Informe de las actividades del Monitoreo de la Ballena Gris (*Eschrichtius robustus*) temporada Invernal 2023. Laguna San Ignacio, B.C.S. México.

Universidad Autónoma de Baja California Sur

Programa de Investigación de Mamíferos Marinos

Laguna San Ignacio Ecosystem Science Program

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The monitoring work of the gray whale (*Eschrichtius robustus*), conducted by the Autonomous University of Baja California Sur and Laguna San Ignacio Ecosystem Science Program (UABCS / LSIESP), is a project sponsored by The Ocean Foundation. This monitoring was carried out in the San Ignacio lagoon, BCS., in the period between January 16 and April 4, 2023. Within this project, activities were carried out: photoidentification period, weekly censuses, photoidentification through the use of drones, registration of marine mammal strandings, dissemination talks and advice of students of the Marine Biology career.

Navigation and Photo-identification.

The technique of photo-identification, is a way to individually identify the individuals of a population and in the case of the gray whale, consists of taking photographs of the dorsal part, both the right and left side. This was done with the help of an SLR camera (Nikon D7500), with a 300mm lens, a camera shooting speed of 1/1000 and a light sensitivity of 400 ISO (Figure 1).

Figure 1. Photo-identification of the right side of a gray whale.

To take these photographs, the boat approached the whales parallel to the whales at a distance of approximately 10 to 20 m. to obtain a photograph of good size and resolution. The

photographs were taken with the purpose of individually recording each whale by means of its distinctive coloration and markings.

To carry out the photo-identification work, we sailed inside the San Ignacio lagoon for 50 days, with a total effort of 264. 5 hours, in which 519 gray whale sightings were recorded. During the fieldwork, a total of 11393 photographs were taken and during the time of stay in the camp, each of the registered photo-identifications were compared with each other, in order to obtain a photo-identification catalog for the year 2023. A total of 618 different individuals (adults) were obtained, of which 83 were females with breeding and 535 corrsponded solitary individuals (females or adult males). According to the records made for each photo-identified individual, the average residence time of each whale (time between the first and last photo-identification of each individual) that would have been recorded in at least two days was estimated, being 34.3 days for females with breeding and 6.4 for solitary individuals. While the maximum time of stay was 68 days for a female with calf and 33 for a solitary individual. Also, as an important part of the monitoring, the photo-identifications obtained in the San Ignacio lagoon will be compared with those obtained in Magdalena Bay during 2023, to determine the relationship between these areas.

All photo-identifications obtained during 2023 were compared with photo-identifications from the catalogs of the Asian population, finding a recapture between both populations: 23-0116-D-LSI = WGW 089 (Fig. 2)

Fig. 2 Photo-identification of the whale of the Western North Pacific population registered in Laguna San Ignacio, during 2023

Likewise, during 2023, only one whale was seen from the period from 1977 to 1982 in Laguna San Ignacio, which, according to estimates, has a minimum age of 43 years.

Body condition

Photographs were taken of the head and scapula and back, to assess body condition; estimating the proportion of the number of whales presenting with skinny whale syndrome (nutritional stress), in which depression of the postcranial region and a decrease in the volume of fat reserves are observed (Figure 3).

Figure 3. Features of skinny whale syndrome

For this part of the work, the methods and criteria proposed by Weller et. al., (2000) and Bradford *et al*., (2012) were used, where a numerical value of 1 to 3 (head) or 1 to 2 (scapula and back) was assigned to each region, depending on its condition. being the highest values those that present a better condition (Table 1).

Table 1. Categorization of gray whale body condition (Bradford 2012).

Categorías	C E D									
Normal	322	321	32X	312	31X	3X2	3X1	3XX		
Aceptable	311	222	221	22X	212	21X	2X2	2X1	2XX	
Pobre	211	122	121	12X	112	111	11X	1X2	1X1	1XX
Desconocida	X22	X21	X2X	X12	X11	X1X	XX2	XX1	XXX	

In total, 83 mothers with calves were identified, of which 82 whose body condition could be determined. Registering 68 mothers (82. 9%) who had a normal body condition, 11 (13.5%) with an acceptable condition, and 3 (3.6%) had a poor body condition (Figure 4)

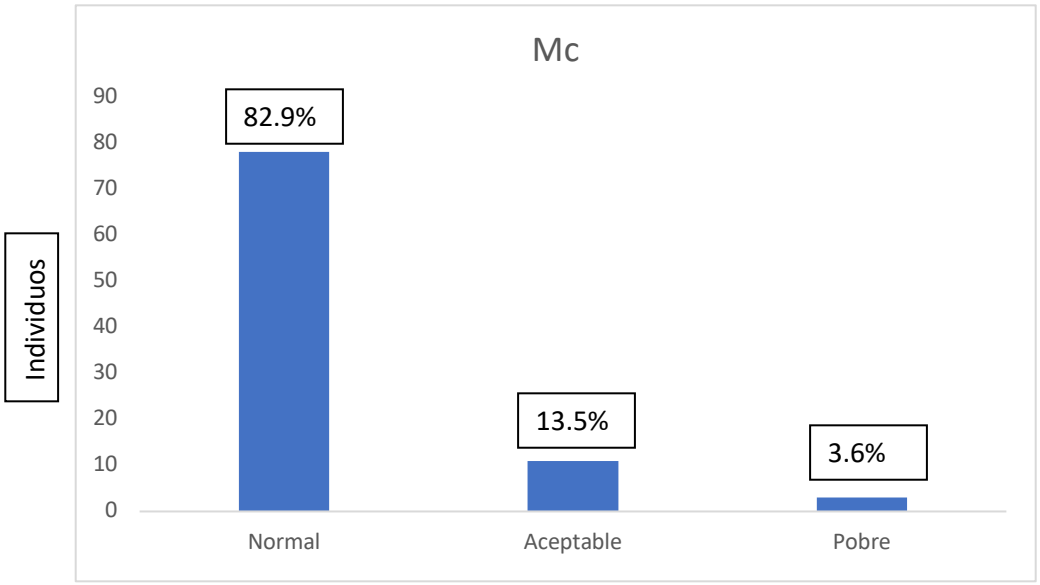

Figure 4. Proportion of females with breeding according to their body condition by2023.

As for solitary individuals, a total of 535 individuals were identified, of which 444 were categorized. It was obtained that 311 (70%) presented a normal body condition, 94 (21.2%) had an acceptable body condition and 39 (8.8%) presented a poor body condition (Figure 5).

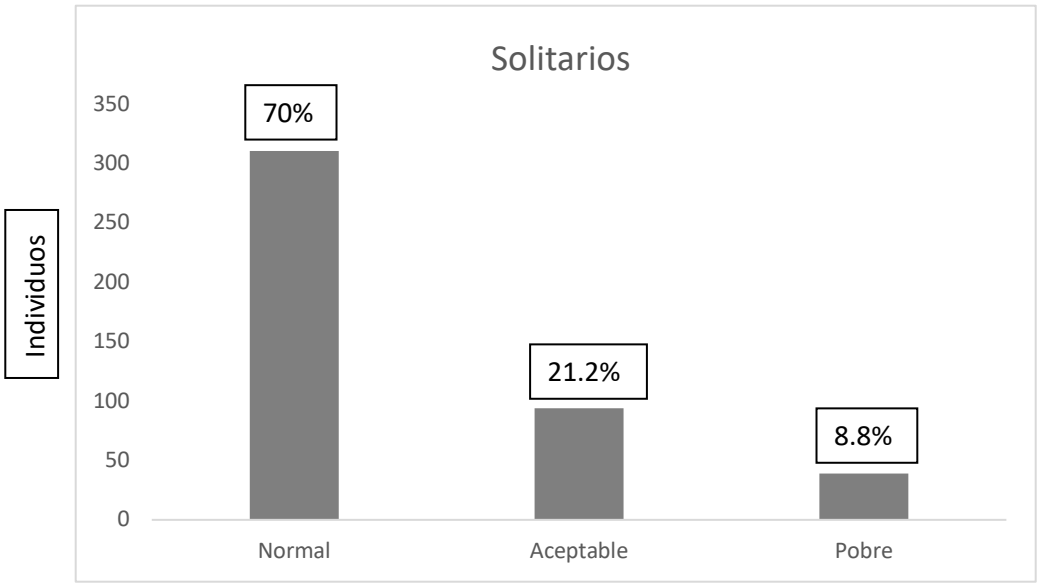

Figure 5. Proportion of solitary individuals according to their body condition, by 2023.

Conducting Abundance Surveys.

Abundance surveys were conducted from a 24 foot long boat, with a 90 hp outboard motor. The beginning of the censuses was in the northern part of the San Ignacio lagoon, where the boat was anchored and stayed for 20 minutes, observing the surroundings with the help of binoculars (Bushnell 10 x 50). Subsequently, a tour of the central part of the lagoon was made, navigating the lagoon from north to south at a speed of 11 km. per hour (Figure 6).

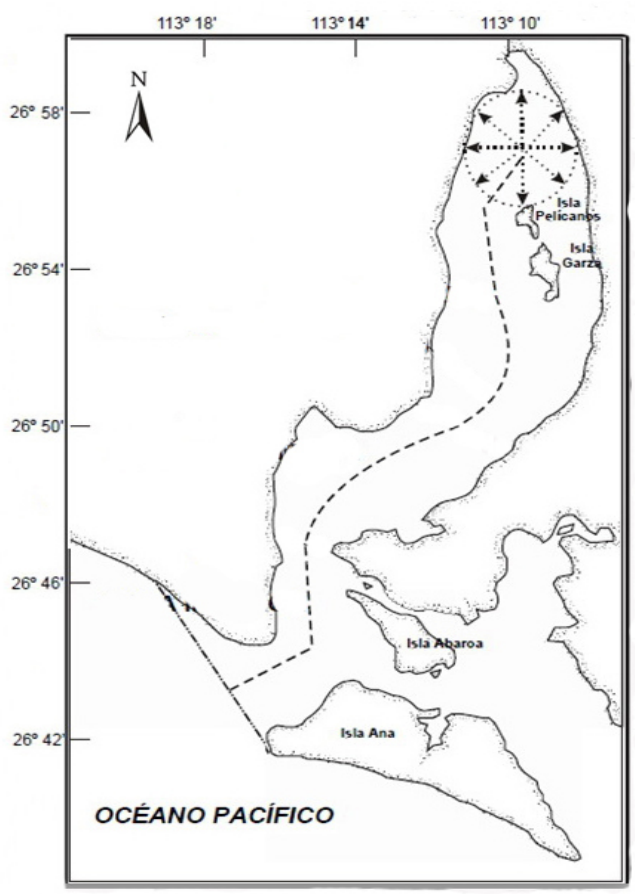

Figure 6. Tour for the census in the San Ignacio lagoon.

To carry out the censuses within the San Ignacio lagoon, two observers were required on each side of the boat (right and left), an annotator who recorded the number of whales observed, their location (areas delimited for the census), as well as the climatic conditions and the orientation of the animals.

The objective of the censuses is to count the minimum number of whales within the San Ignacio lagoon throughout the time of winter stay, as well as to determine their spatial distribution in said lagoon. During the 202 winter season 1 1 surveys were conducted between January 19 and April 4, with a separation between them of 5 to 9 days, depending on environmental conditions. The largest number of whales was recorded on March 6, with 224 whales (Table 2).

Table 2. Summary of censuses conducted during 2023

Census No.	Date	Alone	Mc	Total
1	2 3-Jan-2 3	16	9	34
2	2 8-Jan-2 3	8	14	36
3	03-Feb-2 3	22	23	68
4	11-Feb-23	57	21	99
5	17-Feb-23	89	29	147
6	20-Feb-23	103	28	159
7	1-Mar-2 3	138	27	192
8	6-Mar-23	194	15	224
9	13-Mar-23	100	20	140
10	19-Mar-23	40	37	114
11	4-Apr-23	8	32	72

Dolphin Monitoring

Along with the gray whale monitoring activities, the monitoring of the *dolphins (Tursiops truncatus*) resident

in the lagoon was also carried out (Fig 7), 63 sightings were recorded with a group size of 1 to 40 animals, being the average group size of 9.6 animals, for these records . The photo-identifications obtained will be compared against the individuals of the catalog registered between 2009 and 20 22, to better understand their distribution, abundance and residence.

Figure 7. Photoidentification of dolphins (*Tursiops truncatus*)

Environmental education

During 2023, environmental education talks were given to visitors from the Kuyimá, Punta Piedra and Campo Cortés camps. Likewise, the visit for advice was received, from two groups of the matter of Marine Amniotes, belonging to the Marine Biology career of the Autonomous University of Baja California Sur, Likewise, after three years, the meeting of the researchers was held, with the community, to present the results of the work carried out since 2019 (Fig 8).

Figure 8. Meeting of the researchers with the community of Laguna San Ignacio 2023.

Also during this year interviews and recordings were made for various media (Al Jazeera, El Heraldo, etc.).

Strandings

Four strandings of gray whales were recorded in La Laguna San Ignacio during 202 3 (Table 3), as well as a stranding of California sea lion (Zalophus californianus) and the first stranding of a Pygmy Sperm Whale was recorded at the mouth of the lagoon (Fig 9).

Table 3. Record of gray whales stranded in the San Ignacio lagoon, during the winter season 2023

No	Species	Date	Sex	Age class	Length (m)
LSI-001	Gray whale	2 1-Feb-2 3	Male	Risedulto	10.38
LSI-002	Gray whale	2 1-Feb-2 3	Male	Risedulto	10
LSI-003	Gray whale	24-Feb-23	Female	Adult	12.1
LSI-004	Gray whale	24-Mar-2 3	Male	Adult	12.35
Zca-001	Seal	1 9-Feb-2 3	Male	Risedulto	2.3
KBR-001	Dwarf sperm whale	16-Mar-23	Female	Adult	3.01

Figure 9. Stranding of a pygmy sperm whale at the mouth of Laguna San Ignacio.

This work was carried out under the permission of Scientific Research SPARN-DGVS-01244-23.

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