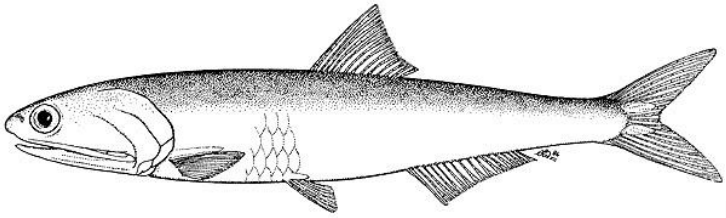
FISHERY ASSESSMENT REPORT

IFFO GLOBAL STANDARD FOR RESPONSIBLE SUPPLY OF FISHMEAL AND FISH OIL



R1

Engraulis ringens (Jenyns, 1842)

FISHERY:	**Chilean Anchovy (*Engraulis ringens)* Regions XV-IV**
LOCATION:	**Chile**
DATE OF REPORT:	**June 2017**
ASSESSOR:	**Deirdre Hoare**

1. APPLICATION DETAILS AND SUMMARY OF THE ASSESSMENT OUTCOME			
Name:			
Address:			
Country: Chile		**Zip:**	
Tel. No.		**Fax. No.**	
Email address:		**Applicant Code**	
Key Contact:		**Title:**	
Certification Body Details			
Name of Certification Body:	**Global Trust Certification Ltd.**		
Assessor Name	**Peer Reviewer**	**Assessment Days**	**Initial/Surveillance/ Re-certification**
Deirdre Hoare	Virginia Polonio	2	Surveillance
Assessment Period	2016		
Scope Details			
1. Scope of Assessment	IFFO Global Standard for Responsible Supply – Issue 1		
2. Fishery	**Chilean Anchovy (*Engraulis ringens)* Regions XV-IV**		
3. Fishery Location	Chile Regions XV - IV		
4. Fishery Method	Purse seine		
Outcome of Assessment			
5. Overall Fishery Compliance Rating	Medium		
6. Sub Components of Low Compliance	None		
7. Information deficiency	None		
8. Peer Review Evaluation	Maintain approval		
9. Recommendation	Maintain approval		

2. QUALITY OF INFORMATION

Good

3. COMPLIANCE LEVEL ACHEIVED

Medium

Recommendation

4. GUIDANCE FOR ONSITE ASSESSMENT

Based on HIGH compliance findings

Based on MEDIUM compliance findings

Based on LOW compliance findings

5. ASSESSMENT DETERMINATION

The Chilean anchovy fishery in regions XV-IV has seen no substantial management changes since the time of the re-assessment. No substantial changes in the management or regulations systems have been defined to modify the level of compliance.

Chile has a robust legal and administrative framework for fisheries, where decisions are informed by annual surveys and fishery-dependent data. The stock is managed as two separate stocks (XV-II and III-IV) and is managed by Chile and Peru. Biomass and Fishing mortality reference points were revised in 2014 and adopted in 2015 in Chile. Regular scientific surveys during the year are conducted by both Peru and Chile scientific institutions, in order to evaluate the biomass of the stock. The Peruvian fishery was closed in the second fishing season of 2014 to allow recovery of the stock. In general, catches have been lower than the overall TAC. Reference points have been revised by external experts and were recently officially adopted. The TAC for 2016 was reduced according with the current stock status. The TAC for the season was reduced from 2,5 million metric tons to 1,8 million metric tons. Protective measures for spawning zones are in place. The stock was considered overexploited and overfished in the revision of stock status carried out in 2015. The reproductive stock has increased since 2010, after a period of decline, in 2016 the recruitment has been higher and for this reason the stock is not considered overfished in the last assessment report. However, the status of the stock is still within the overfishing zone between the limit and the target biomass reference point and it was recommended follow the objective suggested by Paya et al. (2014).

As at the time of the initial assessment, limited data were collected on levels of bycatch in the fishery, now a program to assess the bycatch in the fishery is ongoing and IFOP is getting data from the vessels of different fisheries to evaluate the non-target species captured by different fleets. Some preliminary data are already available*.

*(https://www.ifop.cl/nuestro-que-hacer/la-investigacion-pesquera/depto-de-evaluacion-de-pesquerias/proyectos-de-descarte/)

HIGH Compliance

A1, A3

MEDIUM Compliance

A2, B1, B2, C1, D1, D2, D3, E1, E2

LOW Compliance

SUMMARY OF LEVEL OF COMPLIANCE					
	The Management Framework and Procedures	**Stock assessment procedures and management advice**	**Precautionary approach**	**Management measures**	**Implementation**
legal and administrative basis	A1				
Fisheries management should be concerned with the whole stock unit	A2				
Management actions should be scientifically based	A3				
Research in support of fisheries conservation and management should exist		B1			
Best scientific evidence available should be taken into account when designing conservation and management measures		B2			
The precautionary approach is applied in the formulation of management plans			C1		
The level of fishing permitted should be set according to management advice given by research organisations				D1	
Where excess fishing capacity exist, mechanisms should be in established to reduced capacity				D2	
Management measures should ensure that fishing gear and fishing practices do not have a significant impact on non-target species and the physical environment				D3	
A framework for sanctions of violation of laws and regulations should be efficiently exists					E1
A management system for fisheries control and enforcement should be established					E2

KEY: Low Compliance: Medium Compliance: High Compliance:

6. RATIONALE OF THE ASSESSMENT OUTCOME

A. THE MANAGEMENT FRAMEWORK AND PROCEDURE

LEVEL OF COMPLIANCE	
A1. The management of the fishery must include a legal and administrative basis for the implementation of measures and controls to support the conservation of the fishery.	
LOW	An administrative framework that ensures an efficient management of the fishery for its conservation is not established.
MEDIUM	An administrative framework that ensures an efficient management of the fishery for its conservation is somehow established, but there is evidence of not being efficient to ensure the conservation of the stock.
HIGH	A legal and administrative framework that ensures an efficient management of the fishery for its conservation is established and works efficiently toward the conservation of the stock.

Determination: The 2015 reassessment described an extensive and robust fisheries management framework, which includes specific commitments to ensuring the sustainability of marine stocks. There have been no significant changes in the framework or fishery management organisations since that time.

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 Subsecretariat de Pesca (Undersecretariat of Fisheries, SUBPESCA or 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

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).

For more details on the fishery management in Chile please refer to the reassessment report.

R2, 4 – 8

LEVEL OF COMPLIANCE	
A2. Fisheries management should be concerned with the whole stock unit over its entire area of distribution and take into account fishery removals and the biology of the species.	
LOW	Fisheries management is not concerned with the whole stock unit over its entire area of distribution and do not take into account any of the matters listed in 'A1'.
MEDIUM	Fisheries management is concerned with matters listed in 'A1' but not entirely. Fisheries, in relation to 'A1' statement, should improve to ensure the long term conservation of the marine resource.
HIGH	Fisheries management should be concerned with the whole stock unit over its entire area of distribution and take into account: • All fishery removals • The biology of the species

Determination: Fisheries management takes into account all fishery removals and the biology of the species

however the Southern Peru/Northern Chile Stock is assessed and managed separately by Chile and Peru.

Anchoveta 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 (Serra *et al.*, 1979). There are three different anchoveta (*Engraulis ringens*) stocks (Cahuin *et al*., 2015):

1. the Northern-Central Peruvian stock, managed by Peru;
2. the Southern Peru/ Northern Chile stock, managed by both Peru and Chile, and,
3. 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 (Canales and Leal, 2009), however it is more likely based on genetic and other studies that there is only one stock (Ferrada *et al*., 2002; Cahuin*et al*., 2015).
Chilean anchovy fisheries are divided into three management units;

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

This report refers to the Anchoveta Regions XV-II and III-IV. The Southern Peru/ Northern Chile stock which includes Chile regions XV-II is distributed along Chilean and Peruvian waters, but is managed separately by these countries. No specific management plans are known to be in place for this stock, although several management measures are already used in both countries, including TACs, closed season and minimum mesh sizes (CeDePesca, 2010). A joint Peruvian-Chilean assessment workshop bringing together Chile's Fisheries Development Institute (IFOP) and the Peruvian Institute of the Sea (IMARPE) were held from 1982 to 2011 to evaluate both anchoveta and sardine, but are currently suspended. IFOP has continued to assess the stock, but without the most recent Peruvian survey and sampling data. Anchovy stock assessment is conducted separately for each fishery unit; XV-II Region fishery unit and III-IV Region fishery unit. Quotas are then issued at the Regional level.

Between 2011 and 2016, IFOP and IMARPE, in collaboration with ONGs, have implemented the GEF-UNDP Project "Towards an Ecosystem Approach to Management of Large Marine Ecosystem of the Humboldt Current. As a result, a Strategic Action Program was developed and during 2017 the design of the plan will be developed. It is expected to provide the basis for implementing a coordinated series of measures aimed at greater protection of fish stocks and coastal and marine habitats *(CIAM 2017)*.

There is a no discard policy in place for Chilean fisheries, meaning all by-catch is landed, but only target species appear to be sampled by SERNAPESCA. However, IFOP has started a program since 2013 to collect information on bycatch in demersal and pelagic fisheries. Last updated in September of 2016 the report shows the reported data of total composition of catch from the skippers. These data will be analyzed to manage the bycatch coming from different types of gears and fisheries.

The management of the Regions XV-II and III-IV fishery as separate populations assumes minimal interaction between this and the other anchovy populations.
R17

LEVEL OF COMPLIANCE	
A3. Management actions should be based on long-term conservation objectives	
LOW	Management actions are not based on long term management objectives.
MEDIUM	Management actions are based on long term management objectives. However the actions are not scientifically formulated.
HIGH	Management actions are based on long term management objectives, and actions are science based.

Determination: Management actions are based on long term management objectives, and actions are science based. A management plan is under development, until it is implemented a medium compliance rating remains appropriate.

No management plan is in place for this stock, but biomass target and limit, and target fishing mortality reference points are defined in Chile. However, current levels are not close to the target levels, and there is no harvest control rule to define TACs, but a management plan is under development *(SUBPESCA 2017b)*. Management actions generally aim at keeping spawning biomass at 60% of unfished levels to sustain the reproductive viability of the stock, according to SUBPESCA technical reports. In October 2016, the last monitoring report showed that the stock of immature fish was too high to start fishing and the season was delayed until the reproductive monitoring indicated that the spawning biomass is at the level based on long term objectives.

Under the Chilean General Law for Fisheries and Aquaculture, "the provisions of the Act shall subject the preservation of aquatic resources, and all extractive fishing, aquaculture, research and sport activities, which takes place in inland waters, internal waters, territorial sea or exclusive economic zone of Chile in accordance to Chilean laws and its signed international treaties". The Fisheries Research Fund under the Ministry of Economy is to finance research projects in aquaculture and fisheries, providing for the adoption of management measures of fisheries and aquaculture activities, which aim at the conservation of aquatic resources, considering both the biological and socio-economic aspects of fisheries.

The updated fisheries Law 20.657 states that the purpose of the Act "is to foster the conservation and sustainable use of aquatic resources through the application of a precautionary approach, an ecosystem approach to fisheries regulation and the protection of marine ecosystems in the world those resources". It also states that MSY is the objective to be taken into account when quotas are established.
R1, R2, 20

B. STOCK ASSESSMENT PROCEDURES AND MANAGEMENT ADVICE

LEVEL OF COMPLIANCE	
B1. Research in support of fisheries conservation and management should exist.	
LOW	Research to support the conservation and management of the stock, non-target species and physical environment does not exist
MEDIUM	Research to support the conservation and the management of the stock, non-target species and physical environment exists, however research programmes could be significantly improved to decrease scientific advice uncertainty.
HIGH	Research to support the conservation and the management of the stock, non-target species and physical environment exist, and existent research is considered most adequate for the long term conservation of the target, non-target and physical environment

Determination: Research to support the conservation and the management of the stocks exists, and existent research is considered adequate for long term conservation. However, research on the effects of the fishery on non-target species has been developing and no formal results are available yet.

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. Between 2011 and 2016, IFOP and IMARPE, in collaboration with ONGs, have implemented the

GEF-UNDP Project "Towards an Ecosystem Approach to Management of Large Marine Ecosystem of the Humboldt Current. As a result, a Strategic Action Program was developed and during this year, it will be designed. It is expected to provide the basis for implementing a coordinated series of measures aimed at greater protection of fish stocks and coastal and marine habitats (CIAM 2017).

Currently, regular scientific surveys, at least twice a year, are conducted by scientific institutions of Peruvian and Chile, in order to evaluate the biomass of the stock and oceanographic conditions.

Since 2010, a statistical catch-at-size model, to handle the uncertainty in age estimation is used by IFOP and considers the whole stock. Differentiation by fleet, addresses the different size structures of catches. Data inputs to the model include commercial landings data including 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. Model outputs are provided on a six-month scale to better represent the stock's dynamics with two peak recruitment periods. As previously proposed, IFOP is presenting stock status based on biomass and fishing mortality estimates as well as reproductive potential reduction (RPR) as an alternative analysis of stock status, to take into account the great productivity changes of small pelagic resources and the current high uncertainty in biomass and fishing mortality estimates *(IFOP 2016)*.

A workshop for revision of data and the model was held and an alternative model scenario was conducted using updated population parameter estimates, to provide a preliminary analysis of the impacts of observed accelerated maturity, e.g. smaller individuals reproductively mature. Preliminary results of this modeling exercise indicate that the stock status, expressed by the reduction of the spawning biomass and the reproductive potential, does not show important differences with respect to the base model. However, this scenario indicates a re-escalation towards lower total biomass, spawning biomass, reproductive potential, fishing mortality values and, on the other hand, a higher natural mortality *(IFOP 2016)*.

The CCT-PP established a working group to analyze in detail the new population parameters and their implications in stock status and advice catch levels *(CCT-PP 2016)*.

R 13, 17, 21

LEVEL OF COMPLIANCE	
B2. Best scientific evidence available should be taken into account when designing conservation and management measures.	
LOW	Scientific advice is not taken into account when designing conservation and management measures.
MEDIUM	Scientific advice is taken into account, when designing conservation and management measures. However some areas of discrepancy are identified that could have a significant impact in the long term conservation of the marine environment.
HIGH	Scientific advice is taken into account, when designing conservation and management measures, in a comprehensively manner.

Determination: Since 2013, there has been a legal requirement for SUBPESCA's technical recommendations (including TAC) to be adopted. The original IFOP advice is only available on request however it is clear from other sources that it recommends that F55%(XV-II) F60%(III-IV) as a proxy of mortality level to comply with Fmsy and prevent the overfishing of the stock.

In Chile, stock assessments are officially conducted by the Fisheries Development Institute ('IFOP') which includes different exploitation and risk options. Since 2013, the Technical Committee for the Small Pelagics fisheries (Comité Científico Técnico de Pesquerías de Pequeños Pelágicos, CCT-PP), integrated by IFOP and the SUBPESCA's representatives, analyzes IFOP's update on stock status and catch projections and makes the official recommendation to the Chilean fisheries authority. By law, advised TAC is given with a 20% range of recommendation. The TAC is also distributed between fishing season, if the fleet fishes the whole TAC in the

first fishing season the fishery is closed. Normally the TAC is distributed in because IFOP has been undertaken a monitoring survey to analysed the spawning biomass.

The update to the LGPA made it mandatory for the management recommendations of SUBPESCA's scientific/technical advisory boards to be adopted by fishery managers, including with regards to the setting of quotas. Final TACs do reflect the SUBPESCA recommendations; it is not clear the extent to which they reflect the original IFOP advice. The LGPA also states that quotas should be established using MSY as the primary technical parameter.

The biological closed areas are also recommended by IFOP and SUBPESCA announces in its website when these periods of time are set out. This measure pretends to keep the recruitment and the spawning biomass at level according the precautionary approach and to preserve the stock status.

For 2016, the advised catch – based on IFOP´s latest report (IFOP, 2015c) – was 760,000 tonnes, thus the quota recommended range was 608,000-760,000 tonnes (CCT-PP, 2015). For 2017, the total quota based on the F_{MSY} (0.59) could reach 1.1 million tonnes, with a risk level of 30% of exceeding the management objective *(IFOP 2016)*. However, due to the high instability of environmental conditions on the stock, an atypical El Niño in 2015-2016 and low levels of chlorophyll, the CCT-PP has recommended maintaining the same advice as for 2016, range of 608,000-760,000 tonnes *(CCT-PP 2016)*.

IFOP recommended the use of high-resolution satellite information for the monitoring of the pelagic ecosystem in northern Chile, to have a diagnosis of the productive levels of the environment and thus have a better understanding of the condition of the resource and catch levels that are biologically permissible for the sustainability of the fishery each year. Also, IFOP and the CCT-PP highlight the urgent need to readjust the modeling approach considering the new growth estimates of anchoveta for this stock *(CCT-PP 2016; IFOP 2016)*.

R13, 21

C. THE PRECAUTIONARY APPROACH

LEVEL OF COMPLIANCE	
C1. The precautionary approach is applied in the formulation of management plans.	
LOW	The precautionary approach is not applied in the formulation of management plans.
MEDIUM	The precautionary approach is applied, however not all uncertainties are taken into account.
HIGH	The precautionary approach is applied, taking into account uncertainties relating to the dynamic of fish population (recruitment, mortality, growth and fecundity), and the impact of the fishing activities, such as discards and by-catch of non-target species as well as on the physical environment (Habitats).

***Determination: The precautionary approach is applied in management plans for the target stock which currently is overexploited and overfished therefore not all uncertainties are taken into account*.**

The biological equilibrium reference point for both stocks has been set to prevent the spawning stock from decreasing to less than 55% (XV-II) 60%(III-IV) of that which would exist in the absence of fishing. In other words, it means that the stock should be exploited keeping at least 55 / 60% of the egg production in the long term (10-year period). In addition, given the different sources of uncertainty and high fluctuations due to environmental conditions, management measures aim to ensure that the risk of failing to reach the resource conservation objective in the long term should not exceed 10%.

Following this criteria the reference points proposed by the experts are in the table below:

Table 2. Reference points set out for anchoveta in 2016 (CCT-PP N°04/2016)

RECURSO	*proxy* F_{RMS}	*proxy* B_{RMS}	B_{lim}
Anchoveta XV-II	$F_{55\% BDR}$	55% BDPR (ó 50%B0)	25% B0
Anchoveta III y IV Regiones.	$F_{60\% BDR}$	60% BDPR (ó 55 %B0)	27,5% B0
Anchoveta V a X Regiones.	$F_{60\% BDR}$	60% BDPR (ó 55 %B0)	27,5% B0
Sardina Común V a X Regiones.	$F_{60\% BDR}$	60% BDPR (ó 55 %B0)	27,5% B0
Sardina Austral X Región.	$F_{60\% BDR}$	60% BDPR (ó 55 %B0)	27,5% B0

Regions III-IV

For 2017, the committee has recommended that the catches must be under the MSY which is established 50,700 tonnes. Therefore, the TAC should be set out 40,560 to 50,700 tonnes according the LGPA (artículo 153 letra c). The harvest strategy is following the precautionary approach and 30% of MSY is persevered.

Regions XV- II

The legal framework (LGPA Nº20.657) requires that all stocks be managed to meet MSY. In Chile, two technical workshops recently analyzed and proposed biological reference points for this stock (CCPP, 2012; SUBPESCA, 2012a; CCT-PP, 2014). During the last technical report the reference points were established as showed in table 2. The proxy for BMSY, 50%B0 (B0 = unfished spawning stock biomass) is proposed as the target biomass reference point, which correspond to 55%BDR (Spawning Biomass per Recruit). These data were updated and showed as follow:

Table 3. Reference points after analyzing more information in direct and indirect assessment, biological indicators and results of technical oversights of the main fisheries resources (CCT-PP N°04/2016)

RECURSO	*proxy* F_{RMS}	F / F_{RMS}	*proxy* B_{RMS} (miles tons)	B_{lim} (miles tons)
Anchoveta Zona Norte	0,58	2,73	2.000	1000
Anchoveta III y IV Regiones.	0,48	1,12	45	22,5
Anchoveta V a X Regiones.	0,396	1,00	562	281
Sardina Común V a X Regiones.	0,26	0,73	889	444,5
Sardina Austral X Región.	0,34	0,93	32,4	16,2

The Bmsy was established in 2,000 thousand tones and Blim 1000 thous. tonnes. The proxy for FMSY (F [~55%] BDR) was estimated as 0.58 (CCT-PP, 2016).

The stock assessment shows that in region (XV-II) the stock is overexploited and overfished and in region (III-IV) it is fully exploited.

R13, R14

D. MANAGEMENT MEASURES

LEVEL OF COMPLIANCE	
D1. The level of fishing permitted should be set according to management advice given by research organisations.	
LOW	The level of fishing permitted is not set according to management advice given by research organisations.
MEDIUM	The level of fishing permitted is higher than management advice given by research organisations. However, the difference is not considered to have a significant impact of the sustainability of the stock
HIGH	The level of fishing permitted is set according to management advice given by research organisations.

Determination: The level of fishing in 2017 has been set according to the advice of scientific organizations. As the original report is only available on request medium compliance is appropriate

Stock assessments are officially conducted by IFOP which includes different exploitation and risk options. Since 2013, the Technical Committee for the Small Pelagics fisheries (Comité Científico Técnico de Pesquerías de Pequeños Pelágicos, CCT-PP), composed of IFOP and the SUBPESCA's representatives, analyzes IFOP's update on stock status and catch projections and makes the official recommendation to the Chilean fisheries authority. By law, advised TAC is composed by a 20% range of recommendation.

Finally, the Minister of Economy, Development and Reconstruction proceeds to sign the TACs for each fishery unit and its distribution, in accordance with the Fisheries and Aquaculture Law. The TAC for the anchovy fishery is split to accommodate commercial and research purposes, and the commercial share is subdivided to accommodate the industrial and artisanal sectors. TACs are then allocated in several periods throughout the fishing season taking into account the seasonality of the catch.

The TACs allocated to the two management areas for industrial vessels in 2017 were set as follows:

- Regions XV, I, II: 631,061 t – Blim 25% B0
- Regions III, IV: 25,061.5 t –Blim 27,5% B0

The allocated TACs for 2015 for industrial vessels were as follows:
- Regions XV, I, II: 637,668t- Blim 25% B0
- Regions III, IV: 17,265 t Blim 27,5% B0

The assessment team has scored this issue as level of compliance medium because the original report from IFOP is not available.

R13, 21

LEVEL OF COMPLIANCE	
D2. Where excess fishing capacity exist, mechanisms should be in established to reduced capacity to allow for the recovery of the stock to sustainable levels.	
LOW	Mechanisms to allow for recovery of the stock to sustainable levels are not established.
MEDIUM	Mechanisms to allow for recovery of the stock to sustainable levels are somehow established. However there is no evidence of the efficiency of the methods used.
HIGH	Mechanisms are established to reduce capacity to allow for the recovery of the stock to sustainable levels and there are evidences of recovery.

Determination: Mechanisms to allow for recovery of the stock to sustainable levels are somehow established. However, there is no evidence of the efficiency of the methods used because the stocks are still overfished and overfishing is occurring.

In 1985, the high demand for fishing permits to work in pelagic fisheries forced SUBPESCA to regulate access to the fisheries, freeze the size of the fleet and the related fishing power and refuse new permits. All pelagic fisheries were declared to be fully exploited a definition that had not been used before in Chilean fisheries. In 2001 a new management scheme named Maximum Catch Limit per Firm (MCLF) was established, which is applicable to fully exploited fisheries. With the application of the MCLF management system, a high

proportion of the most important Chilean fisheries became subject to a form of Individual Transferable Quota (ITQ) system. In this, whenever a firm wants to sell a part of its fishing quota, that share is linked to the corresponding vessels and their respective licenses. The MCLF regime has caused a major reduction in fishing capacity in all regulated fisheries (without State intervention) and has increased the profitability of the industrial sector.

Artisanal fishers are registered on the National Registry for Artisanal Fishermen (NRAF) in the particular area they live. This program serves to control their number per Regional Area. Artisanal fishers are allocated exclusive fishing rights in the first five miles contiguous to the coastline and only under exceptional and regulated conditions can industrial fishing be authorized in these areas. However, evidence should be gathered at the next assessment to see if such restriction occurs and if it is effective at restricting the artisanal fleet's effort to TAC-defined levels

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

R10

LEVEL OF COMPLIANCE	
D3. Management measures should ensure that fishing gear and fishing practices do not have a significant impact on non-target species and the physical environment.	
LOW	There are no management measures to prevent the impact of the fishing methods and fishing practices on non-target species and the physical environment.
MEDIUM	There are management measures to prevent the impact of the fishing methods and fishing practices on non-target species and the physical environment. However it is not science based.
HIGH	There are management measures to prevent the impact of the fishing methods and fishing practices on non-target species and the physical environment. Measures are based on scientific information.

Determination: Some management measures are in place to minimise the impacts of the fishery on non-target species, but on the whole there is limited available evidence to determine the extent of these impacts. In particular, there is a lack of data on bycatch, including bycatch of ETP species.

Non-target species

There is no data on bycatch but it is considered to be low (IFOP, 2013; 2015c). South American pilchard *Sardinops sagax* was caught together with anchoveta during the history of the fishery (CeDePesca, 2010). The resource is collapsed, associated with adverse physical and biological environmental conditions for the resource. Still, the highest rates of exploitation occurred in the early 1990s, when the stock was already declining significantly. A quota is issued annually; in 2015 reported catches were 338 tonnes (SUBPESCA, 2016b), well below set TAC (SUBPESCA, 2014).

The new regulation of landing all the catches and the need to have quota to land commercial species will facilitate the reporting of non-target species. The projects in relation to the catches of non-target species are carried out by IFOP, and they will be capable of monitoring and regulating these species.

Ecosystems

Anchovy biomass is strongly affected by the oceanographic conditions; periodically, the upwelling that drives the Humboldt Current Large Marine Ecosystem's productivity, where the fishery operates, is disrupted by El Niño-Southern Oscillation (ENSO) events. The spatiotemporal variability of anchovy have been studied by several authors (Ballón et al., 2011; Bertrand et al., 2011; IMARPE, 2012a,b; Espino and Yamashiro, 2012;

Espinoza and Bertrand, 2014, among many others). During El Niño event, fish abundance and distribution are significantly affected, often leading to stock crashes and cascading social and economic impacts. These events cause regime shifts where anchovies and sardines alternate as the dominant species in the ecosystem. Still, both anchovy and sardine fisheries' collapses can be attributed to a combination of El Niño events and decadal shifts towards less productive conditions, and overfishing (Bertrand et al., 2011).

Kelvin waves and a strong El Niño event observed in 2014 and 2015 are considered to have caused a decrease of the coastal habitat (anchoveta habitat), decrease in nutrients and phytoplankton biomass (IMARPE, 2014a; 2015a) affecting the ecosystem (IMARPE, 2014a,c; 2015d).

ETP species

The fishery for anchovy is known to interact with several ETP species of sea turtles, marine mammals, seabirds and sharks, most of which are released just after being caught. Among these, are the Humboldt Penguin *Spheniscus humboldti* ("Vulnerable"- IUCN), Peruvian Diving Petrel *Pelecanoides garnotii* ("Endangered"- IUCN) and Smooth Hammerhead *Sphyrna zygaena* ("Vulnerable"- IUCN). The greatest impact of this fishery might be the decrease in the availability of anchovy, as it is an important prey for many of the species mentioned above (CeDePesca, 2010). Bertrand et. al. (2012) found out that the foraging efficiency of breeding seabirds may be significantly affected by not only the global quantity, but also the temporal and spatial patterns of fishery removals, thus an ecosystem approach to fisheries management should limit the risk of local depletion around breeding colonies using, for instance, adaptive marine protected areas. There are also concerns about Burmeister's porpoise *Phocoena spinipinnis* whose status is unknown, the Guanay Cormorant *Phalacrocorax bougainvillii* ("Near Threatened" – IUCN) and green turtle *Chelonia mydas* ("Endangered"- IUCN) which feed extensively on anchovy.

Physical environment

The impact of purse seine nets on the physical and biological environment of the sea floor is considered minimal, as nets are generally used at depths considerably greater than their size.

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E. IMPLEMENTATION

LEVEL OF COMPLIANCE	
E1. There should be a framework for sanctions of violation of Laws and regulations.	
LOW	A framework for sanctions of violation of Laws and regulations do not efficiently exist.
MEDIUM	A framework for sanctions of violation of Laws and regulations do exist but do not work efficiently.
HIGH	A framework for sanctions of violation of Laws and regulations exists and is proven to be efficient.

Determination: 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. Punitive proceedings are the responsibility of the regional SERNAPESCA director. In 2005, a national action plan was approved with the aim of preventing, deterring and eliminating IUU fishing, this regulation is in place and involved several institutions such as; Sernapesca who is in charge of enforcing, Oceana, the scientific research centres and Navy.

The regulation is applied for the whole Chain of Custody (CoC). Last October there was a meeting undertaken at the seminary "Abordando los desafíos para el combate de la pesca ilegal en Chile" to force this regulation and make sure the 72 % of fisheries resources in Chile, which are overfished, may be regulated and well managed versus illegal fisheries activities.

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LEVEL OF COMPLIANCE	
E2. A management system for fisheries control and enforcement should be established.	
LOW	A management system for fisheries control and enforcement is not established.
MEDIUM	A management system for fisheries control and enforcement is established but do not work efficiently.
HIGH	A management system for fisheries control and enforcement is established and work efficiently.

Determination: There is evidence of a fisheries control and enforcement regime in place in Chile, but more time to know the results of these projects are needed.

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.

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

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. Km2 ensuring the prevention of depredation of natural resources in an effort to protect the ecosystem from unauthorized 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; also new measures to enforce the national fisheries must be developed. Therefore, the assessment team can confirm that there are measures for fisheries control and enforcement but the new situation will be evaluated in future years.

R18-R19

7. KEY STAKEHOLDERS

8. REFERENCES

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