



MarinTrust Standard V2

Whole fish Fishery Assessment Gulf of California small pelagics fishery, in Eastern Central Pacific FAO 77, Baja California, Mexico

MarinTrust Programme

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Table 1 Application details and summary of the assessment outcome

Application details and summary of the assessment outcome			
Name(s): Sardinias de Sonora S.A. de C. V, Guaymas Protein Company SA, Maz Industrial SA de CV, Industrias Barda S.A de C.V, Pacifico Industrial S.A de C.V, The Scoular Company (Pescaharina De Guaymas SA de CV and Productos Pesqueros de Guaymas S.A. de C.V)			
Country: Mexico			
Email address:		Applicant Code	
Certification Body Details			
Name of Certification Body:		Global Trust Certification	
Assessor Name	CB Peer Reviewer	Assessment Days	Initial/Surveillance/ Re-approval
Léa Lebechnech	Matthew Jew	6	Re-approval
Assessment Period	From October 2022 to October 2023		
Scope Details			
Management Authority (Country/State)		Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food SAGARPA, Mexico	
Main Species		Pacific sardine (<i>Sardinops sagax</i>) Thread herring (<i>Opisthonema spp</i>) Californian anchovy/Anchoveta (<i>Engraulis mordax</i>)	
Fishery Location		Eastern Central Pacific FAO 77: Baja California, Mexico	
Gear Type(s)		Purse Seine	
Outcome of Assessment			
Overall Outcome		PASS when Pacific sardine and thread herring are included as category A PASS when Californian anchovy is included as category B	
Clauses Failed		Maz industrial fleet does not match the scope of the existing MSC certified fishery and so failed the MSC Verification part of this assessment. Consequently, the 3 target species have been fully assessed in this report under their respective A/B categories.	
CB Peer Review Evaluation		Agree with the assessor's determination.	
Fishery Assessment Peer Review Group Evaluation		Agree with the assessor's determination. See Appendix	

Recommendation	Re-approval
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Table 2. Assessment Determination

Assessment Determination
<p>Small pelagic species being assessed in this surveillance audit are Pacific sardine, thread herring, Californian anchovy/anchoveta, bocona sardine/Pacific anchoveta, chub mackerel, round herring/Japanese sardine, and leatherjackets.</p> <p>If any species is categorised as Endangered or Critically Endangered on IUCN’s Red List, or if it appears in the CITES appendices, it cannot be approved for use as Marin Trust raw material. None of the assessed species appear as Endangered or Critically Endangered on IUCN’s Red List, nor does it appear in CITES; therefore, the species are eligible for approval for use as Marin Trust Whole-fish raw material.</p> <p>Pacific sardine and Thread herring represent more than 5% of the total catches and fall under Category A because they are managed under the Fishery Management Plan (FMP) for small pelagics.</p> <p>Pacific anchoveta represents more than 5% of the total catches and falls under Category B because it is not managed under a specific fishery management plan.</p> <p>The rest of the species are assessed under Category C (chub mackerel) and D (round herring and leatherjackets) as they represent less than 5% of the total catch and they are actively or passively managed under the FMP for small pelagics.</p> <p>All seven species were assessed accordingly in their respective categories and passed.</p> <p>As the previous MT surveillance audit (Surveillance 2), this re-approval has been done following the Verification process tool developed by Marin Trust (https://www.marin-trust.com/news/marintrust-unveils-new-verification-tool-fishmeal-plants-claiming-bereceiving-msc-certified).</p> <p>As per guidelines, when the verification tool is used to evaluate a fishery against Marin Trust Fisheries standard V2.0, the clauses M and F are not scored as they are already assessed and scored in the relevant MSC report.</p> <p>In the case of this re-approval, the considered MSC certified fishery is only the following one:</p> <p style="padding-left: 40px;">Small Pelagic fishery in Sonora (Gulf of California); fishery certified in 2011. The first reassessment was performed in 2016 and the 4th surveillance audit was posted on January 3rd, 2023. The fishery is currently under re-assessment : the Announcement Comment Draft Report (ACDR) has been published on 14 October 2022. The target species are Northern/Central Gulf of California Pacific sardine (<i>Sardinops sagax</i>) and Northern/Central Gulf of California thread herring complex (<i>Opisthonema spp.</i>).</p> <p>Mainly the ACDR 2022 and the 3rd and 4th surveillance audit reports have been used in this MT whole-fish re-approval report.</p> <p>In this report, the main species classified as category A have been included in the report as MSC verification elements and the species classified as category B, C or D have been included in whole fish report where applicable as usual in the whole fish reports.</p> <p>Whilst most of the fleets covered by this assessment passed a MSC Verification assessment to assess whether the scope of their activities matched that of the certified MSC fishery “Small pelagics fishery in Sonora, Gulf of California”, MAZ industrial’s fleet do not appear to be covered by the MSC assessment. Consequently, the target species were assessed under clauses A and B of this Whole Fish report. The results of that assessment are as follows: Pacific sardine and thread herring PASS category A, Californian anchovy/Anchoveta and Bocona sardine/Pacific anchoveta PASS category B, Chub mackerel PASSES category C, round herring/Japanese sardine and leatherjackets PASS category D.</p>

As mentioned above, general clauses are not evaluated in this surveillance as they are part of the MSC verification tool and there is no need to re-assess the management plan or impact on the ecosystem as these clauses are included in the principles 2 and 3 of the MSC certified fisheries. Consequently, the assessor can assume that all the M and F clauses are met for this fishery.

The assessor wants to underline that due to problems in datasets and lack of MT guidance, the catches data for this re-approval are approximative and consequently, consistent and fully comprehensive data from all the concerned 7 companies will be needed for next year's assessment (surveillance 1).

In conclusion, the assessor recommends the approval of:

- Pacific sardine (*Sardinops sagax*) and thread herring (*Opisthonema spp*) as category A species,
- Californian anchovy/anchoveta (*Engraulis mordax*) and bocona sardine/Pacific anchoveta (*Cetengraulis mysticetus*) as category B,
- Chub mackerel (*Scomber japonicus*) as category C,
- Round herring/Japanese sardine (*Etremeus teres*) and leatherjackets (*Oligoplites sp*) as category D.

Therefore, they can be used for the production of fishmeal and/or fish oil under the current Marin Trust Whole fish and by-product Standard (v 2.0).

Fishery Assessment Peer Review Comments

The fishery assessment uses the verification process developed by Marin Trust (<https://www.marin-trust.com/news/marintrust-unveils-new-verification-tool-fishmeal-plants-claiming-be-receiving-msc-certified>).

The assessor has stated that “As per guidelines, when the verification tool is used to evaluate a fishery against Marin Trust Fisheries standard V2.0 the clauses M and F are not scored as they are already assessed and scored in the relevant MSC report.” MAZ industrial’s fleet of 8 purse seine vessels are not covered by the MSC assessment. The assessor noted an absence in guidance and proposes that clarification from MT is provided on how to assess the MAZ fleet using the VT tool.

It would be helpful if these guidelines could be made available to the peer reviewer for the new VT tool to validate the level of evidence required/provided.

Catch composition is quite different from the previous year MT review and given the assessor raises concern regarding accurate catch data and lack of data from most clients we would agree that it is essential to have accurate and consistent catch data prior to next review.

Notes for On-site Auditor

N/A

Table 3 General Results

General Clause	Outcome (Pass/Fail)
M1 - Management Framework	As MSC verification used – default pass
M2 - Surveillance, Control and Enforcement	As MSC verification used – default pass
F1 - Impacts on ETP Species	As MSC verification used – default pass
F2 - Impacts on Habitats	As MSC verification used – default pass
F3 - Ecosystem Impacts	As MSC verification used – default pass

Table 4 Species- Specific Results

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

Category	Species	% landings	Outcome (Pass/Fail)	
Category B	Californian anchovy/Anchoveta <i>Engraulis mordax</i>	45.7 - 65.3	Pass	
Category A	Monterrey Pacific sardine <i>Sardinops sagax</i>	30.7 – 4.2	A1	Pass
			A2	Pass
			A3	Pass
			A4	Pass
	Thread herring <i>Opisthonema spp</i>	9.8 - 16.4	A1	Pass
			A2	Pass
			A3	Pass
			A4	Pass
Category B	Bocona sardine/Pacific anchoveta <i>Cetengraulis mysticetus</i>	8.6 – 11.8	Pass	
Category C	Chub mackerel <i>Scomber japonicus</i>	4 – 0.9	Pass	
Category D	Round herring <i>Etremeus teres</i>	1 – 0.7	Pass	
	Leatherjackets <i>Oligoplites spp</i>	0.7 - 0	Pass	

The stock of Monterrey (Pacific) sardine *Sardinops sagax* and thread herring *Opisthonema spp*, have been assessed under **CATEGORY A SPECIES** because MAZ fleet is not equivalent with the MSC certified fisheries.

For the catch data presented in this re-approval, 2 sources have been used:

- Catch summary for observed fishery data from 2021-22 for small pelagic (COBI 2022, Arizmendi-Rodriguez et al, 2022) from the MSC Announcement Comment Draft Report for Small Pelagic Fishery in Sonora, Gulf of California published on 14 October 2022. The client is *Cámara Nacional de la Industria Pesquera* (CANAINPES).
- The catches composition data from the company Sardinas de Sonora S.A. de C. V.

It should be noted that no reliable information seems to be available or was provided for the other clients. Due to the lack of consistent data and guidance from MT, the percentages of landings are only ranged.

Given the variation in species percentage in the two sources and the lack of data from most of the clients, the species categorisation confidence in this WF report is low-medium and remains approximative.

Therefore, the assessor wants to insist on the importance to have fully consistent and accurate data for the next year's MT assessment (Surveillance 1).

Table 5 Species Categorisation Table

Common name	Latin name	Stock	IUCN Redlist Category ¹	% of landings	Management	Category
Californian anchovy/Anchoveta	<i>Engraulis mordax</i>	FAO 77 Pacific Southeast	DD	45.7 - 65.3	SAGARPA	B
Monterrey (Pacific) sardine	<i>Sardinops sagax</i>		LC	30.7 – 4.2	SAGARPA	A
Thread herring	<i>Opisthonema spp</i>		LC	9.8 - 16.4	SAGARPA	A
Bocona sardine/Pacific anchoveta	<i>Cetengraulis mysticetus</i>		LC	8.6 – 11.8	SAGARPA	B
Chub mackerel	<i>Scomber japonicus</i>		LC	4 – 0.9	SAGARPA	C
Round herring	<i>Etremeus teres/acuminatus</i>		LC	1 – 0.7	SAGARPA	D
Leatherjackets	<i>Oligoplites sp</i>		LC	0.7 - 0	SAGARPA	D
Species categorisation rationale						
<ul style="list-style-type: none"> Given the variation in species % in the two sources and the lack of data from most of the clients, the species categorisation confidence in this WF report is considered low-medium. This year's WF report will use the same hybrid approach as in previous years, i.e. a combination of WF & MSCV. 						

Furthermore, it is important to note that, as a part of the verification tool report the M and F clauses are not assessed herein. They are covered under section P2 PIs and P3 PIs of the MSC certified fisheries (Third Surveillance, published in November 2021) and it is assumed that they are equivalent to respectively M and F clauses in MarinTrust whole fish report.

However, as not all clients are covered by the MSC report, the category A and B clauses will still be completed for all the species.

¹ <https://www.iucnredlist.org/>

MANAGEMENT

It is important to note that, as a part of the verification tool report the M clauses are not assessed herein. They are covered under section P3 Pls of the MSC certified fisheries from the Third Surveillance report published in November 2021, and it is assumed that they are equivalent to M clauses in MarinTrust whole fish report.

The two clauses in this section (M1, M2) relate to the general management regime applied to the fishery under assessment. The clauses should be completed by providing sufficient evidence to justify awarding each of the requirements a pass or fail rating. A fishery must meet all the minimum requirements in every clause before it can be recommended for approval.

M1 Management Framework – Minimum Requirements		
M1.1	There is an organisation responsible for managing the fishery.	
M1.2	There is an organisation responsible for collecting data and assessing the fishery.	
M1.3	Fishery management organisations are publicly committed to sustainability.	
M1.4	Fishery management organisations are legally empowered to take management actions.	
M1.5	There is a consultation process through which fishery stakeholders are engaged in decision-making.	
M1.6	The decision-making process is transparent, with processes and results publicly available.	
		Clause outcome:
M1.1	There is an organisation responsible for managing the fishery.	
M1.2	There is an organisation responsible for collecting data and assessing the fishery.	
M1.3	Fishery management organisations are publicly committed to sustainability.	
M1.4	Fishery management organisations are legally empowered to take management actions.	
M1.5	There is a consultation process through which fishery stakeholders are engaged in decision-making.	
M1.6	The decision-making process is transparent, with processes and results publicly available.	
References		
Links		
MarinTrust Standard clause	1.3.1.1, 1.3.1.2	
FAO CCRF	7.2, 7.3.1, 7.4.4, 12.3	
GSSI	D.1.01, D.4.01, D2.01, D1.07, D1.04,	

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

	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.	
Clause outcome:			
<p>M2.1 There is an organisation responsible for monitoring compliance with fishery laws and regulations.</p> <p>M2.2 There is a framework of sanctions which are applied when laws and regulations are discovered to have been broken.</p> <p>M2.3 There is no substantial evidence of widespread non-compliance in the fishery, and no substantial evidence of IUU fishing.</p> <p>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.</p>			
References			
Links			
MarinTrust Standard clause		1.3.1.3	
FAO CCRF		7.7.2	
GSSI		D1.09	

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

Table 6. Results of verification of MSC P1 species:

[View Small Pelagics Fishery in Sonora, Gulf of California - MSC Fisheries.](#)

Verification	MSC report	MarinTrust applicant	Results
1. Scope (Species and Area)	(1) Northern/Central Gulf of California Pacific sardine (<i>Sardinops sagax</i>) (2) Northern/Central Gulf of California thread herring complex (<i>Opisthonema spp.</i>) 3) Gulf of California Pacific anchoveta (<i>Cetengraulis mysticetus</i>) 4) Gulf of California Californian anchovy (<i>Engraulis mordax</i>) 5) Gulf of California chub mackerel (<i>Scomber japonicus</i>)	(1) Northern/Central Gulf of California Pacific sardine (<i>Sardinops sagax</i>) (2) Northern/Central Gulf of California thread herring complex (<i>Opisthonema spp.</i>)	Equivalent
2. Stock	FAO 77 Pacific Southeast stock defined as Central-northern Gulf of California, in NW Mexico	FAO 77 Pacific Southeast stock defined as Central-northern Gulf of California, in NW Mexico	Equivalent
3. Vessel list	50 purse seine vessels registered to the <i>Cámara Nacional de la Industria Pesquera</i> (CANAINPES)	32 vessels are included in the MSC report. The 8 purse seine of MAZ Sardina S.A are not present in the list	Not equivalent
Determination			
View Announcement Comment Draft Report: ACDR 2022, Small Pelagic Fishery in Sonora, Gulf of California MSC Fisheries – 2022 Reassessment.			
The fisheries have the same target species and scope, however, there is a mismatch with the fleets because the vessels from the MT applicant Maz Sardina S.A. de C.V are not considered in the MSC report.			
The assessor recommends that Marin Trust provides clarifications on the fisheries to compare with. Information provided by the client does not match with the fishery to compare with provided by MT.			
Both MSC certified fisheries and MT applicants have identical component, scope of the fisheries is the same, however the only difference is the client group. This fishery includes CANAINPES fleet, and no other eligible fishers have been included in the certificate.			
The verification tool is pending on clarification on how to assess the MAZ fleet in relation with the CANAINPES certificate.			

Therefore, the fisheries cannot be equivalent due to vessels included in the MT application which are not part of the MSC certified fleet;

Notes for on-site Auditor

Species Name		Pacific sardine <i>Sardinops sagax</i>	
A1	Data Collection - Minimum Requirements		
	A1.1	Landings data are collected such that the fishery-wide removals of this species are known.	Yes
	A1.2	Sufficient additional information is collected to enable an indication of stock status to be estimated.	Yes
Clause outcome:			PASS
<p>The following information remain partially the same as last year’s assessment, but some additions/modifications have been made considering the information provided in the third and fourth surveillance audit reports from respectively November 2021 and January 2023, along with the Announcement Comment Draft Report of October 2022.</p> <p>A1.1 Landings data are collected such that the fishery-wide removals of this species are known.</p> <p>In 2020, INAPESCA carried out a population analysis of Pacific sardine (<i>Sardinops sagax</i>) and thread herring (<i>Opisthonema libertate</i>) from the Gulf of California considering the period 1971/72 to 2018/19. The Age-Structured Assessment Program (ASAP) was used in both cases which did not imply a change in the stock assessment methodology in relation to previous years. It is an updated approach and well accepted method to assess populations under commercial exploitation due to the realistic outcome of the dynamic of the population, and allows an interpretation of the stocks’ status, producing biological reference points and biologically acceptable biomass. The following fishery-independent indexes were used:</p> <ul style="list-style-type: none"> • Annual Relative Abundance Index of Evaluation Survey Data (kg of Pacific sardines/thread herring per haul hour (kg/hour), from the historical series (1990-2019) • Annual relative abundance index of acoustic surveys data (tons per year (t/year), of the cruise series (2008-2019) • Relative abundance index of ichthyoplankton cruise data (number of Pacific sardine/thread herring eggs and larvae per 10 m²) • Probability index of sardine spawning • Index of the proportion of sardines in the diet of birds. The indexes 1-3 were used in both species whereas the indexes 4 and 5 were used only for Pacific sardine <p>Landings data are collected such that the fishery-wide removals of this species are known.</p> <p>Furthermore, considering the dynamics of the Pacific sardine population in the period from 1971/72 to 2021/22, and applying the control rule stipulated in the Fisheries Management Plan, it was observed that the population has been exploited below the reference catches (CR) estimated for the period of time analysed. In recent years, the recorded catches have been below the estimated CR, an aspect that coincides with the exploitation levels estimated for those seasons. The estimated value for $FRACTION = 1 - \exp(-F_{MSY}) = 1 - \exp(-0.364) = 0.305$, permitted to set the Biologically Accepted Catch (BAC) for 2021-2022 period at 261,325 tons (Figure 1).</p>			

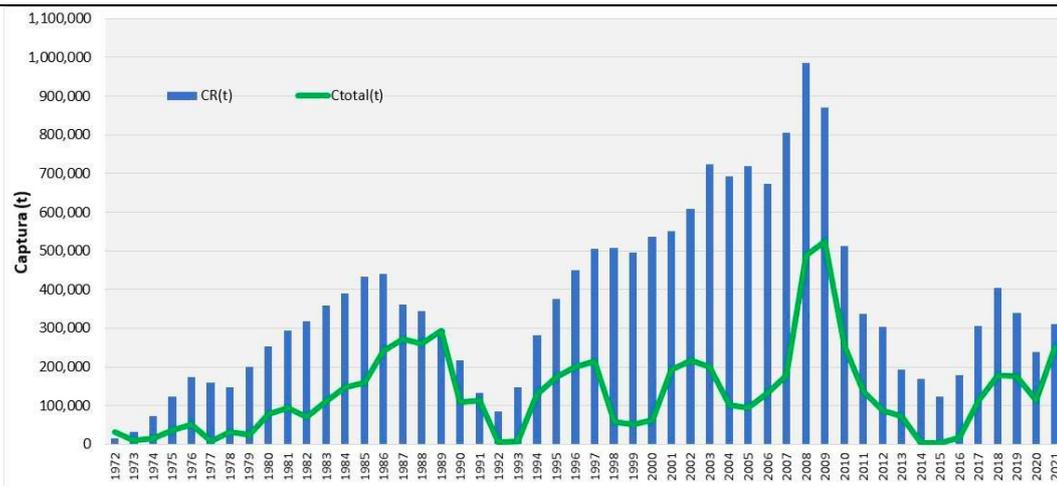


Figure 1. Biologically acceptable catches estimated by asap (blue lines) and their relationship with the actual catch (green line) during the period of time analysed for the Pacific sardine from the gulf of California.

Source : SCS Global Services report, 2022.

Therefore, landings data are collected such that the fishery-wide removals of this species are known, so the fishery PASSES Clause A1.1.

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

INAPESCA conducts the stock assessment and computes the BAC, based on the status of the stock; the results are communicated to other stakeholders including the fishers and the management branch of the government (CONAPESCA) and procedures can be agreed to start operations on the base of the limit established with the BAC. Landings data are collected such that the fishery-wide removals of this species are known.

For the analysis of the stock in 2019/20, $F_{MSY} = 0.314$ and $E_{MSY} = 0.269$, were much higher than the $F_{current} = 0.116$ year and $E_{current} = 0.109$ year. On the other hand, the estimate of the spawning biomass in the MSY was $B_{MSY} = 500,716$ t, lower than that estimated for the last years. When applying the control rule ($BAC = (B_{exp} - B_{MIN}) * FRACTION$) stipulated in the Fisheries Management Plan, considering that $B_{MIN} = 120,000$ t and $FRACTION = 1 - exp(-F_{MSY}) = E_{MSY}$, it was found that the population of Pacific the sardine has been exploited below the estimated BAC in the analysed time period. Considering the current trend in the biomass of the Pacific sardine, an exploitable biomass of 926,000 tons, as well as an exploitation level of $0.269 = FRACTION$, the BAC for the 2020-2021 period was 206,000 tons.

Management has made important progress towards sustainability, such as a Vessel Monitoring System and onboard and port observers' programs. Other measures are being proposed to ensure the stock status is well known.

Considering the estimated value for $FRACTION = 0.305$, the BAC for 2021-2022 period was 261,325 tons (SCS Global Services, 2023).

Therefore, sufficient additional information is collected to enable an indication of stock status to be estimated, so the fishery PASSES Clause A1.2.

References

SCS Global Services report, 2023. Small Pelagic Fishery in Sonora, Gulf of California – 2023 Fourth Surveillance audit: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@assessment>

SCS Global Services report, 2022. Small Pelagic Fishery in Sonora, Gulf of California – 2022 Reassessment: MSC Announcement comment draft report 323pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@assessment>

SCS Global Services report, 2021. SMALL PELAGICS FISHERY IN SONORA, GULF OF CALIFORNIA. Third Surveillance Audit Report. 91 pp. SCS global services: <https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=NAohFthSkwTeJnNCw56BwOxschGa32jJSH5e+uWfeB4cJ/UrcZMC7UR/a2WadvOg>

SCS Global Services, 2019. Small Pelagics fishery in Sonora, gulf of California: MSC Fishery Assessment Third surveillance Report, pdf, 363pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@view>

Molina, J. J., C. H. Hernández-López, R. Villaseñor-Talavera, and J. J. García-Meléndez. 2020. Management strategies proposal for reducing the abundance of small organisms in the small pelagic fishery catch from the Gulf of California. HIDROBIOLÓGICA 30(1): <https://hidrobiologica.izt.uam.mx/index.php/revHidro/article/view/1471>

Fisheries Management Plan (Oct 2012) 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

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

A2 Stock Assessment - Minimum Requirements		
A2.1	A stock assessment is conducted at least once every 3 years (or every 5 years if there is substantial supporting information that this is sufficient for the long-term sustainable management of the stock), and considers all fishery removals and the biological characteristics of the species.	Yes
A2.2	The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.	Yes
A2.3	The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status.	Yes
A2.4	The assessment is subject to internal or external peer review.	Yes
A2.5	The assessment is made publicly available.	Yes
Clause outcome:		PASS

The following information remain partially the same as last year's assessment, but some additions/modifications have been made considering the information provided in the third and fourth surveillance audit reports, respectively from November 2021 and January 2023, along with the Announcement Comment Draft Report of October 2022.

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.

The 2016 assessment used information including a series of CPUE values from scientific cruises, the indices of abundance from acoustic surveys, an index of egg and larvae, an index representing spawning probability and the proportion of sardines in the diet of seabirds. INAPESCA staff opted for using the Age Structured Assessment Program (ASAP) model to reconstruct biomass trajectory and estimate parameters relevant to make management decisions. Data on catch and effort is collected from the official 'Aviso de Arribo' or landing notification forms provided and collected by regional offices of CONAPESCA. Data are processed and analysed by INAPESCA, and results presented in official reports of fishery catch and effort. Annual estimates of biomass in the Gulf of California are obtained with hydroacoustic methods. Abundance is used as relative indices in stock assessments.

In 2020, INAPESCA carried out a population analysis of Pacific sardine (*Sardinops sagax*) and thread herring (*Opisthonema libertate*) from the Gulf of California considering the period 1971/72 to 2018/19; The Age-Structured Assessment Program

(ASAP) was used in both cases which did not imply a change in the stock assessment methodology in relation to previous years. It is an updated approach and well accepted method to assess populations under commercial exploitation due to the realistic outcome of the dynamic of the population, and allows an interpretation of the stocks' status, producing biological reference points and biologically acceptable biomass.

The following fishery-independent indexes were used:

- Annual Relative Abundance Index of Evaluation Survey Data (kg of Pacific sardines/thread herring per haul hour (kg/hour), from the historical series (1990-2019)
- Annual relative abundance index of acoustic surveys data (Tons per year (t/year), of the cruise series (2008-2019)
- Relative abundance index of ichthyoplankton cruise data (number of Pacific sardine/thread herring eggs and larvae per 10 m²)
- Probability index of sardine spawning
- Index of the proportion of sardines in the diet of birds
- The indexes 1-3 were used in both species whereas the indexes 4 and 5 were used only for Pacific sardine.

The last assessment of Nevárez-Martinez et al. in 2022, cited in the last MSC surveillance report (January 2023) used as auxiliary information a series of CPUE values from scientific cruises, the indices of abundance from acoustic surveys, an index of eggs and larvae, an index representing spawning probability, and the proportion of sardines in the diet of seabirds.

The Kobe diagram for the evaluation of the Pacific sardine shows that the stock is not overfished, and overfishing is not occurring (Figure 2). The lowest values of the series (<0.88) of relative biomass (B_{rep}/B_{MSY}) are in the first stage of the 1972-1976 fishery, as well as in 1991/92, which corresponds to low catch; in this season this value was 0.816, relatively close to the reference point ($B_{rep}/B_{MSY} = 1.0$). The evolution of the sardine fishery shows relative biomass values necessary to obtain the MSY ($B_{rep}/B_{MSY} \geq 1.0$), corresponding to low relative mortalities ($F_a/F_{MSY} \leq 1.0$).

Therefore, 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, so the fishery PASSES A2.1.

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

The Age-Structured Assessment Program (ASAP) was used in both cases which did not imply a change in the stock assessment methodology in relation to previous years. It is an updated approach and well accepted method to assess populations under commercial exploitation due to the realistic outcome of the dynamic of the population, and allows an interpretation of the stocks' status, producing biological reference points and biologically acceptable biomass. In the Announcement Comment Draft Report (ACDR) 2022, a Kobe diagram being presented to the audit team, showed that the Pacific sardine population is in good condition (not overfished) and the fishing effort has been below the recommended maximum, so there is no overfishing.

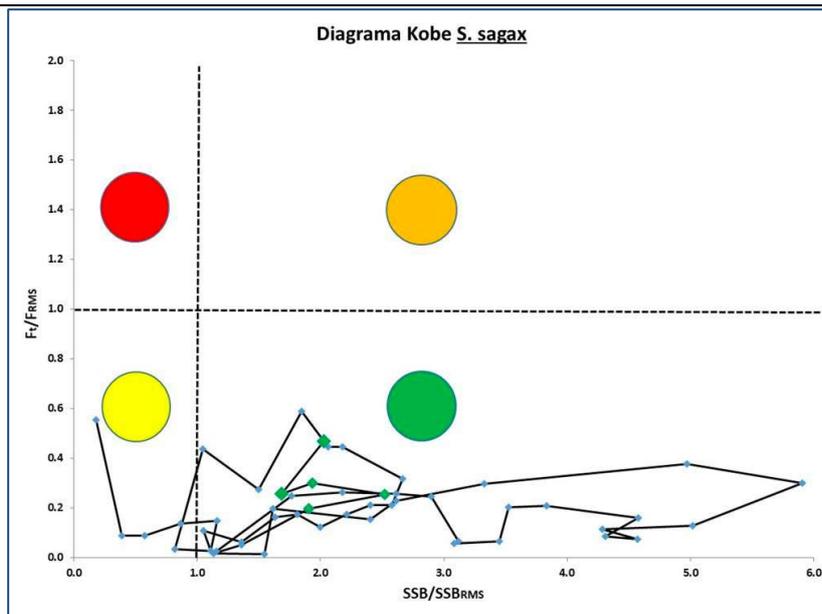


Figure 2. Kobe diagrams showing the evolution and current status of the population of the Pacific sardine in the Gulf of California. Green diamonds indicate the last five years.
Source: SCS Global Services, 2022.

Therefore, the assessment provides an estimate of the status of the biological stock relative to a reference point or proxy, so the fishery PASSES Clause A2.3.

A2.3 The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.

The last results of the previous stock assessment, showed that between 2008/09 and 2013/14 the trend in the abundance series (in number and weight) was downward, however in recent years there was an upward trend: the spawning biomass increased from around 432,000 t in 2014/15 to almost 1,020 million tons in 2017/18-2018/19, while the exploitable biomass behaves the same way as the spawners, but the values in 2014/15 were almost 409,000 tons while this value increased to approximately 876,000 tons in 2016/17 and an average of 1,288 million tonnes in 2017/18-2018/19.

The annual fishing mortality rate and the exploitation rate ($E = 1 - \exp(-F)$) showed values below 0.15 / year for almost the entire time period, with some seasons where these values were between 0.16 and 0.23, with a maximum peak in 1988/89 and the second highest peak in 2008/09, and a third peak in 2018/19 (SCS Global Services, 2022).

For the analysis of the stock in 2019/20, $F_{MSY} = 0.314$ and $E_{MSY} = 0.269$, were much higher than the $F_{current} = 0.116$ year and $E_{current} = 0.109$ year. On the other hand, the estimate of the spawning biomass in the MSY was $B_{MSY} = 500,716$ t, lower than that estimated for the last years. When applying the control rule ($BAC = (B_{exp} - B_{MIN}) * FRACTION$) stipulated in the Fisheries Management Plan, considering that $B_{MIN} = 120,000$ t and $FRACTION = 1 - \exp(-F_{MSY}) = E_{MSY}$, it was found that the population of Pacific the sardine has been exploited below the estimated BAC in the analysed time period.

Biomass and recruitment were estimated to be variable. It should be noted that CPUE indices, the acoustic abundance indices, and the index of seabird diet show an even more intense and frequent, but consistent variability than the ASAP model as parameterized was unable to capture, mostly because of the use of a deterministic stock-recruitment function.

The last ACDR also reports estimates of the annual fishing mortality rate and a measure of exploitation or harvest rate. The fishing mortality rate as computed by ASAP is age and time specific, but to make it age dependent, the separable approach of the model requires that a basic value (termed by Deriso et al. 1985 “full-recruitment fishing mortality”) needs to be modified by gear selectivity under the assumption that at least one age shows selectivity of ‘1’ making the selectivity at age and time the same as the base rate of that year.

Cited in the last ACDR report, Nevárez-Martínez estimated in 2022 that F_y and E_y were the annual fishing mortality rate (F_{annual}) and the annual exploitation rate ($E=1-\exp(-F_a)$) show that the values, during almost the entire period of time, were below 0.163/year, with some seasons where these values were between 0.170/year and 0.214/year, with a maximum peak in 1988/89 and the second lowest peak in 2008/09. A similar behaviour presents the ratio between $C_{\text{total}}/B_{\text{exp}}$, although slightly higher values are observed with respect to $E=1-\exp(-F_a)$, but the peaks occur in the same seasons. The estimated values for the last five fishing seasons increased with respect to what was observed in the 2013/14 to 2015/16 seasons.

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

Therefore, the assessment provides an estimate of the status of the biological stock relative to a reference point or proxy, so the fishery PASSES A2.3.

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

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

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

Therefore, the assessment is subject to internal or external peer review, so the fishery PASSES Clause A2.4.

A2.5 The assessment is made publicly available.

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

Therefore, the assessment is made publicly available, so the fishery PASSES Clause A2.5.

References

SCS Global Services report, 2023. Small Pelagic Fishery in Sonora, Gulf of California – 2023 Fourth audit surveillance report: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@assessment>

SCS Global Services report, 2022. Small Pelagic Fishery in Sonora, Gulf of California – 2022 Reassessment: MSC Announcement comment draft report 323pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@assessment>

Fisheries Management Plan (Oct 2012) 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

SCS Global Services, 2019. Small Pelagics fishery in Sonora, gulf of California: MSC Fishery Assessment Third surveillance Report, pdf, 363pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@view>

Links

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

A3 Harvest Strategy - Minimum Requirements		
A3.1	There is a mechanism in place by which total fishing mortality of this species is restricted.	Yes
A3.2	Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment. Where a specific quantity of removals is recommended, the actual removals may exceed this by up to 10% ONLY if the stock status is above the limit reference point or proxy.	Yes
A3.3	Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy (small quotas for research or non-target catch of the species in other fisheries are permissible).	Yes
Clause outcome:		PASS

The following information remain partially the same as last year's assessment, but some additions/modifications have been made considering the information provided in the third surveillance Audit report of November 2021 and the Announcement comment draft report of October 2022.

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

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

Furthermore, total fishing mortality of this species is restricted by a TAC, set each year, as it can be seen in the table below:

Table 6. Total Allowable Catch (TAC) and catch data of Pacific sardine in the northern-central Gulf of California.

Source: SCS Global Services, 2023.

	Species	Year	Catch (mt)	Effort (days fishing)	N. of vessels
TAC	<i>S. sagax</i>	2021/22	261,325	3,294 ¹	46
UoA/UoC share of TAC	<i>S. sagax</i>	2020/21	209,000		

Therefore, there is a mechanism in place by which total fishing mortality of this species is restricted, so the fishery PASSES Clauses A3.1.

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.

Between 2008/09 and 2013/14, the trend in the abundance series (in number and weight) was downward, however in recent years there was an upward trend: the spawning biomass increased from around 432,000 t in 2014/15 to almost 1,020 million tons in 2017/18-2018/19, while the exploitable biomass behaves the same way as the spawners, but the values in 2014/15 were almost 409,000 tons, while this value increased to approximately 876,000 tons in 2016/17 and an average of 1,288 million tonnes in 2017/18-2018/19. Between 2016 /17 and 2019/20 the exploitable biomass oscillated between 735,000 and 1,125,000 tons (SCS Global Services, 2022).

The annual fishing mortality rate and the exploitation rate ($E = 1 - \exp(-F)$) show values below 0.15/year for almost the entire period, with some seasons where these values were between 0.16 and 0.25, with a maximum peak in 1988/89, the second highest peak in 2008/09, and a third peak in 2018/19.

On the other hand, for the analysis of the stock in 2019/20, $F_{MSY} = 0.314$ and $E_{MSY} = 0.269$, were much higher than the $F_{current} = 0.116$ year and $E_{current} = 0.109$ year. On the other hand, the estimate of the spawning biomass in the MSY was $B_{MSY} = 500,716$ t, lower than that estimated for the last years. When applying the control rule ($BAC = (B_{exp} - B_{MIN}) * FRACTION$) stipulated in the Fisheries Management Plan, considering that $B_{MIN} = 120,000$ t and $FRACTION = 1 - \exp(-F_{MSY}) = E_{MSY}$, it was found that the population of Pacific the sardine has been exploited below the estimated BAC in the analysed time period. Considering the

current trend in the biomass of the Pacific sardine, the BAC for the 2021-2022 period was of 261,325 tons. A Kobe diagram presented in the ACDR 2022 showed that the Pacific sardine population is in good condition and the fishing effort has been below the recommended maximum, so there is no overfishing.

Therefore, 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. The fishery PASSES Clause A3.2.

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).

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

The small pelagic fishing permits in Mexico were issued on a broad geographic scope, allowing operation in all Mexican Pacific waters, without clear criteria of regionalization. In response to the lack of clarity and existing legal gaps regarding regionalization criteria of permits the -003-SAG/PESC-2018, Article 4.3 cites controls to limit entry of new vessels to the small pelagic fishery as follows: “Each vessel must operate in a specific region related to its home port, which will be defined in the corresponding Fishing Permit. The movement of fleets between regions is not allowed. The movement of vessels will only be allowed for a specific time and with the express authorization of the fishing authority, when for operational and maintenance reasons some fishing units cease to operate and other units can occupy the unused effort. [NOM-003-SAG/PESC-2018, Article 4.3]”.

For the 2021/2022 fishing season, CANAINPES reported 49 licensed vessels of which 36 are based in Guaymas, 11 in Yavaros and 2 in Mazatlán.

Therefore, commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy, so the fishery PASSES Clause A3.3.

References

SCS Global Services report, 2022. Small Pelagic Fishery in Sonora, Gulf of California – 2022 Reassessment: MSC Announcement comment draft report, 323pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@assessment>

SCS Global Services report, 2021. Small Pelagic Fishery in Sonora, Gulf of California – 2021 Third Surveillance: MSC Third surveillance audit report, 91 pp.: <https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=NAohFthSKwTeJnNCw56BwOxschGa32jSH5e+uWfeB4cJ/UrcZMC7UR/a2WadvOg>

SCS Global Services, 2019. Small Pelagics fishery in Sonora, gulf of California: MSC Fishery Assessment Third surveillance report, pdf, 363pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@view>

Reglamento de la Ley de Pesca NOM-003-SAG/PESC- 2018 : <https://vlex.com.mx/vid/nom003-sag-pesc-773892697>

Standard clause 1.3.2.1.3

Links

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

A4 Stock Status - Minimum Requirements			
	A4.1	<p>The stock is at or above the target reference point, OR IF NOT:</p> <p>The stock is above the limit reference point or proxy and there is evidence that a fall below the limit reference point would result in fishery closure OR IF NOT:</p> <p>The stock is estimated to be below the limit reference point or proxy, but fishery removals are prohibited.</p>	Yes
Clause outcome:			PASS
<p>A4.1 The stock is at or above the target reference point, OR IF NOT:</p> <p>The stock is above the limit reference point or proxy and there is evidence that a fall below the limit reference point would result in fishery closure OR IF NOT:</p> <p>The stock is estimated to be below the limit reference point or proxy, but fishery removals are prohibited.</p> <p>Between 2008/09 and 2013/14, the trend in the abundance series (in number and weight) was downward, however in recent years there was an upward trend: the spawning biomass increased from around 432,000 t in 2014/15 to almost 1,020 million tons in 2017/18-2018/19, while the exploitable biomass behaves the same way as the spawners, but the values in 2014/15 were almost 409,000 tons, while this value increased to approximately 876,000 tons in 2016/17 and an average of 1,288 million tonnes in 2017/18-2018/19. Between 2016/17 and 2019/20 the exploitable biomass oscillated between 735,000 and 1,125,000 tons (SCS Global Services, 2022).</p> <p>The annual fishing mortality rate and the exploitation rate ($E = 1 - \exp(-F)$) show values below 0.15/year for almost the entire period, with some seasons where these values were between 0.16 and 0.25, with a maximum peak in 1988/89, the second highest peak in 2008/09, and a third peak in 2018/19.</p> <p>On the other hand, for the analysis of the stock in 2019/20, $F_{MSY} = 0.314$ and $E_{MSY} = 0.269$, were much higher than the $F_{current} = 0.116$ year and $E_{current} = 0.109$ year. On the other hand, the estimate of the spawning biomass in the MSY was $B_{MSY} = 500,716$ t, lower than that estimated for the last years. When applying the control rule ($BAC = (B_{exp} - B_{MIN}) * FRACTION$) stipulated in the Fisheries Management Plan, considering that $B_{MIN} = 120,000$ t and $FRACTION = 1 - \exp(-F_{MSY}) = E_{MSY}$, it was found that the population of Pacific the sardine has been exploited below the estimated BAC in the analysed time period. Considering the current trend in the biomass of the Pacific sardine, an exploitable biomass of 926,000 tons (according to Nevárez Martínez et al., 2021a cited in the 2022 ACDR) as well as an exploitation level of $0.269 = FRACTION$, the BAC for the 2020-2021 period was 206,000 tons.</p> <p>Considering the dynamics of the Pacific sardine population in the period from 1971/72 to 2021/22, and applying the control rule stipulated in the Fisheries Management Plan, it was observed that the population has been exploited below the reference catches (CR) estimated for the period of time analysed. In recent years, the recorded catches have been below the estimated CR, an aspect that coincides with the exploitation levels estimated for those seasons. Considering the estimated value for $FRACTION = 1 - \exp(-F_{MSY}) = 1 - \exp(-0.364) = 0.305$, the BAC for 2021-2022 period was 261,325 tons.</p> <p>A Kobe diagram presented in the last MSC ACDR showed that the Pacific sardine population is in good condition and the fishing effort has been below the recommended maximum, so there is no overfishing.</p> <p>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.</p> <p>Therefore, the stock is above the biomass target level, and fishing mortality is well below the target and it PASSES Clause A 4.1.</p>			

References

SCS Global Services report, 2022. Small Pelagic Fishery in Sonora, Gulf of California – 2022 Reassessment: MSC Announcement comment draft report 323pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@assessment>

SCS Global Services report, 2021. Small Pelagic Fishery in Sonora, Gulf of California – 2021 Third Surveillance: MSC Third surveillance audit report 91 pp.: <https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=NAohFthSKwTeJnNCw56BwOxschGa32jSH5e+uWfeB4cJ/UrcZMC7UR/a2WadvOg>

Reglamento de la Ley de Pesca NOM-003-SAG/PESC- 2018 : <https://vlex.com.mx/vid/nom003-sag-pesc-773892697>

SCS Global Services report, 2021. SMALL PELAGICS FISHERY IN SONORA, GULF OF CALIFORNIA. Third Surveillance Audit Report. 91 pp. SCS global services: <https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=NAohFthSKwTeJnNCw56BwOxschGa32jSH5e+uWfeB4cJ/UrcZMC7UR/a2WadvOg>

SCS Global Services report, 2020. SMALL PELAGICS FISHERY IN SONORA, GULF OF CALIFORNIA. Second Surveillance Audit Report. 70 pp. SCS global services: <https://sardinagolfodecalifornia.org/wp-content/uploads/2021/02/2020-Segundo-Informe-Auditoria-Vigilancia.pdf>

SCS Global Services report, 2019. SMALL PELAGICS FISHERY IN SONORA, GULF OF CALIFORNIA. First Surveillance Audit Report. 83 pp.: <https://sardinagolfodecalifornia.org/wp-content/uploads/2021/02/2019-Primer-Informe-Auditoria-Vigilancia.pdf>

Links

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

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

Clause outcome: **PASS**

The following information for thread herring comes from the third and fourth surveillance audit reports, respectively from November 2021 and January 2023, along with the Announcement Comment Draft Report of October 2022.

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

In 2020, INAPESCA carried out a population analysis of Pacific sardine (*Sardinops sagax*) and thread herring (*Opisthonema libertate*) from the Gulf of California considering the period 1971/72 to 2018/19. The Age-Structured Assessment Program (ASAP) was used in both cases which did not imply a change in the stock assessment methodology in relation to previous years.

It is an updated approach and well accepted method to assess populations under commercial exploitation due to the realistic outcome of the dynamic of the population, and allows an interpretation of the stocks' status, producing biological reference points and biologically acceptable biomass. The following fishery-independent indexes were used:

- Annual Relative Abundance Index of Evaluation Survey Data (kg of Pacific sardines/thread herring per haul hour (kg/hour), from the historical series (1990-2019)
- Annual relative abundance index of acoustic surveys data (tons per year (t/year), of the cruise series (2008-2019)
- Relative abundance index of ichthyoplankton cruise data (number of Pacific sardine/thread herring eggs and larvae per 10 m²)
- Probability index of sardine spawning
- Index of the proportion of sardines in the diet of birds. The indexes 1-3 were used in both species whereas the indexes 4 and 5 were used only for Pacific sardine Landings data are collected such that the fishery-wide removals of this species are known.

Catches of thread herring, between 1969/70 and 1982/83, showed an upward trend, but also with high variability (between 3,000 and 100,000 t), associated with important environmental events (El Niño–La Niña) and the behaviour of the availability of the Pacific sardine. A close inverse relationship has been observed in the catches of the thread herring and the Pacific sardine related to El Niño events. When this phenomenon occurs (e.g., 1976/77 or 1982/83), the capture of the Pacific sardine decreases, and thread herring catch increases or vice versa (1971/72 and 1975/76). Starting in 1983/84 and up to the 2008/09 fishing season, thread herring has had three peaks, the longest being between 2002/03 and 2006/07, in which catches ranged between 60,000 and 95,000 tons. During the 2012/13 to 2015/16 seasons, catches exceeded 100,000 t with a historical record of 133,500 t in 2013/14. In the seasons (2016/2017 and 2017/2018) catch decreased to 58,400 t and 63,800 t, respectively; to increase in the last two seasons, 2018/2019 and 2020/2021, to 100,200 t and 65,000 t, respectively (Figure 3).

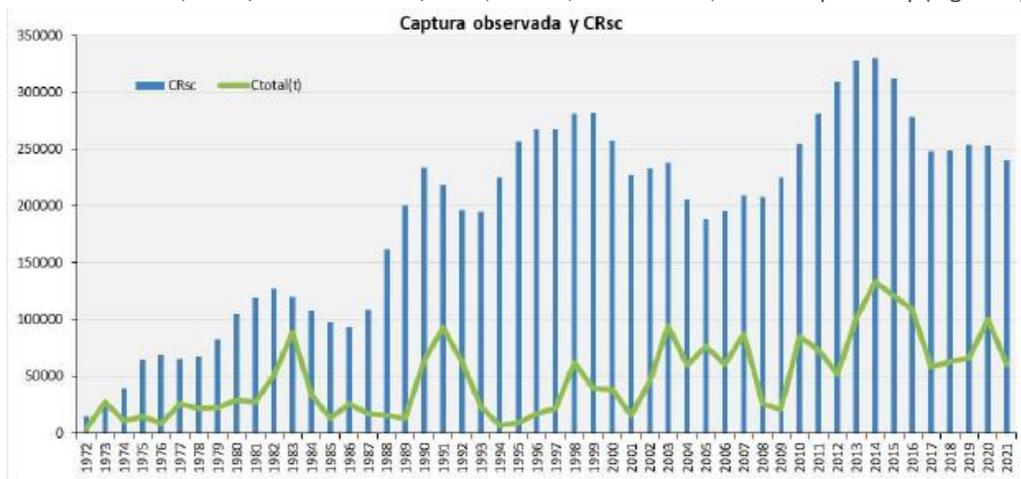


Figure 3. Biologically acceptable catches (blue lines) estimated by ASAP and their relationship with actual catches (green line) from 1971/72 - 2020/2021 for the Gulf of California thread herring.

Source: SCS Global Services, 2022.

Therefore, landings data are collected such that the fishery-wide removals of this species are known, so the fishery PASSES Clause A1.1.

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

INAPESCA conducts the stock assessment and computes the Biologically acceptable catch (BAC) based on the status of the stock; the results are communicated to other stakeholders including the fishers and the management branch of the government (CONAPESCA) and procedures can be agreed to start operations on the base of the limit established with the BAC. Landings data are collected such that the fishery-wide removals of this species are known.

In Sonora, the most recent evaluation of thread herring (from Nevárez-Martínez et al. in 2022, cited in the 2022 ACDR), allowed the historical estimation of the number of organisms and fishing mortality by age and year. The population analysis of this species from the Gulf of California, for the period from 1971/1972 to 2020/2021, included three independent fishing indices. The natural mortality (M) used in thread herring analysis was $M=0.97/\text{year}$. The control rule stipulated in the Fishery Management Plan for the Small Pelagic Fishery (SPFMP) was applied: $C = (B-B_{\text{MIN}}) * \text{FRACTION}$; in this case, the B_{MIN} value used was equal to 52,700 tons, according to the procedure of Morales-Bojórquez and Nevárez-Martínez (2005, cited in the 2022 ACDR). On the other hand, the value of FRACTION was defined as $1-\exp(-F_{\text{MSY}})$, that is; $\text{FRACTION}=1-\exp(-F_{\text{MSY}})$. Therefore, today we only have the analysis of the main species *Opisthonema libertate*, which is as defined below.

The TAC for this species in 2021-2022 was 202,395 tons.

Management has made important progress towards sustainability, such as a Vessel Monitoring System and onboard and port observers' programs. Other measures are being proposed to ensure the stock status is well known.

Therefore, sufficient additional information is collected to enable an indication of stock status to be estimated, so the fishery PASSES Clause A1.2.

References

SCS Global Services report, 2022. Small Pelagic Fishery in Sonora, Gulf of California – 2022 Reassessment: MSC Announcement comment draft report 323pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@assessment>

Fisheries Management Plan (Oct 2012) 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

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SCS Global Services, 2019. Small Pelagics fishery in Sonora, gulf of California: MSC Fishery Assessment Third surveillance Report, pdf, 363pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@view>

Molina, J. J., C. H. Hernández-López, R. Villaseñor-Talavera, and J. J. García-Meléndez. 2020. Management strategies proposal for reducing the abundance of small organisms in the small pelagic fishery catch from the Gulf of California. HIDROBIOLÓGICA 30(1): <https://hidrobiologica.izt.uam.mx/index.php/revHidro/article/view/1471>

Links

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

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

A2.3	The assessment provides an indication of the volume of fishery removals which is appropriate for the current stock status.	Yes
A2.4	The assessment is subject to internal or external peer review.	Yes
A2.5	The assessment is made publicly available.	Yes

Clause outcome: PASS

The following information for thread herring comes from the third and fourth surveillance audit reports, respectively from November 2021 and January 2023, along with the Announcement Comment Draft Report of October 2022.

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.

The 2016 assessment used information including a series of CPUE values from scientific cruises, the indices of abundance from acoustic surveys, an index of egg and larvae, an index representing spawning probability and the proportion of sardines in the diet of seabirds. INAPESCA staff opted for using the Age Structured Assessment Program (ASAP) model to reconstruct biomass trajectory and estimate parameters relevant to make management decisions. Data on catch and effort is collected from the official 'Aviso de Arribo' or landing notification forms provided and collected by regional offices of CONAPESCA. Data are processed and analysed by INAPESCA, and results are presented in official reports of fishery catch and effort. Annual estimates of biomass in the Gulf of California are obtained with hydroacoustic methods. Abundance is used as relative indices in stock assessments.

In 2020, INAPESCA carried out a population analysis of Monterey sardine (*Sardinops sagax*) and thread herring (*Opisthonema libertate*) from the Gulf of California considering the period 1971/72 to 2018/19. The Age-Structured Assessment Program (ASAP) was used in both cases which did not imply a change in the stock assessment methodology in relation to previous years. It is an updated approach and well accepted method to assess populations under commercial exploitation due to the realistic outcome of the dynamic of the population, and allows an interpretation of the stocks' status, producing biological reference points and biologically acceptable biomass.

The following fishery-independent indexes were used:

- Annual Relative Abundance Index of Evaluation Survey Data (kg of Pacific sardines/thread herring per haul hour (kg/hour), from the historical series (1990-2019)
- Annual relative abundance index of acoustic surveys data (Tons per year (t/year), of the cruise series (2008-2019)
- Relative abundance index of ichthyoplankton cruise data (number of Pacific sardine/thread herring eggs and larvae per 10 m²)
- Probability index of sardine spawning
- Index of the proportion of sardines in the diet of birds
- The indexes 1-3 were used in both species whereas the indexes 4 and 5 were used only for Pacific sardine.

The Kobe diagram for the evaluation of the Thread herring in the MSC ACDR 2022 shows that the stock is in a healthy condition and the fishing mortality has been below the recommended maximum; therefore, the stock is not overfished, and overfishing is not occurring.

Therefore, 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, so the fishery PASSES A2.1.

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

The Age-Structured Assessment Program (ASAP) was used in both cases which did not imply a change in the stock assessment methodology in relation to previous years. It is an updated approach and well accepted method to assess populations under

commercial exploitation due to the realistic outcome of the dynamic of the population, and allows an interpretation of the stocks' status, producing biological reference points and biologically acceptable biomass.

In the ACDR 2022, the Kobe diagram for the evaluation of the thread herring shows positive results in terms of exploitation and current status of the population, since most of the points are located in the green quadrant, it remains a healthy population (Figure 4). The lowest values of the series (<0.95) of relative biomass (B_{rep}/B_{MSY}) are located in the first stage of the 1972-1977 fishery; in the rest of the seasons analysed, this ratio varied between 1.0 and 3.33. In all fishing seasons, the values of the F_t/F_{MSY} ratio are less than 0.41 (on the y axis). The evolution of the thread herring fishery shows values of the biomass necessary to obtain MSY (B_{rep}/B_{MSY}), ranging between 1.12 and 3.68, corresponding to a very low relative fishing mortality ($F_t/F_{MSY}<0.25$). Therefore, it can be said that the stock is in a healthy condition and the fishing mortality has been below the recommended maximum; therefore, the stock is not overfished, and overfishing is not occurring.

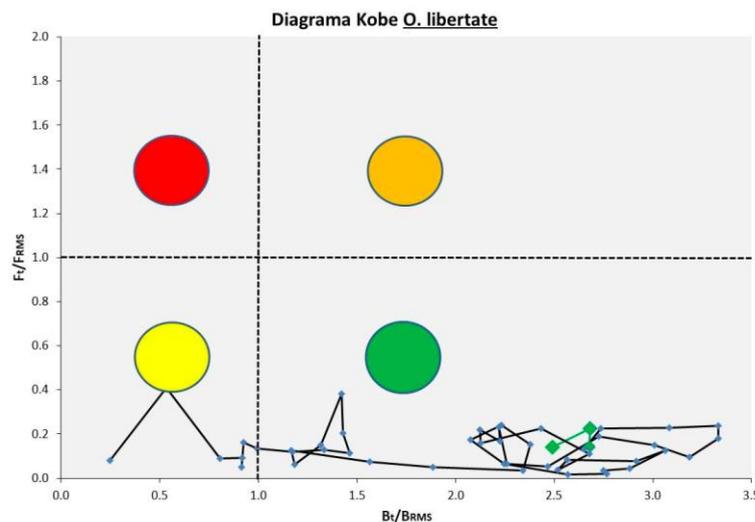


Figure 4. Kobe plot for the thread herring complex in the southern Gulf of California. Dark vertical and horizontal lines represent status of F and SSB respectively, relative to their levels producing MSY.

Source : SCS Global services, 2022.

Therefore, the assessment provides an estimate of the status of the biological stock relative to a reference point or proxy, so the fishery PASSES Clause A2.3.

A2.3 The assessment provides an estimate of the status of the biological stock relative to a reference point or proxy.

The total biomass (B_{total}) and the spawning stock biomass (SSB) (Figure 5) showed a behaviour similar to that observed for the abundance in numbers. The total biomass peaks occurred in 1981/82, 1988/89, 1996/97 and 2012/2013, with the lowest values in the first seasons and in the 1984/85 season, with values below one million t. The SSB presented the lowest values also in the first fishing seasons, and its peaks in 1997/98 and in 2012/13, the latter with 1,148 million tons, the historical maximum; in the last 13 years the B_{rep} has oscillated between 0.850 and 1.148 million tons (SCS Global services, 2022).

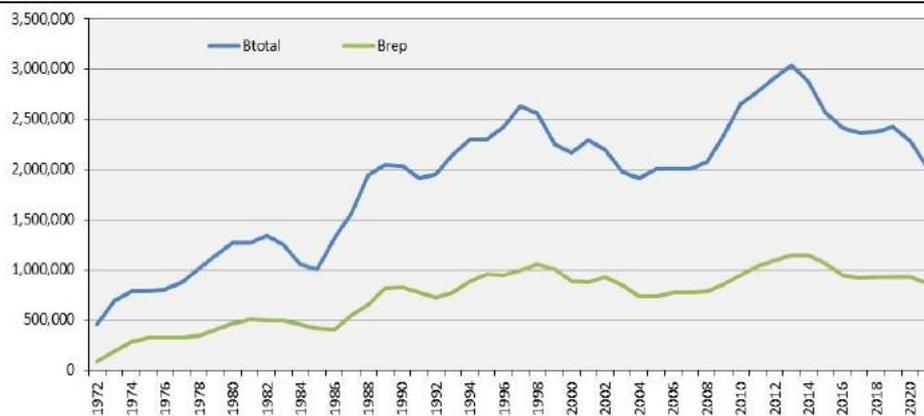


Figure 5. Time series of spawning stock biomass (green line) and total biomass (blue line) for thread herring in the Gulf of California.
Source : SCS Global services, 2022.

The estimated exploitable biomass (B_{exp}) follows a trend very similar to that of the SSB, that is, the lowest values occurred in the first fishing seasons, and their first peaks in 1981/82 and 1989/90, the latter with a little more than 834.00 tons. Between 1993/94 and 2002/03 the B_{exp} ranged between 808,000 and 983,000 t and in the period 2003/04 and 2007/08 it decreased, ranging between 749 and 761 thousand t. In the last 12 years, the exploitable biomass has oscillated between 0.877 and 1.131 million tons, whose maximum value occurred in 2013/14. For the 2020/21 fishing season it is estimated to be 0.853 million tons.

Therefore, the assessment provides an estimate of the status of the biological stock relative to a reference point or proxy, so the fishery PASSES A2.3.

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

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

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

Therefore, the assessment is subject to internal or external peer review, so the fishery PASSES Clause A2.4.

A2.5 The assessment is made publicly available.

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

Therefore, the assessment is made publicly available, so the fishery PASSES Clause A2.5.

References

SCS Global Services report, 2022. Small Pelagic Fishery in Sonora, Gulf of California – 2022 Reassessment: MSC Announcement comment draft report 323pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@assessment>

SCS Global Services, 2019. Small Pelagics fishery in Sonora, gulf of California: MSC Fishery Assessment Third surveillance Report, pdf, 363pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@view>
 Fisheries Management Plan (Oct 2012) 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

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

A3	Harvest Strategy - Minimum Requirements		
	A3.1	There is a mechanism in place by which total fishing mortality of this species is restricted.	Yes
	A3.2	Total fishery removals of this species do not regularly exceed the level indicated or stated in the stock assessment. Where a specific quantity of removals is recommended, the actual removals may exceed this by up to 10% ONLY if the stock status is above the limit reference point or proxy.	Yes
	A3.3	Commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy (small quotas for research or non-target catch of the species in other fisheries are permissible).	Yes

Clause outcome: PASS

The following information comes from the third and fourth surveillance audit reports from respectively November 2021 and January 2023, along with the Announcement comment draft report of October 2022.

It remains partially the same as last's year MT report.

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

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

Furthermore, total fishing mortality of this species is restricted by a TAC, set each year, has it can be seen in the table below:

Table 7. TAC² and Catch Data of thread herring in the northern-central Gulf of California.

Source: SCS Global Services, 2023.

	Species	Year	Catch (mt)	Effort (days fishing)	N. of vessels
TAC	Opisthonema Complex	2021/2022	202,395	3,294 ³	46
UoA/UoC share of TAC	Opisthonema Complex	2020/21	349,000		

Therefore, there is a mechanism in place by which total fishing mortality of this species is restricted, so the fishery PASSES Clauses A3.1.

² The small pelagics fisheries in Mexico can be managed actively by computing an acceptable biological catch (ABC), which in practice operates as a TAC because is a limit that if exceeded, overfishing occurs. Values in the table are ABC.
³ Nominal effort in fishing trips. Trips are not separated by species, it applies to all small pelagics.

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.

The total biomass (B_{total}) and the SSB showed a behaviour similar to that observed for the abundance in numbers. The total biomass peaks occurred in 1981/82, 1988/89, 1996/97 and 2012/2013, with the lowest values in the first seasons and in the 1984/85 season, with values below one million t. The SSB presented the lowest values also in the first fishing seasons, and its peaks in 1997/98 and in 2012/13, the latter with 1,148 million tons, the historical maximum; in the last 13 years the B_{rep} has oscillated between 0.850 and 1.148 million tons (SCS Global services, 2022).

The estimated exploitable biomass (B_{exp}) follows a trend very similar to that of the SSB, that is, the lowest values occurred in the first fishing seasons, and their first peaks in 1981/82 and 1989/90, the latter with a little more than 834.00 tons. Between 1993/94 and 2002/03 the B_{exp} ranged between 808,000 and 983,000 tons and in the period 2003/04 and 2007/08 it decreased, ranging between 749 and 761 thousand tons. In the last 12 years, the exploitable biomass has oscillated between 0.877 and 1.131 million tons, whose maximum value occurred in 2013/14. For the 2020/21 fishing season it is estimated to be 0.853 million tons.

The annual fishing mortality rate (F_{curr}) presented the highest values in 1972/73 (0.161) and in 1982/83 (0.151), showing that in the rest of the fishing seasons the mortality values were below 0.10/year. Regarding the annual exploitation rate ($E=1-\exp(-F_{curr})$), it presented the highest values in the same seasons (1972/73 and 1982/83), while in the last 12 years these values have ranged between 0.090 and 0.037. A similar behaviour presents the ratio C_{total}/B_{exp} , with the peaks appearing in the 1972/73 (0.202) and 1982/83 (0.184) seasons, although it is observed that these values are always higher, with respect to $E=1-\exp(-F_{curr})$. The estimated values, in the last eight fishing seasons, for this indicator ranged between 0.067 and 0.118.

The Kobe diagram presented in ACDR 2022 shows positive results in terms of exploitation and current status of the population, since most of the points are located in the green quadrant, that is, it remains a healthy population. The lowest values of the series (<0.95) of relative biomass (B_{rep}/B_{MSY}) are located in the first stage of the 1972-1977 fishery; in the rest of the seasons analysed, this ratio varied between 1.0 and 3.33. In all fishing seasons, the values of the F_t/F_{MSY} ratio are less than 0.41 (on the y axis). The evolution of the thread herring fishery shows values of the biomass necessary to obtain MSY (B_{rep}/B_{MSY}), ranging between 1.12 and 3.68, corresponding to a very low relative fishing mortality ($F_t/F_{MSY}<0.25$). Therefore, it can be said that the stock is in a healthy condition and the fishing mortality has been below the recommended maximum; therefore, the stock is not overfished, and overfishing is not occurring.

Therefore, 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. The fishery PASSES Clause A3.2.

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).

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

The small pelagic fishing permits in Mexico were issued on a broad geographic scope, allowing operation in all Mexican Pacific waters, without clear criteria of regionalization. In response to the lack of clarity and existing legal gaps regarding regionalization criteria of permits the -003-SAG/PESC-2018, Article 4.3 cites controls to limit entry of new vessels to the small pelagic fishery as follows: *“Each vessel must operate in a specific region related to its home port, which will be defined in the corresponding Fishing Permit. The movement of fleets between regions is not allowed. The movement of vessels will only be allowed for a specific time*

and with the express authorization of the fishing authority, when for operational and maintenance reasons some fishing units cease to operate, and other units can occupy the unused effort. [NOM-003-SAG/PESC-2018, Article 4.3]”.

For the 2021/2022 fishing season, CANAINPES reported 50 licensed vessels.

Therefore, commercial fishery removals are prohibited when the stock has been estimated to be below the limit reference point or proxy, so the fishery PASSES Clause A3.3.

References

SCS Global Services report, 2022. Small Pelagic Fishery in Sonora, Gulf of California – 2022 Reassessment: MSC Announcement comment draft report 323pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@assessment>

SCS Global Services report, 2021. Small Pelagic Fishery in Sonora, Gulf of California – 2021 MSC Third surveillance audit report 91 pp.: <https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=NAohFthSkwTeJnNCw56BwOxschGa32jJSH5e+uWfeB4cJ/UrcZMC7UR/a2WadvOg>

Small Pelagics fishery in Sonora, gulf of California: MSC Fishery Assessment Report 2018 SCS Global Services pdf, 363pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@assessments>

Reglamento de la Ley de Pesca NOM-003-SAG/PESC- 2018 : <https://vlex.com.mx/vid/nom003-sag-pesc-773892697>

Standard clause 1.3.2.1.3

Links

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

A4 Stock Status - Minimum Requirements	
A4.1	<p>The stock is at or above the target reference point, OR IF NOT:</p> <p>The stock is above the limit reference point or proxy and there is evidence that a fall below the limit reference point would result in fishery closure OR IF NOT:</p> <p>The stock is estimated to be below the limit reference point or proxy, but fishery removals are prohibited.</p>
Clause outcome:	
PASS	
<p>A4.1 The stock is at or above the target reference point, OR IF NOT:</p> <p>The stock is above the limit reference point or proxy and there is evidence that a fall below the limit reference point would result in fishery closure OR IF NOT:</p> <p>The stock is estimated to be below the limit reference point or proxy, but fishery removals are prohibited.</p> <p>The B_{total} and the SSB showed a behaviour similar to that observed for the abundance in numbers. The total biomass peaks occurred in 1981/82, 1988/89, 1996/97 and 2012/2013, with the lowest values in the first seasons and in the 1984/85 season, with values below one million t. The SSB presented the lowest values also in the first fishing seasons, and its peaks in 1997/98</p>	

and in 2012/13, the latter with 1,148 million tons, the historical maximum; in the last 13 years the B_{rep} has oscillated between 0.850 and 1.148 million tons (SCS Global Services, 2022).

The estimated exploitable biomass (B_{exp}) follows a trend very similar to that of the SSB, that is, the lowest values occurred in the first fishing seasons, and their first peaks in 1981/82 and 1989/90, the latter with a little more than 834.00 tons. Between 1993/94 and 2002/03 the B_{exp} ranged between 808,000 and 983,000 t and in the period 2003/04 and 2007/08 it decreased, ranging between 749 and 761 thousand t. In the last 12 years, the exploitable biomass has oscillated between 0.877 and 1.131 million tons, whose maximum value occurred in 2013/14. For the 2020/21 fishing season it is estimated to be 0.853 million tons. The annual fishing mortality rate (F_{curr}) presented the highest values in 1972/73 (0.161) and in 1982/83 (0.151), showing that in the rest of the fishing seasons the mortality values were below 0.10 /year. Regarding the annual exploitation rate ($E=1-\exp(-F_{curr})$), it presented the highest values in the same seasons (1972/73 and 1982/83), while in the last 12 years these values have ranged between 0.090 and 0.037. A similar behaviour presents the ratio C_{total}/B_{exp} , with the peaks appearing in the 1972/73 (0.202) and 1982/83 (0.184) seasons, although it is observed that these values are always higher, with respect to $E=1-\exp(-F_{curr})$. The estimated values, in the last eight fishing seasons, for this indicator ranged between 0.067 and 0.118 (Figure below).

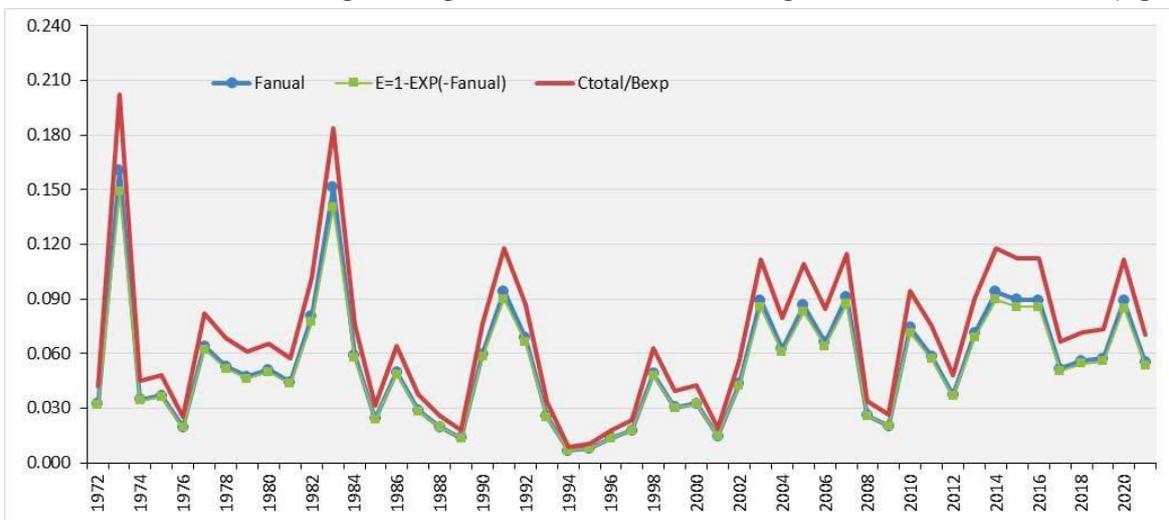


Figure 6. Fishing mortality rates (F_{annual}) and annual exploitation rate ($E=1-\exp(-F)$ and $E=C_{total}/B_{exp}$) obtained with ASAP for the bald sardine in the Gulf of California Status relative to B_{MSY} and F_{MSY} combined.

Source : SCS Global Services, 2022.

Furthermore, the Kobe diagram presented in the last MSC ACDR (Figure 4) showed that the thread herring population is in good condition and the fishing effort has been below the recommended maximum, so the stock is not overfished nor it is undergoing overfishing.

Therefore, the stock is above the biomass target level, and fishing mortality is well below the target reference point, so it PASSES Clause A 4.1.

References

SCS Global Services report, 2022. Small Pelagic Fishery in Sonora, Gulf of California – 2022 Reassessment: MSC Announcement comment draft report 323pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@assessment>

SCS Global Services report, 2021. Small Pelagic Fishery in Sonora, Gulf of California – 2021 MSC Third surveillance audit report 91 pp.: <https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=NAohFthSKwTeJnNCw56BwOxschGa32jJSH5e+uWfeB4cJ/UrcZMC7UR/a2WadvOg>

SCS Global Services Report. 2020. SMALL PELAGICS FISHERY IN SONORA, GULF OF CALIFORNIA. Second Surveillance Audit Report. 70 pp. SCS global services: <https://sardinagolfodecalifornia.org/wp-content/uploads/2021/02/2020-Segundo-Informe-Auditoria-Vigilancia.pdf>

SCS Global Services report, 2019. SMALL PELAGICS FISHERY IN SONORA, GULF OF CALIFORNIA. First Surveillance Audit Report. 83 pp.: <https://sardinagolfodecalifornia.org/wp-content/uploads/2021/02/2019-Primer-Informe-Auditoria-Vigilancia.pdf>

Reglamento de la Ley de Pesca NOM-003-SAG/PESC- 2018 : <https://vlex.com.mx/vid/nom003-sag-pesc-773892697>

Links

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

CATEGORY B SPECIES

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

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

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

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

TABLE B(A) - F, B AND REFERENCE POINTS ARE AVAILABLE

Biomass is above MSY / target reference point	Pass	Pass	Pass	Fail	Fail
Biomass is below MSY / target reference point, but above limit reference point	Pass, but re-assess when fishery removals resume	Pass	Fail	Fail	Fail
Biomass is below limit reference point (stock is overfished)	Pass, but re-assess when fishery removals resume	Fail	Fail	Fail	Fail

Biomass is significantly below limit reference point (Recruitment impaired)	Fail	Fail	Fail	Fail	Fail
	Fishery removals are prohibited	Fishing mortality is below MSY or target reference point	Fishing mortality is around MSY or target reference point, or below the long-term average	Fishing mortality is above the MSY or target reference point, or around the long-term average	Fishing mortality is above the limit reference point or above the long-term average (Stock is subject to overfishing)

If the biomass / fishing pressure risk assessment is not possible

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

TABLE B(B) - NO REFERENCE POINTS AVAILABLE. B = CURRENT BIOMASS; B_{av} = LONG-TERM AVERAGE BIOMASS; F = CURRENT FISHING MORTALITY; F_{av} = LONG-TERM AVERAGE FISHING MORTALITY.

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

Assessment Results

Species Name		Californian anchovy/<i>Anchoveta (Engraulis mordax)</i>
B1	Species Name	Californian anchovy (<i>Engraulis mordax</i>)
	Table used (Ba, Bb)	Ba
	Outcome	PASS

According to the MSC ACDR 2022, F and B, and reference points are available, so the Ba table has been used to assess Californian anchovy.

Biomass is above MSY, target reference point and fishing mortality is below MSY or target reference point:

INAPESCA determines the status of Californian anchovy, in addition to two Pacific anchoveta and chub mackerel, by a surplus production dynamic model (Schaefer) with a CMSY++ method using historical catch data (SCS Global Services, 2022).

According to the reference points for anchovy, the maximum sustainable yield is $MSY=160,000$ t, and the biomass at maximum sustainable yield $B_{MSY}=328,000$ t. The value of F in the MSY was estimated at $F_{MSY}=0.678$.

The Anchovy fishery in the northern Gulf of California shows biomass levels necessary to reach the MSY, since the B_t/B_{MSY} ratio is between 1.5 and 2.0, which corresponds to a relative fishing mortality $F_t/F_{MSY} \leq 0.83$ (Figure below). According to these results, the Anchovy stock in the northern Gulf of California is healthy, and exploitation rates have been lower than those required to achieve maximum sustainable yield; therefore, it is not overfished. The figure below shows that the Californian anchovy biomass in the Gulf of California has remained stable. On the other hand, the estimated maximum sustainable yield is close to yields of northern Anchovy in the fishery.

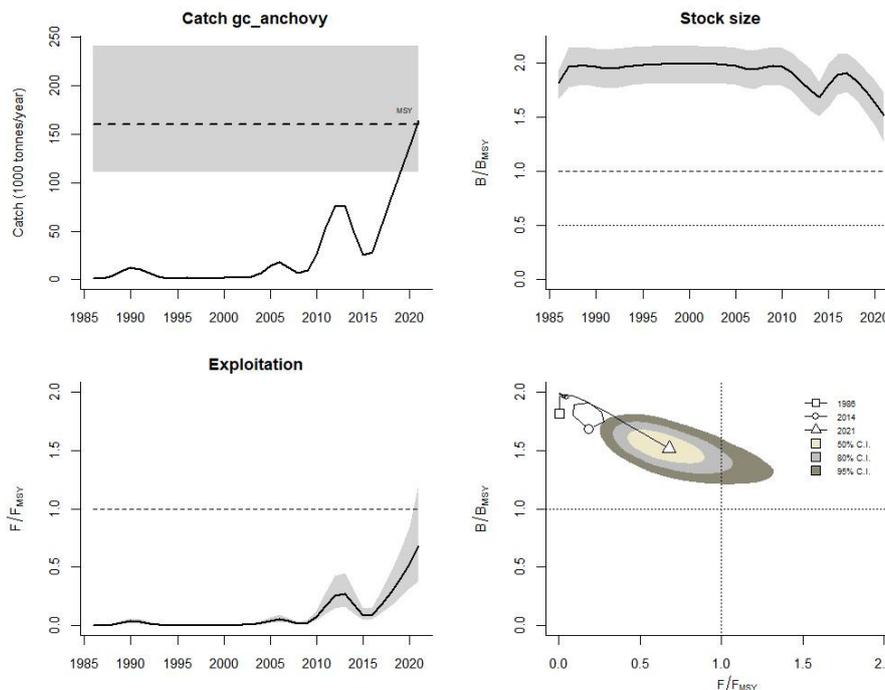


Figure 7. Anchovy biomass trajectory (solid line) and biomass at maximum sustainable yield (dashed line).

Source: Global Services, 2022.

Furthermore, the Kobe diagram (Figure 8) indicates that the probability that the last year falls in the green area is very high, in this case there is a 91.1% probability, 8.9% that it falls in the orange area and 0% probability that it falls in the red area or yellow. That is, since the northern anchovy has a high probability of being found in the green area (management objective), it would indicate a sustainable fishing pressure and a healthy stock size capable of producing high yields close to the MSY.

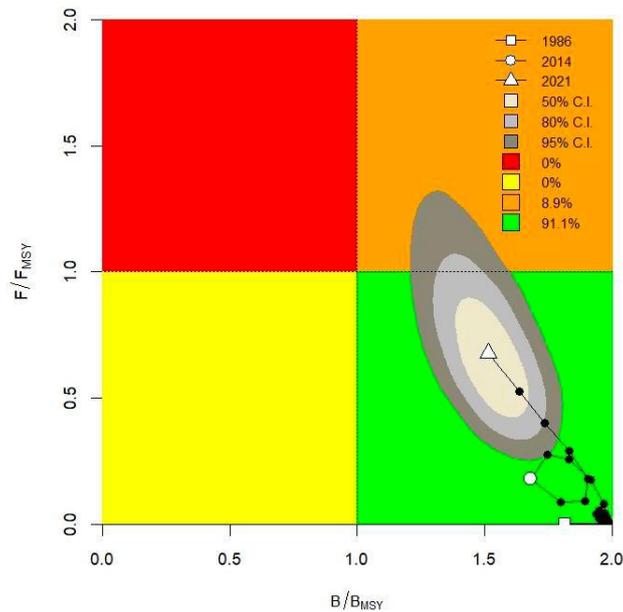


Figure 8. The Kobe plot shows the trajectory of the Californian anchovy biomass and its current level in the Gulf of California.

Source: SCS Global Services, 2022.

In the case of the anchovy in the Gulf of California, it was estimated that the exploitable biomass for the 2021/2022 fishing season (October 2021 to September 2022) is 426,525 t, that the B_{MIN} value is 65,600 t, that $F_{MSY}=0.488$ and $FRACTION=0.8F_{MSY}=0.3904$. It was estimated that the CR for the 2021/2022 fishing season is 140,905 t. In addition, the annual catch limit (LCA) and the BAC were estimated, whose values were $LCA=160,000$ t, $BAC=166,515$ t.

References

SCS Global Services report, 2022. Small Pelagic Fishery in Sonora, Gulf of California – 2022 Reassessment: MSC Announcement comment draft report 323pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@assessment>

Fishbase. *Engraulis mordax* (Girard, 1854), Californian anchovy: <https://www.fishbase.se/summary/Engraulis-mordax.html>

Links

MarinTrust Standard clause	1.3.2.2, 4.1.4
FAO CCRF	7.5.1
GSSI	D.5.01

Species Name		Bocona sardine/Pacific anchoveta (<i>Cetengraulis mysticetus</i>)
B1	Species Name	Pacific anchoveta (<i>Cetengraulis mysticetus</i>)
	Table used (Ba, Bb)	Ba
	Outcome	PASS
<p>F and B, and reference points are available, so the Ba table has been used to assess Pacific anchoveta.</p> <p>Biomass is above MSY / target reference point and fishing mortality is below MSY or target reference point:</p> <p>INAPESCA determines the status of Pacific anchoveta, in addition to Californian anchovy and chub mackerel, by a surplus production dynamic model (Schaefer) with a CMSY++ method using historical catch data (SCS Global Services, 2022). The model outcomes provide CPUE trends, Biomass trend in relation with the MSY and a Kobe chart, using the relationships F_t/F_{MSY} and B_t/B_{MSY}. This report uses the fishing data from the permanent monitoring of the small pelagic fishery in the Gulf of California carried out by the staff of the Small Pelagic Program of the Regional Center for Fishery and Aquaculture Research (CRIAP) in Guaymas, Sonora, of the <i>Instituto Nacional de Pesca y Acuicultura</i> (INAPESCA) of <i>Secretaría de Agricultura y Desarrollo Rural</i> (SADER). Catch and effort statistics comes from the Arrival Notices of small pelagic landings from the ports of Guaymas and Yavaros, provided by the Federal Fishing Offices-SADER of Guaymas and Huatabampo, Sonora, which comprise seasons 1971/72 to 2018/19. Fishers began catching Pacific anchoveta and Anchovy in the mid-1980s, so Anchovy catch data is for 34 fishing seasons (1985/86 to 2018/19) and for Pacific anchoveta 30 fishing seasons (from 1989/90 to 2018/19). The Catch-MSY method uses the Schaefer (1954) production model in a dynamic version.</p> <p>The historical values of the Pacific anchoveta biomass have exceeded 369,500 tons, with great fluctuations after the year 2000. Biomass fluctuations have been between 365,500 and 616,500 tons, and the fishing season with the lowest biomass value was 2013/2014. In the last three seasons, the biomass of the Pacific anchoveta exceeded 531,000 tons, a value higher than $B_{MSY} = 314,071$ tons. In most of the years, catches have been above the $MSY = 136,564$ tons, except in fishing season 2011/2012. In the last six fishing seasons, catches have been below MSY, a period with an upward trend in biomass (Figure below).</p>		

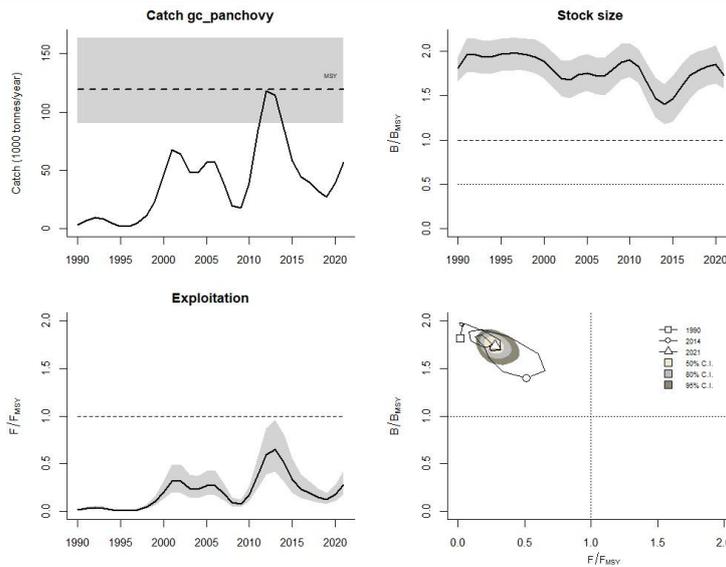


Figure 9. Time series of the biomass of the Pacific anchoveta stock of the Gulf of California. The dashed line represents the biomass at maximum sustainable yield.
Source: SCS Global Services, 2022.

The "Kobe chart" format of the status of biomass and fishing mortality from the Pacific anchoveta fishery places the fishery in the "green zone", which means it is a healthy stock (**Figure 10**). The lowest value of the relative biomass ratio ($B_t/B_{MSY}=1.2$) occurred in the fishing season 2013/2014 but is still above the limit reference point $B_t/B_{MSY}=1.0$.

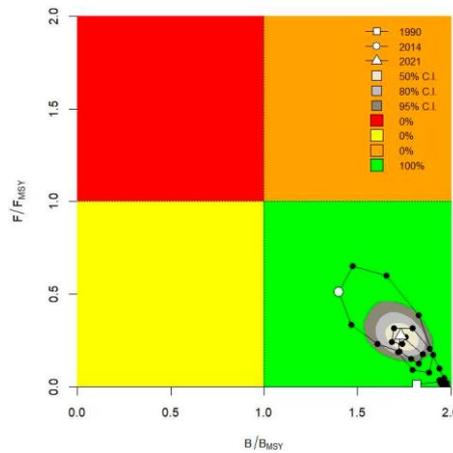


Figure 10. The Kobe chart shows the trajectory of the Pacific anchoveta biomass and its current level in the Gulf of California.
Source: SCS Global Services, 2022.

Furthermore, taking into account the results of F_{MSY} , B_{MSY} and B/B_{MSY} , as well as the biomass for the last year, it was estimated that the exploitable biomass for the 2021/2022 fishing season (October 2021 to September 2022) of the Pacific anchoveta is 368,500 t, that the value of B_{MIN} is 62,500 t, that $F_{MSY}=0.475$ and that $FRACTION=0.8F_{MSY}=0.38$, then it was estimated that the CR for the Pacific anchoveta of the north-central Gulf of California for the 2021/2022 fishing season is 116,280 tons: $CR_{2021/2022}=(368,500-62,500)*(0.8*0.475)=116,280$ t.

In addition, the LCA annual catch limit and the BAC were estimated, whose values were $LCA=120,000$ t, $BAC=140,030$ t.

References

SCS Global Services report, 2022. Small Pelagic Fishery in Sonora, Gulf of California – 2022 Reassessment: MSC Announcement comment draft report 323pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@assessment>

Fishbase. *Cetengraulis mysticetus* (Günther, 1867), Pacific anchoveta: <https://www.fishbase.se/summary/Cetengraulis-mysticetus.html>

Links

MarinTrust Standard clause	1.3.2.2, 4.1.4
FAO CCRF	7.5.1
GSSI	D.5.01

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.

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. Where a species fails this Clause, it may be assessed as a Category D species instead, EXCEPT if there is evidence that it is currently below the limit reference point.

Species Name		Chub mackerel, <i>Scomber japonicus</i>	
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.	Yes
	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.	Yes
			Clause outcome: PASS
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.			
<p>The landing notification forms (<i>avisos de arribo</i>) are provided and collected by regional offices of CONAPESCA. Data are processed and analysed by INAPESCA; results presented in official reports of fishery catch and effort.</p> <p>The time series of Chub mackerel catch in the Gulf of California is shown in Figure below. This species has been recorded since the beginning of the small pelagic fishery in the Gulf of California, with an upward trend and great variability from year to year. During the period 1971/72 to 1983/84 their catches fluctuated between 150 t and 5,750 t; it was followed by a period (1984/85 - 1994/95) of high increase in landings, but also greater interannual variability, since they came to record between 2,070 and 17,060 t. As of the 1995/96 fishing season, the variations in the catch were magnified, showing three marked decreases of less than 5,000 t (from 1995/1996 to 1997/1998, from 2001/2002 and from 2007/2008 to 2009/2010), followed by high catches, reaching double and triple the magnitude of landings from the previous period. The first peak recorded catches between 33,750 t and 41,000 t (1998/1999 and 1999/2000), the second peak was about 33,000 t (2004/2005); the third historical landing, was 47,600 t (2011/2012); and the fourth and last peak (maximum) was almost 83,828 t (2017/2018).</p> <p>In the last five seasons (from 2013/2014 to 2018/2019), the Chub mackerel landings ranged from 34,500 t to 83,850 t. For this reason, Chub mackerel, along with the Pacific anchoveta and Anchovy, have become alternative species in the fishery, when the catch of the latter decreases, without replacing the levels obtained for this species.</p>			

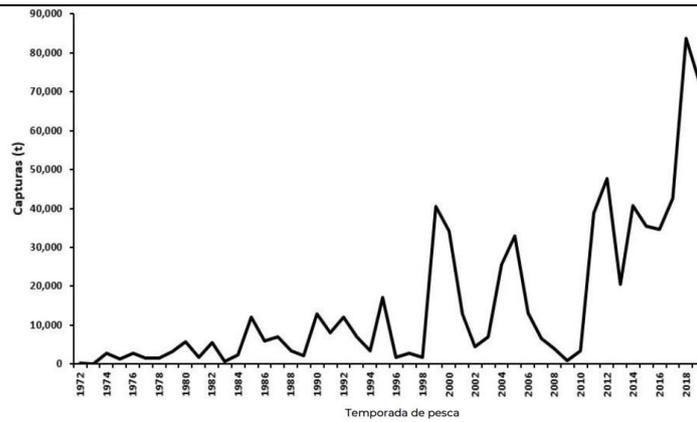


Figure 11. Total catch of Chub mackerel in the northern Gulf of California stock.
Source : SCS Global Services, 2022.

Fishery removals of the species in the fishery under assessment are included in the stock assessment process, so the fishery PASSES Clause C1.1.

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.

INAPESCA determined the status of chub mackerel, in addition to Pacific anchoveta and anchovy, by a surplus production dynamic model (Schaefer) with a CMSY++ method using historical catch data.

According to the model, the historical trend for Chub Mackerel biomass has exceeded 300,000 tons, with a downward trend in the last nine fishing seasons, just as landings showed a steady increase. Likewise, the annual landings have been below MSY = 89,810 tons (Figure below). The last fishing season have been dropped related to the MSY.

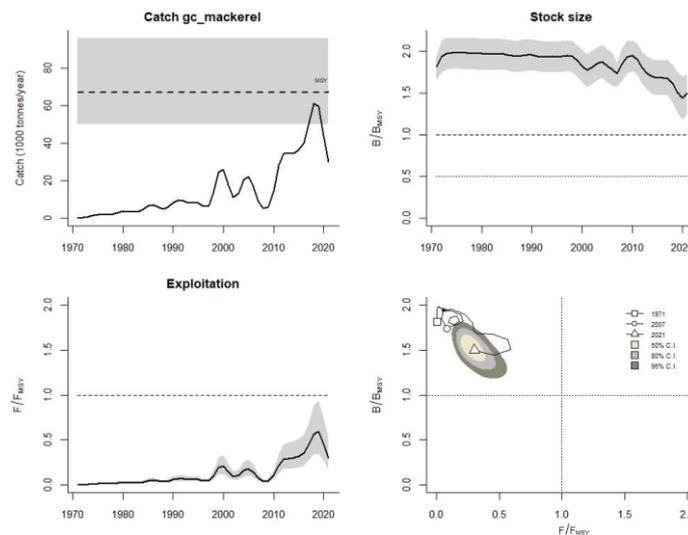


Figure 12. Chub mackerel biomass trajectory (black line), biomass at maximum sustainable yield and catch trend (grey line).
Source: SCS Global Services report, 2022.

The status of chub mackerel in the northern Gulf of California can be illustrated by the Kobe chart format, which relates the biomass and fishing mortality. In this case, the Chub mackerel fishery falls into the "green zone", which means it is a healthy stock (Figure 13). The lowest value of the relative biomass ratio ($B_t/B_{MSY}=1.5$) occurred in the fishing season 2018/2019 but is still above the limit reference point $B_t/B_{MSY}=1.0$. The Chub mackerel fishery in the northern Gulf of California shows the biomass is at a level adequate to reach the MSY, since the B_t/B_{MSY} ratio is between 1.5 and 2.0, which corresponds to a relative fishing mortality

$F_t/F_{MSY} \leq 0.3$. According to these results, the Chub mackerel stock in the northern Gulf of California is healthy, and exploitation rates have been lower than those required to achieve maximum sustainable yield; therefore, there is no overfishing of the stock.

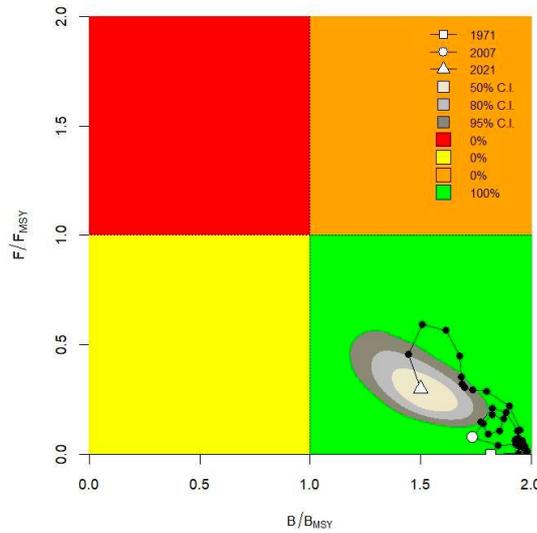


Figure 13. Kobe chart showing chub mackerel trajectory and its current status in the Gulf of California.
Source: SCS Global Services report, 2022.

Therefore, the species is considered, in its most recent stock assessment, to have a biomass above the limit reference point, so the fishery PASSES Clause C1.2.

References

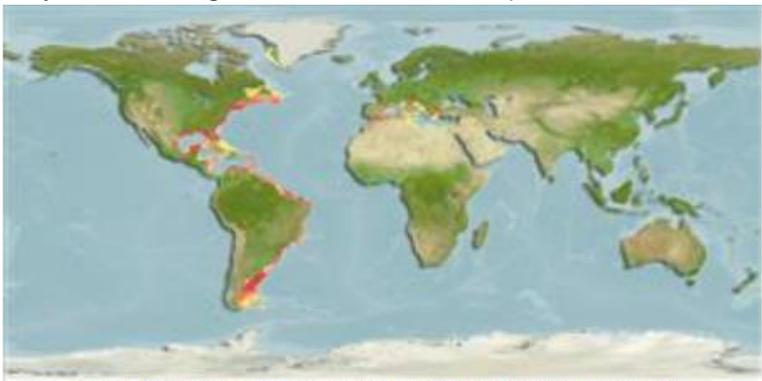
SCS Global Services report, 2022. Small Pelagic Fishery in Sonora, Gulf of California – 2022 Reassessment: MSC Announcement comment draft report 323pp.: <https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@assessment>

Links

MarinTrust Standard clause	1.3.2.2
FAO CCRF	7.5.3
GSSI	D.3.04, D5.01

CATEGORY D SPECIES

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

D1	Species Name	Round herring, <i>Etrumeus teres/acuminatus</i>	
	Productivity Attribute	Value	Score
	Average age at maturity (years)	0.9	1
	Average maximum age (years)	3.3	1
	Fecundity (eggs/spawning)	>20 000	1
	Average maximum size (cm)	27	1
	Average size at maturity (cm)	16.5	1
	Reproductive strategy	Broadcast spawner (non-guarders: open water)	1
	Mean trophic level	3.6	3
	Average Productivity Score		1.29
	Susceptibility Attribute	Value	Score
	Availability (area overlap)	<10% overlap	1
	Encounterability (the position of the stock/species within the water column relative to the fishing gear)	Pelagic, 0-125m	3
	Selectivity of gear type	1 to 2 times mesh size	2
	Post-capture mortality	Most dead	3
	Average Susceptibility Score		2.25
	PSA Risk Rating (From Table D3)		Pass
	Compliance rating		PASS
	Further justification for susceptibility scoring (where relevant)		
	<p><i>For susceptibility attributes, please provide a brief rationale for scoring of parameters where there may be uncertainty affecting your decision</i></p> <p>Very few information has been found on round-herring. As life history parameters are likely very similar between this species and the red-eye round herring, the assessor found it acceptable to use them when needed.</p>		
 <p>This map was computer-generated and has not yet been reviewed. <i>Etrumeus sadina</i> AquaMaps Data sources: GBIF OBIS</p>			
References			
Fishbase. <i>Etrumeus acuminatus</i> Gilbert, 1890: https://www.fishbase.se/summary/Etrumeus-acuminatus.html			
For complementary information:			
Fishbase. <i>Etrumeus sadina</i> (Mitchill, 1814) Red-eye round herring: https://www.fishbase.se/summary/Etrumeus-sadina.html#			
Standard clauses 1.3.2.2			

D1	Species Name	Leatherjackets, <i>Oligoplites sp.</i>	
	Productivity Attribute	Value	Score
	Average age at maturity (years)	1.6	1
	Average maximum age (years)	5.7	1
	Fecundity (eggs/spawning)	No value	-
	Average maximum size (cm)	36.6	1
	Average size at maturity (cm)	21.2	1
	Reproductive strategy	Broadcast spawners	1
	Mean trophic level	4.3	3
	Average Productivity Score		1.33
	Susceptibility Attribute	Value	Score
	Availability (area overlap)	<10%	1
	Encounterability (the position of the stock/species within the water column relative to the fishing gear)	0-50m	3
	Selectivity of gear type	>2 times mesh size	3
	Post-capture mortality	Most retained	3
	Average Susceptibility Score		2.5
	PSA Risk Rating (From Table D3)		Pass
	Compliance rating		PASS
	Further justification for susceptibility scoring (where relevant)		
	For susceptibility attributes, please provide a brief rationale for scoring of parameters where there may be uncertainty affecting your decision		
			
	<p>This map was computer-generated and has not yet been reviewed. <i>Oligoplites saurus</i> AquaMaps Data sources: GBIF OBIS</p>		
	References		
Fishbase. <i>Oligoplites saurus</i> (Bloch & Schneider, 1801), Leatherjacket: https://www.fishbase.de/summary/1001			
Standard clauses 1.3.2.2			

Table D2 - Productivity / Susceptibility attributes and scores.

Productivity attributes	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
Average age at maturity	<5 years	5-15 years	>15 years
Average maximum age	<10 years	10-25 years	>25 years
Fecundity	>20,000 eggs per year	100-20,000 eggs per year	<100 eggs per year
Average maximum size	<100 cm	100-300 cm	>300 cm
Average size at maturity	<40 cm	40-200 cm	>200 cm
Reproductive strategy	Broadcast spawner	Demersal egg layer	Live bearer
Mean Trophic Level	<2.75	2.75-3.25	>3.25

Susceptibility attributes	Low susceptibility (Low risk, score = 1)	Medium susceptibility (medium risk, score = 2)	High susceptibility (high risk, score = 3)
Areal overlap (availability) Overlap of the fishing effort with the species range	<10% overlap	10-30% overlap	>30% overlap
Encounterability The position of the stock/species within the water column relative to the fishing gear, and the position of the stock/species within the habitat relative to the position of the gear	Low overlap with fishing gear (low encounterability).	Medium overlap with fishing gear.	High overlap with fishing gear (high encounterability). Default score for target species
Selectivity of gear type Potential of the gear to retain species	a Individuals < size at maturity are rarely caught	a Individuals < size at maturity are regularly caught.	a Individuals < size at maturity are frequently caught
	b Individuals < size at maturity can escape or avoid gear.	b Individuals < half the size at maturity can escape or avoid gear.	b Individuals < half the size at maturity are retained by gear.
Post-capture mortality (PCM) The chance that, if captured, a species would be released and	Evidence of majority released post-capture and survival.	Evidence of some released post-capture and survival.	Retained species or majority dead when released.

D3		Average Susceptibility Score		
		1 - 1.75	1.76 - 2.24	2.25 - 3
Average Productivity Score	1 - 1.75	PASS	PASS	PASS
	1.76 - 2.24	PASS	PASS	TABLE D4
	2.25 - 3	PASS	TABLE D4	TABLE D4
that it would be in a condition permitting subsequent survival				

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.

It is important to note that as a part of the verification tool report the clauses F are not assessed herein. They are covered under section P2 PIs of the MSC certified fisheries from the Third Surveillance report published in November 2021, and it is assumed that they are equivalent to clauses F in MarinTrust whole fish report.

F1	Impacts on ETP Species - Minimum Requirements	
	F1.1	Interactions with ETP species are recorded.
	F1.2	There is no substantial evidence that the fishery has a significant negative effect on ETP species.
	F1.3	If the fishery is known to interact with ETP species, measures are in place to minimise mortality.
		Clause outcome:
<p>F1.1 Interactions with ETP species are recorded.</p> <p>F1.2 There is no substantial evidence that the fishery has a significant negative effect on ETP species.</p> <p>F1.3 If the fishery is known to interact with ETP species, measures are in place to minimise mortality.</p>		
References		
Links		
MarinTrust Standard clause		1.3.3.1
FAO CCRF		7.2.2 (d)
GSSI		D4.04, D.3.08
F2	Impacts on Habitats - Minimum Requirements	
	F2.1	Potential habitat interactions are considered in the management decision-making process.
	F2.2	There is no substantial evidence that the fishery has a significant negative impact on physical habitats.
	F2.3	If the fishery is known to interact with physical habitats, there are measures in place to minimise and mitigate negative impacts.
		Clause outcome:
<p>F2.1 Potential habitat interactions are considered in the management decision-making process.</p> <p>F2.2 There is no substantial evidence that the fishery has a significant negative impact on physical habitats.</p> <p>F2.3 If the fishery is known to interact with physical habitats, there are measures in place to minimise and mitigate negative impacts.</p>		
References		
Links		
MarinTrust Standard clause		1.3.3.2
FAO CCRF		6.8
GSSI		D.2.07, D.6.07, D3.09

F3 Ecosystem Impacts - Minimum Requirements	
F3.1	The broader ecosystem within which the fishery occurs is considered during the management decision-making process.
F3.2	There is no substantial evidence that the fishery has a significant negative impact on the marine ecosystem.
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.
Clause outcome:	
<p>F3.1 The broader ecosystem within which the fishery occurs is considered during the management decision-making process.</p> <p>F3.2 There is no substantial evidence that the fishery has a significant negative impact on the marine ecosystem.</p> <p>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.</p>	
References	
Links	
MarinTrust Standard clause	1.3.3.3
FAO CCRF	7.2.2 (d)
GSSI	D.2.09, D3.10, D.6.09

SOCIAL CRITERION

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

Appendix A - Determining Resilience Ratings

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

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

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

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

Glossary

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

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

Appendix

MarinTrust Fishery Assessment Peer Review Template

This section comprises a summary of the fishery being assessed against version 2 of the MarinTrustStandard.

Fishery under assessment	WF17 Gulf of California small pelagic fishery, in Eastern Central Pacific FAO 77, Baja California, Mexico
Management authority (Country/State)	Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food SAGARPA, Mexico
Main species	Pacific sardine (<i>Sardinops sagax</i>) Thread herring (<i>Opisthonema spp</i>) Californian anchovy/Anchoveta (<i>Engraulis mordax</i>)
Fishery location	Eastern Central Pacific FAO 77: Baja California, Mexico
Gear type(s)	Purse Seine

Summary: in this section, provide any additional information about the fishery that the reviewers feel is significant to their decision.

The fishery assessment uses the verification process developed by Marin Trust (<https://www.marin-trust.com/news/marintrust-unveils-new-verification-tool-fishmeal-plants-claiming-be-receiving-msc-certified>).

The assessor has stated that “As per guidelines, when the verification tool is used to evaluate a fishery against Marin Trust Fisheries standard V2.0 the clauses M and F are not scored as they are already assessed and scored in the relevant MSC report.” MAZ industrial’s fleet of 8 purse seine vessels are not covered by the MSC assessment. The assessor noted an absence in guidance and proposes that clarification from MT is provided on how to assess the MAZ fleet using the VT tool.

It would be helpful if these guidelines could be made available to the peer reviewer for the new VT tool to validate the level of evidence required/provided.

Catch composition is quite different from the previous year MT review and given the assessor raises concern regarding accurate catch data and lack of data from most clients we would agree that it is essential to have accurate and consistent catch data prior to next review.

General Comments on the Draft Report provided to the peer reviewer

An internal review of the assessment has been conducted. It would be helpful for the peer reviewer to have provided more detail on their evaluation.

Certification body response

This is the internal peer reviewer comment:

“The peer reviewer agrees with the findings of the assessment.

Categorization of the species are correct per the average percent catch composition. IUCN Redlist Statuses and assessment categories were correctly assigned according to MarinTrust guidelines. There is no new evidence or data that would contradict the previous initial and surveillance assessments. New data was reported and correctly applied in the MT assessment process.

The assessor correctly applied the MSC verification steps where they were applicable and carried out the assessment properly where the MSC verification failed.

All seven species were correctly assigned to the correct category (A through D) and passes the respective clauses for its category.

As stated, the peer reviewer agrees with the assessor’s determination and the stocks are approved by the assessment team for the production of fishmeal and fish oil under the MarinTrust v2.0 Whole Fish Standard.”

According to MT standard, the internal peer review comments are not shared in the report, but archived internally and shared with Marin Trust.

Summary of Peer Review Outcomes

Peer reviewers should review the fishery assessment report with the primary objective of answering the key questions listed in the table below. Where the situation is more complicated, reviewers may instead answer “See Notes”.

	YES	NO	See Notes
A – Fishery Assessment			
1. Has the fishery assessment been fully completed, using the recognised MarinTrust fishery assessment methodology and associated guidance?	Yes		VT used
2. Does the Species Categorisation section of the report reflect the best current understanding of the catch composition of the fishery?	Yes		Catch data confidence is low-medium
3. Are the scores in the following sections accurate (i.e. do the scores reflect the evidence provided)?	Yes		
Section M - Management	VT used		
Category A Species	Yes		
Category B Species	Yes		Please clarify data correct and reference to largemouth bass in error
Category C Species	Yes		
Category D Species	Yes		
Section F – Further Impacts	VT used		

Detailed Peer Review Justification

Peer reviewers should provide support for their answers in the boxes provided, by referring to specific scoring issues and any relevant documentation as appropriate.

Detailed justifications are only required where answers given are one of the ‘No’ options. In other (Yes) cases, either confirm ‘scoring agreed’ or identify any places where weak rationales could be strengthened (without any implications for the scores).

Boxes may be extended if more space is required.

1. Is the scoring of the fishery consistent with the MarinTrust standard, and clearly based on the evidence presented in the assessment report?

The scoring is consistent with the MT standard for category A, B, C and D species and the appropriate evidence is provided within the assessment report, and notwithstanding the remarks in this peer review report (see each section below and summary).

The new verification tool has been used to cover Sections M and F, however, MT may wish to clarify if assessors should provide greater support to the determination based on the MSC reports or if it is sufficient to reference the MSC report. For example, a basic level of evidence from the MSC assessments could be provided in the MarinTrust assessment such as the MSC score allocated for that Performance Indicator/Principle to demonstrate that the fishery does meet all the MT standard requirements.

Certification body response

According to **MarinTrust guidance**: *“For the purposes of the WF17 assessment, it is sufficient for the assessor to reference the MSC assessment report. It is at discretion of the assessor if they choose to include further information from the MSC report to support their determination”*, the assessor estimates that the information written in the report is sufficient.

2. Has the fishery assessment been fully completed, using the recognised MARINTRUST fishery assessment methodology and associated guidance?

The fishery assessment has been completed following the MARINTRUST methodology, with use of the new verification tool, though evidence from MSC report to evidence compliance with MT guidance notes would be useful.

Using the new verification tool (VT) has replaced the need for assessment of M and F clauses.

We would propose that for each Section the assessor could add a statement that the MSC assessment meets the guidance of the MT standard and the assessor could highlight any areas of weakness even if it meets the clause (e.g. is there a condition as part of a MSC clause).

Details of the evaluation comments from the internal reviewer would be useful.

The assessment determination section could include a summary statement on management, control and enforcement and the impacts of the fishery on ETP species and wider ecosystem based on the MSC reports.

Certification body response

At the beginning of each concerned Section, a statement explaining why the clause it not further assessed is written: *“It is important to note that, as a part of the verification tool report the M clauses are not assessed herein. They are covered under section P3 PIs of the MSC certified fisheries from the Third Surveillance report published in November 2021, and it is assumed that they are equivalent to M clauses in MarinTrust whole fish report”* and *“It is important to note that as a part of the verification tool report the clauses F are not assessed herein. They are covered under section P2 PIs of the MSC certified fisheries from the Third Surveillance report published in November 2021, and it is assumed that they are equivalent to clauses F in MarinTrust whole fish report”*.

According to MT standards and the exchanges I add with the staff on that matter, further information is not needed.

Details of the evaluation comments from the internal reviewer has been shared in the beginning of this document.

As per MT guidance, no more information has been added in the assessment determination, as it is already explained that the MSC verification tool covers for M and F sections thanks to the MSC certified fishery.

3. Does the Species Categorisation section of the report reflect the best current understanding of the catch composition of the fishery?

The species categorisation section (see Table 4) indicates the majority of the catch composition is Anchoveta (45-65%), with Thread Herring (10-16%), Monterrey (Pacific) sardine (4-30%) and Bocona Sardine (8-12%) as the other main species. Three species are caught at less than 5% of the catch (chub mackerel, round herring and leatherjackets).

Note this is different to last year's MT review (up to Oct 2021) which gave the main catch composition as Thread Herring (50%) and Monterrey (Pacific) sardine (30%) and five species at less than 5% of the catch (Mackerel, anchoveta, Bocona Sardine, Japanese sardine and Leatherjackets). Given the assessor raises concern regarding accurate catch data and lack of data from most clients we would agree that it is essential to have accurate and consistent catch data prior to next review.

Certification body response

I agree with the fact that it is essential to have accurate and consistent catch data prior to next review. This warning is already written in the report.

3M. Are the scores in "Section M – Management" clearly justified?

The MarinTrust MSC verification tool has been utilised and identified that the MSC fishery assessment "Small Pelagics Fishery in Sonora, Gulf of California" has the same target species and scope, and as such the M and F clauses have not been completed in the assessor report.

We would propose that for this Section the assessor could add a statement that the MSC assessment meets the guidance of the MT standard and the assessor could highlight any areas of weakness even if it meets the clause (e.g is there a condition as part of a clause). All said, the assessor has provided references and links to the MSC reports which can be accessed by the reader. Clarification on the level of detail could form part of further guidance from MarinTrust.

Certification body response

According to **MarinTrust guidance**: *"For the purposes of the WF17 assessment, it is sufficient for the assessor to reference the MSC assessment report. It is at discretion of the assessor if they choose to include further information from the MSC report to support their determination"*, the assessor estimates that the information written in the report is sufficient.

Regarding the last sentence, MarinTrust accepts this feedback and will review this need for clarification and may include clarification in future guidance for MSC verification tool.

3A. Are the "Category A Species" scores clearly justified?

The scores in this section are justified with detailed evidence provided by the assessor including of both fishery dependent and fishery independent data being collected and utilised and stock assessments being conducted at least every 3 years. The assessor has completed section A for Pacific sardine and Thread Herring. Total biomass and SSB for thread herring has been decreasing in recent years although the population is still considered to be healthy with fishing mortality below recommended maximum.

Comments:

Is there evidence of management measures in place or being implemented to prohibit commercial fishery removals if the stock has been estimated to be below the limit reference point or proxy (e.g closures or move-on rules)?

Certification body response

The stock is in a healthy condition and the fishing mortality has been below the recommended maximum; therefore, the stock is not overfished, and overfishing is not occurring. In the last 30 years, the stock has never been estimated to be below the limit reference point or proxy, so I could not find this kind of evidence of management measures in place or being implemented to prohibit commercial fishery removals of the stock.

3B. Are the “Category B Species” scores clearly justified?

The scores in this section are justified with biomass above MSY and evidence including biomass trajectory provided by the assessor.

In the Pacific anchoveta section last paragraph the assessor refers to largemouth bass – can they confirm, as we predict this is a typographical error and that the data relates to anchoveta?

Certification body response

It’s a typographical error in the report used for this assessment. It has been corrected in this WF report.

3C. Are the “Category C Species” scores clearly justified?

The scores in this section are justified.

Is there any evidence that management measures are being implemented for stock rebuilding for chub mackerel especially given large increase in landings and decrease in biomass?

Certification body response

The latest management plan has been updated and made explicit the control rule for active managed stocks. As the latest stock assessment for Chub mackerel showed that the biomass has been above B_{MSY} and the annual fishing mortality below F_{MSY} , there is no need of rebuilding management measures (even if landings increase and biomass decrease). I could consequently not find evidence that management measures are being implemented for stock rebuilding for this species.

3D. Are the “Category D Species” scores clearly justified?

The scores in this section are justified with use of data for similar species when not available for round herring.

Certification body response

Thanks.

3F. Are the scores in “Section F – Further Impacts” clearly justified?

The MarinTrust MSC verification tool has been utilised and as such no F clause has been included in the report. As mentioned above a brief summary of evidence from the use of the VT could be included to validate the scores under this standard.



Certification body response

I had an exchange with MT after this external peer review on this point. I do not have anything to add at this moment.

MarinTrust accepts this feedback and will review this need for clarification and may include clarification in future guidance for MSC verification tool.

Optional: General comments on the Peer Review Draft Report

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