Catch composition analysis.

Confirm primary and secondary species in accordance to MSC standard

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Context

The 2017 MSC Pre-Assessment (PA) for the Artisanal Suripera Blue Shrimp Fishery of Sinaloa, was developed by MRAG and used to prepare and launched the Fishery Improvement project (in fisheryprogress.org FIP profile). The assessment team used limited available information, such as the bycatch report developed by Balmori and Morales (2012) for the artisanal shrimp fleets operating in coastal bays of Sinaloa, were 15 species were identified as part of the Suripera (cast net) and no primary species or species of particular concern were reported. The PA authors concluded that despite the fact that the target species in the coastal lagoons and estuaries of Sinaloa is the blue shrimp, the other two shrimp species might be harvested in lower proportions, and included these two (brown shrimp and white shrimp) as main primary species too. The decision was mostly driven by the statement that catch composition varies every season, but based on biological surveys available (which were developed only during the off-season) catch composition showed greater proportions with up to 36.5% of white shrimp one season (2016)(which was an unprecedent case). Following the inclusion of both species as primary species the assessment also evaluated the status of their stock. To achieve this, the authors used the 2016 INAPESCA reports for both brown and white shrimp stocks of Sinaloa-Nayarit, which were reported as fully exploited. As a result, PI 2.1.1 scored <60 considering the status of white and brown shrimp species.

As part of the improvement project, a data log system (bitacoras) was put in place to complete the data collection program (fishery monitoring) led by managers during the off season. The program aims to have a clear, constant and long term source of information related to the catch composition, but also to help other aspects of the fishery (e.g. fishing effort, interactions with ETP species, efficiency, etc.). Managers already have in place a monitoring that runs during the off-season that is used to assess the status of the species in terms of sizes (tallas) to decide based on the data and the species biology, when to open the fishing season[1]. For this report, we used the data from Del Pacifico monitoring system to evaluate the catch composition, update the primary species and if feasible, justify a change in the appropriate PIs. The previous version of this report (2021) only contained data from the 2019-2020, 2020-2021 seasons, the partial data from the 2021-2022 season. We update results based on the whole set of information of the 2021-2022 and the 2022-2023 seasons, data provided by the onboard observer program that remained in place.

[1] https://www.inapesca.gob.mx/portal/documentos/publicaciones/PdfBajos/A5.Analisiscapturas.pdf

Objective of the report

- Analyze the information collected from the logbooks and update the catch composition following the MSC standard definitions.

Methodology

Based on the action 4 from the FIP. *Biological monitoring data collection to verify catch composition*, a fishing logbook was designed and has been implemented since 2019. This system was co-designed with Del Pacifico and the fishers, and adheres to the requisites of the National Fisheries Institute (INAPESCA) and National Fisheries Commission (CONAPESCA) requirements.

The objective of the logbook was to complement the information from the biological monitoring carried out by INAPESCA and also cover information gaps to improve some Performance Indicators (PI) of the MSC's sustainable fisheries standard.

The data collection system covers the following topics:

- General information (name and registration of the boat, name of the skipper, number of crew members).
- Target species information
- Non-target fauna information (bycatch species caught during fishing operations, interaction with Endangered, Threatened or Protected species ETP). Species identification was developed by using photographs using the Castro-Aguirre catalog (1978)

We used the data to have a complete characterization of the shrimp drift cast net bycatch from the 2019-2020 to the 2022-2023 fishing seasons. We also compare the results to historical composition or characterization available during one previous period, including studies developed by Amezcua et al (2006) and Balmori and Morales (2012).

Analysis and results

The information from the fishing logs covered 3,131 fishing trips and 4,995 fishing sets using the Suripera among the four seasons. From the almost five thousand reported sets, a total of 33,675.32 kg of total catch was observed consisting of more than 32 species (Table 1). Penaeid shrimp species were the highest group caught by weight, with 69.3% followed by finfish (22.3%), crustaceans other than penaeid shrimp (6.9%), and invertebrates (1.5%).

Blue shrimp was by far the most important species in terms of weight, representing ~55% of the total catch. Some of the most important species were the swimming crab (*Callinectes bellicosus*) 3.8%, finescale triggerfish (*Balistes polylepis*) with 1.9%, white mullet (*Mugil curema*) 2.7%, Dark spot mojarra (*Eucinostomus entomelas*) 3.8%, Peruvian mojarra

(*Diapterus peruvianus*) 3.3%. These were identified as the main bycatch species of the current Suripera commercial shrimp fishery. Brown shrimp and white shrimp were also present in the catch with a 2.3 and 3.1% of the catch. Other 10 species were grouped as others, and represented 12.5% of the total catch. The bycatch to shrimp ratio error distribution was assumed lognormal and the corresponding sample ratio geometric mean in units of weight was 1 to 1.9.

Species categorization

The MSC standard considers primary species where all the following criteria are met:

- Species in the catch that are not covered under P1 because they are not included in the UoA;
- Species that are within scope of the MSC program defined in FCR 7.4.1.1 (not Amphibians, Reptiles, Birds nor Mammals);
- Species where management tools and measures are in place, intended to achieve stock management objectives reflected in either limit or target reference points.
- In cases where a species would be classified as primary due to the management measures of one jurisdiction but not another that overlaps with the UoA, that species shall still be considered as primary.

Secondary Species in P2 as species in the catch that are within scope of the MSC program but are not covered under P1 because they are not included in the Unit of Assessment and

Are not considered “primary” as defined previously, or

- Species that are out of the program, but where the definition of ETP species is not applicable.

Main and Minor Species

For Primary and Secondary species, species may be considered main based on either resilience/vulnerability and catch volume. Species that are not main are minor. Main and minor species must meet different Performance Indicators (PIs) in P2.

Discussion and conclusions

Concerning the artisanal Pacific shrimp fishery, Amezcua et al. (2006) studied the effect on the fauna in the coastal lagoon of Santa Maria la Reforma, Mexico. They used three fishing gears employed by shrimp fishermen including the suripera net. The authors concluded that the bycatch-shrimp ratio for the suripera was close to 1:1. The catch composition data for

three years from the artisanal fleet was provided and used to clarify more clearly the operation of that fleet using the fishing gear.

Scientific name	Common name	% of catch per volume	Category
Litopenaeus stylirostris	Blue shrimp	55	Target
Others (10 species)		**12.5**	
Callinectes bellicosus	Warrior swimming crab	3.8	Primary minor
Eucinostomus entomelas	Dark spot mojarra	3.8	Secondary minor
Diapterus peruvianus	Peruvian mojarra	3.3	Secondary minor
L. vanammei	White shrimp	3.1	Secondary minor
Mugil curema	White mullet	2.7	Secondary minor
Farfantepenaeus californiensis	Yellowleg shrimp	2.3	Secondary minor
Balistes polylepis	Finescale triggerfish	1.9	Secondary minor
Anisotremus interruptus	Burrito grunt	1.9	Secondary minor
Brotula clarkae	Pacific bearded brotula	1.8	Secondary minor
Pomadasys panamensis	Grunts	1.8	Secondary minor
Scomberomorus sierra	Pacific sierra	1.6	Secondary minor
Hexaplex nigritus	Black murex	1.5	Secondary minor
Sphoeroides annulatus	Bullseye puffer	1.5	Secondary minor
Oligoplites altus	Longjaw leatherjack	1.5	Secondary minor

Primary Species

According to the catch data, no primary species were designated; none of the listed P2 species have in place a full stock assessment, a scientifically established TAC, or known limit or target reference points. There are no management tools and measures in place intended to achieve stock management objectives reflected in either limit or target reference points. All bycatch species are classified as secondary species.

Secondary Species

We used the catch volumes for each fishing gear independently to determine secondary main and minor designations. We classified all species as secondary minor because their catch composition was <5%.

The information on the shrimp fishery bycatch is broad, bus mostly focused in the industrial fishery. Some papers are focus on determining the bycatch composition globally (e.g. Guillet, 2008), while others are aimed to study bycatch locally (Pérez-Mellado and Finley, 1985;

Rábago-Quiroz et al., 2011; López-Martínez et al., 2010; Madrid- Vera et al., 2007; Madrid-Vera et al., 2010). There are several sources for bycatch information, however not all of these sources collect this data from the artisanal fleet.

Studies on gear selectivity and efficiency of cast nets (suripera) for artisanal fleets operating in the coastal lagoons and bays of the Gulf of California have been conducted in the past (Grande-Vidal et al. (1996). Suripera nets are mainly used in the bays of Sinaloa. The shrimp captured by suriperas are of smaller size, but are captured live and thus of better quality (Amezcua et al. 2009). In addition, Flores-Santillan and Aguilar-Ramirez (2000) evaluate the effectiveness of the gear in Baja California Sur, as well as Cervantes-Ureña et al (2005) also evaluate the low impact of the gear in Sinaloa.

A total of thirty two species of bycatch were identified under this report, belonging to various taxonomic groups, such as fish, elasmobranchs, crustaceans, and mollusks. Some of the retained species have commercial value or are kept for family consumption (e.g. mojarras (*Eucinostomus entomelas or Diapterus peruvianus*) , and swimming crab (*Callinectes bellicosus*). With suripera nets, bycatch remained low (close to 1:1.9, which is very low compared to the average of 1:10 in tropical areas and industrial fisheries. The 2012, Balmori and Morales report suggested that suripera for Sinaloa do not capture any bycatch in at least one third of their fishing hauls, and calculated the volume and proportion of retained and discarded species for a number of coastal lagoons. For this report, the proportion was a little higher than the reported in Amezcua et al (2006) and in most the sets (hauls) bycatch was reported, but in small amounts. To conclude, and based in the fact that there are no explicit measures in place to manage retained species, but, considering the low risk to retained species placed by suriperas, this gear qualifies for SG80 and the management strategy can be considered the gears themselves. For these reasons and considering all the information presented previously since there are no reference points considered for the associated species, nor any of these species are enlisted in Appendix 1 of the Convention on International Trade in Endangered Species (CITES) they are considered as Secondary Species. This gives as a result to score the following PIs as follow:

- PI 2.1.1 +80 instead of red
- PI 2.1.2 +80 instead of yellow
- PI 2.1.3 +80 instead of yellow

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