Biological Monitoring in the Biosphere Reserve Marismas Nacionales

RESERVA DE LA BIOSFERA
MARISMAS NACIONALES

Fisheries Improvement Project (FIP)
Mexico Marismas Nacionales artisanal whiteleg shrimp - trap /cast-nets

Systematize biometric data and bycatch of the fishery

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Nature Conservancy

June 2024

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La Reserva de la Biosfera Marismas Nacionales es un extenso sistema de humedales que se localiza al noroeste del estado de Nayarit, y forma parte de las planicies costeras del Pacifico mexicano (**Fig. 1**). La región tiene una superficie aproximada de 175, 000 ha y se caracteriza por presentar diversos hábitats, como los sistemas de lagunas costeras, manglares, pantanos, deltas y marismas, que están en constante cambio por procesos geomorfológicos y por la presión antropogénica.

El ecosistema de la reserva tiene una gran importancia biológica ya que es un hábitat que permiten el crecimiento, alimentación y protección de diversas especies costeras, siendo el camarón blanco y el ostión los más importantes para las actividades pesqueras. Estas áreas también sirven de refugio para aves acuáticas migratorias (patos y aves playeras) y especies de fauna como el cocodrilo de río (*Crocodylus acutus*) y el jaguar (*Panthera onca*).

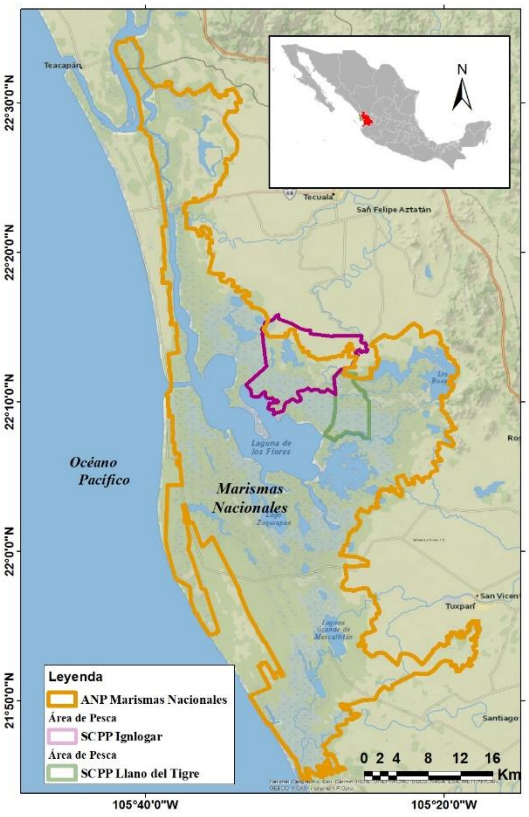

Figure 1. Location of the Marismas Nacionales Biosphere Reserve and the fishing areas corresponding to the SCPP Ignlogar and SCPP Llano del Tigre cooperatives.

Among the most relevant economic activities in Marismas Nacionales is fishing, providing the economic support of more than 14 thousand people. The fishing zone is divided into 15 capture areas, which are used by 20 fishing cooperative societies, with authorization for the extraction and capture of different species. The main species captured by organized fishing cooperatives are divided into three large groups: shrimp, oyster, and scale, with a fishing use of 41.5%, 36%, and 18.7% respectively. Biological monitoring was carried out *in situ* in the fishing areas corresponding to the Ignlogar and Llano del

Tigre cooperatives (**Fig. 1**). Sampling in the reserve Marismas Nacionales carried out monthly during the shrimp fishing season, between September 2023 and March 2024.

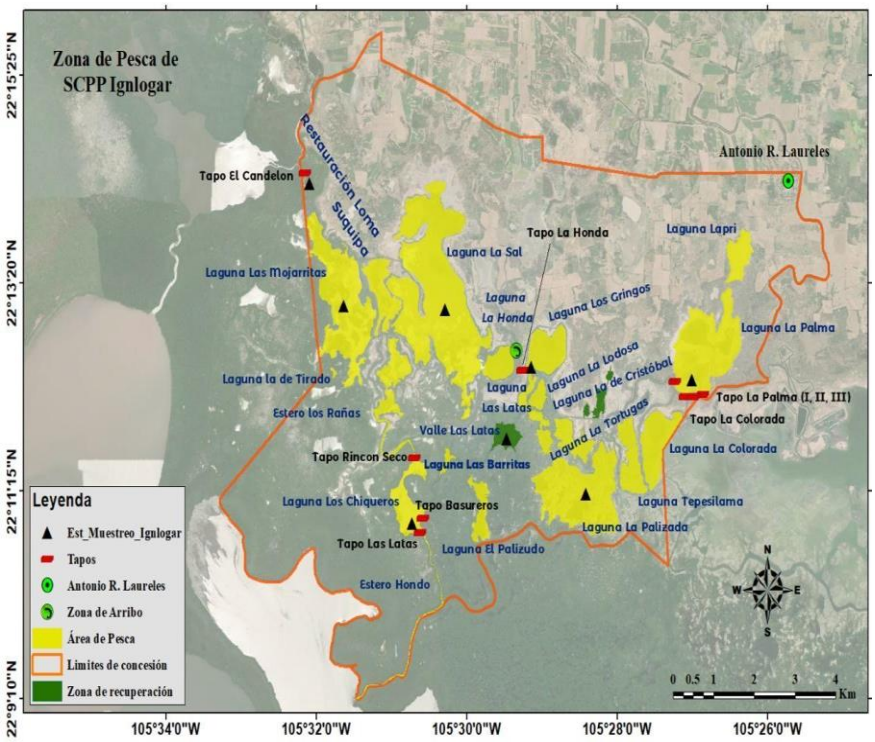

Figure2. *In situ* Sampling Stations to collect physical data and biological information on the white shrimp fishery and associated fauna in the SCPP Ignlogar fishing zone. The black triangles correspond to the sampling stations.

At each station, biological data (total length, weight, etc.) were recorded, both of the white shrimp catches and of the species associated with the fishery, and data physical-chemical (temperature, salinity, nutrients, sediments, etc.).

During the biological sampling, at each of the stations, 15 hauls were made with cast nets (5 hauls per cast net) of different mesh size (Fig. 2), with the objective of identifying and comparing catch abundances and the impact of them in the habitat. In each haul carried out, the total catch of white shrimp and associated fauna was weighed, in addition, biometric measurements (length and total weight) were carried out individually for each species identified in the sampling. On the other hand, samples were taken for subsequent analysis in the ENIP-UAN laboratory, with the objective of determining the age and growth of the fishing resource.

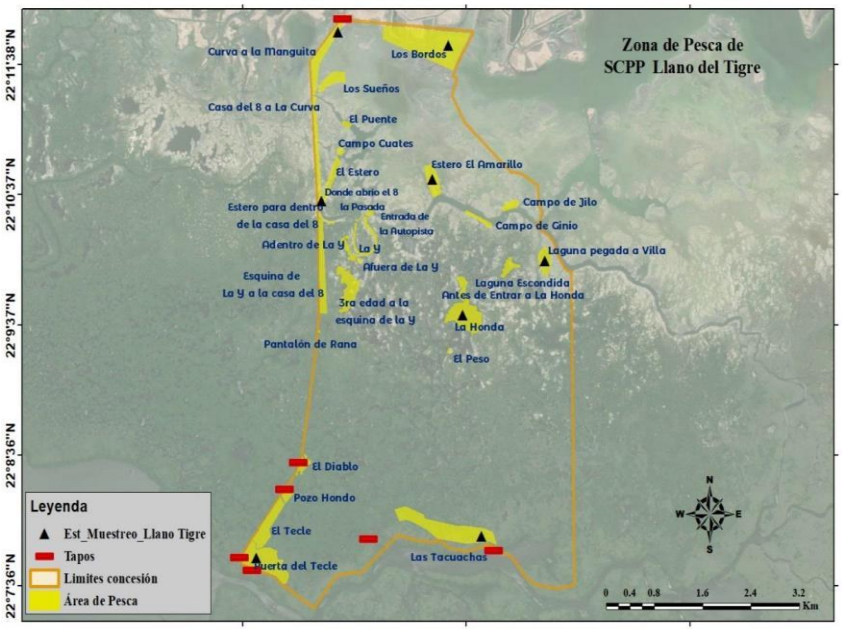

Figure 3. *In situ* Sampling Stations to collect physical data and biological information on the white shrimp fishery and associated fauna in the fishing area of the Llano del Tigre SCPP. The black triangles correspond to the sampling stations.

About the associated fauna, the total weight of the catch per set was recorded, subsequently, the identification of species was carried out, and finally, biometric measurements of each identified individual were carried out. In addition, the catches obtained in each net used (0.75´´, 1.0´´, and 1.5´´ inches) were recorded, which allows evaluation the impact that each fishing gear has on the fauna associated with the white shrimp fishery in Marismas Nacionales Reserve.

Figure 4. Fishing gear (Atarrayas) used in monitoring for collecting biological data in Marismas Nacionales Reserve.

In general, 1027 individuals were captured in the biological sampling, where they showed a general average of 7.4 cm in total length, with September 2023 and February 2024 being the months with the largest size. November 2023 recorded the smallest size, possibly due to the few individuals that could be sampled (Table 1). In relation, to the average weight, September and October 2023 showed the highest average weights (Table 1), greater than 9.5 g per sampled individual.

Table 1. Monthly information on biological monitoring carried out in the Marismas Nacionales Reserve fishing area.

Fecha	Individuos muestreados	Longitud total Promedio (cm)	Peso Promedio (gr)	Peso total (gr)
sep-23	98	7.6	9.89	1092
oct-23	414	7.5	9.5	3679
nov-23	8	6.85	6.94	55.5
dic-23	112	7.5	7.6	822
ene-24	166	7.4	8	1344
feb-24	86	7.6	8.2	685
mar-24	143	7.2	7.7	1020

Size Structure

Figure 5 shows the size structure of shrimp captured with cast nets (different mesh sizes) in biological sampling during September 2023 and March 2024. The size frequency distribution showed a range that varies between 3.9 to 11.9 cm in diameter. total length of the shrimp, with a monthly average of 7.4 cm.

In general, an equitable distribution of the data was observed, where the data presented a distribution about the mean of the data (7.4 cm). The cast net with a 0.75-inch net showed greater captures of smaller (younger) individuals, while the 1.5-inch cast net recorded the lowest captures of small organisms (Fig.5).

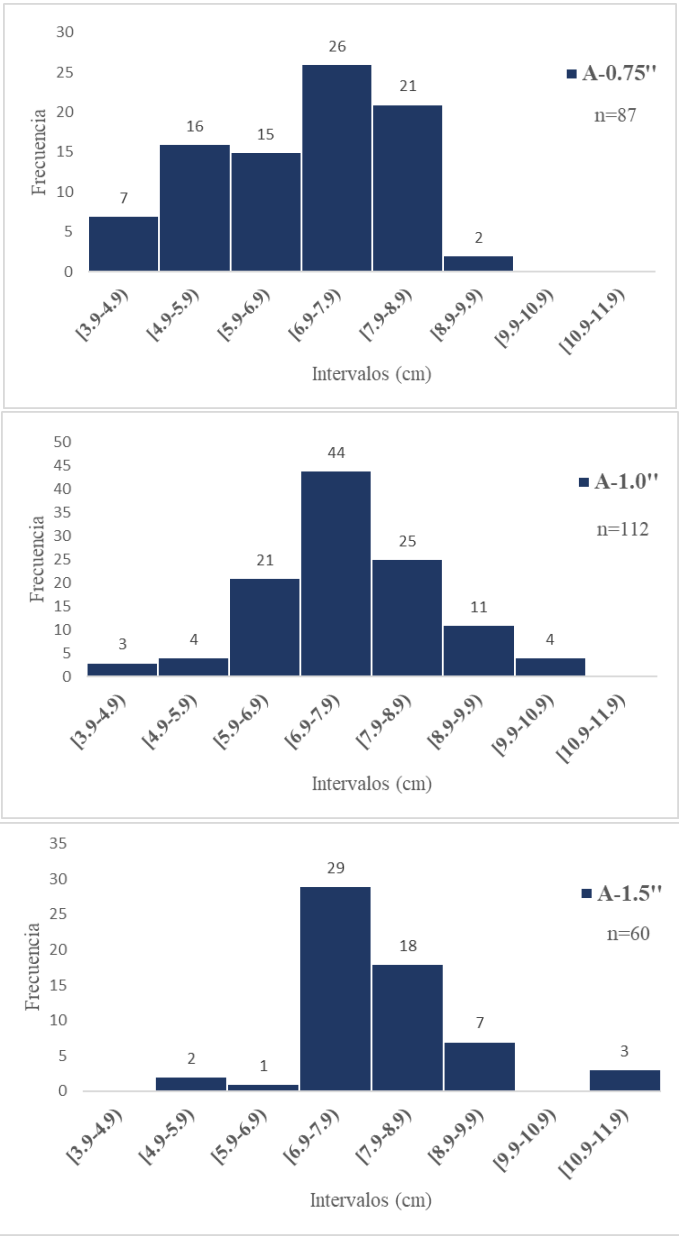

Figure 5. Histogram of size structure by fishing gear for the Ignlogar cooperative fishing area during the fishing season from September 2023 to March 2024.