IFFO RS Limited

T: +44 (0) 2030 539 195
E: Standards@iffors.com
W: www.iffors.com

Unit C, Printworks | 22 Amelia Street
London, SE17 3BZ | United Kingdom

Global Standard for Responsible Supply of Marine Ingredients

Fishery Assessment Methodology and Template Report V2.0

Fishery Under Assessment	**Chilean anchovy *Engraulis ringens* Chile EEZ V-X de Valparaíso a Los Lagos**
Date	**November 2019**
Assessor	**Jim Daly**

Application details and summary of the assessment outcome				
Name: Alimar and others				
Address:				
Country: Chile		**Zip:**		
Tel. No.:		**Fax. No.:**		
Email address:		**Applicant Code**		
Key Contact:		**Title:**		
Certification Body Details				
Name of Certification Body:		**SAI Global Ltd**		
Assessor Name	**Peer Reviewer**	**Assessment Days**	**Initial/Surveillance/Re-approval**	**Whole fish/ By-product**
Jim Daly	Vito Romito	3	SURV 1	Whole fish
Assessment Period	2018-2019			

Scope Details	
Management Authority (Country/State)	SUBPESCA & SERNAPESCA, Chile; SPRFMO (International Waters, Chilean Jack mackerel fishery)
Main Species	Chilean anchovy *Engraulis ringens*
Fishery Location	Chile EEZ V-X
Gear Type(s)	Purse seine
Outcome of Assessment	
PASS	Chilean anchovy *Engraulis ringens*
Clauses Failed	NONE
PASS	Common sardine *Strangomera bentincki*
Clauses Failed	NONE
PASS	Chilean jack mackerel *Trachurus murphyi*
Clauses Failed	NONE
Peer Review Evaluation	Agree
Recommendation	Approve

Assessment Determination

Chilean anchovy (anchoveta, *Engraulis ringens*) and Common sardine (araucanian herring, *Strangomera bentincki*) in the V-X Regions are harvested as part of a mixed pelagic fishery. These species are caught during the same period and area by artisanal and industrial fleets that fish for both using the same fishing gear (which is non-selective). A discard reduction plan was recently published. Discarding represents less than 10% of catches in both artisanal and industrial fisheries. The artisanal component of the fleet has shown a negligible discarding proportion in some regions.

The Subsecretaria de Pesca (Undersecretariat of Fisheries, SUBPESCA or SSP); positioned within the Chilean Ministry (MINECOM) provide policy settings and regulatory framework for domestic management of the sector. The Instituto de Fomento Pesquero (Fisheries Development Institute, IFOP) is the research arm; providing scientific advice to SUBPESCA on fisheries and aquaculture issues.

A management plan for Chilean anchovy and Common sardine (Chile V-X) has been officially adopted. The plan sets lines of action to address biological, economic, social and ecological matters. Fixed and mobile temporal closures to protect spawning stock and juveniles are included. Catches are reported annually. Catch limits are modified in an adaptive way during the year to account for updated scientific data. Direct hydro-acoustic surveys (Chilean anchovy and Common sardine) have been conducted biannually since 1999.

According to the latest (October 2019) assessment CCT-PP (Scientific and Technical Committee formed by IFOP and SUBPESCA) confirmed that the anchovy stock (V-X) is over-exploited but has moved away from the limit level of collapse (8% chance of being depleted).

According to the CCT-PP anchovy biomass has advanced in its recovery and is now close to target biomass and above Blim proxy as laid down in the management plan. A Biologically Acceptable Catch (BAC) of 162,876t was published for the 2020 fishery.

A final assessment of the Common sardine stock (V-X) by CCT-PP concluded that here was a 1% probability of the stock being over-exploited and a 2% probability of the stock being over-fished. CCT-PP recommended a BAC of 321,307t for the 2020 fishery.

The Kobe diagram for Chilean jack mackerel shows a spawning biomass with an increasing trend over the last 5 years, with biomass reaching levels around MSY (BD_{RMS}) in 2018. A stock re-building plan is in place.

Chilean anchovy, Common sardine and Chilean Jack mackerel 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 14.11.19).

The SAI Global assessment team recommends the approval of Chilean anchovy V-X *Engraulis ringens* whole-fish (Category A)); Common sardine *Strangomera bentincki* whole-fish (Category A)) and Chilean Jack mackerel (*Trachurus murphy*i) by-product (Category C) for the production of fishmeal and/or fish oil under the current IFFO-RS Whole fish and by-product Standard (v 2.0).

Peer Review Comments

Based on the latest assessment, the common sardine stock appears to be within sustainable management targets set to avoid overfishing and overfished status.

The anchovy stock appears to be increasing in size and is currently considered to be above Blim proxy level. However, the stock is still fished above fishing mortality targets. The Jack mackerel stock has been increasing in recent years due to a decrease in fishing mortality but has not yet reached the BMSY threshold. Bycatch, ETP, habitat and ecosystem effects of the fishery do not appear to be significant. The Peer Reviewer agrees that that Chilean anchovy V-X *Engraulis ringens* whole-fish (Category A)); Common sardine *Strangomera bentincki* whole-fish (Category A)) and Chilean Jack mackerel (*Trachurus murphy*i) by-product (Category C) should be approved for the production of fishmeal and/or fish oil under the current IFFO-RS Whole fish and by-product Standard (v 2.0).
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	Chilean Anchovy *Engraulis ringens*	37%	A1	Pass
			A2	Pass
			A3	Pass
			A4	Pass
Category A	Common Sardine *Strangomera bentincki*	58%	A1	Pass
			A2	Pass
			A3	Pass
			A4	Pass
Category C	Chilean Jack mackerel *Trachurus murphyi*	5%	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
Chilean Anchovy	*Engraulis ringens*	FAO 87 V-X region Chile	37%	Species-specific. Multi pelagic fisheries MINECON	A
Common Sardine	*Strangomera bentincki*	FAO 87 V-X region Chile	58%	Species-specific. Multi pelagic fisheries MINECON	A
Chilean Jack mackerel	*Trachurus murphyi*	FAO 87 V-X Central-southern Chile EEZ and high seas	5%	Species-specific. Multi pelagic fisheries MINECON	C

MANAGEMENT

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

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

Evidence:

M1.1:

MINECON:

Actions of Chile's Ministry of Economy, Development and Tourism (MINECON) involve promoting the development of the fisheries sector, along with the protection, conservation, and full use of resources and the marine environment.

Chile's institutional structure involves governing the fisheries sector centres around three key organisations, with several other institutions providing additional research and enforcement:

- The Subsecretaria de Pesca (Undersecretariat of Fisheries, SUBPESCA or SSP); positioned within MINECOM; provides policy settings and regulatory framework.
- The Servicio Nacional de Pesca (National Fisheries Service, SERNAPESCA) is also based within MINECOM. Responsible for executing fisheries policy through enforcement.
- The Instituto de Fomento Pesquero (Fisheries Development Institute, IFOP) is the research arm of the institutional framework and the primary source of scientific advice to SUBPESCA.

Management Committee:
A Management Committee for the Chilean anchovy and Common sardine (araucanian herring) mixed fishery in the assessment area is composed of SUBPESCA and SERNAPESCA members, artisanal and industrial fishermen and the processing industry. The Management Plan was officially adopted in 2015.

FISHERIES COUNCIL:
A National Fisheries Council; created by the Fisheries and aquaculture Law LGPA No. 18.892, ensures the participation of all stakeholders in the fisheries and aquaculture sector.

Regional Government Areas in Chile corresponding to fishery management units have been defined:

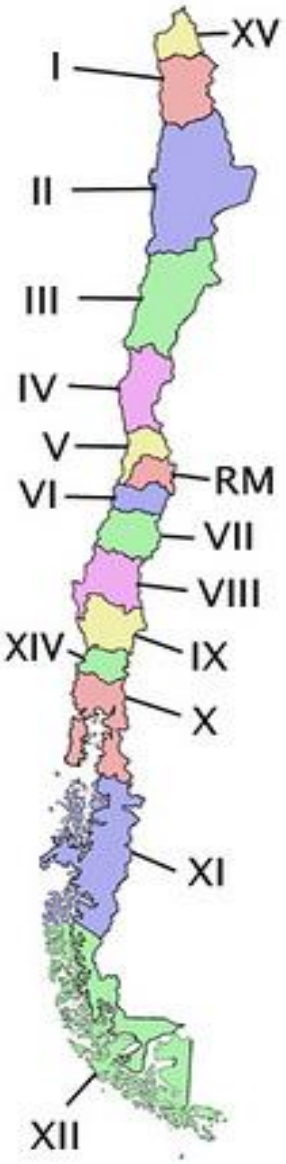

Figure 1a Regional Government Areas in Chile corresponding to fishery management units.
Adapted from https://pepeschile.com/es/regiones-chilenas-de-que-son-todos-estos-numeros **R1**

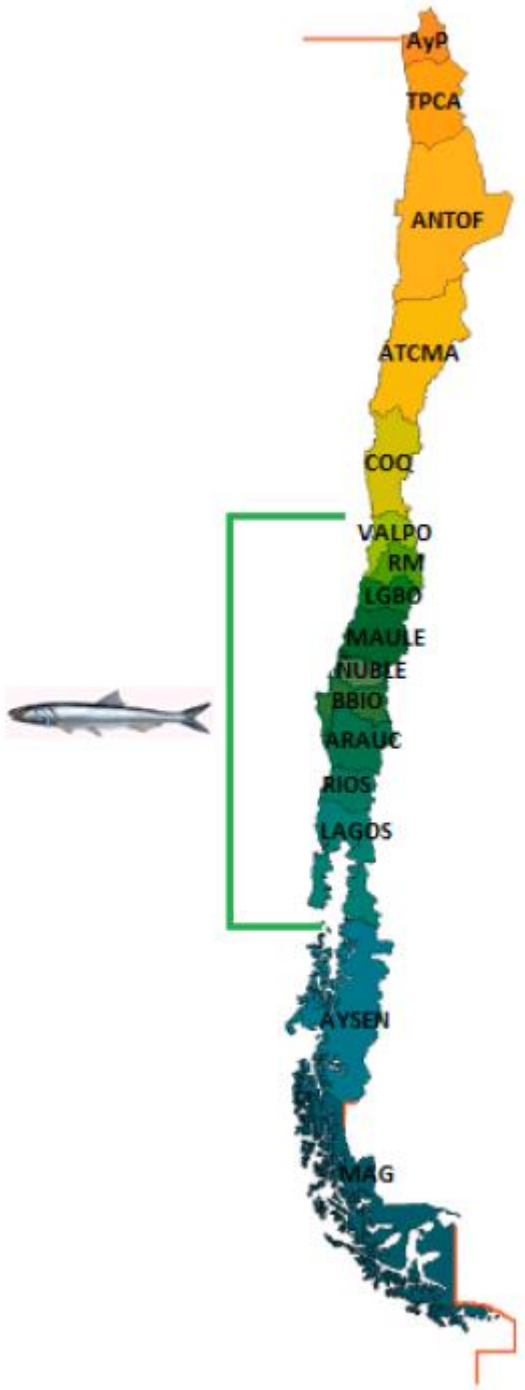

Figure 1b Management Unit for Chilean anchovy *Engraulis ringens* in the assessment area V-X (Valpo-Valparaíso to Biobío (Lagos) R2

M1.2:

IFOP: (Instituto de Fomento Pesquero):

IFOP is the organization responsible for sampling stocks and carrying out annual acoustic surveys. IFOP is a non-profit organisation created in 1964 under a joint agreement between the Chilean government, the FAO, and the UN Development Program. (UNDP). IFOP'S public role is to support sustainable development of Chile's fishing sector.

Scientific Committee**:**
A Scientific and Technical Committee for Small Pelagic fisheries (Comité Científico Técnico de Pesquerías de Pequeños Pelágicos, CCT-PP), formed by IFOP and SUBPESCA, analyse updates on stock status and catch projections and make official recommendations to the authorities; termed Biologically Acceptable Catches (BAC, CBA in Spanish).

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

M1.3
As laid down in the LGPA (see M1.4) one of the main objectives of the Act is to guarantee sustainability of Chile's marine resources. Long term management plans, which reference the Act, ensure rules are in place to achieve this objective. MINECON's mission statement, available on their website, is to generate feasible and sustainable development, with stable progressive equality in the allocation of economic interests.

M1.4
Legal instruments:
Adopted in 2013, the primary legal instrument for fisheries management in Chile has been la Ley General de Pesca y Acuicultura (LGPA) No. 20.657

The LGPA is a modification of the previous fisheries legislation, and includes:

- Commitments convened to manage the sustainable use and conservation of marine resources.
- Commitments convened to make key decisions on conservation measures based on scientific information above all other considerations. Recommendations of Scientific and Technical Committees (CCT-PP) have been made mandatory for all stakeholders.

The LGPA also includes commitments to develop management plans for any fishery with restricted access, and to review and update these plans every five years. An update of the management plan for Chilean anchovy in the assessment area in due in 2020. Article 5 of the LGPA states that SUBPESCA should determine Biological Reference Points (BRP's) for all targeted stocks. Biologically Acceptable Catches (BAC's) and resource recovery plans are implemented. under Article 9.

SUBPESCA resolution No 291/2015 states that all stocks should be exploited around the MSY level, and that the MSY is the objective to be considered when quotas are established.

The LGPA does not legislate for catch restrictions when stocks are below limit biomass. Fisheries are not closed below this limit for social and economic reasons, and in order to monitor the recovery of the resource according to recovery plans. Recovery plans imply reductions in fishing mortality at levels below or equal to FMSY according to the expected time of recovery established by the Management Committees.

M1.5
Management Plans set lines of action to address biological, economic, social and ecological matters. There is consultation and evaluation of a series of harvest control rules and definitions of robust rules to allow viable mixed fisheries. Minutes of these and other CCT-PP meetings are published on the relevant websites.

M1.6:
Stock-recruitment and spawning periods are closely monitored by IFOP, per region. Results of acoustic surveys are published in monthly bulletins (Informes) which also contain details of closed seasons by area and general information on stock status. Regulations on quota swaps between different fleet sectors and quota distribution through fishing regions are also made available here.

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

R1-R10

References p29

Standard clauses 1.3.1.1, 1.3.1.2

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

Evidence

M2.1

Compliance both within and outside Chile's EEZ is monitored by a number of different entities:

- **SERNAPESCA:**
  Carry out audits of capture fisheries; implement surveillance and control of compliance with all legal provisions relating to fisheries.
  Health and environmental monitoring of aquaculture. Develop strategies and procedures for prevention, surveillance and control of high-risk diseases.
  Information and sectoral statistics. Managing fisheries and aquaculture records.
- **Chilean Navy:**
  Within Chile's Exclusive Economic Zone (EEZ) the Navy monitor an area covering approximately 4,542,990 km^2 ensuring the prevention of depredation of natural resources by protecting the ecosystem from unauthorized activities.
- **Observer Programme**:
  In 2014 Chilean fishing trips carried observers on 9.1% of high seas trips and 15.2% of trips within the Chilean EEZ.

A Project FIPA (2018-49) has been launched by the Ministry. This involves the design and implementation of management strategies in the assessment area. Recommendations from CCT-PP will be incorporated in this Project in order to strengthen harvest control rules in the fishery.

M2.2

The LGPA defines a range of sanctions for offences including fishing with an unlicensed vessel, illegal discarding, incorrect logbook use, failure to report landings and fishing in a region or fishery other than the one for which the vessel is licenced. Other sanctions are in place for industrial vessels landing more fish than they have quota for.

Depending on the offence, sanctions can include one or a combination of: monetary penalties; suspension of fishing licence; and revocation of licence.

M2.3

In 2005, a national action plan was approved with the aim of preventing, deterring and eliminating IUU fishing. The fishery is monitored and there is no currently no evidence of widespread IUU fishing activities. Chile is now involved in an international program to avoid illegal fishing; ''Acuerdo sobre medidas del Estado rector del Puerto "(Port State Measures). This program obliges landings from other countries to be controlled by Chile and applies to foreign flagged vessels fishing in Chilean waters.

M2.4

Industrial vessels operate under mandatory VMS monitoring. SERNAPESCA carry out audits of capture fisheries; implementing surveillance and control of compliance. Within the EEZ the Chilean Navy monitor an area covering approximately 4,542,990. Km^2.

R5, R8, R12

References p29

Standard clause 1.3.1.3

CATEGORY A SPECIES

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

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

A1.1.

Fishery-dependent data is collected through port sampling of landings (SERNAPESCA Inspectors) and observer reports (IFOP directed). Indirect assessments are conducted using a statistical catch-at-age model allowing the incorporation of SSB, Catch Per Unit of Effort (CPUE), Fishing mortality (F), catch-by-age and year and recruitment indices.

Global captures of anchovy in the assessment area (Jan-Sept 2018) totalled 42,000t; while for the same period in 2019 captures totalled 121,000t.

A1.2

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

Preliminary results of the evaluation of biomass, abundance by size and spatial distribution of anchovy in the assessment area (May 2019 PELACES survey) have been reported (SUBPESCA Oct 2019). Total biomass in the assessment area (Chile V-X) was calculated at 786,931t representing 126 billion individual fish. Of this biomass figure 314,601t (40%) were new recruits to the fishery; of the abundance figure 104 billion (83%)

were new recruits to the fishery. Biomass levels were equal to the historical average for the autumn survey; recruitment levels were the highest observed in 10 years (Figure 2):

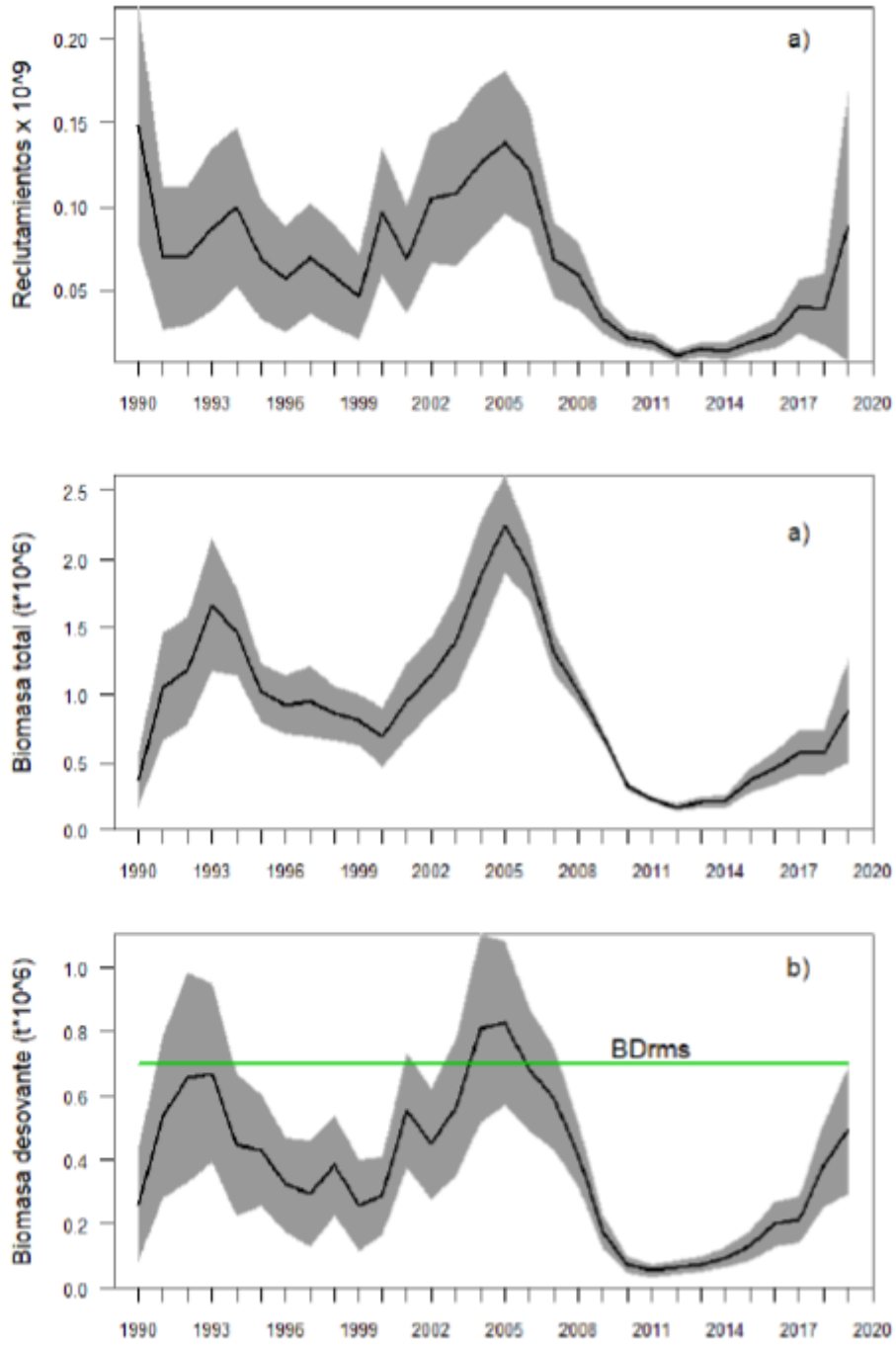

Figure 2 (Upper panel) Anchovy recruitment (billions); (Middle panel) Total biomass (millions t): (Lower panel) Spawning stock biomass (millions t) Green line SSBMSY= BDrms R7

R4; R7; R10-R12

References p29

Standard clause 1.3.2.1.1

A2	Stock Assessment - Minimum Requirements		
	A2.1	A stock assessment is conducted at least once every 3 years (or every 5 years if there is substantial supporting information that this is enough for the long-term sustainable management of the stock) and considers all fishery removals and the biological characteristics of the species.	Pass
	A2.2	The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.	Pass
	A2.3	The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status.	Pass
	A2.4	The assessment is subject to internal or external peer review.	Pass
	A2.5	The assessment is made publically available.	Pass
	Clause outcome:		**Pass**

A2.1

Hydro acoustic surveys have been conducted biannually since 1999 by means of two cruises: RECLAS in January (summer season; over the recruitment period) and PELACES in May (autumn season). Together with fishery-dependent data IFOP conduct annual stock status assessments which are presented every year to SUBPESCA through meetings of the Scientific Committee for Small Pelagics (CCT-PP).

A2.2

Biomass target reference points - BMSY proxy -are defined at 55% of virgin spawning stock biomass (SSB0). Limit reference points - Blim proxy – are set at 27.5% of SSB0. Target fishing mortality is associated with the fishing intensity that maintains BMSY, being estimated at FMSY proxy. Each annual assessment provides updates on reference points calculated relative to stock status. SSBMSY for the stock is calculated according to the management plan. Stock status is referenced using Kobe plots:

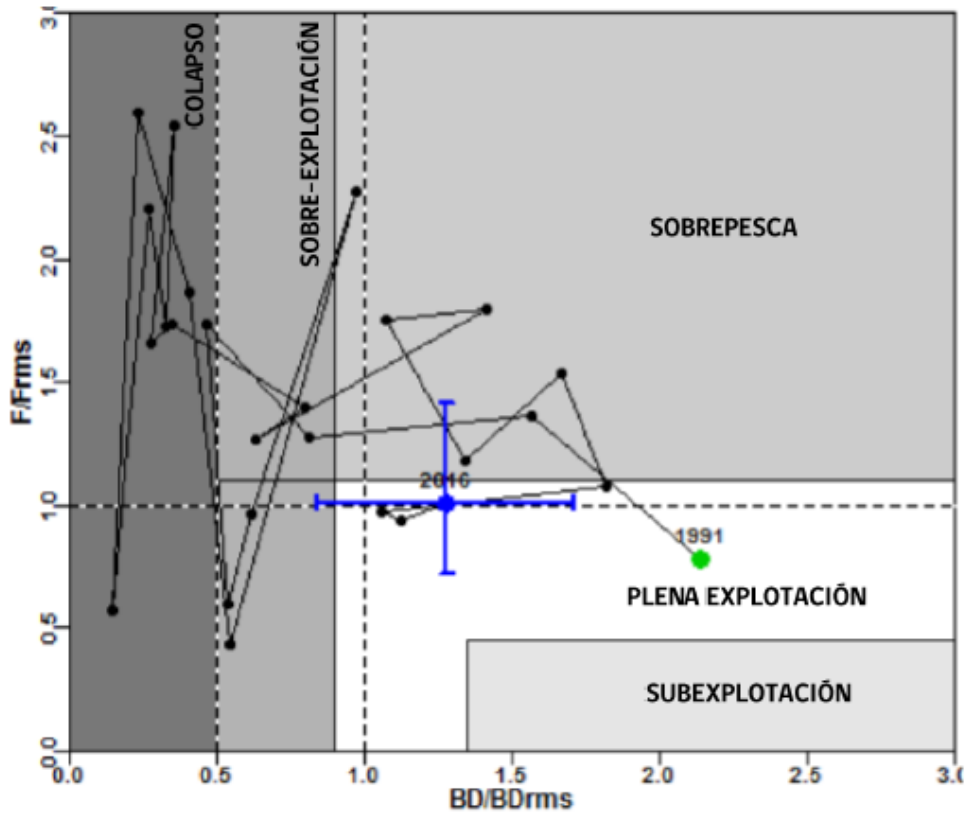

Figure 3: Kobe plot: BD/BDrms= SSB/SSBmsy; Frms = Fmsy; Plena explotacion=fully exploited; Sobrepesca=overfished; Sobre explotacion = over exploited; Colapso = collapsed R10

A2.3:

When incorporating information from the autumn survey in advice previously released in July the 2019 stock is considered to be over-exploited (BD / BDRMS <0.9) with a 10% probability of being exhausted / collapsed and a 31% probability of being over-fished:

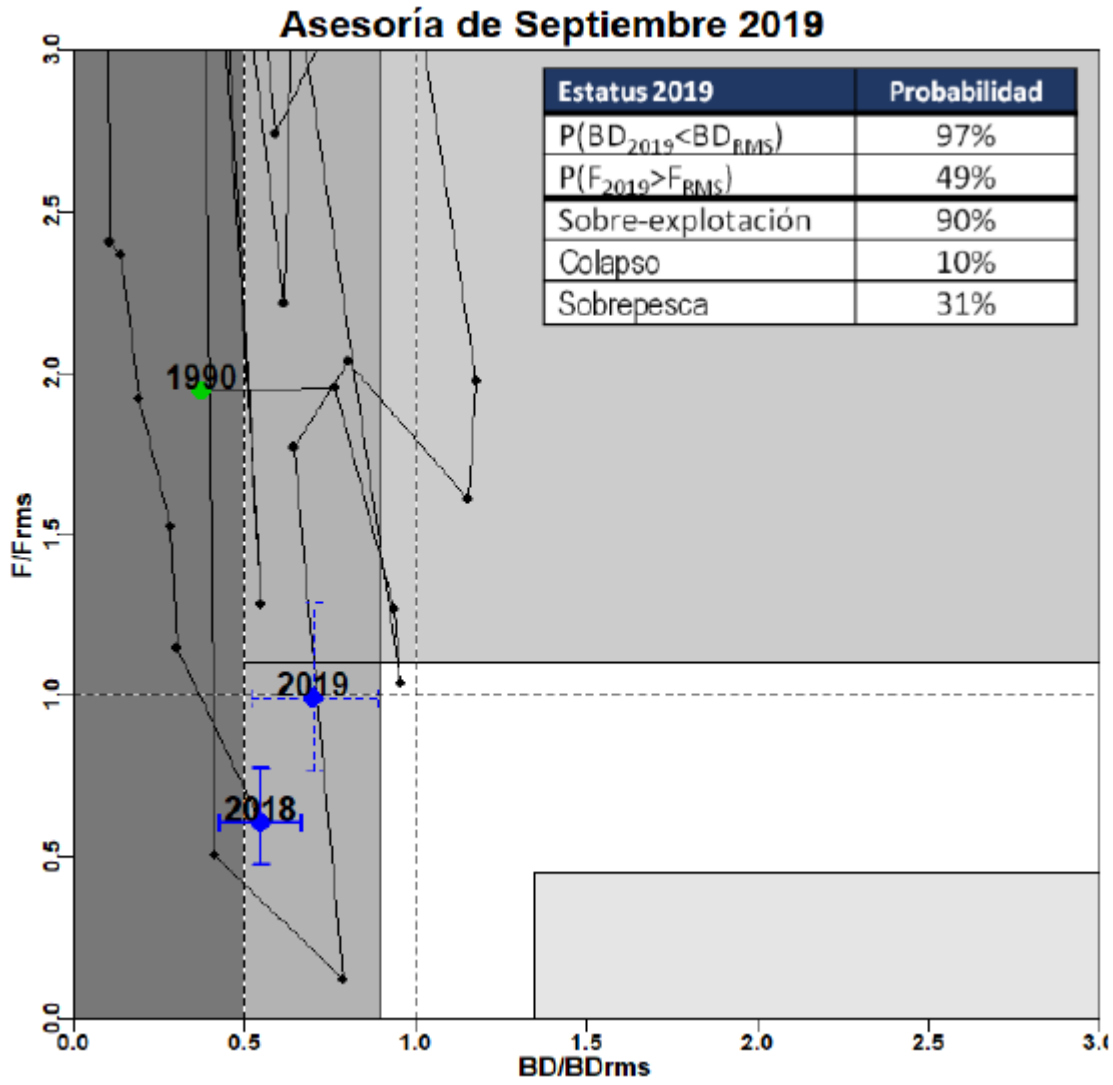

Figure 4: Kobe plot for Chilean anchovy Valparíso-Los Lagos X axis F/FMSY Y axis SSB/SSBMSY
Blue crosses indicate confidence intervals (stock moving away from collapsed state). R7

Information for 2019 is based on assumptions of catches; fleet age composition and fishing mortality. Stock status estimates for 2018 are based on complete information; these data were considered when assessing the Biologically Acceptable Catch (BAC) for 2019. Results from the 2019 autumn survey were also used in the calculation. Recruitment was estimated to correspond to average recruitment from 2008-19 which is the highest in the series. Spawning stock biomass is in excess of Blim proxy.

The recommended BAC range (2020) for the stock was calculated (discard rate 1%) at 162,876 t with a range from 130, 301t to 162,876t.

A2.4

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

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

A2.5:

Reports stock assessments and advice on BAC's can be found on IFOP and SUBPESCA websites. ACTAS published on SUBPESCA's website give summaries of the stock assessment process and confirm final decisions on BAC's. Stock-recruitment and spawning period are closely monitored by IFOP and published in monthly bulletins (INFORMES) which also contain details of closed seasons by area and general information on current stock status. All the information is available.

R4-R7, R10, R16-R17

References p29

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**

A3.1:

The BAC is set up every year following scientist recommendations and data from historical series of data and biannual surveys. BAC's are divided into three categories: research, industrial and artisanal. The number of commercial landings permitted are subject to change depending on survey results.

Normally BAC's are set up for two fishing seasons, effort may be controlled depending on the period of the year. By Chilean Law (LGPA Law No. 20.657) recommendations are provided as a range with the lower limit as 20% of actual recommendations. Annual temporal closures for the anchovy and sardine fishery in V-X protect spawning stock and juveniles. These closures are mobile and depend on monitoring of the biological indicators.

Workshops have been provided by Government to demonstrate best fishing practice including minimising discards and bycatch. Temporary closure orders have been issued by Government when high proportions of juvenile anchovy have been detected. When large quantities of juveniles are detected closure orders may be extended for periods of one week to fifteen days or more.

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

A3.2:
BACs are in place since 2001 and are split to accommodate commercial (both industrial and artisanal sectors) and research purposes. BAC's are allocated to the industrial fishery in three periods (January-April 85%, May-August 7% and September-December 7%) considering seasonality of the catch and temporal closures that protect 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. BACs are set up initially and can be corrected after acoustic surveys. Future assessments should verify that the newly introduced artisanal extraction regime has been fully implemented and is effective at maintaining landings from this sector within allocated BAC's. Landings from the industrial sector have not regularly exceeded (2001-15) levels indicated or stated in stock assessments.

A3.3:
In Chile Blim or Proxy is used to inform management decisions rather than prohibit fishery removals. The Fisheries Act (LGPA) does not establish catch restrictions when stocks are below limit biomass (for social and economic reasons and to facilitate further research). Instead a resource recovery plan must be implemented. Management committees are required to elaborate and implement such recovery plans (Article 9 LGPA); implying reductions in fishing mortality at levels below or equal to FRMS.

Other management strategies include the obligatory use of vessel monitoring systems (VMS), temporal closures (SUBPESCA and IFOP recommendations) and the recent mandatory use of on-board cameras to identify and quantify discards. Evidence has been provided that the precautionary approach is being taken in allocating BAC's.

IFOP produce outputs which indicate the level of risk associated with potential fishery management actions. SERNAPESCA is responsible for supervising enforcement and ensuring proper application of rules and regulations on fishing.

R7, R10

References p29

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**

A 4.1
Stock status estimates for 2018 are based on complete information; these data were considered when assessing the Biologically Acceptable Catch (BAC). Results from the 2019 autumn survey were also used in the calculation. Recruitment was estimated to correspond to average recruitment from 2008-19 which is the highest in the series. Spawning stock biomass is in excess of Blim proxy.

References p29

Standard clause 1.3.2.1.4

Species Name		Common Sardine *Strangomera bentincki*	
A1	**Data Collection - Minimum Requirements**		
	A1.1	Landings data are collected such that the fishery-wide removals of this species are known.	PASS
	A1.2	Sufficient additional information is collected to enable an indication of stock status to be estimated.	PASS
		Clause outcome:	**PASS**

Evidence

A1.1:

Fishery-dependent data is collected through port sampling of landings (SERNAPESCA Inspectors) and observer reports (IFOP directed). SERNAPESCA reported (January 2019) total artisanal landings in the assessment area of 329, 840t representing catches of 101% of the 2018 allocated quota; industrial landings of 11,194t represented 101.6 % of the 2018 allocated quota. During the 2019 fishery global captures in the assessment area (Jan-Sept 2019) totalled 239,826t.

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

A1.2:

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

Preliminary results of the evaluation of biomass, abundance by size and spatial distribution of common sardine in the assessment area (May 2019 PELACES survey) have been reported (SUBPESCA Oct 2019) (Figure 5):

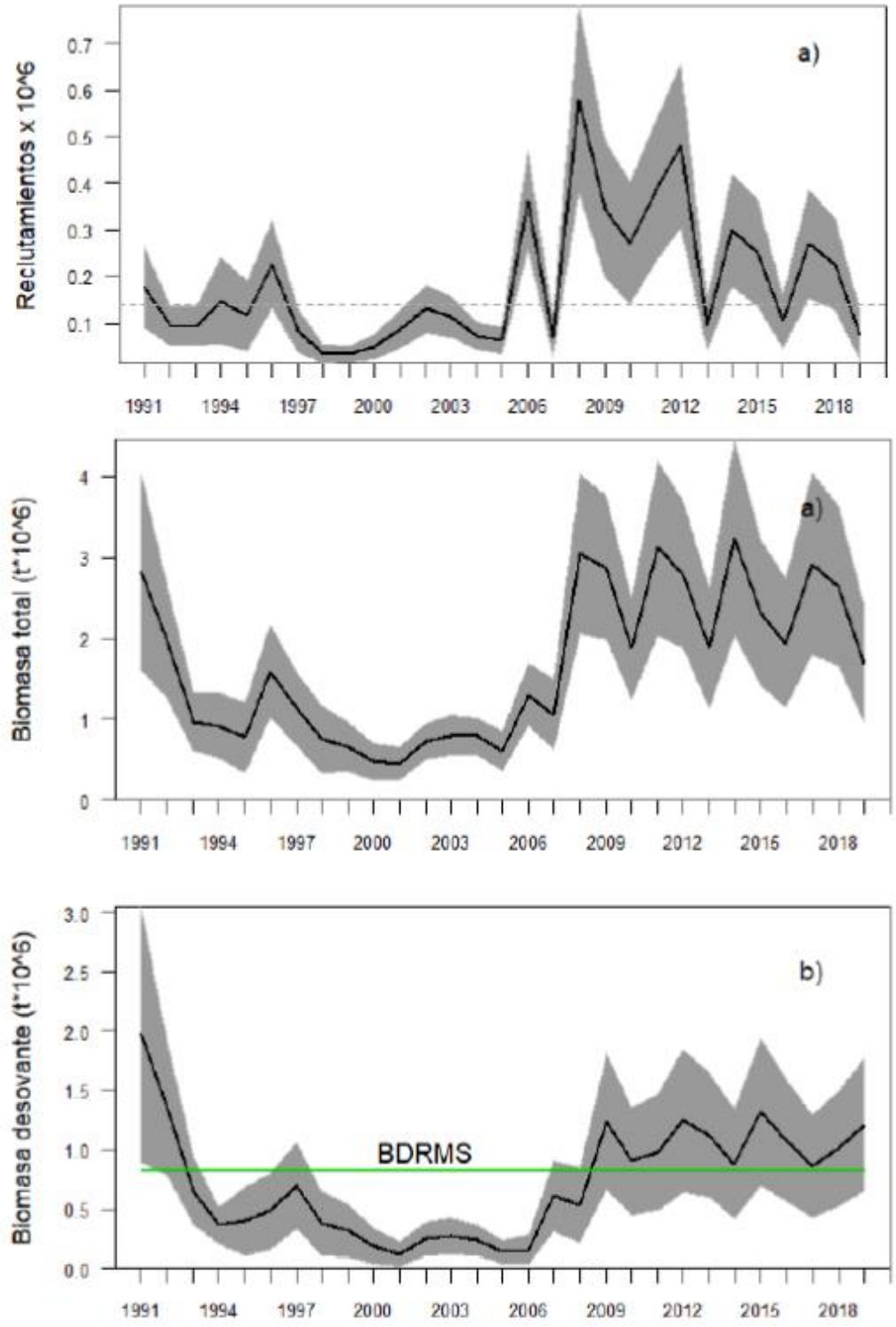

Figure 5 (Upper panel) Common sardine recruitment (billions); (Middle panel) Total biomass (millions t): (Lower panel) Spawning stock biomass (millions t) Green line SSBMSY= BDRMS (831,000t) R7

Recruitment levels (Figure 5 upper panel 74 billion) in 2019 were 35% less than the average recruitment from 1991-2007. Average biomass (2008-18) during a period of high productivity was 2.6 million t; for 2019 total biomass was estimated at 1.7 million t, a decrease of 35% (Figure 5 middle panel). Spawning stock (SSB) in 2019 was estimated at 1.213 million t, an increase of 46% over SSBMSY of 831,000t.

R7, R10; R12, R18

References p29

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.	
		Clause outcome:	**PASS**

Evidence

A2.1

Hydro acoustic surveys have been conducted biannually since 1999 by means of two cruises: RECLAS in January (summer season; over the recruitment period) and PELACES in May (autumn season). Together with fishery-dependent data IFOP conduct annual stock status assessments which are presented every year to SUBPESCA through meetings of the Scientific Committee for Small Pelagics (CCT-PP).

A2.2

Biomass target reference points - BMSY proxy -are defined at 55% of virgin spawning stock biomass (SSB0). Limit reference points - Blim proxy – are set at 27.5% of SSB0. Target fishing mortality is associated with the fishing intensity that maintains BMSY, being estimated at FMSY proxy. Each annual assessment provides updates on reference points calculated relative to stock status. Stock status is referenced using Kobe plots (See Anchovy assessment A 2.2).

A2.3:

The initial assessment of the stock (July 2019, with complete data from the 2018 fishery) was that there was a 4% probability of spawning stock being below SSBMSY and a 1% probability of the stock being over-exploited. At that time (July 2019) the stock was described as being fully exploited without being over-fished. A drop-in recruitment was observed following analysis of the Autumn 2019 (May) survey data. Increased levels of spawning stock observed in 2019 were the product of a good recruitment to the fishery in 2018 (Figure 5 lower panel).

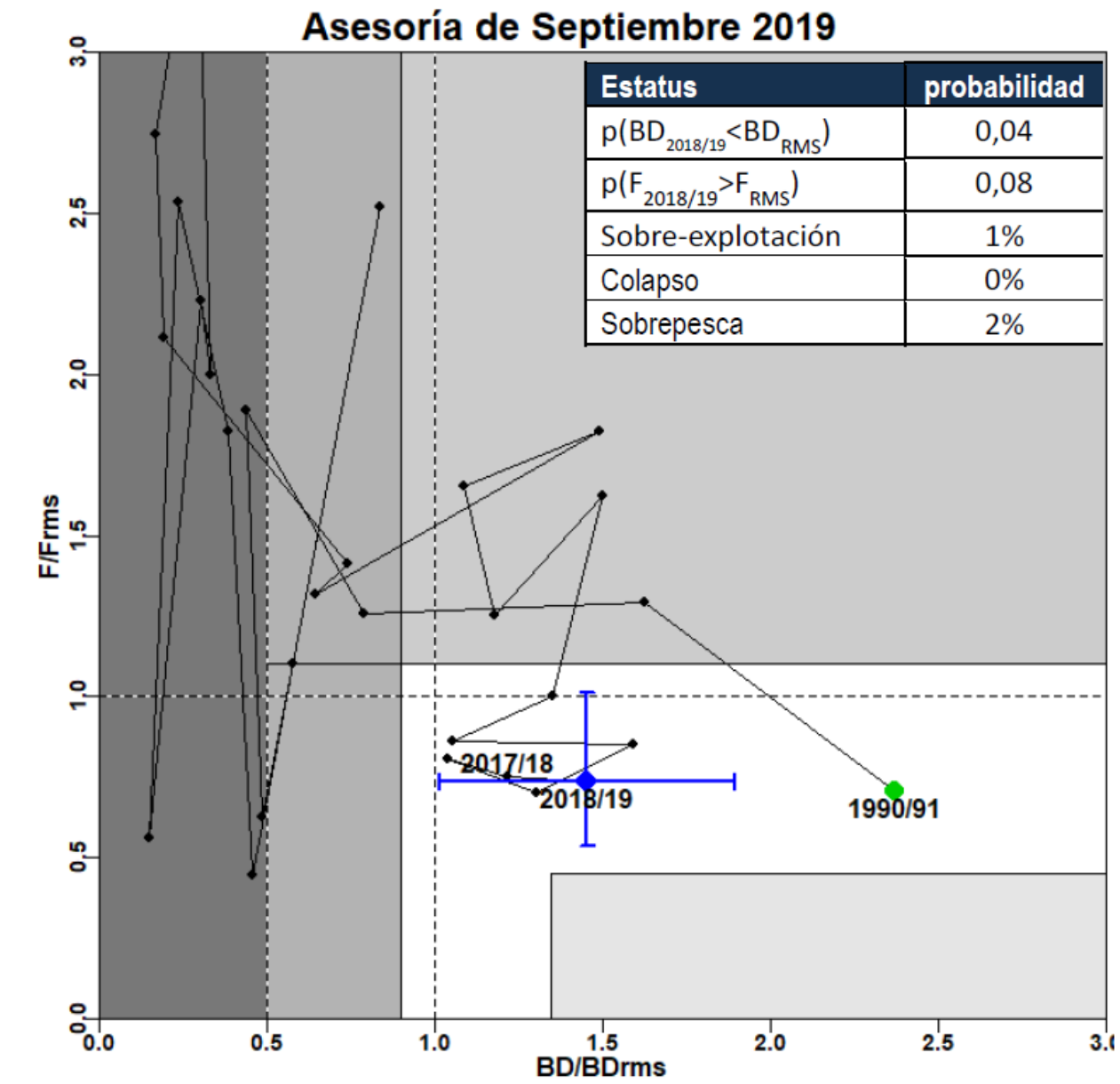

Figure 6: Kobe plot for Common sardine Valparíso-Los Lagos X axis F/FMSY Y axis SSB/SSBMSY
Blue crosses indicate confidence intervals R7

A final assessment of the stock (October 2019) was that there was a 1% probability of the stock being over-exploited and a 2% probability of the stock being over-fished (Figure 6).

CCT-PP recommended a Biologically Acceptable Catch (BAC) for 2020 of 321,307t, assuming a discard rate of 2%.

A2.4

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

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

A2.5:
Reports stock assessments and advice on BAC's can be found on IFOP and SUBPESCA websites. ACTAS published on SUBPESCA's website give summaries of the stock assessment process and confirm final decisions on BAC's. Stock-recruitment and spawning period are closely monitored by IFOP and published in monthly bulletins (INFORMES) which also contain details of closed seasons by area and general information on current stock status. All the information is available

R7, R10; R12, R17-R18

References p29

Standard clause 1.3.2.2, 1.3.2.1.2, 1.3.2.1.4

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

Evidence

A3.1:
The BAC is set up every year following scientist recommendations and data from historical series of data and annual surveys. BAC's are divided into three categories: research, industrial and artisanal. The number of commercial landings permitted are subject to change depending on survey results.

Normally BAC's are set up for two fishing seasons, effort may be controlled depending on the period of the year. By Chilean Law (LGPA Law No. 20.657) recommendations are provided as a BAC range with the lower limit 20% of actual BAC recommendations.

Workshops have been provided by Government to demonstrate best fishing practice including minimising discards and bycatch. Temporary closure orders have been issued by Government when high proportions of juvenile anchovy have been detected. When large quantities of juveniles are detected closure orders may be extended for periods of one week to fifteen days or more.

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

A3.2:
Landings of this species are keeping below upper advised BAC's and have been decreasing over the years (Figure 7):

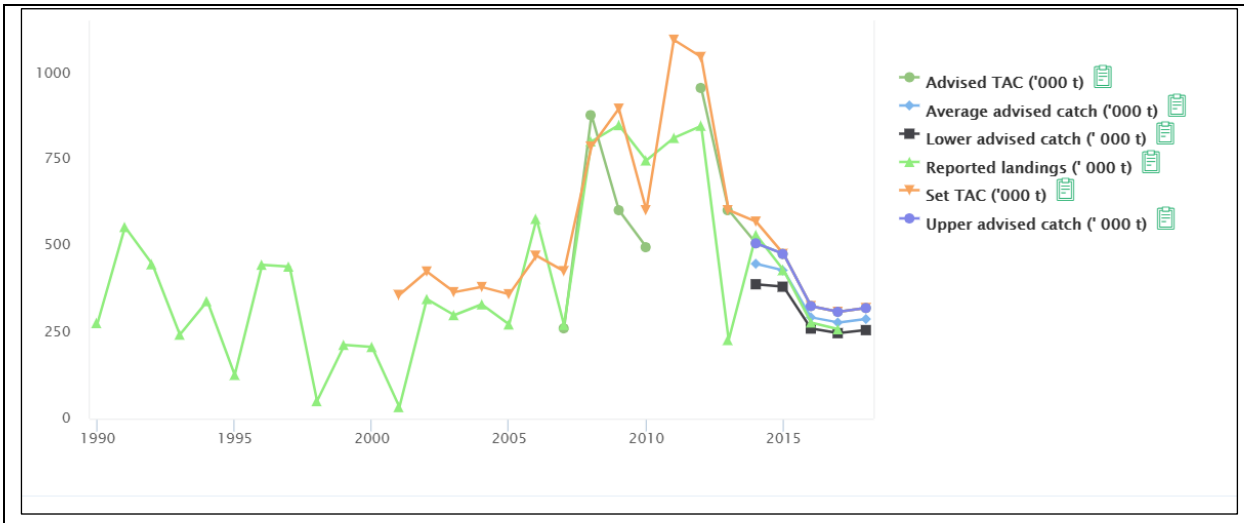

Figure 7. Catch and BAC from 1990-2015 Common sardine (V-X, Chile) R18

A3.3:

In Chile Blim or Proxy is used to inform management decisions rather than prohibit fishery removals. The Fisheries Act (LGPA) does not establish catch restrictions when stocks are below limit biomass (for social and economic reasons and to facilitate further research). Instead a resource recovery plan must be implemented. Management committees are required to elaborate and implement such recovery plans (Article 9 LGPA); implying reductions in fishing mortality at levels below or equal to FRMS.

Other management strategies include the obligatory use of vessel monitoring systems (VMS), temporal closures (SUBPESCA and IFOP recommendations) and the recent mandatory use of on-board cameras to identify and quantify discards. Evidence has been provided that the precautionary approach is being taken in allocating BAC's.

IFOP produce outputs which indicate the level of risk associated with potential fishery management actions. IFOP consider a range of sources of uncertainty, e.g. variability in CPUE data, environmental factors, stock aggregation for habitat or reproduction and acoustic biomass estimation parameters. Life history parameters are also considered (growth, mortality and maturity) as is the process error inherent in the evaluation model and the short history of the fishery

R7, R10, R17-R18

References p29

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.	
		Clause outcome:	PASS

Evidence

Increased levels of spawning stock observed in 2019 were the product of a good recruitment to the fishery in 2018. A final assessment of the stock (October 2019) was that there was a 1% probability of the stock being over-exploited and a 2% probability of the stock being over-fished (Figure 6).

CCT-PP recommended a Biologically Acceptable Catch (BAC) for 2020 of 321,307t, assuming a discard rate of 2%.

References p29

Standard clause 1.3.2.1.4

Species Name	Chilean jack mackerel *Trachurus murphyii*	
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

The South Pacific Regional Fisheries Management Organization (SPRFMO) conduct joint Jack mackerel assessments. Since 2013, catch limits have been agreed for the entire assessment area and the SPRFMO Convention area (where members and non-contracting parties operate; localized in the high seas) in accordance with scientific recommendations. The assessment model continues to be revised. Data, information, and decisions from all fishing countries are integrated into this assessment process. For 2019 SPRFMO advice for the whole assessment unit only was provided. A stock re-building plan is in place.

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

C1.2

BMSY is temporarily fixed at 5,500,000 tonnes and is used to determine the status of the stock. FMSY, also dynamic, is at 0.13 (Source SPRFMO). The estimated increase in biomass to 90% of interim BMSY, resulted from fishing mortality rates decreasing in the past three years to 0.09 in 2018, well below FMSY, along with a slight recruitment improvement. Catches were preliminarily reported at 472,966 tonnes in 2018 for the whole assessment area. The 2019 TAC was defined at 531,061 tonnes.

The Kobe diagram (Figure 8) for the stock shows a spawning biomass above 0.5 BMSY:

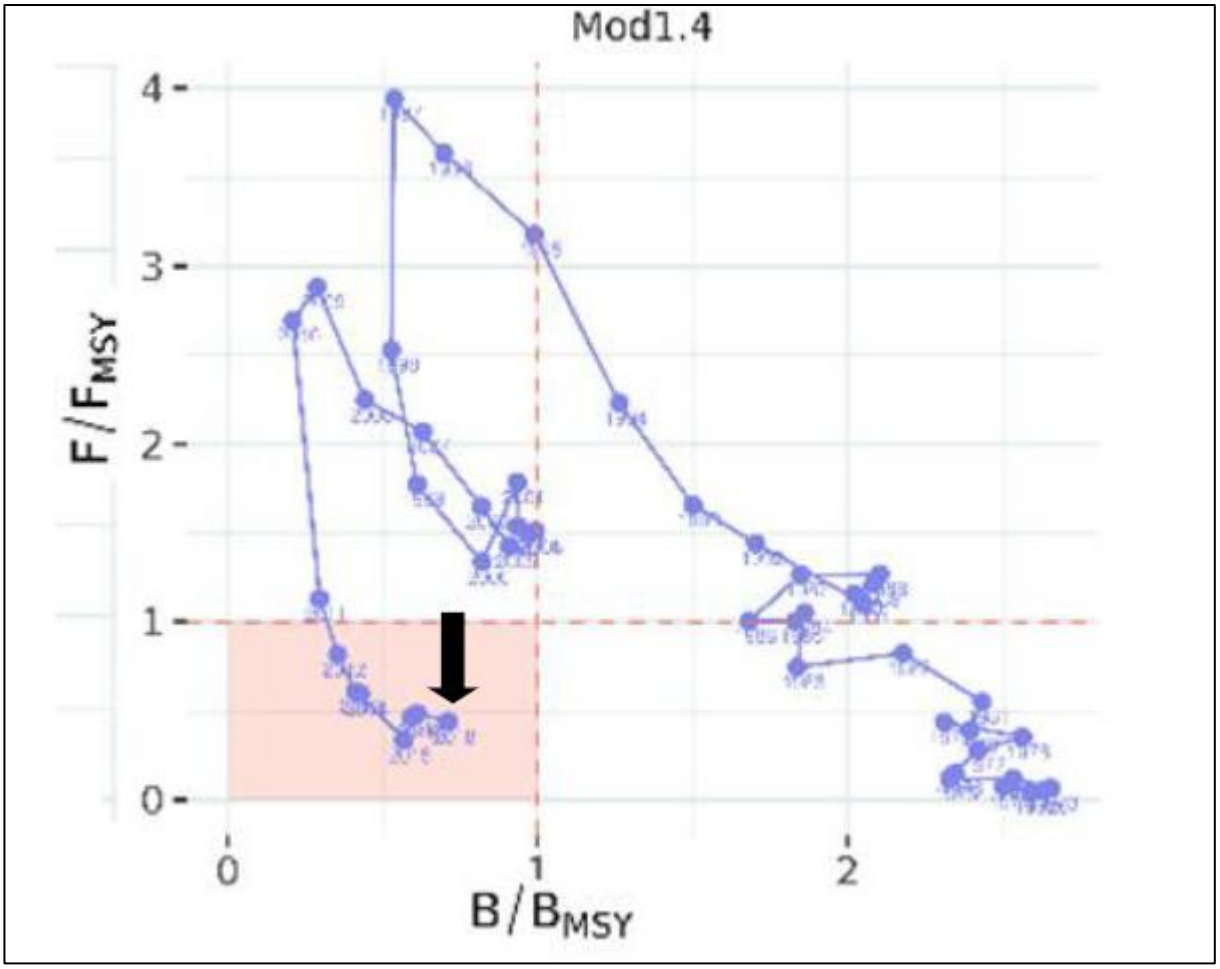

Figure 8. Kobe plot for Chilean jack mackerel. SPRFMO R19

CCT-PP consider the stock, in their latest assessment, to be over-exploited but not over-fished. Current biomass is above the 0.5 BMSY proxy threshold

R19-R21

References p29

Standard clauses 1.3.2.2

FURTHER IMPACTS

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

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

Evidence:

F 1.1

The fishery is known to interact with several ETP species: sea turtles, marine mammals, seabirds and sharks, most of which are released just after being caught. Among these, are the Humboldt Penguin *Spheniscus humboldti* ("Vulnerable"- IUCN), Peruvian Diving Petrel *Pelecanoides garnotii* ("Endangered"- IUCN) and Smooth Hammerhead *Sphyrna zygaena* ("Vulnerable"- IUCN).

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

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

Specific logbook data for recording bycatch, incidental and ETP species capture according to FAO and ORP protocol (2017-2018) are available.

F1.2:

The purse seine is a non-selective fishing gear in relation to fish size, since the mesh size used is small enough (1/2" or 9/16") to prevent mass escapes 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 species to be caught can be previously selected, since both fishermen's experience and the use of echo sounders and sonar allow 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. This would appear to be the best action to take which allows the release of incidental catches of juveniles.

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.

F1.3:

The interaction of the fishery with ETP species is recently known after an analysis of the 2014-2016 time series. Several mitigation measures have been recommended in the recently published discard reduction plan.

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

- A software platform developed for the registry of incidental fishing in the operation of industrial fleets (XV-X).
- On-board vessel protocols for the release and treatment of ETP fauna.
- Training programs for crews of fishing vessels.

- For the Jack mackerel fishery ecological risk assessments (ERAs) to determine the impact of the fishery on bycatch species are being conducted by SPRFMO in the Convention area. This will include an observer programme. Updates on this initiative will be published on SPRFMO's website. At the time of writing of this report no progress has been reported by SPRFMO.

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.

R13-R14; R22-R23

References p29

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:

A recently convened Habitat Monitoring Working Group (HMWG) under the auspices of SPRFMO and ICES has as its terms of reference to provide indicators obtained from the monitoring of the environment as a future management tool. Information will be derived from the Jack mackerel fishery, acoustic surveys (scientific and from the fishery), oceanographic and biological surveys and remote sensing data.

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

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

F2.2:

For the Jack mackerel fishery an assessment of the impact of fishing on non-target, associated or dependent species is being undertaken for all fleets operating in the Convention area, including an observer's program and ecological risk assessments (ERAs) to determine the impact of the fishery on bycatch species. No progress on this project was found on the SPRFMO's website (accessed 18.11.19).

No direct habitat damage is known in the mid-water trawl and purse seine fisheries. Such damage is unlikely due to the gear types used (Source SPRFMO 2014). Artisanal purse seines can reach dimensions of 30 fathoms depth by 240 fathoms length (approx. 55 m x 249 m) while industrial purse seines can reach up to 60 × 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.

F2.3:
A Reserve Zone for Artisanal Fishing has been established by law. This regulation is also in force around oceanic islands and inland waters. This measure prevents the industrial fleet from entering the coastal zone to carry out extractive fishing operations. It has also become a conservation measure for the bulk of fishery resources that spawn near the coast and inland waters.

This regulation is designed to protect coastal pelagic resources, being of benefit mainly to anchovy and common sardine fisheries. Reserve zones may be temporarily suspended through authorizations for research fishing and dredging that allow temporary entries of industrial vessels into zones only in specific areas and only during specific periods.

R13-R14; R22-R23

References p29

Standard clause 1.3.3.2

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

Evidence:

F 3.1

Annual temporal closures for the anchovy and sardine fishery in V-X protects spawning stock and juveniles. These closures are mobile and depend on monitoring of the biological indicators. An introduction of a five-mile artisanal-exclusive zone near the shoreline has provided significant protection to spawners and other shallow-water organisms from industrial fishing activities. A maximum catch limit per owner regime has been established for the industrial sector as well as an artisanal extraction regime for the artisanal sector (Regions V, VIII and X). Chile has implemented five marine reserves (see below) with the objective of conserving natural banks of scallops, oyster and mussel, but also of dolphins and penguins.

Fish stocks are known to be highly dependent on recruitment which in turn changes with environmental conditions and oceanographic conditions in the Chilean upwelling ecosystems like the El Niño and La Niña.

F 3.2:

Due to the low trophic level of the species under consideration there can be an effect on other species which prey on the species under assessment. To account for predation of these species' models have been adapted. In recent years ecosystem consideration has been considered when setting up total fishery removals ensuring reduced impact of fisheries on key roles of these species in the ecosystems.

A recently convened Habitat Monitoring Working Group (HMWG) under the auspice of the SPRFMO has as its terms of reference to provide indicators obtained from the monitoring of the environment that will inform future stock assessments of the Chilean Jack mackerel resource.

F 3.3:

In Chile, 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; extending over 5 nautical miles measured from the coast from the I Region to 41°28,6' S (located in the first third of the X Region) and from south of 41° 28,6' up to 5 nm west of the straight baselines. This regulation is also in force around the oceanic islands and in inland waters.

Between 2011 and 2016, IFOP and IMARPE (Peru) in collaboration with ONGs, implemented the GEF-UNDP Project "Towards an Ecosystem Approach to Management of the Large Marine Ecosystem of the Humboldt Current''. As a result, a Strategic Action Program (SAP) was prepared; during 2017 the design of the plan was developed. The SAP has been delayed in publication. The program is expected to be launched in March 2020. The 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 stock (V-X) of anchovy.

R13-R14; R22-R23

References

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

R2 SUBPESCA March 2019. Estado de situación de las principales pesquerías chilenas, año 2018.Anchoveta pp 8-11: http://www.subpesca.cl/portal/618/articles-103742_recurso_1.pdf

R3: Ministerio de Economía, Fomento y Turismo MINECON http://out.easycounter.com/external/minecon.gov.cl

R4 SUBPESCA http://www.subpesca.cl/portal/616/w3-channel.html

R5 SERNAPESCA www.sernapesca.cl

R6 IFOP https://www.ifop.cl/en/

R7 Comité Científico de Pesquerías de Pequeños Pelágicos (CCT-PP): Técnica Report No 5 (Oct 2019) http://www.subpesca.cl/portal/616/w3-propertyvalue-51142.html

R8 LGPA Law on Fisheries and Aquaculture No 20.657**:** http://www.subpesca.cl/normativa/605/articles-764_documento.pdf

R9 South Pacific Regional Fisheries Management Organisation https://www.sprfmo.int/

R10 Management Plan**:** Plan de manejo (2016) para la anchoveta y sardina común Subpesca 2017 72pp PDF http://www.subpesca.cl/portal/616/articles-94523_documento.pdf

R11 On port state measures to prevent, deter and eliminate illegal, unreported and unregulated fishing**.** FAO 2016 http://www.fao.org/3/a-i5469t.pdf

R12 SERNAPESCA (Jan 2019): Informe Final Control Cuota Pesquerías Anchoveta (*Engraulis ringens*) y Sardina común Regiones de Valparaíso a Los Lagos (*Strangomera bentincki*), año 2018 46pp http://www.sernapesca.cl/sites/default/files/informe_final_2018_pelagicos_anchoveta_y_sardina_comun_v-x.pdf

R13 Fishsource Chilean anchovy: Anchoveta: https://www.fishsource.org/stock_page/1380

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

R15 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.

R16 IFOP BOLETÍN SEMANAL N° 36 (Regiones Arica y Parinacota a Coquimbo) 12pp https://www.ifop.cl/wp-content

R17 ACTA CCT-PP: Biologically Acceptable Catches (2020) for Anchovy and Common sardine:pdf 10pp

R18 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

R19 6th Scientific Committee Meeting Report SPRFMO 2018 https://www.sprfmo.int/meetings/scientific-committee/6th-sc-2018/ p 16 Kobe Plot.

R20 Fishsource Chilean Jack mackerel: https://www.fishsource.org/stock_page/756

R21 SPRFMO. 2019b. CMM 01-2019 Conservation and Management Measure for Trachurus murphyi (Supersedes CMM 01-2018). 6 pp. https://www.sprfmo.int/assets/Fisheries/Conservation-and-Management-Measures/2019-CMMs/CMM-01-2019-5Mar2019.pdf

R22 SPRFMO HABITAT MONITORING WORKING GROUP 2019 Report 2pp https://www.sprfmo.int/assets/Fisheries/Habitat-Monitoring-WG/2019/30-Apr-2019-HMWG-meeting-report-with-participants1.pdf

R23 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.
Standard clause 1.3.3.3