IFFO RS Limited

T: +44 (0) 2030 539 195
E: Standards@iffors.com
W: www.iffors.com

Unit C, Printworks | 22 Amelia Street
London, SE17 3BZ | United Kingdom

Global Standard for Responsible Supply of Marine Ingredients

Fishery Assessment Methodology and Template Report V2.0

Fishery Under Assessment	**Monterrey (Pacific) Sardine *Sardinops sagax* FAO 77 Eastern Central Pacific**
Date	**January 2019**
Assessor	**Jim Daly**

Application details and summary of the assessment outcome				
Name: Sardinas de Sonora S.A. de C.V				
Address:				
Country:		**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	Virginia Polonio	5	Surveillance	Whole fish
Assessment Period	2017-2018			

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

Assessment Determination

Monterrey (Pacific) sardine is thought to consist of three subpopulations or stocks: a northern ("cold") subpopulation (northern Baja California to Alaska), a southern subpopulation (outer coastal Baja California to southern California), and a Gulf of California subpopulation have been distinguished by population studies. This species is mainly distributed among northern and Gulf of California subpopulations (Figure 1).

In recent years the status of the Monterrey (Pacific) sardine fishery has been of concern as evidence showed a sharp decline in catches from a historic high around 500,000t (2007/08 and 2008/09) down to 3,571t in season 2013/14 and 4,455t in season 2014/15. Although these catches were obtained in seasons when the fleet agreed to suspend effort the records represented historic lows for the fishery.

Studies concluded (MSC 4th Annual Surveillance Audit Report: MSC Gulf of California Mexican Sardine Fishery (2016, SCS Global Services) that the stock was fluctuating around its reference points such that recruitment was *"not imperilled by overfishing"*. Early descriptions about the behaviour of sardine populations indicated that their availability depends on wind patterns and inter-annual fluctuations in temperature in the central Gulf of California related to the El Nino Southern Oscillation (ENSO).

The Mexican Fisheries Institute (INAPESCA, Small Pelagics Program) have proposed that the best possible explanation for low catches up to 2014/15 is that the stock shifted distribution to the north of the Gulf, to deeper waters making the fish unavailable to the fishery. An occurrence of a strong El Niño event was confirmed in 2015.

A 2018 Report (MSC Public Certification Report: Small pelagics fishery (2018), Sonora, Gulf of California SCS Global Services) has concluded that, with the exception of the 1986-1990 and 2007-2009 fisheries, the Monterrey (Pacific) sardine stock has not been through periods of overfishing. Figures have also shown that for the most part catches have been under what would have been the Biologically Acceptable Catch (BAC, equivalent to Limit Reference Point (LRP). Assessments provide an estimate of the status of the biological stock relative to a reference point or proxy.

The fishery for small pelagic fish in Mexico is managed using a control rule based on removing a fraction of the allowable biomass above a minimum threshold. Such fraction can oscillate between 5 and 25% and it is assumed that if the "fraction is approximately equal to F_{msy}, then the harvest rate in the control rule will not exceed F_{msy}". The language in the Plan is interpreted such that this BAC (and the corresponding fraction) works as a Limit Reference Point (LRP) and therefore is acting as a precautionary approach in the management of the fishery because, 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.

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 promotes the predominance of other species in the ecosystem. The Monterrey (Pacific) stock was designated a key Low Trophic Level (LTL) species for the 2018 Report. Studies are also being undertaken that provide information in a precautionary sense about which species will warrant greater attention when generating measures that regulate exploitation.

The MSC Public Certification Report (2018) also identified some weaknesses in the estimation of fishing mortality, and recommended a review of stock assessment methodology. This fishery is regulated under the

Norma Oficial Mexicana (NOM) 003-PESC-1993 and a management plan is in place. However no quotas are set in the Mexican fishery; the NOM has set a minimum landing size, fleet capacity is controlled.

The management plan is still missing a harvest strategy or a description of how it would be linked with the fisheries plan for small pelagic in north-western Mexico. Work is ongoing and further progress should be noted during future assessments.

Monitoring of ETP species encountered in the fishery has occurred during observer programs. Some mitigation measures were noted to be partially in place such as "*Scaring, by spraying water with a pressure hose to keep birds away from the buoy line of the net."* Continued monitoring and development of mitigation strategies is needed.

The 2012 Fisheries Management Plan (FMP) includes short and long-term objectives associated with a research plan and also contains proper and formal consideration of the role of the resource on the maintenance of the ecosystem and evidence that these considerations have been incorporated into harvest control rules.

Monterrey (Pacific) sardine has not yet been assessed for the IUCN Red List; this species is not on any current CITES list of endangered species (websites accessed 17.12.18).

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

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** **Thread Herring**	60 20	A1	Pass
			A2	Pass
			A3	Pass
			A4	Pass
Category B	**Bocona sardine**	10	Pass	
Category C	**Chub Mackerel**	5	Pass	
Category D	**Red-eye round herring**	5	Pass	

[List all Category A and B species. List approximate total %age of landings which are Category C and D

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
Monterrey (Pacific) sardine	*Sardinops sagax*	FAO 77	60	Mexico	**A**
Thread herring	*Opisthonema spp.*	FAO 77	20	Mexico	**A**
Bocona sardine	*Cetengraulis mysticetus*	FAO 77	10	Mexico	**B**
Chub mackerel	*Scomber japonicus*	FAO 77	5	Mexico	**C**
Red-eye herring	*Etrumeus teres*	FAO 77	5	Mexico	**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.

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

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 reference points.

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.

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 catch exceeds BAC" . This Plan is reviewed annually during Small Pelagic Workshops (Taller de Pelágicos Menores); the most recent one (XXV) convened in June 2017). For the most part recorded catches have followed that of the announced BAC (**Figure 5**).

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.

Scientific advice is provided by the National Fisheries Institute (Instituto Nacional de Pesca, INP or INAPESCA), through which the National Fisheries Charter (Carta Nacional Pesquera) was developed. The Charter is an annually-updated summary of the status and scientific understanding of all commercial fishery resources in federal waters. The Charter is broadly divided between Pacific and Gulf of Mexico fisheries (**Figure 1**):

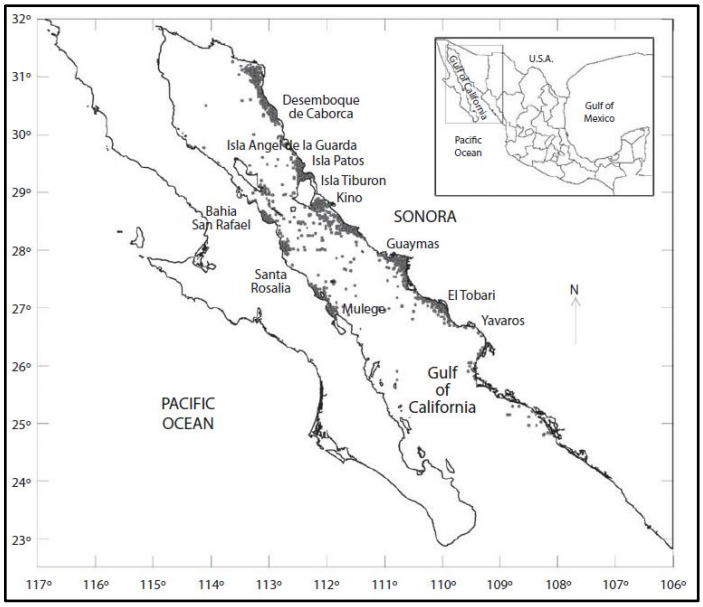

Figure 1. Landing distribution (dark grey points) of small pelagic fishery in the Gulf of California from 2002 to 2007. **R8**

There is an organisation responsible for managing the fishery. **R1-R6**

M1.2:

Scientific research and advice in support of the management of Mexican fisheries is provided by the National Fisheries Institute (**INP OR INAPESCA**). 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 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 National Fisheries Charter (CNP) and the 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.

There is an organisation responsible for collecting data and assessing the fishery. **R6**

M1.3:
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 promote research schemes with the participation and financial support from the sectors involved".

During a MSC First Surveillance Audit (Southern Gulf, Thread Herring Fishery (2018) SCS Global Services Ltd) minutes were presented of meetings between scientists and industry to discuss management plans for the small pelagics fishery 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 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 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 **R7**

M1.4:
Carta Nacional Pesquera (CNP):
The Carta Nacional Pesquera (CNP) is a binding instrument for the fisheries authorities' decision- making process. This Fisheries Charter includes the diagnosis and assessment of a fishery, fisheries and conservation indicators, and recommendations by INP for the management of the 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 by means of publication in the Diario Oficial (DOF). This allows the general public, non-governmental organisations and the academic sector, among others, to give their opinion of fisheries status. The latest version of the CNP (2017) was published by INP in June 2018.

Mexican National Standard for Small Pelagic Fisheries [Norma Oficial Mexicana (NOM)]:
The primary legal instruments are the Fisheries Law (Ley de Pesca) and the Regulation to the Fisheries Law (Reglamento de la Ley de Pesca NOM -003-PESC-1993). The 2014 updates contained the following changes:

- Capture of pilchard, anchovy or thread herring below the minimum catch size does 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 the 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), at which point there will be a requirement to notify the National Commission of Aquaculture and Fisheries.

A further update of proposed NOM revisions was provided 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 depending on information from monitoring surveys.

An update of the Fisheries Management Plan (FMP) for the small pelagics fishery (Southern Gulf of California) was presented by Government Officials during a 2018 MSC Surveillance Audit. The update included all preliminary information from biology, status and other relevant aspects of the fishery. The plan is still missing a harvest strategy or a description of how it would be linked with the fisheries plan for small pelagics in north-western Mexico. Work is ongoing and further progress should be noted during future fisheries assessments.

Fishery management organisations are legally empowered to take management actions **R2, R10-R11, R13**

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 Offical Gazette draft updates undergo a public review process by means of publication in the Diario Oficial. This allows the general public, non-governmental organisations and the academic sector, among others, to give their opinion of fisheries status. The latest version of the Fisheries Charter was published by INP in June 2018.

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. **R5, R7, R10-R11**

References

R1 Programas SAGARPA: https://www.gob.mx/sader/acciones-y-programas/programas-y-componentes-de-la-sagarpa

R2 Fisheries Management Plan for the minor pelagic species (Plan de manejo pesquero para la pesquería de pelágicos menores) http://dof.gob.mx/nota_detalle_popup.php?codigo=5276945

R3 Instituto nacional de pesca centro regional de investigación pesquera (CRIP_ de guaymas XXV Taller del Comité Técnico de Pelágicos Menores 82pp http://www.sardinagolfodecalifornia.org/wp-content/uploads/2017/11/MEMORIAS-XXV-TALLER-CTPM_Junio-2017.pdf

R4 CONAPESCA https://www.gob.mx/conapesca

R5 Carta Nacional Pesquera (2018) Acuerdo por el que se da a conocer la actualización de la Carta Nacional Pesquera. (Continúa en la Tercera Sección). https://www.gob.mx/cms/uploads/attachment/file/334832/DOF_-_CNP_2017.pdf

R6 INAPESCA homepage: https://www.gob.mx/inapesca

R7 Alvarez. C, Anhalzer G (April 2018) Southern Gulf of California Thread Herring Fishery (Sinaloa & Nayarit, Mexico) First Surveillance Audit Report SCS Global Services 73pp

R8 Lluch-Belda et al (1995). Atlas Pesquero de México. Pesquerías Relevantes. Secretaría de Pesca/Instituto Nacional de Pesca/Universidad de Colima (Cenedic).

R9 Centro de Operaciones Interinstitutionales COI https://www.gob.mx/profepa/prensa/realiza-gobierno-federal-100-operaciones-maritimas-y-40-aereas-en-alto-golfo-de-california-coi

R10 Reglamento de la Ley de Pesca 2014 NOM-003-SAG/PESC-2014 http://dof.gob.mx/nota_detalle.php?codigo=5374148&fecha=04/12/2014
R11 Reglamento de la Ley de Pesca 2017 https://legalzone.com.mx/reglamento-de-la-ley-de-pesca-2017-mexico/
R13 SCS Global Services Report. 2018. Small Pelagics Fishery In Sonora, Gulf of California. MSC Fishery Assessment Report- Public Certification Report. 363 pp.

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

M2.1:

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) work together under the Centro de Operaciones Interinstitutionales (COI) (San Felipe) directed by the Commandant of the Naval Sector. They carry out surveillance operations in the Upper Gulf by adding equipment and personnel to promote the protection and combat illegal trafficking of marine resources.

There is an organisation responsible for monitoring compliance with fishery laws and regulations **R9-R10**

M2.2-M2.3:

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.

The COI carry out surveillance operations in the Upper Gulf by adding equipment and personnel to promote the protection of and combat illegal trafficking in marine resources. This 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)* – critically threatened 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.

There is a framework of sanctions which are applied when laws and regulations are discovered to have been broken. There is no substantial evidence of widespread non-compliance in the fishery, and no substantial evidence of IUU fishing. **R9-R10**

M2.4:

There is effective monitoring of each fishing boat's position at all times through a compulsory satellite detection system and subject to sanctions. Each and every landing operation is sampled by technical personnel from the Centro Regional de Investigación Pesquera (CRIP, Regional Center for Fisheries Research, a branch of INAPESCA). Personnel from CONAPESCA perform regular and frequent inspection visits to fish processing plants and boats to assert that all norms and precepts of the regulation are fully complied with.

The fishery generally complies 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).

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 conduct monitoring, control and surveillance of the fishery to ensure compliance with current regulations. Landings are monitored and sampled and 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.

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.
R9-R10.

References

R9 Centro de Operaciones Interinstitutionales COI https://www.gob.mx/profepa/prensa/realiza-gobierno-federal-100-operaciones-maritimas-y-40-aereas-en-alto-golfo-de-california-coi

R10 Reglamento de la Ley de Pesca 2014 NOM-003-SAG/PESC-2014 http://dof.gob.mx/nota_detalle.php?codigo=5374148&fecha=04/12/2014

R11 Reglamento de la Ley de Pesca 2017 https://legalzone.com.mx/reglamento-de-la-ley-de-pesca-2017-mexico/

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

A1.1:

Since 2000 catches caught in this fishery have been documented through landing slips and catch records for each jurisdiction. In 2015 a stock assessment was conducted using the Age Structured Assessment Program (ASAP) model. The analysis used catch and biological data from the fishery.

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 in the ecosystem (**Figure 2**):

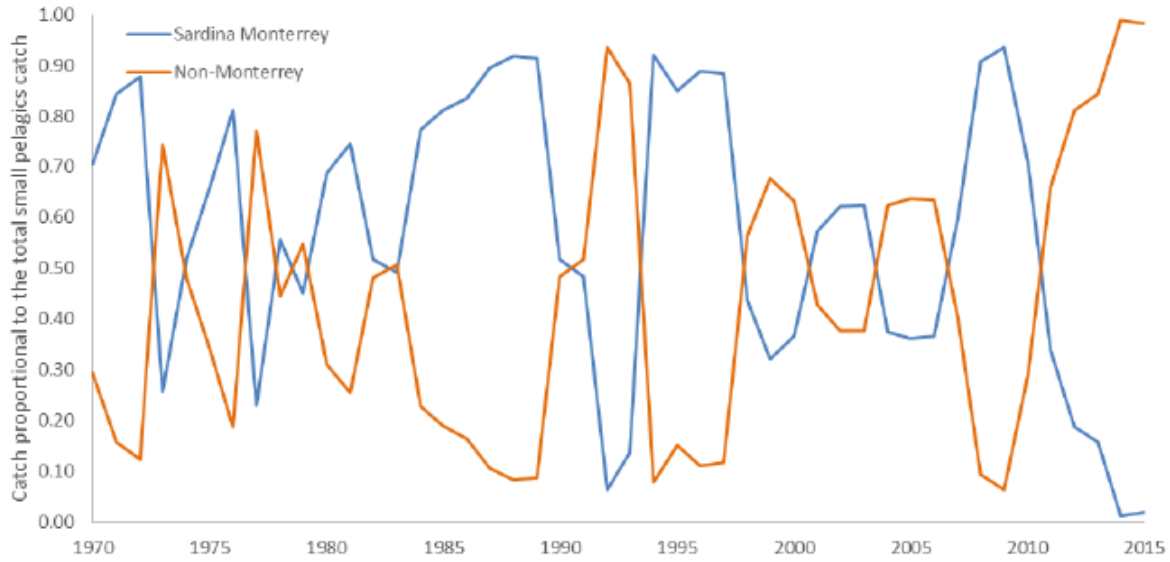

Figure 2 Proportional contribution of the Pacific sardine to the total catch of small pelagic fish in the central Gulf of California compared to all other small pelagics in the catch. **R13**

Landings data are collected such that the fishery-wide removals of this species are known. **R12-R13**

A1.2:

Estimates of abundance independent of the fishery have been obtained from hydroacoustic surveys carried out in the Gulf of California from 2008-2016. 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 fish 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).

Sufficient additional information is collected to enable an indication of stock status to be estimated. **R12-R13**

References

R9 Centro de Operaciones Interinstitutionales COI https://www.gob.mx/profepa/prensa/realiza-gobierno-federal-100-operaciones-maritimas-y-40-aereas-en-alto-golfo-de-california-coi

R10 Reglamento de la Ley de Pesca 2014 NOM-003-SAG/PESC-2014 http://dof.gob.mx/nota_detalle.php?codigo=5374148&fecha=04/12/2014

R12 Nevarez-Martinez et al 2015 Evaluación poblacional de la sardina monterrry (*Sardinops sagax*) en el Golfo de California, Mexico, 1971/71 -2014/2015. Informe Técnico del Programa de Pelágico Menores. Instituto Nacional de Pesca, CRIP Guaymas, Sonora, 23pp. http://www.sardinagolfodecalifornia.org/wp-content/uploads/2015/12/InfTec_Evaluaci%C3%B3n-sardina-monterrey_2015.pdf

R13 SCS Global Services Report. 2018. Small Pelagics Fishery In Sonora, Gulf of California. MSC Fishery Assessment Report- Public Certification Report. 363 pp.

https://cert.msc.org/FileLoader/FileLinkDownload.asmx/GetFile?encryptedKey=yHo1ADc6rEFZpAwyFhB061LIgQfRoY4i8/BFKvGIuXFlC5kCw6VCdStkyBvkF1X2
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

A2.1:

The Pacific sardine has been assessed using different methodological approaches. Because of the inconsistency in catch trends and estimated biomass from VPA analysis, one of the main demands that have been presented was the inclusion of auxiliary information generated independently from the fishery. In principle, abundance indices obtained with acoustic methods were available, but it was later recognized that other sources of information were already at hand and was only required to adapt them to a methodology that would allow their simultaneous use in one single evaluation of the stock.

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.

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 of Pacific sardine and adult biomass estimated using ASAP in the Gulf of California. **R12**

These assessments also indicated that total abundance closely follows the trend in recruitment (**Figure 4**):

Figure 4. Abundance of Pacific sardine in the Gulf of California estimated using the ASAP analysis. N total = total population, BR = recruit abundance, Brep = adult abundance **R12**

The MSC Public Certification Report identified some weaknesses in the estimation of fishing mortality, and recommended that INAPESCA review stock assessment methodology for future assessments

A stock assessment is conducted at least once every 3 years. **R5; R12,R13**

A2.2:

In recent years the status of the Monterrey (Pacific) sardine has been of concern because the evidence showed a sharp decline in catches from a historic high around half a million tons in seasons 2007/08 and 2008/09 down to 3,571 tons in season 2013/14 and 4,455 tons in season 2014/15. Although these catches were obtained in seasons when the fleet agreed to suspend effort on Pacific sardine, the records represented historic lows for the fishery. Stock assessments concluded that recruitment is highly variable and suggested that environmental conditions may play an important role in such variability.

Early descriptions about the behaviour of sardine populations indicated that availability depends on wind patterns and inter-annual fluctuations in temperature in the central Gulf of California related to the El Nino Southern Oscillation (ENSO).

Despite the fishery collapsing down to less than 3% of maximum production there is historical evidence of this stock's capacity to recover quickly after two years, as happened in 1993-1994. During periods of low sardine abundance, fish concentrate around the large midriff islands of the Gulf of California, where cool water from tidal currents creates a region of high productivity called the Center of Biological Activity, and although reproduction may be reduced, the Center of Biological Activity serves as a refuge in extremely adverse conditions.

The occurrence of a strong El Niño event was confirmed in 2015. INAPESCA Small Pelagics Program staff have proposed that the best possible explanation for low catches is that the stock shifted distribution to the north of the Gulf, and to deeper waters making these fish unavailable to the fishery.

Reports of hydroacoustic surveys conducted by INAPESCA had identified that it would be necessary to continue working on ground-truth methods to assign overall acoustic energy to the different species in order to generate more reliable estimates of abundance. The current index is set to under-estimate the true abundance.

The approach is to consider the index as a relative abundance estimate that is below the true abundance. The MSC Report (2018) concluded that acoustic indices are considered appropriate to support the control rule because of the reliability in the trend, and because they are inserted into a fisheries and population model in conjunction with other indices that have provided consistent results in the stock assessment.

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) with the exception of the above years:

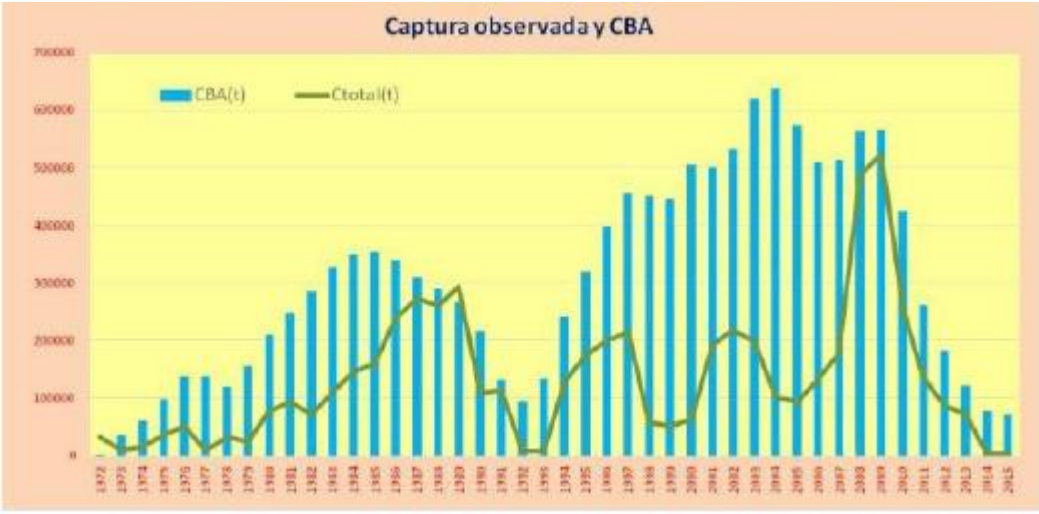

Figure 5 Comparison of catch records (green line) of Pacific sardine in the Gulf of California with the estimated Biologically Acceptable Catch (bars) obtained with the control rule in the Management Plan **R12**

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

Optimum yield was estimated at 220,000t and F = 0.26. More recently estimated Fmsy = 0.28. Management exploitation rate (FMP) is defined at 0.25 **R12-R14**

A2.4-A2.5:

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

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

Assessments are publicly available and are subject to internal or external peer review **R5, R11-R14**

References

R5 Carta Nacional Pesquera (2018) Acuerdo por el que se da a conocer la actualización de la Carta Nacional Pesquera. (Continúa en la Tercera Sección). https://www.gob.mx/cms/uploads/attachment/file/334832/DOF_-CNP_2017.pdf

R11 Reglamento de la Ley de Pesca 2017 https://legalzone.com.mx/reglamento-de-la-ley-de-pesca-2017-mexico/

R12 Nevarez-Martinez et al 2015 Evaluación poblacional de la sardina monterrry (Sardinops sagax) en el Golfo de California, Mexico, 1971/71 -2014/2015. Informe Técnico del Programa de Pelágico Menores. Instituto Nacional de Pesca, CRIP Guaymas, Sonora, 23pp. http://www.sardinagolfodecalifornia.org/wp-content/uploads/2015/12/InfTec_Evaluaci%C3%B3n-sardina-monterrey_2015.pdf

R13 SCS Global Services Report. 2018. Small Pelagics Fishery In Sonora, Gulf of California. MSC Fishery Assessment Report- Public Certification Report. 363 pp

R14 Reglamento de la Ley de Pesca NOM-003-PESC-1993 4pp pdf https://www.inapesca.gob.mx/portal/documentos/publicaciones/pelagicos/NOM003pesc1993SARDINA.pdf

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

A3.1-A3.2:

During previous MSC Audits in the Mexican small pelagic fishery minutes were presented of meetings between scientists and industry that discussed the management plan 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.

A comparison of catch records (green line) of Pacific sardine in the Gulf of California with the estimated Biologically Acceptable Catch (bars) obtained with the control rule in the Management Plan (**Figure 5**) shows that total fishery removals of this species did not regularly exceed the level indicated or stated in the stock assessment **R2, R12-R14.**

A3.3:

The primary legal instruments are the Fisheries Law (Ley de Pesca) and the Regulation to the Fisheries Law (Reglamento de la Ley de Pesca) last updated in 2014. Based on the contents of these laws, the SAGARPA mission statement includes a commitment to "facilitate competitive and sustainable development of the fisheries and aquaculture sector in the country to increase the welfare of Mexicans".

The Fisheries Management Plan (FMP) for the minor pelagic species aims to set out the actions to develop the fisheries in a sustainable manner based on the 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 most recent one (XXV) convened in June 2017.

Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy **R2**, **R7, R11-R14**

References

R2 Fisheries Management Plan for the minor pelagic species (Plan de manejo pesquero para la pesquería de pelágicos menores) http://dof.gob.mx/nota_detalle_popup.php?codigo=5276945

R7 Alvarez. C, Anhalzer G (April 2018) Southern Gulf of California Thread Herring Fishery (Sinaloa & Nayarit, Mexico) First Surveillance Audit Report SCS Global Services 73pp

R11 Reglamento de la Ley de Pesca 2017 https://legalzone.com.mx/reglamento-de-la-ley-de-pesca-2017-mexico/

R12 Nevarez-Martinez et al 2015 Evaluación poblacional de la sardina monterrry (Sardinops sagax) en el Golfo de California, Mexico, 1971/71 -2014/2015. Informe Técnico del Programa de Pelágico Menores. Instituto Nacional de Pesca, CRIP Guaymas, Sonora, 23pp. http://www.sardinagolfodecalifornia.org/wp-content/uploads/2015/12/InfTec_Evaluaci%C3%B3n-sardina-monterrey_2015.pdf

R13 SCS Global Services Report. 2018. Small Pelagics Fishery In Sonora, Gulf of California. MSC Fishery Assessment Report- Public Certification Report. 363 pp. https://cert.msc.org/FileLoader/FileLinkDownload.asmx/GetFile?encryptedKey=yHo1ADc6rEFZpAwyFhB061LIgQfRoY4i8/BFKvGIuXFlC5kCw6VCdStkyBvkF1X2

R14 Reglamento de la Ley de Pesca NOM-003-PESC-1993 4pp pdf https://www.inapesca.gob.mx/portal/documentos/publicaciones/pelagicos/NOM003pesc1993SARDINA.pdf

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:	**PASS**

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

Evidence

A4.1:

The decline 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 support this conclusion.

The updated stock assessment further supports the conclusion that fishing mortality is historically below BAC (Figure 5). 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. **R12- R14**

References

R12 Nevarez-Martinez et al 2015 Evaluación poblacional de la sardina monterrry (Sardinops sagax) en el Golfo de California, Mexico, 1971/71 -2014/2015. Informe Técnico del Programa de Pelágico Menores. Instituto Nacional de Pesca, CRIP Guaymas, Sonora, 23pp. http://www.sardinagolfodecalifornia.org/wp-content/uploads/2015/12/InfTec_Evaluaci%C3%B3n-sardina-monterrey_2015.pdf

R13 SCS Global Services Report. 2018. Small Pelagics Fishery In Sonora, Gulf of California. MSC Fishery Assessment Report- Public Certification Report. 363 pp. https://cert.msc.org/FileLoader/FileLinkDownload.asmx/GetFile?encryptedKey=yHo1ADc6rEFZpAwyFhB061LIgQfRoY4i8/BFKvGIuXFlC5kCw6VCdStkyBvkF1X2

R14 Reglamento de la Ley de Pesca NOM-003-PESC-1993 4pp pdf https://www.inapesca.gob.mx/portal/documentos/publicaciones/pelagicos/NOM003pesc1993SARDINA.pdf

Standard clause 1.3.2.1.4

Species Name		**Thread herring complex *Opisthonema spp***	
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:

Current regulations do not include restrictions in the form of allowable catch or quotas. This was confirmed in 2017 when no quota was applicable through a 'dictamen tecnico' published by INAPESCA. Fishing effort is restricted (no further increase in vessel numbers) North of 20ºN. This prohibition includes the addition of vessels to the fleet unless they are to replace old active boats that are retired. Other management measures include a 160mm minimum landing size, limits on maximum seine capacity, and limited entry to the fishery.

Middling thread herring (*O. medirastre)*, Pacific thread herring *(O. libertate)* and Slender thread herring (*O. bulleri)* are pelagic species which form coastal shoals. Middling thread herring is distributed from Los Angeles Bay (Ca, USA), in the Gulf of California to the Bay of Sachura, Peru. Pacific thread herring and slender thread herring are both distributed from Santa Rosalita, Pacific coast of Baja, California, Mexico southward to Punta Sal and Punta Picos, Peru (Figure 1).

O. medirastre, O. libertate and O. bulleri are all managed as a component of the "Pelagicos menores" (small pelagic) stock, fished only in Pacific waters. 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. The data are processed and analysed by INAPESCA and results presented in official reports of fishery catch and effort.

The status of the Thread Herring complex have been evaluated using VPA and a surplus production model Results and shows that each stock has either been stable for a long time or has 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 current fisheries management plan.

Landings data are collected such that the fishery-wide removals of this species are known. **R2, R7**

A1.2:
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.

Fisheries independent data is collected via hydro-acoustic surveys which began in 2008. The work presented by INAPESCA recently includes five acoustic surveys carried out in the Gulf of California during spring 2016 aboard INAPESCA research vessels. Two acoustic surveys were conducted in 2017.

Sufficient additional information is collected to enable an indication of stock status to be estimated. **R7**

References

R2 Fisheries Management Plan for the minor pelagic species (Plan de manejo pesquero para la pesquería de pelágicos menores) http://dof.gob.mx/nota_detalle_popup.php?codigo=5276945

R7 Alvarez. C, Anhalzer G (April 2018) Southern Gulf of California Thread Herring Fishery (Sinaloa & Nayarit, Mexico) First Surveillance Audit Report SCS Global Services 73pp

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

A2.1:

Abundance from acoustic surveys shows a moderate declining trend from 2012 to 2016 although the age structured model fit to these data predicts a stabilization of the trend around 600,000t (**Figure 6**):

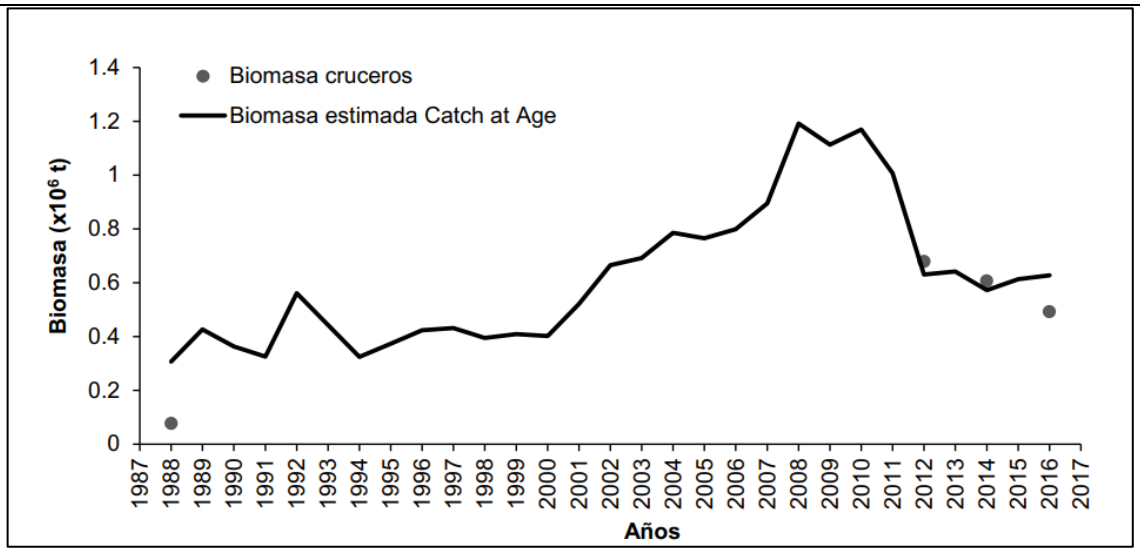

Figure 6: Biomass trend of the thread herring complex in the southern Gulf of California as predicted using an age structured model fit to acoustic based estimates of abundance (dots). **R15**

A stock assessment is conducted at least once every 3 years **R7; R15**

A2.2:

A new approach to assess stock status (Thread Herring Complex Southern Gulf of California) was introduced by the INAPESCA staff using an age structured model fit to catch and acoustic based indices of abundance. Model predicted abundance is estimated for the whole complex and each species separately. Outputs include management oriented parameters such as harvest and fishing mortality rates. A development of the model includes a discussion of what reference points are appropriate for the stock (Southern Gulf of California) and if they can be estimated. In the FMP a Biologically Acceptable Catch (BAC) (equivalent to a Limit Reference Point) is computed as a fraction of the estimated MSY.

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 (Thread Herring Complex Southern Gulf of California) and attempt new methods.

The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy. **R7, R13, R15**

A2.3:

There does not appear to be a TAC set for the fishery as a whole nor the individual species, although the INP does make recommendations (700,000t for all small pelagic species in the 2012 CNP).

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

The fishery for small pelagic fish in Mexico is managed using a control rule based on removing a fraction of the allowable biomass above a minimum threshold. Such fraction can oscillate between 5 and 25% and it is assumed that if the "fraction is approximately equal to F_{msy}, then the harvest rate in the control rule will not exceed F_{msy}".

The language in the Plan is interpreted such that this BAC (and the corresponding fraction) works as a Limit Reference Point (LRP) and therefore is acting as a precautionary approach in the management of the fishery because, 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.

The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status. **R5, R7, R15**

A2.4-A2.5:
The CNP is a binding instrument for the fisheries authorities' decision- making process. This Fisheries Charter includes the diagnosis and assessment of a fishery, fisheries and conservation indicators, and recommendations by INP/INAPESCA for or the management of the fisheries that are included in the CNP.

Updates of CNP are prepared by INP/INAPESCA every two or three years, but before the updates of the CNP are published in the Offical Gazette the draft update undergoes 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 an opinion of the fisheries status. The latest version of the CNP (2017) was published by INP in June 2018.

The assessments are subject to internal or external peer review and are made publically available. **R5,R7,R13, R15**

References

R5 Carta Nacional Pesquera (2018) Acuerdo por el que se da a conocer la actualización de la Carta Nacional Pesquera. (Continúa en la Tercera Sección). https://www.gob.mx/cms/uploads/attachment/file/334832/DOF_-CNP_2017.pdf

R7 Alvarez. C, Anhalzer G (April 2018) Southern Gulf of California Thread Herring Fishery (Sinaloa & Nayarit, Mexico) First Surveillance Audit Report SCS Global Services 73pp

R13 SCS Global Services Report. 2018. Small Pelagics Fishery In Sonora, Gulf of California. MSC Fishery Assessment Report- Public Certification Report. 363 pp. https://cert.msc.org/FileLoader/FileLinkDownload.asmx/GetFile?encryptedKey=yHo1ADc6rEFZpAwyFhB061LIgQfRoY4i8/BFKvGIuXFlC5kCw6VCdStkyBvkF1X2

R15: Jacob-Cervantes M.L, J. Payán-Alejo and J.R. Rendón-Martínez. 2017a. Evaluación de las poblaciones de sardina crinuda (*Opistonema libertate, O. medirastre y O. bulleri*) al sur del Golfo de California: Avances. Reporte técnico del Programa de Pelágicos Menores del Sur del Golfo de California. INAPESCA, CRIP. Mazatlán, Sinaloa. 29 pp. http://www.academia.edu/15826175/Proyecto-doctorado

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

A3.1:

The fishery for small pelagic fish in Mexico is managed using a control rule that is based on removing a fraction of the allowable biomass above a minimum threshold. The opportunistic nature of the small pelagic fleet makes it difficult to interpret CPUE on a particular species, as the fleet prefers Monterrey (Pacific) sardine but will opportunistically capture any of the marketable small pelagic species it encounters. The level of fishing is controlled by fishing seasons and effort restrictions.

It is considered difficult to implement a control rule over a stock complex that could require a low allowable catch level on one component of the complex while other components are abundant but could not be harvested in full because the fishery cannot separate the least abundant species from the most abundant. The industry needs to be aware of this problem to discuss with the scientific staff and start working with them to develop a strategy to address this issue.

There is effective monitoring of each fishing boat's position at all times through a compulsory satellite detection system and subject to sanctions. Each and every landing operation is sampled by technical personnel from the Centro Regional de Investigación Pesquera (CRIP, Regional Center for Fisheries Research, a branch of INAPESCA). Personnel from CONAPESCA, formally identified, perform regular and frequent inspection visits to fish processing plants and boats to assert that all norms and precepts of the regulations in force are fully complied with.

Specific mechanisms in the FMP operate such that its definition of 'sustainable levels' is consistent with MSY. The main reference point (BAC, a LRP) is established and expected to keep biomass above the level producing MSY. Records indicate that recorded catches of *S.crinuda* (*O.libertate*) have never exceeded the calculated BAC (**Figure 7**, **R15**):

Figure 7 Biomass trajectories of Thead herring in the Gulf of California estimated using a biomass dynamics model with environmental forcing. ***S. crinuda*** – ***O.libertate*** **R15**

There is a mechanism in place by which total fishing mortality of this species is restricted **R7**, **R15**

A3.2:

There does not appear to be a TAC set for the fishery as a whole nor for individual species, although the INP does make recommendations (700,000t for all small pelagic species in the 2012 CNP). The NOM has set a species minimum landing size; fleet capacity is controlled (no further increase in vessel numbers North of 20°N) and no addition of vessels to the fleet unless they are to replace old active boats that are retired.

This TAC needs to be technically justified in future assessments, and efforts should be made to achieve accurate assessments of population abundance by species.

However the NOM 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 INAPESCA.

The total catch of small pelagics for the 2015/2016 season was 203,037t; 41,428t smaller than the 2014/2015 season. However, catches of thread herring complex have increased. The opportunistic nature of the small pelagic fleet makes it difficult to interpret CPUE on a particular species, as the fleet prefers Monterrey (Pacific) sardine but will opportunistically capture any of the marketable small pelagic species it encounters. In recent years the Biologically Acceptable Catch (BAC) for *O.libertate* has not been exceeded.

Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment **R5, R7, R15**

A3.3:

The definitive determination of reference points (*Opisthonema* complex) in the Southern Gulf is in progress however further work is required. For now, F_{MSY} still is the default 0.25 suggested in the management plan but INAPESCA staff are considering substituting this value with an estimated parameter once the new model operates to the satisfaction of the assessment needs.

An important development was discussed in a management system review which 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.

Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy. **R5, R7, R15**

References

R5 Carta Nacional Pesquera (2018) Acuerdo por el que se da a conocer la actualización de la Carta Nacional Pesquera. (Continúa en la Tercera Sección). https://www.gob.mx/cms/uploads/attachment/file/334832/DOF_-CNP_2017.pdf

R7 Alvarez. C, Anhalzer G (April 2018) Southern Gulf of California Thread Herring Fishery (Sinaloa & Nayarit, Mexico) First Surveillance Audit Report SCS Global Services 73pp

R15 Jacob-Cervantes M.L, J. Payán-Alejo and J.R. Rendón-Martínez. 2017a. Evaluación de las poblaciones de sardina crinuda (*Opistonema libertate, O. medirastre y O. bulleri*) al sur del Golfo de California: Avances. Reporte técnico del Programa de Pelágicos Menores del Sur del Golfo de California. INAPESCA, CRIP. Mazatlán, Sinaloa. 29 pp. http://www.academia.edu/15826175/Proyecto-doctorado

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

A4.1:

The status of the Thread Herring complex have been evaluated using VPA and a surplus production model. Results show that each stock has either been stable for a long time or has 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.

The stock is at or above the target reference point **R7, R15**

References

R7 Alvarez. C, Anhalzer G (April 2018) Southern Gulf of California Thread Herring Fishery (Sinaloa & Nayarit, Mexico) First Surveillance Audit Report SCS Global Services 73pp

R15 Jacob-Cervantes M.L, J. Payán-Alejo and J.R. Rendón-Martínez. 2017a. Evaluación de las poblaciones de sardina crinuda (*Opistonema libertate, O. medirastre y O. bulleri*) al sur del Golfo de California: Avances. Reporte técnico del Programa de Pelágicos Menores del Sur del Golfo de California. INAPESCA, CRIP. Mazatlán, Sinaloa. 29 pp.

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		**Bocona sardine**
B1	Species Name	*Cetengraulis mysticetus*
	Table used (Ba, Bb)	Ba
	Outcome	**PASS**

Evidence

B1:

Bocona sardine is passively managed under the FMP. For passively managed species, the control rule determined that the BAC is simply 25% of the most recent estimate of the SSB.

The biomass is about twice the level producing MSY while the fishing mortality rate has been much lower than the level producing the MSY (**Figure 8**):

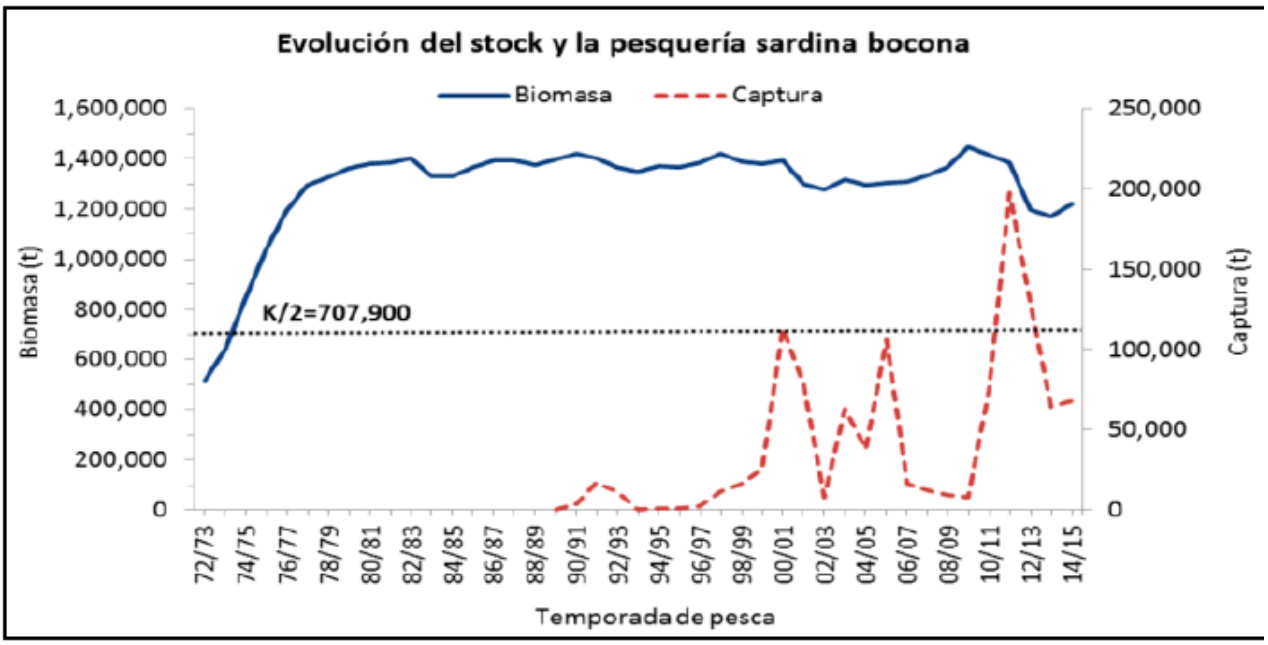

Figure 8 Biomass trajectory of bocona sardine in the Gulf of California estimated using a biomass dynamics model with environmental forcing **R13**

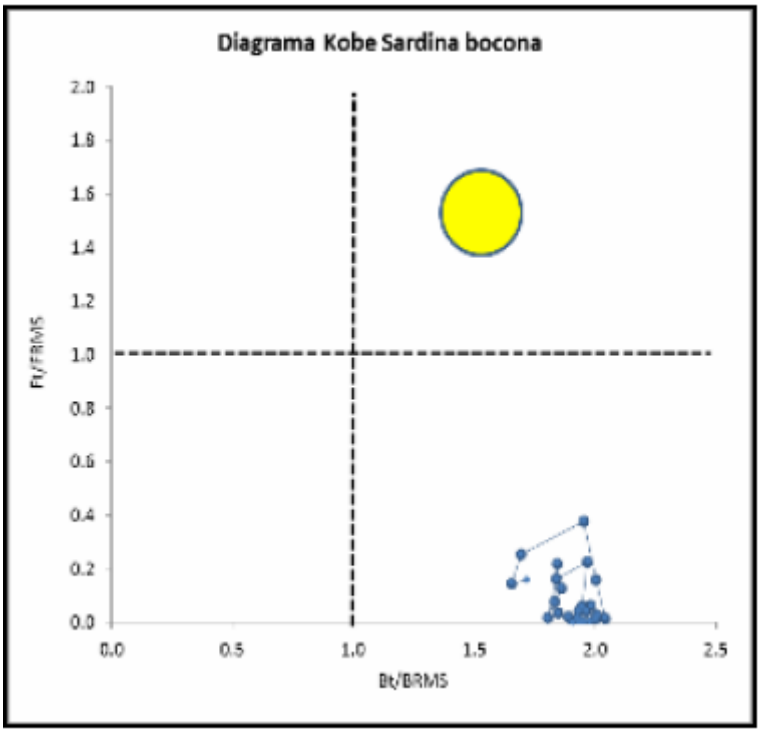

Figure 9. Kobe plot with stock status history of bocona sardine in the Gulf of California **R13**

R2, R13

References

R2 Fisheries Management Plan for the minor pelagic species (Plan de manejo pesquero para la pesquería de pelágicos menores) http://dof.gob.mx/nota_detalle_popup.php?codigo=5276945

R13 SCS Global Services Report. 2018. Small Pelagics Fishery In Sonora, Gulf of California. MSC Fishery Assessment Report- Public Certification Report. 363 pp.

Standard clauses 1.3.2.1

CATEGORY C SPECIES

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

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

Species Name		**Chub mackerel *S.japonicus***	
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**

Evidence

C1.1:

Legal and administrative frameworks exist at the national and international level. Pacific chub mackerel is managed as a component of the pelagic stock. Sufficient information is collected to allow for stock assessment and the informed management of the stock. Fishery removals of the species in the fishery under assessment are included in the stock assessment process. The latest survey was undertaken in March 2018 and covered a total of 21,200 km^2 between latitude 0^0 02 N and 3^0 23 S; divided into Subarea A and B:

Total biomass estimated was 265,714t, around 74% of the previous estimation. The species is highly dependent on environmental changes and its dynamic is very influenced by El Niño and La Niña natural events being considering as a bio-indicators, according to studies carried out by INP.

Fishery removals of the species in the fishery under assessment are included in the stock assessment process **R13, R16**

C1.2:

Chub mackerel is designated under the active management category. For species actively managed, the FMP has added an MSY-based control rule which, based on the application of a harvest rate, requires the catch to be reduced if the biomass declines. Eventually, if a biomass threshold is reached, the fishery stops operating.

Using a biomass dynamics model Nevárez-Martínez et al. (2016e, **R13**) calculated biological reference points for Chub mackerel. The fishing mortality rate at MSY was estimated to be 0.350 and MSY at 70,000t. No estimates of fishing mortality rates using the ASAP approach are available for chub mackerel (**Table 1; Figure 10**)

Table 1 Biomass model parameter and biological reference points for chub mackerel (*Scomber japonicus*) in the Central-Northern Gulf of California fishery **R13**

Parameter	Chub mackerel
R	0.700
K	400,000
B_0	360,000
B_{MSY}	200,000
MSY	70,000
F_{MSY}	0.350
f_{MSY}	1,964
q_{med}	1. 78E-04

The biomass dynamics model pools catch of chub mackerel indicate that recorded catches are far below the estimated B_{MSY} for all of its trajectory:

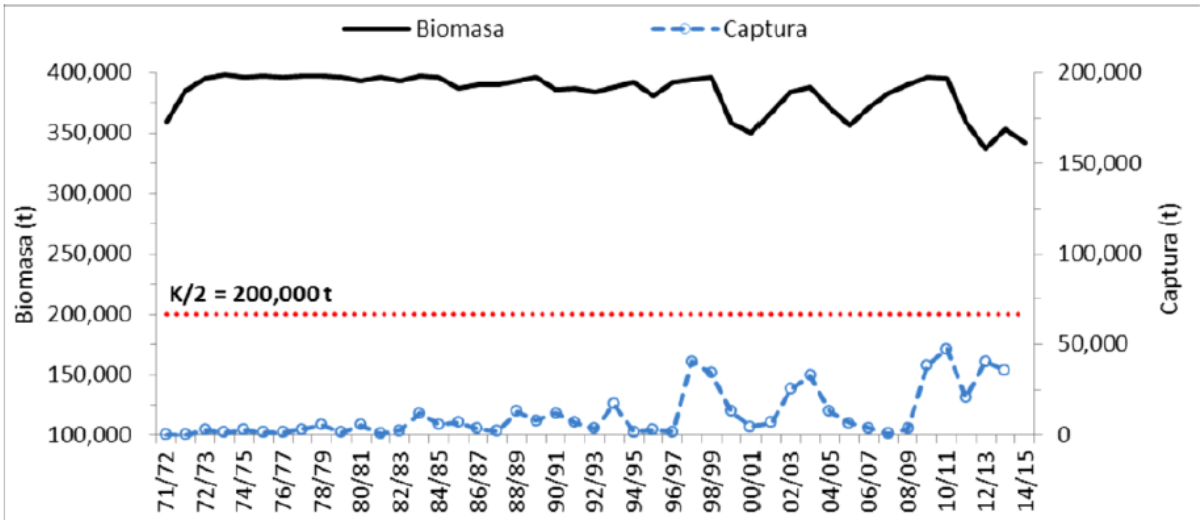

Figure 10. Biomass trajectories of chub mackerel in the Gulf of California **R13**

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 B_{MSY} and average fishing mortality rate remains below F_{MSY}, thus there is no risk of overfishing

The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy). **R13, R16**

References

R13 SCS Global Services Report. 2018. Small Pelagics Fishery In Sonora, Gulf of California. MSC Fishery Assessment Report- Public Certification Report. 363 pp

R16 Instituto Nacional de Pesca (March 2018) Hydroacoustic abundance estimates and biomass for the main pelagic species (Report No INP-SRP-CNP) 20pp

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.

D1	**Species Name:**	**Red-eye herring *Etrumeus teres***	
	Productivity Attribute	**Value**	**Score**
	Average age at maturity (years)	0.5	1
	Average maximum age (years)	3	2
	Fecundity (eggs/spawning)	Egg >10000	1
	Average maximum size (cm)	33	1
	Average size at maturity (cm)	16.4	1
	Reproductive strategy	Pelagic eggs	1
	Mean trophic level	3.6	3
	Average Productivity Score		**1.4**
	Susceptibility Attribute	**Value**	**Score**
	Overlap of adult species range with fishery	25-50%	2
	Distribution	N/A	
	Habitat	Pelagic	1
	Depth range	N/A	
	Selectivity	1-2	2
	Post-capture mortality	Retained	3
	Average Susceptibility Score		**2**
	PSA Risk Rating (From Table D3)		**PASS**
	Compliance rating		**PASS**

D1:
Red-eye herring is caught as bycatch in this pelagic fishery. No research or stock assessment activities are conducted specifically in relation to this species. There is an obligation to report all landings in the logbooks, therefore by-catch information is available. Regulations targeting other species are likely to affect the level and nature of fishing pressure on the species.

The comparative lack of scientific information on the status of the population means that a risk-assessment style approach must be taken. The species is assessed as a Category D species. This species has not yet been assessed by the IUCN Red List and currently does not appear in any CITES appendices of endangered species (websites accessed 17.12.18).

Using the Productivity-Susceptibility Analysis (PSA) for Category D species this species approved (by-product) under the current IIFO RS Standard 2.0

References

R17 Fishbase: Red Eye Round Herring: http://www.fishbase.org/Summary/SpeciesSummary.php?ID=1455&AT=ROUND+HERRING

Standard clauses 1.3.2.2

Table D2 - Productivity / Susceptibility attributes and scores.

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

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

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

D3		Average Susceptibility Score		
		1.00 – 1.75	1.76 – 2.24	2.25 – 3.00
Average Productivity Score	1.00 – 1.75	PASS	PASS	PASS
	1.76 – 2.24	PASS	PASS	TABLE D4
	2.25 – 3.00	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.

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

F1.1-F1.3:

Monterrey (Pacific) sardine in the Gulf of California are fished with purse seine nets. Compared to many 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 which is supported by surface floats.

Monitoring of ETP species occurred during the observer program (2013/2014); results are presented below (**Table 2)**. Data includes the ETP species Spanish common name, Latin name, observed sets, percentage of all individuals within each species, total number of organisms observed and the number of organisms with lethal interactions.

Some mitigation measures were noted to be partially in place such as "*Scaring, by spraying water with a pressure hose to keep birds away from the buoy line of the net."* Continued monitoring and development of mitigation strategies is needed:

Table 2: INAPESCA-SARGARPA Report on the purse seine observer programme **R13, R18**

Spanish Common Name	Species	Status NOM-059	No. of observed sets	% of observed sets	No. Org. Encountered	No. Mortalities
Peces/Fishes						
Caballito de mar	*Hippocampus ingens*	Vulnerable	9	0.28	9	5
Ángel de Cortez	*Pomacanthus zonipectus*	Least Concern	2	0.093	2	2
Marlín rayado	*Kajikia audax*	Near Threatened	3	0.14	5	5
Gavilán dorado	*Rhinoptera steindachneri*	Near Threatened	5	0.23	43	43

Guitarra espinuda	*Platyrhinoidis triseriata*	Least Concern	1	0.04	1	1
Raya eléctrica ocelada	*Diplobatis ommata*	Vulnerable	1	0.093	1	1
Manta diabla	*Mobula munkiana*	Near Threatened	1	0.04	4	4
Tiburón arenero	*Carcharhinus obscurus*	Vulnerable	1	0.04	1	1
Tiburón martillo	*Sphyrna lewini*	Endangered	7	0.33	10	10
Tiburón ballena	*Rhincodon typus*	Vulnerable	2	0.09	1	-
Tortugas/Turtles						
Tortuga golfina	*Lepidochelys olivacea*	Vulnerable	3	0.14	3	-
Tortuga prieta	*Chelonia agassizii*	Endangered	3	0.14	3	-
Aves/Birds						
Pardela pata rosada	*Puffinus creatopus*	Vulnerable	14	0.99	34	-
Pardela mexicana	*Puffinus ophistomelas*	Endangered	23	1.6	43	-
Bobo pata azul	*Sula nebouxii*	Least Concern	261	12.23	9,236	101
Pelicano pardo	*Pelecanus occidentalis*	Least Concern	1305	61.15	67,357	83
Gaviota ploma	*Larus heermanni*	Near threatened	542	23.5	22,438	2
Gaviota pata amarilla	*Larus livens*	Least Concern	69	3.23	687	-
Charran elegante	*Thalasseus elegans*	Near Threatened	16	0.75	230	-
Mamíferos/Marine Mammals						
Delfín	*Delphinus* spp	Special Protection	94	4.4	1,085	34
Lobo marino	*Zalophus californianus*	Least Concern	984	46.11	9,375	1

Observer Programme update:

A total of five vessels of the Thread Herring fleet (Southern Gulf Purse Seine (Sinaloa & Nayarit, Mexico) of nine operational vessels carried on-board observers in 2017. An observer manual includes information on the regulations of the fishery, outlines the responsibilities of the observers and details the type of information that needs to be collected according the specific forms.

Improvements noted in the coverage and training of the observer program has 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.

A review of existing and new mitigation measures to reduce impacts on ETP species and reduce bycatch (Southern Gulf fishery) was presented during an INAPESCA 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 INAPESCA in collaboration with Maz Sardina completed the 5th "Best Practices workshop. A Manual for Mitigation Measures and Best Practices was also published in 2015. This includes guidelines in 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.

In conjunction with the 'Best Practices Workshop's and the 'Mitigation Measures' the fishery 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 put in place to reward the crew for trips with a proportion of bycatch ≤2% of catch.

If the fishery is known to interact with ETP species, measures are in place to minimise mortality. **R12-R13, R16, R18**

References

R12 Nevarez-Martinez et al 2015 Evaluación poblacional de la sardina monterrry (Sardinops sagax) en el Golfo de California, Mexico, 1971/71 -2014/2015. Informe Técnico del Programa de Pelágico Menores. Instituto Nacional de Pesca, CRIP Guaymas, Sonora, 23pp. http://www.sardinagolfodecalifornia.org/wp-content/uploads/2015/12/InfTec_Evaluaci%C3%B3n-sardina-monterrey_2015.pdf

R13 SCS Global Services Report. 2018. Small Pelagics Fishery In Sonora, Gulf of California. MSC Fishery Assessment Report- Public Certification Report. 363 pp. https://cert.msc.org/FileLoader/FileLinkDownload.asmx/GetFile?encryptedKey=yHo1ADc6rEFZpAwyFhB061LIgQfRoY4i8/BFKvGIuXFlC5kCw6VCdStkyBvkF1X2

R16 Instituto Nacional de Pesca (March 2018) Hydroacoustic abundance estimates and biomass for the main pelagic species in Ecuador (Report No INP-SRP-CNP) 20pp

R18 Padilla-Serrato, J.G, et al 'Programa de observadores a bordo de la flota cerquera en el Golfo de California' INAPESCA-SARGARPA. 69pp

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

F2.1-F2.3:

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 the small mesh nylon netting is easily damaged.

Research carried out in 2004 by CRIP with Support from SAGARPA evaluated the impact of bottom trawlers from the shrimp and demersal finfish fisheries in the bottom substrates in the Gulf of California. Despite the changes in sediment structure as a result of the suspension and redisposition of organic matter, the study did not find significant changes in benthic communities affected by bottom trawls. The study suggested that this was due to the high energy process in this area where benthic communities are capable of absorbing the impact of the bottom trawls.

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.

There is no substantial evidence that the fishery has a significant negative impact on physical habitats. **R12, R16**

References

R12 Nevarez-Martinez et al 2015 Evaluación poblacional de la sardina monterrry (Sardinops sagax) en el Golfo de California, Mexico, 1971/71 -2014/2015. Informe Técnico del Programa de Pelágico Menores. Instituto Nacional de Pesca, CRIP Guaymas, Sonora, 23pp. http://www.sardinagolfodecalifornia.org/wp-content/uploads/2015/12/InfTec_Evaluaci%C3%B3n-sardina-monterrey_2015.pdf

R16 Instituto Nacional de Pesca (March 2018) Hydroacoustic abundance estimates and biomass for the main pelagic species in Ecuador (Report No INP-SRP-CNP) 20pp

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-F3.3:

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 Gulf of California ecosystem. Removing lower trophic-level species has the potential to impact dynamics and abundance of their predator populations.

Monterrey (Pacific) sardine is a low trophic level (LTL) species, and has been described as an important component of the Gulf of California Ecosystem as has being recognised as a key species in the ecosystem. Thread herring is not considered key. The thread herring in the Gulf of California was evaluated at the time as a simple LTL species and not a key LTL species by observing definitions in MSC Certification Requirements and Guidance to MSC Certification. As thread herring is a forage species a recent assessment of this fishery (**R13**) has concluded that ecosystem considerations for this species are also required under this Performance Indicator. This corrective action should be monitored in future assessments.

Monterey (Pacific) sardines are an important component in the diet of seabirds, large pelagics, and sharks and that changes in the abundance of small pelagics may influence the distribution of the populations of its predator.

An estimated threshold harvest rate for Pacific sardine to risk an irreversible disruption of ecosystem structure and function is established at 36%. INP scientists are working on determine B_{min} based on ecosystem needs.

The 2012 FMP (**R2**) 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.

Active management is for stocks with biologically significant catch levels, and/or socioeconomic or ecological considerations, requiring or demanding relatively intense management procedures, and having sufficient

information. The second category of management is for stocks that do not require intensive management; where the monitoring of landings and abundance indices are considered sufficient for their handling.

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 total permissible fishery removals. **R2,R13 R16**

References

R2 Fisheries Management Plan for the minor pelagic species (Plan de manejo pesquero para la pesquería de pelágicos menores) http://dof.gob.mx/nota_detalle_popup.php?codigo=5276945

R13 SCS Global Services Report. 2018. Small Pelagics Fishery In Sonora, Gulf of California. MSC Fishery Assessment Report- Public Certification Report. 363 pp.

R16 Instituto Nacional de Pesca (March 2018) Hydroacoustic abundance estimates and biomass for the main pelagic species in Ecuador (Report No INP-SRP-CNP) 20pp

Standard clause 1.3.3.3

Appendix A - Determining Resilience Ratings

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

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

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

t_{max} (years)	1 - 3	4 – 10	11 – 30	> 30

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

Appendix B – Background on the 5% catch rule

The proposed fishery assessment methodology uses a species categorisation approach to divide the catch in the assessment fishery into groups. These groups are:

- **Category A:** "Target" species with a species-specific management regime in place.
- **Category B:** "Target" species with no species-specific management regime in place.
- **Category C:** "Non-target" species with a species-specific management regime in place.
- **Category D:** "Non-target" species with no species-specific management regime in place

The distinction between 'target' and 'non-target' species is made to enable the assessment to consider the impact of the fishery on all the species caught regularly, without requiring a full assessment be conducted for each. Thus 'target' species are subjected to a more detailed assessment, while 'non-target' species are considered more briefly. For the purposes of the IFFO RS fishery assessment, 'target' and 'non-target' species are defined by their prevalence in the catch, by weight. Applicants must declare which species are considered 'target' species in the fishery, and the combined weight of these must be at least 95% of the annual catch. The remaining 5% can be made up of 'non-target' species. Note also that ETP species are considered separately, irrespective of their frequency of occurrence in the catch.

The proposed use of 5% as a limit for 'non-target' species is one area in which feedback is being sought via the public consultation. The decision to propose a value of 5% ensures consistency with other fishery assessment programmes, such as the MSC which uses 5% to distinguish between 'main' and 'minor' species (see MSC Standard, SA3.4 and GSA3.4.2); and Seafood Watch, which uses 5% when defining the 'main' species for the assessment (see Seafood Watch Standard, Criterion 2). The value is also consistent with the approached used in Version 1 of the IFFO RS Standard, in which up to 5% of the raw material could be comprised of 'unassessed' species.

Comments on this proposition are welcomed along with any other feedback on the proposed approach.