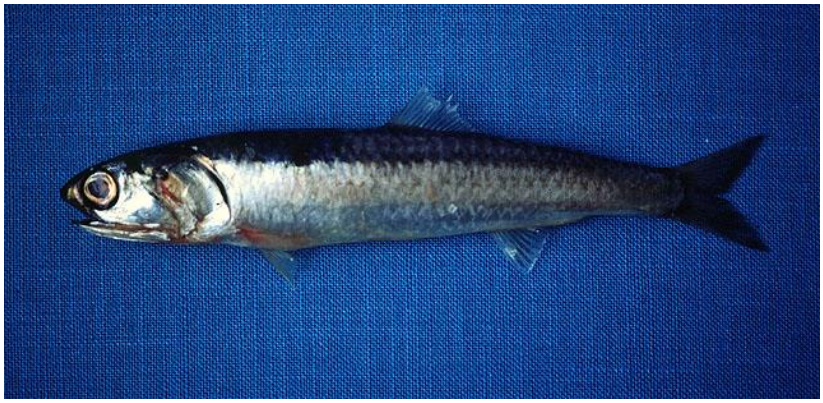
FISHERY ASSESSMENT REPORT

IFFO GLOBAL STANDARD FOR RESPONSIBLE SUPPLY OF FISHMEAL AND FISH OIL


R1

FISHERY:	**Peru Anchovy (*Engraulis ringens*)**
LOCATION:	**Northern Border Of The EEZ To 16^{O} South**
DATE OF REPORT:	**March 2016**
ASSESSOR:	**Sam Peacock**

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1. APPLICATION DETAILS AND SUMMARY OF THE ASSESSMENT OUTCOME			
Name:			
Address:			
Country: Peru		**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**
Sam Peacock	Deirdre Hoare	2	Re-Certification
Assessment Period	2015		
Scope Details			
1. Scope of Assessment	IFFO Global Standard for Responsible Supply		
2. Fishery	Anchovy (*Engraulis ringens*)		
3. Fishery Location	North-central Peru and Southern Peru/Northern		
4. Fishery Method	Purse seine		
Outcome of Assessment			
5. Overall Fishery Compliance Rating	Medium/High		
6. Sub Components of Low Compliance	None		
7. Information deficiency	None		
8. Peer Review Evaluation	Maintain approval		
9. Recommendation	Re-approve		

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2. QUALITY OF INFORMATION

Good; primarily government reports and websites

3. COMPLIANCE LEVEL ACHEIVED

Medium/High

Recommendation

Maintain fishery approval

4. GUIDANCE FOR ONSITE ASSESSMENT

Confirm that landings contain no Category C or Category D species, particularly jack mackerel and chub mackerel. Total bycatch is estimated at 3% of landings; individual species making up more than 0.1% of the total catch must be assessed.

Based on HIGH compliance findings

Based on MEDIUM compliance findings

Based on LOW compliance findings

5. ASSESSMENT DETERMINATION

In general, there have been no substantial changes to the management of the Peruvian north-central anchovy fishery since the time of the previous IFFO RS surveillance report. The fundamental management and research frameworks and systems remain in place and appear to be effective. There is new information on the reference points used by IMARPE to inform these recommendations, which has led to an upgrade of the compliance rating in section C1 from medium to high.

The main issues with the fishery are the lack of evidence of formal consultation of fishery stakeholders during the decision-making process, the uncertainty regarding the official reference points and also the lack of information on the potential impacts of the fishery on ETP species which led to the conditions listed above. However, based on the information in the IMARPE reports, the stock is in satisfactory condition and the scientific quota recommendations continue to be followed.

HIGH Compliance

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

MEDIUM Compliance

A1, A3, D3

LOW Compliance

NONE

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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:

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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: 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. No evidence was found of formal consultation of fishery stakeholders during the decision-making process.

M

Fisheries management in Peru falls under the jurisdiction of the Vice-Ministry of Fisheries under the Ministry of Production (PRODUCE). PRODUCE was created in 2002 by Peruvian Law number 27779 and its responsibilities include the development and implementation of policies and management plans, conducting fisheries research, establishing the regulatory framework for fisheries management, and issuing and administering regulations. PRODUCE also has the final say on annual catch limits, dictated through the publishing of Ministerial Resolutions. The stated functions of PRODUCE includes:

"Improve and strengthen the sectoral environmental management system, proposing policies and standards of environmental protection and conservation of natural resources, through supervision, monitoring and control of sustainable use of natural resources in the field of fishery subsectors and industry under the National Environmental Management System".

Within PRODUCE, the Instituto del Mar del Peru (IMARPE) is a specialised technical agency with responsibility for designing and conducting the scientific research necessary to ensure informed fisheries management decisions. IMARPE has laboratories located all along the Peruvian coast, and six dedicated research vessels. IMARPE reports that it uses an ecosystems-based approach to ensure it can provide accurate advice on the management of marine resources and the coastal environment. IMARPE is responsible for conducting stock assessments and recommending annual catch limits to PRODUCE.

Stock assessment reports do not appear to be made publically available, a conclusion supported by the FishSource profile of the fishery. However, in March 2015 IMARPE published their methodology for generating total permissible catch recommendations. When considered alongside regular reports summarising the outcomes of hydroacoustic research cruises and others detailing the process by which the results of these cruises and length-frequency sampling are used to generate catch recommendations, the process appears to now be fairly transparent. The results of the decision-making process are provided on the PRODUCE website in the form of Ministerial Resolutions.

No evidence was found of formal consultation of fishery stakeholders during the decision-making process.

R2 – 6

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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: There is no evidence of any substantial change in either the scientific understanding of the biological stock, or the stock management unit.		H

Anchovy in the South-eastern Pacific is widely distributed, ranging the full length of the South American coastline. This assessment is concerned with the northernmost stock, the Peruvian North-central anchovy fishery which extends from the northern end of the Peruvian EEZ down to 16^0S. That this represents a single biological stock is well documented in the scientific literature. The stock has been expanding in recent warmer years up to Gulf of Guayaquil (3°00' S), in Ecuador (Instituto Nacional de Pesca, 2009), where it is captured by a small pelagics purse seine fishery. The status of north-central anchovy as a single biological stock is confirmed by Cahuin *et al* 2015.

After carrying out the regular biannual hydroacoustic surveys, IMARPE gives out the maximum total permissible catch advice for each fishing season following a protocol (IMARPE, 2015a) which implies: 1) estimation of stock size structure and biomass using data from acoustic survey, 2) projection of size structures under different scenarios (exploitation, growth and mortality, which vary according to expected environmental conditions within the projection period) and 3) elaboration of a decision table. When abundance is low and environmental conditions are unstable, extra surveys are conducted (EUR-OCEANS, 2008; IMARPE, 2014d; 2015d). Discards are not directly recorded, but rather incorporated into stock assessments indirectly via acoustic surveys and population length frequency data.

R4,7

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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. However, there is some uncertainty regarding the official reference points The Peruvian North-central anchovy fishery is subject to both generic and stock-specific management objectives. The generic objectives include "ensure the sustainability of fisheries and of aquatic resources, by managing fisheries with an ecosystem approach, based on the best scientific evidence and including consideration of economic and social aspects", and "maintain environmental quality by implementing the National Environmental Policy for ecosystem conservation". It is not clear whether 4.5 million tonnes is an official reference point. Previous IMARPE reports have indicated various target and limit reference points, including B_{pa} = 5,000,000t; B_{MSY} = 6,000,000t; and B_{lim} = 4,000,000t. To add further uncertainty, FishSource reports that IMARPE uses other harvest control rules, including that fishing mortality should be below natural mortality, and that the harvest should never be more than 30% of the total estimated biomass. SSB has been estimated to be above 4,000,000t by every hydroacoustic cruise for more than a decade, with the exception of two estimates in 2014. R8,9		M

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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: The conservation and management of the North-central anchovy fishery is supported by the collection of fishery-dependent and fishery-independent data by IMARPE.

H

IMARPE is responsible for the assessment of Peruvian anchovy populations based on direct and indirect methods and processes studies. Fishery-dependent data are collected when catch is landed and on board vessels at sea, and include effort data. Fishery-independent hydro-acoustic surveys are also carried out regularly. The stock is assessed at least twice per year by virtual population analysis (VPA) and using integrated population models. Spawning areas are identified and Spawning Stock Biomass (SSB) is estimated using the Egg-Production Method (EPM).

A range of fishery-dependent and fishery-independent data are collected in support of the management of the stock. Landings data are collected by the international surveillance company SGS, and include date and location of catch, plus size frequency sampling. IMARPE publishes anchovy landings data for every individual day on its website, plus is planning to provide fortnightly summaries. IMARPE also conducts an observer programme to collect further data during fishing activity.

Total landings in the Peru North-Central anchovy fishery, 1963 - 2014. The y-axis shows landings in '000t. From the FishSource fishery profile.

In addition to the fishery-dependent data collected at landing, IMARPE conducts regular hydroacoustic cruises, during which size frequency data are also collected. Due to the short-lived nature of the species and the tendency of the population to rapidly fluctuate in size, the results of these cruises are essential components of the quota-setting process. In particular, the results of the cruises are used to estimate the total biomass of the stock, broken down into 16 latitude-based regions. IMARPE has published the biomass

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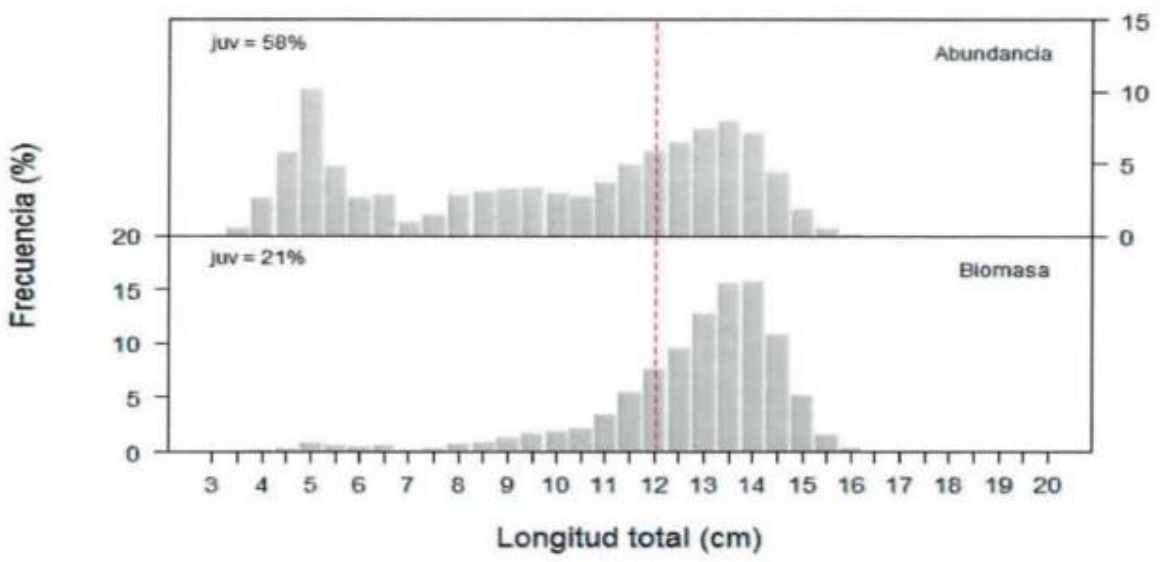
estimates for every cruise conducted since 1985; however, it is not clear what methodology was used to arrive at these estimates, or whether that methodology has changed over time. As a result of the most recent cruise, number 1508-10 conducted in 2015, total stock biomass was estimated to be 5,087,603t. This was a significant reduction in the estimate from the cruise earlier in the year (9,620,574), but such a difference appears to be entirely usual compared to historical fluctuations.



Catch composition size frequency (by number of individuals and biomass) of anchovy in the North-Central Peruvian stock, based on the 2015 hydroacoustic cruise 1502-04. 'Frecuencia' = Frequency; 'Longitud total'= Total length; 'Abundancia' = Abundance; 'Biomasa' = Biomass. From the 2015 IMARPE stock evaluation.

R8 – 12

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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 comprehensive manner.	
Determination: Scientific advice is taken into account, when designing conservation and management measures, in a comprehensive manner.		H

The north-central anchovy fishery is subject to a range of scientifically-advised technical measures, based on best available scientific understanding of the stock via advice provided by IMPARPE. The dates of fishing seasons are specified to protect the anchovy during the main spawning periods in January-March and July – October. Additional management measures in place include:

- Seasonal quotas, with closure of the fishery occurring if the quota is reached (see section D1).
- All vessels must have a valid fishing permit
- Minimum mesh size is 13 mm
- Minimum landing size of 12cm, although up to 10% of individuals may be smaller
- If the presence of juveniles exceeds 10% in the daily landings at a port, fishing will be prohibited fro m
  this port for a minimum of three days
- No fishing within 5 miles of the coast
- All vessels must have an operating satellite positioning system on board
- Daily lists published on the PRODUCE website of permitted and prohibited fishing vessels

In 2015, IMARPE recommended localised fishery closures due to the high incidences of juvenile anchovy in the catch. These closures affected holders of all types of licence, including artisanal, small-scale and industrial. An additional measure implemented in the same legislation restricted all vessels to one fishing trip per day throughout the north-central region. There were similar localised fishery closures during the April – September season, also due to the high incidence of juveniles in the catch. These instances provide strong evidence that in-season advice from scientists is followed closely by fishery managers, even where that advice recommends closure.

R2, 3

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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 process by which quotas and other management measures are determined appears precautionary and conservative.		H

According to IMARPE, landings and exploitation rates have been decreasing since 1994, due to more precautionary fishing policies (IMARPE, 2014c). However, fishing mortality or exploitation rates are not regularly published; fishing effort is reported as number of fishing trips and duration of fishing trips (IMARPE, 2014c; 2015c). Landings peaked in 1970 (around 10 million tonnes), dropped to a minimum in 1978 (480,000 tonnes), peaked again in 1994 (around 9 million tonnes). Over the past decade, landings peaked at 8 million tonnes in 2000 and 2004, since 2006 have stabilized around 5 million tonnes and dropped in 2010 to 3 million tonnes, recovering to 4 million tonnes in 2013. In 2014 only the first fishing season was opened, landings were low, 1.7 million tonnes (68% of set TAC). In the first fishing season of 2015 landings were higher than in 2014; 2.56 million tonnes were caught (99% of set TAC).

The stock analysis conducted for the evaluation report predicts the remaining biomass at the end of the fishing season under a range of possible catch limits (see graph below). These results include a confidence interval which allows the estimation of the chances that a given quota will ensure that SSB remains above a certain level. Although an explicit statement that this was the target reference point, the 2015 1st season IMARPE advice recommends a quota based on ensuring biomass remains above 4.5 million tonnes with 95% probability.

Adaptive management is used for this stock due to its strong dependence on environmental variables and rapid fluctuations in biomass (EUR-OCEANS, 2008). Some precautionary measures have been taken to allow the recovery of the stock from adverse environmental conditions, such as closure of the second fishing season in 2014 and lower TAC in second fishing season of 2015 (IMARPE, 2014c-e; IMARPE, 2015b-d).

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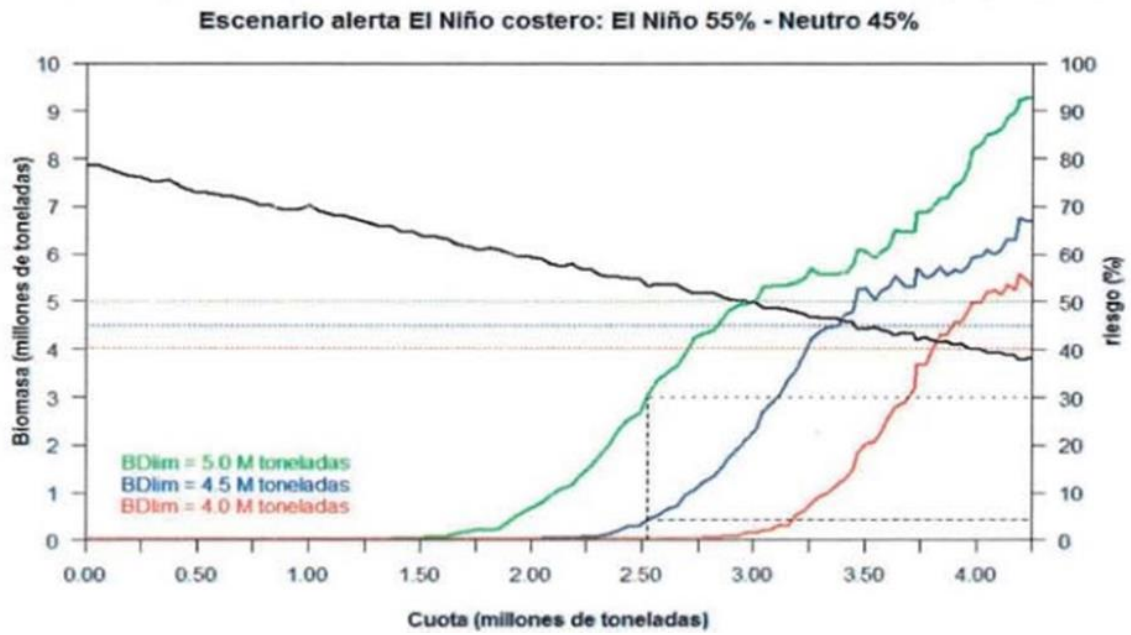

Predicted SSB in August 2015 (black line, left axis, millions of tonnes) under various scenarios for total catch limit (bottom axis, millions of tonnes) for the first fishing season in 2015. Coloured lines show estimated chance (right axis, % risk) of SSB falling below 5 million tonnes (green line), 4.5 million tonnes (blue line), and 4 million tonnes (red line) for various total catch limits (bottom axis, millions of tonnes). The final quota recommendation was 2.52 million tonnes, marked on this graph with a dotted line, which represented a 95% chance that SSB would be above 4.5 million tonnes in August 2015. From the IMARPE stock evaluation and projection for the first season in 2015

R4, 8, 9

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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.

H

Determination: The level of fishing permitted is set according to management advice given by research organisations.

Total fishing mortality is restricted using a system of Individual Vessel Quotas. The catch restrictions cover the entire industrial fleet, and lump both Peruvian anchovy and white anchovy into a single management unit. Although artisanal landings are not included within the quota system, these represent a negligible percentage of total mortality. Vessel Quotas were originally awarded to steel and wooden hull vessels which held licenses in the fishery prior to 2008 when the programme was introduced. A combination of catch history and vessel capacity was used to determine the size of these initial shares, which can be temporarily or permanently transferred between vessels owned by the same quota holder. Shares can also be revoked for non-compliance with the scheme's rules.

Each share represents a fixed proportion of the total national TAC (or *Maxima Captura Total Permisible,* MCTP), with 2.2% of the total reserved as a 'contingency stock'. The TAC is largely based on the recommendations provided by IMARPE, up to and including the closure of the fishery when biomass is too low to support removals. The table below lists the recommended TAC, actual TAC, and estimated landings for each fishing season in the last 3 years. In the first 2015 season, the TAC was set around 2% higher than recommended, and final landings were estimated to exceed the original advice by around 1.5%. In all other recent years for which data are available, landings have been at or below the advised level. Although the specific harvest control rules are uncertain (see A2), it is clear that fishery removals are reduced to reflect estimated biomass, and that they cease entirely when the stock falls below a certain level.

Scientific recommendation, actual quota, and final estimate of landings for anchovy fishery seasons from 2013 - 2016. Summarised from a variety of references, provided below.

Season	IMARPE recommendation	Actual TAC	Estimated Landings
2016 1st Season	Not yet available	n/a	n/a
2015 2nd Season	1,110,000t	1,110,000t	Not yet available
2015 1st Season	2,520,000t	2,580,000t	2,560,000t
2014 2nd Season	No 2nd season	Fishery remained closed	0t
2014 1st Season	2,530,000t	2,530,000t	1,720,000t
2013 2nd Season	2,304,000t	2,304,000t	Approx 2,300,000t

R13 – 22

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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: Fishing effort is primarily limited by strict quotas and licencing, and the fishery remains closed to new entrants. Seasonal quotas and vessel licensing are the primary management mechanism used to restrict excess fishing capacity. The fishery is closed to new vessels, and there is 24-hour monitoring of all 130 landing locations to ensure that only those vessels with a permit are allowed to land catch. There is substantial evidence that these mechanisms have been successful in the limiting of fishing effort, the most important of which is that seasonal landings have not exceeded quotas. R13 – 22		H

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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: There are some management measures to prevent the impact of the fishing methods and fishing practices on non-target species and the physical environment. Due to the continuing high levels of discarding and potential direct impacts on PET species, a medium compliance rating remains appropriate.		M

There is an on-board observer program in the industrial anchoveta fleet, however coverage is not informed. Peruvian law allows just up to 5% of non-target species bycatch in weight in this fishery (e.g. PRODUCE, 2015b,c). IMARPE reports bycatch species and frequency of occurrence in hauls per fishing season (e.g. IMARPE, 2015c); although no quantitative weight estimates are available. Chilean jack mackerel (Trachurus murphyi) and Chub mackerel (Scomber japonicus) are mentioned as the main incidental species in the anchoveta industrial fishery (IMARPE 2014a).

ETP

FishSource reports that the main threat posed by the fishery to ETP species is via a reduction in food availability; anchovy is an important prey for a range of ETP species including Humboldt penguin, Peruvian diving petrel, Guanay cormorants, and also the non-ETP fur seals and sea lions. Efforts taken to protect ETP species include the establishment of three major Marine Protected Areas (MPAs), covering a total area of 6,305km^2, the National Reserve System of Guano Islands, Isles and Capes; the Paracas National Reserve; and the San Fernando National Reserve. These areas correspond to IUCN category VI protected areas and represent important refuges for seabirds and marine mammals.

Ecosystem

A full and detailed report into the ecosystem aspects of the anchovy stock and fishery. Pelagic trawling continues to be widely acknowledged to have minimal impact on the physical environment; additionally, fishing in the anchovy fishery is prohibited within 5 miles of the coast.

R4, 23, 24

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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: A framework for the application of effective sanctions wherever laws and regulations are violated is in place. PRODUCE publishes lists of sanctions invoked and the relevant laws, fines, and fishing suspensions on the ministerial website, as required by Regulations of the Organization and Functions of the Ministry of Production. Other regulations relevant to fisheries sanctions include: • Ley 25977 Ley General de Pesca (Artículos del 76° al 83°) • Decreto Supremo 012-2001-PE Reglamento de la Ley General de Pesca (Artículos del 126° al 150°) • Decreto Supremo 016-2007-PRODUCE Reglamento de Inspecciones y Sanciones Pesqueras Acuícolas		H

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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: The fishery is subject to a well-established system for control and enforcement, with appropriate and sufficient actions taken by authorities to identify and tackle illegal activity.		H

The implementation and enforcement of fisheries laws and regulations is one of the stated functions of the Ministry of Production, through the Directorate General of Supervision and Control (DGSF), although landings are monitored and recorded by the international surveillance company SGS. The DGSF publishes and regularly updates a list of vessels prohibited from operating on the fishery, and also lists a significant number of 'featured inspections' and prosecutions on its website. The most recent of these involving anchovy was the confiscation of 7.5t of anchovy landed illegally by the artisanal fleet at the end of March 2016; however there are many examples of inspection and sanctioning available. An IFFO industry news update reports that there are up to 650 inspectors conducting daily control operations across Peru during periods of heavy fishing activity.

There does not appear to be any substantial evidence of widespread non-compliance, and FishSource reports that compliance in the fleet is generally considered to be high. However, some sources report that fishery enforcement in Peru is somewhat underfunded, which does sometimes lead to unsustainable fishing practices.

Industrial vessels are required to operate a Satellite Tracking System (SISESAT), a law which is designed to ensure they remain further than 5nm from the coast. In 2016, a mobile app introduced by the DGSF and incorporated into the SISESAT system won third place at the second Stop IUU Fishing Awards. PRODUCE states that the app allows accredited PRODUCE inspectors to check location, speed, direction and distance to coast with more accuracy than the traditional satellite systems.

R24-30

7. KEY STAKEHOLDERS

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8. REFERENCES

R1 – Image of *Engraulis ringens* by Philippe Béarez
http://www.fishbase.org/photos/PicturesSummary.php?ID=4&what=species

R2 -PRODUCE overview: http://www.produce.gob.pe/index.php/ministerio/acerca-del-ministerio

R3 -IMARPE overview: http://www.imarpe.pe/imarpe/index.php?id_seccion=I0169000000000000000000

R4- FishSource Peru Anchovy profile: http://www.fishsource.com/fishery/summary?fishery=Anchoveta+-+Peruvian+northern-central+stock

R5- IMARPE protocol for generating permissible catch limit recommendations:
http://www.imarpe.pe/imarpe/archivos/informes/imarpe/protocolo_captu_stok_ancho.pdf

R6- Example of hydroacoustic cruise results report:
http://www.imarpe.pe/imarpe/archivos/informes/imarpe_infor_ejec_cr_1508_10.pdf

R7 – Cahuin, S.M.; Cubillos, L. A.; Escribano, R. 2015. Synchronous patterns of fluctuations in two stocks of anchovy Engraulis ringens Jenyns, 1842 in the Humboldt Current System. J. Appl. Ichthyol. 31, 45–50, ISSN 0175–8659.
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