

Report on the Monitoring of the Gray Whale (*Eschrichtius robustus*) winter season 2023.  
Bahía Magdalena Lagoon Complex, Santo Domingo Channel and Bahía Almejas, B.C.S.  
México.



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## Executive Summary

We present the results on the monitoring of the gray whale *Eschrichtius robustus* done on the Lagoon Complex Bahía Almejas, Bahía Magdalena and Santo Domingo Channel, B.C.S. during the winter season 2023, realized by the *Programa de Investigación de Mamíferos Marinos* (PRIMMA), the Marine Mammal Research Program of the UABCS and LSIESP (Laguna San Ignacio Ecosystem Science Program/UABCS), this is a project fund by The Ocean Foundation. The monitoring was done from January 11<sup>th</sup>, until March 26<sup>th</sup>. In total, we did 4 census per area (Bahía Almejas, Bahía Magdalena, and Santo Domingo channel). We registered 221 gray whale sightings and 922 whales were photo-identified, 31 were cow-calf pairs.

### Photo-identification and Navigation.

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

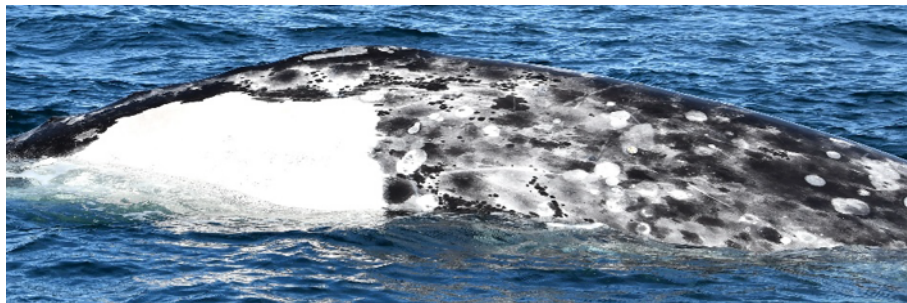


Figure 1. Photo-identification of the right side of a gray whale taken in Bahía Almejas.

To take these photographs, the boat approached parallel to the whales at approximately 10 to 20 meters to obtain a photograph of good size and resolution. The photographs were taken in order to record each whale individually through its individual marks and coloration. To carry out the photo-identification work, we navigated Bahía Magdalena, Bahía Almejas and the Santo Domingo Channel.

### Results

To carry out the photo-identification work, we navigated within Bahía Magdalena, Bahía Almejas and the Santo Domingo Channel, with a total effort of 432.3 hours, in which 221 sightings were recorded. During the field work, a total of 11,058 photographs were taken and during the time spent in the field, each of the registered photo-identifications were compared with each other, to obtain a photo-identification catalog for the year 2023. A total of 922 different individuals (adults) were obtained, of which 31 were females with young and 891 corresponded to solitary individuals (females or adult males).

Nine tours were made in collaboration with Mar Vivo, where of the 221 total sightings of this 2023, 28 were carried out jointly and 70 whales were photo identified, of which 68 were single, 2 were mothers with calves.

According to all the records made for each photo-identified individual, the maximum residence (time between the first and last photo-identification) was 42 days for the females with young and 26 days for solitary individuals.

## Body Condition

Photographs of the head and scapula and dorsal were taken to assess body condition; estimating the proportion of the number of whales exhibiting skinny whale syndrome (nutritional stress), in which there is a depression of the post cranial region and a decrease in the volume of fat stores. For this part of the work, the methods and criteria proposed by Weller et al., (2000) were used. and Bradford et al., (2012) where they were assigned a numerical value of 1 to 3 (head) or 1 to 2 (scapula and back) to each region, depending on its condition. being the highest values those that present a better condition (Table 1).

Table 1. Categories on the body condition of gray whales in 2023.

Category	Mothers & calves	Singles
Normal	23	234
Acceptable	5	258
Poor	1	33
Unknown	2	366
Total	31	891
<b>Total overall</b>	922	

There were 31 females with calves identified, of which only in 29 their body condition could be determined. Out of these, 23 females presented normal body condition, 5 had acceptable condition, one presented poor condition and two could not identify body condition (Figure 2).

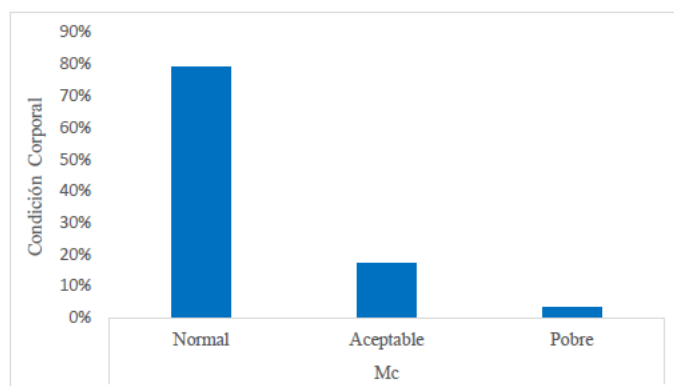


Figure 2. Proportion of Female Gray with Calves by Body Condition for 2023 in Bahía Magdalena, Almejas and Canal de Santo Domingo complex.

Regarding single individuals, a total of 891 single individuals were identified, and there were 525 categorized. Of which 234 (44.6%) presented normal body condition, 258 (49.1%) had an acceptable body condition and 33 (6.3%) had a poor body condition (Figure 3).

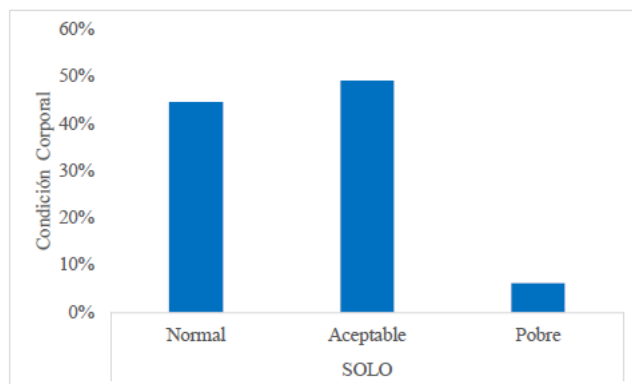


Figure 3. Proportion of single gray whale individuals according to their body condition, In 2023 in the Bahía Magdalena, Almejas and Canal de Santo Domingo complex.

### Census

To count the minimum number of gray whales within the Lagoon Complex Bahía Almejas, Bahía Magdalena and Canal de Santo Domingo throughout their winter stay, we carried out censuses with previously defined methodologies and transects (Figure 4). Generally, surveys were conducted in a 25-foot boat with a 70-foot outboard motor, sailing at an approximate speed of 11 km/h. There were two main observers (one on each side of the boat), a helper and a writer.

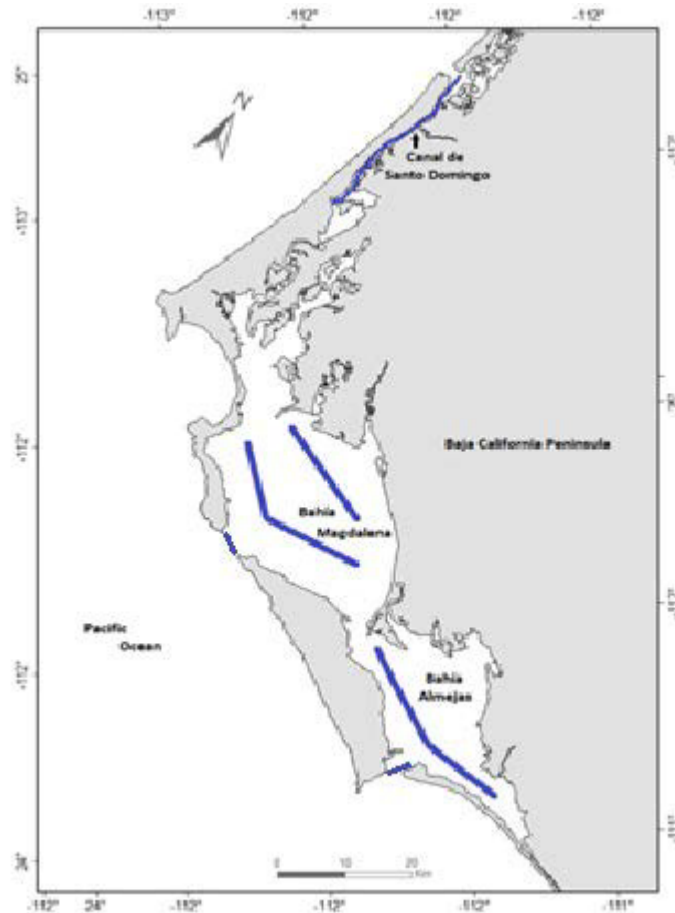


Figure 4. Transects of gray whale surveys in the Bahía Almejas Lagoon complex, Bahía Magdalena and Santo Domingo Channel.

In the southernmost area of the lagoon complex, Bahía Almejas, a transect of approximately 21.5 km in a time of 2.5 h. Added one more transect in the mouth of approximately 4.1 km with an approximate travel time of 37 min (Figure 5).

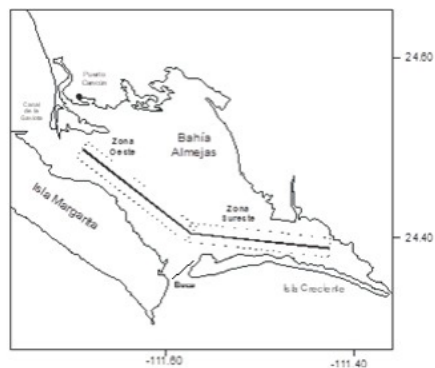


Figure 5. Census transect in Bahía Almejas.

In Bahía Magdalena, the middle zone, two transects were covered, the first of them in the center of the bay (18.3 km), the second close to the mouth (23.3 km) and the last, crosses the mouth of the bay (4.3 km). The latter was carried out from the month of February. The total effort time to perform the three counts is approximately 4.5 h. (Figure 6).

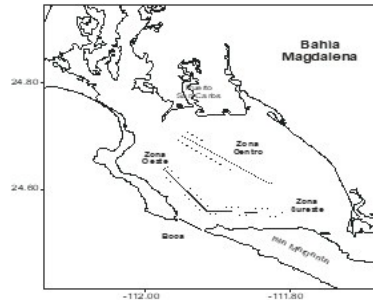


Figure 6. Census transect in Bahía Magdalena

In the third zone and the most northerly, Canal de Santo Domingo, a transect is covered at the center. The approximate length of the transect is 34.6 km, which takes approximately 3 hours. (Figure 7).



Figure 7. Census transect in Santo Domingo Channel.

The speed and the route were followed and corrected with the help of a GPS. The data recorded in the census are number of mothers with calves, number of adults, the direction they were going, fishermen boats, tourist pangas, as well as other species of marine mammals.

## Results

During the 2023 winter season, 4 censuses were carried out per locality, one in each month. The highest number of whales was registered in Bahía Almejas on February 19, with 295 animals, the highest number for Bahía Magdalena was 97 individuals registered on February 18 and for the Santo Domingo Channel, the maximum registered was 34 individuals on February 20, in total in the censuses only 40 females with calves were recorded (Figure 8).

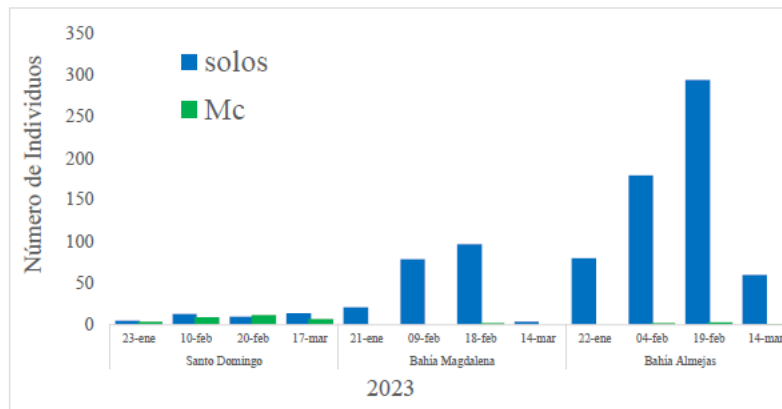


Figure 8. 2023 Gray Whale census.

### Comparison between years of the number of calves

When comparing the number of calves recorded in 2023, an important difference is observed compared to previous years, registering an increase from 5 to 40 whales from 2022 to this 2023. This suggests a recovery on the reproductive rate (Figure 9).

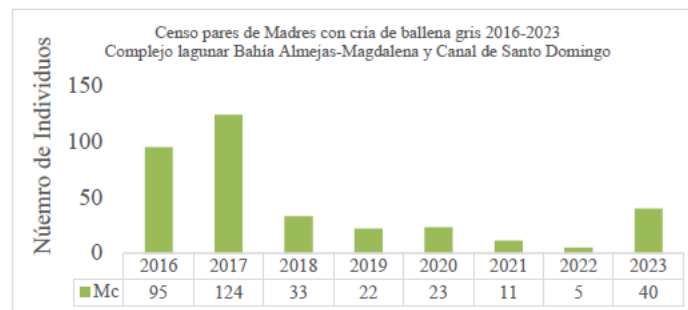


Figure 9. Gray whales Cow calf pairs from 2016 to 2023.



## Other Species Observed

During our outing for photo identification, 49 Humpback whale sightings were also recorded (*Megaptera novaeangliae*), 32 bottlenose dolphins (*Tursiops truncatus*), 10 blue whales (*Balaenoptera musculus*), five short-beaked common dolphin (*Delphinus delphis*), three Pacific white-sided dolphins (*Lagenorhynchus obliquidens*), one fin whale (*Balaenoptera edeni*) and one male killer whale (*Orcinus orca*) (Table II).

Table II. Records of other cetacean species in the Bahía Almejas lagoon complex, Bahía Magdalena, Canal de Santo Domingo and in the Pacific during the 2023 season.

Species	Number of sightings
<i>Balaenoptera edeni</i>	1
<i>Balaenoptera musculus</i>	10
<i>Delphinus delphis</i>	5
<i>Lagenorhynchus obliquidens</i>	3
<i>Megaptera novaeangliae</i>	49
<i>Orcinus orca</i>	1
<i>Tursiops truncatus</i>	32

## Drone monitoring

Recordings were made through an unmanned aircraft, the drones that were used for the recordings were Mavic 3 and Mavic Mini 3 Pro. In a total of 40 flights, 7.95 hours were recorded of videos in which 7 different species of cetaceans were captured. The species that could be recorded throughout the season were 4 species of toothed whales such as orca, bottlenose dolphins, common short-beaked dolphins and Pacific white-sided dolphins while within the group of the mysticetes were recorded 3 species: gray whale, humpback whale and fin whale. of the videos registered, there are 16 feeding fragments, 258 swimming, 15 mating videos, 224 from socialization and 26 from field work (Figure 10).





Figure 10. Cetacean species captured by drones.

### **Courses for tourism companies and environmental education**

In October and December 2022, a total of five courses were given to tourism companies. In October it was in Puerto Chale and Puerto San Carlos (Figure 11), the subject was "Recommendations for the Tourist activity with Gray Whale in San Carlos and Puerto Chale", with the objective of promoting good practices for whale watching tourism and the review of the NOM-131 law. There were nine persons in Puerto San Carlos who participated, two women and seven men from the community and some tourist companies. One of the agreements generated during the workshop was to see the possibility of forming a participatory environmental surveillance committee, formed and paid for by the community, the need for members of a government authority to participate in the workshops was mentioned, in order to discuss some points that generate confusion regarding compliance with NOM-131 specifically for gray whales in these communities and that in turn, help to increase the interest of community members in participating in the workshops.

On October 2nd, 2022, the workshop was held in the community of Puerto Chale, attended by 45 people of the community, of which seven were women and most of them were members of the groups that offer the gray whale watching activity. Some of the agreements that emerged during the meeting were that the participation of institutions such as PROFEPA and Vida Silvestre would be sought to resolve doubts regarding compliance with NOM-131, specifically at the time of touching the whales. In addition, some points were discussed such as the use of drones and GoPro cameras by tourists, agreeing that its use will only be allowed in case of having a permit and it will seek to propose that this item be added to NOM-131.



Figure 11. San Carlos and Puerto Chale community participation in the workshops by PRIMMA, october 2022.

The third round of workshops "Current State of the gray whale population and research activities in 2023 in Puerto San Carlos, Puerto Chale and Puerto A. López Mateos" were from December 16 to 18, 2022 with the purpose of updating the communities on the most recent studies that indicate the status of the gray whale population in the face of the possible impacts of change climate change and report each of the research activities that the PRIMMA/UABCS would make during the 2023 season.

In the community of Puerto San Carlos, 21 people from the community, including tourist companies, members of some non-governmental organizations and high school students were present.

Some of the subjects discussed were related to the need for unity among tourist companies to generate agreements that help improve the management of the activity as a community, the bases for forming vigilance committees were presented, and the need for a training workshop to be part of the Network of Assistance to Entangled Whales (RABEN).

During the workshop in the community of Puerto Chale, 18 members of the tourist companies were present (7 women and 11 men). They proposed to make an announcement on the good practices of whale watching. The last workshop was held in the community of Puerto Adolfo López Mateos on December 18, 2022, we had the participation of 19 people from the whale watching tourist companies.

We gave a talk on January 9, 2023, on the biology of the gray whale to the staff of the Tourist Office of the municipality of La Paz, with the aim of informing them, so that tourism promotion is carried out responsibly and correctly.

Six women and 8 men participated in this session. The result of this talk in collaboration with Costa Salvaje, was that we were able to design and place informative posters on the biology of the gray whales, as well as the guidelines for its tourist observation.

Also from February to March, 12 talks were given to two elementary schools, six to junior high school and four to high school, we gave this talks collaborating with Mar Vivo (Figure 12).



Figure 12. Different talks given to different academic levels.

During our monitoring with Mar Vivo, four high school students came along with us (Figure 13).



Figure 13. Students participating in different monitorings.

## Strandings



There was only one stranding reports in the López Mateos locality, on January 29<sup>th</sup>, it was a 4.82 m long calf (Figure 14). We also registered a 2.1m long stranded bottlenose dolphin, on March 13<sup>th</sup> in the coast of Bahía Magdalena (Figure 15).



Figure 14. Gray whale stranded in López Mateos, 2023.



Figure 15. Bottlenose dolphin stranded in Bahía Magdalena, 2023.

## References

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