Updates to the MSC Principle 2 PIs for the Mexican small-scale shrimp fishery

October 2025

Executive summary

This report presents the results of updating the P2 PIs' scores using available data and, when not, taking into consideration the MSC's Risk-Based Framework (RBF)—the assessment of the Small-Scale blue shrimp (*Litopenaeus stylirostris*) fishery in the Gulf of California. The fishery operates using three primary gear types: small otter trawls, drift gillnets, and suriperas. The analysis evaluates the impacts on associated species under Principle 2 of the Marine Stewardship Council (MSC) Standard, with a focus on the fishery's impact on non-target species.

The update of the PIs, was completed using the most recent available information and the MSC's Risk-based framework to score:

2.1.1 – Primary species outcome
2.2.1 – Secondary species outcome
2.3.1 – ETP species outcome

The RBF employed Productivity–Susceptibility Analysis (PSA) to determine risk levels associated with each gear type. The evaluation was performed separately for each gear, then integrated conservatively to reflect the highest risk. Scores were aligned with MSC guideposts (<60, 60-79, or ≥ 80).

In addition, the remaining PIs associated with these were revised and updated for the three gears. The major changes are described below:

ETP Species outcomes (PI 2.3.1)

The most recent available information indicates there is no bycatch of ETP species. The direct and indirect impacts of ETP were assessed. Based on the level of interactions, it is highly likely that the UoA has detrimental, direct or indirect, effects on ETP species. The operation of all the gears (gillnets, suripera, and small-scale trawls) is highly unlikely to hinder the recovery of ETP species. However, more information is needed to confirm with a high degree of confidence that there are no significant detrimental direct effects of the UoA on ETP species, and therefore SG100 is not met.

Abbreviations

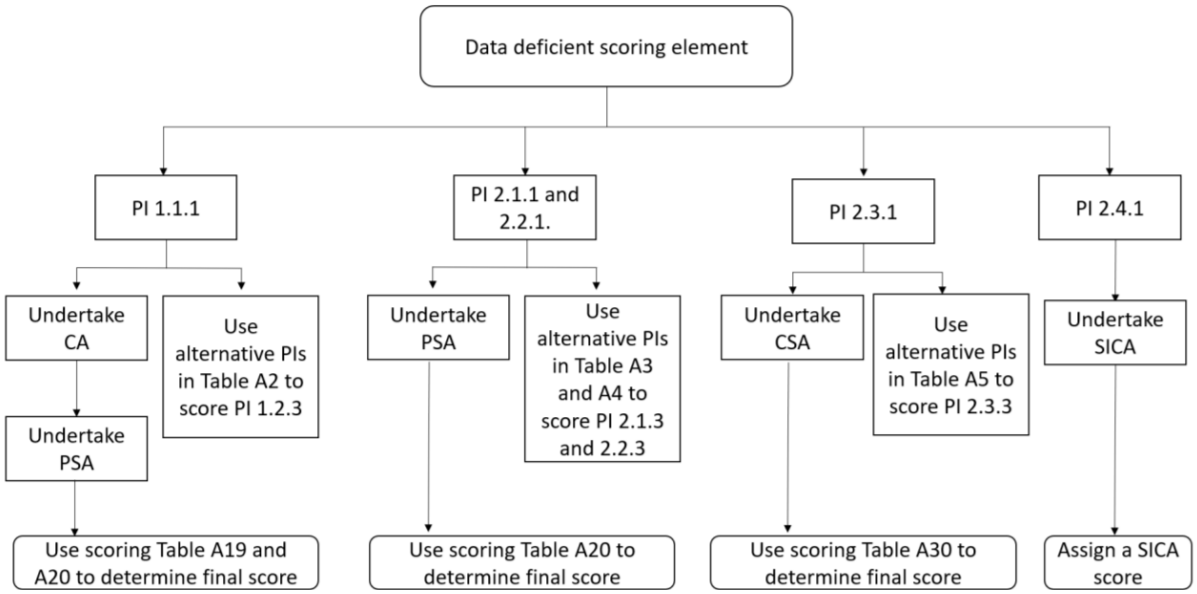
CPUE	Catch Per Unit Effort
EEZ	Exclusive Economic Zone
ETP	Endangered,Threatened or Protected
FIP	Fishery Improvement Project
F_{MSY}	fishing mortality consistent with achieving maximum sustainable yield
IUCN	International Union for Conservation of Nature
km	kilometers
m	meters
MSC	Marine Stewardship Council
MSY	maximum sustainable yield
PI	performance indicator
PRI	Point of recruitment impairment
PSA	Productivity Susceptibility Analysis
RBF	Risk Based Framework
UoA	Unit of Assessment

Unit of Assessment (UoA)

Target species	Blue shrimp (*Litopenaeus stylirostris*)
Fishery location	Mexican Pacific Coast (States of Sonora and Sinaloa)
Gear type(s)	Gillnets (chinchorro de linea), small-scale Small trawl (Chango) and modified cast nets (Suriperas)
Management authority	CONAPESCA

Context of the Risk-Based Framework (RBF)

This Risk-Based Framework (RBF) was developed based on Marine Stewardship Council (MSC) Fisheries Process to assess the fishery that has data deficient in the certification program against the MSC standard for sustainable fishing. The RBF may be used for evaluating the BSC stock status and the impact of the fisheries on primary species, secondary species, ETP species, habitat and ecosystem components of MSC standard Principle 2. The RBF decision making tree is shown in the figure below.



Scope of this RBF

This RBF was conducted in the scope of Risk-based assessment and to provide scores on PIs of Principle 2, particularly for those species that did not have any stock status/abundance information available.

Scoring summary

Principle	Component	PI #	Performance Indicator	Small trawl	Gillnet	Suripera
2	Primary species	2.1.3	Primary species information	≥80	≥80	≥80
		2.1.1	Primary species outcome	≥80	≥80	≥80
		2.1.2	Primary species management	≥80	≥80	≥80
	Secondary species	2.2.3	Secondary species information	≥80	≥80	≥80
		2.2.1	Secondary species outcome	60-79	≥80	≥80
		2.2.2	Secondary species management	≥80	≥80	≥80
	ETP species	2.3.3	ETP species information	≥80	≥80	≥80
		2.3.1	ETP species outcome	≥80	≥80	≥80
		2.3.2	ETP species management	≥80	≥80	≥80

Principle 2

Information on all species caught in the fishery, along with their catch quantities, is necessary to score many of the indicators under this principle. If such data are lacking, collecting catch data may be one of the first areas a fishery will need to address when entering an improvement project.

Under the MSC standard, non-ETP (endangered, threatened, or protected) Principle 2 species are classified as either 'primary' or 'secondary.' Primary species have management objectives (e.g. reference points) and stock status monitoring in place, whereas secondary species do not.

Important definitions used in Principle 2

For scoring P2 indicators, we use the following MSC definitions.

Bycatch - unwanted catch or catch that the fisher did not intend to catch but could not avoid and did not want or chose not to use.

We use **non-target** as a general term to refer to primary and secondary species, which are defined as follows:

- **Primary species** - Species where management tools and measures are in place, intended to achieve stock management objectives reflected in either limit or target reference points.
- **Secondary species** – Species that are not considered primary or ETP species.

Definitions for management measures and strategy terms:

- **Measures** - actions or tools in place within the management system that either explicitly manage impacts on the component or indirectly contribute to management of the element under assessment, having been designed to manage the effects elsewhere.
- **Partial strategy** - a cohesive arrangement which may comprise one or more measures, an understanding of how /they work to achieve an outcome, and an awareness of the need to change the measures should they cease to be effective. It may not have been designed to specifically manage the impact on that component.
- **Strategy or full strategy** - a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome, and which should be designed to manage impact on that component specifically. A strategy must be tailored to the scale, intensity, and cultural context of the fishery. It should include mechanisms for modifying fishing practices in response to the identification of unacceptable impacts.

Data on catch composition

The FIP conducted a bycatch study during the 2024-2025 fishing season for the three gears used by the producers in the area. The report presented the results of a survey of the bycatch composition of the small-scale shrimp fishery in south-central Sonora and north-central Sinaloa, during the 2024-2025 fishing season. The report was conducted using the same approach as previous studies developed in 2012 (Balmori-Ramírez and Morales Aspeitia), 2019 (Balmori-Ramírez and Cervantes Higuera), and 2020 (Balmori-Ramírez). Bycatch samples were collected from the three fishing methods used by producers (entanglement, drift net, cast net, and bottom trawl). Organisms were identified to the species level, and quantities and sizes were recorded.

Bycatch samples were collected from the three fishing methods used by producers (entanglement drifnets, castnet-suriperas, and small-scale bottom trawl). Organisms were identified to the species level, and quantities and sizes were recorded. Following the methodology used in the previous studies mentioned above, 350 samples of bycatch

from 275 entanglement drift-net sets, 275 from bottom trawl sets, and 200 from drift cast-net sets were analyzed. The report concluded that the bycatch was composed of 38 species for the entanglement driftnet, of which 12 represent 90% of the bycatch. For the drift cast-net, the bycatch was composed of 15 species, of which 8 represent 76% of the total. Meanwhile, bottom trawl bycatch comprises 80 species, of which 18 species represent 84% of the total. None of the species with the most incredible relative abundance in the bycatch of the three fishing systems were reported to be listed in any category higher than "Least Concern (LC)" on the IUCN Red List. No incidental capture of any species considered protected, threatened, or endangered by national legislation or international treaties was recorded. Based on available information, a variety of species are susceptible to incidental capture in shrimp fisheries. Results from numerous bycatch assessments in the industrial Pacific shrimp fishery have shown that the shrimp bycatch ratio is highly variable across zones, gear types, and seasons of the year. Results suggest that bycatch levels decrease sharply as the fishing season progresses (López-Martínez et al., 2012).

For the artisanal Pacific shrimp fishery, Amezcua et al. (2006) studied the effect of artisanal fishing on the fauna in the coastal lagoon of Santa Maria la Reforma, Mexico. They used three fishing gears employed by shrimp fishermen in the area: a small shrimp trawl net (chango), a gillnet, and a suripera net. The highest abundance and biomass were caught with the shrimp trawl net. According to Amezcua et al. (2006), the fishing gears with the greatest impact on the fish fauna were the shrimp trawl net and the gillnet, because they caught the most fish, biomass, and diversity, and captured a large number of small individuals. They estimated bycatch-shrimp ratios: 6:1 for the shrimp trawl net, 15:1 for the gillnet, and 1:1 for the suripera. Managers (INAPESCA) have been collecting catch composition data from the artisanal fleet since 2009, aiming to analyze bycatch composition and evaluate changes in benthic communities (Gómez-Medina et al., 2017). The most recent results from these efforts showed that, for artisanal trawl nets (changos), the most abundant species were the flatfishes *Citharichthys gilberti, Cyclopseta querna, and Etropos crossotus*.

In 2019, Balmori & Cervantes analyzed the composition of the gillnet fishery in Sonora and found that the main species were the Warrior Swimming Crab, Pacific anchovy, Persistent walkeri, and Pacific crevalle jack. Finally, during the 2019-2020 shrimp season, Balmori (2020) studied the catch composition of small-scale trawl nets in Sinaloa and found that *Callinectes bellicosus w*as recorded in 88.89% of the records, followed by *Eucinostomus dowii,* which occurred in 52.87% of the records. The following species *Haemulopsis elongatus*, *Nematistius pectoralis* and *Eucinostomus currani* were present with values above 40%, five species presented percentages of occurrence higher than 30% (*Caranx caninus, Cetengraulis mysticetus, Anchoa walkeri, Scomberomorus sierra*

and Opisthonema libertate). In recent data collected on fishing operations during the 2019-20 and 2020-2021 fishing seasons, the suripera bycatch species with the highest representations were Swimming crab (*Callinectes spp)* (2.48%), Bullseyer pufferfish (*Sphoeroides annulatus)* 1.34%, Panama king croaker (*Menticirrihus panamensis*) 0.99% and at least another 13 species with less than 1%, none of these species was flagged as a less resilient species.

Considering the collective data and reports from similar fisheries, the following species met the thresholds to be considered primary or secondary (main and minor) bycatch species across all gears in the small-scale shrimp fishery (Tables 1-3). Based on the data, only two species can be considered main primary species for the gillnet fishery. While the rest of the species that represented more than 5% of the catch composition in the observed trips were either secondary main or minor, due to the lack of management measures in place.

Table 1. Species with average estimated catch from the commercial small-scale fishery targeted by small bottom trawl nets. 'Main' species are those that comprise at least 5% of the total catch by weight.

Common name Spanish	Scientific name	Relative abundance percent	Classification
Blue shrimp	***Litopenaeus stylyrostris***	**24.69%**	**Target species**
Jaiba azul	*Callinectes arcuatus*	12.84%	Primary main
Silver mojarra	*Eucinostomus argenteus*	11.30%	Secondary main
Raya redonda	*Urobatis halleri*	7.40%	Secondary main
Lenguadito	*Etropus crossotus*	6.53%	Secondary main

Table 2. Species with average estimated catch from the commercial small-scale fishery targeted by gillnets. 'Main' species are those that comprise at least 5% of the total catch by weight.

Common name Spanish	Scientific name	Relative abundance percent	Classification
Blue shrimp	***Litopenaeus stylyrostris***	**75.40%**	**Target species**
Sardina bocona	*Cetengraulis mysticetus*	6.90%	Primary main
Warrior Swimming Crab	*Callinectes bellicosus*	5.50%	Primary main

Table 3. Species with average estimated catch from the commercial small-scale fishery targeted by suripera nets. 'Main' species are those that comprise at least 5% of the total catch by weight or 2% that can be categorized as less resilient.

Common name	Scientific name	Relative abundance percent	Classification
Blue shrimp	***Litopenaeus stylyrostris***	**87.04%**	**Target species**
15 species (<1.6% max each)		12.96%	Secondary minors

Color coding: (blank: target species, Green=Evaluated using available information, Yellow=evaluated using the RBF framework)

Primary main species outcome (2.1.1)

	Previous scoring	New score
Small trawl	≥80	≥80
Gillnet	≥80	≥80
Suripera	≥80	≥80

Rationale:

Small trawl species

Jaiba azul

Balmori et al. (2021) developed a stock assessment for the arched swimming crab in the Mexican Pacific Ocean. The authors fed official landings data from 1980 to 2018 into a catch-maximum sustainable yield (C-MSY) method to estimate the maximum sustainable yield (MSY), the biomass associated with MSY (BMSY), and the fishing mortality associated with maximum sustainable yield (FMSY) for C. arcuatus in the Gulf of California (Balmori et al. 2021). The authors declared BMSY as the target reference point for the species, based on its ecology. Based on the analysis, the authors calculated the MSY for the arched swimming crab as 5,483 t and the BMSY as 9,205 t. The results showed that arched swimming crab biomass has been above BMSY (Figure 1). Based on the results, it is highly likely that the species is above the PRI.

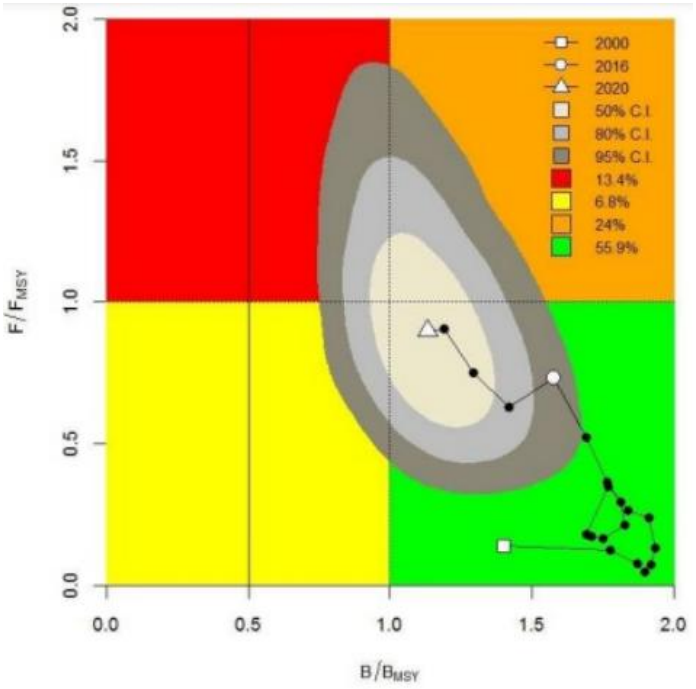


Figure 1: Kobe plot of arched swimming crab in the Gulf of California (Source: Balmori et al. 2021).

Gillnet species

Sardina bocona

Cetengraulis mysticetus is reported as a pelagic species in the Mexican Pacific. The most recent stock status reported by managers was released in the 2022 version of the fishery profile within the National Fisheries Chart. The species was reported to show no signs of being overfished, nor was overfishing occurring (see figure 2). In addition, the Mexican fishery that targets the species is MSC certified until 2028[1]

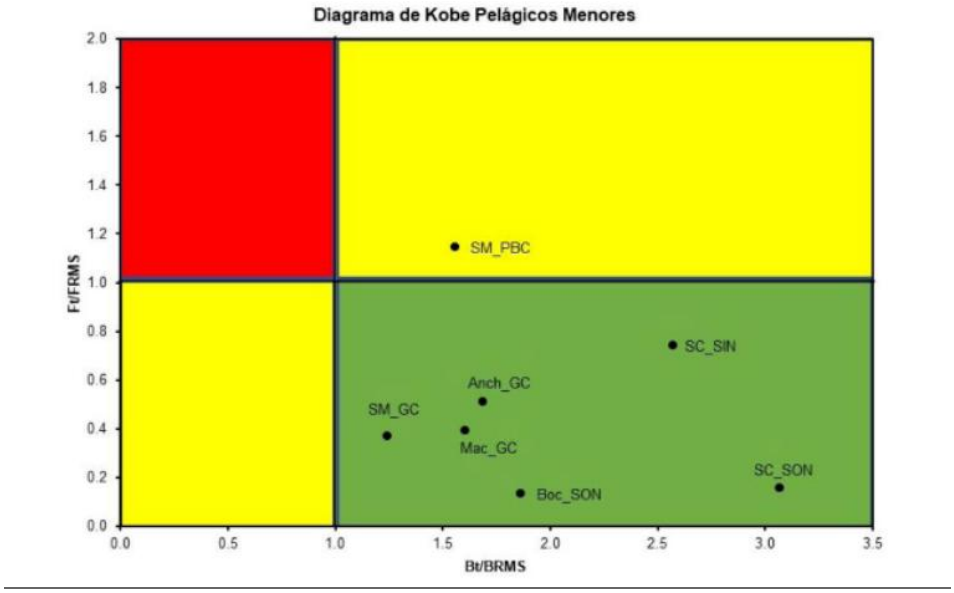


Figure 2. Kobe diagram for minor pelagic species off northwest Mexico: Sonoran sardina bocona (Boc_SON) (Source: DOF 2022)

In addition, according to the latest stock assessment (Nevárez-Martínez et al. 2022), the last Pacific anchoveta biomass estimate was around 432,000 t, while the biomass at MSY is 250,000 t. Fishing mortality estimates have been lower than FMSY throughout the period, and catches have been around 20,000 t in most years. Additionally, the stock is not overfished. The Pacific anchoveta stock assessment (Nevárez-Martínez et al. 2022) suggests that the estimated biomass has been above BMSY throughout the analysis period. Therefore, SG80 and 100 of the PIS are achieved.

Callinectes bellicosus

[1] https://fisheries.msc.org/en/fisheries/small-pelagics-fishery-in-sonora-gulf-of-california/@@view

Balmori et al. (2021) developed a stock assessment for Cortez swimming crab in the Mexican Pacific Ocean. The authors used official landings data from 1980 to 2018 in a catch-maximum sustainable yield (C-MSY) method to estimate the maximum sustainable yield (MSY), the biomass associated with MSY (BMSY), and the fishing mortality associated with MSY (FMSY) for the species in the Gulf of California. The authors declared BMSY as the target reference point for the species, based on its ecology. Based on the analysis, the authors calculated MSY for the arched swimming crab as 24,687 t and BMSY as 41,448 t. The results showed that Cortez swimming crab biomass has been above BMSY (Figure 3). In addition, managers estimated BLIM at 50% of the BMSY as a reference point for future management decisions.

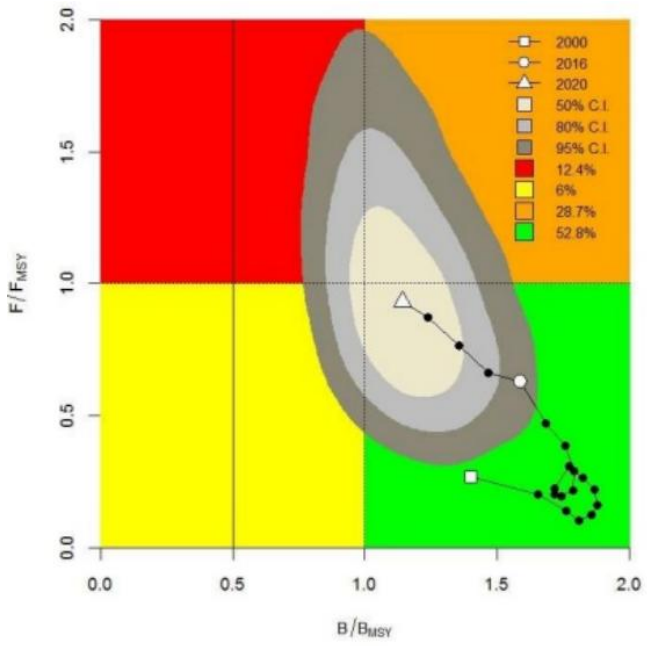


Figure 3: Kobe plot of Cortez swimming crab in the Gulf of California (Source: Balmori et al. 2021).

Suripera net species

No primary species, for this reason, this PI scored ≥80

Primary main species management (2.1.2)

	Previous scoring	New score
Small trawl	≥80	≥80
Gillnet	≥80	≥80
Suripera	≥80	≥80

Rationale:

Mexican legislation has in place a series of measures to protect the target species, which also indirectly affect associated species. These are expected to maintain limited impacts or not hinder rebuilding of main secondary species at levels highly likely to be within biologically based limits. Among these measures, the shrimp fishery has season closures, no fishing zones (0-5 phantoms depth) along the coast and around the mouths connecting the sea with several bays, coastal lagoons, and estuaries (DOF, 2013), which are considered nursing areas, and creation of several protected marine areas have been established with different objectives and issued by two different secretariats (SAGARPA and SEMARNAT).

Additionally, NOM-002, which regulates the fishery, specifies the terms for the shape and size of the different gears, which are also described in the permits held by each producer. All these measures work cohesively to protect the reproduction, spawning, and juveniles of several species. The combination of these measures for the artisanal fleet can be considered a partial management strategy, which, when combined with available information and monitoring in place, can help estimate the effectiveness and practicality of the measures in minimizing UoA-related mortality of unwanted catch of main non-target species.

Finally, both the swimming crab fishery and the sardine fisheries have in place official norms (Mexican Official Norms: NOM-039-PESC-2003 for crab and NOM-003-SAG/PESC-2018 for Sardine), which include measures such as the minimum carapace width (95 mm for *C. arcuatus*) to control impacts. Considering this, there is some evidence that the measures are being implemented successfully. For these reasons, this PI is scored as yellow for trawl nets and gillnets, and green for suripera, considering that, based on the scoring (2.2.1), a strategy might not be necessary.

Primary main species information (2.1.3)

	Previous scoring	New score
Small trawl	≥80	≥80
Gillnet	≥80	≥80
Suripera	≥80	≥80

Rationale: Based on the available data, only the gillnet captures the primary species. Both *C. bellicosus* and *C. mysticetus* are species of great importance to Mexican fisheries. Some quantitative information is available, which is adequate to assess the impact of the UoA on the main primary species with respect to their status. Both species have been recently evaluated (DOF 2022). In the case of C. mysticetus, the species is part of an MSC-certified fishery. In addition, catch data containing catch composition and non-target

species collected in the most recent years have been identified. The available information is at the species and genus levels.

Secondary main species outcomes (2.2.1)

	Previous scoring	New score
Small trawl	60 – 79	60 – 79
Gillnet	≥80	≥80
Suripera	≥80	≥80

Rationale: Since no specific information is available on the status of the secondary main species, PSAs were used to assess their vulnerability to fishery impacts. The score for this performance indicator is based on PSA scores for all main non-target species combined. The results of these are shown below.
Based on the results, the secondary species are likely to be above biologically based limits, although the available data need to improve to guarantee this. If the main secondary species are below biologically based limits, confirm that measures or partial management strategies don't hinder recovery. In addition, based on the ERA methodology, since none of the species scored as red (<60) on the PSAs, this PI reached the 60-79 value for gillnets and trawl nets, and green for suripera, considering that their impact on the secondary species is concentrated only on minor species.

Small trawl species

Lenguadito

Productivity		
Attribute	**Rationale**	**Score**
Average age at maturity	High productivity: <5 years[2]	1
Average maximum age	High productivity: 1.2 years old[2]	1
Fecundity	Medium productivity: 100-20,000 eggs per year	2
Average maximum size	High productivity: 22.4[2]	1
Average size at maturity	High productivity: 8.5 cm [2]	1
Reproductive strategy	High productivity: Broadcast spawner[2]	1
Trophic level	3.5 (Fishbase)	3

Susceptibility		
Attribute	**Rationale**	**Score**
Areal overlap	Medium Susceptibility: 10-30% overlap: Based on the broad distribution of the species (from Baja California Sur to Peru) and the relative high probability of occurrence throughout most of its range (Fishbase)	2
Encounterability	High Susceptibility: high overlap with fishing gear: According to the depth range to the 100 m (Fishbase) with an average of 30 m	3
Selectivity of gear type	High Susceptibility: Trawling nets have a direct interaction with the habitat where the species normally distributes. For this reason, this factor is scored as high risk	3

[2] https://www.fishbase.se/summary/Etropus_crossotus.html

Post capture mortality	High Susceptibility: Retained species or majority dead when released: No information **3** on discard mortality was available, team assumed higher risk factor	3
PSA score and MSC Guidepost	2.73	>60-79

Raya redonda

Productivity		
Attribute	**Rationale**	**Score**
Average age at maturity	High productivity: <5 years (reports of 3.7 and 3.8 years)[3]	1
Average maximum age	Medium productivity: Up to 14 years old[3]	1
Fecundity	Medium productivity: >20,000 eggs per year[4]	2
Average maximum size	High productivity: 21.2 cm[3]	1
Average size at maturity	High productivity: 12.8 cm[3]	1
Reproductive strategy	High productivity: Broadcast spawner[3]	1
Trophic level	3.2 [3]	3

Susceptibility		
Attribute	**Rationale**	**Score**
Areal overlap	Medium Susceptibility: 10-30% overlap: Based on the broad distribution of the species (from Baja California Sur to Peru) and the relative high probability of occurrence throughout most of its range[2]	2
Encounterability	High Susceptibility: high overlap with fishing gear: According to the depth range to the 0-12 m [2]	3
Selectivity of gear type	High Susceptibility: Trawling nets have a direct interaction with the habitat where the species normally distributes. For this reason, this factor is scored as high risk	3
Post capture mortality	High Susceptibility: Retained species or majority dead when released: No information **3** on discard mortality was available, team assumed higher risk factor	3
PSA score and MSC Guidepost	2.73	>60-79

Mojarrita plateada

Productivity		
Attribute	**Rationale**	**Score**
Average age at maturity	High productivity: <2 years[5]	1
Average maximum age	Medium productivity: 12.5 years old[5]	2
Fecundity	High productivity: >20,000 eggs per year[6]	1
Average maximum size	High productivity: 58 cm[2]	1
Average size at maturity	High productivity: 12.8 cm[4]	1
Reproductive strategy	High productivity: Broadcast spawner[4]	1
Trophic level	3.2 [4]	3

Susceptibility		
Attribute	**Rationale**	**Score**
Areal overlap	High Susceptibility: >30% overlap: Based on the broad distribution of the species (from northern California (USA) to Ecuador) and the relative high probability of occurrence throughout most of its range[4]	3

[3] https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1095-8649.2008.01940.x#:~:text=Abstract,Babel%2C%20J.%20S.%20(1967).

[4] https://www.fishbase.se/Reproduction/SpawningList.php?ID=2580&GenusName=Urobatis&SpeciesName=halleri&fc=669&StockCode=2776

[5] https://biogeodb.stri.si.edu/caribbean/en/thefishes/species/3703

[6] https://www.fishbase.se/summary/eucinostomus-argenteus

Encounterability	High Susceptibility: high overlap with fishing gear: According to the depth range to the 0-91 m [4]	3
Selectivity of gear type	Medium Susceptibility: Trawling nets have t interaction with the habitat where the species normally distributes. However, most of the organisms are adults. For this reason, this factor is scored as mid risk	2
Post capture mortality	High Susceptibility: Retained species or majority dead when released: No information **3** on discard mortality was available, team assumed higher risk factor	3
PSA score and MSC Guidepost	2.68	>60-79

Secondary main species management (2.2.2)

	Previous scoring	New score
Small trawl	60 – 79	≥80
Gillnet	≥80	≥80
Suripera	≥80	≥80

Rationale:

Mexican legislation has in place a series of measures to protect the target species, which also indirectly affect associated species. These are expected to maintain limited impacts or not hinder rebuilding of main secondary species at levels highly likely to be within biologically based limits. Among these measures, the shrimp fishery has season closures, no fishing zones (0-5 phantoms depth) along the coast and around the mouths connecting the sea with several bays, coastal lagoons, and estuaries (DOF, 2013), which are considered nursing areas, and creation of several protected marine areas have been established with different objectives and issued by two different secretariats (SAGARPA and SEMARNAT).

Additionally, NOM-002, which regulates the fishery, specifies the terms for the shape and size of the different gears, which are also described in the permits held by each producer. All these measures work cohesively to protect the reproduction, spawning, and juveniles of several species. The combination of these measures for the artisanal fleet can be considered a partial management strategy, which, when combined with available information and monitoring in place, can help estimate the effectiveness and practicality of the measures in minimizing UoA-related mortality of unwanted catch of main non-target species. Considering this, there is some objective basis for confidence that the measures/partial strategy will work, based on direct information about the UoA and/or species involved and the measures' successful implementation. For these reasons, this PI is scored as >80 for all three gears.

Secondary main species information (2.2.3)

	Previous scoring	New score
Small trawl	≥80	≥80
Gillnet	≥80	≥80
Suripera	≥80	≥80

Rationale: Most of the species identified as secondary main species have not been assessed, and the impact of the shrimp fishery upon these species is not well understood. Information from the INAPESCA data collection program, desktop research, reviewed literature, and data collection programs established through the fishery improvement project (FIP) was sufficient to classify some species as either main or minor secondary species. For the main species, sufficient biological information was available for a productivity-susceptibility analysis (PSA). When there is insufficient data for a species, a higher risk score is automatically assigned. Thus, some quantitative information is adequate to assess productivity and susceptibility attributes for the main secondary species. In addition, due to their nature and level of impact, the chinchorro and suripera gears can be considered partial strategies, as they are highly selective and generally have low impacts (based on available data).

The information collected in the UoA, is sufficient to support measures (including seasonal and spatial closures and MPAs) to manage the main secondary species. There was some quantitative information available and adequate to assess the impact of the UoA on the main secondary species with respect to their status. Finally, considering that the PSA were used to evaluate the vulnerability of secondary species to fishing (using quantitative information) and the information is adequate to support the partial strategy, SG80 was met and scored as green for all gears.

ETP species outcome (2.3.1)

	Previous scoring	New score
Small trawl	60 – 79	≥80
Gillnet	60 – 79	≥80
Suripera	≥80	≥80

Rationale:

Several ETP species can be found in the region, including five species of sea turtles, Kemp´s Ridley (*Lepidochelys kempii*) (CE), loggerhead turtle (*Caretta caretta*) (VU), Olive Ridley turtle (*Lepidochelys olivacea*) (VU), Green turtle (*Chelonia mydas*) (VU) and Leatherback turtle (*Dermochelys coriacea*) (VU), and fish species, such as Giants seahorse (Hippocampus ingens) which is included in CITES Appendix II.

Interactions with sea turtles, have been reported by the industrial fleet in previous years. Amezcua and Amezcua-Linares (2014) also reported the capture of Pacific seahorse (*Hippocampus ingens*) during sampling activities using a combination of trawls, gill nets, and suriperas. However, the author did not clarify which gear caught the species or if all of them interacted. There is potential for the fishery to interact with ETP species in the area, although the overlap between the industrial fleet and the suripera and trawls fisheries is limited.

During the data collection process described earlier in the document, a total of 750 fishing trips and hauls of the artisanal fleet (275 sets from gillnet, 275 small trawls, and 200 from "suripera"). According to the collected data, around 40, 38, and 15 species were reported to interact with trawls, gillnets, and suripera, respectively. Most of them were classified as least concern (LC) on the IUCN Red List. Five species lack sufficient data to determine their category; four have not been evaluated, and one is near threatened (NT). Additional published studies provided by the client (Amezcua et al. 2006, de la Rosa Meza 2005, Balmori-Ramirez 2017, Amezcua and Aquirre 2009) also show no catches of ETP species. Therefore, based on that information, the direct effects of the UoA are highly unlikely to hinder the recovery of ETP species, and SG60 and SG80 are met.

The impacts of the artisanal fishery on ETP species in the Gulf of California shrimp fishery have been evaluated as very low for bycatch and non-existent for ETP species. Primarily due to the low amount of bycatch that is generated, the low ratio of the capture to bycatch, and the lack of presence of threatened or endangered species (Balmori-Ramírez and Morales-Azpeitia, 2012). Indirect impacts for ETP species may include physical and noise disturbance, pollution, lost gear, and situations where the removal of the target species reduces its availability as prey for predatory species. Regarding physical and noise disturbance, the assessed fisheries are composed of relatively small vessels, so this is not considered significant.

Abandoned or discarded fishing gear does not seem to be a concern in the shrimp fishery as fishers try to avoid areas where the gear may be entangled (coral reefs, rocks, sunken ships, etc). In relation to the availability as prey for predatory species, Ecopath and Ecosim simulations conducted by Salcido-Guevara et al. (2012 did not indicate a decrease in prey availability due to shrimp fishing operations. Thus, it is highly likely that there are no significant detrimental indirect effects of the UoA on ETP species, SG80 is met for both fishing gears.

Finally, the operation range for gillnets, suripera, and small-scale small trawls included in this assessment does not overlap with ETP species in other regions of the Gulf of California (e.g., Vaquita or totoaba), and according to the most recent data available, there were no interactions with ETP. Therefore, based on the available information, the direct effects of the UoA are highly unlikely to hinder the recovery of ETP species, as SG60 and SG80 are met.

ETP species management (2.3.2)

	Previous scoring	New score
Small trawl	60 – 79	≥80
Gillnet	60 – 79	≥80
Suripera	60 – 79	≥80

Rationale: Several measures are in place to protect ETP species in the area of operation of the fishery and in the assessed fisheries. For example, since 1994, the catch of sea turtles in Mexico has been prohibited. The national norm NOM-059-SEMARNAT-2010 also lists sea turtle species as species at risk. While the NOM-002-SAG/PESC-2013 protects breeding and juvenile populations by establishing closed periods and zones, it ensures that sufficient individuals remain for subsequent life cycles. The NOM-029-PESC-2006 for the sustainable management of sharks and rays prohibits the retention of some shark species, such as the whale shark (*Rhincodon typus*), the basking shark (*Cetorhinus maximus*), and the white shark (*Carcharodon carcharias*), among others. It also prohibits shark fishing in areas near beaches where sea turtles nest and near sea lion colonies. A no-fishing zone (5 fathoms deep) and banned fishing at river mouths for the protection of juveniles. While several MPAs have also been established by the Comisión Nacional de Áreas Naturales Protegidas (CONANP) in the area to protect ETP species.

On the other hand, the artisanal shrimp fisheries do not interact with this marine mammal. Additionally, for suriperas, the gear type's selective nature is a measure in and of itself, as its use results in low bycatch, as documented by data collection and other publications (e.g., Amezcua et al. 2006, 2012). These low -or zero-levels of ETP bycatch have been detected in the fishery. This can be considered evidence that the measures currently implemented in the fisheries are working to reduce the impacts on those species.

Data collected in a logbook provides evidence that these measures are working as intended. Therefore, a strategy is in place to ensure that the UoA does not hinder the recovery of ETP species, and the SG60 and SG80 levels are met for the fishing gears. However, there is a need for a comprehensive strategy to manage the UoA's impact on ETP species. So, SG100 is not met by any UoA. Finally, these types of measures have been tested worldwide. Considering that available literature suggests these fisheries might only interact with the Pacific seahorse (Amezcua & Amezcua-Linares 2014), there is an objective basis of confidence that the measures will work, based on information directly about the fishery and/or the species involved. Appropriate measures are in place to ensure that the UoA does not hinder the recovery of ETP species, and these measures are considered likely to be effective, based on a plausible argument. Finally, the fact that there is a monitoring implemented in the fishery but no or minimal recorded interactions between ETP species and the UoAs under assessment provides an objective basis for confidence that the strategy will work, based on information directly about the fishery and/or the species involved, such that all UoAs meet SG60 and SG80 of incise c and d.

ETP species information (2.3.3)

	Previous scoring	New score
Small trawl	≥80	≥80
Gillnet	≥80	≥80
Suripera	≥80	≥80

Rationale: According to the different catch composition data and information available, interactions between small-scale shrimp fisheries and ETP species are very limited or non-existent. Recent data (e.g. Balmori & Cervantes 2019, Balmori 2020 and SCS 2024) confirmed that the fisheries do not interact with ETP species. In 2014, Amezcua and Amezcua-Linares reported the capture of *Hippocampus ingens* (Pacific seahorse, CITES Appendix II), an ETP species, during sampling activities using a combination of small-scale trawl nets, gill nets, and cast nets (suriperas), which suggests that potential interactions might have occurred. However, based on published studies (Amezcua et al. 2006, de la Rosa-Meza 2005, Balmori-Ramirez 2017, Amezcua and Aquirre 2009), as well as no catch volumes of ETP species and gross estimates for the fleet, it is doubtful that direct impacts will hinder the recovery of the ETP species. Available qualitative and quantitative information is sufficient to estimate the impact of the UoA on ETP species and to support measures for managing these impacts. The most recent information collected by the curent FIP confirmed these findings, it can be considered that there is some quantitative information that is adequate to assess the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species. Similarly, there are different sources of information that were available and considered adequate to measure trends and support a strategy to manage impacts, minimize mortality and injury of ETP species, SG80 is met by all of the UoA.

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Appendix

Scoring tables for PSA

PSA scoring tables (PF4 and PF5) from the MSC Fisheries Standard are provided below. For MSC pre-assessments, only a PSA is required to score PI 1.1.1. However, in a full assessment, a Consequence Analysis would be applied in addition to the PSA, through which stakeholder input would be used to complement available fishery-specific data and scientific literature when determining scores.

Table A8: PSA productivity attributes and scores for fish and invertebrates

Productivity attribute	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 (not to be used when scoring invertebrate species)	<100 cm	100-300 cm	>300 cm
Average size at maturity (not to be used when scoring invertebrate species)	<40 cm	40-200 cm	>200 cm
Reproductive strategy	Broadcast spawner	Demersal egg layer	Live bearer
Trophic Level	<2.75	2.75-3.25	>3.25
Density dependence (to be used when scoring invertebrate species only)	Compensatory dynamics at low population size demonstrated or likely.	No depensatory or compensatory dynamics demonstrated or likely.	Depensatory dynamics at low population sizes (Allee effects) demonstrated or likely.

Table A17: PSA susceptibility attributes and scores for fish and invertebrates

Susceptibility attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
Areal overlap (availability): Overlap of the fishing effort with a species concentration of the stock	<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 (Principle 1).
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 that it would be in a condition permitting subsequent survival	Evidence of majority released post-capture and survival. >66% of animals are returned alive and survive the encounter. Where observers can verify that >66% are released alive in combination with a high risk score for selectivity, the PCM score may be reduced to a low risk score (1).	Evidence of some released post-capture and survival. 33-66% of animals are returned alive and survive the encounter. Where observers can verify that 33-66% are released alive in combination with a high risk score for selectivity, the PCM score may be reduced to a medium risk score (2).	Retained species or majority dead when released. <33% of animals are returned alive and survive the encounter. Default score for retained species (Principle 1 or Principle 2).