower catches. However, the stock is still considered to continue in a collapsed condition.

A meeting of the CCT-PP was held (April 2018) to assess catch and recruitment data for the first quarter of 2018 for the ANE stock; review current models for stock assessments. Working groups were established to prioritise issues with the fishery and to establish corrective actions. Methods were proposed to improve data collection in the fishery and to revise current biological reference points which in the opinion of the working group do not take into account annual changes in species productivity.

R7; R16-R21

References

R15 MINECON Quota (2018) for Anchovy V-X (Industrial and Artisanal): D. Ex. N° 674/2017

R16 Acta CC-PP (2017): Establishing closures in the ANE, SAR V-X fishery 3pp pdf

R17 Fishsource Chilean Anchovy (Central-Southern V-X) https://www.fishsource.org/stock_page/1380 (accessed 31.10.18)

R18 CCT-PP Technical Report No 1 (April 2018): Update on ANE, SAR V-X stock assessments, 2018 BAC's http://www.subpesca.cl/portal/616/articles-100409_documento.pdf

R19 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 V -X Regiones. Noviembre 2017. Page 234.

R20 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.	Pass
		Clause outcome:	**Pass**

Evidence

The stock is estimated to be below the limit reference point or proxy. Anchovy resource (V-X) remains in a situation of exhaustion and/or collapse with values of spawning biomass of the most recent year around 72% below MSY and below BLIM. As noted in section A3.3, fishery removals have not been prohibited. In this fishery Blim or Proxy is used to inform management decisions rather than prohibit fishery removals. A Maximum Catch Limit per Vessel Owner regime has been established for the industrial sector and an Artisanal Extraction Regime for the artisanal sector, through which artisanal individual fishermen or associations may obtain catch quotas.

October 2018 update:

The fishery has been declared as being fully exploited. New entrants to the fishery are prohibited. Closures are in operation to protect spawning stock and new recruits to the fishery. The CCT-PP have recommended a Biologically Acceptable Catch for 2018 of 49,440t in conformance with Article 153 c) of the LGPA. This catch to be divided between the fishmeal industrial (10,626t) and artisanal (37, 676t) fleets. When the BAC's are exhausted, compliance with laws and regulations (fishery closures) is actively monitored, through a regime which may include at-sea and portside inspections, observer programmes, and VMS monitoring.

In this fishery Blim or Proxy is used to inform management decisions rather than prohibit fishery removals. The Fisheries Act (LGPA) does not establish catch restrictions when stocks are below limit biomass (for social and economic reasons and to facilitate further research). A resource recovery plan must be implemented and the management committee of the fishery are required to elaborate and implement such recovery plans (Article 9 LGPA). This would imply reductions in fishing mortality at levels below or equal to FRMS. Other management strategies include obligatory use of vessel monitoring systems (VMS), temporal closures (SUBPESCA and IFOP recommendations) and recent mandatory use of on board cameras to identify and quantify discards. A meeting of the CCT-PP was held (April 2018) to assess catch and recruitment data for the first quarter of 2018 for this stock and review current models for stock assessments. Future assessments should verify that the proposals of the working group established in April 2018 are being implemented in the fishery. **R7; R18-R20**
References
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		**Common Sardine (*Strangomera bentincki*)**	
C1	**Category C Stock Status - Minimum Requirements**		
	C1.1	Fishery removals of the species in the fishery under assessment are included in the stock assessment process, OR are considered by scientific authorities to be negligible.	Pass
	C1.2	The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy), OR removals by the fishery under assessment are considered by scientific authorities to be negligible.	Pass
Clause outcome:			**Pass**

Evidence

C1.1 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.

The catches are reported every year and the annual catch limit is modified in an adaptive way during the year in result of updated scientific data and has been in accordance to recommendation. Also, 1998-2001 landings were amended due to indications of under-reporting and the models updated to avoid uncertainties in the models. Input data included: 1991-June 2017 landings from SERNAPESCA; 1997-June 2017 catch-at-age and weight-at-age data from the Monitoring Program of the Main National Fisheries (Pelagic Fisheries); biomass time series of the acoustic surveys performed in summer (2000-2017) and autumn (2003-2017), from the IFOP scientific research cruises conducted annually; and other relevant information related to the species' life cycle from scientific articles.

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.

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

Recruitment has been showing inter-annual oscillations according to the information available but in 2016/2017 increased 56% in regards to 2015/2016, especially of age 0 individuals. Total biomass has been reflecting recruitment's fluctuations and increased 15% in 2016/2017 comparing to 2015/2016. SSB decreased and is 6.3% below B_{MSY}, at 741,410 tonnes which, in contrast to total biomass, presents a 36% decrease in 2016/2017 compared to 2015/2016. This can be explained by the fact the model considers the biological year

so the 2017 value represents the beginning of the biological year (August 2016) which is lower due to a weak recruitment in 2016. F increased 24% in respect to 2015/2016 and is at 0.263 in 2016/2017, 4.4% above FMSY (F2016/2017/F_{MSY}=1.04) (Basualto and Quiroz 2017). The reference points defined during the last stock assessment are listed below:

a) BDRMS = 60%BDPR ó 55%Bdo (BMSY)
b) BD límite = 27,5%Bdo (BLIM)
c) FRMS =F60% BDR (FMSY)

Based on these reference points and the data from the last report the stock status was considered healthy and in a good condition.

The last report carried out by SUBPESCA has shown that the fishing mortality is a little bit higher that the F_{MSY} however the stock is in the green area of Kobe plot as shown in the figure below. Therefore the estimated TAC for next year has been set up according these results and to maintain the stock in the green area (Figure 3)

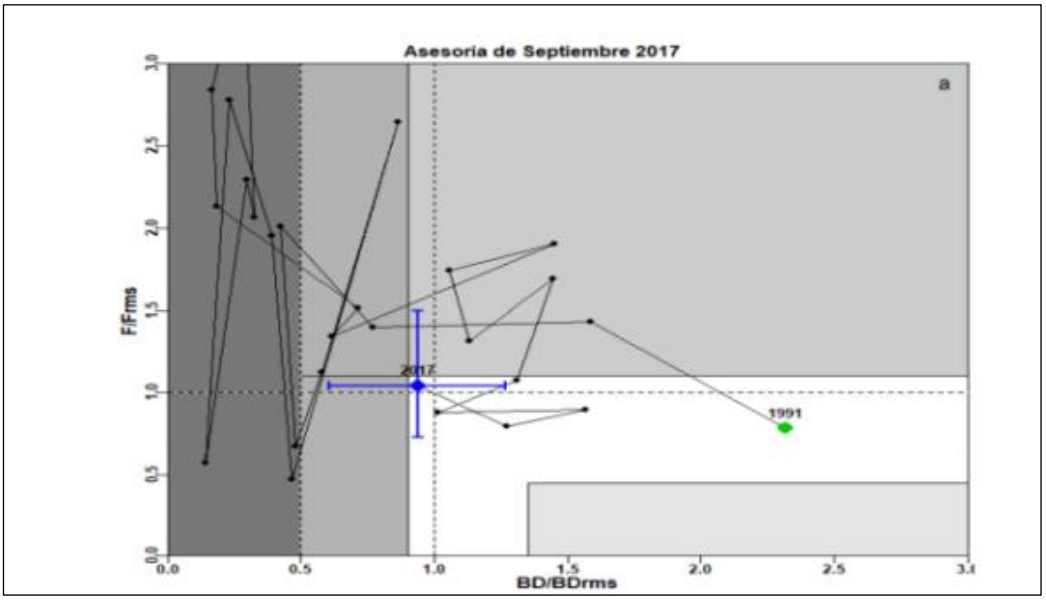

Figure 4. Kobe plot for Chilean common sardine. Source: IFOP. **R15**

Figure 4 shows BD/BDRMS v F/FRMS values with 2017 data highlighted.

R7, R21-R22

References

R21 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.

R22 Basualto, M. J. Z., and J. C. Quiroz. 2017b. Informe 1 de estatus. Convenio desempeño 2017. Estatus y posibilidades de explotación biológicamente sustentables de los principales recursos pesqueros nacionales, año 2018 en sardina común v-x regiones: sardina común V-X regiones 2018. Subsecretaría de Economía y EMT / Septiembre 2017. Page 195. IFOP.

Standard clauses 1.3.2.2

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

Evidence

C2.1 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.

Since 2010, a joint Jack mackerel stock assessment has been conducted, including fisheries independent and dependent data from each fishing country in a statistical catch-at-age model performed by the South Pacific Regional Fisheries Management Organization's (SPRFMO) Scientific Committee (SC). The models run consider the 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. Therefore, all the fishery removals are taking into account in the stock assessment.

C2.2 The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy), OR removals by the fishery under assessment are considered by scientific authorities to be negligible.

Following the last results showing by the Committee, it was established for the jack mackerel the reference points listed below:

- BD_{RMS} = 5,198,000 tons (BMSY)
- BD_{limit} = 1,300,000 tons (BLIM)
- F_{RMS} = 0.197 year -1 (FMSY)

Stock Status

Kobe diagram for the Chilean jack mackerel shows a spawning biomass with an increasing trend over the last 5 years, with biomass reaching levels around MSY (BD_{RMS}) in 2017 and growth projections for 2018 (Figure 4).The reconstruction of the biomass was propitiated by the joint effect of mortality reduction by fishing and stronger annual classes in the years 2015-2016, according to the results of the evaluation. Fishing mortality has been reduced since the 2011 from levels close to the F_{RMS}, until the year 2017 reaching an F = 0.073 (F <FRMS). Consequently, the Chilean jack mackerel biomass would have reached recovery levels, which place them slightly over the B_{RMS}, without overfishing, described by $BD2017/BD_{RMS}$= 1,018 and one $F2017/F_{RMS}$ = 0.197, and consequently in a condition of full exploitation.

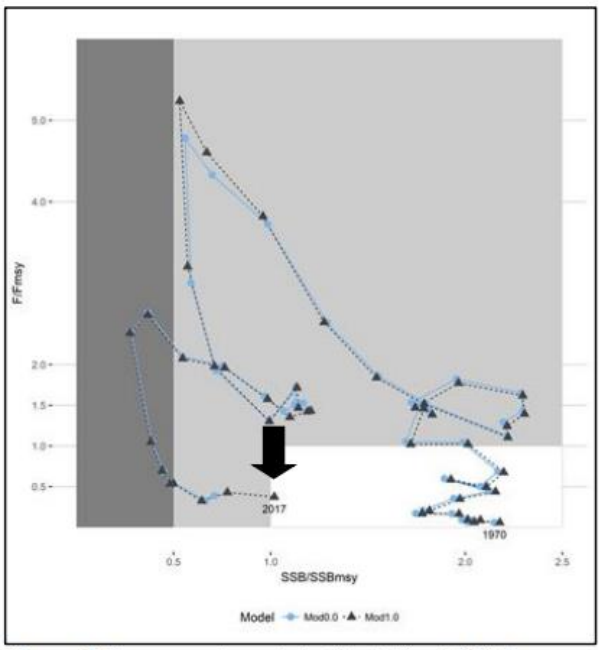

Figura 2.Diagrama de explotación del jurel 2017.

Figure 5. Kobe plot for Chilean jack mackerel. Source: IFOP. **R7**

Based on the above calculations the CCT-PP have proposed a global quota (XV-X) of 371,887t (Artisanal 33,680t; Industrial 330,422t; Human Consumption 3,718t).

R7; R19; R22

References

Standard clauses 1.3.2.2

FURTHER IMPACTS

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

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

Evidence

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 common sardine found in summer (as small as 5 cm total length). There is a rather strong possibility that the species to be caught can be previously selected, since both fishermen's experience and the use of state-of-the-art echo sounders and sonar allow the species to be identified with some accuracy before setting the net. However, on some occasions, the catch trapped in the sack is released by opening the net when necessary.

Unlike purse seine fishing in other regions, in Chile the incidence of dolphins in catches is considered infrequent. The Peruvian pelican (*Pelecanus thagus)*, Near Threatened in IUCN Red List, 2014), among other 7 seabird species has been identified during sampling conducted on board artisanal purse seine boats.

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.

October 2018 update:

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.

The Fisheries Research Institute (INPESCA) has cooperated with stakeholders to provide logbooks for recording bycatch, incidental and ETP species catches according to FAO protocols. A software platform has been developed to record incidental catches (Zones XV-X).

R23-R25

References

R23 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

R24 BirdLife International, 2012. *Spheniscus humboldti*. In: IUCN 2013. IUCN Red List of Threatened Species, Version 2013.1. [Accessed 24th October 2013

R25 INPESCA (March 2018) Manual de ingreso de datos pesqueros flota de cerco de la octava región (Software platform for the registry of incidental fishing) 5pp

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). However, it should be noted that in this particular fishery, "penetration windows" exist, where industrial operations within the first five nautical miles offshore is permitted.

October 2018 update:

Industrial fishing for small pelagic stocks is prohibited from the foreshore for a distance of five nautical miles.

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. Compliance measures recently introduced to the artisanal fishery (artisanal extraction regime) should be monitored during future assessments to verify that this sector is complying with allocated quota regimes. The bulk of the catch of this fishery is from the artisanal sector.

It has also become a conservation measure for the bulk of fishery resources that spawn near the coast and in inland waters. This regulation is directly related to the opportunities of protecting and recovering coastal pelagic resources, being of benefit mainly to anchovy and common sardine. It may be temporarily suspended through authorizations for research fishing and dredging that allow the temporary entry of industrial vessels into the reserve zone, in specific areas and during specific periods.

R26-R28

References

R26 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.

R27 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.

R28 IFOP, 2015. Estatus y posibilidades de explotación biológicamente sustentables de los principales recursos pesqueros nacionales año 2016": Anchoveta V-X Regiones. September, 2015. 118 pp.

Standard clause 1.3.3.2

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

Evidence

As mention previously the purse seine fishery has no impacts on the key physical structure of the ecosystems. However due to the low trophic level of the species under consideration there can be an effect in other species which prey on the species under assessment. To account for the predation of these species the models have been adapted and in recent years ecosystem consideration has been taken into account to set up the total fishery removals to ensure no impact on 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 Humboldt Penguin. Chile has implemented five marine reserves, with the objective of conserving natural banks of scallop, oyster and mussel, but also dolphins and penguins. Additionally, the introduction of the five-mile artisanal-exclusive zone near the shoreline has provided significant protection to spawners and other shallow-water organisms from industrial fishing activities. However,

it is likely that this benefit is significantly reduced by the consistently high levels of artisanal fishing in recent years which are much higher than removals by the industrial fleet over this period (figure 1).

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 evaluating the impact of the fishery in the ecosystem under an ecological risk assessment (ERA) is still under development within the framework of the SPRFMO.

R26-R28

References

Standard clause 1.3.3.3