

IFFO RS V2.0



FISHERY ASSESSMENT METHODOLOGY AND TEMPLATE REPORT

Fishery Under Assessment	Panama Small Pelagics
Date	May 2018
Assessor	RS Standards

Application details and summary of the assessment outcome				
Name:				
Address:				
Country:		Zip:		
Tel. No.		Fax. No.		
Email address:		Applicant Code		
Key Contact:		Title:		
Certification Body Details				
Name of Certification Body:		RS Standards		
Assessor Name	Peer Reviewer	Assessment Days	Initial/Surveillance/ Re-approval	Whole fish / By-product
Assessment Period	Feb – May 2018			
Scope Details				
Management Authority (Country/State)		Panama		
Main Species		Pacific anchoveta, Pacific thread herring, Pacific bumper		
Fishery Location		Panama, Gulf of Panama		
Gear Type(s)		Purse seine		
Outcome of Assessment				
Overall Outcome				
Clauses Failed				
Peer Review Evaluation				
Recommendation				

General Results

General Clause	Outcome
M1 - Management Framework	PASS
M2 - Surveillance, Control and Enforcement	GAP
F1 - Impacts on ETP Species	GAP
F2 - Impacts on Habitats	GAP
F3 - Ecosystem Impacts	GAP

Note: This table should be completed for whole fish assessments only.

Species-Specific Results

Category	Species	% landings	Outcome (Pass/Fail)	
Category A	Pacific anchoveta	50-60%	A1	PASS
			A2	GAP
			A3	GAP
			A4	GAP
	Pacific thread herring	35-40%	A1	PASS
			A2	GAP
			A3	GAP
			A4	GAP
Category B	None		n/a	
Category C	None		n/a	
Category D	White mullet	0.1-2%	PASS	
	Cachema weakfish	0.1-2%	PASS [estimated]	
	Peruvian moonfish	0.1-2%	PASS	
	Sea catfish	0.1-2%	GAP	
	Pacific bumper	0.1-2%	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
Pacific anchoveta	<i>Cetengraulis mysticetus</i>	Gulf of Panama	50-60%	Yes	A
Pacific thread herrings	<i>Opisthonema spp</i>	Gulf of Panama	35-40%	Yes	A
Pacific bumper	<i>Chloroscombrus orqueta</i>	Gulf of Panama	0.1-2%	No	D
White mullet	<i>Mugil curema</i>		0.1-2%	No	D
Cachema weakfish	<i>Cynoscion phoxocephalus</i>		0.1-2%	No	D
Peruvian moonfish	<i>Selene peruviana</i>		0.1-2%	No	D
Sea catfish	<i>Ariopsis spp</i>		0.1-2%	No	D

Context for this Assessment Report

The Panamanian small pelagic fishery was the first fishery accepted into the pilot programme for the IFFO RS Improver Programme (IP), in November 2015. Since that time it has passed both the 6 month and 1 year surveillance assessments and remained in the IP, demonstrating considerable progress towards achieving full IFFO RS approval. In 2017, IFFO RS implemented two significant changes impacting the Panama small pelagic IP membership: firstly, Version 2 of the IFFO RS standard was launched in June 2017, including a substantial revision and update of the fishery assessment criteria and process. Secondly, the IP application and acceptance process was fully revised and strengthened to reflect changes in the way it was viewed by the reduction fishery supply chain.

Together, these events necessitate the re-visiting of the Panama small pelagic assessment and application. This assessment report represents an upgrade of the initial Version 1 fishery assessment conducted in 2015, updated to reflect both the changes in the IFFO RS fishery assessment process and the fishery itself over the last 3 years. From this report, the fishery will be able to make any required changes to its improvement timeline and ensure it is able to remain in the new IFFO RS IP until such time as it is able to achieve full IFFO RS approval.

Key 2017 updates as reported by CeDePesca

Throughout 2017, a number of areas were addressed relating to general improvement in fishery management for the Panamanian small pelagic fishery¹. Some of these key elements have been summarised below from the CeDePesca FIP updates.

2017

January – March 2017

- In January, a report on the bycatch observed by the Onboard Observers Program during the 2016 fishing season was prepared by CeDePesca and presented to Promarina. The database on catch and effort was also fully updated.
- In February, Promarina and CeDePesca coordinated the execution of a hydroacoustic survey in the Gulf of Panama. The survey took place onboard of Promarina's fishing vessels "Anchoveta" and "Tabor" from February 20th to 25th under the lead of hydroacoustic experts Albor Tecnológico and with collaboration of CeDePesca. The final report on the hydroacoustic survey was delivered by Albor Tecnológico to Promarina in March.
- In March, CeDePesca started the recruiting process for the 2017 Onboard Observers Program. Promarina has agreed to increase the coverage of the program from two onboard observers to three during the 2017 fishing season.

April – June 2017

- On April 20th, Promarina and CeDePesca have welcomed Procesadora Bayano (Probasa) to the FIP. Probasa is a fishmeal company that has recently started operations in the Gulf of Panama. An addendum to the Framework Collaboration Agreement has been signed to

¹ http://cedepesca.net/wp-content/uploads/2018/01/2018-01_Panamanian-small-pelagics-FIP_Progress-table.pdf

welcome Probasa to the FIP, and Specific Agreement N°6 has been signed by all FIP partners adopting the 2017 FIP Action Plan.

- Also in April, CeDePesca participated from the exploratory fishing trips that take place annually in coordination of ARAP before the start of the season onboard Promarina's vessels.
- In May, a biologist was trained to join the Observers Program. Two observers will be boarding Promarina vessels, and one will be observing Probasa vessels.
- On June 28th, ARAP sent a letter to Promarina and CeDePesca providing its opinions regarding the FIP's proposal for the fishery's management plan that was presented in mid-2016.

July – September 2017

- In August, Promarina, Probasa and CeDePesca met with ARAP to discuss changes to the proposed management plan for the fishery. Also in August, the Onboard Observers Program database was handed over to the authority.
- In September, the catch and effort database was updated with the information provided by Promarina. The size structure database was also updated with the information collected through the Onboard Observers Program.

October – December 2017

- On October 31, the 2017 fishing season ended, and the catch and effort database and size structure database were updated with the information of the whole season during November.
- In December, FIP partners held a meeting with ARAP to draft the FIP Action Plan for 2018. It should be noted that, for the first time during the implementation of this FIP, ARAP has requested to participate from the activity planning process.

Background

1.1 Overview of the fishery

Fishery Characterisation

This assessment covers the Panamanian industrial small pelagic reduction fishery. The following characterisation uses observer data from 2015², 2016³ and 2017⁴ to determine the typical catch composition.

The fishery is conducted by industrial purse seiners, and landed 107,600t in 2016. The fishery produces relatively low levels of bycatch, with three species groups representing around 95% of landings (although precise catch composition varies from year to year). Pacific anchoveta (*Cetengraulis mysticetus*) is the most common species in the catch, representing around 50-60% of landings, followed by Pacific thread herrings (*Opisthonema spp*) at around 35-40%. Also caught in significant volumes in some years is the Pacific bumper (*Chloroscombrus orqueta*), which can represent up to 5% of the catch. An IFFO RS fishery assessment requires a minimum of 95% of landings by weight to be assessed as Type 1 'target' species, and therefore this report considers these three species groups to be the Type 1 species.

Based on landings data from 2015-2017, the composition of the bycatch also varies from year to year. Species representing more than 0.1% of landings in one of those years include these include *Ariopsis* catfish, Mexican needlefish (*Tylosurus fodiator*), White mullet (*Mugil curema*), Chilhuil sea catfish (*Bagre panamensis*), Cachema weakfish (*Cynoscion phoxocephalus*), Pacific smalleye croaker (*Nebris occidentalis*), Mexican barracuda (*Sphyrna ensis*), Pacific sierra (*Scomberomorus sierra*), Boccone weakfish (*Cynoscion praedatorius*), Red sea catfish (*Bagre pinnimaculatus*), Peruvian moonfish (*Selene peruviana*), Brassy grunt (*Orthopristis chalceus*), Silver stardrum (*Stellifer illecebrosus*), Panama grunt (*Pomadasys panamensis*), "*Bardiela armata*" (which may be a spelling error as searches for the common name were unsuccessful), and the Whiteleg shrimp (*Litopenaus vannamei*). Of these, the only species groups to represent more than 0.1% of the catch in more than one year are white mullet, cachema weakfish, Peruvian moonfish and *Ariopsis* catfish. None of the species listed above represent more than 0.1% of the catch in all three years.

The IFFO RS fishery assessment process requires that any non-Type-1 species "representing more than 0.1% of the annual catch" should be assessed as a Type 2 'non-target' species. This demand requires some interpretation in the case of the Panama small pelagic fishery, due to the variation in bycatch from year to year. For the purposes of this report, the four species groups listed above (white mullet, cachema weakfish, Peruvian moonfish and *Ariopsis* sea catfish) will be assessed as Type 2 species; however this may change based on the recorded bycatch in future years. As a general rule, the fishery should be aware of the bycatch composition and minimise the extent to which vulnerable species are caught.

² Small pelagic fishery in Panama, stock assessment and recommendations for a management plan, CeDePesca, March 2015. http://sportdocbox.com/amp/71088079-Game_and_Fish/Small-pelagic-fishery-in-panama-stock-assessment-and-recommendations-for-a-management-plant.html

³ Panama small pelagic fishery incidental catch report, CeDePesca, 2016. http://cedepesca.net/wp-content/uploads/2017/08/2017-01_CeDePesca_Informe-del-by-catch-de-la-pesquer%C3%ADa-de-PP_2016.pdf

⁴ Panama small pelagic fishery incidental catch report, CeDePesca, 2017. Pers. Comm.

History and Operations

The Panamanian small pelagics fishery began in the 1940s as one of the sources of bait for the tuna international fishery, and since the 1960s it has been the basis of the Panamanian reduction industry that produces fishmeal and fish oil for national consumption and export. In 2016, 107.6 thousand short tons of raw fish produced 8.3 thousand tonnes of fish oil and 25.1 thousand tonnes of fishmeal. As of December 2016, exports were valued at 17.7 million USD, with Europe as the main market for fish oil, and China, North America, and countries neighbouring Panama as the main customers for fishmeal.

Industrial catches are made by purse seine gears. Each of the 18 purse seine boats that are currently operating makes daily trips between April and October, landing products at the two processing plants located at Puerto Caimito and Puerto Coquira. Small amounts of artisanal catches are made in low-depth areas with fishnets and small purse seines and are then used as bait for fish of higher commercial value, such as snapper, grouper, and weakfish⁵. Executive Decree N° 107 (March 2016) set up a new license for the fishing of Pacific anchoveta, Pacific thread herring and Pacific bumper. The decree also limited total fishing capacity by setting the maximum number of licenses to be issued for industrial vessels at 20, and for artisanal vessels (less than 8m long) at 10.

1.2 Management system

The Panama fishery management system includes an effective administrative and legal regime, and a framework for cooperation with other parties, when necessary, to achieve objectives related to the sustainability of the stock and to maintain the structure, productivity, function and diversity of the ecosystem on which the fishery depends. The primary body with jurisdiction over fisheries management in Panama is the Aquatic Resources Authority of Panama (*Autoridad de los Recursos Acuáticos de Panamá*, ARAP). ARAP was created in 2006 as a result of a law put in place to unify responsibility for coastal and marine resources, aquaculture, fishing, and related administrative activities. ARAP's mission is "to ensure the development of a productive and social culture of aquatic resources in a sustainable and sustainable way in harmony with the environment to improve the quality of life of the inhabitants of the Republic"⁶. Specific objectives include the protection of natural biodiversity and ecological processes, and ensuring a healthy aquatic environment in coordination with the National Environment Authority⁷.

ARAP was created in 2006 to unify responsibility for coastal and marine resources, aquaculture, fishing, and related administrative activities. The functions of ARAP include the regulation and promotion of technical measures and administrative processes regarding the management of aquatic resources; the protection of marine ecosystems; the creation and application of management strategies and programmes in both wild capture fisheries and aquaculture; the engagement of stakeholders including industry and civil society in the management process; the application of fisheries enforcement regulations, including coordinating with the National Air Service to apply monitoring regimes; and the promotion and development of scientific research. A diagram provided

⁵ <http://cedepesca.net/promes/small-pelagics/panamanian-small-pelagics/>

⁶ ARAP website, 'Mission and Vision'. <http://arap.gob.pa/mision-y-vision/>

⁷ ARAP website, 'General objectives'. <http://arap.gob.pa/objetivos-generales/>

by the fishery detailing the organisational structure of ARAP indicates that the Authority includes departments devoted to information collection and analysis, and inspection and control.

ARAP, together with private companies (harvesters and processors) and a non-governmental organization (the Centre for Development and Sustainable Fisheries, CeDePesca), is working with the purpose of improving fisheries management. The fishery has been the subject of a FIP since 2011, which is currently rated by the SFP as “A – Exceptional progress”⁸.

The ARAP website⁹ lists the legislation under which fisheries in Panama are managed; key examples include:

- Law 44 of November 23, 2006, which created ARAP;
- Law 32 of February 9, 1996, under which measures were adopted “to preserve the ecological balance and ensure the appropriate use of mineral resources and other provisions”;
- Executive Decree 49 of October 19, 2009, which establishes and regulates fishing licensing¹⁰.

On March 29th 2016, the Government of Panama issued Executive Decree N° 107¹¹, effectively updating regulations for the small pelagics fishery that had previously remained unchanged since they were set for the first time in 1977. This decree was based on a series of results and recommendations stemming from the work conducted through the fishery improvement project which began in 2011, under the assistance of CeDePesca and other fishery stakeholders, most notably Promarina and ARAP. Aside from a number of technical management measures, the decree set a framework for the issuing of annual total allowable catches (TACs), requiring that these are based on research and monitoring activities, and further adopted the Onboard Observers, setting up its minimum permanent coverage at 20% of operative vessels. Decree 107 is considered a **significant** step towards ensuring the sustainability of the Panamanian small pelagic fishery, and it is also an important milestone for the implementation of the current FIP¹².

Management measures specific to the fishery.

Article 15 of Executive Decree No. 107 of March 2016 decrees that the opening of the small pelagic fishing season will be carried out every year by resolution of the ARAP considering the availability of the resource and the size structures of the target species. The information will be obtained through biological samplings, carried out in a pre-season fishing cruise, which will be coordinated between ARAP officials, representatives of the fishmeal and fish oil processing companies, members of the fishermen's union and interested parties. Exploratory trips to determine the status of the stocks begin depending on environmental conditions (commonly, after the trade winds season and upwelling in the Gulf has occurred, between October and April). The fishing season starts if the size of the majority of the sampled specimens of Pacific anchoveta and Pacific thread herring in each fishing ground is

⁸ Panamanian small pelagics FIP, SFP rating tool summary, January 2018. http://cedepesca.net/wp-content/uploads/2018/01/2018-01_Panamanian-small-pelagics-FIP_SFP-rating-tool.pdf

⁹ ARAP website, ‘Legislation’. <http://arap.gob.pa/legislacion/>

¹⁰ http://arap.gob.pa/wp-content/uploads/2015/05/ARAP_legislacion_decretoejec49-19-10-2009.pdf

¹¹ Republic of Panama law no. 2017, May 2016. http://www.cedepesca.net/wp-content/uploads/2016/05/2016_Decreto_107_29_marzo_que_regula_la_pesqueria_de_pequenos_pelagicos.pdf

¹² <http://cedepesca.net/promes/small-pelagics/panamanian-small-pelagics/>

greater than sizes that have been historically considered as acceptable and which coincide with average size at first maturity in the literature (12.5 cm for Pacific anchoveta and 17 cm for Pacific thread herring; there is no minimum landing size for Pacific bumper). Pacific anchoveta is the first target species of the fishery until July, when spawning is about to reach its peak. From July onwards, Pacific thread herring becomes the target species until October, when weekly yields start to decrease and the fishery is closed through an ARAP administrative resolution. Pacific bumper is targeted opportunistically.

The closing of the fishing season for small pelagic species is established by ARAP resolution, according to the scientific reports based on the monitoring and research on the fishery during the season, as defined by Article 16 of Executive Decree No. 107 of March 2016. Figure 1 shows a snapshot of the official closing announcement for 2017.



Figure 1 - Snapshot of the official announcement of the seasonal closure of the small pelagic fishery in 2017¹³.

The Executive Decree No. 107 also regulates the issuing of fishing licenses for anchovy, herring and bumper in Panama, according to the following articles:

- Article 1. Fishing vessels engaged in the fishing of anchoveta, herring and orqueta in the national waters of Panama, must possess and carry a fishing license issued by the Water Resources Authority of Panama (ARAP) that authorizes the boat owning it to exclusively fish these species.
- Article 3. Limit to twenty (20) the number of fishing licenses for fishing vessels of height and limit to 10 artisanal vessels (less than 8m long).
- Article 8. For the fishing of small pelagic fish in national waters at the industrial level, purse seines with a mesh size equal to or greater than 2.54 cm, may be up to 680 meters long and have a height of 68 or less. Meters. For artisanal fishing, a purse-seine net with mesh size

¹³ Closure of the small pelagic fishing season, Panama governmental official gazette. Pers. Comm.

equal to 1.90 cm will be used and may have a length of up to 162 meters and a height equal to or less than 7 meters.

- Article 9. Industrial vessels engaged in the fishing of small pelagics may only have a fish storage capacity equal to or less than 188 cubic meters.
- Article 10. Artisanal vessels dedicated to the capture of small pelagics may only have a storage capacity of fish equal to or less than 3 m³.
- Article 15. The opening of the fishing season for small pelagic species in the Gulf of Panama is decreed every year by resolution issued by the ARAP, considering the availability of resources and the size structures of the target species of the fishery, for the anchoveta, the average total length must be equal to or greater than 12.5 cm (size of first maturation) and for herring, the average total length must be equal to or greater than 17.0 cm (size of first maturation).
- Article 16. The closing of the fishing season for small pelagic species will be decreed by means of a resolution issued by the ARAP according to scientific reports based on monitoring and research on fishing activities during the season¹⁴.

Management Plan

In February 2015, CeDePesca and Promarina signed Specific Agreement #3, to conduct a first formal stock assessment; to organize a second workshop for the Ecological Risk Assessment for the Effects of Fishing (ERAEF); and to draft a management plan for the fishery based on the information collected throughout the full FIP implementation period. In March 2015, CeDePesca completed the first formal stock assessment for this fishery and issued recommendations for a management plan. In October 2015, a Memorandum of Understanding (MoU) was signed between ARAP, Promarina, Taboguilla S.A., AnimalFeeds and CeDePesca to further delineate future improvement activities. In this MoU, ARAP committed itself to reviewing and adopting a management plan for the fishery in the short term. In July 2016, an updated draft of the proposed management plan for the Panamanian Small Pelagics Fishery was agreed by FIP partners and delivered formally to ARAP for their consideration. This updated draft took into account the results of the latest stock assessment prepared by CeDePesca. On June 28th 2017, ARAP sent a letter to Promarina and CeDePesca providing its opinions regarding the FIP's proposal for the fishery's management plan that was presented in mid-2016. FIP Partners have started improving the proposal by taking into consideration ARAP's comments, with the ultimate goal of achieving its adoption by the government. In August 2017, Promarina, Probasa¹⁵ (a new fishmeal operation in the Gulf of Panama) and CeDePesca met with ARAP to discuss changes to the proposed management plan for the fishery¹⁶.

Inspections and Sanctions

Inspections and sanctions are the responsibility of ARAP's Directorate of Inspection, Surveillance and Control. ARAP may temporarily suspend or revoke permits and licenses related to fishing when permits or licenses are breached. Figure 2 shows a record of enforcement activities carried out

¹⁴ http://cedepesca.net/wp-content/uploads/2018/01/2018-01_Panamanian-small-pelagics-FIP_Progress-table.pdf

¹⁵ http://cedepesca.net/wp-content/uploads/2017/08/2017-04_PROMARINA-PROBASA-CeDePesca_Adenda-N1-al-Convenio-Marco.pdf

¹⁶ <http://cedepesca.net/promes/small-pelagics/panamanian-small-pelagics/>

between 2012 and 2016. It is not clear if there are more current records and better explanations of the type of violations found. It is not clear whether this level of enforcement is sufficient to record violations or deter potential violators, although there are only 18 vessels in the fleet.

According to reports from the satellite tracking system and analysis of plant size samplings and those carried out through the On-Board Observer Program, fishermen comply with the management system even when questioning the specifics¹⁷.

				
AUTORIDAD DE LOS RECURSOS ACUATICOS DE PANAMÁ DIRECCIÓN GENERAL DE INSPECCIÓN, VIGILANCIA Y CONTROL INFORME CUADRO DE PROCESOS ADMINISTRATIVOS A BUQUES BOLICHEROS 2012 - 2016				
PESQUERA TABOGUILLA	EXPEDIENTE	FECHA	PROCESO	OBSERVACION
M/V ANDREA M	DGIVC-212-13	17/4/13	POR NO CONTAR CON ZARPE	Multa de B/100.00
M/V CELIA M	DGVC-211-13	17/4/13	POR NO CONTAR CON ZARPE	Multa de B/100.00
M/V PLEAMAR	DGVC-214-13	17/4/13	POR NO CONTAR CON ZARPE	Multa de B/100.00
M/V ISLA VERDE	DGVC-213-13	17/4/13	POR NO CONTAR CON ZARPE	Multa de B/100.00
M/V FARALLONES	DGIVC-216-13	23/9/14	POR NO CONTAR CON ZARPE	Multa de B/100.00

Figure 2- Enforcement activities, 2012-16.

1.3 Target Species

Species Caught in the Fishery

This small pelagics fishery takes place in the Gulf of Panama and involves two main target species: Pacific anchoveta (*Cetengraulis mysticetus*) and Pacific thread herring (*Opisthonema libertate*). Pacific bumper (*Chloroscombrus orqueta*) is also targeted opportunistically.

Stock Assessment and Scientific Studies on the Fishery

ARAP is responsible for marine fisheries data collection and analysis in Panama. There has been a recent effort to develop and implement a research and monitoring plan for the small pelagic fishery, to collect the data necessary to start assessing size of these stocks with more precision¹⁸.

CeDePesca and ARAP cooperated on the development of an acoustic survey which was planned for February 2017. It should be noted that this survey model is based on what was indicated by Simmonds

¹⁷ Summary information provided by CeDePesca

¹⁸ <http://cedepesca.net/promes/small-pelagics/panamanian-small-pelagics/>

& MacLennan (2005)¹⁹, which were adapted to the operating conditions, as well as the geographical distribution of the target species. The survey was carried out by the company Albor Tecnológico SAC, in coordination with the fishing company PROMARINA who provided the logistics and government permits for the work. The process covered both the calibration of the portable echosounder (February 20 and 21 following ICES methodology to perform the acoustic calibrations) and the survey from 22 to 25 February 2017. Post processing for the calculation of abundance / biomass was carried out from February 26 to March 10²⁰.

The report for the 2017 Hydroacoustic Assessment was published online by ARAP²¹. During the survey activities, the temperatures off the coast of Panama in oceanic waters (22 to 25°C) and coastal waters (25 to 26°C) were recorded. With these temperature variations, the biomass estimation cruise was initiated and two dominant species were detected in the ecosystem: anchoveta (*Cetengraulis mysticetus*) and thread herring (*Opisthonema libertate*). The anchoveta was detected from Penonomé to La Palma in isolated concentrations from the coast to 20nm, the highest concentration occurring in a dense core compared to La Palma (0 to 20mn), with length ranges from 9.5 to 20 cm. The resulting population structure is trimodal showing ranges between 12, 17.5 and 18.5 cm in length. Thread herring was detected continuously in medium concentrations from Balboa to Chimán from 3 to 15 nm on average and compared to La Palma in dense concentrations from 3 to 20 mn of coast. It presented a size range of 10.5 to 21 cm with a main range of 17.5 cm. The biomass estimated in the area evaluated for all pelagic resources in the Pacific Ocean of Panama was 384,180 t. The most abundant species was the sardine with 233,138 t and the herring with 151,042 t. The figures below show detailed results for geographical distribution and size frequency. AnimalFeeds has stated that new research is scheduled for March 2018 prior to the opening of the 2018 season planned for opening in Mid-April.

¹⁹ <http://onlinelibrary.wiley.com/book/10.1002/9780470995303>

²⁰ EMPRESA PESQUERA PROMARINA. I Campaña 2017 _ Evaluación Hidroacústica de Recursos Pelágicos. INFORME EJECUTIVO

²¹ Hydroacoustic evaluation of pelagic resources in Panama, 2017, Empresa Pesquera Promarina. <http://arap.gob.pa/informe-ejecutivo-de-evaluacion-hidroacustica-de-recursos-pelagicos-de-la-empresa-pesquera-promarina/>

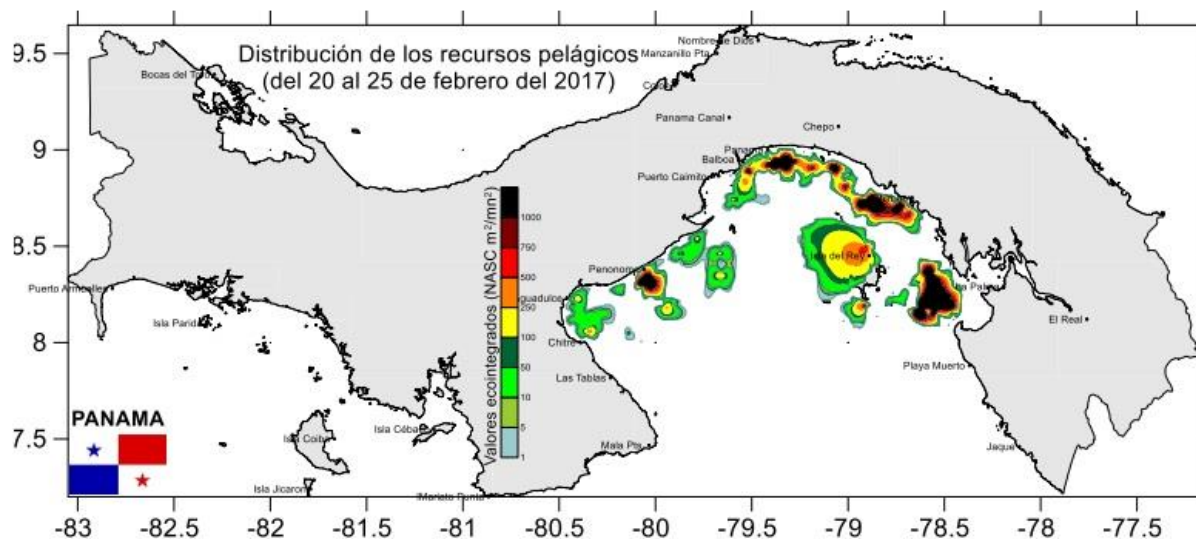


Figure 3 - Distribution of Small Pelagic Resources in Panama. From the 2017 hydroacoustic cruise²².

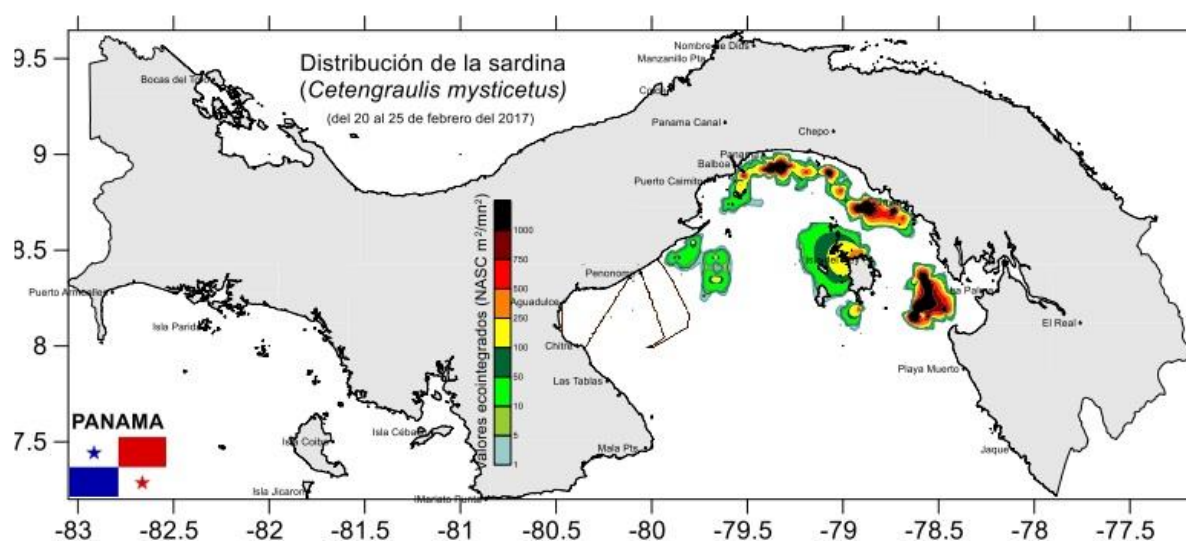


Figure 4 - Distribution of Anchoveta in Panama. From the 2017 hydroacoustic cruise²².

²² Hydroacoustic evaluation of pelagic resources in Panama, 2017, Empresa Pesquera Promarina.
<http://arap.gob.pa/informe-ejecutivo-de-evaluacion-hidroacustica-de-recursos-pelagicos-de-la-empresa-pesquera-promarina/>

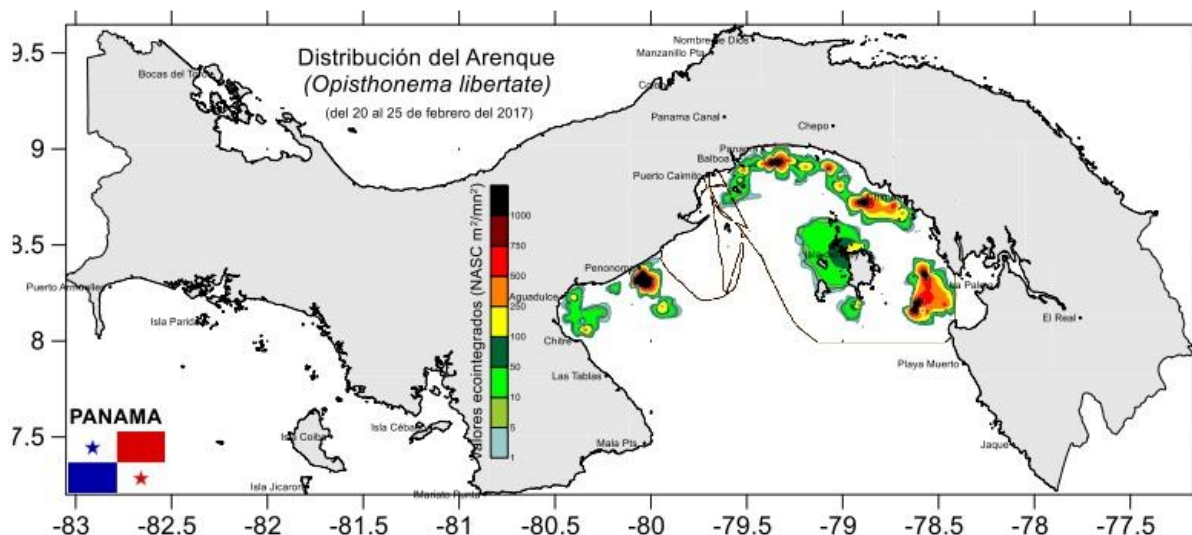


Figure 5 - Distribution of Thread Herring in Panama. From the 2017 hydroacoustic cruise²².

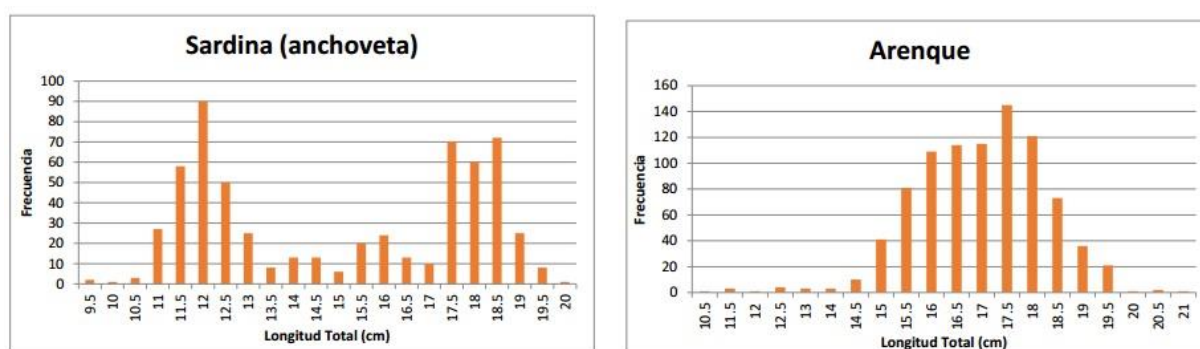


Figure 6 - Size Frequency Distributions for anchoveta and thread herring (arenque). From the 2017 hydroacoustic cruise²².

1.4 Other Impacts

Associated species catch (bycatch)

In the 2017 season, 253 fishing hauls were sampled through the Observer Program²³ (note that this refers to samples of the catches heading to the Promarina plant; at the time of this assessment Probasa has not reported their numbers). As in the analysis of the information corresponding to the previous seasons, the information for this season shows a low catch of non-target species. Bycatch represents 6.92% of the total catch, and there is considered by managers to be limited ecosystem impact. Most of the species mainly impacted during this fishing season are listed as Low Concern on the IUCN Red List, and the remainder such as shrimp (*L. occidentalis*, *X. riveti*) and *T. fodiator*, have not been evaluated; *U. aspidura* has been categorised as Data Deficient. Further analysis of the bycatch composition is provided above in the section “Fishery Characterisation”.

²³ Pesquería de pequeños pelágicos en el Golfo de Panamá. Informe de la captura incidental. Temporada 2017 Report

Table 1 - Small pelagic fishery catch composition estimates (%) for 2017²⁴.

Especies Objetivos	Porcentaje de captura total observada		
<i>Cetengraulis mysticetus</i>	57.167		
<i>Opisthonema spp</i>	35.911		
Especies no-objetivo	Porcentaje de captura total observada	Especies no-objetivo	Porcentaje de captura total observada
<i>Ariopsis</i>	0.858	<i>Nebris occidentalis</i>	0.031
<i>Tylosurus fodiator</i>	0.158	<i>Selene peruviana</i>	0.015
<i>Ariopsis seemanni</i>	0.144	<i>Menticirrhus panamensis</i>	0.013
<i>Mugil curema</i>	0.128	<i>Occidentarius platypogon</i>	0.008
<i>Bagre panamensis</i>	0.107	<i>Carangoides otrynter</i>	0.007
<i>Peprilus</i>	0.075	<i>Xiphopenaeus riveti</i>	0.006
<i>Lithopenaeus occidentalis</i>	0.073	<i>Peprilus medius</i>	0.006
<i>Cynoscion phoxocephalus</i>	0.071	<i>Polydactylus opercularis</i>	0.003
<i>Odontognathus panamensis</i>	0.050	<i>Urotrygon aspidura</i>	0.002
<i>Larimus argenteus</i>	0.033		

ETP species

During the 2017 Season the On-Board Observer Program recorded several sea turtle sightings. The loggerhead sea turtle (*Caretta caretta*) is categorised by the International Union for Conservation of Nature (IUCN) Red List as "Vulnerable", and represented 63.6% (with 7 sightings) of the observations; the green turtle (*Chelonia mydas*), (categorised as "Endangered" by the IUCN Red List) represented 18.2% (2 sightings) of the observations; and the hawksbill sea turtle (*Eretmochelys imbricata*), (categorised as "Critically Endangered") represented 18.2% of the observations (2 sightings). All the turtles captured by purse seine net were released without damage.

In total, thirty-five shark interactions were recorded. The shark species identified were: Scalloped Hammerhead (*Sphyrna lewini*), (categorised as "Endangered" by the IUCN Red List) which accounted for 91.4% (32 sightings) of the individuals captured in the sampled sets; Pacific Sharpnose Shark (*Rhizoprionodon longurio*), (not evaluated by the IUCN) that represented 5.7% (2 sightings); and nurse shark (*Ginglymostoma cirratum*), (categorised as "Data Deficient") which represented 2.9% (one sighting). In relation to the interaction with rays, one sighting was recorded and four were examined, all spotted eagle rays (*Aetobatus narinari*) which is categorised as "Near Threatened" on the IUCN Red List.

²⁴ Panama small pelagic fishery incidental catch report, CeDePesca, 2017. Pers. Comm.

Evidence Section

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			
<p>M1.1 – The primary body with jurisdiction over fisheries management in Panama is the Aquatic Resources Authority of Panama (<i>Autoridad de los Recursos Acuáticos de Panamá</i>, ARAP). ARAP was created in 2006 as a result of a law put in place to unify responsibility for coastal and marine resources, aquaculture, fishing, and related administrative activities. The functions of ARAP include the regulation and promotion of technical measures and administrative processes regarding the management of aquatic resources; the protection of marine ecosystems; the creation and application of management strategies and programmes in both wild capture fisheries and aquaculture; the engagement of stakeholders including industry and civil society in the management process; the application of fisheries enforcement regulations, including coordinating with the National Air Service to apply monitoring regimes; and the promotion and development of scientific research. A diagram provided by the fishery detailing the organisational structure of ARAP indicates that the Authority includes departments devoted to information collection and analysis, and inspection and control.</p> <p>M1.2 – ARAP is responsible for marine fisheries data collection and analysis in Panama. There has been a recent effort to develop and implement a research and monitoring plan for the small pelagic fishery, to collect the data necessary to start assessing size of these stocks with more precision²⁵. ARAP is supported in these activities by CeDePesca and industry groups, who have been heavily involved in the recent (2015 and 2016) stock assessment reports, and by Albor Tecnológico, who conducted the 2017 hydroacoustic survey with the support of PROMARINA.</p> <p>M1.3 – ARAP’s mission is “to ensure the development of a productive and social culture of aquatic resources in a sustainable and sustainable way in harmony with the environment to improve the quality of life of the inhabitants of the Republic”²⁶. Specific objectives include the protection of natural biodiversity and ecological</p>			

²⁵ <http://cedepesca.net/promes/small-pelagics/panamanian-small-pelagics/>

²⁶ ARAP website, ‘Mission and Vision’. <http://arap.gob.pa/mision-y-vision/>

processes, and ensuring a healthy aquatic environment in coordination with the National Environment Authority²⁷.

M1.4 – On March 29th 2016, the Government of Panama issued Executive Decree N° 107, effectively updating regulations for the small pelagics fishery that had previously remained unchanged since they were set for the first time in 1977. This decree was based on a series of results and recommendations stemming from the work conducted through the fishery improvement project which began in 2011, under the assistance of CeDePesca and other fishery stakeholders, most notably Promarina and ARAP. Aside from a number of technical management measures, the decree set a framework for the issuing of annual total allowable catches (TACs), requiring that these are based on research and monitoring activities, and further adopted the Onboard Observers, setting up its minimum permanent coverage at 20% of operative vessels. Decree 107 is considered a huge step forward towards ensuring the sustainability of the Panamanian small pelagic fishery, and it is also an important milestone for the implementation of the current FIP²⁸.

The ARAP website²⁹ lists other legislation under which fisheries in Panama are managed; key examples include:

- Law 44 of November 23, 2006, which created ARAP;
- Law 32 of February 9, 1996, under which measures were adopted “to preserve the ecological balance and ensure the appropriate use of mineral resources and other provisions”;
- Executive Decree 49 of October 19, 2009, which establishes and regulates fishing licensing³⁰.

M1.5 – Fishery stakeholders have been engaged in the development of the research and management of the fishery via the FIP which has been in place since 2011. The reduction industry has been heavily involved in the FIP, to the extent that they have signed an MoU committing to continued support of the programme. FIP partners include Promarina³¹, Probasa³², and CeDePesca.

M1.6 – The CeDePesca website for the Panamanian small pelagic FIP³³ provides extensive information on the decision-making process and its outcomes, dating back to the start of the FIP currently being implemented by the fishery. The website includes summaries of historical and scheduled FIP actions; links to resource and management analysis reports; relevant fisheries legislation; and current management actions and activities.

Improver Programme Notes

The management of the fishery currently meets the requirements of M1. Several of the requirements (most notably M1.5 and M1.6) are met via the apparatus set up as part of the FIP currently in place on the fishery. Managers should ensure that equivalent measures independent of the FIP are put in place before the FIP ends, in order to continue to meet these requirements. This will be particularly important should the fishery choose not to pursue MSC certification and thus end the FIP at the point of application to full IFFO RS approval.

Standard clauses 1.3.1.1, 1.3.1.2

²⁷ ARAP website, ‘General objectives’. <http://arap.gob.pa/objetivos-generales/>

²⁸ <http://cedepesca.net/promes/small-pelagics/panamanian-small-pelagics/>

²⁹ ARAP website, ‘Legislation’. <http://arap.gob.pa/legislacion/>

³⁰ http://arap.gob.pa/wp-content/uploads/2015/05/ARAP_legislacion_decretoejec49-19-10-2009.pdf

³¹ <http://www.promarinapanama.com/new/es/>

³² <http://probasa.com/>

³³ CeDePesca, Panamanian small pelagics FIP. <http://cedepesca.net/promes/small-pelagics/panamanian-%20small-pelagics/>

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.	GAP
	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:			GAP
<p>Evidence</p> <p>M2.1 – The monitoring of compliance with fisheries laws and regulations is the responsibility of ARAP's Directorate of Inspection, Surveillance and Control³⁴. The stated objective of the DISC is to "Promote, organize, monitor, coordinate and execute the general policy, strategy, plans and programs regarding inspection, surveillance, control and control of aquatic resources". Roles include conducting inspections, establishing base parameters to be followed in terms of technical standards for fishing and aquaculture activities, issuing of certificates of inspections, investigating complaints, ensuring vessels adhere to safety legislation, and imposing sanctions for violations of legal and regulatory norms.</p> <p>M2.2 – Articles 52 to 57 of Panama Law no. 44, 2006³⁵ describe the sanctions to be applied in the case of a range of infractions, including failure to comply with the law and its regulations, failure to allow inspections, fishing without a license or with a falsified license, or hindering the activities of any official carrying out the law or its regulations. Article 54 sets out potential fines, including \$100 - \$10,000 for minor infractions, and \$10,001 - \$1,000,000 for serious infractions. Article 55 empowers officials to suspend or revoke permits, licenses or authorisations. Potential sanctions described by the law do not appear to include confiscation of property or imprisonment.</p> <p>M2.3 – Figure 7, below, shows a record of enforcement activities carried out between 2012 and 2016. It is not clear if there are more current records and better explanations of the type of violations found. It is not clear whether this level of enforcement is sufficient to record violations or deter potential violators, although there are only 18 vessels in the fleet.</p> <p>According to reports from the satellite tracking system and analysis of plant size samplings and those carried out through the On-Board Observer Program, fishermen comply with the management system even when questioning the specifics³⁶.</p>			

³⁴ ARAP website, Directorate of Inspection, Surveillance and Control. <http://arap.gob.pa/direccion-de-inspeccion-vigilancia-y-control/>

³⁵ Republic of Panama Law no. 44, November 2006. <http://www.iacseaturtle.org/docs/marco/panama/Panama%20-%20Law%2044%20of%20November%2023rd,%202006.pdf>

³⁶ Summary information provided by CeDePesca



AUTORIDAD DE LOS RECURSOS ACUATICOS DE PANAMÁ
DIRECCIÓN GENERAL DE INSPECCIÓN, VIGILANCIA Y CONTROL
INFORME CUADRO DE PROCESOS ADMINISTRATIVOS A BUQUES BOLICHEROS
2012 - 2016

PESQUERA TABOGUILLA	EXPEDIENTE	FECHA	PROCESO	OBSERVACION
M/V ANDREA M	DGIVC-212-13	17/4/13	POR NO CONTAR CON ZARPE	Multa de B/100.00
M/V CELIA M	DGVC-211-13	17/4/13	POR NO CONTAR CON ZARPE	Multa de B/100.00
M/V PLEAMAR	DGVC-214-13	17/4/13	POR NO CONTAR CON ZARPE	Multa de B/100.00
M/V ISLA VERDE	DGVC-213-13	17/4/13	POR NO CONTAR CON ZARPE	Multa de B/100.00
M/V FARALLONES	DGIVC-216-13	23/9/14	POR NO CONTAR CON ZARPE	Multa de B/100.00



Figure 7 - Enforcement activities, 2012-16.

M2.4 – Resolution no. 2 of October 2007 set out the technical requirements of a mandatory vessel monitoring system required on all industrial vessels in Panama. The Resolution also set up a Satellite Monitoring Unit³⁷, with the objective of minimising IUU fishing. The Unit monitors VMS data to ensure that vessels adhere to legislation and regulations, but also to enhance safety at sea and improve fishery statistical data collection. The evidence also indicates the production of a daily Illegal Fishing Report, which forms the basis for the application of enforcement activities by the Inspection, Surveillance and Control Department of ARAP.

Improve Programme Notes

In general there is good evidence that there is a control and enforcement regime in place in Panamanian fisheries, with established sanctions and surveillance mechanisms. However, additional evidence of the efficacy of the regime would be beneficial to ensure requirement 2.3 is met.

Standard clause 1.3.1.3

³⁷ ARAP website, Satellite Monitoring Department. <http://arap.gob.pa/departamento-de-monitoreo-satelital/>

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		Pacific Anchoveta	
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 – Annual landings estimates are available for anchoveta for every year since 1956. CeDePesca has also produced estimates of fishing effort and CPUE for every year since 1995.

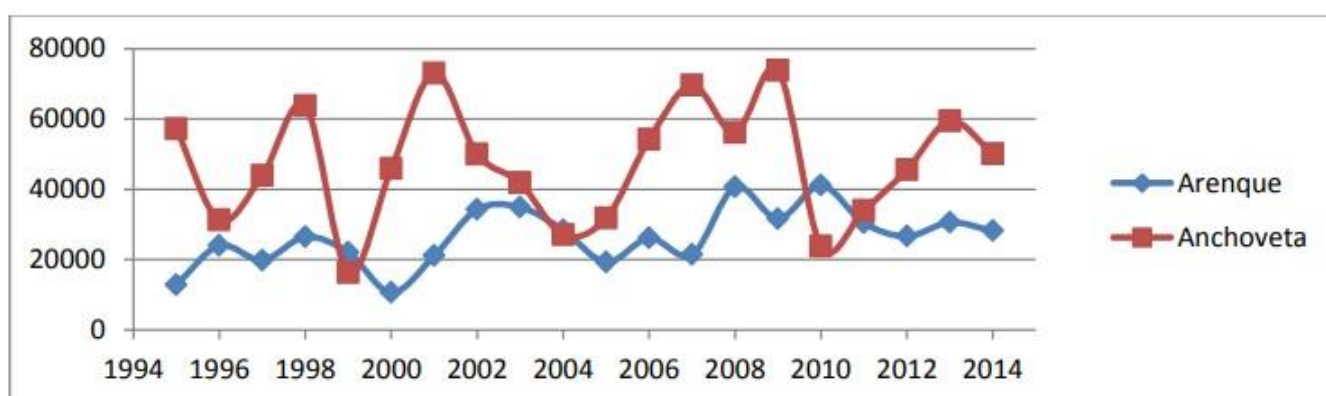


Figure 8 – Landings (in tons) of anchoveta and herring (arenque), 1995-2014³⁸.

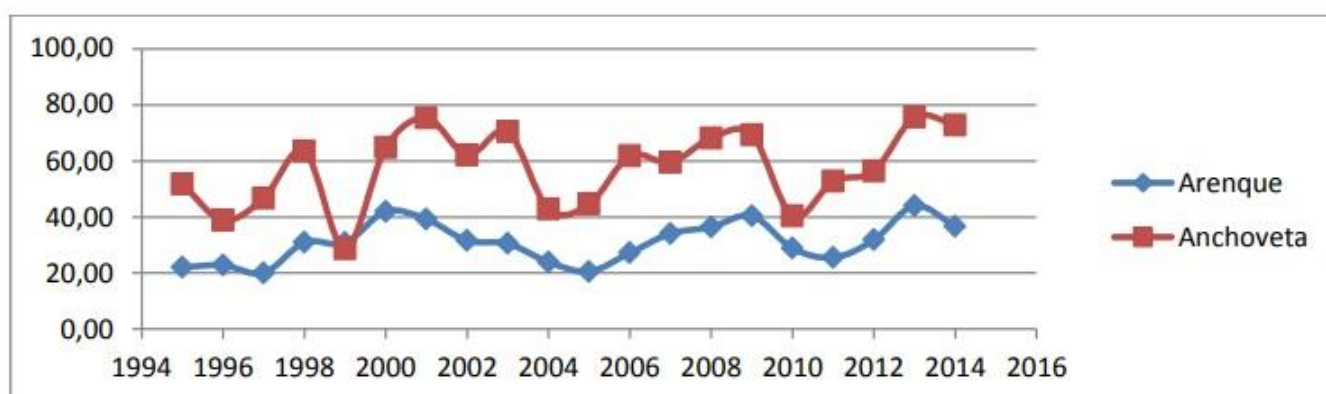


Figure 9 – CPUE (landings (t) per trip) for anchoveta and herring (arenque), 1995-2014³⁸.

³⁸ Small Pelagic Fishery in Panama: Stock Assessment and Recommendations for a Management Plan. CeDePesca, 2015. http://www.cedepesca.net/wp-content/uploads/2016/05/The_Panama_small_pelagics_fishery.pdf

The report for the 2017 Hydroacoustic Assessment was published online by ARAP⁴¹. During the survey activities, the temperatures off the coast of Panama in oceanic waters (22 to 25°C) and coastal waters (25 to 26°C) were recorded. With these temperature variations, the biomass estimation cruise was initiated and two dominant species were detected in the ecosystem: anchoveta (*Cetengraulis mysticetus*) and thread herring (*Opisthonema libertate*). The anchoveta was detected from Penonomé to La Palma in isolated concentrations from the coast to 20nm, the highest concentration occurring in a dense core compared to La Palma (0 to 20mn), with length ranges from 9.5 to 20 cm. The resulting population structure is trimodal showing ranges between 12, 17.5 and 18.5 cm in length. The biomass estimated in the area evaluated for all pelagic resources in the Pacific Ocean of Panama was 384,180 t. The most abundant species was the sardine with 233,138 t and the second most herring with 151,042 t. Figures 9 & 10 show detailed results for geographical distribution and size frequency. AnimalFeeds has stated that new research is scheduled for 18th – 25th March 2018 prior to the opening of the 2018 season. The survey will again be carried out by Albor Tecnológico in conjunction with PROMARINA and ARAP.

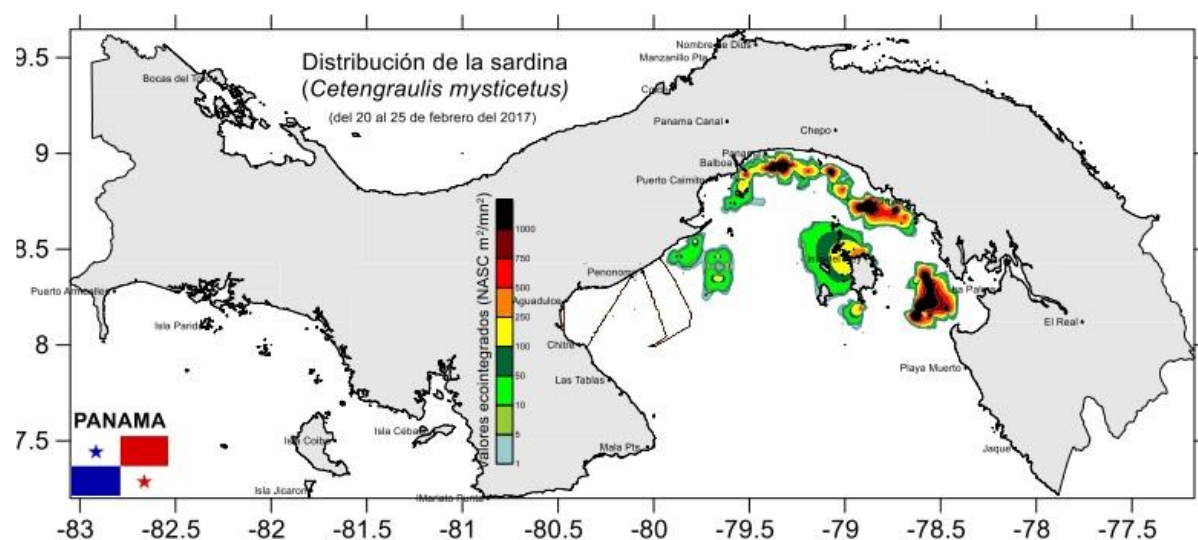


Figure 10 – Distribution of Anchoveta in Panama. From the 2017 hydroacoustic cruise²².

³⁹ <http://onlinelibrary.wiley.com/book/10.1002/9780470995303>

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⁴¹ Hydroacoustic evaluation of pelagic resources in Panama, 2017, Empresa Pesquera Promarina.
<http://arap.gob.pa/informe-ejecutivo-de-evaluacion-hidroacustica-de-recursos-pelagicos-de-la-empresa-pesquera-promarina/>

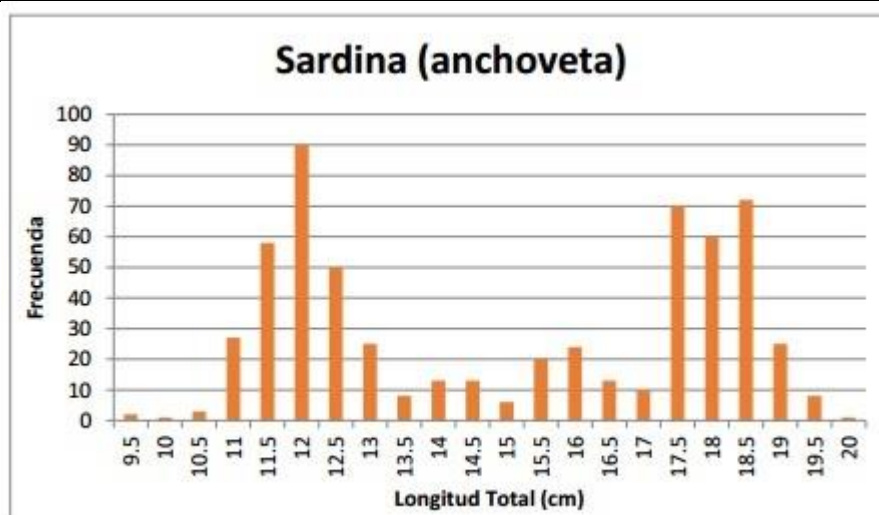


Figure 11 – Size Frequency Distribution for anchoveta. From the 2017 hydroacoustic cruise²².

Improver Programme Notes

There is evidence of adequate data collection on anchoveta, including landings data and fishery-independent data. Only one acoustic survey has so far been conducted and the fishery should ensure this continues regularly to maintain a pass rating in this section.

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.	GAP
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.	GAP
A2.5	The assessment is made publically available.	PASS
Clause outcome:		GAP

Evidence

A2.1 – Stock assessments were conducted on the resource in 2015⁴² and 2016⁴³. These stock assessments took the form of an analysis of available information to develop recommendations for the management plan which is currently under development for the fishery. The 2017 hydroacoustic assessment also provides some of the

⁴² Small Pelagic Fishery in Panama: Stock Assessment and Recommendations for a Management Plan. CeDePesca, 2015. http://www.cedepesca.net/wp-content/uploads/2016/05/The_Panama_small_pelagics_fishery.pdf

⁴³ Analysis of Weekly CPUE for Pacific anchoveta and thread herring in the Gulf of Panama, Management Suggestions. CeDePesca, March 2016. http://cedepesca.net/wp-content/uploads/2017/08/2016-03_CeDePesca_Analysis-of-the-weekly-CPUE-for-Pacific-anchoveta-and-thread-herrings_V2_ENG.pdf

information required of a formal stock assessment, and resulted in biomass estimates for both anchoveta and thread herring.

A2.2 – The 2017 hydroacoustic cruise estimated a total anchoveta biomass of 233,138t, and a total thread herring biomass of 151,042t. There is currently no evidence of any established reference points, although these studies have only recently been implemented and are a firm basis for the calculation of reference points in the future.

A2.3 – The 2016 stock assessment proposes that the available CPUE data suggests it would be prudent to “formalise what is already being applied as good practice in the fishery: stop fishing for Pacific anchoveta when the first sexually mature individuals appear”. This would avoid the need for “costly direct assessments of the stock” and would “not require abundance forecasts”. Finally, it notes that a secondary harvest control rule, closing the fishery when CPUE falls below a precautionary level, should also be implemented. These recommendations are being considered as part of the management plan which is in the late stages of development, and so have not yet been implemented. Currently, the closing of the fishing season for small pelagic species is established by ARAP resolution, “according to the scientific reports based on the monitoring and research on the fishery during the season”, as defined by Article 16 of Executive Decree No. 107 of March 2016. It is not clear what specific variables are used by ARAP to determine the closing date, although anecdotal report are that closure occurs “when weekly yields start to decrease”.

A2.4 – It is currently unclear whether the ‘stock assessments’ which have been produced to date have been peer reviewed, although this seems likely and evidence to this effect would immediately improve the score in this section.

A2.5 – All of the documentation discussed in this section is made publically available on the CeDePesca FIP summary website⁴⁴.

Improver Programme Notes

Stock assessments have recently begun to be completed for the stock, although the data collection and analyses are spread between several documents and the approach is not yet formalised. However, as these efforts continue and become better established, the fishery is likely to achieve a pass against A2.1 in the near future. The developing stock assessments should ensure to determine some form of reference point or proxy, to ensure that the status of the stock can be determined, as this allows managers to more conclusively demonstrate that the stock is not being over-exploited and that fishery removals are at an appropriate level. Information on the peer review process for the stock assessments would immediately improve the score against A2.4, and the provision of all assessment documentation online means the fishery already meets A2.5.

Standard clause 1.3.1.2, 1.3.2.1.2, 1.3.2.1.4

⁴⁴ CeDePesca FIP website, Panamanian small pelagics. <http://cedepesca.net/promes/small-pelagics/panamanian-%20small-pelagics/>

A3 Harvest Strategy – Minimum Requirements			
A3	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.	GAP
	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).	GAP
Clause outcome:			GAP
Evidence			
<p>A3.1 – The main mechanisms by which total removals are currently restricted are seasonal closures and restrictions on total fishing licences. Article 15 of Executive Decree No. 107 of March 2016 decrees that the opening of the small pelagic fishing season will be carried out every year by resolution of the ARAP considering the availability of the resource and the size structures of the target species. The information will be obtained through biological samplings, carried out in a pre-season fishing cruise, which will be coordinated between ARAP officials, representatives of the fishmeal and fish oil processing companies, members of the fishermen's union and interested parties. Exploratory trips to determine the status of the stocks begin depending on environmental conditions (commonly, after the trade winds season and upwelling in the Gulf has occurred, between October and April). The fishing season starts if the size of the majority of the sampled specimens of Pacific anchoveta and Pacific thread herring in each fishing ground is greater than sizes that have been historically considered as acceptable and which coincide with average size at first maturity in the literature (12.5 cm for Pacific anchoveta and 17 cm for Pacific thread herring; there is no minimum landing size for Pacific bumper). Pacific anchoveta is the first target species of the fishery until July, when spawning is about to reach its peak. From July onwards, Pacific thread herring becomes the target species until October, when weekly yields start to decrease and the fishery is closed through an ARAP administrative resolution. Pacific bumper is targeted opportunistically.</p> <p>The closing of the fishing season for small pelagic species is established by ARAP resolution, according to the scientific reports based on the monitoring and research on the fishery during the season, as defined by Article 16 of Executive Decree No. 107 of March 2016.</p> <p>Article 1 of Executive Decree 107 of May 2016⁴⁵ states that all vessels targeting anchoveta, herring or bumper must possess and carry a fishing license issued for those species specifically. Licenses are valid for a year and the application for renewal must be submitted at least a month before expiry. Licenses are charged at a cost per cubic metre capacity of the hold.</p> <p>Article 3 restricts the total number of licenses available; a maximum of 20 licenses for large (industrial) vessels and 10 for small vessels. Small vessels must be below 8m in length, and must have a fish storage hold smaller than 3 cubic metres; industrial vessels are limited to a maximum hold size of 188 cubic metres. Licensed vessels of any size may only be replaced if completely removed from the fishery, and the new vessel will be issued the same licence number as the replaced vessel. This number must be clearly painted on both sides of all licensed vessels.</p> <p>A3.2 – At present the stock assessments do not provide an explicit recommendation for total catch level; to the</p>			

⁴⁵ Republic of Panama law no. 2017, May 2016. <http://www.cedepesca.net/wp-content/uploads/2016/05/2016-Decreto-107-29-marzo-que-regula-la-pesqueria-de-pequenos-pelagicos.pdf>

extent that they do (via seasonal closures etc), these recommendations are currently under consideration as part of the management plan which is under development for the fishery.

A3.3 – As there is currently no limit reference point or proxy, there is currently no point at which the fishery would be closed (beyond the falling weekly yields described above). Based on the methodology described for the opening of the season, it is unlikely that low total biomass would result in the cancellation of the opening.

Improver Programme Notes

The mechanisms for restricting total fishery removals are in place, and therefore it could be expected that if total catch limits (or some other mechanism for determining an appropriate level of catch) were to be developed, they could be implemented via the mechanisms already in place. A3.2 will be met once this is the case. To meet A3.3 the fishery should ensure that the management plan includes a proviso that the fishery will be closed if biomass estimates (or some proxy) reveal the stock is below a precautionary level.

Standard clause 1.3.2.1.3

A4 Stock Status – Minimum Requirements		
A4.1	<p>The stock is at or above the target reference point, OR IF NOT:</p> <p>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:</p> <p>The stock is estimated to be below the limit reference point or proxy, but fishery removals are prohibited.</p>	GAP
Clause outcome:		GAP
Evidence		
A4.1 – There are currently no explicit target or limit reference points in place for the stock, nor is there any formal evidence that the fishery would be closed if the stock were to be found to be below a precautionary level.		
Improve Programme Notes		
The fishery will become able to meet this requirement once reference points (or proxies) have been established. The simplest way to meet the requirement is to establish a rule stating that the fishery will be closed if the stock falls below the limit reference point.		
Standard clause 1.3.2.1.4		

Species Name		Pacific Thread Herring	
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	PASS

estimated.

Clause outcome:

PASS

Evidence

A1.1 – A1.1 – Annual landings estimates are available for thread herring for every year since 1956. CeDePesca has also produced estimates of fishing effort and CPUE for every year since 1995.

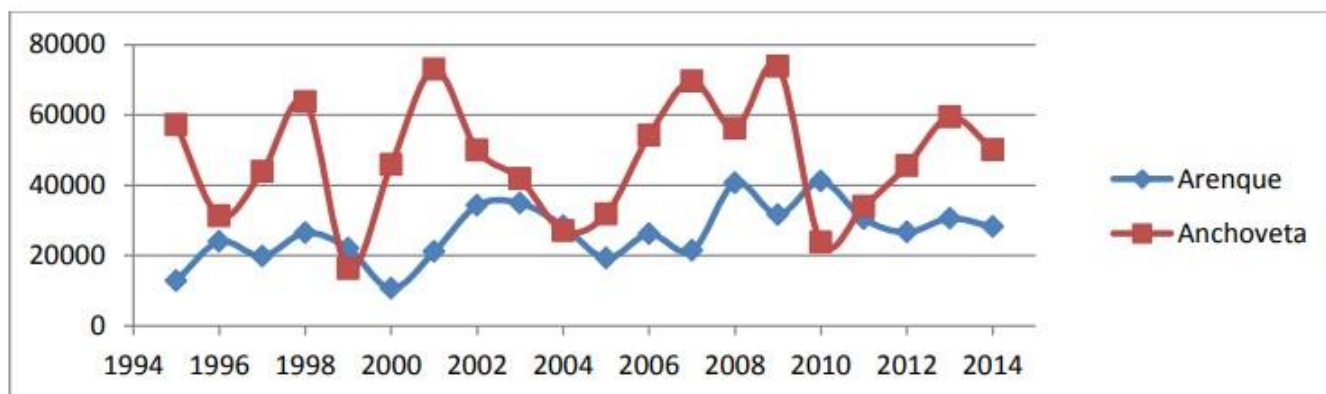


Figure 12 – Landings (in tons) of anchoveta and herring, 1995-2014⁴⁶.

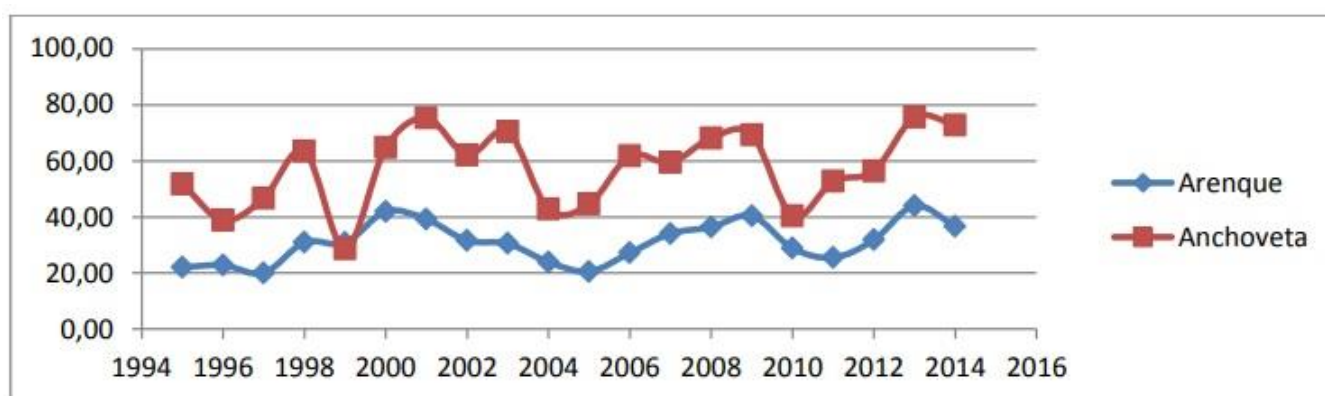


Figure 13 – CPUE (landings (t) per trip) for anchoveta and herring (arenque), 1995-2014³⁸.

A1.2 – CeDePesca and ARAP cooperated on the development of an acoustic survey which was carried out in February 2017. The survey covered both anchoveta and thread herring; for more details on the survey methodology refer to A1.2 in the anchoveta section.

Thread herring was detected continuously in medium concentrations from Balboa to Chiman from 3 to 15 nm on average and compared to La Palma in dense concentrations from 3 to 20 mn of coast. It presented a size range of 10.5 to 21 cm with a main range of 17.5 cm. The biomass estimated in the area evaluated for all pelagic resources in the Pacific Ocean of Panama was 384,180 t. The most abundant species was the sardine with 233,138 t and the second most herring with 151,042 t. Figures 9 & 10 show detailed results for geographical distribution and size frequency. AnimalFeeds has stated that new research is scheduled for 18th – 25th March 2018 prior to the opening of the 2018 season. The survey will again be carried out by Albor Tecnológico in

⁴⁶ Small Pelagic Fishery in Panama: Stock Assessment and Recommendations for a Management Plan. CeDePesca, 2015. http://www.cedepesca.net/wp-content/uploads/2016/05/The_Panama_small_pelagics_fishery.pdf

conjunction with PROMARINA and ARAP.

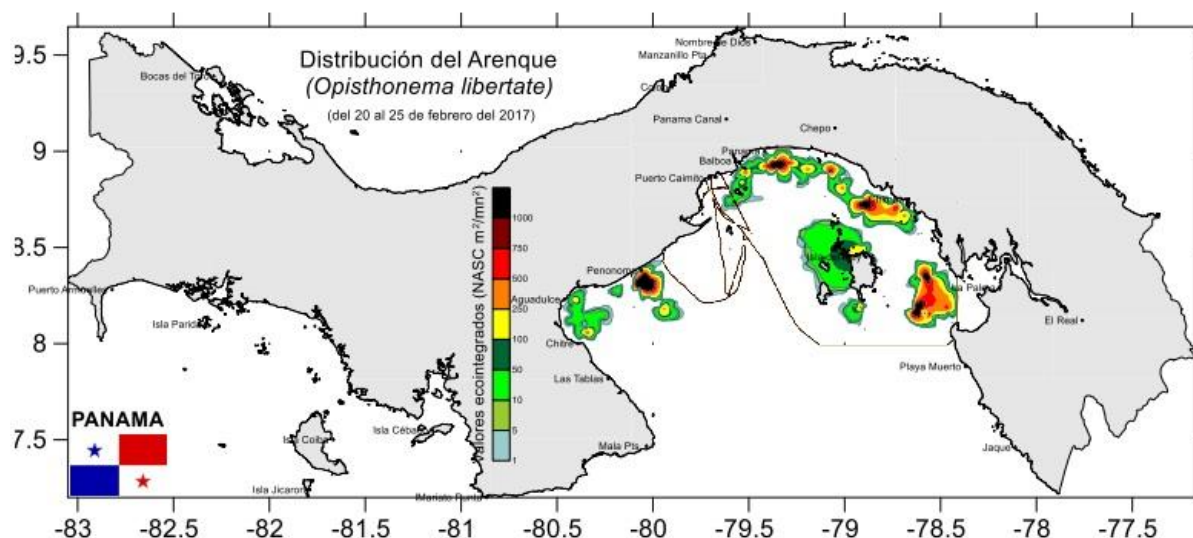


Figure 14 – Distribution of Thread Herring in Panama. From the 2017 hydroacoustic cruise²².

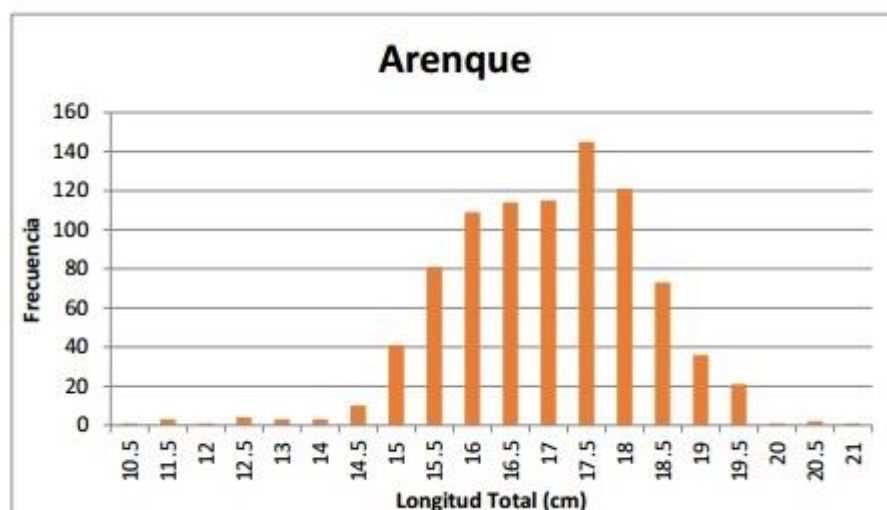


Figure 15 – Size Frequency Distribution for thread herring (arenque). From the 2017 hydroacoustic cruise²².

Improve Programme Notes

There is evidence of adequate data collection on thread herring, including landings data and fishery-independent data. Only one acoustic survey has so far been conducted and the fishery should ensure this continues regularly to maintain a pass rating in this section.

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.	GAP
	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.	GAP
	A2.5	The assessment is made publically available.	PASS
Clause outcome:			GAP
<p>Evidence</p> <p>A2.1 – Stock assessments were conducted on the resource in 2015⁴⁷ and 2016⁴⁸. These stock assessments took the form of an analysis of available information to develop recommendations for the management plan which is currently under development for the fishery. The 2017 hydroacoustic assessment also provides some of the information required of a formal stock assessment, and resulted in biomass estimates for both anchoveta and thread herring. There are known to be multiple species of thread herring in the fishery, and the 2016 stock assessment includes a recommendation that a study be conducted to determine the composition of these species in the catch. To date, thread herring is treated as a single stock in all management plans and materials.</p> <p>A2.2 – The 2017 hydroacoustic cruise estimated a total anchoveta biomass of 233,138t, and a total thread herring biomass of 151,042t. There is currently no evidence of any established reference points, although these studies have only recently been implemented and are a firm basis for the calculation of reference points in the future. The 2016 stock assessment states that the information available is insufficient to develop an abundance indicator or proxy for thread herring.</p> <p>A2.3 – The 2016 stock assessment recommends “[closure of] the thread herrings season no later than October 31st each year or when 2 thousand tons of average landings per vessel are reached (for a maximum of 20 vessels)”. This recommendation is being considered, along with the others from the report, as part of the management plan which is in the late stages of development, and so has not yet been implemented. Currently, the closing of the fishing season for small pelagic species is established by ARAP resolution, “according to the scientific reports based on the monitoring and research on the fishery during the season”, as defined by Article 16 of Executive Decree No. 107 of March 2016. It is not clear what specific variables are used by ARAP to determine the closing date, although anecdotal reports are that closure occurs “when weekly yields start to decrease”.</p> <p>A2.4 – It is currently unclear whether the ‘stock assessments’ which have been produced to date have been peer reviewed, although this seems likely and evidence to this effect would immediately improve the score in this section.</p>			

⁴⁷ Small Pelagic Fishery in Panama: Stock Assessment and Recommendations for a Management Plan. CeDePesca, 2015. http://www.cedepesca.net/wp-content/uploads/2016/05/The_Panama_small_pelagics_fishery.pdf

⁴⁸ Analysis of Weekly CPUE for Pacific anchoveta and thread herring in the Gulf of Panama, Management Suggestions. CeDePesca, March 2016. http://cedepesca.net/wp-content/uploads/2017/08/2016-03_CeDePesca_Analysis-of-the-weekly-CPUE-for-Pacific-anchoveta-and-thread-herrings_V2_ENG.pdf

A2.5 – All of the documentation discussed in this section is made publically available on the CeDePesca FIP summary website⁴⁹.

Improver Programme Notes

Stock assessments have recently begun to be completed for the stock, although the data collection and analyses are spread between several documents and the approach is not yet formalised. However, as these efforts continue and become better established, the fishery is likely to achieve a pass against A2.1 in the near future. Managers should ensure to adopt the recommendation of the 2016 stock assessment to study the species composition of thread herring in the catch, as this may have a significant knock-on effect on the appropriate management approach. The developing stock assessments should ensure to determine some form of reference point or proxy, to ensure that the status of the stock can be determined, as this allows managers to more conclusively demonstrate that the stock is not being over-exploited and that fishery removals are at an appropriate level. Information on the peer review process for the stock assessments would immediately improve the score against A2.4, and the provision of all assessment documentation online means the fishery already meets A2.5.

Standard clause 1.3.1.2, 1.3.2.1.2, 1.3.2.1.4

A3 Harvest Strategy – Minimum Requirements			
A3	A3.1	There is a mechanism in place by which total fishing mortality of this species is restricted.	GAP
	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.	GAP
	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).	GAP
Clause outcome:			GAP
Evidence			
<p>A3.1 – The main mechanisms by which total removals of thread herring are currently restricted are applied at the fishery level (i.e. to all small pelagics). See A3.1 in the anchoveta section for details.</p> <p>A3.2 – At present the stock assessments do not provide an explicit recommendation for total catch level; to the extent that they do (via seasonal closures etc), these recommendations are currently under consideration as part of the management plan which is under development for the fishery.</p> <p>A3.3 – As there is currently no limit reference point or proxy, there is currently no point at which the fishery would be closed (beyond the falling weekly yields described above). Based on the methodology described for the opening of the season, it is unlikely that low total biomass would result in the cancellation of the opening.</p>			

⁴⁹ CeDePesca FIP website, Panamanian small pelagics. <http://cedepesca.net/promes/small-pelagics/panamanian-%20small-pelagics/>

Improver Programme Notes

The mechanisms for restricting total fishery removals are in place, and therefore it could be expected that if total catch limits (or some other mechanism for determining an appropriate level of catch) were to be developed, they could be implemented via the mechanisms already in place. A3.2 will be met once this is the case. To meet A3.3 the fishery should ensure that the management plan includes a proviso that the fishery will be closed if biomass estimates (or some proxy) reveal the stock is below a precautionary level.

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:	GAP
	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:		GAP
Evidence		
A4.1 – A4.1 – There are currently no explicit target or limit reference points in place for the stock, nor is there any formal evidence that the fishery would be closed if the stock were to be found to be below a precautionary level.		
Improver Programme Notes		
The fishery will become able to meet this requirement once reference points (or proxies) have been established. The simplest way to meet the requirement is to establish a rule stating that the fishery will be closed if the stock falls below the limit reference point.		
<i>Standard clause 1.3.2.1.4</i>		

CATEGORY B SPECIES

Category B species are those which make up greater than 5% of landings in the applicant raw material, but which are not subject to a species-specific research and management regime sufficient to pass all Category A clauses. If there are no Category B species in the fishery under assessment, this section can be deleted.

Category B species are assessed using a risk-based approach. The following process should be completed once for each Category B species.

If there are estimates of biomass (B), fishing mortality (F), and reference points

It is possible for a Category B species to have some biomass and fishing mortality data available. When sufficient information is present, the assessment team should use the following risk matrix to determine whether the species should be recommended for approval.

Table B(a) – F, B and reference points are available

Biomass is above MSY / target reference point	Pass	Pass	Pass	Fail	Fail
Biomass is below MSY / target reference point, but above limit reference point	Pass, but re-assess when fishery removals resume	Pass	Fail	Fail	Fail
Biomass is below limit reference point (stock is overfished)	Pass, but re-assess when fishery removals resume	Fail	Fail	Fail	Fail
Biomass is significantly below limit reference point (Recruitment impaired)	Fail	Fail	Fail	Fail	Fail
	Fishery removals are prohibited	Fishing mortality is below MSY or target reference point	Fishing mortality is around MSY or target reference point, or below the long-term average	Fishing mortality is above the MSY or target reference point, or around the long-term average	Fishing mortality is above the limit reference point or above the long-term average (Stock is subject to overfishing)

If the biomass / fishing pressure risk assessment is not possible

Initially, the resilience of each Category B species to fishing pressure should be estimated using the American Fisheries Society procedure described in Musick, J.A. (1999). This approach is used as the resilience values for many species and stocks have been estimated by FishBase, and are already available online. For details of the approach, please refer to Appendix A. Determining the resilience provides a basis for estimating the risk that fishing may pose to the long-term sustainability of the stock. Table B(b) should be used to determine whether the species should be recommended for approval.

Table B(b) – No reference points available. B = current biomass; B_{av} = long-term average biomass; F = current fishing mortality; F_{av} = long-term average fishing mortality.

$B > B_{av}$ and $F < F_{av}$	Pass	Pass	Pass	Fail
$B > B_{av}$ and F or F_{av} unknown	Pass	Pass	Fail	Fail
$B = B_{av}$ and $F < F_{av}$	Pass	Pass	Fail	Fail
$B = B_{av}$ and F or F_{av} unknown	Pass	Fail	Fail	Fail
$B > B_{av}$ and $F > F_{av}$	Pass	Fail	Fail	Fail
$B < B_{av}$	Fail	Fail	Fail	Fail
B unknown	Fail	Fail	Fail	Fail
Resilience	High	Medium	Low	Very Low

Assessment Results

Species Name		Pacific Bumper
B1	Species Name	Pacific Bumper
	Table used (Ba, Bb)	Bb
	Outcome	GAP
Evidence There is no evidence of any reference points, biomass estimates, or fishing mortality estimates for Pacific bumper in the Panamanian small pelagic fishery. Some information on landings is available. Due to the lack of reference points, Table Ba cannot be used. <i>Chloroscombrus orqueta</i> has a resilience rating of 'High' according to the AFS procedure ⁵⁰ . According to Table Bb, Pacific bumper will pass the Category B assessment if biomass is currently around the long term average and fishing mortality is below the long term average; or if biomass is above the long term average and fishing mortality is not above the long term average. As there currently do not appear to be any long-term estimates of biomass or fishing mortality, the species does not pass this section.		
Improver Programme Notes Category B is designed to enable fishery managers to demonstrate that stocks for which limited information is available are being responsibly managed through the use of the precautionary		

⁵⁰ Fishbase species page, Pacific bumper. <http://www.fishbase.org/summary/1937>

approach. The most straightforward way to pass Category B is via Table Ba, which demands a stock to be maintained at or above an established target reference point or proxy, and with fishing mortality at or below MSY. In the case of Pacific bumper, there are no established reference points, and so the stock must be assessed against the more conservative Table Bb. As noted above, to pass Table Bb the stock must have biomass at or above the long-term average, with fishing mortality below the long term average. Therefore Pacific bumper again fails to meet the requirements, as estimates of these variables are not available.

It is important to note that passing via Table Bb is only ever temporary, as it is not possible to maintain biomass above the long-term average indefinitely. Therefore any fishery intending to maintain approval against the IFFO RS requirements using Section B must aim to establish biomass and fishing mortality reference points, and may find that meeting the Category A requirements becomes feasible.

Standard clauses 1.3.2.1

CATEGORY C SPECIES

In a whole fish assessment, Category C species are those which make up less than 5% of landings, but which are subject to a species-specific management regime. In most cases this will be because they are a commercial target in a fishery other than the one under assessment. In a by-product assessment, Category C species are those which are subject to a species-specific management regime, and are usually targeted species in fisheries for human consumption.

Clause C1 should be completed for **each** Category C species. If there are no Category C species in the fishery under assessment, this section can be deleted. A Category C species does not meet the minimum requirements of clause C1 should be re-assessed as a Category D species.

Species Name		NONE	
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.	
	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.	
			Clause outcome:
Evidence			
Improver Programme Notes			
There are currently no species captured in the fishery which fall under this Category.			
<i>Standard clauses 1.3.2.2</i>			

CATEGORY D SPECIES

In a whole fish assessment, Category D species are those which make up less than 5% of landings and are not subject to a species-specific management regime. In the case of mixed trawl fisheries, Category D species may make up the majority of landings. In a by-product assessment, Category D species are those which are not subject to a species-specific management regime. In both cases, the comparative lack of scientific information on the status of the population of the species means that a risk-assessment style approach must be taken.

The process for assessing Category D species involves the use of a Productivity-Susceptibility Analysis (PSA) to further subdivide the species into 'Critical Risk', 'Major Risk' and 'Minor Risk' groups. If there are no Category D species in the fishery under assessment, this section can be deleted.

Productivity and susceptibility ratings are calculated using a process derived from the APFIC document "Regional Guidelines for the Management of Tropical Trawl Fisheries, which in turn was derived from papers by Patrick *et al* (2009) and Hobday *et al* (2007). Table D1 should be completed for each Category D species as follows:

- Firstly, the best available information should be used to fill in values for each productivity and susceptibility attribute.
- Table D2 should be used to convert each attribute value into a score between 1 and 3.
- The average score for productivity attributes and the average for susceptibility attributes should be calculated.
- Table D3 should be used to determine whether the species is required to meet the requirements of Table D4. A species which does not need to meet the requirements of D4 is automatically awarded a pass.
- Table D4 should be used to assess those species indicated by Table D3 to determine a pass/fail rating.
- Any Category D species which has been categorised by the IUCN Red List as Endangered or Critically Endangered, or which appears in the CITES appendices, automatically results in a fail.

D1	Species Name	White mullet (<i>Mugil curema</i>)	
	Productivity Attribute	Value	Score
	Average age at maturity (years)	2 to 4	2
	Average maximum age (years)	10 to 30	2
	Fecundity (eggs/spawning)	>10,000	1
	Average maximum size (cm)	60 to 150	2
	Average size at maturity (cm)	<30cm	1
	Reproductive strategy	Broadcast spawner	1
	Mean trophic level	<2.5	1
	Average Productivity Score		1.43
	Susceptibility Attribute	Value	Score
	Overlap of adult species range with fishery	<25%	1
	Distribution	Throughout region	1
	Habitat	Pelagic	3
	Depth range	High overlap	3
	Selectivity	>2 times mesh size	3
	Post-capture mortality	Retained	3
	Average Susceptibility Score		2.3
	PSA Risk Rating (From Table D3)		PASS
	Compliance rating		PASS

References

Fishbase species profile, white mullet. <http://www.fishbase.org/summary/Mugil-curema.html>

IUCN Red List, white mullet. <http://www.iucnredlist.org/details/190168/0>

Improver Programme Notes

Based on landings data from 2015-2017, the composition of the bycatch varies from year to year. Species representing more than 0.1% of landings in one of those years include these include *Ariopsis* catfish, Mexican needlefish (*Tylosurus fodiator*), White mullet (*Mugil curema*), Chilhuil sea catfish (*Bagre panamensis*), Cachema weakfish (*Cynoscion phoxocephalus*), Pacific smalleye croaker (*Nebris occidentalis*), Mexican barracuda (*Sphyrna ensis*), Pacific sierra (*Scomberomorus sierra*), Boccone weakfish (*Cynoscion praedatorius*), Red sea catfish (*Bagre pinnimaculatus*), Peruvian moonfish (*Selene peruviana*), Brassy grunt (*Orthopristis chalceus*), Silver stardrum (*Stellifer illecebrosus*), Panama grunt (*Pomadasys panamensis*), *Bardiella armata*, and the Whiteleg shrimp (*Litopenaus vannamei*). Of these, the only species groups to represent more than 0.1% of the catch in more than one year are white mullet, cachema weakfish, Peruvian moonfish and *Ariopsis* catfish. None of the species listed above represent more than 0.1% of the catch in all three years.

The IFFO RS fishery assessment process demands that any non-Type-1 species “representing more than 0.1% of the annual catch” should be assessed as a Type 2 ‘non-target’ species. This demand requires some interpretation in the case of the Panama small pelagic fishery, due to the variation in bycatch from year to year. For the purposes of this report, the four species groups listed above (white mullet, cachema weakfish, Peruvian moonfish and *Ariopsis* sea catfish) will be assessed as Type 2 species; however this may change based on the recorded bycatch in future years. As a general rule, the fishery should be aware of the bycatch composition and minimise the extent to which vulnerable species are caught.

White mullet is the only species for which values for all required productivity and susceptibility attributes are available. By applying the IFFO RS PSA analysis to these attributes, white mullet receives a Pass rating from table D3. This means it does not need to be subjected to any further analysis.

Standard clauses 1.3.2.2

D1	Species Name	Cachema weakfish (<i>Cynoscion phoxocephalus</i>)	
	Productivity Attribute	Value	Score
	Average age at maturity (years)	Unknown	
	Average maximum age (years)	Unknown	
	Fecundity (eggs/spawning)	>10,000	1
	Average maximum size (cm)	<60cm	1
	Average size at maturity (cm)	30-150	2
	Reproductive strategy	Broadcast spawner	1
	Mean trophic level	>3.8	3
	Average Productivity Score		1.6 [est]
	Susceptibility Attribute	Value	Score
	Overlap of adult species range with fishery	<25%	1
	Distribution	Throughout region	1
	Habitat	Pelagic	3
	Depth range	Unknown	
	Selectivity	>2 times mesh size	3
	Post-capture mortality	Retained	3
	Average Susceptibility Score		2.2 [est]
	PSA Risk Rating (From Table D3)		PASS
	Compliance rating		PASS [estimated]

References

Fishbase species profile, cachema weakfish. <http://www.fishbase.org/summary/11001>

IUCN Red List, cachema weakfish. <http://www.iucnredlist.org/details/183996/0>

Jorge, A & Campos, M. *Estimates of length at first sexual maturity in Cynoscion spp. (Pisces: Sciaenidae) from the Gulf of Nicoya, Costa Rica*. Rev. Biol. Trop., 40 (2): 239-241, 1992.

<https://revistas.ucr.ac.cr/index.php/rbt/article/viewFile/24541/24729>

Improver Programme Notes

The productivity and susceptibility information for cachema weakfish is incomplete. Based on the information available, the species is likely to have a productivity score of around 1.6, meaning that whatever the susceptibility score the species will receive a Pass rating from Table D3. Cachema weakfish is categorised by the IUCN as 'Least Concern'; however if the species is regularly present in the small pelagic catch the fishery should take steps to determine the remaining productivity and susceptibility attributes.

Standard clauses 1.3.2.2

D1	Species Name	Peruvian moonfish (<i>Selene peruviana</i>)	
	Productivity Attribute	Value	Score
	Average age at maturity (years)	Unknown	
	Average maximum age (years)	Unknown	
	Fecundity (eggs/spawning)	Unknown	
	Average maximum size (cm)	<60cm	1
	Average size at maturity (cm)	Unknown	

Reproductive strategy	Unknown	
Mean trophic level	>3.25	3
Average Productivity Score		n/a
Susceptibility Attribute	Value	Score
Overlap of adult species range with fishery	<25%	1
Distribution	Throughout region	1
Habitat	Demersal	1
Depth range	Low overlap	1
Selectivity	>2 times mesh size	3
Post-capture mortality	Retained	3
Average Susceptibility Score		1.67
PSA Risk Rating (From Table D3)		PASS
Compliance rating		PASS

References

Fishbase species profile, Peruvian moonfish. <http://www.fishbase.org/summary/Selene-peruviana.html>

IUCN Red List, Peruvian moonfish. <http://www.iucnredlist.org/details/183213/0>

Improver Programme Notes

There is very little information available on the biological characteristics of Peruvian moonfish, meaning that it is not possible to calculate even an estimate of the productivity score for the species. However, the susceptibility attributes are fully known, and result in a susceptibility score sufficiently low that the species will receive a Pass rating from Table D3 whatever the productivity score. Regardless, if the species is regularly present in the small pelagic catch the fishery should take steps to determine the remaining productivity attributes. Peruvian moonfish is categorised by the IUCN as 'Least Concern'.

Standard clauses 1.3.2.2

D1	Species Name	Sea catfish (<i>Ariopsis spp</i>)	
	Productivity Attribute	Value	Score
	Average age at maturity (years)	Unknown	
	Average maximum age (years)	Unknown	
	Fecundity (eggs/spawning)	Unknown	
	Average maximum size (cm)	<60cm	1
	Average size at maturity (cm)	Unknown	
	Reproductive strategy	Mouth brooder	3
	Mean trophic level	>3.25	3
	Average Productivity Score		n/a
	Susceptibility Attribute	Value	Score
	Overlap of adult species range with fishery	<25%	1
	Distribution	Throughout region	1
	Habitat	Moderately likely	2
	Depth range	Medium overlap	2
	Selectivity	>2 times mesh size	3
	Post-capture mortality	Retained	3
	Average Susceptibility Score		2
	PSA Risk Rating (From Table D3)		GAP
	Compliance rating		GAP

References

Fishbase species profile, tete sea catfish. <http://www.fishbase.org/summary/13480>

IUCN Red List, tete sea catfish. <http://www.iucnredlist.org/details/183818/0>

Fishbase species profile, blue sea catfish. <http://www.fishbase.org/summary/Ariopsis-guatemalensis.html>

IUCN Red List, blue sea catfish. <http://www.iucnredlist.org/details/183394/0>

Improver Programme Notes

There are several different groups of *Ariopsis* reported in the landings and sampling data, the largest of which does not define a species. The PSA for this group has been conducted using attributes taken from several catfish species present in the catch. There is insufficient data to determine a reliable estimate of productivity score. The susceptibility score of 2 means that without a productivity score it is not possible to determine whether the species group receives a Pass rating in Table D3. Although the both of the most commonly occurring catfish species are categorised by the IUCN as 'Least Concern', the fishery should take steps to determine the remaining productivity attributes.

If this species group has a productivity score above 2.25, it will require assessment against Table D4 (see Table 4 for further notes).

Standard clauses 1.3.2.2

D1	Species Name	Pacific bumper (<i>Chloroscombrus orqueta</i>)	
	Productivity Attribute	Value	Score
	Average age at maturity (years)	<2	1
	Average maximum age (years)	<10	1
	Fecundity (eggs/spawning)	>10,000	1
	Average maximum size (cm)	<60	1
	Average size at maturity (cm)	<30	1
	Reproductive strategy	Broadcast spawner	1
	Mean trophic level	2.5	2
	Average Productivity Score		1.14
	Susceptibility Attribute	Value	Score
	Overlap of adult species range with fishery	25-50%	2
	Distribution	Regional	2
	Habitat	High overlap	3
	Depth range	High overlap	3
	Selectivity	>2 times mesh size	3
	Post-capture mortality	Retained	3
	Average Susceptibility Score		2.67
	PSA Risk Rating (From Table D3)		PASS
	Compliance rating		PASS

References

Fishbase species profile, pacific bumper: <https://www.fishbase.de/summary/1937>

Improver Programme Notes

Based on the outcomes of the IFFO RS PSA analysis, Pacific bumper receives a Pass rating from table D3. This

means it does not need to be subjected to any further analysis.

Standard clauses 1.3.2.2

Table D2 - Productivity / Susceptibility attributes and scores.

Productivity attributes	Low productivity/ High risk	Medium productivity/ Medium risk	High productivity/ Low risk
	Score 3	Score 2	Score 1
Average age at maturity (years)	>4	2 to 4	<2
Average maximum age (years)	>30	10 to 30	<10
Fecundity (eggs/spawning)	<1 000	1 000 to 10 000	>10 000
Average maximum size (cm)	>150	60 to 150	<60
Average size at maturity (cm)	>150	30 to 150	<30
Reproductive strategy	Live bearer, mouth brooder or significant parental investment	Demersal spawner "berried"	Broadcast spawner
Mean trophic level	>3.25	2.5–3.25	<2.5

Susceptibility attributes		High susceptibility/ High risk	Medium susceptibility/ Medium risk	Low susceptibility/ Low risk
		Score 3	Score 2	Score 1
Availability	1) Overlap of adult species range with fishery	>50% of stock occurs in the area fished	Between 25% and 50% of the stock occurs in the area fished	<25% of stock occurs in the area fished
	2) Distribution	Only in the country/ fishery	Limited range in the region	Throughout region/ global distribution
Encounterability	1) Habitat	Habitat preference of species make it highly likely to encounter trawl gear (e.g. demersal, muddy/sandy bottom)	Habitat preference of species make it moderately likely to encounter trawl gear (e.g. rocky bottom/reefs)	Depth or distribution of species make it unlikely to encounter trawl gear (e.g. epi-pelagic or meso-pelagic)
	2) Depth range	High overlap with trawl fishing gear (20 to 60 m depth)	Medium overlap with trawl fishing gear (10 to 20 m depth)	Low overlap with trawl fishing gear (0 to 10 m, >70 m depth)
Selectivity		Species >2 times mesh size or up to 4 m length	Species 1 to 2 times mesh size or 4 to 5 m length	Species <mesh size or >5 m length
Post capture mortality		Most dead or retained Trawl tow >3 hours	Alive after net hauled Trawl tow 0.5 to 3 hours	Released alive Trawl tow <0.5 hours

Note: Availability 2 is only used when there is no information for Availability 1; the most conservative score between Encounterability 1 and 2 is used.

D3		Average Susceptibility Score		
		1 - 1.75	1.76 - 2.24	2.25 - 3
Average Productivity Score	1 - 1.75	PASS	PASS	PASS
	1.76 - 2.24	PASS	PASS	TABLE D4
	2.25 - 3	PASS	TABLE D4	TABLE D4

D4 Species Name		N/A	
Impacts On Species Categorised as Vulnerable by D1-D3 - Minimum Requirements			
D4.1	The potential impacts of the fishery on this species are considered during the management process, and reasonable measures are taken to minimise these impacts.		
D4.2	There is no substantial evidence that the fishery has a significant negative impact on the species.		
			Outcome:
Evidence			
Improver Programme Notes			
Based on the available catch composition data, cachema weakfish and sea catfish may need assessment under Table D4, depending on the nature of their currently unknown attributes. If this were to occur, it is likely that clause D4.2 for each would be met by the fact that both groups are categorised as “Least Concern” by the IUCN. However, clause D4.1 requires that managers take the potential impacts of the fishery on these species into account, and take reasonable measures to mitigate these impacts. Therefore dependant on the outcomes of efforts to improve understanding of the two species groups, the fishery should be prepared to consider its impacts on them and take steps to mitigate these impacts.			
Standard clause 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.	GAP
Clause outcome:			GAP
Evidence			
<p>F1.1 – In 2016, the on-board observer programme was expanded to include collection of data on ETP interactions. Example logbooks were provided demonstrating the species ID keys and information recording used by observers to monitor interactions with turtles, sharks and rays. It is not clear what proportion of vessels or fishing trips have an observer present; the bycatch data reports that 318 fishing sets were observed in 2016. The summary reports that during 2016, the fleet encountered 42 turtles, 266 sharks and 48 rays.</p> <p>Of the turtles, all specimens were reported to be released; 85.7% apparently undamaged, 9.5% with minor injuries, and 4.8% with serious injuries. Species encountered were green sea turtle (<i>Chelonia mydas</i>, 33.3% of observations, listed as Endangered by the IUCN); olive ridley sea turtle (<i>Lepidochelys olivacea</i>, 26.2% of observations, listed as Vulnerable by the IUCN); and hawksbill sea turtle (<i>Eretmochelys imbricate</i>, 9.5% of observations, listed as Critically Endangered by the IUCN). The species of the remaining 31% of observations was not identified.</p> <p>No information was provided on the release or survival rates for sharks and rays. Of the species listed in 2016, the majority are categorised as Data Deficient by the IUCN. However the most significant shark interaction, in terms of numbers, is with the scalloped hammerhead, <i>Sphyrna lewini</i>. 249 individuals were caught in the sampled sets; scalloped hammerhead is categorised by the IUCN as Endangered.</p> <p>During the 2017 Season the On-Board Observer Program recorded several sea turtle sightings. The loggerhead sea turtle (<i>Caretta caretta</i>) is categorised by the International Union for Conservation of Nature (IUCN) Red List as "Vulnerable", and represented 63.6% (with 7 sightings) of the observations; the green turtle (<i>Chelonia mydas</i>), (categorised as "Endangered" by the IUCN Red List) represented 18.2% (2 sightings) of the observations; and the hawksbill sea turtle (<i>Eretmochelys imbricata</i>), (categorised as "Critically Endangered") represented 18.2% of the observations (2 sightings). All the turtles captured by purse seine net were released without damage</p> <p>Error! Bookmark not defined.</p> <p>In total, thirty-five shark interactions were recorded. The shark species identified were: Scalloped Hammerhead (<i>Sphyrna lewini</i>), (categorised as "Endangered" by the IUCN Red List) which accounted for 91.4% (32 sightings) of the individuals captured in the sampled sets; Pacific Sharpnose Shark (<i>Rhizoprionodon longurio</i>), (not evaluated by the IUCN) that represented 5.7% (2 sightings); and nurse shark (<i>Ginglymostoma cirratum</i>), (categorised as "Data Deficient") which represented 2.9% (one sighting). In relation to the interaction with rays, one sighting was recorded and four were examined, all spotted eagle rays (<i>Aetobatus narinari</i>) which is categorised as "Near Threatened" on the IUCN Red List</p> <p>Error! Bookmark not defined.</p>			
<p>F1.2 – There is clear evidence of interactions with ETP species. Of most concern is the Endangered scalloped hammerhead, for which no release or survival rates are available. The IUCN states that scalloped hammerhead</p>			

“is heavily exploited through its range in the Eastern Pacific. Of particular concern is increasing fishing pressure at adult aggregating sites such as Cocos Island (Costa Rica) and the Galapagos Islands (Ecuador), and along the slopes of the continental shelf where high catch rates of juveniles can be obtained. The number of adult individuals at a well-known *S. lewini* aggregation site in the Gulf of California (Espiritu Santo seamount) has declined sharply since 1980. Large hammerheads were also formerly abundant in coastal waters off Central America, but were reportedly depleted in the 1970s. A comparison of standardized catch rates of pelagic sharks (species-specific information was not available) in the EEZ of Costa Rica from 1991-2000 showed a decrease of 60%. In Ecuador, landings (grouped for the family Sphyrnidae) peaked in 1996 and declined until 2001. Given continued high fishing pressure, observed and inferred declines, the species is assessed as Endangered in this region”⁵¹.

F1.3 – To reduce the impacts of fisheries on sea turtles, Panama adopted the Declaration of the Inter-American Commission for the Protection and Conservation of Sea Turtles (CIT), which prohibits the retention of these species (via Law No. 8 of January 4, 2008). In addition, the creation of several Wildlife Refuge Areas with the purpose of protecting the nesting areas of sea turtles, for example on Isla Caña, La Barqueta Beach, La Marinera Beach as a special management area, among others, indicate State interest in conserving these species.

Improver Programme Notes

Interactions with Endangered and Critically Endangered species mean that the fishery must take steps to mitigate its impacts. Evidence of existing mitigating measures would improve the score in this section, otherwise the fishery must develop and implement new measures before the requirements will be met.

Standard clause 1.3.3.1

F2 Impacts on Habitats - Minimum Requirements			
F2	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 – The use of purse seines in areas with hard bottoms is reportedly avoided by fishers, to limit gear damage. There are also no-take zones in place to protect mangroves and river mouths; CeDePesca reports that compliance with these closures has historically not been excellent but that the introduction of mandatory VMS has improved compliance. F2.2 – Given the nature of the gear used in the fishery, and in the absence of evidence to the contrary, it is unlikely to have a substantial impact on physical habitats. F2.3 – As the fishery is unlikely to interact with physical habitats, it is also unlikely to require measures to mitigate potential impacts.			
Improver Programme Notes			

⁵¹ IUCN Red List, scalloped hammerhead. <http://www.iucnredlist.org/details/39385/0>

It is usually straightforward for a purse seine fishery to meet the requirements of section F2, due to the low probability of significant interactions with the physical environment. However, in some pelagic fisheries, the large size of the nets combined with operations in relatively shallow waters can make habitat interactions possible, and the fishery should be aware of this possibility when developing an improvement plan.

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.	GAP
F3.2	There is no substantial evidence that the fishery has a significant negative impact on the marine ecosystem.	GAP
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.	GAP
Clause outcome:		GAP
Evidence F3.1 – The 2015 stock assessment report ⁵² includes brief consideration of ecosystems via studies conducted by the Smithsonian Institute and the Audobon Society on marine and wading birds in the region. The conclusion of the particular study referenced by the report was that the small pelagic fishery was not having a significant negative effect on the seabird population. The 2016 stock assessment ⁵³ also includes a brief consideration of the role of the target species in the ecosystem. F3.2 – Information on the impacts of the fishery on the ecosystem is limited and so it is not possible to score this clause. F3.3 – Information on the role of anchoveta and thread herring within the ecosystem is limited and so it is not possible to score this clause; however as small pelagic species it is possible that they play a key role in the marine ecosystem.		
Improver Programme Notes The evidence suggests that the impacts of the fishery on the ecosystem, and the role of the target species within the ecosystem, do not play a substantial role in informing the management of the fishery. The fishery improvement plan should include measures designed to improve the understanding of the ecosystem aspects of the fishery and to factor these into the stock assessment and other management processes.		
<i>Standard clause 1.3.3.3</i>		

⁵² Small Pelagic Fishery in Panama: Stock Assessment and Recommendations for a Management Plan. CeDePesca, 2015. http://www.cedepesca.net/wp-content/uploads/2016/05/The_Panama_small_pelagics_fishery.pdf

⁵³ Analysis of Weekly CPUE for Pacific anchoveta and thread herring in the Gulf of Panama, Management Suggestions. CeDePesca, March 2016. http://cedepesca.net/wp-content/uploads/2017/08/2016-03_CeDePesca_Analysis-of-the-weekly-CPUE-for-Pacific-anchoveta-and-thread-herrings_V2_ENG.pdf

SOCIAL CRITERION

In addition to the scored criteria listed above, applicants must commit to ensuring that vessels operating in the fishery adhere to internationally recognised guidance on human rights. They must also commit to ensuring there is no use of enforced or unpaid labour in the fleet(s) operating upon the resource.

Improver Programme Notes

In the current version of the IFFO RS fishery assessment, the social component is limited to a commitment from applicants. The extent to which this commitment is 'tested' is limited. However, applicants to the Improver Programme should be aware that this section will be under continuing development over the coming year(s), and additional social requirements are likely to be added before the end of any FIP process.