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Global Standard for Responsible Supply  
of Marine Ingredients

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**Global Standard for  
Responsible Supply  
of Marine Ingredients**  
Fishery Assessment  
Methodology and Template  
Report V2.0



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<b>Fishery Under Assessment</b>	Thread Herring ( <i>Opisthonema</i> ) Complex FAO Area 77 (Eastern Central Pacific)
<b>Date</b>	October 2019
<b>Assessor</b>	Jim Daly

Application details and summary of the assessment outcome				
Name: Maz Industrial; Sardinias de Sonora				
Address:				
Country: Mexico		Zip:		
Tel. No.:		Fax. No.:		
Email address:		Applicant Code		
Key Contact:		Title:		
Certification Body Details				
Name of Certification Body:		SAI Global Ltd		
Assessor Name	Peer Reviewer	Assessment Days	Initial/Surveillance/ Re-approval	Whole fish/ By-product
Jim Daly	Vito Romito	2	Re-approval	Whole fish
Assessment Period	2019			

Scope Details	
<b>Management Authority (Country/State)</b>	SAGARPA
<b>Main Species</b>	Thread Herring ( <i>Opisthonema</i> ) Complex
<b>Fishery Location</b>	FAO Area 77 (Eastern Central Pacific)
<b>Gear Type(s)</b>	Purse Seine
Outcome of Assessment	
<b>Overall Outcome</b>	PASS
<b>Clauses Failed</b>	NONE
<b>Peer Review Evaluation</b>	APPROVE
<b>Recommendation</b>	PASS

## Assessment Determination

The purse-seine fishery targeting small pelagics is organized and managed in four fleets, according to the regions where they operate and the location of landing ports. Two fleets fish in the area west of Baja California and Baja California South; two other fleets operate inside the Gulf of California.

Fleets within the Gulf are arranged into the Southern fleet fishing off the coast of Sinaloa and Nayarit, landing into Mazatlán and the Northern fleet fishing off the coast off the State of Sonora and landing into the ports of Guaymas and Yavaros. The Sinaloa fleet (which captures mostly thread herring) received MSC certification in October 2016. The Sonora fleet, the largest of the four fleets, primarily targets Pacific sardines and secondarily targets Thread herring.

The Mexico Sinaloa Thread herring (*Opisthonema*) directed fishery targets to a lesser extent six other small pelagic species (*Centengraulis mysticetus*, *Etrumeus teres*, *Oligoplites* spp., *Sardinops sagax*, *Scomber japonicus*, and *Trachurus symmetricus*). Of these non-target species, based on volume of capture, Chub mackerel *Scomber japonicus* and Pacific jack mackerel *Trachurus symmetricus* were assessed in this report (see Species categorisation table p7).

There are two MSY-based control rules in the Fisheries Management Plan (FMP); for passively managed species the rule determines that the Biological Acceptable Catch (BAC) is 25% of the most recent estimate of SSB. This represents the use of a fixed harvest rate (0.25) at all times. Chub mackerel *Scomber japonicus* and Pacific jack mackerel *Trachurus symmetricus* are passively managed in the assessment area. Monitoring of vessel discharges and determination of abundance indices are considered sufficient for managing this stock. Passively managed stocks may revert to an actively managed regime (including formal stock assessments) if the competent authority change their advice.

For species that are actively managed the control rule uses a harvest rate that can vary among species at different times but is constrained between 5 and 25% of estimated SSB, over a cut-off of minimum biomass. Such a fraction can oscillate between 5 and 25% and it is assumed that if the “*Fraction is approximately equal to Fmsy, then the harvest rate in the control rule will not exceed Fmsy.*” Thread herring are actively managed.

A Biologically Acceptable Catch (BAC) (equivalent to Limit Reference Points) is computed as a fraction of estimated MSY. The FMP States that the BAC is a “prudent level of catch” that can vary between 5% and 25% of estimated biomass. For Thread herring (2018) the BAC was 65,522 t. with a Bmin (would prompt closure of the fishery) of 12,000 t. Total landings (Thread herring and Bocona sardine) in the 2017/2018 fishery from the assessment area were 63,380t. Assessments provide estimates of the status of the biological stock relative to a reference point or proxy.

A Second Surveillance Audit Report (Southern Gulf of California Thread Herring Fishery, Sinaloa & Nayarit, Mexico) was published in May 2019 (SCS Global Services). The fishery continues to be MSC Certified.

For the targeted Thread herring fishery progress has been made on conditions related to reference points stock assessment. However definitive determination of reference points is still in progress and further work is required.

INAPESCA scientists are being trained to work with the Stock Synthesis (SS) III framework, to improve the general stock assessment and develop more robust predictive models. This work is expected to be

complemented by fishery-independent data collected through hydroacoustic surveys as soon as more reliable species-based estimates of abundance are available. Training has also been undertaken in the use of Echoview software to support more accurate acoustic surveys and address a number of technical issues that have arisen during previous surveys.

Monitoring of ETP species encountered in the fishery has occurred during observer programs (2016-2018 data). Some additional mitigation measures to avoid encounters with ETP species are included in this report. In 2018 (October) INAPESCA carried out the 6th “Course on Good Practices of Fishing of Minor Pelagic Fish”. Objectives of the workshop included a review of observer reports, a review of current MSC Fisheries Standard requirements, a review of regulations in force and a review of impact mitigation measures with ETP species among others.

Thread herring have been assessed for the IUCN Red List as a species of least concern; this species is not on any current CITES list of endangered species (websites accessed 17.10.19).

This species is approved (whole fish) for the production of fishmeal and fish oil under v 2.0 of the IFFO-RS standard.

#### Peer Review Comments

The purse-seine fishery targeting small pelagics is organized and managed in four fleets, according to the regions where they operate and the location of landing ports. Two fleets fish in the area west of Baja California and Baja California South; two other fleets operate inside the Gulf of California.

According to the latest assessment (2018 data, published in 2019) Thread herring SSB producing MSY was estimated to be 460,000 t. The Kobe plot indicated that the stock was not over-exploited, and no overfishing was taking place. Data provided to the auditors (Second Surveillance Audit Thread herring fishery 2019) confirmed that estimates of fishing mortality rates for the Thread herring complex were below the current 0.25 reference point suggested by the FMP. BAC obtained for 2018 was 65,522 t.; against a Bmin of 12,000t. Total catches for 2018 (Thread herring complex and Bocona sardine) were 63,380t. The stock is at or above the target reference point.

Under the SPFMP chub mackerel is classified as an “active” management species. The control rule for actively managed species uses a harvest rate that is constrained between 5 and 25% of estimated SSB, over a cut-off of minimum biomass.

In 2016/2017, during the directed fishery for Thread herring from a total catch (small pelagics) of 14,529t; 220t of Chub mackerel representing 1.50% of the total volume of catches in the fishery were retained. Using a biomass dynamics model Nevarez-Martínez et al. (2016e) calculated biological reference points for Chub mackerel. Kobe plots for the assessment of chub mackerel show positive results in terms of exploitation and current state of the population, with all years indicating that estimated biomass is above BMSY and average fishing mortality rate remains below FMSY, thus there is no risk of overfishing

Pacific Jack mackerel is passively managed in the fishery: the control rule determines that the Biologically Acceptable Catch (BAC) is 25% of the most recent estimate of SSB. During the 2016-17 targeted fishery for Thread herring a total of 245.75t Pacific jack mackerel were caught, equivalent to 1.67% by volume of total catches of small pelagics for the season. Based on the relatively lack of data, the species was assessed via the PSA and passed the risk assessment.

During the first surveillance audit (Thread herring fishery 2018) the MSC assessment team confirmed that landing declarations were in use, but their implementation was still low, and that most were incomplete in the sections for non-target species. For the third season of their use the amount of discard data included in the logbook were much higher than in the previous two seasons.

Habitat and ecosystem issues do not appear to be of significance for this fishery.

The peer reviewer agrees that the species under assessment should be approved (whole fish) for the production of fishmeal and fish oil under v 2.0 of the IFFO-RS standard.

#### Notes for On-site Auditor

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

## General Results

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

## Species-Specific Results

Category	Species	% landings (2016-2017) in the targeted fishery for Thread Herring	Outcome (Pass/Fail)	
Category A	Thread herring Crinuda ( <i>Opisthonema</i> ) Complex	95.69	A1	PASS
			A2	PASS
			A3	PASS
			A4	PASS
Category C	Chub mackerel Macarela ( <i>Scomber japonicus</i> )	1.64	PASS	
Category D	Pacific jack mackerel Charrito ( <i>Trachurus symmetricus</i> )	1.67	PASS	

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

## HOW TO COMPLETE THIS ASSESSMENT REPORT

This assessment template uses a modular approach to assessing fisheries against the IFFO RS standard.

### Whole Fish

The process for completing the template for a **whole fish** assessment is as follows:

1. ALL ASSESSMENTS: Complete the Species Characterisation table, to determine which categories of species are present in the fishery.
2. ALL ASSESSMENTS: Complete clauses M1, M2, M3: Management.
3. IF THERE ARE CATEGORY A SPECIES IN THE FISHERY: Complete clauses A1, A2, A3, A4 for **each** Category A species.
4. IF THERE ARE CATEGORY B SPECIES IN THE FISHERY: Complete the Section B risk assessment for **each** Category B species.
5. IF THERE ARE CATEGORY C SPECIES IN THE FISHERY: Complete clause C1 for **each** Category C species.
6. IF THERE ARE CATEGORY D SPECIES IN THE FISHERY: Complete Section D.
7. ALL ASSESSMENTS: Complete clauses F1, F2, F3: Further Impacts.

A fishery must score a pass in **all applicable clauses** before approval may be recommended. To achieve a pass in a clause, the fishery/species must meet **all** of the minimum requirements.

### By-products

The process for completing the template for **by-product raw material** is as follows:

1. ALL ASSESSMENTS: Complete the Species Characterisation table with the names of the by-product species and stocks under assessment. The ‘% landings’ column can be left empty; all by-products are considered as Category C and D.
2. IF THERE ARE CATEGORY C BYPRODUCTS UNDER ASSESSMENT: Complete clause C1 for **each** Category C by-product.
3. IF THERE ARE CATEGORY D BYPRODUCTS UNDER ASSESSMENT: Complete Section D.
4. ALL OTHER SECTIONS CAN BE DELETED. Clauses M1 - M3, F1 - F3, and Sections A and B do not need to be completed for a by-product assessment.

By-product approval is awarded on a species-by-species basis. Each by-product species scoring a pass under the appropriate section may be approved against the IFFO RS Standard.

## SPECIES CATEGORISATION

The following table should be completed as fully as the available information permits. Any species representing more than 0.1% of the annual catch should be listed, along with an estimate of the proportion of the catch each species represents. The species should then be divided into Type 1 and Type 2 as follows:

- **Type 1 Species** can be considered the ‘target’ or ‘main’ species in the fishery. They make up the bulk of annual landings and are subjected to a detailed assessment.
- **Type 2 Species** can be considered the ‘bycatch’ or ‘minor’ species in the fishery. They make up a small proportion of the annual landings and are subjected to relatively high-level assessment.

**Type 1 Species must represent 95% of the total annual catch. Type 2 Species may represent a maximum of 5% of the annual catch (see Appendix B).**

Species which make up less than 0.1% of landings do not need to be listed (NOTE: ETP species are considered separately). The table should be extended if more space is needed. Discarded species should be included when known.

The ‘stock’ column should be used to differentiate when there are multiple biological or management stocks of one species captured by the fishery. The ‘management’ column should be used to indicate whether there is an adequate management regime specifically aimed at the individual species/stock. In some cases, it will be immediately clear whether there is a species-specific management regime in place (for example, if there is an annual TAC). In less clear circumstances, the rule of thumb should be that if the species meets the minimum requirements of clauses A1-A4, an adequate species-specific management regime is in place.

NOTE: If any species is categorised as Endangered or Critically Endangered on the IUCN Red List, or if it appears in the CITES appendices, it **cannot** be approved for use as an IFFO RS raw material. This applied to whole fish as well as by-products.

**TYPE 1 SPECIES (Representing 95% of the catch or more)**

**Category A:** Species-specific management regime in place.

**Category B:** No species-specific management regime in place.

**TYPE 2 SPECIES (Representing 5% OF THE CATCH OR LESS)**

**Category C:** Species-specific management regime in place.

**Category D:** No species-specific management regime in place.

Common name	Latin name	Stock	% of landings	Management	Category
Thread herring <i>Crinuda</i>	<i>Opisthonema spp</i>	FAO 77	95.69	SAGARPA	A
Chub mackerel <i>Macarela</i>	<i>Scomber japonicus</i>	FAO 77	1.64	SAGARPA	C
Pacific jack mackerel <i>Charrito</i>	<i>Trachurus symmetricus</i>	FAO 77	1.67	SAGARPA	D

## MANAGEMENT

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

<b>M1</b>	<b>Management Framework – Minimum Requirements</b>		
	M1.1	There is an organisation responsible for managing the fishery	PASS
	M1.2	There is an organisation responsible for collecting data and assessing the fishery	PASS
	M1.3	Fishery management organisations are publically committed to sustainability	PASS
	M1.4	Fishery management organisations are legally empowered to take management actions	PASS
	M1.5	There is a consultation process through which fishery stakeholders are engaged in decision-making	PASS
	M1.6	The decision-making process is transparent, with processes and results publically available	PASS
<b>Clause outcome:</b>			<b>PASS</b>
<p><b>Evidence:</b></p> <p><b>M1.1:</b></p> <p>The Government body with responsibility for fisheries management in Mexico is the Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación, SAGARPA).</p> <p>Within SAGARPA, the National Commission on Aquaculture and Fisheries (Comisión Nacional de Acuacultura y Pesca, CONAPESCA) is directly responsible for management, co-ordination and policy development with regards to fisheries</p> <p>A Fisheries Management Plan (FMP) for the minor pelagic species (Plan de manejo pesquero para la pesquería de pelágicos menores, first published in 2012) aims to set out actions to develop the fisheries in a sustainable manner based on current knowledge of ecological, environmental, economic, cultural, social and biological aspects of the fisheries. This Plan is reviewed annually during Small Pelagic Workshops (Taller de Pelágicos Menores). The latest review (2017) was published by INAPESCA (see below) in 2018.</p> <p>The Carta Nacional Pesquera (CNP) or National Fisheries Charter, is a binding instrument for fisheries authorities decision- making process. The Charter includes the diagnosis and assessment of a fishery, published fisheries and conservation indicators, and recommendations by INAPESCA for the management of fisheries included in the CNP. The Charter is broadly divided between Pacific and Gulf of Mexico fisheries.</p> <p>There is an organisation responsible for managing the fishery.</p> <p><b>M1.2:</b></p> <p>INAPESCA (or INP, Instituto Nacional de la Pesca (National Fisheries Institute)) provide scientific advice to Government and publish updates to the FMP. The latest revision was made in June 2019.</p> <p>INAPESCA's (or INP) mission statement is to:</p> <p><i>‘Coordinate and conduct scientific and technological research on fisheries and aquaculture resources with sustainability criteria for management and conservation and promote research schemes with the participation and financial support from the sectors involved’.</i></p>			



This includes the development of stock-specific management plans, the maintenance of the CNP and the planning and conducting of research in support of these functions. Updates of the CNP are prepared by INAPESCA every two or three years. The latest version was published in 2018.

There is an organisation responsible for collecting data and assessing the fishery

**M1.3:**

INP's mission statement references sustainability issues. SAGARPA's mission statement also includes a commitment to:

*“Facilitate the competitive and sustainable development of the fisheries and aquaculture sector in the country to increase the welfare of Mexicans”.*

Fishery management organisations are publically committed to sustainability.

**M1.4:**

The primary legal instruments are the Fisheries Law (Ley de Pesca) and the Fisheries Regulation (Reglamento de la Ley de Pesca NOM -003-PESC-1993), replaced in 2018 by NOM-003-SAG-PESC-2018 when it came into force following publication in the Official Gazette (Diario Oficial, DOF) in March 2019.

Important changes have been introduced related to the stock management model, the number of vessels per fishing zone, minimum capture sizes and the permitted % of capture of individuals below minimum size in force (changed from 30 to 20%). Changes were also introduced in the permitted periods of fisheries closures.

In relation to minimum sizes NOM-003-SAG-PESC-2018 maintains the same values per species as per the previous NOM (Thread herring 160mm). SAGARPA may modify these values within in each season; considering INAPESCA's technical opinion. All decisions are published in the Official Gazette.

Updates of CNP are prepared by INAPESCA every two or three years, but before updates are published in the DOF draft updates undergo a public review process; allowing the general public, non-governmental organisations and the academic sector, among others, to give an opinion on fisheries status. The latest version of the CNP (2017) was published by INP in June 2018.

Fishery management organisations are legally empowered to take management actions.

**M 1.5:**

Scientists have discussed and communicated to other interested parties' options to define reference points appropriate for the fishery. Scientists continue to investigate the best approach to stock assessments and attempt new methods.

Stakeholders are currently applying for MSC Certification for the fishery. The 2<sup>nd</sup> Surveillance audit (SCS Global Services May (2019) 103pp) for the Southern Gulf Thread Herring Fishery, Sinaloa & Nayarit, Mexico has been completed and published.

Based on results of acoustic surveys undertaken by INAPESCA, dates for opening of fishing seasons are decided only by agreement between fisheries researchers and fishery operators during official meetings where agreements are then signed by all participants.

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

**M 1.6:**

During the MSC Second Surveillance Audit's site visit (March 2019) minutes were presented to the auditors of meetings between scientists and industry to discuss management plans for the small pelagics fishery. Discussions were undertaken about the need to determine potential mechanisms to shut operations as real time cumulative catches approach 90% of the allowable catch each year.

Draft updates of the CNP undergo a public review process by means of publication. This allows the general public, non-governmental organisations and the academic sector, among others, to give their opinions of fisheries status.

Decision-making processes are transparent, with processes and results publically available.

**R1-R10**

References p 33

*Standard clauses 1.3.1.1, 1.3.1.2*

<b>M2</b>	<b>Surveillance, Control and Enforcement - Minimum Requirements</b>		
	M2.1	There is an organisation responsible for monitoring compliance with fishery laws and regulations	PASS
	M2.2	There is a framework of sanctions which are applied when laws and regulations are discovered to have been broken	PASS
	M2.3	There is no substantial evidence of widespread non-compliance in the fishery, and no substantial evidence of IUU fishing	PASS
	M2.4	Compliance with laws and regulations is actively monitored, through a regime which may include at-sea and portside inspections, observer programmes, and VMS.	PASS
<b>Clause outcome:</b>			<b>PASS</b>
<p><b>Evidence:</b></p> <p><b>M2.1:</b></p> <p>The Secretariat of Environment and Natural Resources (SEMARNAT), the Federal Attorney for Environmental Protection (PROFEPA), Marina (Mexican Navy); National Defense (SEDENA); the National Commission on Security (CNS), the Federal Police, and the National Commission of Aquaculture and Fisheries (CONAPESCA) all work together under the Centro de Operaciones Interinstitucionales (COI) (San Felipe) directed by the Commandant of the Navy. This group carry out surveillance operations in the Upper Gulf to promote the protection of marine resources and combat illegal trafficking in prohibited marine species.</p> <p>There is an organisation responsible for monitoring compliance with fishery laws and regulations.</p> <p><b>M2.2:</b></p> <p>The Fisheries Law (Ley General de Pesca y Acuacultura Sustentables 2007) lays down details of infractions (Article 132) and sanctions (Article 133) to be applied. Article 138 also details how fines are determined.</p> <p><b>Sanctions include:</b></p> <ul style="list-style-type: none"> <li>• A warning or reprimand.</li> <li>• Fines with additions for every day the infraction persists.</li> <li>• Administrative arrest for 36 hours.</li> <li>• Temporary/permanent partial or total closure of installations where the infractions occurred.</li> <li>• Confiscation of vessels or vehicles, fishery equipment and/or products obtained by aquaculture or fishing directly related to the infractions committed.</li> <li>• Suspension or revocation of corresponding fishing permits, concessions or authorisations.</li> </ul> <p>COI in October 2017 inspected a total of 20 vessels, 11 artisanal vessels, 3 vehicles and also interviewed a total of 207 individuals. A total length of 5,632m of illegal nets were seized, 4 arrests made, 10 hauls of an endangered species (IUCN list) were recovered and 1 vehicle was seized.</p> <p>Inspectors from CONAPESCA perform regular visits to processing plants and vessels to ensure that all obligations of the fisheries regulation are fully complied with.</p> <p>There is a framework of sanctions which are applied when laws and regulations are discovered to have been broken.</p>			

**M2.3:**

PROFEPA handle environmental disputes related to all types of protected species, such as dolphins. PROFEPA also perform inspections and provides inspection training to SAGARPA staff to help catch and discourage IUU fishing practices.

There is effective monitoring of each fishing boat's position at all times through a compulsory satellite detection system. Personnel from CONAPESCA perform regular inspection visits to processing plants and vessels.

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

**M2.4:**

CONAPESCA and INAPESCA inspectors conduct monitoring, control and surveillance of the fishery to ensure compliance with current regulations. Landings are monitored, sampled and regular inspections take place at ports of landing; processing plants and on fishing vessels.

The current observer program (2017-2018 season) reached coverage of 44.3% of the overall number of fishing trips and 100% of the Sinaloa & Nayarit fleet trips. Observers have different logs in which they take information on the results of each haul by species and size. Climatic data and data related to by-catches are also retained. All observers are certified by CONAPESCA before undertaking trips. All data is made available to INAPESCA scientists and to others on request (see next paragraph).

Observer information (2012-17) was compiled and made available to the SCS Assessment Team during their Second Surveillance Audit (2019) of the Gulf Thread Herring Fishery. Data on catch of non-MS-C target small pelagic species and other non-target species ((Bony fish, elasmobranchs, molluscs and echinoderms) was presented (Table 3). Also results of inspections by CONAPESCA inspectors confirmed the low volume of elasmobranchs retained in catches. Concern had been expressed for rays due to their inherent vulnerability.

There is effective monitoring of each fishing boat's position at all times through a compulsory satellite detection system. Each landing operation is sampled by technical personnel from the Centro Regional de Investigación Pesquera (CRIP, Regional Center for Fisheries Research, a branch of INAPESCA).

INAPESCA undertake monthly reviews of the cumulative percentage of bycatch to determine when it has reached the allowable percentage by species (bycatch). When this amount is reached inspectors from CONAPESCA are notified. The fishery has established a traceability program to ensure only trips with a maximum of 2% bycatch can be considered eligible to enter chain of custody. A financial incentive program was put in place to reward crew for trips with a proportion of bycatch  $\leq 2\%$  of catch.

All fishing vessels have a permit issued by CONAPESCA based on a technical opinion issued by INAPESCA. Permits have to be renewed every 5 years. It is a condition of the fishing permit that vessels are required to use Vessel Monitoring System (VMS) equipment during fishing operations.

Compliance with laws and regulations is actively monitored, through a regime which may include at-sea and portside inspections, observer programmes, and VMS.

**R9; R11-R17****References p 33-34**

*Standard clause 1.3.1.3*

## CATEGORY A SPECIES

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

Species Name		Thread Herring <i>Opisthonema Complex</i>	
A1	Data Collection - Minimum Requirements		
	A1.1	Landings data are collected such that fishery-wide removals of this species are known.	PASS
	A1.2	Sufficient additional information is collected to enable an indication of stock status to be estimated.	PASS
Clause outcome:			PASS

### Evidence:

#### A1.1:

The purse-seine fishery is organized and managed in four fleets, according to the regions where they operate and the location of landing ports. Two of the fleets' fish in the area west of Baja California and Baja California South; two other fleets operate inside the Gulf of California. Fleets within the Gulf are arranged into the Southern fleet fishing off the coast of Sinaloa and Nayarit, landing into Mazatlán and the Northern fleet fishing off the coast off the State of Sonora and landing into the ports of Guaymas and Yavaros. The Sinaloa fleet (which captures mostly Thread herring) received MSC certification in October 2016. The Sonora fleet, the largest of the four fleets, primarily targets Pacific sardines and secondarily targets Thread herring (Figure 1):

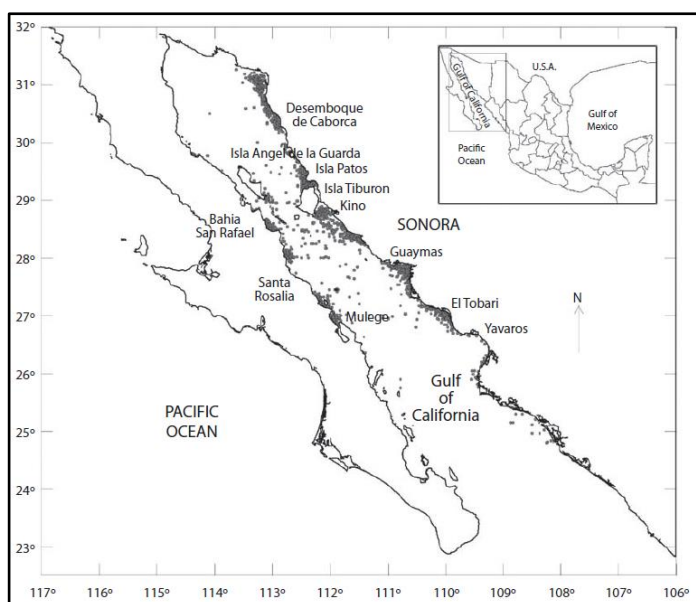


Figure 1. Landing distribution (dark grey points) of small pelagic fishery in the Gulf of California from 2002-2007. R18

Data on catch and effort from the official 'Aviso de Arribo' or landing notifications are collected by regional offices of CONAPESCA and then forwarded to and processed by INAPESCA scientists. Results are presented in official reports of fishery catch and effort:

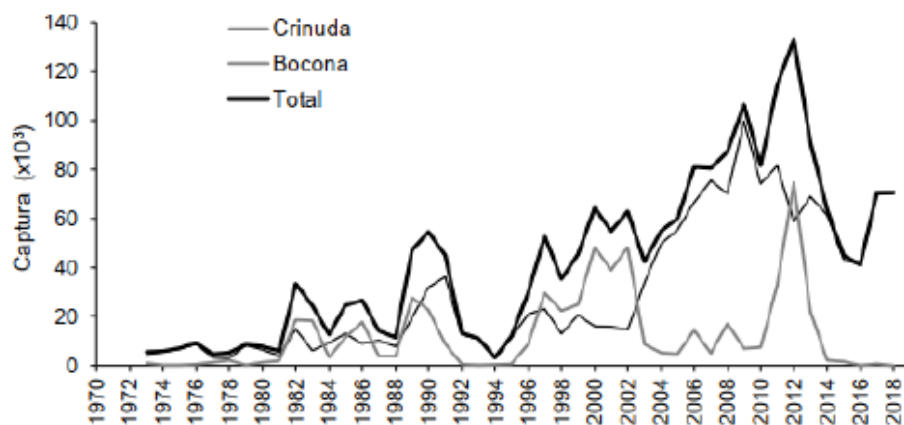


Figure 2 History of observed catches of Thread herring (Crinuda) and Bocona sardine (*Cetengraulis mysticetus*) in the southern Gulf. Reproduced from Jacob-Cervantes et al. (2019) R9

Total landings (Thread herring and Bocona sardine) in the 2017/2018 fishery from the assessment area were 63,380t.

The opportunistic nature of the small pelagic fleet makes it difficult to interpret CPUE on a particular species, as the fleet prefers Pacific sardine (*Opisthonema libertate*) but will opportunistically capture any of the marketable small pelagic species it encounters.

Landings data are collected such that fishery-wide removals of this species are known.

#### A1.2:

In 2018 INAPESCA conducted two acoustic surveys. Results were similar to 2017 where the fish was found to be scattered. Indices of relative abundance in terms of kg/hr of tow were obtained from sets conducted according to survey design. These indices served to determine differences in temporal and spatial distribution of Thread herring and associated species in the region. A relevant finding in the second survey was that few immature fish (Thread herring) were detected.

For the 2018 surveys INAPESCA Staff used the same age structured estimation model using alternative assumptions about natural mortality but also added a comparison of model performance using two forms of stock-recruitment relationship (Beverton-Holt and Ricker, Figure 3):

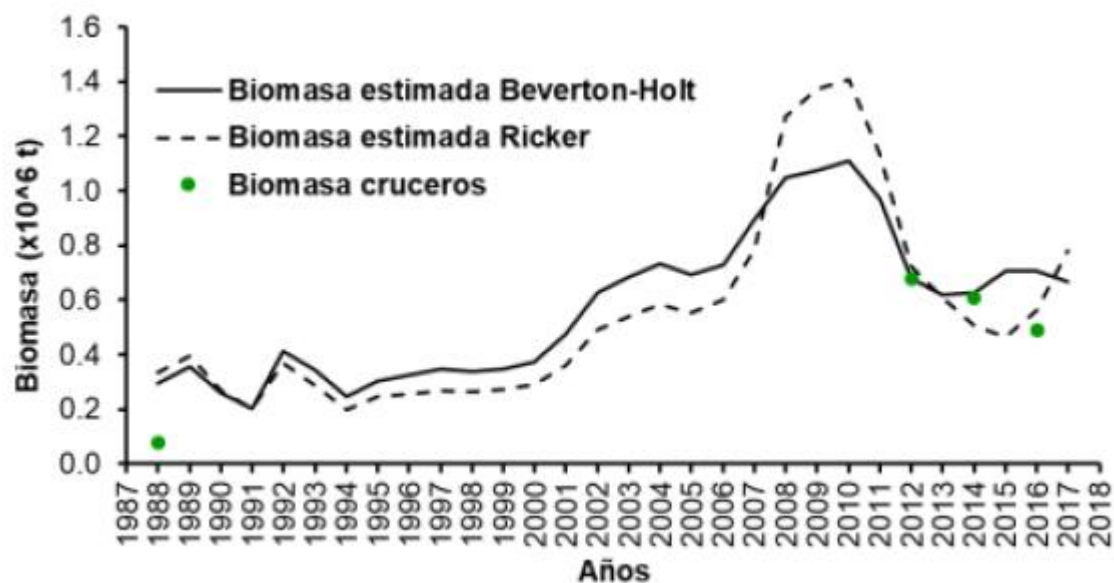


Figure 3: Biomass trend of the thread herring complex in the southern Gulf of California as predicted using two alternative age structured models fit to acoustic based estimates of abundance (dots). Trends obtained under the assumption of natural mortality  $M=0.6$ . R9

Although the intent was to understand better the uncertainty associated to this component of the model, the procedure did not move forward in releasing natural mortality for estimation. In addition, results of the model presented alternative status of the stock and therefore computed alternative values of the Biologically Acceptable Catch (BAC) resulting from application of the control rule (conclusions of the MSC Auditors in 2019 (Second Surveillance Audit Thread herring fishery)).

#### Acoustic Surveys (2018):

Total biomass was estimated based on acoustic detections processed using Echoview software using a target strength (TS) function requiring a species-specific acoustic reflectivity parameter. For small pelagics in Mexico, there is currently no information on values specific for Thread herring. INAPESCA scientists used a known value for *Sardinops ocellatus* and also a generic value for the Clupeidae family. Estimated biomass abundance under the *S. ocellatus* TS assumption was 749,538t; under the *Clupeidae* assumption 1,034,650 t.

The auditors concluded (Second Surveillance Audit Thread herring fishery) that INAPESCA scientists in future obtain information about the reflectivity parameter specific for the genus *Opisthonema*. The auditors also acknowledged difficulties in obtaining abundance indices and will continue to monitor efforts by INAPESCA scientists to improve the science during future audits.

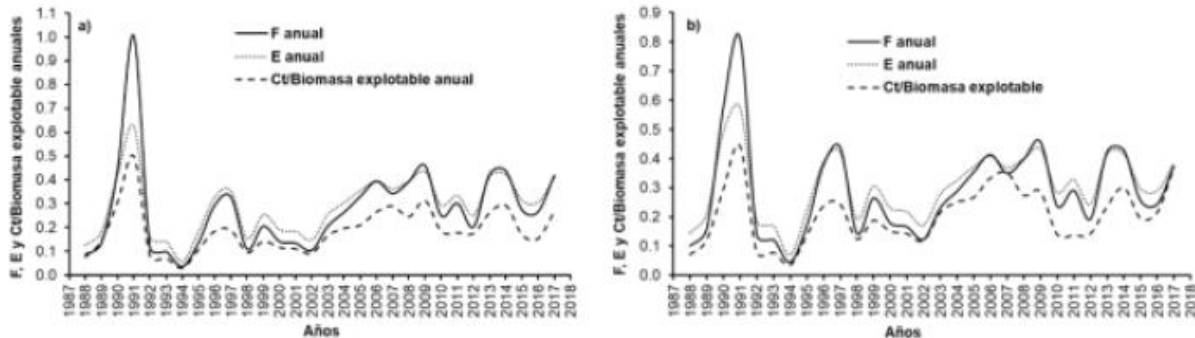
Sufficient additional information is collected to enable an indication of stock status to be estimated.

R9; R18

#### References p33-34

Standard clause 1.3.2.1.1



<b>A2</b>	<b>Stock Assessment - Minimum Requirements</b>		
	A2.1	A stock assessment is conducted at least once every 3 years (or every 5 years if there is substantial supporting information that this is sufficient for the long-term sustainable management of the stock) and considers all fishery removals and the biological characteristics of the species.	PASS
	A2.2	The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.	PASS
	A2.3	The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status.	PASS
	A2.4	The assessment is subject to internal or external peer review.	PASS
	A2.5	The assessment is made publically available.	PASS
<b>Clause outcome:</b>			<b>PASS</b>
<b>Evidence</b>			
<b>A 2.1:</b>			
<p>Annual biomass trends of the thread herring complex in the southern Gulf of California have been predicted since 1987 (Figure 3). Scientists have discussed and communicated to other interested parties' options to define reference points appropriate for the fishery although caveats have been also identified and no conclusion reached yet. INAPESCA Scientists continue to investigate the best approach to stock assessments.</p> <p>Methodological differences with previous assessments make it difficult to interpret how the estimated harvest rate has changed, but despite an increase in the last two years, the rate appears to continue fluctuating around the same average of the last ten years at least:</p>			
			
<p>Figure 4: Fishing mortality (F), the contribution of fishing to total mortality (E) and the harvest rate (C/Bexploit) on the thread herring complex in the southern Gulf of California. Left, estimated assuming a Beverton-Holt stock-recruitment relation; Right using a Ricker function. Reproduced from Jacob-Cervantes et al. (2018a). R9</p>			
<p>After the sharp decline of previous years, the trend in the catch of previous years reverted and increased in 2017 and 2018 (Figure 5):</p>			



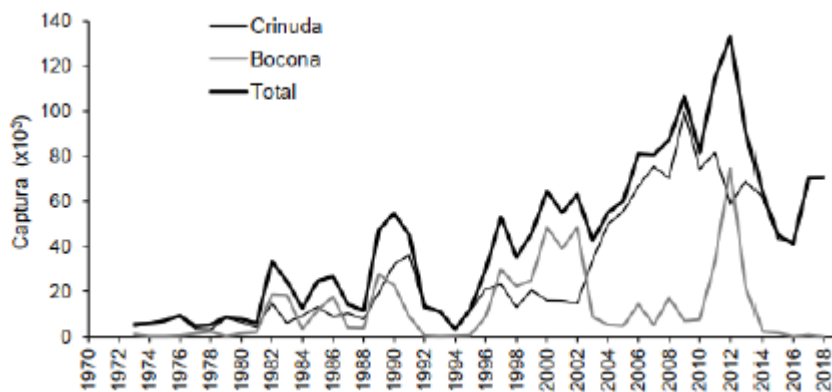


Figure 5: History of observed catch of thread herring and bocona sardine in the southern Gulf of California. Reproduced from Jacob-Cervantes et al. (2019). R9

A stock assessment is conducted at least once every 3 years.

#### A2.2:

A relevant insertion in the FMP is the definition of a guidance to establish reference points. A Biologically Acceptable Catch (BAC) (equivalent to Limit Reference Point) is computed as a fraction of the estimated MSY. The Plan states that the BAC is a “prudent level of catch” that can vary, for actively managed species, between 5 and 25% of estimated biomass.

An additional definition in the FMP states that overfishing “occurs when fishing takes place at a rate that is high enough to risk the stock’s ability to continuously produce MSY on the long term”. The FMP further adds, operationally, “in the fishery of small pelagic, overfishing occurs if catch exceeds the BAC”.

For now,  $F_{msy}$  still is the default 0.25 suggested in the FMP but INAPESCA staff substituted this value with an estimated parameter in 2018. INAPESCA scientists are aware the calculation of the allowable catch with this control rule needs to use as input the most recent abundance estimates available, which in this case is biomass estimated with the population dynamics model and does not rely on outdated survey-based estimates.

In 2018 the BAC was computed again using the model-based estimate of  $F_{msy}$  (0.194) and abundance estimates using an age structured model (382,740 t). It’s worth noting the default  $F_{msy}$  value of 0.25 was originally estimated for the Pacific sardine *Sardinops sagax*.

Assuming that  $B_{min} = 12,000$  t, the BAC obtained for 2018 was 65,522 t. According to the latest stock assessment (2018 data, published in 2019) SSB producing MSY was estimated to be 460,000t. The Kobe plot (*O. libertate*) indicated that the stock is not over-exploited, and no overfishing is taking place:

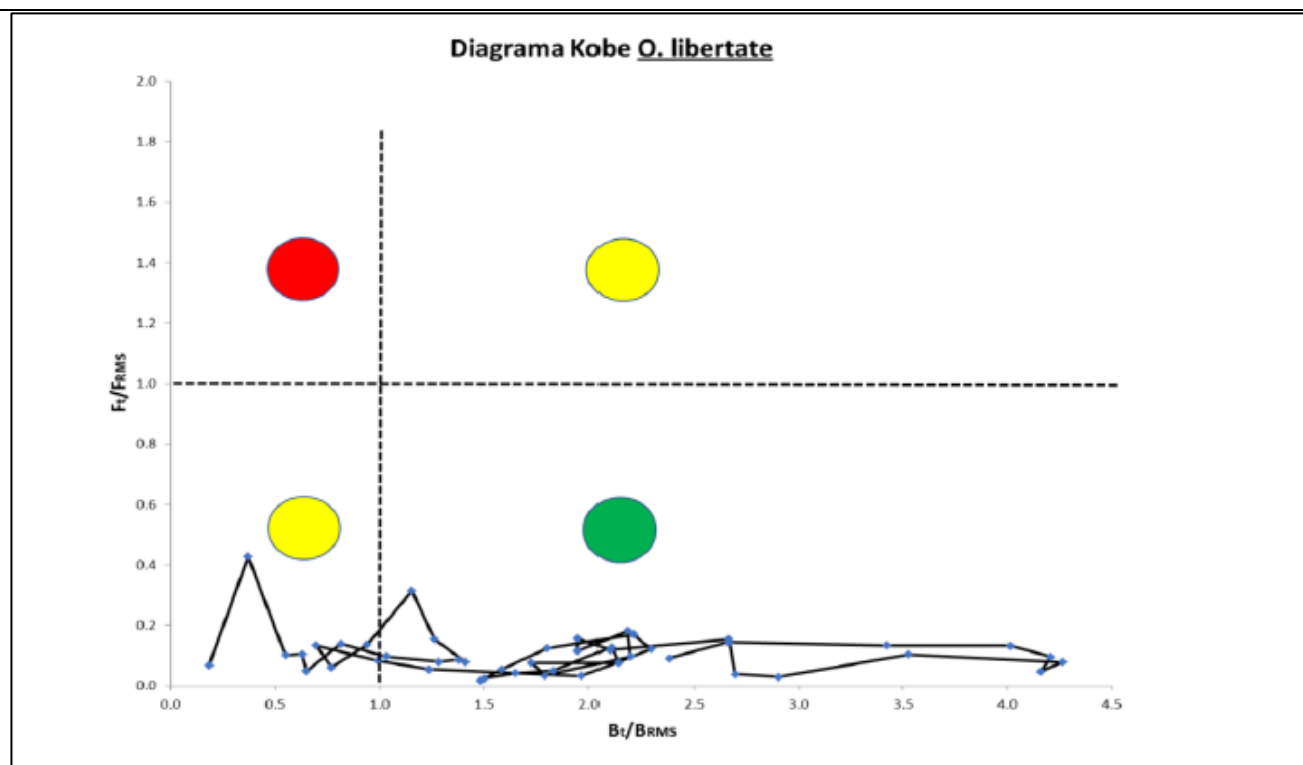


Figure 6 Kobe plot of biomass and fishing mortality rate relative to their respective levels producing MSY for the thread herring in central/northern Gulf of California. Biomass is SSB. R20

Estimates of fishing mortality rates for the Thread herring complex are below the 0.25 reference point suggested by the FMP.

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

### A2.3:

The new Fisheries Management Plan (FMP) describes that some species are to be actively managed, while others will be passively managed. The purpose of these two categories of management is to use institutional resources as efficiently and effectively as possible to meet management goals. *O. medirastre*, *O. libertate* and *O. bulleri* are all actively managed. For species that are “actively managed” the FMP has added an MSY-based control rule that, based on the application of a harvest rate, forces the catch to be reduced if the biomass declines until eventually, if a biomass threshold is reached, the fishery stops operating.

The general formula for the harvest control rule is as follows:

$$C = (B - B_{min}) * FRACTION$$

$C$  = Target Catch level

$B$  = Biomass of fish aged 1 and older

$B_{min}$  = Biomass necessary to conserve the resource and the ecosystem

Fishable fraction = 25 %

As discussed earlier an improvement was reported (Second Surveillance Audit Thread herring fishery) in the calculation of the Biologically Acceptable Catch (BAC); replacing the quantity FRACTION with a harvest rate computed as  $HR = 1 - \exp(-FMSY)$ . For now, FMSY still is the default 0.25 suggested in the FMP.

There does not appear to be a TAC set for the thread herring fishery as a whole nor for individual species, although INAPESCA make recommendations (700,000t for all small pelagic species in the 2012 CNP). This TAC needs to be technically justified in future assessments, and efforts are been made to achieve accurate assessments of population abundance by species.

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

**A2.4-A2.5:**

The Carta Nacional Pesquera (CNP) is a binding instrument for the fisheries authorities' decision- making process. This Charter includes diagnosis and assessment of a fishery, fisheries and conservation indicators, and recommendations by INAPESCA for the management of fisheries included in the CNP.

Updates of CNP are prepared by INAPESCA every two or three years, but before updates are published in the Official Gazette (Dario Oficial, DOF), the draft update undergoes a public review process by means of publication in the DOF. This allows the general public, non-governmental organizations and the academic sector, among others, to give an opinion of the fisheries status.

Assessments are publicly available and are subject to internal or external peer review.

**R9; R19-R20**

**References p33-34**

*Standard clause 1.3.2.2, 1.3.2.1.2, 1.3.2.1.4*

<b>A3</b>	<b>Harvest Strategy - Minimum Requirements</b>		
	A3.1	There is a mechanism in place by which total fishing mortality of this species is restricted.	PASS
	A3.2	Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment. Where a specific quantity of removals is recommended, the actual removals may exceed this by up to 10% ONLY if the stock status is above the limit reference point or proxy.	PASS
	A3.3	Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy (small quotas for research or non-target catch of the species in other fisheries are permissible).	PASS
<b>Clause outcome:</b>			<b>PASS</b>
<p><b>Evidence</b></p> <p><b>A3.1:</b></p> <p>The latest NOM (2018) does not include restrictions in the form of allowable catch or quotas. This was confirmed in the most recent CNP, where no quota was applicable through a ‘dictamen tecnico’ published by INP. Fishing effort in the NOM is restricted (no further increase in vessel numbers) North of 20°N. This prohibition also includes no addition of vessels to the fleet unless they are to replace retired active boats.</p> <p>The fishery for small pelagic fish in Mexico is managed using a control rule based on removing a fraction of allowable biomass above a minimum threshold. The language in the Plan is interpreted such that this BAC (and the corresponding fraction) works as a Limit Reference Point (LRP). Although no actual value has been provided, the Target Reference Point (TRP) in terms of fishing mortality will be lower than the level producing MSY.</p> <p>INAPESCA summarise actions to be taken:</p> <p><i>‘once the estimated Optimal Catch is reached a temporal suspension of fishing is applied until it is determined -in agreement with fishery indicators such as abundance, size and maturity- that the health of the fishery is such to establish the pertinence of continuing with fishing operations of this resource’</i></p> <p>Other management measures in place include 160mm minimum landing size (<i>Opisthonema</i> complex), limits on maximum seine capacity, and limited entry to the fishery. The new Standard (NOM 2018) maintains same values (160mm) per species as the previous Standard. However, SAGARPA may modify these values within each season taking into account INAPESCA's technical opinion. All revised decisions are published in DOF.</p> <p>A maximum volume of 20% (down from 30%) of the annual catch limits for each small pelagic species that are below the minimum landing size for that species is permitted. This reduced rate of capture applies for Monterey sardine (<i>Sardinops sagax</i>), Thread herring Crinuda (<i>Opisthonema spp.</i>) and Californian anchovy (<i>Engraulis mordax</i>).</p> <p>This amount may be revised through technical opinions provided by INAPESCA and published in the Diario Oficial de la Federación (DOF). In relation to the closure periods, SAGARPA may establish periods and zones for the capture of small pelagic species in order to improve fishery management tools, the conservation of the resource and interaction with other fisheries. These periods and zones will be taken according to the technical criteria of INAPESCA after discussion with the industry and that, through regulatory agreements, will be published in the Official Gazette.</p>			

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

**A 3.2:**

Methodological differences with previous assessments make it difficult to interpret how the estimated harvest rate has changed, but despite an increase in the last two years, the rate appears to continue fluctuating around the same average of the last ten years at least (Figure 4).

After the sharp decline of previous years, the trend in the catch of previous years reverted and increased in 2017 and 2018 (Figure 5).

Evidence was presented by INAPESCA (Second Surveillance Audit Thread herring fishery 2019) that catches for the most recent season did not exceed BAC.

Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment.

**A 3.3:**

The FMP has added an MSY-based control rule which, based on the application of a harvest rate, requires catches to be reduced if biomass declines. If a biomass threshold is reached, the fishery stops operating.

Other management actions employed when reaching or exceeding one or more reference points include temporary or zone closures, establishment or change of minimum size limits and change of allowable catch levels by species and effort restrictions.

SAGARPA act according to technical criteria of INAPESCA following discussion with the industry. All revisions of the Regulation are published in DOF.

Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy

**R9**

**References p33-34**

*Standard clause 1.3.2.1.3*

<b>A4</b>	<b>Stock Status - Minimum Requirements</b>		
	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>	<b>PASS</b>
<b>Clause outcome:</b>			<b>PASS</b>
<p><b>Evidence</b></p> <p><b>A4.1:</b></p> <p>According to the latest assessment (2018 data, published in 2019) SSB producing MSY was estimated to be 460,000 t. The Kobe plot indicated that the stock was not over-exploited, and no overfishing was taking place.</p> <p>Data provided to the auditors (Second Surveillance Audit Thread herring fishery 2019) confirmed that estimates of fishing mortality rates for the Thread herring complex were below the current 0.25 reference point suggested by the FMP.</p> <p>BAC obtained for 2018 was 65,522 t.; against a Bmin of 12,000t. Total catches for 2018 (Thread herring complex and Bocona sardine) were 63,380t.</p> <p>The stock is at or above the target reference point.</p> <p><b>R9; R20</b></p> <p><b>References p34</b></p>			
<i>Standard clause 1.3.2.1.4</i>			

## CATEGORY C SPECIES

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

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

Species Name		Chub mackerel	<i>Scomber japonicus</i>	FAO 77
C1	Category C Stock Status - Minimum Requirements			
	C1.1	Fishery removals of the species in the fishery under assessment are included in the stock assessment process OR are considered by scientific authorities to be negligible.		PASS
	C1.2	The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy), OR removals by the fishery under assessment are considered by scientific authorities to be negligible.		PASS
Clause outcome:				PASS
<b>C1.1:</b> Data on catch and effort is collected from the official ‘Aviso de Arribo’ or landing notification form provided and collected by regional offices of CONAPESCA. Data are processed and analysed by INAPESCA; results presented in official reports of fishery catch and effort.  Chub mackerel has been included in acoustic surveys, but results have not been included in stock assessments for this species. Under the SPFMP chub mackerel is classified as an “active” management species. The control rule for actively managed species uses a harvest rate that is constrained between 5 and 25% of estimated SSB, over a cut-off of minimum biomass.  In 2016/2017, during the directed fishery for Thread herring from a total catch (small pelagics) of 14,529t; 220t of Chub mackerel representing 1.50% of the total volume of catches in the fishery were retained.  Landings data for Chub mackerel have been recorded since 1999 (Table 1). Chub mackerel present trends of variable abundance. Peaks appear to be on an approximate five-year cycle. Highest landings, over 40,000 mt, were recorded in 1998/99 (40,535 mt) when it accounted for 25% of catch composition of the fishery and in 2011-12 (47,600 mt) representing 10% of total catch (Table 1):				

Table 1 Total landings (mt) of small pelagic species in the Gulf of California purse seine fishery. R21

Year	Total Landings	Pacific sardine <i>Sardinops sagax</i>	Thread Herring <i>Opisthoteuthis</i> spp.	Chub Mackerel <i>Scomber japonicus</i>	Red-eye round herring <i>Etrumeus teres</i>	California Anchovy <i>Engraulis mordax</i>	Bocona sardine <i>Cetengraulis mysticetus</i>	Leather-jackets <i>Oligoplites</i> spp.	Mixed Species	No vessels	Nominal effort (trips)
99/00	178,902	65,593	38,510	34,240	5,006	4,493	25,229	4,741	1,091	28	1,603
00/01	333,370	190,862	15,834	13,003	345		112,954	277	75	28	2,533
01/02	353,903	220,360	46,666	4,493	270	2,853	78,261	890	110	32	2,827
02/03	318,379	198,757	94,956	6,992	4,889	1,100	7,682	3,309	693	31	2,745
03/04	271,638	102,034	59,685	25,507	8,858	5,717	63,253	5,494	1,090	28	2,121
04/05	260,859	94,559	76,183	32,943	4,683	7,354	38,031	4,233	2,874	30	2,074
05/06	365,164	133,567	60,560	13,191	7,178	41,820	106,062	945	1,841	36	2,922
06/07	297,867	178,205	87,172	6,616	3,088	1,271	16,491	2,530	2,495	38	2,499
07/08	538,669	488,639	25,726	3,988	698	5,885	12,303	238	1,190	42	3,861
08/09	564,298	528,094	21,564	963	422	2,620	9,537	212	885	47	3,757
09/10	360,952	256,409	85,116	3,527	5,545	481	8,315	520	1,039	50	2,761
10/11	407,114	138,068	73,507	38,762	3,040	76,849	74,067	2,382	441	49	3,306
11/12	461,058	86,470	51,780	47,600	2,560	73,124	197,354	666	1,503	50	3,358
12/13	465,486	72,802	101,814	20,557	12,587	118,833	129,296	3,947	5,649	51	3,601
13/14	293,686	3,571	133,452	40,640	6,684	33,772	64,135	10,869	564	49	2,685
14/15	244,465	4,455	120,919	35,503	7,173	3,888	67,960	4,168	399	50	2,223

Fishery removals of the species in the fishery under assessment are included in the stock assessment process.

#### C1.2:

Using a biomass dynamics model Nevarez-Martínez et al. (2016e) calculated biological reference points for Chub mackerel. The biomass dynamics model pools catch of chub mackerel indicate that recorded catches are far below estimated BMSY for all of its trajectory:

Table 2 Biological reference points for Chub mackerel R21

Parameter	Chub mackerel
R	0.700
K	400,000
B <sub>0</sub>	360,000
B <sub>MSY</sub>	200,000
MSY	70,000
F <sub>MSY</sub>	0.350
f <sub>MSY</sub>	1,964
Q <sub>med</sub>	1.78E-04



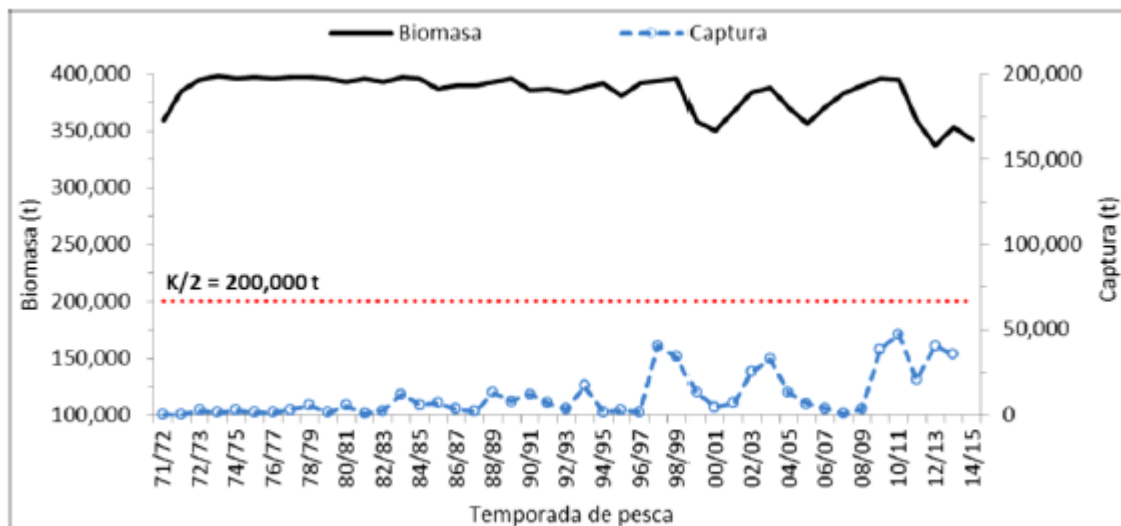


Figure 7 Biomass trajectories of chub mackerel in the Gulf of California. Reproduced from Nevarez-Martinez et al. (2016e) R21

Kobe plots for the assessment of chub mackerel show positive results in terms of exploitation and current state of the population, with all years indicating that estimated biomass is above BMSY and average fishing mortality rate remains below FMSY, thus there is no risk of overfishing:

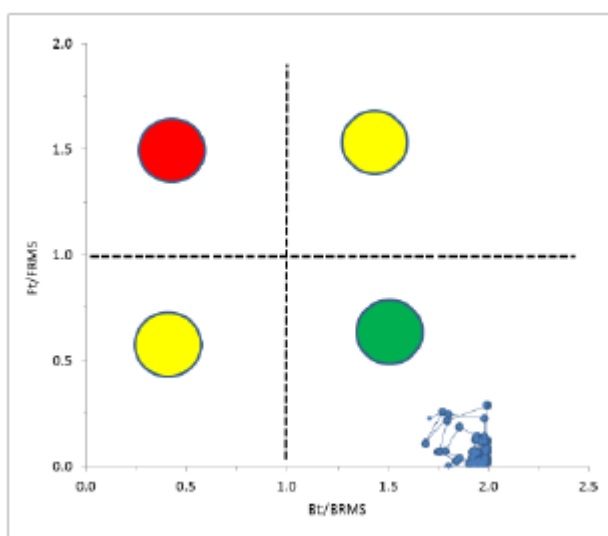


Figure 8 Kobe plots with stock status of mackerel (*Scomber japonicus*) in Gulf of California. R21

The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy) and passes Clause C1.2.

**R21**

**References P34**

*Standard clauses 1.3.2.2*

## CATEGORY D SPECIES

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

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

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

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

<b>D1</b>	<b>Species Name:</b>	<b>Pacific Jack mackerel (<i>Trachurus symmetricus</i>)</b>	
	<b>Productivity Attribute</b>	<b>Value</b>	<b>Score</b>
	Average age at maturity (years)	3	2
	Average maximum age (years)	30	2
	Fecundity (eggs/spawning)	53,000	1
	Average maximum size (cm)	81	2
	Average size at maturity (cm)	31	2
	Reproductive strategy	Spawners	1
	Mean trophic level	3.6	3
	<b>Average Productivity Score</b>		<b>1.86</b>
	<b>Susceptibility Attribute</b>	<b>Value</b>	<b>Score</b>
	Overlap of adult species range with fishery	No data	
	Distribution	Throughout	1
	Habitat	N/A	
	Depth range	0-400 m	1
	Selectivity	>2 times mesh	3
	Post-capture mortality	Short tows	2
	<b>Average Susceptibility Score</b>		<b>1.75</b>
	<b>PSA Risk Rating (From Table D3)</b>		<b>PASS</b>
	<b>Compliance rating</b>		
	<b>Evidence:</b>		
	Pacific Jack mackerel is passively managed in the fishery: the control rule determines that the Biologically Acceptable Catch (BAC) is 25% of the most recent estimate of SSB. During the 2016-17 targeted fishery for Thread herring a total of 245.75t Pacific jack mackerel were caught, equivalent to 1.67% by volume of total catches of small pelagics for the season.		
	While evidence has shown this species is subject to a management regime current reference points (e.g. BAC) for the species in the assessment area were not available. The comparative lack of scientific information on the status of the population in the assessment area means that a risk-assessment style approach must be taken.		
	The species has passed this risk-based assessment.		
	<b>References:</b>		
	<b>D1</b> FishBase Pacific Jack Mackerel: <a href="http://www.fishbase.org/Summary/SpeciesSummary.php?ID=368&amp;AT=Pacific+jack+mackerel">http://www.fishbase.org/Summary/SpeciesSummary.php?ID=368&amp;AT=Pacific jack mackerel</a>		
	<b>D2</b> Fishsource Pacific Jack Mackerel: <a href="https://www.fishsource.org/stock_page/1526">https://www.fishsource.org/stock_page/1526</a>		
	<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.

<b>D3</b>		<b>Average Susceptibility Score</b>		
		<b>1.00 – 1.75</b>	<b>1.76 – 2.24</b>	<b>2.25 – 3.00</b>
<b>Average Productivity Score</b>	<b>1.00 – 1.75</b>	PASS	PASS	PASS
	<b>1.76 – 2.24</b>	PASS	PASS	TABLE D4
	<b>2.25 – 3.00</b>	PASS	TABLE D4	TABLE D4

## 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.

<b>F1</b>	<b>Impacts on ETP Species - Minimum Requirements</b>		
	F1.1	Interactions with ETP species are recorded.	PASS
	F1.2	There is no substantial evidence that the fishery has a significant negative effect on ETP species.	PASS
	F1.3	If the fishery is known to interact with ETP species, measures are in place to minimise mortality.	PASS
<b>Clause outcome:</b>			<b>PASS</b>
<p><b>Evidence</b></p> <p><b>F 1.1:</b></p> <p>In 2016 the captain's logbook (<i>Bitacora de capitan</i>) was modified to include additional information on the landing declaration (<i>Aviso de Arribo</i>) to allow crew to record more detailed information on discards, retention and transshipment of small pelagic species, capture of bycatch and ETP species (retained and discarded) and their status (live or dead).</p> <p>During the first surveillance audit (Thread herring fishery 2018) the MSC assessment team confirmed that landing declarations were in use, but their implementation was still low, and that most were incomplete in the sections for non-target species. For the third season of their use the amount of discard data included in the logbook were much higher than in the previous two seasons.</p> <p>In 2018 (October) INAPESCA carried out the 6th Course on Good Practices of Fishing of Minor Pelagic Fish. Objectives of the workshop included a review of observer reports, a review of the MSC Fisheries Standard requirements, a review of the regulations in force and a review of impact mitigation measures with ETP species among others.</p> <p>Interactions with ETP species are recorded.</p> <p><b>F1.2:</b></p> <p>Observer information and landings data (Table 3 2012-2017 and Table 2012-2018) and results of inspections by CONAPESCA inspectors confirmed the low volume of elasmobranchs retained in catches. Concern had been expressed for rays due to their inherent vulnerability.</p> <p>The capture of the devil blanket (<i>Mobula japonica</i>) was 0.008 t (discarded); 6 discarded individuals Sparrow hawk (<i>Aetobatus narinari</i>) were also recorded. The largest catch in the group of elasmobranchs corresponded to the black hawk (<i>Rhinoptera steindachneri</i>) with 0.592 t, corresponding to 93 estimated individuals.</p>			

Regarding seabirds, during 986 fishing sets eight species of seabirds were identified, of which the Brown Pelican (*Western Pelecanus*) and the Earwig (*Fregata magnificens*) presented a wide spatial distribution, being registered in most of the zones of fishing.

During 2018 24 specimens of sea turtles were retained in 986 fishing sets. A total of two species were recorded, the most abundant being the Olive Ridley (*Lepidochelys olivacea*) with a registry of 19 specimens. All were released alive:

Table 3 Proportions of retained catches (2012- 2017). Information collected from landings data and observer program. R9

Species	2012- 2013	2013- 2014	2014- 2015	2015- 2016	2016- 2017
<b>MSC Target Species</b> ( <i>Opisthonema</i> spp )	41%	89.9%	94.7%	99%	95.7%
<b>Non-MSC target small pelagic species:</b>					
<i>Centengraulis mysticetus</i>	59%	7.4%	3.5%	0%	0.0%
<i>Etrumeus teres</i>	0%	0.0%	0.0%	0%	0.0%
<i>Oligoplites</i> spp.	0%	0.0%	0.0%	0%	0.0%
<i>Sardinops sagax</i> ,	0%	0.0%	0.0%	0%	0.0%
<i>Scomber japonicus</i>	0%	0.1%	0.5%	0%	1.5%
<i>Trachurus symmetricus</i>	0%	0.0%	0.4%	0%	1.7%
<b>Sub-total proportion of catches of non-MSC target small pelagics</b>	59%	8%	4%	0%	3%
<b>Non-target Species</b> (Bony fish, elasmobranchs, mollusks and echinoderms) For a list of all species See Table 8	3%	2.6%	0.9%	0%	1.1%
<b>Combined proportion of catches from IPI stocks</b>	<b>64%</b>	<b>10.6%</b>	<b>4.9%</b>	<b>0%</b>	<b>1.4%</b>

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

#### F 1.3:

A Manual for Mitigation Measures and Best Practices first published in 2015 has been updated. This includes guidelines on the manipulation of rays, sharks and sea turtles. Excluder grids are used to filter organisms such as rays and return them to the ocean. Water sprayed during hauling prevents birds from being captured; blocks installed on hauling lines prevents birds from being caught during fishing manoeuvres.

Specific documentation is available for fishermen and boats in the form of posters in order that they can consult mitigation procedures more quickly and effectively.

If the fishery is known to interact with ETP species, measures are in place to minimise mortality. R9-R10; R20
<b>References p34</b>
<i>Standard clause 1.3.3.1</i>

<b>F2</b>	<b>Impacts on Habitats - Minimum Requirements</b>		
	F2.1	Potential habitat interactions are considered in the management decision-making process.	PASS
	F2.2	There is no substantial evidence that the fishery has a significant negative impact on physical habitats.	PASS
	F2.3	If the fishery is known to interact with physical habitats, there are measures in place to minimise and mitigate negative impacts.	PASS
<b>Clause outcome:</b>			<b>PASS</b>
<b>Evidence</b> <b>F2.1 – F 2.3:</b> <p>Thread herring (<i>Opisthonema</i> spp) are fished with purse seine nets. Compared to other fishing methods purse seine gear is relatively selective, since it is done in the open water column and directed at schools of targeted species. Fishing vessels capture large aggregations of small pelagic species that shoal in mid-water by surrounding these concentrations with a curtain of netting supported by surface floats.</p> <p>The purse seine fleet in the small pelagic fishery operates in mid-water between 40 and 100m and generally avoids bottom contact. Contact is intentionally avoided as small mesh nylon netting is easily damaged.</p> <p>There is no documented evidence that purse seining or purse seine fishing elsewhere, even when touching bottom, has had irreversible effects on marine habitats. Currently there is no zoning or depth regulation for the small pelagics purse seine fleet apart from protected areas.</p>			
<b>R9-R10; R20</b>			
<b>References p34</b>			
<i>Standard clause 1.3.3.2</i>			



<b>F3</b>	<b>Ecosystem Impacts - Minimum Requirements</b>		
	F3.1	The broader ecosystem within which the fishery occurs is considered during the management decision-making process.	PASS
	F3.2	There is no substantial evidence that the fishery has a significant negative impact on the marine ecosystem.	PASS
	F3.3	If one or more of the species identified during species categorisation plays a key role in the marine ecosystem, additional precaution is included in recommendations relating to the total permissible fishery removals.	PASS
<b>Clause outcome:</b>			<b>PASS</b>
<b>Evidence</b>			
<b>F3.1:</b>			
<p>In relation to announced closed periods, SAGARPA may establish periods and zones to avoid capture of small pelagics in order to improve fishery management tools, conservation of the resource and interaction with other fisheries. These periods and zones are announced based on advice from INAPESCA and following discussion with the industry. All announcements are published in DOF.</p> <p>A new approach to the allowed proportion of fish under the size limit has been introduced into the 2018 revision of NOM. Minimum sizes and percentages of capture of individuals below minimum size in force has been reduced from 30% to 20%. This reduced rate of capture applies for Monterey sardine (<i>Sardinops sagax</i>), Thread herring Crinuda (<i>Opisthonema spp.</i>) and Californian anchovy (<i>Engraulis mordax</i>).</p> <p>In relation to minimum landing sizes, NOM (2018) maintains the same values per species as the previous NOM; SAGARPA may modify these values in each season following discussion with INAPESCA. All revised minimum landing sizes are published in DOF.</p> <p>In relation to the regionalization of fisheries, NOM (2018) establishes three regions for the exploitation of the resources of small pelagic species denominated as follows:</p> <ul style="list-style-type: none"> <li>• A (Littoral of the Peninsula of Baja California);</li> <li>• B (Gulf of California and coast of Sinaloa-Nayarit and North of Jalisco) and</li> <li>• C (from North of Jalisco to Chiapas)</li> </ul> <p>For each Region a maximum number of operational vessels has been established.</p> <p>The broader ecosystem within which the fishery occurs is considered during the management decision-making process.</p>			
<b>F3.2 – F3.3:</b>			
<p>The current observer program (2017-2018 season) reached coverage of 44.3% of the overall number of fishing trips and 100% of the Sinaloa &amp; Nayarit fleet trips. There is a total of 23 observers on board within the program and one in the plant. All observers are certified by CONAPESCA.</p> <p>Observer training systems have improved, as well as the information collection systems; especially for seabirds. All sets of observer ships are sampled. Observers have different logs in which they take information on the results of each haul by species and size, climatic data and data related to by-catches. The latter includes information on fish and sharks, crustaceans, birds, marine mammals and turtles.</p>			



Table 4: Incidental capture (Retained and Discarded Capture) in metric tons registered on-board during observer trips in the southern Gulf (2012 - 2018). R9

	2012-2013				2013-2014				2014-2015				2015-2016				2016-2017				2017-2018	
Species Group	Ret.	%	Disc	%	Ret.	%	Disc	%	Ret.	%	Disc	%	Ret.	%	Disc	%	Ret.	%	Disc	%	Ret.	%
Target Stock	5,965	40%	103	12%	7,524	90%	69	16%	10,138	95%	12	33%	11,164	99%	75	77%	14,084	96%	101	92%	35,133	95%
Other Small Pelagic Species	8,459	57%	320	38%	629	8%	345	82%	471	4%	11	31%	50	0%	-	0%	468	3%	-	0%	1,183	3%
Bony Fish	489	3%	415	50%	214	3%	5	1%	92	1%	12.1	35%	24	0%	23	23%	164	1%	8.2	7%	208.01	1%
Elasmobranchs	2.2	0%	-	0%	0.3	0%	0.2	0%	0.2	0%	0.3	1%	0.2	0%	0	0%	0.7	0%	1	1%	0.05	0%
Crustaceans	0.7	0%	-	0%	0.6	0%	-	0%	0.2	0%	0	0%	0.2	0%	0	0%	0.1	0%	0	0%	0.05	0%
Echinoderms	-	0%	-	0%	-	0%	-	0%	0	0%	0	0%	0	0%	0	0%	0	0%	-	0%	0	0%
Molluscs	-	0%	-	0%	-	0%	-	0%	0	0%	-	0%	0	0%	-	0%	0	0%	-	0%	0	0%
Cnidarians	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	1.3	0%	0	0%	0.44	0%
Total Catch (t)	14,916		838		8,367		419		10,701		35		11,238		98		14,718		110		36,525	

Incidental catches decreased significantly with respect to the previous year (2017) as one of the lowest values in the history of the observer program (<1%) was obtained. Some advances on conducting a literature review to gather information on food chains and diet composition as part of a database to inform ecosystem models have been made. Reductions in overall bycatch species seems to indicate that management measures adopted are successfully mitigating overall direct impact on ecosystem functions.

Conclusions from the auditors' report (2<sup>nd</sup> Surveillance Audit Thread Herring fishery (March 2019)) were that incidental captures associated with the (targeted) sardine fishery indicated that retention of other organisms was minimal and that activities of the (targeted) sardine fleet do not negatively affect structure and function of the ecosystem in the area.

In conjunction with the 'Best Practices Workshop's and the 'Mitigation Measures' described previously the fishery has also established a traceability program to ensure only trips with a maximum of 2% bycatch can be considered eligible to enter chain of custody. A financial incentive program was put in place to reward crew for trips with a proportion of bycatch  $\leq 2\%$  of catch.

Through an action plan the client (Maz Industrial) in collaboration with INAPESCA and CONAPESCA will make quarterly technical meetings where they will announce results of fisheries monitoring. If there is evidence of potential negative impacts of the fishery on the pelagic ecosystem and estuarine communities, agreements between parties involved will be taken to implement procedures related to current regulations to reduce them.

## R9-R10; R20

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*Standard clause 1.3.3.3*