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Global Standard for Responsible Supply of Marine Ingredients

Fishery Assessment Methodology and Template Report V2.0

Fishery Under Assessment	**Californian anchovy, Anchoveta norteña *Engraulis mordax***
Date	**July 2019**
Assessor	**Jim Daly**

Application details and summary of the assessment outcome				
Name: Sardinas de Sonora S.A. de C. V				
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	**Pier Reviewer**	**Assessment Days**	**Initial/Surveillance /Re-approval**	**Whole fish/ By-product**
Jim Daly	Virginia Polonio	4	Initial	Whole fish
Assessment Period	2018-2019			

Scope Details	
Management Authority (Country/State)	Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food **SAGARPA. Mexico**
Main Species	Anchoveta *Engraulis mordax* Monterrey (Pacific) sardine *S. sagax* Thread Herring (*Opisthonema* spp)
Fishery Location	Eastern Central Pacific FAO 77: Baja California, México.
Gear Type(s)	Purse Seine
Outcome of Assessment	
Overall Outcome	PASS
Clauses Failed	NONE
Peer Review Evaluation	APPROVE
Recommendation	**PASS**

Assessment Determination

The catch of small pelagics represents around 30% of total landings in Mexico, with more than 80% of the harvest taking place in the Gulf of California. The fishery began at the end of the 1960's; landings increased to a peak in 1988-89 to nearly 300,000 mt whereupon the fishery declined abruptly to less than one-third of landings the following year. Landings have been highly variable since, increasing (2010-2015) to more than 500,000 mt. Two fleets fish in the areas West of Baja California and Baja California South; other fleets operate inside the Gulf of California (**Figure 1**).

Californian anchovy/Anchoveta has been observed up to 480km from the coast and at greater than 200m depth. They form large, dense shoals and are distributed from Vancouver to the Gulf of California. The species is passively managed under the Fisheries Management Plan (FMP) for small pelagics. Monitoring of vessel discharges and determination of abundance indices are considered sufficient for managing the species. There is currently no directed fishery for this species and no formal stock assessments have been undertaken. Historical biomass data is available, the stock is therefore assessed as a Category B stock (risk assessment analysis, see Section B of this report). The stock passes the Category B risk-based assessment.

In 2018 an MSC Fishery Assessment Report on the Small Pelagics fishery in Sonora (Gulf of California) was published by SCS Global Services. In June 2019 an MSC First Surveillance Audit Report (Southern Gulf, Thread Herring Fishery, Sonora) re-assessed and renewed the client's certificate to MSC requirements.

In addition to Anchoveta; the status of Monterrey (Pacific) sardine and Thread Herring were also assessed. These species are actively managed with formal stock assessments undertaken. With the exception of 1986-1990 and 2007-2009 the Monterrey (Pacific) sardine stock has not been through periods of overfishing. Figures shows that for the most part catches of this stock has been under the Biologically Acceptable Catch (BAC) reference point. The status of the Thread Herring complex in the assessment area was evaluated using VPA and a surplus production model. Results show that this stock has either been stable for a long time or has been increasing since the late 1990s. For this IFFO-RS assessment both species were assessed as Category A species and passed.

Fishers in general comply with most regulatory mechanisms defined in Law. However, it was found that the small pelagic fishery systematically exceeds the allowable proportion of undersized fish in the catch. This is being addressed in the proposal to modify the current NOM 2018 (Norma Oficial Mexicana). A new approach to the allowed proportion of fish under the size limit has been introduced. This revision is in its final steps. The MSC Assessment Team concluded that it was reasonable to wait for the revised NOM and re-evaluate the fishery performance on this issue for the next fisheries assessment.

Monterey (Pacific) sardines are at times the dominant species in the fishery, representing up to 94% of total landings in the multi-species purse seine fishery in the Gulf of California. During cold years Monterey (Pacific) sardines and chub mackerel (*Scomber japonicus*) tend to dominate whereas, during warmer years, thread herring (*Opisthonema* spp.) and other species including Californian anchovy dominate.

Californian anchovy is not listed on the current IUCN Red List but is listed in the Current Catalogue of Life (website accessed 24.07.19). The Californian anchovy is approved by the assessment team for the production of fishmeal and fish oil under the IFFO-RS v 2.0 by-products standard for whole fish products.
Peer Review Comments
Agree following suggested amendments.
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	Outcome (Pass/Fail)	
Category A	**Monterrey (Pacific) sardine *S. sagax*** **Thread Herring (*Opisthonema* spp)**	60% 20%	A1	PASS
			A2	PASS
			A3	PASS
			A4	PASS
Category B	**Anchoveta *Engraulis mordax***	20%	PASS	
Category C				
Category D				

[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
Anchoveta	***Engraulis mordax***	FAO 77	20	SAGARPA	B
Monterrey (Pacific) sardine	***Sardinops sagax***	FAO 77	60	SAGARPA	A
Thread Herring	***Opisthonema* spp**	FAO 77	20	SAGARPA	A

MANAGEMENT

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

M1	**Management Framework – Minimum Requirements**		
	M1.1	There is an organisation responsible for managing the fishery	PASS
	M1.2	There is an organisation responsible for collecting data and assessing the fishery	PASS
	M1.3	Fishery management organisations are publically committed to sustainability	PASS
	M1.4	Fishery management organisations are legally empowered to take management actions	PASS
	M1.5	There is a consultation process through which fishery stakeholders are engaged in decision-making	PASS
	M1.6	The decision-making process is transparent, with processes and results publically available	PASS
		Clause outcome:	**PASS**

Evidence

M1.1:

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 of the fleets' fish in the

area west of Baja California and Baja California South; two other fleets operate inside the Gulf of California (**Figure 1**).

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**):

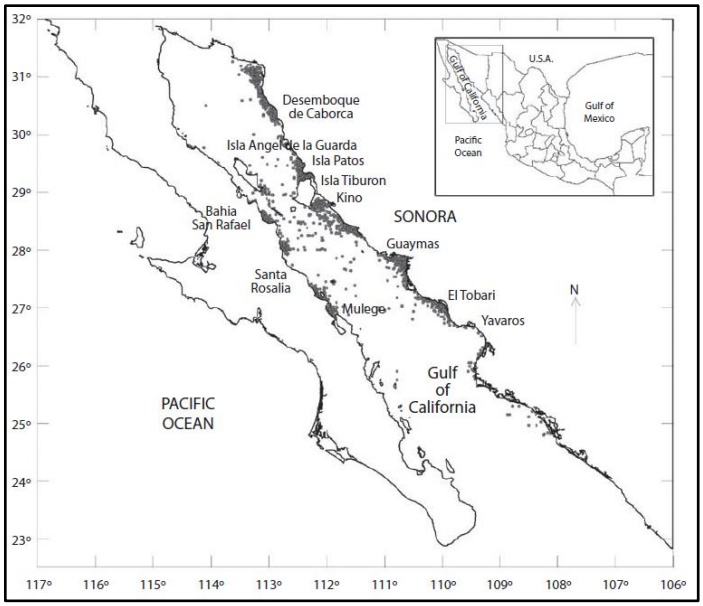

Figure 1: Landing distribution (dark grey points) for the small pelagic fishery in the Gulf of California **R1**

The Government body with responsibility for fisheries management in Mexico is the Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (Secretaría de Agricultura, Ganadaría, Desarrollo Rural, Pesca y Alimentación) SAGARPA. 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.

The National Fisheries Institute (INP or INAPESCA) develop the National Fisheries Charter (Carta Nacional Pesquera (CNP)). Broadly divided between Pacific and Gulf of Mexico fisheries the Charter is an annually-updated summary of the status and scientific understanding of all commercial fishery resources in federal waters. The latest version was published in 2017.

There is an organisation responsible for managing the fishery.

M1.2:
The mission of INP is to 'Coordinate and conduct scientific and technological research on fisheries and aquaculture resources with sustainability criteria for its management and conservation and also to promote research schemes with the participation and financial support from the sectors involved'.

This includes the development of stock-specific management plans, the maintenance of the CNP and planning and conducting of research in support of these functions. The CNP includes annual estimates of total landings and species composition in the small pelagic fishery and also makes recommendations for the level of fishing in future years.

The Fisheries Management Plan (FMP) for small pelagic species in the assessment area (Plan de manejo pesquero para la pesquería de pelágicos menores) 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. A relevant insertion in the FMP is the definition of a guidance to establish biological reference points.

A Biologically Acceptable Catch (BAC) (equivalent to a Limit Reference Point) 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. 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 in the long term". The Plan further adds that in the fishery of small pelagics overfishing occurs if catches exceed BAC.

The FMP is reviewed annually during Small Pelagic Workshops (Taller de Pelágicos Menores). These workshops are facilitated by the National Fisheries Institute's Centro Regional de Investigación Pesquera (CRIP). The FMP is still missing a harvest strategy or a description of how it would be linked with the fisheries plan for small pelagics.

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

M1.3:
During a recent audit on behalf of the MSC minutes were presented of meetings between scientists and industry discussing management plans for the fishery in the southern Gulf. Discussions were undertaken about the need to determine potential mechanisms to shut operations should real time cumulative catches approach 90% of the allowable catch of the year. Minutes were also presented where actual decisions were made between industry and authorities to stop fishing operations based on results of in-season monitoring of abundance and size.

SAGARPA's mission statement also includes a commitment to "facilitate the competitive and sustainable development of fisheries and aquaculture sector in the country in order to increase the welfare of Mexicans".

Fishery management organisations are publically committed to sustainability.

M1.4:
The CNP is a binding instrument for the fisheries authorities' decision- making process. The CNP includes the diagnosis and assessment of a fishery, production of fisheries and conservation indicators, and provides recommendations for the management of fisheries included in the CNP.

Updates of CNP are prepared by INP every two or three years. Before updates are published in the Offical Gazette (Diario Oficial, DOF) draft updates undergo a public review process. This allows the public, non-governmental organizations and the academic sector, among others, to give their opinion of fisheries status.

NOM's (Norma Oficial Mexicana) are National Rules developed for Small Pelagic Fisheries. Primary legal instruments in Mexico are the Fisheries Law (Ley de Pesca) and the Key Regulation to the Fisheries Law (Reglamento de la Ley de Pesca NOM -003-PESC-1993).

2014 legislative changes to NOM -003-PESC-1993 include**:**

- Capture of pilchard, anchovy or thread herring below the minimum catch size do not exceed 30% of the number of organisms per fishing season by region (less stringent than previous NOM).
- No further authorization for the entry of more vessels, except for replacement of existing vessels. Existing vessels have good cooling systems and do not increase their current carrying capacity (more stringent than previous NOM).
- INAPESCA undertake monthly reviews of the cumulative percentage of bycatch to determine when it has reached the allowable percentage (bycatch).

A further update of proposed NOM revisions was published in 2018:

- A proposed modification to the rule defining minimum size and the proportion of the catch currently allowed to be under the size limit. The proposed change would not determine a minimum size but would maintain a limitation in size that would be determined every year by INAPESCA Scientists depending on information from monitoring surveys.

Fishery management organisations are legally empowered to take management actions.

M1.5 – M1.6:
Scientists have discussed and communicated to other interested parties' options to define reference points appropriate for the small pelagic fishery although caveats have been also identified and no conclusions have been reached yet. Scientists continue to investigate the best approach to stock assessments for small pelagic species and to attempt new methods.

Before updates of the CNP are published in the DOF draft updates undergo a public review process by means of publication in the DOF. This allows the general public, non-governmental organisations and the academic sector, among others, to give their opinion of fisheries status.

There is a consultation process through which fishery stakeholders are engaged in decision-making; the decision-making process is transparent, with processes and results publically available**.**
R1-R10

References p29

Standard clauses 1.3.1.1, 1.3.1.2

M2	Surveillance, Control and Enforcement - Minimum Requirements		
	M2.1	There is an organisation responsible for monitoring compliance with fishery laws and regulations	PASS
	M2.2	There is a framework of sanctions which are applied when laws and regulations are discovered to have been broken	PASS
	M2.3	There is no substantial evidence of widespread non-compliance in the fishery, and no substantial evidence of IUU fishing	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
		Clause outcome:	**PASS**

Evidence:

M 2.1:

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 Interinstitutionales (COI) (San Felipe) directed by the Commandant of the Naval Sector. All entities carry out surveillance operations in the Upper Gulf by adding equipment and personnel to promote protection of marine resources and combat illegal trafficking of same.

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

M2.2:

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:

Sanctions include:

- A warning, reprimand
- Fine (Article 138 details how fines are determined).
- Additional fines for every day the infraction persists.
- Administrative arrest for 36 hours.
- Temporary/ permanent partial or total closure of the installations where the infractions occurred
- Confiscation of vessels or vehicles, fishery equipment and/or products obtained by aquaculture or fishing directly related to the infractions committed.
- Suspension or revocation of corresponding fishing permits, concessions or authorisations.

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

M2.3:

The COI's inter-institutional programme in 2015-2016 resulted in the following actions:

- 1,424 trainings resulting in the inspection of: 2,794 landings, 10,888 people, 2,579 vehicles, 48 installations and 252 boats.

- The provision of 3 patrol vessels, 108 boats, 77 people, 17 vehicles for control purposes.
- A total of 23 specimens and 308 hauls of Totoaba (*Totoaba macdonaldi)* a marine fish (member of the Drum family and endemic to the Gulf) critically endangered species on IUCN red list.
- 505 articles of fishing gear confiscated.
- 106t of fish product seized.
- 17 tonnes of coral seized.
- Rescued alive one whale, one Totoaba and 11 Turtles.
- Monitoring of a total of 196 fishing grounds, 26 landing sites, 237 fishing facilities and installing a total of 36 checkpoints and 58 air surveillance operations.

The bulk of the inspections detected illegal fishing activity in the Totoaba (Marine Drum fish) fishery and in other protected fisheries. In addition, operations recovered 1,079 fishing nets which had been 'ghost fishing' in coastal waters. From a total of 2,794 landing inspections only 106t of fish product was seized.

Non-compliance is not widespread because there are other relevant measures for enforcement and monitoring that are well established. New regulations are being reviewed to define a different approach for undersized catches. Future assessments should monitor the implementation of these regulations and their level of compliance by stakeholders.

There is no evidence of widespread IUU fishing activities.

M2.4:

There is effective monitoring of each fishing boat's position at all times through a compulsory satellite detection system. Each and every landing operation is sampled by technical personnel from CRIP. Personnel from CONAPESCA also perform regular and frequent inspection visits to fish processing plants and boats to assert that all norms and precepts of the regulation in force are fully complied with.

Fishers in general comply with most regulatory mechanisms defined in Law. However, it was found that the small pelagic fishery systematically exceeds the allowable proportion of undersized fish in the catch. This is being addressed in the proposal to modify the current NOM (2018). A new approach to the allowed proportion of fish under the size limit has been introduced. This revision is in its final steps.

Compliance with laws and regulations is actively monitored, through a regime which may include at-sea and portside inspections, observer programmes, and VMS. CONAPESCA and INAPESCA (CRIP) conduct monitoring, control and surveillance of the fishery to ensure compliance with current regulations. Landings are monitored; regular inspections take place at ports of landing/processing plants and on fishing vessels. An observer program was planned and implemented for 2016 but the data from this program has not been published yet.

In 2011 as part of the Client Action Plan, CANAINPES (Cámara Nacional de la Industria Pesquera) with support from INAPESCA (CRIP-Guaymas) and the Mexican NGO Community and Biodiversity (COBI), developed and implemented an observer program. Funding was secured from Producer

Organisations and the Walton Family Foundation to develop a collaborative and multi-sectorial observer program for the fishery. All fishing vessels have a permit issued by CONAPESCA based on a technical opinion issued by INAPESCA. The permits have to be renewed every 5 years; fishing vessels are required to use Vessel Monitoring System equipment (VMS system) for tracking the spatial position of 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. **R3, R6, R9. R11-R12**
References p 29
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		**Monterrey (Pacific) sardine *Sardinops sagax***	
A1	**Data Collection - Minimum Requirements**		
	A1.1	Landings data are collected such that the fishery-wide removals of this species are known.	PASS
	A1.2	Sufficient additional information is collected to enable an indication of stock status to be estimated.	PASS
Clause outcome:			**PASS**

Evidence

A 1.1 – A 1.2

Monterrey (Pacific) sardine *S. sagax:*

Since 2000 catches caught in this fishery have been documented through landing slips and catch records for each jurisdiction. As this species is actively managed in 2015 a stock assessment was conducted using the Age Structured Assessment Program (ASAP) model.

Data on catch and effort is collected from the official 'Aviso de Arribo' or landing notification forms provided and collected by regional offices of CONAPESCA. Data are processed and analysed by INAPESCA and results presented in official reports of fishery catch and effort.

The Monterrey (Pacific) sardine can be a predominant species in the catch but at times can be equally important relative to all other species together or may be practically insignificant. Environmental variability may promote the predominance of other species including Californian anchovy in the ecosystem. **Figure 2:**

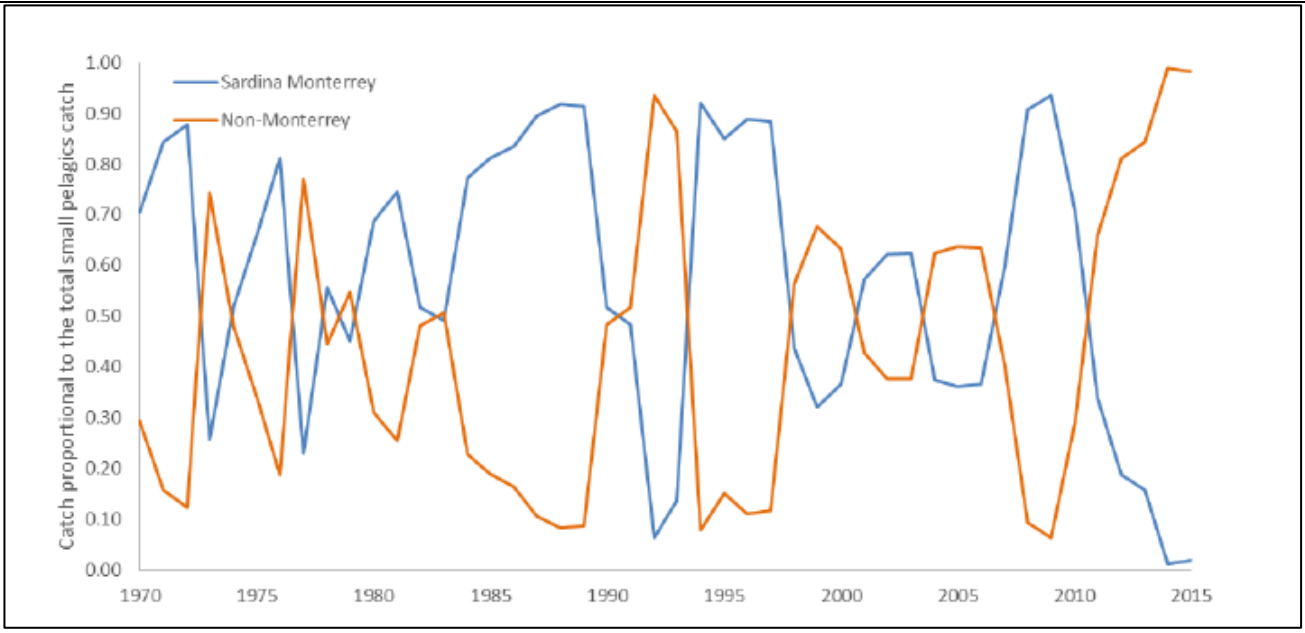

Figure 2. Proportional contribution of the Pacific sardine to the total catch of small pelagic fish in the central Gulf of California compared to all other small pelagic in the catch. **R10**

For actively managed species stock assessments since 2000 have been conducted using a stochastic age-structured model with density dependent recruitment and catch and effort data, estimating the number of individuals at age using Virtual Populations Analysis (VPA) and a Shepherd's stock-recruitment model.

Fishery independent data collected has more recently included the following indices of relative abundance:

- Number of fishes caught per squared km in tows, during prospective and acoustic surveys (1990-2014).
- Indices of biomass obtained by means of acoustic detection of fish (2008-2014).
- Abundance of eggs and larvae (number/10 m^2) (1971-1988).
- An environmentally based index specifying the spawning probability (1979-1996).
- An index based on the proportion of sardine in the diet of sea birds (Nevarez-Martinez et al. 2015).

Total landings (mt) of Pacific sardine in the 2014-2015 Gulf of California purse seine fishery were 4,455t. Landings data are collected such that the fishery-wide removals of this species are known. Sufficient additional information is collected to enable an indication of stock status to be estimated.

R10, R13-R14

References p 29

Standard clause 1.3.2.1.1

A2	Stock Assessment - Minimum Requirements		
	A2.1	A stock assessment is conducted at least once every 3 years (or every 5 years if there is substantial supporting information that this is sufficient for the long-term sustainable management of the stock) and considers all fishery removals and the biological characteristics of the species.	PASS
	A2.2	The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.	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
Clause outcome:			**PASS**

Evidence

A 2.1:

The most recent assessment (2016) used information including a series of CPUE values from scientific cruises, the indices of abundance from acoustic surveys, an index of egg and larvae, an index representing spawning probability and the proportion of sardines in the diet of seabirds. INAPESCA staff opted for using the Age Structured Assessment Program (ASAP) model to reconstruct biomass trajectory and estimate parameters relevant to make management decisions.

Data on catch and effort is collected from the official 'Aviso de Arribo' or landing notification forms provided and collected by regional offices of CONAPESCA. Data are processed and analysed by INAPESCA and results presented in official reports of fishery catch and effort.

Annual estimates of biomass in the Gulf of California are obtained with hydroacoustic methods. Abundance is used as relative indices in stock assessments. The most recent stock assessment reports indicate that the stock has been stable in the last 3 years, spawning stock biomass (SSB) around Bmsy (533,000 tonnes) (Nevarez-Martinez et al. 2015; SCS Global Services Report 2018). The surveillance assessment for 2020 will include data from the 2019 biomass estimates.

A stock assessment is conducted at least once every 3 years; annual biomass estimates are obtained.

A2.2:

Biomass data in relation to BAC are summarised in **A2.3.** Estimated total biomass of the stock reached a maximum of over 5,000,000t in 2002/03 and 2007/08 while vulnerable biomass reached a maximum of more than 2,000,000t between 1999/2000 and 2008/09. Subsequently biomass decreased sharply to a total of 1,000,000t and nearly 500,000t of adult biomass in 2014/2015 **Figure 3:**

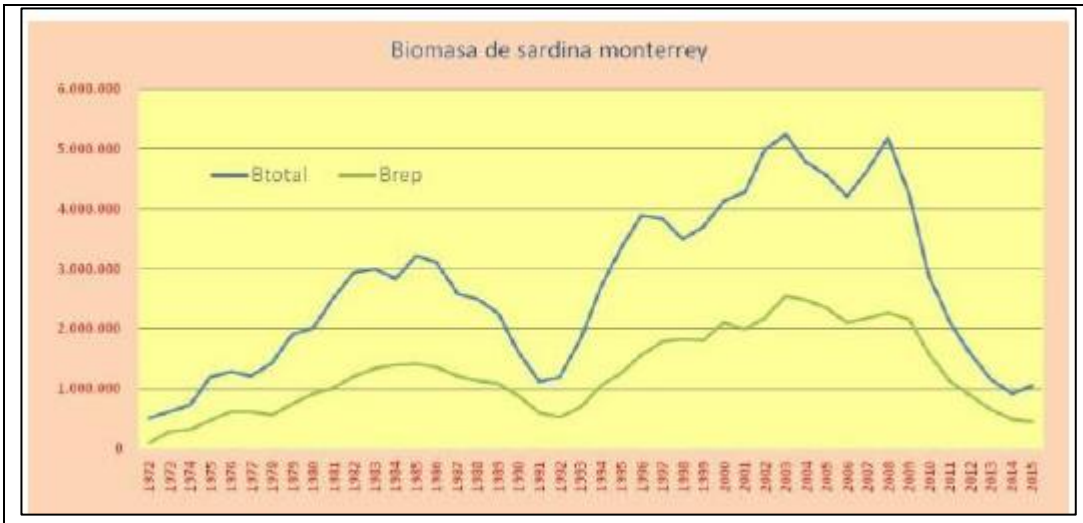

Figure 3. Total Biomass (**Blue line**) of Pacific sardine and adult biomass (**Green line**) estimated using ASAP in the Gulf of California **R10**

Assessments provide an estimate of the status of the biological stock relative to a reference point or proxy.

A2.3:

A discussion of the stock assessment results with INAPESCA staff (MSC Report 2018) has indicated that, with the exception of 1986-1990 and 2007-2009 the stock has not been through periods of overfishing.

Figures shows that for the most part the catch has been under the Biologically Acceptable Catch (BAC)

Figure 4:

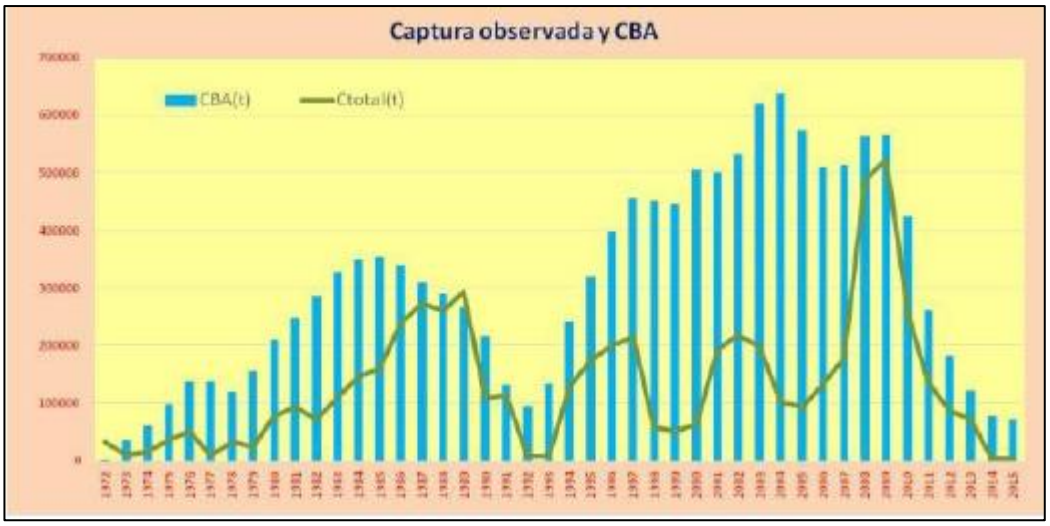

Figure 4. Comparison of catch records (green line) of Pacific sardine in the Gulf of California with the estimated Biologically Acceptable Catch (CBA bars) obtained with the control rule in the Management Plan **R10**

Assessments provide an indication of the volume of fishery removals 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 Offical Gazette (Dario Oficial, DOF), the draft update undergoes a public review process by means of publication in the DOF. This allows the 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.

References p 29
R2, R7, R10. R13-R14,

Standard clause 1.3.2.2, 1.3.2.1.2, 1.3.2.1.4

A3	**Harvest Strategy - Minimum Requirements**		
	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
Clause outcome:			**PASS**

Evidence

A 3.1 – A 3.2:

During previous MSC Audits in the Mexican small pelagic fishery minutes were presented of meetings between scientists and industry that discussed management plans in the southern Gulf. Discussions were undertaken about the need to determine potential mechanisms to shut operations as real time cumulative catches approach 90% of the allowable annual catch. Minutes were presented where actual decisions were made between industry and authorities to stop fishing operations based on results of in-season monitoring of abundance and size.

The small pelagic fishery is regulated under the Norma Oficial Mexicana (NOM, 003-PESC-1993) and the current management plan published in the Diario Oficial (DOF). No quotas are set but the NOM has set a minimum landing size for important species including Monterey Sardine; fleet capacity is controlled by the DOF and is regulated by fishing area.

Catch records show that for the most part the catch has been under the Biologically Acceptable Catch (BAC) (**Figure 4**).

A 3.3:

The MSY control rule, for actively managed stocks including Monterrey (Pacific) sardine is that which reduces exploitation when biomass declines.

A general formula (Harvest Control) is contained in the Small Pelagics FMP:

C = (B-BMIN) *FRACCION where C is the target catch level

BMIN is the lowest estimated biomass level at which directed capture is allowed and FRACTION is the proportion of biomass above BMIN that can be captured by the fishery. B is generally estimated biomass of fish age 1 and older. If FRACTION is approximately equal to FMSY, then the capture rate in the MSY control rule will not exceed FMSY.

Management options stated in the Reglamento de la Ley de Pesca NOM -003-PESC-1993 (updated in 2014 and 2018) include restricting capture of small pelagics (including Monterrey (Pacific) Sardine below minimum landing size to not exceeding 30% by number. No new entrants to the fishery are permitted in order not to increase fleet capacity; monthly reviews of all removals from the fishery are undertaken to determine if by-catch levels have been reached at which point the fishery for target species including Monterrey (Pacific) Sardine would be closed.

During the 2018 revision of the NOM it was recommended that restrictions on vessel movements between zones should be put in place in particular to avoid fleets operating in Baja California moving into the Gulf. Vessel registers that specify maximum capacity in each of the following areas will be published: 40 vessels in Sonora, 21 in Baja California (including 2 in Isla Cedros; 5 in Baja California South and 12 in Sinaloa).

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

R2, R10, R15-R16

References p 29

Standard clause 1.3.2.1.3

A4	**Stock Status - Minimum Requirements**		
	A4.1	The stock is at or above the target reference point, OR IF NOT: 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.	PASS
Clause outcome:			**PASS**

Evidence

The control rule is built with the intent to keep a minimum amount of biomass unfished to protect the stock. If the minimum biomass is reached; the fleet is expected to stop fishing. Given low availability during fishing seasons 2013/14 and 2014/15, the industry voluntarily avoided fishing on Pacific sardines. The rule was computed to evaluate past catches and it was concluded the fishery had not exceeded the threshold level determined by the yearly computed BAC in almost all years (**Figure 4**). This would verify that Harvest Control Rules in place in this fishery are fit for purpose.

Recent declines in catch and other indicators more likely reflect low availability rather than low abundance. Evidence from hydroacoustic surveys and evidence regarding potential effects of El Niño and other environmental considerations would support this conclusion. Evidence that stock availability has shifted rather than declined and that catch has historically remained below BAC supports the conclusion that it is highly likely that the stock is at or above target reference point. **R2, R10, R15-R17**
References p 29
Standard clause 1.3.2.1.4

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

Evidence

A1.1 – A1.2:

O. medirastre, O. libertate and O. bulleri (Thread Herring complex) are all actively managed as a component of the "Pelágicos menores" (small pelagic) stock.

Management measures in place include a160 mm SL minimum landing size, limits on maximum seine capacity, and limited entry for the fleet.

Data on catch and effort is collected from the official 'Aviso de Arribo' or landing notification form provided and collected by the regional offices of CONAPESCA. Data are processed and analysed by INAPESCA; results presented in official reports of fishery catch and effort. Total landings in the 2014/2015 fishery (Gulf purse seine) were 120,919t; in 2016/2017 58,445t and in 2017/2018 63,380t.

Fisheries independent data of thread herring abundance (Gulf of California) is also collected via hydro-acoustic surveys which began in 2008. Findings were recently summarised and presented for the period between 2008 and 2012.

Work included data collection from over five acoustic surveys carried out in the Gulf (Spring 2016, near 500,000t abundance estimates) aboard INAPESCA research vessels. Two acoustic surveys were conducted in 2017 (900,000t abundance estimates). No estimate was presented for 2018 even though a survey was conducted.

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

R2, R10, R17-R18

References p 29

Standard clause 1.3.2.1.1

A2	Stock Assessment - Minimum Requirements		
	A2.1	A stock assessment is conducted at least once every 3 years (or every 5 years if there is substantial supporting information that this is sufficient for the long-term sustainable management of the stock) and considers all fishery removals and the biological characteristics of the species.	PASS
	A2.2	The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.	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
		Clause outcome:	**PASS**

Evidence

A 2.1:

Biomass trend of the thread herring complex in the southern Gulf as predicted using an age structured model fit to acoustic based estimates of abundance is available from 1987-2017 (**Figure 5**).

Scientists have discussed and communicated to other interested parties' options to define reference points that are appropriate for the fishery although caveats have been also identified and no conclusion has been reached yet. Scientists continue to investigate the best approach to the stock assessment.

A 2.2:

Biomass trends of the thread herring complex in the southern Gulf of California as predicted using an age structured model are available (**Figure 5**). The model predicts a stabilization of the trend around 600,000 t:

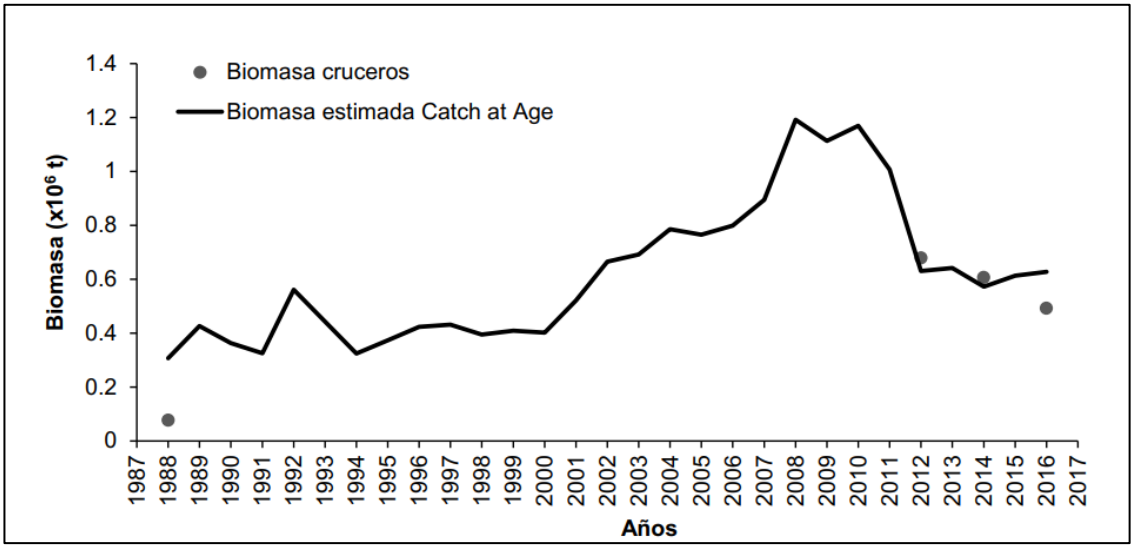

Figure 5 Biomass trend of the thread herring complex in the southern Gulf of California as predicted using an age structured model fit to acoustic based estimates of abundance (dots). Estimation was conducted under the assumption of natural mortality M=0.6. Reproduced from Jacob-Cervantes et al. (2017a) **R2**

Estimates of abundance specifically obtained for thread herring from hydro-acoustic surveys (2016 data only) are available (**Table 1).** Estimates differ depending on the value of the TS (tongue-strap) parameter used:

Table 1: Thread Herring Abundance (2016 data) R17

Year	Average length (mm)	Weight (gr)	b_{20}	TS	Individuals per area	Average biomass	Biomass (t)
2016	148	74.5	-70.5	-47.09	492,248.8	36.69	355,924
			-71.9	-48.49	679,492	50.56	491,312

According to the latest assessment (2018 data, published in 2019) SSB producing the MSY was estimated to be 460,000 t. The Kobe plot indicates that the stock is not over-exploited, and no overfishing is taking place:

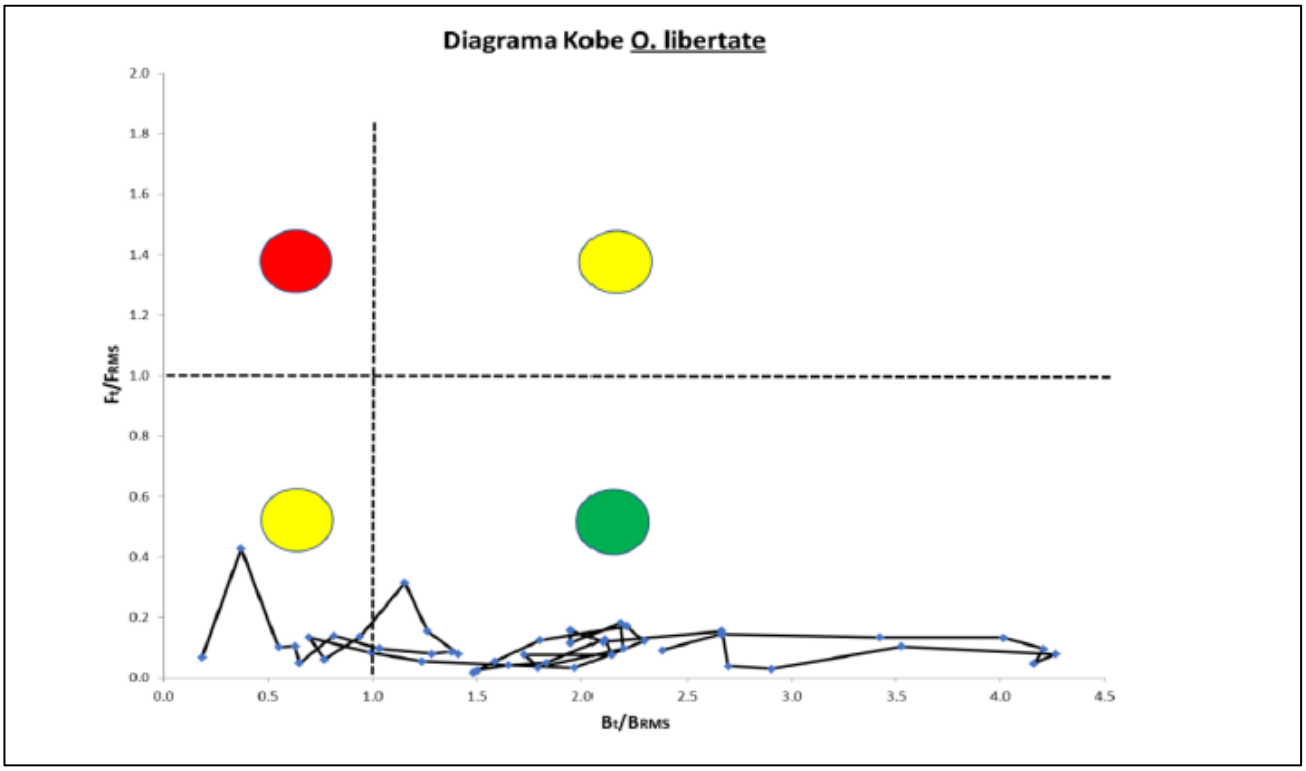

Figure 6 Kobe plot of biomass and fishing mortality rate relative to their respective levels producing MSY for the thread herring in the central/northern Gulf of California. Biomass is SSB. Reproduced from Nevarez-Martinez *et al.* (2019c). **R2**

Despite limitations in both analytical approaches (VPA and SPM), 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.

A 2.3:

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

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. Effort in the NOM is restricted (no further increase in vessel numbers) North of 20°N. This prohibition includes no addition of vessels to the fleet unless they are to replace retired active boats that are retired.

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 Offical Gazette (Dario Oficial, DOF), the draft update undergoes a public review process by means of publication in the DOF. This allows the 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.

References p 29
R2, R6, R9, R15-R18

Standard clause 1.3.2.2, 1.3.2.1.2, 1.3.2.1.4

A3	**Harvest Strategy - Minimum Requirements**		
	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
Clause outcome:			**PASS**

Evidence

A 3.1:

No quotas are set but the NOM (2018) has set a minimum landing size for important species including thread herring; fleet capacity is controlled by the DOF and regulated by fishing area.

Monitoring of vessel discharges and determination of abundance indices are considered enough 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.

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

A 3.2:

An Improvement was reported 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, F_{MSY} still is the default 0.25 suggested in the management plan but INP staff are considering substituting this value with an estimated parameter once the model operates to the satisfaction of the assessment needs. An important development included a proposal to modify the harvest control rule as currently defined in the management plan. Future assessments should note if these new proposals are been implemented and legislated.

The status of the Thread Herring complex has been evaluated using VPA and a surplus production model. Results show that each stock has either been stable for a long time or have been increasing since the late 1990s. Despite limitations in both analytical approaches (VPA and SPM), estimates of fishing mortality rates for the Thread Herring Complex are below the 0.25 reference point suggested by the FMP.

A 3.3:

For thread herring, according to the latest data made available by INP (no abundance estimate presented for 2018 even though a survey was conducted) B_{min} (lowest estimated biomass level at which directed capture is allowed) was calculated at 52,700t; using the estimate of F_{MSY} at 0.6, the BAC for the period 2018/2019 was determined to be 382,000 t against landings in 2017/2018 of 63,380t.

The new NOM (PESC 2018) establishes a volume of capture below minimum size, determined in the same standard for Monterrey sardine (*Sardinops sagax*), Western herrings (*Opisthonema spp.*), and Northern anchovy (*Engraulis mordax*) corresponding to 20% of the volume total of the annual nominal catch. Percentages allowed below this size will be modified according to the technical opinion of INP which will be announced through regulatory agreements published in the Official Gazette of the Federation (DOF).

In addition, 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. Eventually, if a biomass threshold is reached, the fishery stops operating. Other types of control rules including CPUE, minimum size (referenced earlier). There are also emerging management actions that can be employed when reaching or exceeding one or more reference points. These include temporary or zone closures, establishment or change of minimum size limits and change of allowable catch levels by species and effort restrictions.

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

References p 29
R2, R10, R15-R18

Standard clause 1.3.2.1.3

	Stock Status - Minimum Requirements

A4	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.	PASS
Clause outcome:			**PASS**
Evidence **A 4.1:** For thread herring, according to the latest data made available by INP (no abundance estimate presented for 2018 even though a survey was conducted) B_{min} (lowest estimated biomass level at which directed capture is allowed) was calculated at 52,700t; using the estimate of F_{MSY} at 0.6, the BAC for the period 2018/2019 was determined to be 382,000 t. According to the latest assessment (2018 data, published in 2019) SSB producing the MSY was estimated to be 460,000 t. The Kobe plot indicates that the stock is not over-exploited, and no overfishing is taking place. (**Figure 6**).			
References p 29 **R2**			
Standard clause 1.3.2.1.4			

CATEGORY B SPECIES

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

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

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

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

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

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

If the biomass / fishing pressure risk assessment is not possible

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

Table B (b) - No reference points available. B = current biomass; Bav = long-term average biomass; F = current fishing mortality; Fav = long-term average fishing mortality.

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

Assessment Results

Species Name		**Californian anchovy, Anchoveta norteña** *Engraulis mordax*
B1	**Species Name**	**Californian anchovy, Anchoveta norteña**
	Table used (Ba, Bb)	Ba
	Outcome	PASS: Biomass above MSY/target reference point

For passively managed species, the control rule determines that the Biologically Acceptable Catch (BAC, equivalent to a Limit Reference Point) is computed as a fraction of the estimated Maximum Sustainable Yield (MSY). Monitoring of vessel discharges and determination of abundance indices are considered sufficient for managing passively managed stocks. At the discretion of INP passively managed stocks may revert to being actively managed.

From the 2010/2011 season until 2013/2014 the *E. mordax* fishery formed a major component of the small pelagic species landed in the assessment area (**Tables 2,3**) **R10**
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Table 2 Total landings (mt) of small pelagic species in the Gulf of California purse seine fishery. Data from Nevarez-Martinez et al **R10**

Year	Total Landings	Pacific sardine *Sardinops sagax*	Thread Herring *Opisthonema* spp.	Chub Mackerel *Scomber japonicas*	Red-eye round herring *Etrumeus teres*	California Anchovy *Engraulis mordax*	*Bocona* sardine *Cetengraulis mysticetus*	Leather-jackets *Oligoplites* 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

Table 3 Percentage of small pelagic species landed in the Gulf of California sardine purse seine fishery by weight since the 1999-2000 fishing season. R10

Year	Total Landings	Pacific sardine *Sardinops sagax*	Thread Herring *Opisthonema* spp.	Chub Mackerel *Scomber japonicas*	Red-eye round herring *Etrumeus teres*	California Anchovy *Engraulis mordax*	*Bocona* sardine *Cetengraulis mysticetus*	Leather-jackets *Oligoplites.* spp.	Mixed Species
99/00	178,902	37	22	19	3	3	14	3	1
00/01	333,370	57	5	4	0	0	34	0	0
01/02	353,903	62	13	1	0	1	22	0	0
02/03	318,379	62	30	2	2	0	2	1	0
03/04	271,638	38	22	9	3	2	23	2	0
04/05	260,859	36	29	13	2	3	15	2	1
05/06	365,164	37	17	4	2	11	29	0	1
06/07	297,867	60	29	2	1	0	6	1	1
07/08	538,669	91	5	1	0	1	2	0	0
08/09	564,298	94	4	0	0	0	2	0	0
09/10	360,952	71	24	1	2	0	2	0	0
10/11	407,114	34	18	10	1	19	18	1	0
11/12	461,058	19	11	10	1	16	43	0	0
12/13	465,486	16	22	4	3	26	28	1	1
13/14	293,686	1	45	14	2	12	22	4	0
14/15	244,465	2	49	15	3	2	28	2	0

From 2010-2011 to 2013-2014, the California anchovy/E.mordax fishery represented more than 10% of total catches of small pelagics. By 2014-2015 the proportion was down to 2%. The IFFO-RS assessment team are not of the view that there may be a problem with this stock.

In our opinion populations of small pelagic fish undergo wide variations in their contribution to total catch that are associated with their availability due to environmental fluctuations. The California anchovy/E.mordax is not a regular or frequent component of the catch of small pelagics in the assessment area. By 2014/2015 the catch declined and if the pattern continues the team do not expect to see it again any time soon.

Recent very rapid change in species composition makes it very difficult for scientists doing the monitoring, analysis and modelling of the fishery to respond to changes. In addition, the principal emphasis on ecosystem management of the pacific sardine fishery recommended in previous assessments should now be expanded to focus on ecosystem management of a variable complex of small pelagics, including Californian anchovy.

The very flat, near Bo, time series of biomass for by-catch species such as Californian anchovy imply that the density-dependence which determines the sustainable and/or optimum exploitation rate cannot possibly be assessed until the biomass of these genera falls below 50% of Bo.

The stock passes the Category B risk-based assessment with a medium resilience rating (reference Fishbase, accessed 01.08.19).

R2-R3, R10, R17

References p 29

Standard clauses 1.3.2.1

FURTHER IMPACTS

The three clauses in this section relate to impacts the fishery may have in other areas. A fishery must meet the minimum requirements of all three clauses before it can be recommended for approval.

F1	**Impacts on ETP Species - Minimum Requirements**		
	F1.1	Interactions with ETP species are recorded.	PASS
	F1.2	There is no substantial evidence that the fishery has a significant negative effect on ETP species.	PASS
	F1.3	If the fishery is known to interact with ETP species, measures are in place to minimise mortality.	PASS
Clause outcome:			**PASS**

Evidence

F 1.1

Observer reports (2017-2018) prepared by Global GRUPO A.C. (Global Grupo A.C. 2018) examined the impact of the small pelagics fishery from fleets operating out of Guaymas and Yavaros ports (Sonora State, **Figure 1).** Global Grupo, CONAPESCA and INAPESCA carry out and support research to improve assessments of incidental mortality in the population and ecosystem dynamics.

Global GRUPO A.C.:

Global GRUPO A.C. provided the following data on interactions with ETP species: the plumage gull, *Larus heermanni* and the brown pelican, *Pelecanus occidentalis*, are within a category of protection under NOM-059-SEMARNAT-2010. Regarding mortality by species, the plumage gull was the species that presented the highest number of dead specimens (132 individuals); equivalent to a mortality of 0.071 individuals per fishing set. Regarding the brown pelican, this species represented a mortality of 0.041 organisms per set. In relation to turtles, 13 interactions were recorded in five fishing zones for four species, the most abundant being the Pacific brown turtle *Chelonia agassizii* with a record of eight individuals.

Table 3 shows the volume in tonnes and percentage of species retained and discarded in the fishery:

Table 3 Volume of retained and discarded species R2, R19

	Guaymas		Yavaros	
Groups of Species	Total catches (t)	% of catches	Total catches (t)	% of catches
Small pelagic	76,246.8 t	99.03%	35,186.5	99.08%
Bone fish	744.1	0.967 %	321.92	0.907 %
Elasmobranch	0.593	0.0%	2.92	0.008%
Crustaceans	1.1	0.0%	0.53	0.0%
Mollusc	0.011	0.0%	0.010	0.0%
Echinoderms	0.064	0.0%	0.040	0.0%
Sea turtles	0.00	0.0%	0.0	0.0%
Sea mammals	0.00	0.0%	0.0	0.0%
Seabirds	0.00	0.0%	0.0	0.0%

Thread Herring Observer Programme 2017:

Five vessels from the Thread Herring fleet (Southern Gulf Purse Seine (Sinaloa & Nayarit **Figure 1**) of nine operational vessels carried on-board observers in 2017. An observer manual included information on the regulations of the fishery, outlined responsibilities of observers and detailed the type of information to be collected, including interactions with ETP species.

Improvements noted in the coverage and training of the observer program resulted in an increase in the number of by catch species registered. As a result of the changes in the fishery the overall proportion of bycatch species was reduced. The number of registered bony fishes increased from 38 to 83 species between the first season (2012-2013) and the most recent season (2016-2017); in elasmobranchs the number of registered species increased from 5 to 12 species, and in crustaceans the number of registered species increased from 2 to 13.

Interactions with ETP and other species are recorded.

F 1.2:

Information collected by observers has allowed establish that during fishing operations the mortality of birds and marine mammals is very low and, in some seasons, null. There is no impact on the abundance of their populations. Likewise, the treatment of the data indicates that incidental catches in fishing operations are not high.

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 was published in 2015. The manual includes guidelines on the manipulation of rays, sharks and sea turtles. Excluder grids are being used to filter organisms such as rays and return them to the ocean before the catch is stored in the haul. A review of existing and new mitigation measures to reduce impacts on ETP species and reduce bycatch (Southern Gulf fishery) was presented during an INP workshop (October 2016). One of the goals of

the course was to provide an opportunity for participants to share ideas, experiences and knowledge to assist in the implementation of "best practices".

In October 2017 INP in collaboration with Maz Sardina completed the 5th Best Practices Workshop. Stakeholders established a traceability program to ensure that only trips with a maximum of 2% bycatch could be considered eligible to enter chain of custody. A financial incentive program was also put in place to reward the crew for trips with a proportion of bycatch ≤2% of catch.

In 2018 INP carried out the 6th Best Practices Workshop (October 15-16). Among the objectives of this workshop were to introduce new impact mitigation measures with ETP species. Systems were analysed to treat different individuals, in case of being hoisted on board, to cause them least possible damage and to affect their release in the shortest time.

Global GRUPO presented a strategy proposal to mitigate mortality by incidental capture of seabirds and ETP species. This proposal complies with objectives indicated in the client's action plan (ref Stakeholders application for MSC Certification Small Pelagics Fishery Sonora, Mexico), namely:

- How measures to protect seabirds will work as part of a cohesive arrangement;
- How effectiveness of the measures will be monitored and assessed.

A Technical Report on incidental catches and presence of species in the ETP category was presented under the program: Technical observers aboard the largest sardine fleet in the Pacific Ocean and Gulf of California. This strategy records incidences with seabirds and mitigation measures applied.

References p 29
R2, R19-R21

Standard clause 1.3.3.1

F2	**Impacts on Habitats - Minimum Requirements**		
	F2.1	Potential habitat interactions are considered in the management decision-making process.	PASS
	F2.2	There is no substantial evidence that the fishery has a significant negative impact on physical habitats.	PASS
	F2.3	If the fishery is known to interact with physical habitats, there are measures in place to minimise and mitigate negative impacts.	PASS
Clause outcome:			**PASS**

Evidence

F 2.1 - F 2.2

The purse seine fleet operates in mid-water between 40-100m depths and generally avoids bottom contact. Contact is intentionally avoided as the small mesh nylon netting is easily damaged. Interviews with fishermen undertaken during the MSC site visit indicated that in the rare event when gear is lost, it is retrieved due to its high monetary value. Abandoned purse seine gear has limited capacity to continue fishing because it achieves full functionality only when used at the surface. 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.

R19-R21

References p 29
Standard clause 1.3.3.2

F3	**Ecosystem Impacts - Minimum Requirements**		
	F3.1	The broader ecosystem within which the fishery occurs is considered during the management decision-making process.	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
Clause outcome:			**PASS**

Evidence

F 3.1:

Ecosystem interactions relevant to the northern Gulf of California small pelagic fishery include the impacts of the removal of low trophic level fish biomass on the structure and function of the ecosystem. Removing of lower trophic-level species has the potential to impact dynamics and abundance of their predator populations.

Due to changes in time series of catches, different approaches to determine the role of small pelagic species in the ecosystem and information on environmental variability stocks can sometimes be a key Low Trophic Level (LTL) species and other times not. A case in point is the variability in biomass of the Californian anchovy. A stock can sometimes be a key LTL species and some other times would not.

Management systems should have a mechanism to account for these environmentally driven changes such that the status of the stock would be re-evaluated at every surveillance, particularly in terms of the contribution of each LTL species to the total small pelagics catch and prey composition in the diet of predators, particularly sea birds.

The FMP in the assessment area 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. INP and other technical groups must support data collection programs and ecosystem modelling that continues to consider the impact of removal of target stocks on ecosystem functioning. These programs, models and their results will be examined during future assessments of the fishery.

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

F 3.2:

Information collected by observers has allowed establish that during fishing operations the mortality of birds and marine mammals is very low and, in some seasons, null. There is no impact on the abundance of their populations. Likewise, the treatment of the data indicates that incidental catches in fishing operations are not high. There is no substantial evidence that the fishery has a significant negative effect on ETP species.

Improvements noted in the coverage and training of the observer program resulted in an increase in the number of by catch species registered. As a result of the changes in the fishery the overall proportion of bycatch species was reduced. The number of registered bony fishes increased from 38 to 83 species between the first season (2012-2013) and the most recent season (2016-2017); in elasmobranchs the number of registered species increased from 5 to 12 species, and in crustaceans the number of registered species increased from 2 to 13. Interactions with ETP and other species are recorded. As confirmed through newly convened observer programmes there is no substantial evidence that the fishery has a significant negative impact on the marine ecosystem.

F 3.3:
The 2012 FMP includes short, long-term objectives and management advice associated with research plans and also contains formal consideration of the role of the resource on the maintenance of the ecosystem and requires evidence that these considerations have been incorporated into future harvest control rules.

The control rule for the small pelagic fish in Mexico is well defined in the management plan. The revised NOM (2018) now opens the possibility to communicate and implement scientific advice provided by INP INAPESCA derived from stock assessments.

The revised NOM now states: "The Secretariat may establish periods and closed areas for the capture of smaller pelagics in order to apply dynamic management of the fishery, avoid interaction with other fisheries, as well as contribute to the conservation of other biological resources and the ecosystem".

Mechanisms outlined in the revised NOM now allow for elements of the harvest strategy to work together monitoring the status of the stock and react if the ecosystem-based reference points are approached.

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.
References:
R2, R10, R19-R21

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