



MarinTrust Standard V2

Whole fish Fishery Assessment Report Template

MarinTrust Programme

Unit C, Printworks

22 Amelia Street

London

SE17 3BZ

E: standards@marin-trust.com

T: +44 2039 780 819

Table 1 Application details and summary of the assessment outcome

Application details and summary of the assessment outcome			
Name: Promarina, S.A.			
Address: Puerto Caimito, La Chorrera			
Country: Panama		Zip:	
Tel. No. (+507) 248-4072		Fax. No.	
Email address: pleamar@promarinapanama.com		Applicant Code	
Key Contact: Tomas Villa Garay		Title: General Manager	
Certification Body Details			
Name of Certification Body:		LRQA	
Assessor Name	CB Peer Reviewer	Assessment Days	Initial/Surveillance/ Re-approval
Jose Peiro Crespo	Kate Morris	5.5	Initial
Assessment Period	Jan – February 2022		
Scope Details			
Management Authority (Country/State)		Panama, Aquatic Resources Authority of Panama (Autoridad de los Recursos Acuáticos de Panamá, ARAP)	
Main Species		Pacific anchoveta (<i>Cetengraulis mysticetus</i>) Pacific thread herring (<i>Opisthonema spp.</i>)	
Fishery Location		Area FAO 77, EASTERN CENTRAL PACIFIC Panama (Gulf of Panama)	
Gear Type(s)		Purse seine	
Outcome of Assessment			
Overall Outcome		Pass	
Clauses Failed		None	
CB Peer Review Evaluation			
Fishery Assessment Peer Review Group Evaluation			
Recommendation			

Table 2. Assessment Determination

Assessment Determination
<p>This report assesses the purse seine fishery of small pelagic species in Panama. The fishery targets (Pacific anchoveta (<i>Cetemgraulis mysticetus</i>) and Pacific thread herrings (<i>Opisthonema spp.</i>)) which represent more than 95% of the catch, with relatively low catches of other species, such as Pacific bumper (<i>Chloroscombrus orqueta</i>), white mullet (<i>Mugil curema</i>), cachema weakfish (<i>Cynoscion phoxocephalus</i>), Peruvian moonfish (<i>Selene peruviana</i>) and sea catfish (<i>Ariopsis. seemanni</i> and <i>A. guatemalensis</i>).</p> <p>The small pelagic fishery in Panama is managed by the Aquatic Resources Authority of Panama (Autoridad de los Recursos Acuáticos de Panamá, ARAP). ARAP is also the body responsible for the data collection and analysis of fisheries resources in Panama. This work has been supported by CeDePesca and the industry under the FIP for the small pelagic fishery in Panama. Albor Tecnológico is the company in charge of conducting hydroacoustic survey with the support of the fishing industry.</p> <p>The ARAP's Directorate of Inspection, Surveillance and Control is responsible for monitoring compliance with fishery laws and regulations. The 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".</p> <p>The management framework and the surveillance, control, and enforcement system meet minimum requirements set by the MARINTRUST Standard, clauses M1-M2 are passed.</p> <p>The assessment of the Pacific anchoveta and Pacific thread herring stocks considers all fishery removals and the biological characteristics of the target species. Commercial catches are collected by the authorities. In addition to catch data (for the period 1956-2019), CPUEs, size classes from landing data (available since 2014) and biomass estimates from hydroacoustic surveys conducted in 2017, 2018 and 2019 were used in order to assess the stock status of the species. The last stock assessment for these species was conducted in 2020 (Canales 2020).</p> <p>The stock is managed under the Small pelagic management plan (ARAP 2018). A management objective has been established for these stocks to ensure that at least 60% of the virgin biomass (Target reference point) is kept for both stocks. A Biomass limit (Blim) of 20% of the virgin biomass was also established by Canales 2020, although the review conducted by Minte-Vera 2021 indicated that this last value was not conservative enough for key stocks. Hydroacoustic surveys are carried out before the fishing season to provide an estimation of the biomass and inform the maximum allowable catch (CMA) for the season. The spawning biomass for Pacific anchoveta and Pacific thread herring in 2020 was estimated to be at 77% and 86% of the virgin biomass respectively. The last hydroacoustic survey conducted in 2021 estimated a total biomass of 270,619 mt in waters of Panama, which corresponded to 154,884 mt of herring and 115,775 mt of anchoveta (CeDePesca 2021).</p> <p>The main mechanisms by which total removals are currently restricted are seasonal closures and restrictions on total fishing licences. The fishery is closed by the authorities based on the monitoring of the fishery. Catches of Pacific anchoveta and Pacific thread herring in the last 10 years have been at around 50,000 mt and 33,000 mt respectively below the sustainable catch values of 71,000 mt and 66,000 mt indicated by Canales (2020). Therefore, clauses A1-A4 are passed for both Category A target species.</p> <p>Category D species (non-managed species representing <5% of the catch) include Pacific bumper, white mullet, cachema weakfish, Peruvian moonfish, and sea catfish. Although data on biological characteristics is scarce for some of these species, a PSA analysis has been conducted. Pacific bumper, white mullet, cachema weakfish, Peruvian moonfish passed the PSA analysis and sea catfish was further assessed against clauses under D4. In the particular case of sea catfish, two <i>Ariopsis</i> species are found in the area <i>A. seemanni</i> and <i>A. guatemalensis</i>. Catch data is collected in the fishery through an onboard observer program which has improved the knowledge about the impact of the fishery on bycatch species. The bycatch levels of sea catfish are low, below 0.1-2% of the total catch and these species are listed as Least Concern by the IUCN red list. Therefore, the impact of the fishery on them is considered negligible. Clauses D are met for all the category D species.</p> <p>In relation to the impact of the small pelagic fishery on ETP species, this fishery interacts with sharks, sea turtles and seabirds. When interacting, sea turtles are released alive. Information about the bycatch of seabirds is</p>

scarce but no interactions with endangered species have been reported in the fishery (only for pelicans). Interactions with ETP species are recorded, **F1.1 is met.**

Of most concern is the Critically Endangered scalloped hammerhead. The post-release mortality is higher for injured released sharks and has been reported as 100% for the Scalloped Hammerhead in purse seines, although this conclusion was based on limited data (Eddy et al. 2016). The species is caught globally as target and bycatch in pelagic commercial and small-scale longline, purse seine, and gillnet fisheries, and is retained for the meat and fins. The Scalloped Hammerhead has undergone steep declines in all oceans, with some signs of stabilization and possible recovery in response to management only in the Northwest Atlantic and Gulf of Mexico (Rigby et al., 2019).

Although it is difficult to assess the total impact of the fishery on this species (the percentage of coverage of the observer program is not provided in the bycatch reports), 249 individuals were caught in 2016, 35 in 2017, and 32 in 2018 (in the observed sets). In 2019, when according to CeDePesca 10% of the total catch was observed, 105 scalloped hammerheads were captured (more recent data is not used as it has not been entirely processed). It would correspond to a total catch of 1,050 scalloped hammerheads in the fishery in 2019. The species is critically endangered and even a low level of bycatch can have an impact on the population. However, these catch numbers are very much lower than in other fisheries operating in the area, such as the longline or the trawl fisheries. A number of workshops have been conducted in this fishery to improve data collection on interactions and release of bycatch specimens, and stakeholders in the fishery have also signed a voluntary code of conduct which includes among its objectives to comply with laws and regulations to protect ETP species. A collaboration agreement has been also recently established by Promarina with a shark specialist to launch a shark monitoring and release project. Therefore, it is considered that with the available information **F1.2 and F1.3 are met.**

In the case of the habitat impacts of the fishery, purse seine is designed to catch shoals of pelagic species and they use to operate in the water column without contacting the seabed. However, as this fishery occurs in coastal areas, purse seines for Pacific anchoveta and herring do contact the seabed. However, the fishery occurs over mud where the impact is reduced, and a number of no-take zones have been established in order to protect the vulnerable habitats in the area (mangroves). Therefore, the physical impacts of pelagic fisheries are considered insignificant. **F2 clauses are met.**

Pacific anchoveta and Pacific thread herring are coastal pelagic fish, which form large schools. Small pelagic species play a key role in the general health of marine ecosystems, as they feed on plankton and are a prey for other fish, birds, reptiles, and marine mammals. The on-board observer program currently in place collect data on ETP and habitat interactions, which is used to assess the impact of the fishery on key elements of the ecosystem. Reference points set during the most recent assessment of the target species were set taking into consideration the role of these species in the ecosystem, and a precautionary biomass target of 60% of the virgin spawning stock biomass was used for assessing stock status. Both target species are currently above that precautionary level. The review conducted by Minde-Vera 2021 highlighted the need for a more precautionary approach in this case for the Blim, set by Canales 2020 at 0.2SSB. Annual landings for both species (around 70,000 mt) are below the estimated MSY for both species (137,000 mt). Therefore, it is considered that the broader ecosystem within which the fishery occurs is considered during the management decision-making process, there is no substantial evidence that the fishery has a significant negative impact on the marine ecosystem and the key role of the target species is considered by the authorities when recommending the total permissible fishery removals. **F3 clauses are met.**

Fishery Assessment Peer Review Comments

The fishery under assessment is the Panama Pacific Anchoveta fishery, the species caught in this fishery are – Marin Trust (MT) Category A (Pacific anchoveta and Pacific thread herring) – Marin Trust Category D (Pacific bumper, White mullet, Cachema weakfish, Peruvian moonfish, Sea catfish) – species have been correctly classified and assessed against the MT requirements.

The Panama anchoveta fishery has a Monitoring Control and Surveillance system in place, and the observer programme initiated in 2016 provides some confidence in the bycatch and ETP catch quantities. The target stock makeup a significant proportion of the overall catch (95%) and is managed under the Small pelagic fishery management plan. The management plan ensures the target stocks are kept in line with 60% of the virgin biomass (Target reference point). A recent assessment of both target stocks (2020) confirms that both are

managed within the sustainable limits set. Regarding the assessment of the impact on ETP species, there is evidence to suggest there are regular interactions with ETPs, and information in regard to species and number is improving. Although an observer program has been established, it's unclear if it is achieving the 20% target coverage of hauls, and the reports provided to the audit team were patchy and did not contain %coverage expect for 2019. The scalloped hammerhead is of most concern in this fishery, under F1.2 scoring. There is no population estimate for this species and reporting in the fishery does not cover a sufficient timespan to accurately assess the fishery's impact on the scalloped hammerhead. The quality ETP recording in this fishery is improving, and although management seems to favour turtle species and lacks scrutiny for shark and seabird species, where post-capture mortality is high (e.g., scalloped hammerhead) alternative measures to reduce fishery-specific interactions are being explored. Finally, the fishery under assessment deploys pelagic trawls, over muddy substrates, which are known to not significantly impact habitat types. Although there is a lack of complete habitat mapping within the fishery extent, where vulnerable habitats are known to occur, such as estuaries and mangroves, the management system has implemented an extensive MPA network. Ecosystem elements have also been adequately considered by the auditor.

The auditor's recommendation to pass this fishery for the production of fishmeal and fish oil under the IFFO RS v2.0 whole-fishery standard is supported by the peer reviewer.

The following recommendations are made to the auditor and client for consideration in future audits:

- Establish stock boundaries of the Pacific anchoveta and if appropriate a separate section M should be completed (M scoring).
- Clarification on the agreed frequency of the management committee meetings for the anchoveta fishery (M1.5 scoring).
- Clarification on landings of category A species outside of Panama, and if these are included in stock assessments (A2.1 scoring).
- A MCS system is in place, but more information could be provided to fully assess the coverage. Information on the number of inspections, vessels inspected, the number of infringements, and the number of fines (M2.3 scoring).
- The fishery has an ambitious observer program coverage target of 20%, this level of coverage is not seen in many fisheries globally. However, quality of reporting over quantity is key to recognizing any trends in the number of bycatch species caught. The % coverage for each reporting year should be provided, along with vessels observed, and a random sample of reports to be examined.
- Information on the species composition residing in, or on the benthic substrates over which the fishing gear is deployed.

Clarification from Marin Trust should be provided on the following:

- Category D species scoring, MT guidance should not impact assessment outcome. When there is not enough information to use the PSA tables provided, is the default to score the species using D4.1/2? Specifically in the case of the Peruvian Monkfish, please note, from the table D3, the susceptibility score falls under the first column (values 1-1.75) so regardless of the productivity score, the species is in the green section and gets a PASS. The same occurs if it were to happen the other way around (if the productivity score is between 1 and 1.75).
- ETP species, MT guidance may impact assessment outcome. When there is no population estimate for an ETP species how should the impact of the fishery be assessed? This is specifically regarding the assessment of scalloped hammerhead, which has a global distribution, and little is known about any local population structures or relative numbers. Information on catches in this fishery is good, and improving, alongside other fisheries catches of scalloped hammerhead are comparatively low.

Notes for On-site Auditor



Table 3 General Results

General Clause	Outcome (Pass/Fail)
M1 - Management Framework	Pass
M2 - Surveillance, Control and Enforcement	Pass
F1 - Impacts on ETP Species	Pass
F2 - Impacts on Habitats	Pass
F3 - Ecosystem Impacts	Pass

Table 4 Species- Specific Results

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

Category	Species	% landings	Outcome (Pass/Fail)	
Category A	Pacific anchoveta (<i>Cetengraulis mysticetus</i>)	50-60%	A1	Pass
			A2	Pass
			A3	Pass
			A4	Pass
Category A	Pacific thread herrings (<i>Opisthonema spp.</i>)	35-40%	A1	Pass
			A2	Pass
			A3	Pass
			A4	Pass
Category B	NA			
Category C	NA			
Category D	Pacific bumper (<i>Chloroscombrus orqueta</i>)	0.1-2%	Pass	
Category D	White mullet (<i>Mugil curema</i>)	0.1-2%	Pass	
Category D	Cachema weakfish (<i>Cynoscion phoxocephalus</i>)	0.1-2%	Pass	
Category D	Peruvian moonfish (<i>Selene peruviana</i>)	0.1-2%	Pass	
Category D	Sea catfish (<i>Ariopsis. seemanni</i> and <i>A. guatemalensis</i>)	0.1-2%	Pass	

Table 5 Species Categorisation Table

Common name	Latin name	Stock	IUCN Redlist Category ¹	% of landings	Management	Category
Pacific anchoveta	<i>Cetengraulis mysticetus</i>	Gulf of Panama	<u>Least concern</u>	50-60%	Aquatic Resources Authority of Panama (ARAP)	A
Pacific thread herrings	<i>Opisthonema spp.</i>	Gulf of Panama	<u>Least concern</u>	35-40%	Aquatic Resources Authority of Panama (ARAP)	A
Pacific bumper	<i>Chloroscombrus orqueta</i>	Gulf of Panama	<u>Least concern</u>	<5%	ARAP	D
White mullet	<i>Mugil curema</i>		<u>Least concern</u>	<5%		D
Cachema weakfish	<i>Cynoscion phoxocephalus</i>		<u>Least concern</u>	<5%		D
Peruvian moonfish	<i>Selene peruviana</i>		<u>Least concern</u>	<5%		D
Sea catfish	<i>Ariopsis spp.</i>		<u>Least concern</u>	<5%		D

Species categorisation rationale

The species categorisation table has been based on the catch profile shown in the FIP (RS standards 2018) although some differences in bycatches can be seen between years. The last observer report published by the fishery (CeDePesca 2021) indicates that bycatch in the Panama small pelagic fishery represents 4.2% of the total catch. Two species (Pacific anchoveta (*Cetengraulis mysticetus*) and Pacific thread herrings (*Opisthonema spp.*) make up to 95% of the catch, with 50-60% and around 35-40% of the landings respectively. The other five species represent less than 5% of the total catch and as no management measures are implemented for them, they are assessed as category D species: Pacific bumper (*Chloroscombrus orqueta*), White mullet (*Mugil curema*), Cachema weakfish (*Cynoscion phoxocephalus*), Peruvian moonfish (*Selene peruviana*), Sea catfish (*Ariopsis spp.*).

References

Links to the IUCN red list are provided in the table above.

CeDePesca 2021. Programa Privado de Observadores a Bordo. Pesquería de Pequeños Pelágicos de Panamá. Informe Preliminar #1/2021. 3 pp.

RS Standards 2018. Panama small pelagics. Fishery assessment report. 48 pp.

¹ <https://www.iucnredlist.org/>

MANAGEMENT

The two clauses in this section (M1, M2) relate to the general management regime applied to the fishery under assessment. The clauses should be completed by providing sufficient evidence to justify awarding each of the requirements a pass or fail rating. 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.	Yes
M1.2	There is an organisation responsible for collecting data and assessing the fishery.	Yes
M1.3	Fishery management organisations are publicly committed to sustainability.	Yes
M1.4	Fishery management organisations are legally empowered to take management actions.	Yes
M1.5	There is a consultation process through which fishery stakeholders are engaged in decision-making.	Yes
M1.6	The decision-making process is transparent, with processes and results publicly available.	Yes
Clause outcome:		Pass
M1.1	<p>There is an organisation responsible for managing the fishery.</p> <p>The organisation responsible for the management of fisheries resources in Panama is the Aquatic Resources Authority of Panama (Autoridad de los Recursos Acuáticos de Panamá, ARAP), created by Law 44 of November 23th 2006 (https://arap.gob.pa/wp-content/uploads/2015/05/ARAP_legislacion_ley-2006-44.pdf).</p> <p>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; the ARAP is also responsible for vessel licensing and the promotion and development of scientific research.</p> <p>The ARAP has also conducted some awareness workshops and training to fishermen about the importance of reducing the impact of fisheries on ETP species such as sharks (https://arap.gob.pa/arap-crea-conciencia-entre-los-pescadores-de-punta-chame-para-conseguir-la-sostenibilidad-del-recurso-tiburon/)</p> <p>There is an organisation responsible for managing the fishery. Sub-clause M1.1 is met.</p>	
M1.2	<p>There is an organisation responsible for collecting data and assessing the fishery.</p> <p>ARAP is the body responsible for the data collection and analysis of fisheries resources in Panama. This work has been supported by CeDePesca and the industry under the FIP for the small pelagic fishery in Panama. Albor Tecnológico is the company in charge of conducting hydroacoustic survey with the support of the fishing industry (CeDePesca 2021).</p> <p>There are organizations responsible for collecting data and assessing the fishery. Sub-clause M1.2 is met.</p>	
M1.3	<p>Fishery management organisations are publicly committed to sustainability.</p> <p>In March 2021, a new fisheries law was approved in Panama. Article 8 lists the main objectives of the law, including implementing sustainable management of the fishery resources and the application of the precautionary approach to fisheries management in the country (https://cedepesca.net/wp-content/uploads/2021/08/Panama-Ley-de-Pesca-2021.pdf).</p> <p>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". Specific objectives include the protection of natural biodiversity and ecological processes and ensuring a healthy aquatic environment in coordination with the National Environment Authority.</p> <p>Fishery management organisations are publicly committed to sustainability. Sub-clause M1.3 is met.</p>	
M1.4	<p>Fishery management organisations are legally empowered to take management actions.</p>	

Article 4 numeral 2 of Law 44 of November 23, 2006, establishes that the ARAP has the power to apply the technical measures and processes for the rational, sustainable, and responsible use of aquatic resources, in order to protect the national aquatic heritage and contribute to the protection of the environment.

On March 29th, 2016, the Government of Panama issued Executive Decree N° 107, effectively updating regulations for the small pelagic fishery. 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 (<http://www.viceipup.up.ac.pa/cidim/files/ARAP-Decreto-Ejecutivo-107-de-2016.pdf>).

A management plan was approved for the small pelagic fishery (including pacific anchoveta (*Cetengraulis mysticetus*), pacific herring (*Opisthonema* sp.), and pacific bumper (*Chloroscombrus orqueta*) in Panama in 2018 (Resolution ADM/ARAP 027 of August 28, 2018).

Fishery management organisations are legally empowered to take management actions. **Sub-clause M1.4 is met.**

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

As indicated above, in March 2021, a new fisheries law was approved in Panama. Article 8 of the law lists the main objectives, among which is to promote stakeholder participation in fisheries management in the country (<https://cedepesca.net/wp-content/uploads/2021/08/Panama-Ley-de-Pesca-2021.pdf>).

Fishery stakeholders (which include the reduction industry (Promarina and Probasa), NGOs (CeDePesca) and management authorities (ARAP)) have been engaged in the development of the research and management of the fishery via the FIP which has been in place since 2011.

In 2021, a management committee was created for this fishery. It includes representatives from the government-ARAP (1), from the fishmeal industry (1), from the pelagic industrial fishery (1), from the pelagic artisanal fishery (1) and, a representative from a relevant NGO. The role of this committee is to monitor the execution and/or modification of the small pelagic fishery management plan (<https://cedepesca.net/wp-content/uploads/2021/08/Anexo-VII.-Agenda-comite-Pequeños-Pelágicos-Marzo-2021-y-borrador-reglamento.pdf>)

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

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

The Marin Trust and CeDePesca websites for the Panamanian small pelagic provides extensive information on the decision-making process and its outcomes and includes updates on the status of the FIP, relevant legislation, activities and other information. Laws and regulations for the fishery can be found on the ARAP’s website.

The decision-making process is transparent, with processes publicly available. **Sub-clause M1.6 is met.**

References

Direct links to the legislation used have been included in the text (*references in Spanish*)

ARAP 2018. Plan de manejo de la pesquería de pequeños pelágicos anchoveta, arenque y orqueta en el Pacífico de Panamá. 31pp.

CeDePesca 2021. Programa Privado de Observadores a Bordo. Pesquería de Pequeños Pelágicos de Panamá. Informe Preliminar #1/2021. 3 pp

RS Standards 2018. Panama small pelagics. Fishery assessment report. 48 pp.

RS Standards 2020. Panama small pelagics. 4th year assessment. 15pp.

Links

MARINTRUST Standard clause	1.3.1.1, 1.3.1.2
FAO CCRF	7.2, 7.3.1, 7.4.4, 12.3

GSSI	D.1.01, D.4.01, D2.01, D1.07, D1.04,
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M2	Surveillance, Control and Enforcement - Minimum Requirements	
M2.1	There is an organisation responsible for monitoring compliance with fishery laws and regulations.	Yes
M2.2	There is a framework of sanctions which are applied when laws and regulations are discovered to have been broken.	Yes
M2.3	There is no substantial evidence of widespread non-compliance in the fishery, and no substantial evidence of IUU fishing.	Yes
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.	Yes
Clause outcome:		Pass

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

The ARAP's Directorate of Inspection, Surveillance and Control (DISC) is responsible for monitoring compliance with fishery laws and regulations (Article 38 of Panama Law no. 44, 2006). The 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". DISC tasks include conducting inspections, establishing base parameters to be followed in terms of technical standards for fishing and aquaculture activities, issuing certificates of inspections, investigating complaints, ensuring vessels adhere to safety legislation, and imposing sanctions for violations of legal and regulatory norms regulations (https://arap.gob.pa/wp-content/uploads/2015/05/ARAP_legislacion_ley-2006-44.pdf).

There is an organisation responsible for monitoring compliance with fishery laws and regulations. Therefore, **sub-clause M 2.1 is met.**

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

Title IV of the Articles 52 to 57 of Panama Law no. 44, 2006 describes infractions and sanctions in Panamanian fisheries. Articles 52 to 57 describe the sanctions to be applied for 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 (https://arap.gob.pa/wp-content/uploads/2015/05/ARAP_legislacion_ley-2006-44.pdf). Minor infractions are fined with fines between \$100 - \$10,000, and serious infractions with fines between \$10,001 - \$1,000,000. Fishing permits, licenses or authorisations may be also revoked by the authorities.

There is a framework of sanctions that are applied when laws and regulations are broken. **Sub-clause M2.2 is met.**

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

A number of measures have been implemented in the fishery which make difficult for fishers to be non-compliant with the regulations in the small pelagic fishery, such as: the implementation of a catch database, the introduction of an on-board observer programme with the objective of covering at least 20% of the trips (Executive decree no 107 2016 (<http://www.vicepup.up.ac.pa/cidim/files/ARAP-Decreto-Ejecutivo-107-de-2016.pdf>), VMS for all industrial vessels, etc. In the first assessment for the FIP, enforcement activities carried out between 2012 and 2016 are shown. During that period 5 fines (3 of them related to the same incident) were applied to the fishery. Fishing hauls are mapped and monitored on a monthly basis. Between January and July 2021, 68 trips and 262 hauls were observed (23.6%) (see figure below)). Information about the level of enforcement in the fishery (number of inspections, infractions, etc) in most recent years is not available, but the number of vessels in the fishery seems to be relatively low, monitoring (observer coverage) has increased and compliance with management measures (such as closed areas) seems to have improved (RS Standards 2020).

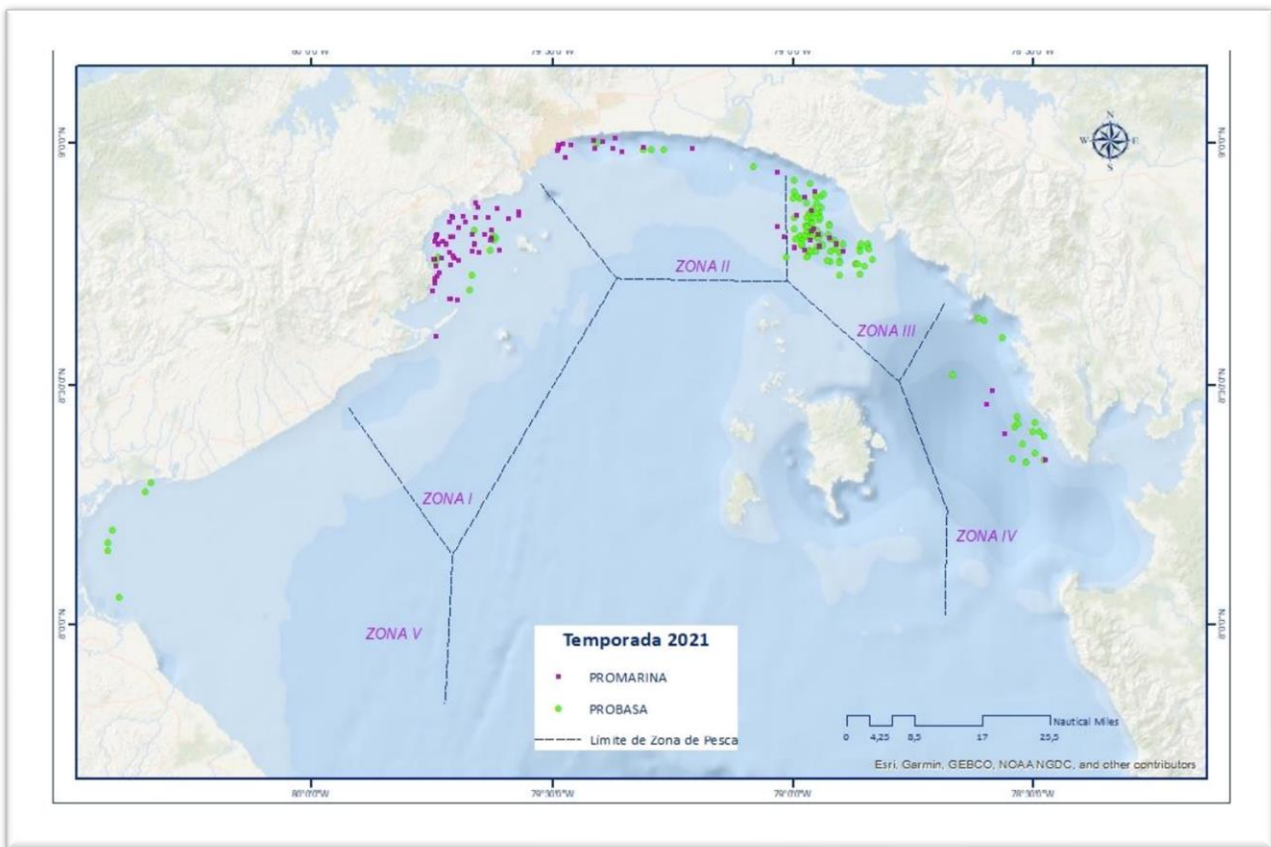


FIGURE 1 MONITORED HAULS BY OBSERVERS F=DURING MAY AND JUNE 2021 (CeDePesca 2021).

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

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.

Resolution ARAP no. 2 of October 2007 set out the technical requirements of a mandatory vessel monitoring system (VMS) for industrial vessels with a TRB > 6 tonnes in Panama (https://arap.gob.pa/wp-content/uploads/2015/05/ARAP_legislacion_resuelto-arap2-18-10-2007.pdf). The Resolution also set up a Satellite Monitoring Unit (SMU), with the objective of minimising IUU fishing. The SMU 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. Executive decree no 107 - 2016 indicates that an onboard observer programme, covering at least 20% of the trips, must be implemented in the fishery. The current observer coverage oscillates around 15% of the fishing trips. Observers act also as a compliance officer and conduct training aboard for fishermen (CeDePesca pers.comm.).

Compliance with laws and regulations is actively monitored, through a regime which include at-sea and portside inspections, observer programmes, and VMS. **Sub-clause M2.4 is met.**

References

Direct links to the legislation used have been included in the text (*references in Spanish*)

CeDePesca 2021. PROYECTO DE MEJORAS DE LA PESQUERÍA. I Campaña 2021 - Evaluación Hidroacústica de Recursos Pelágicos. INFORME EJECUTIVO- PANAMÁ. Del 21 al 27 de febrero 2021.

RS Standards 2020. Panama small pelagics. 4th year assessment. 15pp.

Links

MARINTRUST Standard clause	1.3.1.3
FAO CCRF	7.7.2
GSSI	D1.09

CATEGORY A SPECIES – Pacific anchoveta (*Cetengraulis mysticetus*)

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. The clauses should be completed by providing sufficient evidence to justify awarding each of the requirements a pass or fail rating. The species must achieve a pass rating against all requirements to be awarded a pass overall. **If the species fails any of these clauses it should be re-assessed as a Category B species.**

Species Name		Pacific anchoveta (<i>Cetengraulis mysticetus</i>)	
A1	Data Collection - Minimum Requirements		
	A1.1	Landing data are collected such that the fishery-wide removals of this species are known.	Yes
	A1.2	Sufficient additional information is collected to enable an indication of stock status to be estimated.	Yes
Clause outcome:			Pass

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

According to the management plan, landing and effort data is available for this fishery for the period between 1995 and 2017. Catches of Pacific anchoveta and Pacific thread herring in the last 10 years have been around 50,000 mt and 33,000 mt respectively. Although important changes in landings have occurred for the first species (ARAP 2018). Catch data per trip between 1995 and 2019 was used to assess the status of the stock in 2020 (Canales 2020).

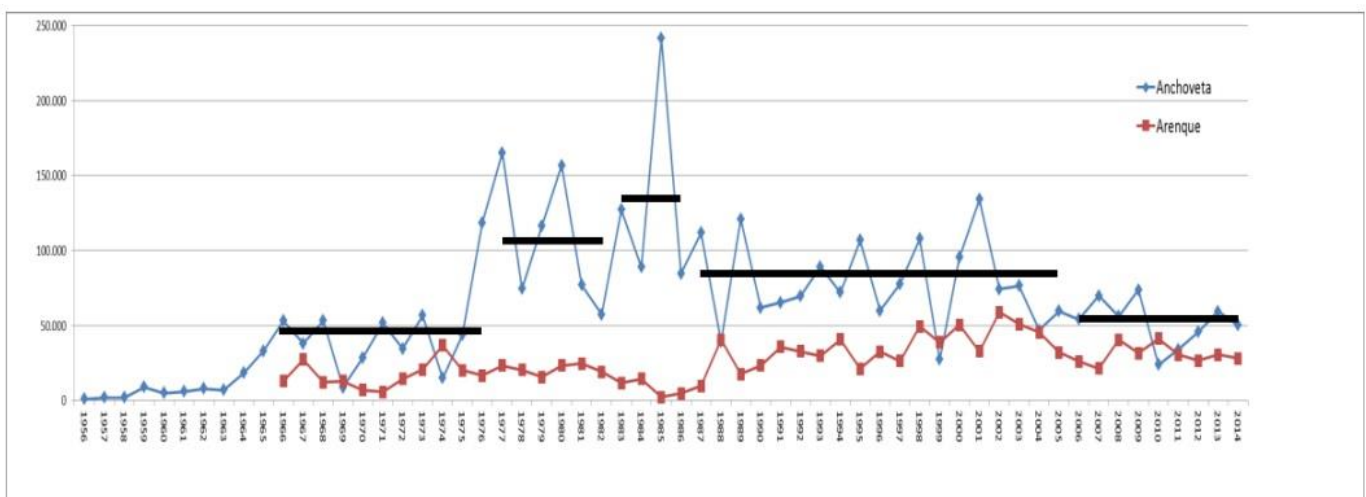


FIGURE 2 HISTORIC EVOLUTION IN SMALL PELAGIC FISHERY 1956-2014 (SOURCE: CeDePesca 2015 FROM FISTAT AND PROMARINA DATA)

Landing data is collected and used for assessing the stock, **sub-clause A1.1 is met.**

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

Apart from landing data, CPUEs, size classes from landing data (available since 2014) and biomass estimates from hydroacoustic surveys are also available. These different sources of data were also used for assessing the stock in 2020.

Sufficient additional information is collected to enable an indication of stock status to be estimated. **Sub-clause A1.2 is met.**

References

CeDePesca 2015.

Canales 2020. Evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenque (*Opisthonema sp.*) en el Golfo de Panamá. CeDePesca. 48 pp.

Links

MARINTRUST Standard clause	1.3.2.1.1, 1.3.2.1.2, 1.3.2.1.4, 1.3.1.2
FAO CCRF	7.3.1, 12.3
GSSI	D.4.01, D.5.01, D.6.02, D.3.14

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

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.

Stock assessments for Pacific anchoveta and Pacific thread herring were conducted in 2015, 2016 and more recently in 2020 under the umbrella of the Fisheries Improvement Project. In the last assessment landing data (for the period 1956-2019), CPUEs, size classes from landing data (available since 2014) and biomass estimates from hydroacoustic surveys conducted in 2017, 2018 and 2019 were used in order to assess the stock status of the species.

		2017			2018			2019		
		Sardina	Arenque	Ambas	Sardina	Arenque	Ambas	Sardina	Arenque	Ambas
Biomassas (t)	Puntual	233,136	151,042	384,180	249,851	180,493	430,344	135,596	220,367	358,183
	Límite superior	342,509	209,927		372,787	284,864		248,675	297,679	
	Límite inferior	123,767	92,157		126,918	98,122		22,517	143,486	
Límite de confianza		46.91%	38.98%		49.20%	46.74%		83.39%	34.95%	

FIGURE 3 BIOMASS ESTIMATES FOR PACIFIC ANCHOVETA (SARDINA) AND PACIFIC THREAD HERRING (ARENQUE) FOR THE PERIOD 2017-2019 (CANALES 2020).

The species is assessed regularly, and the assessment considers all fishery removals and biological characteristics of the species. **Sub-clause A2.1 is met.**

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

A management objective has been established for these stocks to ensure that at least 60% of the virgin biomass (Target reference point) is kept for both stocks. A Blimit of 20% of the virgin biomass was also established by Canales 2020, although the review conducted by Minte-Vera 2021 indicated that this last value was not conservative enough for key stocks. Hydroacoustic surveys are carried out before the fishing season to provide an estimation of the biomass and inform the maximum allowable catch (CMA) for the season. The spawning biomass for Pacific anchoveta in 2020 was estimated to be at 77% of the virgin biomass (Canales 2020). The last hydroacoustic survey conducted in 2021 estimated a total biomass of 270,619 mt in waters of Panama, which corresponded to 154,884 mt of herring and 115,775 mt of anchoveta (CeDePesca 2021).

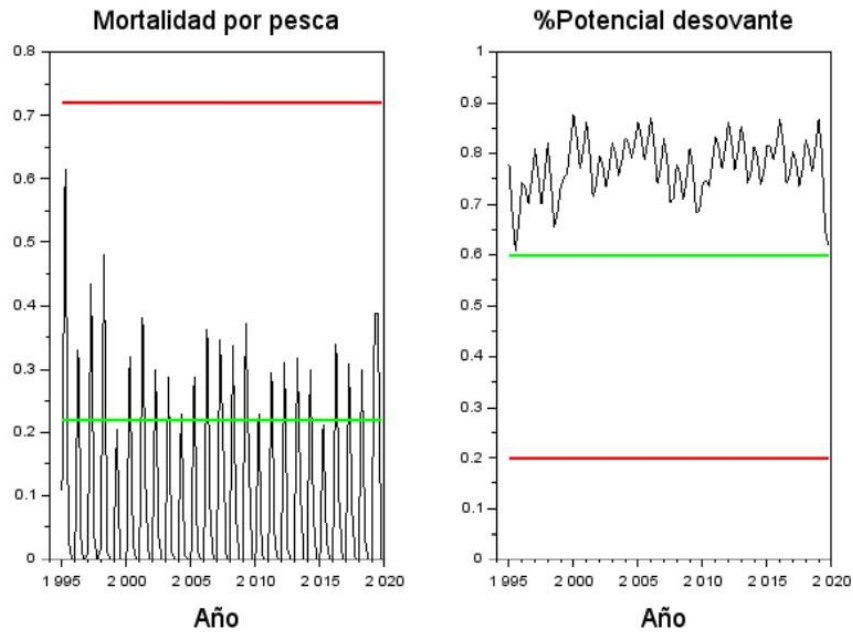


FIGURE 4 FISHING MORTALITY AND SSB FOR PACIFIC ANCHOVETA IN REFERENCE TO THE TARGET (GREEN LINE) AND THE TARGET REFERENCE POINTS (RED LINE) (CANALES 2020).

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

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

During the assessment of the status of Pacific anchoveta a $F_{msy}=F_{60\%}$ was calculated by Canales 2020. It would correspond to a value of 0.21. Canales 2020 considers that although there have been moments in the past in which $F > F_{msy}$, these were not long enough to create a situation of overexploitation in the stock. The harvest strategy has been effective in maintaining the stock above B_{msy} (see also Fishing mortality target and limit reference points in the figure above).

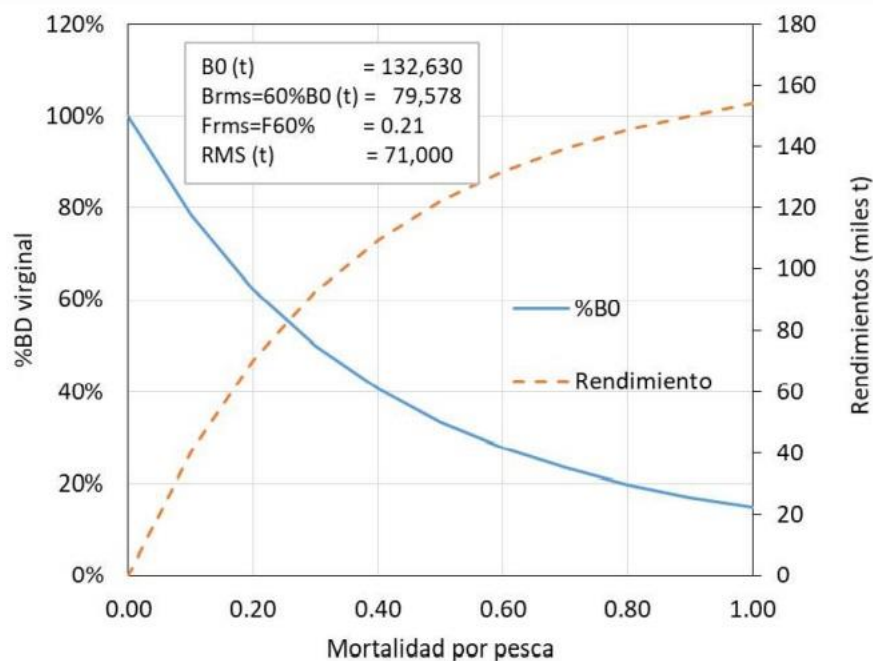


FIGURE 5 RELATIONSHIP BETWEEN FISHING MORTALITY SSB0 AND YIELD FOR ANCHOVETA (CANALES 2020)

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

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

As indicated previously, the assessment of the pelagic fishery conducted by Canales in 2020 (internal to CeDePesca) was reviewed in 2021 by Minte-vera (external party). A number of short- and medium-term recommendations were given to improve the assessment of the stocks:

Short term:

- Study the spatial distribution of fleet and maintain the areas that are not fished as “ecosystem insurance”.
- Study the size ranges preferred by the species predating on anchovy/herring, comparing their needs with the fishery selectivity
- Maintain fleet selectivity to ensure prey is available for predators before the species are recruited to the fishery
- Use interim biomass limit reference points that take into account a minimum level of “escape” of reproductive biomass, preferably more than the 0.2SSB0 proposed by the author, which is low given the key role of these species in the ecosystem.
- Use dynamic interim target reference points (relative to SSB0 resulting from the annual recruitment) and/or interim target reference points based on fishing mortality.
- Take into account changes in regime and the variability of recruitments when selecting limit reference points, for maintaining a minimum biomass in the stocks.
- Use a Bayesian approach to estimate probabilities of exceeding reference points, $P(B < B_{lim})$

Medium term:

- Quantify changes in stock productivity to perform simulations within a process of evaluation of the management strategies.
- Test various harvest control rules using different management strategy evaluations in order to incorporate them to the stock management plan.

The assessment is subject to internal and external review. **Sub-clause A2.4 is met.**

A2.5 The assessment is made publicly available.

Stock assessment can be accessed from the Marin Trust (<https://www.marin-trust.com/panama-small-pelagics-fip>) and CeDePesca (dedicated websites).

The assessment is made publicly available. **Sub-clause A2.5 is met.**

References

Canales 2020. Evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenque (*Opisthonema sp.*) en el Golfo de Panama. CeDePesca. 48 pp.

CeDePesca 2015. Small Pelagic Fishery in Panama, Stock Assessment and Recommendations for a Management Plant. 24 pp.

CeDePesca 2021. PROYECTO DE MEJORAS DE LA PESQUERÍA. I Campaña 2021 - Evaluación Hidroacústica de Recursos Pelágicos. INFORME EJECUTIVO- PANAMÁ. Del 21 al 27 de febrero 2021.

Minte-Vera, C.V. 2021. Revisión por pares de la evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenques de hebra (*Opisthonema spp.*) en el Golfo de Panamá 2021 (informe no-publicado. 35 pgs).

Links

MARINTRUST Standard clause	1.3.2.1.2, 1.3.2.1.4, 1.3.1.2
FAO CCRF	12.3
GSSI	D.5.01, D.6.02, D.3.14

A3 Harvest Strategy - Minimum Requirements		
A3.1	There is a mechanism in place by which total fishing mortality of this species is restricted.	Yes
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.	Yes
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).	Yes
Clause outcome:		Pass
<p>A3.1 There is a mechanism in place by which total fishing mortality of this species is restricted.</p> <p>Article 15 of Executive Decree No. 107 of March 2016 indicates 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 (http://www.viceipup.up.ac.pa/cidim/files/ARAP-Decreto-Ejecutivo-107-de-2016.pdf). That information is collected through biological samplings, carried out in a pre-season fishing survey, which is conducted by Albor Tecnológico, support by the fishmeal and fish oil processing companies and coordinated by the ARAP (CeDePesca 2021).</p> <p>The fishing season starts when the average size of the 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). 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. The fishery is closed by ARAP's 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 and Article 3 of Executive Decree 107 of May 2016 states that all vessels targeting anchoveta, herring or bumper must possess and carry a fishing license issued for those species specifically. The total number of licenses available are 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.</p> <p>The stock is managed under the Small pelagic management plan. Hydroacoustic surveys are conducted before the fishing season. The fishing season starts and the TACs are set taking into consideration the data collected during the survey (biomass estimates, size structure, etc). The main mechanisms by which total removals are currently restricted are seasonal closures and restrictions on total fishing licences. The fishery is closed by the authorities based on the monitoring of the fishery. Therefore, it is understood that a management mechanism is in place to restrict fishing mortality. Sub-clause A3.1 is met.</p> <p>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.</p> <p>As indicated previously, catches of Pacific anchoveta and Pacific thread herring in the last 10 years have been at around 50,000 mt and 33,000 mt respectively. Canales 2020 indicated sustainable catch values of 71,000 mt and 66,000 mt as sustainable for the anchoveta and herring stocks respectively. Therefore, catches have been below sustainable levels in recent years. Hydroacoustic surveys are carried out before the fishing season to provide an estimation of the biomass and inform the maximum allowable catch (CMA) for the fishing season. The last hydroacoustic survey conducted in 2021 estimated a total biomass of 270,619 mt in the waters of Panama, which corresponded to 154,884 mt of herring and 115,775 mt of anchoveta (CeDePesca 2021).</p> <p>Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment. Sub-clause A3.2 is met.</p>		

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).

Limit reference points have been established for these stocks at 0.2SSB0. They are currently well above the Bmsy, but it is considered that the fishery would stop if the annual hydroacoustic surveys indicate that the stocks has been reduced to low levels below Blim.

Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point. **Sub-clause A3.3 is met.**

References

Canales 2020. Evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenque (*Opisthonema sp.*) en el Golfo de Panama. CeDePesca. 48 pp.

Minte-Vera, C.V. 2021. Revisión por pares de la evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenques de hebra (*Opisthonema spp.*) en el Golfo de Panamá 2021 (informe no-publicado. 35 pgs).

Standard clause 1.3.2.1.3

Links

MARINTRUST Standard clause	1.3.2.1.3, 1.3.2.1.4
FAO CCRF	7.2.1, 7.22 (e), 7.5.3
GSSI	D3.04, D6.01

A4 Stock Status - Minimum Requirements		
A4.1	The stock is at or above the target reference point, OR IF NOT:	Yes
	The stock is above the limit reference point or proxy and there is evidence that a fall below the limit reference point would result in fishery closure OR IF NOT:	
	The stock is estimated to be below the limit reference point or proxy, but fishery removals are prohibited.	
Clause outcome:		Pass
<p>A4.1 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> <p>The stock of Pacific thread herring was assessed by Canales 2020. A target and limit reference point of 60% and 20% of the virgin biomass were selected respectively. The spawning biomass for Pacific thread herring was estimated to be at 77% of the virgin biomass. Fishing mortality was estimated at 63% of Fmsy (Canales 2020).</p>		

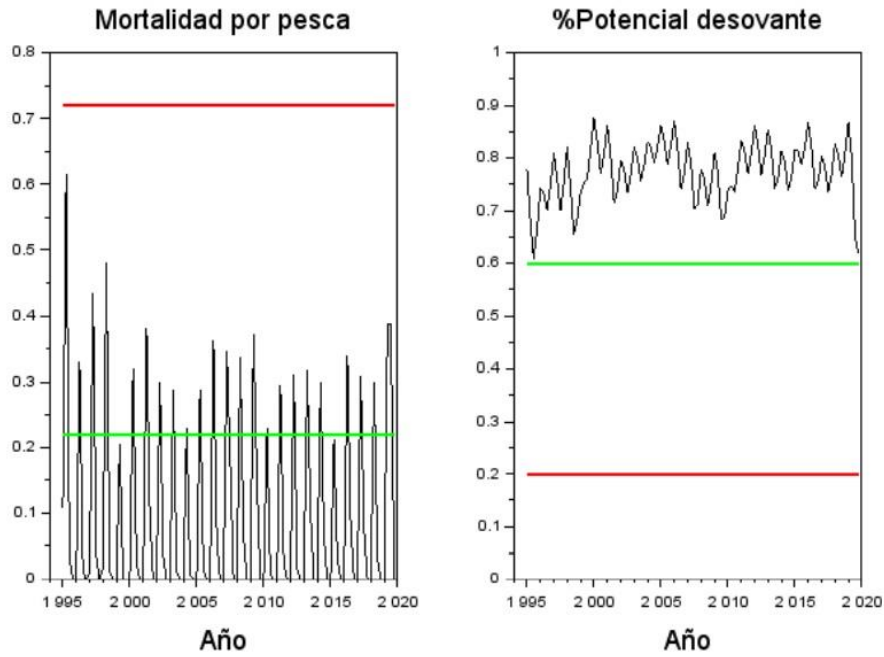


FIGURE 6 STATUS (F AND SSB) OF PACIFIC THREAD HERRING IN REFERENCE TO TARGET AND LIMIT REFERENCE POINTS (CANALES 2020)

The stock is above the limit reference point. **Sub-clause A4.1 is met.**

References

Canales 2020. Evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenque (*Opisthonema sp.*) en el Golfo de Panama. CeDePesca. 48 pp.

Links

MARINTRUST Standard clause	1.3.2.1.4
FAO CCRF	7.2.1, 7.2.2 (e)
GSSI	D6 01

CATEGORY A SPECIES – Pacific thread herrings (*Opisthonema spp.*)

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. The clauses should be completed by providing sufficient evidence to justify awarding each of the requirements a pass or fail rating. The species must achieve a pass rating against all requirements to be awarded a pass overall. **If the species fails any of these clauses it should be re-assessed as a Category B species.**

Species Name		Pacific thread herrings (<i>Opisthonema spp.</i>)	
A1	Data Collection - Minimum Requirements		
	A1.1	Landing data are collected such that the fishery-wide removals of this species are known.	Yes
	A1.2	Sufficient additional information is collected to enable an indication of stock status to be estimated.	Yes
Clause outcome:			Pass

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

According to the management plan, landing and effort data is available for this fishery for the period between 1995 and 2017. Catches of Pacific anchoveta and Pacific thread herring in the last 10 years have been around 50,000 mt and 33,000 mt respectively. Catch data per trip between 1995 and 2019 was used to assess the status of the stock in 2020 (Canales 2020).

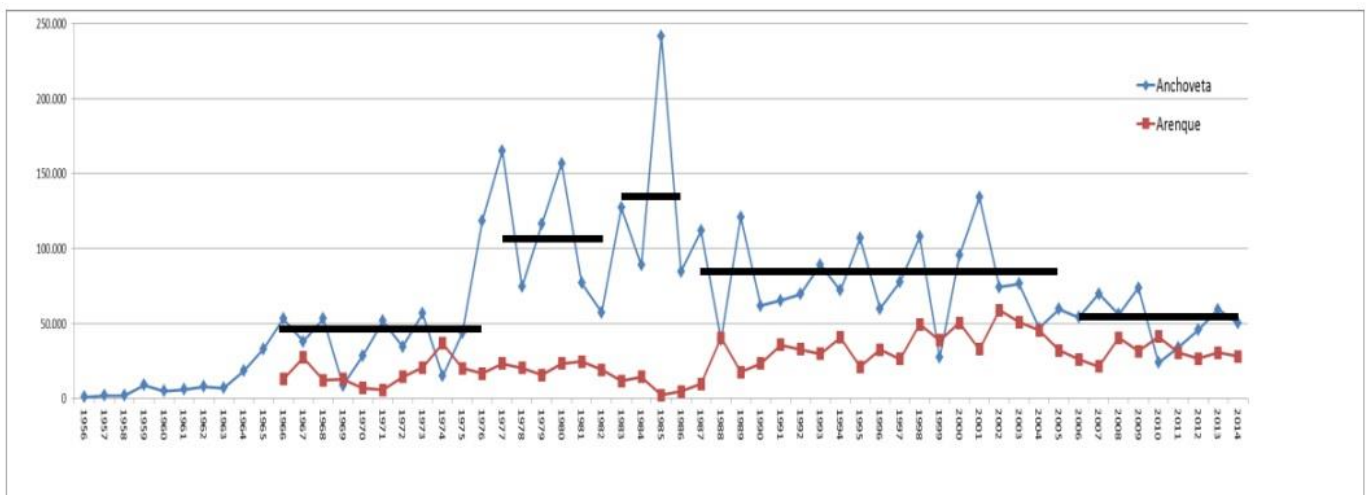


FIGURE 7 HISTORIC EVOLUTION IN SMALL PELAGIC FISHERY 1956-2014 (SOURCE: CEDEPESCA 2015 FROM FISTAT AND PROMARINA DATA)

Landing data is collected and used for assessing the stock, **sub-clause A1.1 is met.**

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

Apart from landing data, CPUEs, size classes from landing data (since 2014) and biomass estimates from hydroacoustic surveys are also available. These different sources of data were also used for assessing the stock in 2020.

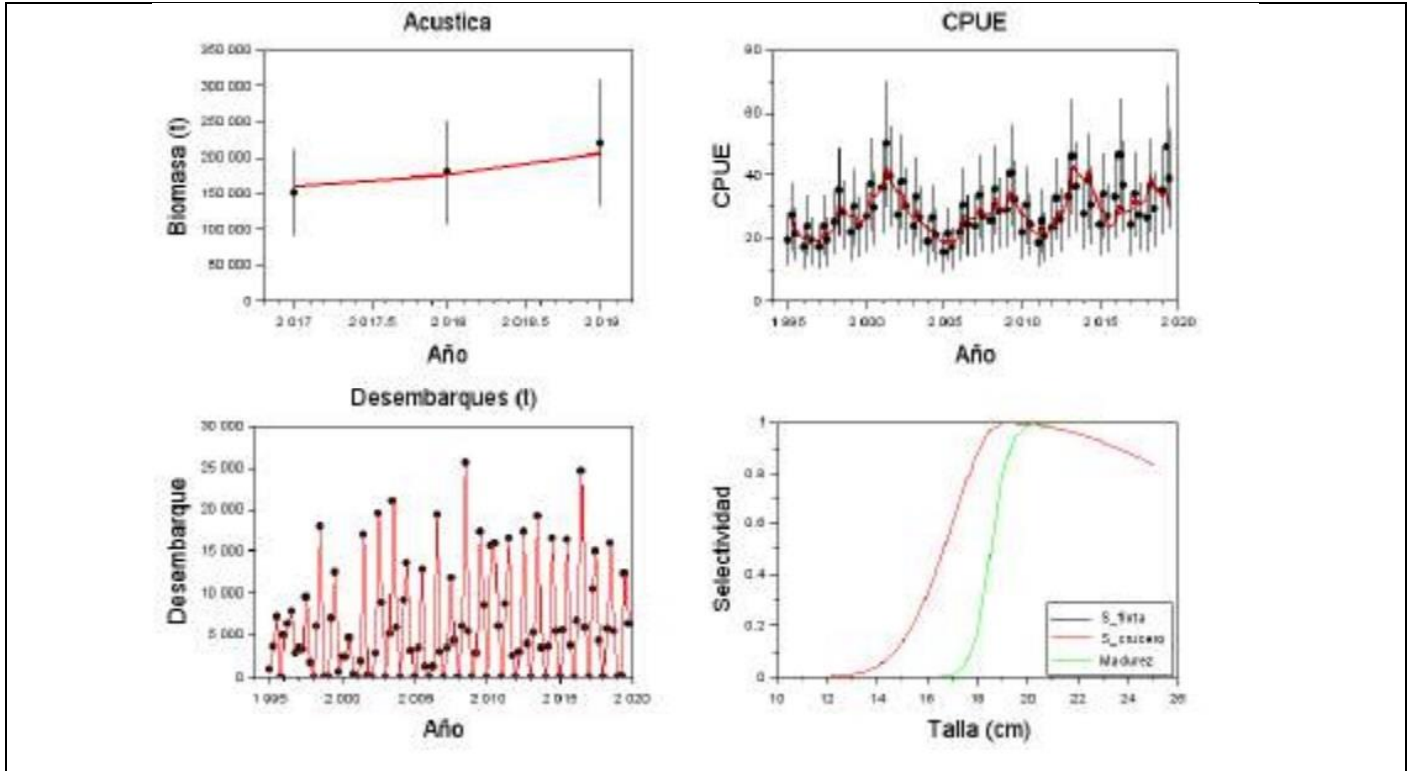


FIGURE 8 ADDITIONAL INFORMATION AVAILABLE FOR THE ASSESSMENT OF PACIFIC THREAD HERRING (CANALES 2020)

Sufficient additional information is collected to enable an indication of stock status to be estimated. **Sub-clause A1.2 is met.**

References

Canales 2020. Evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenque (*Opisthonema sp.*) en el Golfo de Panama. CeDePesca. 48 pp.

Links

MARINTRUST Standard clause	1.3.2.1.1, 1.3.2.1.2, 1.3.2.1.4, 1.3.1.2
FAO CCRF	7.3.1, 12.3
GSSI	D.4.01, D.5.01, D.6.02, D.3.14

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

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.

Stock assessments for Pacific anchoveta and Pacific thread herring were conducted in 2015, 2016 and more recently in 2020 under the umbrella of the Fisheries Improvement Project. In the last assessment landing data (for the period 1956-2019), CPUEs,

size classes from landing data (available since 2014) and biomass estimates from hydroacoustic surveys conducted in 2017, 2018 and 2019 were used in order to assess the stock status of the species.

		2017			2018			2019		
		Sardina	Arenque	Ambas	Sardina	Arenque	Ambas	Sardina	Arenque	Ambas
Biomassas (t)	Puntual	233,138	151,042	384,180	249,851	180,493	430,344	135,596	220,567	356,163
	Limite superior	342,509	209,927		372,787	264,864		248,675	297,679	
	Limite inferior	123,767	92,157		126,916	96,122		22,517	143,498	
Limite de confianza		46.91%	38.99%		49.20%	46.74%		83.39%	34.95%	

FIGURE 9 BIOMASS ESTIMATES FOR PACIFIC ANCHOVETA (SARDINA) AND PACIFIC THREAD HERRING (ARENQUE) FOR THE PERIOD 2017-2019 (CANALES 2020).

The species is assessed regularly, and the assessment considers all fishery removals and biological characteristics of the species. **Sub-clause A2.1 is met.**

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

A management objective has been established for these stocks to ensure that at least 60% of the virgin biomass (Target reference point) is kept for both stocks. A Blimit of 20% of the virgin biomass was also established by Canales 2020, although the review conducted by Minte-Vera 2021 indicated that this last value was not conservative enough for key stocks. Hydroacoustic surveys are carried out before the fishing season to provide an estimation of the biomass and inform the maximum allowable catch (CMA) for the season. The spawning biomass for Pacific thread herring was estimated to be at 86% of the virgin biomass in 2020 (Canales 2020). The last hydroacoustic survey conducted in 2021 estimated a total biomass of 270,619 mt in waters of Panama, which corresponded to 154,884 mt of herring and 115,775 mt of anchoveta (CeDePesca 2021).

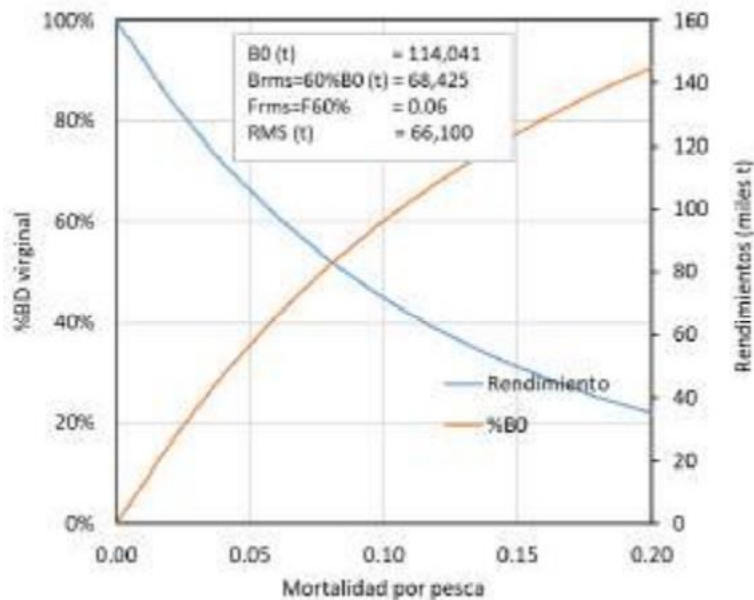


FIGURE 10 BIOMASS ESTIMATES FOR DIFFERENT FISHING MORTALITIES FOR THE HERRING STOCK (CANALES 2020).

The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy. **Sub-clause A2.2 is met.**

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

During the assessment of the stock Fmsy for this stock was estimated at 0.06. This low value is due to the low selectivity of the fleet for this species (juveniles are regularly caught in the fishery). Anyway, Canales 2020 considers that the stock has never been overexploited ($F > F_{msy}$) and that the current mortality (catches of around 25,000 mt) was well below Fmsy (catches of 67,000 mt which corresponded to a F of 0.019).

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

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

As indicated previously, the assessment of the pelagic fishery conducted by Canales in 2020 was reviewed in 2021 by Minte-vera. A number of short- and medium-term recommendations were given to improve the assessment of the stocks.

The assessment is subject to internal and external review. **Sub-clause A2.4 is met.**

A2.5 The assessment is made publicly available.

Stock Assessments can be accessed from the Marin Trust and CeDePesca websites.

The assessment is made publicly available. **Sub-clause A2.5 is met.**

References

Canales 2020. Evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenque (*Opisthonema sp.*) en el Golfo de Panama. CeDePesca. 48 pp.

Minte-Vera, C.V. 2021. Revisión por pares de la evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenques de hebra (*Opisthonema spp.*) en el Golfo de Panamá 2021 (informe no-publicado. 35 pgs).

Links

MARINTRUST Standard clause	1.3.2.1.2, 1.3.2.1.4, 1.3.1.2
FAO CCRF	12.3
GSSI	D.5.01, D.6.02, D.3.14

A3 Harvest Strategy - Minimum Requirements		
A3.1	There is a mechanism in place by which total fishing mortality of this species is restricted.	Yes
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.	Yes
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).	Yes
Clause outcome:		Pass

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

Article 15 of Executive Decree No. 107 of March 2016 indicates 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. That information is collected through biological samplings, carried out in a pre-season fishing survey, which is conducted by Albor Tecnológico, support by the fishmeal and fish oil processing companies and coordinated by the ARAP (CeDePesca 2021).

The fishing season starts when the average size of the 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). 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. The fishery is closed by ARAP's 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.

Article 1 and Article 3 of Executive Decree 107 of May 2016 states that all vessels targeting anchoveta, herring or bumper must possess and carry a fishing license issued for those species specifically. The total number of licenses available are 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.

The stock is managed under the Small pelagic management plan. Hydroacoustic surveys are conducted before the fishing season. The fishing season starts and the TACs are set taking into consideration the data collected during the survey (biomass estimates, size structure, etc). The main mechanisms by which total removals are currently restricted are seasonal closures and restrictions on total fishing licences. The fishery is closed by the authorities based on the monitoring of the fishery. Therefore, it is understood that a management mechanism is in place to restrict fishing mortality. **Sub-clause A3.1 is met.**

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.

As indicated previously, catches of Pacific anchoveta and Pacific thread herring in the last 10 years have been at around 50,000 mt and 33,000 mt respectively. Canales 2020 indicated sustainable catch values of 71,000 mt and 66,000 mt as sustainable for the anchoveta and herring stocks respectively. Therefore, catches have been below sustainable levels in recent years. Hydroacoustic surveys are carried out before the fishing season to provide an estimation of the biomass and inform the maximum allowable catch (CMA) for the fishing season. The last hydroacoustic survey conducted in 2021 estimated a total biomass of 270,619 mt in waters of Panama, which corresponded to 154,884 mt of herring and 115,775 mt of anchoveta (CeDePesca 2021).

Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment. **Sub-clause A3.2 is met.**

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).

Limit reference points have been established for these stocks at 0.2SSB0. They are currently well above the Bmsy, but it is considered that the fishery would stop if the annual hydroacoustic surveys indicate that the stocks has been reduced to low levels below Blim.

Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point. **Sub-clause A3.3 is met.**

References

Canales 2020. Evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenque (*Opisthonema sp.*) en el Golfo de Panama. CeDePesca. 48 pp.

Minte-Vera, C.V. 2021. Revisión por pares de la evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenques de hebra (*Opisthonema spp.*) en el Golfo de Panamá 2021 (informe no-publicado. 35 pgs).

Standard clause 1.3.2.1.3

Links

MARINTRUST Standard clause	1.3.2.1.3, 1.3.2.1.4
FAO CCRF	7.2.1, 7.22 (e), 7.5.3
GSSI	D3.04, D6.01

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>

Clause outcome: Pass

A4.1 The stock is at or above the target reference point, OR IF NOT:

The stock is above the limit reference point or proxy and there is evidence that a fall below the limit reference point would result in fishery closure OR IF NOT:

The stock is estimated to be below the limit reference point or proxy, but fishery removals are prohibited.

The stock of Pacific thread herring was assessed by Canales 2020. A target and limit reference point of 60% and 20% of the virgin biomass were selected respectively. The spawning biomass for Pacific thread herring was estimated to be at 86% of the virgin biomass. Fishing mortality was estimated at 32% of Fmsy (Canales 2020).

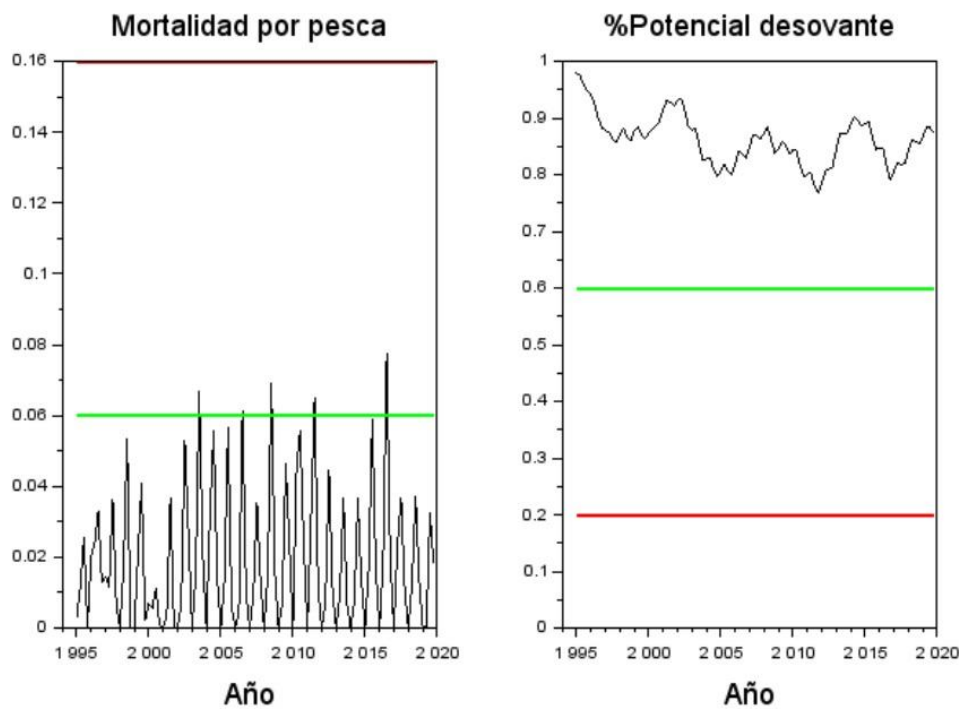


FIGURE 11 STATUS (F AND SSB) OF PACIFIC THREAD HERRING IN REFERENCE TO TARGET AND LIMIT REFERENCE POINTS (CANALES 2020)

The stock is above the limit reference point. **Sub-clause A4.1 is met.**

References

Canales 2020. Evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenque (*Opisthonema sp.*) en el Golfo de Panama. CeDePesca. 48 pp.

Links

MARINTRUST Standard clause	1.3.2.1.4
FAO CCRF	7.2.1, 7.2.2 (e)
GSSI	D6 01

CATEGORY D SPECIES - Pacific bumper (*Chloroscombrus orqueta*)

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. 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.

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)	300000 – 4.000.000	1
	Average maximum size (cm)	30	1
	Average size at maturity (cm)	12	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	Distribution Eastern Pacific: San Pedro, southern California, USA to Peru, including the Gulf of California. <25% of stock occurs in area fished	1
	Distribution	widely distributed population	1
	Habitat	BENTOPELAGIC	1
	Depth range	0 - 20 m	1
	Selectivity	Species > 2 times	3
	Post-capture mortality	Retained species	3
		Average Susceptibility Score	1.67
		PSA Risk Rating (From Table D3)	PASS
		Compliance rating	PASS
References			
NOTE: Although this species is included in the management plan no reference points and no stock assessments are conducted for it. So, it is considered a category C species.			
Froese, R. and D. Pauly. Editors. 2021. FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021.)			
<i>Standard clauses 1.3.2.2</i>			

CATEGORY D SPECIES – White mullet (*Mugil curema*)

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. 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.

D1	Species Name	White mullet (<i>Mugil curema</i>)	
	Productivity Attribute	Value	Score
	Average age at maturity (years)	2-3	2
	Average maximum age (years)	16	2
	Fecundity (eggs/spawning)	50.000-1.000.000	1
	Average maximum size (cm)	91	2
	Average size at maturity (cm)	19.7	1
	Reproductive strategy	Broadcast spawner	1
	Mean trophic level	2	1
	Average Productivity Score		1.4
	Susceptibility Attribute	Value	Score
	Overlap of adult species range with fishery	Western Atlantic: Nova Scotia, but uncommon north of Cape Cod to Argentina. Eastern Atlantic: Senegal River outlet southwards up to Namibia. Eastern Pacific: Gulf of California to Chile <25% of stock occurs in area fished	1
	Distribution	Throughout region	1
	Habitat	Pelagic	1
	Depth range	0-300	2
	Selectivity	Species > 2 times	3
	Post-capture mortality	Retained species	3
	Average Susceptibility Score		1.8
	PSA Risk Rating (From Table D3)		PASS
	Compliance rating		PASS
References			
Froese, R. and D. Pauly. Editors. 2021. FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021). White mullet (<i>Mugil curema</i>). Available at: https://www.fishbase.de/summary/Mugil-curema.html			
<i>Standard clauses 1.3.2.2</i>			

CATEGORY D SPECIES – Cachema weakfish (*Cynoscion phoxocephalus*)

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. 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.

D1	Species Name	Cachema weakfish (<i>Cynoscion phoxocephalus</i>)	
	Productivity Attribute	Value	Score
	Average age at maturity (years)	1	1
	Average maximum age (years)	6	1
	Fecundity (eggs/spawning)	47,000- 550.000	1
	Average maximum size (cm)	60	2
	Average size at maturity (cm)	23.6	1
	Reproductive strategy	Water column	1
	Mean trophic level	3.8	3
	Average Productivity Score		1.4
	Susceptibility Attribute	Value	Score
	Overlap of adult species range with fishery	Eastern Pacific: southern Mexico to Peru. <25% of stock occurs in area fished	1
	Distribution	Throughout region	1
	Habitat	Pelagic Coastal and estuaries	1
	Depth range	10 - 60	1
	Selectivity	Species > 2 times	3
	Post-capture mortality	Retained species	3
	Average Susceptibility Score		1.67
	PSA Risk Rating (From Table D3)		PASS
	Compliance rating		PASS
References			
Froese, R. and D. Pauly. Editors. 2021.FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021). Cachema weakfish (<i>Cynoscion phoxocephalus</i>) Available at: https://www.fishbase.de/summary/Cynoscion-phoxocephalum.html			
<i>Standard clauses 1.3.2.2</i>			

CATEGORY D SPECIES – Peruvian moonfish (*Selene peruviana*)

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. 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.

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)	40	1	
	Average size at maturity (cm)	16	1	
	Reproductive strategy	Water column	1	
	Mean trophic level	4.3	3	
			Average Productivity Score	n/a
	Susceptibility Attribute	Value	Score	
	Overlap of adult species range with fishery	Eastern Pacific: Redondo Beach in southern California, USA to Peru; rare north of Baja California, Mexico. <25% of stock occurs in area fished	1	
	Distribution	Throughout region	1	
	Habitat	Pelagic coastal	1	
	Depth range	0-50	1	
	Selectivity	Species > 2 times	3	
	Post-capture mortality	Retained species	3	
			Average Susceptibility Score	1.67
			PSA Risk Rating (From Table D3)	PASS
			Compliance rating	PASS
References				
Froese, R. and D. Pauly. Editors. 2021. FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021). Peruvian moonfish (<i>Selene peruviana</i>) . Available at: https://www.fishbase.de/summary/Selene-peruviana.html				
<i>Standard clauses 1.3.2.2</i>				

CATEGORY D SPECIES – Sea catfish (*Ariopsis spp*)

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. 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.

D1	Species Name	Sea catfish (<i>Ariopsis spp</i>)	
	Productivity Attribute	Value	Score
	Average age at maturity (years)	Late maturity (?)	3
	Average maximum age (years)	24 years	2
	Fecundity (eggs/spawning)	<100 (low fecundity)	3
	Average maximum size (cm)	35	1
	Average size at maturity (cm)	17	1
	Reproductive strategy	Water column	1
	Mean trophic level	3.5	3
	Average Productivity Score		2
	Susceptibility Attribute	Value	Score
	Overlap of adult species range with fishery	Central America: Mexico, Belize, Honduras, Guatemala, Nicaragua, Costa Rica and Panama. <25% of stock occurs in area fished	1
	Distribution	Throughout region	1
	Habitat	Freshwater; brackish; demersal;	2
	Depth range	0-10	1
	Selectivity	Species > 2 times	3
	Post-capture mortality	Retained species	3
	Average Susceptibility Score		2.25
	PSA Risk Rating (From Table D3)		TABLE D4
	Compliance rating		TABLE D4
References			
<p>Flinn, S., & Midway, S. (2019). Age and Growth of Hardhead Catfish and Gafftopsail Catfish in Coastal Louisiana, USA. MARINE AND COASTAL FISHERIES, 11 (5), 362-371. https://doi.org/10.1002/mcf2.10089</p> <p>Froese, R. and D. Pauly. Editors. 2021. FishBase. World Wide Web electronic publication. www.fishbase.org, (02/2021). Sea catfish (<i>Ariopsis spp</i>). Available at: https://www.fishbase.de/summary/Ariopsis.html</p>			
<i>Standard clauses 1.3.2.2</i>			

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	Sea catfish (<i>Ariopsis spp.</i>)	
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.	Yes	
D4.2	There is no substantial evidence that the fishery has a significant negative impact on the species.	Yes	
Outcome:			Pass
Evidence			
<p>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.</p> <p>D4.2 There is no substantial evidence that the fishery has a significant negative impact on the species.</p> <p>Catch data is collected in the fishery. An on-board observer programme was implemented in 2016 which has helped to improve the knowledge about the impact of the fishery on bycatch species. In general, bycatch levels in pelagic fisheries targeting small pelagic species are low.</p> <p>In this fishery, the catch of sea catfish (two species are found in the area <i>A. seemanni</i> and <i>A. guatemalensis</i>) is below 0.1-2% of the total catch. These species are locally abundant in many parts of their range, no major threats are known to them, and they are listed as Least Concern by the IUCN red list (Cooke et al.,2010). One of the main objectives (Objective 5) of the management plan for the small pelagic fishery in Panama indicates: “<i>monitor the bycatch in the fishery and implement measures (if necessary)</i>”. In this case, it is considered that due to the relatively low impact of the fishery on these species and their healthy status no management measures are necessary.</p> <p>The observer coverage has increased in recent years, which will help to get a better understanding of the current impact of the fishery on catfish and other species. Therefore, it is understood that if the impact increases, it would be considered during the management process, and measures would be implemented to minimise that impact. Sub-clause D4.1 and D4.2 are met.</p>			
References			
<p>Cooke, R., Acero, A., Betancur, R., Rojas, P., Cotto, A. 2010a. <i>Ariopsis seemanni</i>. The IUCN Red List of Threatened Species 2010: e.T183818A8182512. https://dx.doi.org/10.2305/IUCN.UK.2010-3.RLTS.T183818A8182512.en. Accessed on 12 February 2022.</p> <p>Cooke, R., Acero, A., Betancur, R., Rojas, P., Cotto, A. 2010b. <i>Ariopsis guatemalensis</i>. The IUCN Red List of Threatened Species 2010: e.T183394A8105776. https://dx.doi.org/10.2305/IUCN.UK.2010-3.RLTS.T183394A8105776.en.</p>			
Links			
MARINTRUST Standard clause		1.3.2.2, 4.1.4	
FAO CCRF		7.5.1	
GSSI		D.5.01	

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.	Yes
	F1.2	There is no substantial evidence that the fishery has a significant negative effect on ETP species.	Yes
	F1.3	If the fishery is known to interact with ETP species, measures are in place to minimise mortality.	Yes
		Clause outcome:	PASS

F1.1 Interactions with ETP species are recorded.

Interactions with ETP species are monitored by the On-Board Observer Program (OBOP) since 2016, including sea turtles, sharks and rays. A number of observers have been trained and ID keys are used. In 2019, monitoring covered a 10% of the catch (CeDePesca 2021). Until July 2021, 68 trips and 262 hauls were also monitored. As indicated previously, a 20% coverage for operative vessels has been set by the management plan (<http://www.viceipup.up.ac.pa/cidim/files/ARAP-Decreto-Ejecutivo-107-de-2016.pdf>). It seems that although interactions with these species are being recorded, the frequency and accuracy of reporting in the logbooks is low but measures to improve reporting is being implemented (RS Standards 2020).

The information provided about the interaction of the fishery with ETP and non-ETP species improved in 2019. Interactions with seabirds were also recorded in that year and the percentage of covered hauls/trips was also provided (CeDePesca 2019).

Interactions with ETP species are recorded in the fishery. **Sub-clause F1.1 is met.**

F1.2 There is no substantial evidence that the fishery has a significant negative effect on ETP species.

There is clear evidence of interactions with ETP species. In 2016, 318 fishing sets were observed. During that year, the fleet encountered 42 turtles, 266 sharks and 48 rays.

Of the turtles, all specimens were reported to be released; 85.7% undamaged, 9.5% with minor injuries, and 4.8% with serious injuries. Species encountered were green sea turtle (*Chelonia mydas*, 33.3% of observations, listed as Endangered by the IUCN); olive ridley sea turtle (*Lepidochelys olivacea*, 26.2% of observations, listed as Vulnerable by the IUCN); and the hawksbill sea turtle (*Eretmochelys imbricate*, 9.5% of observations, listed as Critically Endangered by the IUCN). The species of the remaining 31% of observations was not identified.

Of the species listed in 2016, the most significant shark interaction, in terms of numbers, was with the scalloped hammerhead (*Sphyrna lewini*) which is listed as Critically endangered (Rigby et al., 2019). 249 individuals were caught in the sampled sets in 2016. Other species caught by the fishery were: sharks (*Sphyrna corona*, *Carcharhinus porosus* and *C. galapagensis*.) and rays (48 individuals) (*Urotrygon rogersi*, *Dasyatis longus*, *D. brevis*, *Aetobatus narinari* and *Minatura pacifica*). No information was provided on the release or survival rates for sharks and rays.

During the 2017 OBOP season several sea turtle sightings were recorded, including loggerhead sea turtle (*Caretta caretta*, 63.6% of observations (7 sightings), listed as Vulnerable by the IUCN), the green turtle (*Chelonia mydas*, 18.2% of observations (2 sightings, listed as Endangered); and the hawksbill sea turtle (18.2% of the observations (2 sightings)). All the turtles captured by purse seine net were released without damage.

That same year, thirty-five shark interactions were recorded. The shark species identified were: Scalloped Hammerhead (*Sphyrna lewini*), (91.4% (32 sightings)), Pacific Sharpnose Shark (*Rhizoprionodon longurio*, 5.7% (2 sightings), Vulnerable); and the Atlantic nurse shark (*Ginglymostoma cirratum*, 2.9% of the observations (one sighting), Vulnerable) (NOTE: this last species seems to be incorrectly identified as it is not present in the Pacific). 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 Endangered on the IUCN Red List (NOTE: Again, this seems to be a misidentification).

In 2018, 483 hauls were observed. The bycatch represented 1.309% of the total catch. Interactions with 47 turtles were recorded, but all the individuals were released alive. Forty-one sharks were observed, the scalloped hammerhead represented 78% (32 individuals) of those interactions. The impact of the fishery on that species was mainly on the juvenile fraction (<50

cm). Sixty-seven % of those individuals were released alive. Other species affected by the fishery were: scalloped bonnethead (*Sphyrna corona*), nurse shark (*Ginglymostoma cirratum*) (CR) and Pacific sharpnose shark (*Rhizoprionodon longurio*) (VU) (CeDePesca 2018).

During the 2019 fishing season, 10% of the hauls were covered by observers. The observer programme identified 9 types of seabirds which interacted with the fishery, although not all to the species level. “Interacted” included birds which were observed to feed on catch during hauling. Of 50,183 interactions, 327 mortalities were recorded. These mortalities included neotropic cormorant (*Phalacrocorax brasilianus*, IUCN Least Concern) and brown pelican (*Pelecanus occidentalis*, IUCN Least Concern). There were also a small number of mortalities of unidentified *Phalacrocorax* individuals.

Interactions with sea turtles were recorded during 4.5% of the 616 observed sets. Of these, 24 turtles were caught in the net and released in good condition. 9 turtles were observed during fishing but were not caught in the nets. No mortalities were observed. Four species of turtle were identified: loggerhead turtle, hawksbill turtle, olive ridley and green turtle.

That same year, 105 scalloped hammerhead sharks (63% of the total catch) were reported by the observers (CeDePesca 2021). Other shark species affected by the fishery were *Sphyrna* spp. (37%) and Pacific sharpnose shark.

The most recent observer reports (2020-21) were not finished at the time of this assessment (CeDePesca 2021). However, until July 2021, 68 trips and 262 hauls were monitored by observers. Catches of rays and sharks were very low during these trips, but it is unclear the percentage of coverage those numbers represent in the fishery.

Of most concern is the Critically Endangered scalloped hammerhead. The post-release mortality is higher for injured released sharks and has been reported as 100% for the Scalloped Hammerhead in purse seines although this information is based on a limited number of sharks caught (Eddy et al. 2016). The species is caught globally as target and bycatch in pelagic commercial and small-scale longline, purse seine, and gillnet fisheries, and is retained for the meat and fins. The Scalloped Hammerhead has undergone steep declines in all oceans, with some signs of stabilization and possible recovery in response to management only in the Northwest Atlantic and Gulf of Mexico (Rigby et al., 2019).

It is difficult to assess the impact of the fishery on ETP species and in particular on scalloped hammerheads. 249 individuals were reported by observers as caught in 2016, 35 in 2017, 32 in 2018 and 105 in 2019 (plus 39 non-identified *Sphyrna* sharks) (when 10% of the hauls were covered). The species is critically endangered and even a low level of bycatch can have an impact in the population. However, these catch numbers are very much lower than in other fisheries operating in the area, such as the longline (impact 100 times higher) or the trawl fisheries (impact is 5 or 6 times higher). Therefore, it is considered that the impact of the assessed fishery on ETP species is relatively low and **sub-clause F1.2 is met**.

F1.3 If the fishery is known to interact with ETP species, measures are in place to minimise mortality.

As indicated above, the fishery interacts with sharks, sea turtles and seabirds.

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. These species are released alive when caught.

For seabirds, the crew try to avoid the catch of birds and when caught (for example pelicans) they are released the as soon as possible. Marine-coastal bird workshop has also been conducted with fishermen to understand the impact of those species and how to minimise it (<https://cedepesca.net/proyectos/panamanian-small-pelagics/>).

For elasmobranch species, a number of workshops have been conducted in this fishery to improve data collection on interactions and release of bycatch specimens, and stakeholders in the fishery have also signed a voluntary code of conduct which includes among its objectives to comply with laws and regulations to protect ETP species and release them as soon as possible. According to new information provided, the combination of observer education, workshops, and the Code of Conduct meant that in 2019 the majority of scalloped hammerhead bycatch were released alive (around 58%) (Archer & Peacock 2021). Furthermore, a collaboration agreement has been also recently established by Promarina with a shark specialist to launch a shark monitoring and release project to further improve these numbers (Promarina pers. comm.). There

is also an ongoing study to define zones and time periods where this kind of bycatch is higher in order to analyse if it is worth avoiding these areas during the fishing season or even to create a protected area. However, the information currently available indicates that spatial or seasonal measures couldn't minimize the impact on this species (CeDePesca 2021).

Management measures are in place in the fishery to minimise mortality of sensitive species. The combination of observer education, workshops, and the Code of Conduct meant that in 2019 the majority of scalloped hammerhead bycatch was released alive (around 58%). **Sub-clause F1.3 is met.**

References

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Links

MARINTRUST Standard clause	1.3.3.1
FAO CCRF	7.2.2 (d)
GSSI	D4.04, D.3.08

F2	Impacts on Habitats - Minimum Requirements		
	F2.1	Potential habitat interactions are considered in the management decision-making process.	Yes
	F2.2	There is no substantial evidence that the fishery has a significant negative impact on physical habitats.	Yes
	F2.3	If the fishery is known to interact with physical habitats, there are measures in place to minimise and mitigate negative impacts.	Yes
Clause outcome:			Pass
F2.1 Potential habitat interactions are considered in the management decision-making process.			
The Pacific anchoveta occurs inshore, principally over mud flats. Apparently, it does not make long migrations along sandy or rocky areas (Di Dario 2020). Pacific thread herring is also a coastal pelagic fish found over soft substrate near the surface in both coastal and offshore waters (Cotto et al.,2010). The fishery occurs therefore in coastal areas where the gear can impact the seabed. However, a number of no-take zones have been implemented in Panama in order to protect mangroves and river			

mouths (CeDePesca 2015). The use of VMS in industrial vessels is currently mandatory which has improved compliance with these spatial measures. Furthermore, the use of purse seines in areas with hard bottoms is reportedly avoided by fishers, to limit gear damage.

Bahía Chame	Resolución AG #364 de 2009
Manglares de la Bahía de Panamá	Ley #1 de 2015
Panamá Viejo	Decreto Ejecutivo #210 de 1965
Puerto Aguadulce	Decreto Ejecutivo #210 de 1965
San Carlos - Río Hato	Decreto Ejecutivo #210 de 1965

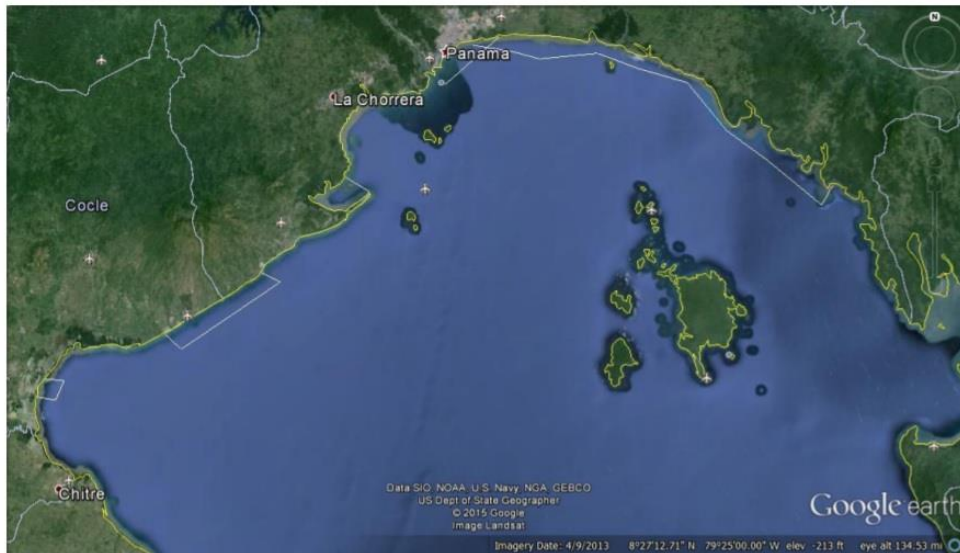


FIGURE 12 NON-TAKE ZONES IN THE GULF OF PANAMA (CEDEPESCA 2015)

It also seems that very recently the country reached a 30% protection of its marine areas after protecting the Coiba ridge (<https://mission-blue.org/2021/06/panama-achieves-30x30-ocean-protection-goals-in-newly-expanded-cordillera-de-coiba-marine-protected-area/>).

Therefore, potential habitat interactions are considered in the advice and in the management decision-making process. **Sub-clause F2.1 is met.**

F2.2 There is no substantial evidence that the fishery has a significant negative impact on physical habitats.

Purse seine are designed to catch shoals of pelagic species and they use to operate in the water column without contacting the seabed. However, as this fishery occurs in coastal areas, purse seines for Pacific anchoveta and herring do contact the seabed. The fishery occurs over mud where the impact is reduced, and a number of no-take zones have been established in order to protect the vulnerable habitats in the area (mangroves). Therefore, physical impacts of pelagic fisheries are considered insignificant. **Sub-clause F2.2 is met.**

F2.3 If the fishery is known to interact with physical habitats, there are measures in place to minimise and mitigate negative impacts.

As indicated above, no-take zones have been established in the area. Therefore, **sub-clause F2.3.**

References

Cotto, A., Medina, E., Bernal, O. 2010. *Opisthonema libertate*. The IUCN Red List of Threatened Species 2010: e.T183662A8154151. <https://dx.doi.org/10.2305/IUCN.UK.2010-3.RLTS.T183662A8154151.en>. Accessed on 12 February 2022.

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Links

MARINTRUST Standard clause	1.3.3.2
FAO CCRF	6.8
GSSI	D.2.07, D.6.07, D3.09

F3 Ecosystem Impacts - Minimum Requirements		
F3.1	The broader ecosystem within which the fishery occurs is considered during the management decision-making process.	Yes
F3.2	There is no substantial evidence that the fishery has a significant negative impact on the marine ecosystem.	Yes
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.	Yes
Clause outcome:		Pass

F3.1 The broader ecosystem within which the fishery occurs is considered during the management decision-making process.

Pacific anchoveta occurs inshore, principally over mud flats and forms large schools. Juveniles feed principally on diatoms, and also silico-flagellates, dinoflagellates and small crustaceans. Adults feed mainly on benthic diatoms and are oviparous with pelagic larvae. In Panama, this species is associated with upwelling events in the Gulf of Panama and migrate to shallower waters between February and April (Di Dario 2020). Pacific thread herring is a coastal pelagic fish is found over soft substrate near the surface in both coastal and offshore waters. It forms dense schools and feeds on phytoplankton (Cotto et al., 2010). Small pelagic species play a key role in the general health of marine ecosystems, as they feed from plankton and are a prey for other fish, birds, reptiles and marine mammals.

In 2005/2006 the Smithsonian Institute and the Audubon Society STRI and the Audubon Society of Panama carried out a survey of marine and wading birds in the Gulf of Panama, estimating the total bird population in the area in more than 50,000 individuals that belong to 20 species. The pelican was the predominant species.

That study indicated that interactions with the small pelagic fishery with seabirds during the nesting and feeding period was low due to the restricted (coastal) area of operation of the fishery, the between the fishery and the feeding season. And concluded: ““there is no evidence in the long run of declining marine or wading birds in the Gulf of Panama” (Angehr et al, 2007) and fishing was not among the potential threats listed.

The onboard observer program currently in place collect data on ETP and habitat interactions, which is used to assess the impact of the fishery on hat elements of the ecosystem. And conversations with the University of Panama and the Ministry of Environment have been undertaken to conduct monitoring of seabirds interacting with the fishery. Seminars, training workshops and camera trials have been also conducted in order to monitor and minimise the impact of the fishery on several elements of the ecosystem (seabirds, sharks, etc.).

Reference points set during the most recent assessment of the target species were set taking into consideration the role of these species in the ecosystem (see F3.3).

In March 2021, a new fisheries law was approved in Panama. Article 8 of the law lists the main objectives, among which is the application of the ecosystem approach to regulating fishing activities in the country (<https://cedepesca.net/wp-content/uploads/2021/08/Panama-Ley-de-Pesca-2021.pdf>).

The broader ecosystem within which the fishery occurs is considered during the management decision-making process. **Sub-clause F3.is met.**

F3.2 There is no substantial evidence that the fishery has a significant negative impact on the marine ecosystem.

The main bycatch species in the fishery is scalloped hammerhead (*Sphyrna lewini*), as indicated previously the impact on that species is difficult to assess and it is considered that it has already been scored in F1.2. The target species are over Bmsy. No other key elements have been identified. An on-going monitoring is in place in the fishery which will help to further understand the impacts of the fishery on the ecosystem.

Therefore, there is no substantial evidence that the fishery has a significant “general” negative impact on the marine ecosystem due to good status of these species and the increase in the number of predator populations that rely on the stock, it is considered that **sub-clause F3.2 is met.**

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.

As indicated above small pelagic play a key role in the ecosystem as they act as a prey of a number of species, such as bigger fish, seabirds or marine mammals. In this case, the most recent assessment of these stocks a precautionary biomass target of 60% of the virgin spawning stock biomass was set as objective to account for the key role of these species (Canales 2020) and

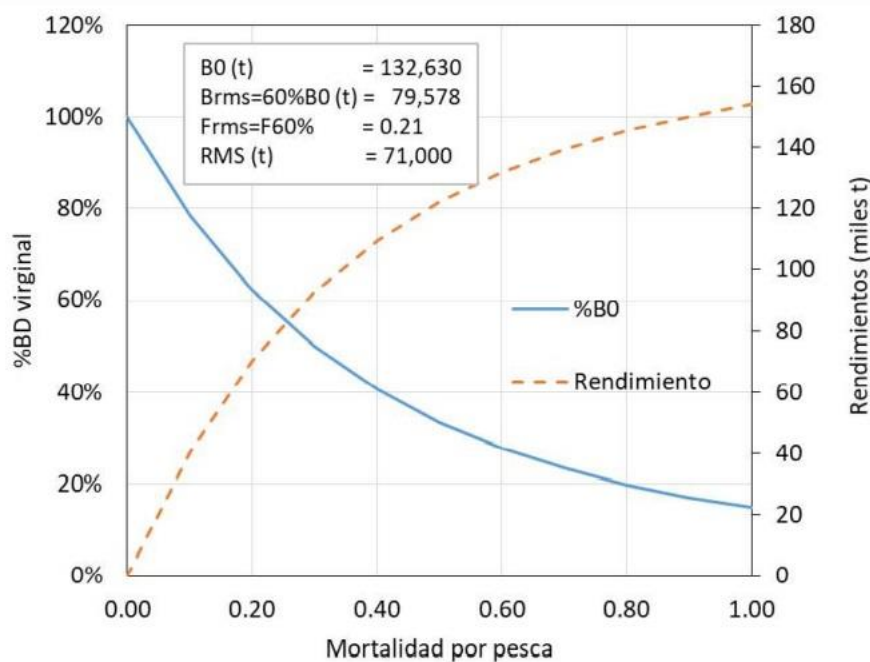


FIGURE 13 REFERENCE POINTS SET FOR PACIFIC ANCHOVETA (CANALES 2020).

Both target species are currently above that precautionary level. The review conducted by Minde-Vera 2021 highlighted the need of a more precautionary approach in this case for the Blim, set by Canales 2020 at 0.2SSB. Annual landings for both species (around 70,000 mt) are below the estimated MSY for both species (137,000 mt).

The key role of the species is taking into consideration when recommending total permissible fishery removals. Therefore, **sub-clause F3.3 is met.**

References

Canales, C. 2020. Evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenque (*Opisthonema sp.*) en el Golfo de Panamá. CeDePesca. 48 pp.

Minte-Vera, C.V. 2021. Revisión por pares de la evaluación de los stocks de anchoveta (*Cetengraulis mysticetus*) y arenques de hebra (*Opisthonema spp.*) en el Golfo de Panamá 2021 (informe no-publicado. 35 pgs).

Links

MARINTRUST Standard clause	1.3.3.3
FAO CCRF	7.2.2 (d)
GSSI	D.2.09, D3.10, D.6.09

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.

Appendix A - Determining Resilience Ratings

The assessment of Category B species described in this assessment report template utilises a resilience rating system suggested by the American Fisheries Society. This approach was chosen because it is also used by FishBase, and so the resilience ratings for many thousands of species are freely available online. As described by FishBase, the following is the process used to arrive at the resilience ratings:

“The American Fisheries Society (AFS) has suggested values for several biological parameters that allow classification of a fish population or species into categories of high, medium, low and very low resilience or productivity (Musick 1999). If no reliable estimate of r_m (see below) is available, the assignment is to the lowest category for which any of the available parameters fits. For each of these categories, AFS has suggested thresholds for decline over the longer of 10 years or three generations. If an observed decline measured in biomass or numbers of mature individuals exceeds the indicated threshold value, the population or species is considered vulnerable to extinction unless explicitly shown otherwise. If one sex strongly limits the reproductive capacity of the species or population, then only the decline in the limiting sex should be considered. We decided to restrict the automatic assignment of resilience categories in the Key Facts page to values of K , t_m and t_{max} and those records of fecundity estimates that referred to minimum number of eggs or pups per female per year, assuming that these were equivalent to average fecundity at first maturity (Musick 1999). Note that many small fishes may spawn several times per year (we exclude these for the time being) and large live bearers such as the coelacanth may have gestation periods of more than one year (we corrected fecundity estimates for those cases reported in the literature). Also, we excluded resilience estimates based on r_m (see below) as we are not yet confident with the reliability of the current method for estimating r_m . If users have independent r_m or fecundity estimates, they can refer to Table 1 for using this information.”

Parameter	High	Medium	Low	Very low
Threshold	0.99	0.95	0.85	0.70
r_{max} (1/year)	> 0.5	0.16 - 0.50	0.05 - 0.15	< 0.05
K (1/year)	> 0.3	0.16 - 0.30	0.05 - 0.15	< 0.05
Fecundity (1/year)	> 10,000	100 - 1000	10 - 100	< 10
t_m (years)	< 1	2 - 4	5 - 10	> 10
t_{max} (years)	1 - 3	4 - 10	11 - 30	> 30

[Taken from the FishBase manual, “Estimation of Life-History Key Facts”, <http://www.fishbase.us/manual/English/key%20facts.htm#resilience>]

Glossary

Non-target: Species for which the gear is not specifically set, although they may have immediate commercial value and be a desirable component of the catch. OECD (1996), Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI(96)12

Target: In the context of fishery certification, the target catch is the catch of stock under consideration by the unit of certification – i.e. the fish that are being assessed for certification and ecolabelling. (GSSI)