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Gray whale stranding records in Mexico, during UME 2019-2022: 2023 Update

S. Martínez-Aguilar[1,2], A. González-Cisneros[1,2], M. Valerio-Conchas[1,2], F.M. Rodríguez-González[1,2], R. Lobo-Barrera[1,2], L.A. Zamora-Zavala[1,2], J.A. Olguín-Hernández[1,2], F. Castillo-Romero[4], G.A. Zaragoza-Aguilar[3], J. Rivera-Rodríguez[4], N. López-Paz[3], A. Zaragoza-Aguilar[4], S. Swartz [2], L. Viloria-Gómora [1,2] M. A. González-Viscarra[4] and J. Urbán R. [1,2]

1 Departamento Académico de Ciencias Marinas y Costeras. Universidad Autónoma de Baja California Sur, La Paz, B.C.S., México

2 Laguna San Ignacio Ecosystem Science Program (LSIESP), Darnestown, MD, USA

3 Reserva de la Biósfera "El Vizcaino", Secretaria del Medio Ambiente y Recursos Naturales, B.C.S. México

4 Exportadora de Sal S.A. BCS, México.

ABSTRACT

Unusual Mortality Events (UME) occur when mortalities of marine mammals increase above an average annual rate. In 2019 the U.S. National Oceanic and Atmospheric Administration (NOAA) declared a gray whale UME along the North Pacific Coast of North America and continued until 2022. Gray whale stranding records were collected in Mexico between January 1st and April 11 of 2023 and documented at least 33 gray whales stranded along the Pacific coast of Baja California, Mexico. As in previous years, most of the strandings (n=27) occurred in Ojo de Liebre lagoon (LOL) and the surrounding areas. Of the total number, 19 were female gray whales and 14 were males. The age classes of the dead whales were: 8 adults, 4 subadults, 5 yearling whales and 16 calves. The number of strandings in 2023 was similar to the stranding numbers before the UME started in 2019. The main age class of stranded whales were calves as is usually the case in the non-UME years.

INTRODUCTION

During the last two decades, two gray whale UMEs have been declared: the first in 1999-2000, with at least 319 stranded dead whales discovered in the breeding and calving areas in Mexico; and the second UME during 2019-2022 with 608 stranded whales discovered (NOAA, 2023). In both of the UMEs some of the stranded whales appeared

to be "skinny", suggesting that they were suffering from nutritional stress (LeBoeuf *et al*., 2000; Fauquier *et al.,* 2023). For the 1999-2000 UME, Moore *et al.* (2001), suggested that the increase in gray whale mortality was a result of the Eastern North Pacific (ENP) gray whale population increasing to an abundance level that exceeded the "carrying capacity" of the gray whales' feeding grounds. After the 2019 UME was declared, renewed efforts to monitor and report gray whale strandings throughout their range in Mexico were undertaken.

METHODS

As in previous years (2019-2022), information (date, position, location, sex, age class, body length and physical condition) on dead stranded gray whales was collected from three sources. The age for each stranded whale was estimated from body length and categorized with age-length criteria established by the NOAA gray whale UME stranding investigating panel: calves (less than 7.9 m); yearlings (8 - 8.9 m); sub-adults from (9-11 m for males, and 11.6 m for females); and adults (larger than 11.1 m for males and 11.7 m for females).

Sources of stranding data for 2023 included:

1.- Strandings from Ojo de Liebre lagoon and Guerrero Negro lagoon, BCS, and from Manuela lagoon, Baja California, were recorded from January 15 to April 11 of 2023 by Departamento de Ecología of Exportadora de Sal S.A. and CONANP “El Vizcaino”.

2.- Strandings in Laguna San Ignacio and Bahia Magdalena-Bahía Almejas complex, BCS., during the period from January 15 to April 4 of 2023 were recorded by researchers from the Laguna San Ignacio Ecosystem Science Program (LSIESP) and Marine Mammals Research Program / Universidad Autónoma de Baja California Sur (PRIMMA/UABCS).

3.- One gray whale stranded along the Pacific coast of Baja California Peninsula was reported during February of 2023 on the internet “News” websites.

RESULTS

Between January 1st to April11 of 2023, 33 dead, stranded gray whales were reported in Baja California (Fig. 1 and Fig. 2). Of these whales, 19 were females and 14 were males (Fig. 3). Their age categories were: 8 adults, 4 subadults, 5 yearling and 16 calves (Fig. 4). The advanced decomposition of most of these stranded whales (78.7%), prevented determination of their body condition at the time of their deaths (e.g., "good", "fair", or "poor" condition).

Laguna Ojo de Liebre (Scammon´s lagoon) y Laguna Manuela

These lagoons are located within the northern portion of the “El Vizcaíno Biosphere Reserve." In the winter of 2023, 27 stranded dead gray whales were discovered in these areas (the lowest number since 2019), which is 81.8% of the total stranded gray whales reported for Mexico in 2023. Of these stranded whales: 16 were females, and 11 were males (Table 1). The age classes of these whales included: 16 calves, 4 yearling animals, 2 subadults, and 6 adults (Table 1).

Laguna San Ignacio

In Laguna San Ignacio, Baja California Sur, there were only four gray whales stranded during the 2023 winter: one was female and three were males. Two of these whales were subadults and two were adults (Table 1). Even when all the carcasses were fresh or in a moderated state of decomposition, only one was judged to be emaciated.

Bahia Magdalena-Bahia Almejas complex

This complex includes the areas from south to north, Bahia Almejas, Bahía Magdalena, Cabo San Lazaro and Canal de Santo Domingo. In the winter of 2023 only one stranded dead gray whale, a female calf, was discovered in these areas (Table1).

Pacific Coast of Baja California

This includes the region from the Tijuana coast to Cabo San Lucas west coast, except the main wintering and breeding lagoons. During 2023 there was only one subadult female gray whale stranding reported near to Ensenada.

Gulf of California

There were no strandings reported from this area

DISCUSSION

The number of stranded gray whales (n=33) reported in Mexican waters during the first three months of 2023 was the lowest since the UME started in 2019 (Fig 2).

As seen in previous years, the number of strandings in Laguna Ojo de Liebre (n=27) was the highest observed in the three wintering areas in Baja California as it is the main breeding and calving lagoon in Mexico (Figs. 1 and 2), however, this number is not greater than the usual number of stranded whales observed in this lagoon during a non-UME year. Due to the long time between surveys to discover strandings in this area, almost all of carcasses examined were in a state of advanced decomposition so their body condition could not be assessed. The number of strandings in Laguna San Ignacio (n=4) decreased

from the number of stranded whales discovered in 2022 (n=12). Although all of these whales were in fresh or a moderated state of decomposition, no necropsies were made because the carcasses were floating. Only one of these whales was emaciated and it was observed alive five days before it was discovered stranded.

Comparing data from 2023 against the data from 2020-2022 (Martínez-Aguilar *et al*., 2020; 2021; 2022), the proportion of the sexes of the stranded whales were higher for females in 2019 and 2023, unlike the period from 2020 to 2022 where stranded males were predominant (Fig. 3). Calves were the main age category of the stranded whales during 2023, as is usually seen in non-UME years (Fig 4). Subadult and adult age classes were the most common categories of stranded whales during the 2019-2022 period of the UME (Fig 4). The increase of the number of calves stranded is likely related to higher numbers of calves seen in the wintering lagoons during 2023 (Urbán *et al*., 2023).

As in previous years, in 2023 the body condition of most of the stranded whales could not be determinate due to the advanced decomposition of the carcasses. In 2023 only 3 whales were observed to be fresh, 8 were in moderated decomposition, 6 were in fair condition, and only one was judged to be emaciated.

The number of reported gray whale strandings is likely an underestimate of actual mortalities, because of the differences in detectability, the dimensions of the area where the gray whales are distributed along the Baja California Peninsula, an undetermined number may drift out to sea and do not appear on the coastal beaches, and the differences in search effort conducted in all areas (Martínez-Aguilar *et al*., 2021). Compared to the previous four years, the number of stranded gray whales discovered in 2023 is lower, and similar to stranding numbers in non-UME years suggesting that the gray whale mortality event may be slowing (Fig 4).

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TABLES AND FIGURES

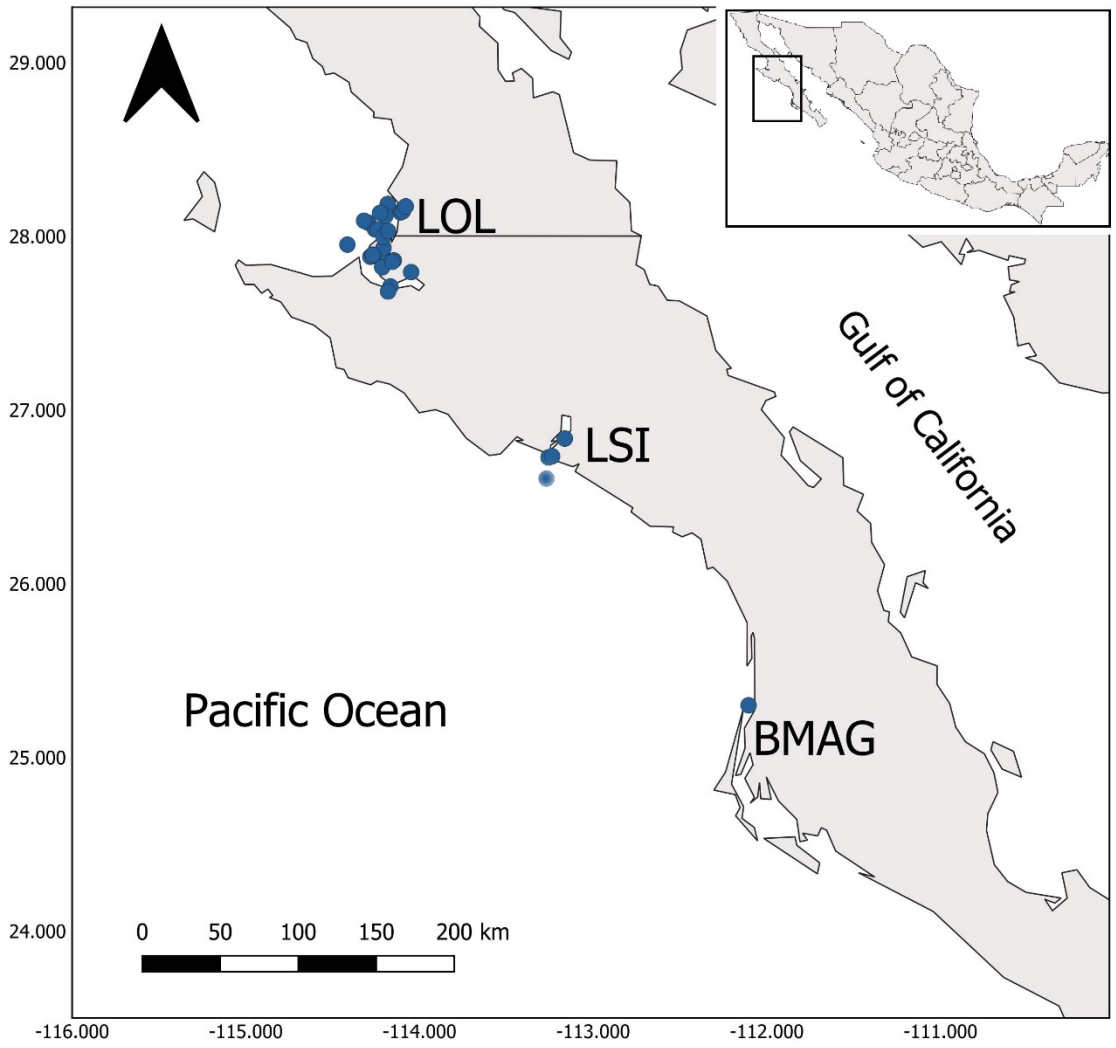

Figure 1. Distribution of gray whales stranded in Baja California Peninsula, Mexico from January ?? to April 11 of 2023. (LOL- Ojo de Liebre Lagoon; LSI-San Ignacio Lagoon; BMAG- Bahía Magdalena)**.**

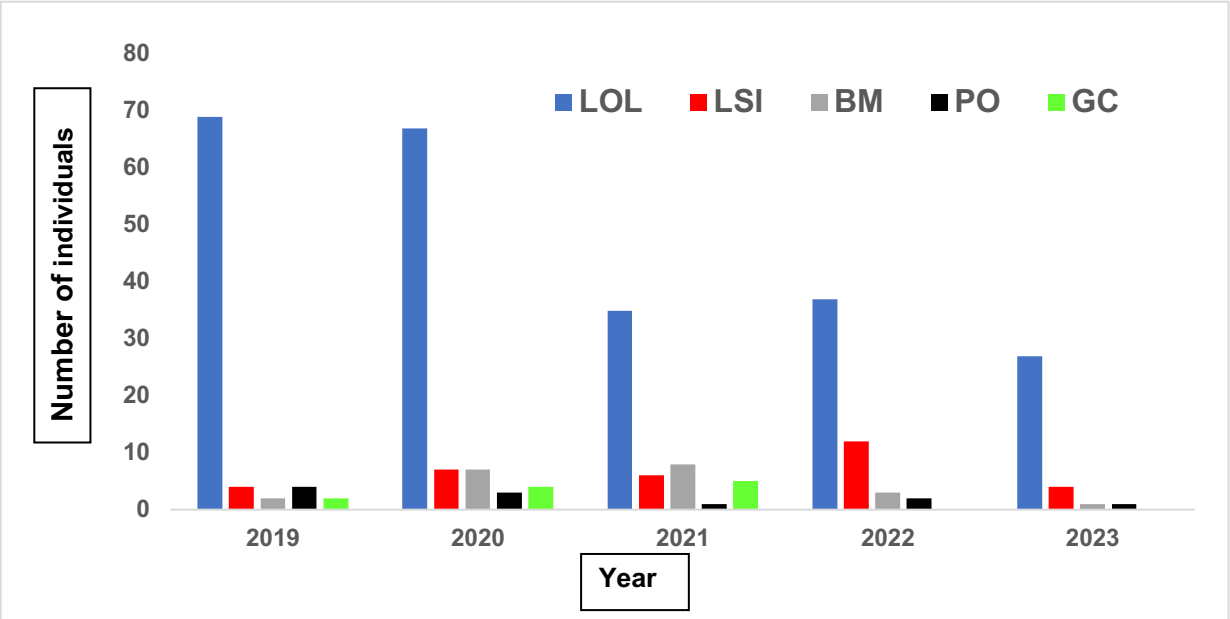

Figure 2. Total number of gray whales stranded in Mexico by area, during the UME of 2019-2023. LOL (Ojo de Liebre Lagoon), LSI (San Ignacio Lagoon), BM (Bahía Magdalena), PO (Pacific Ocean), GC (Gulf of California).

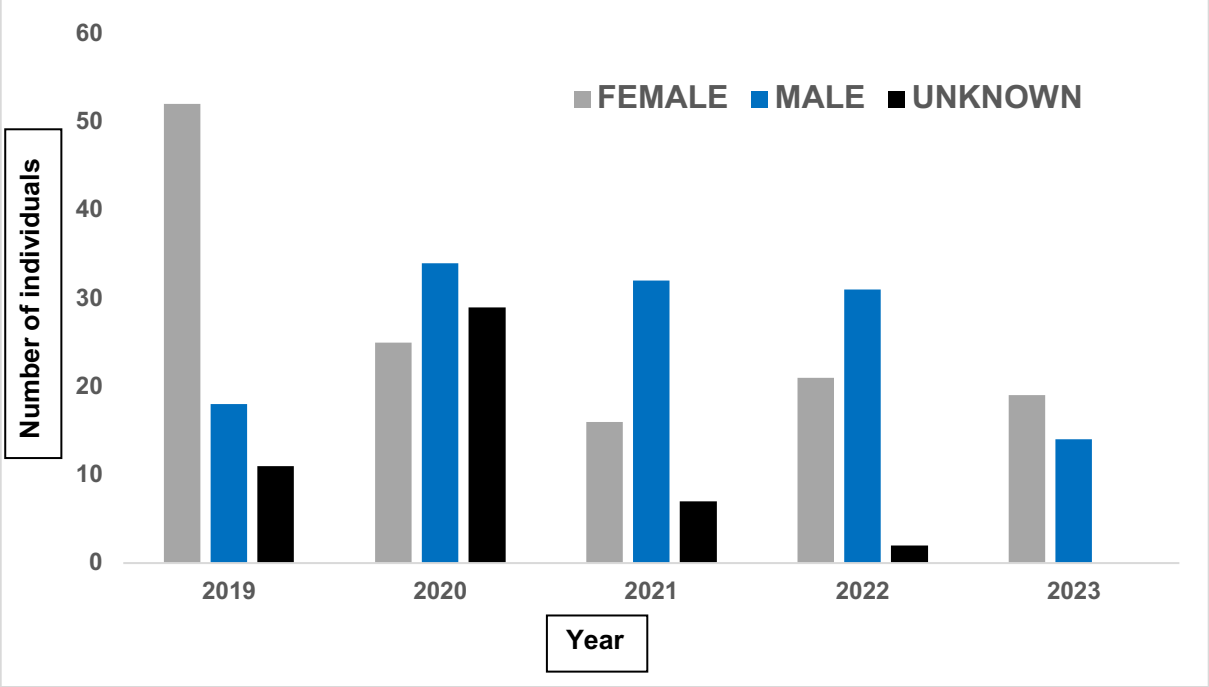

Figure 3. Total number of gray whales stranded in Mexico by sex during the UME of 2019-2023.

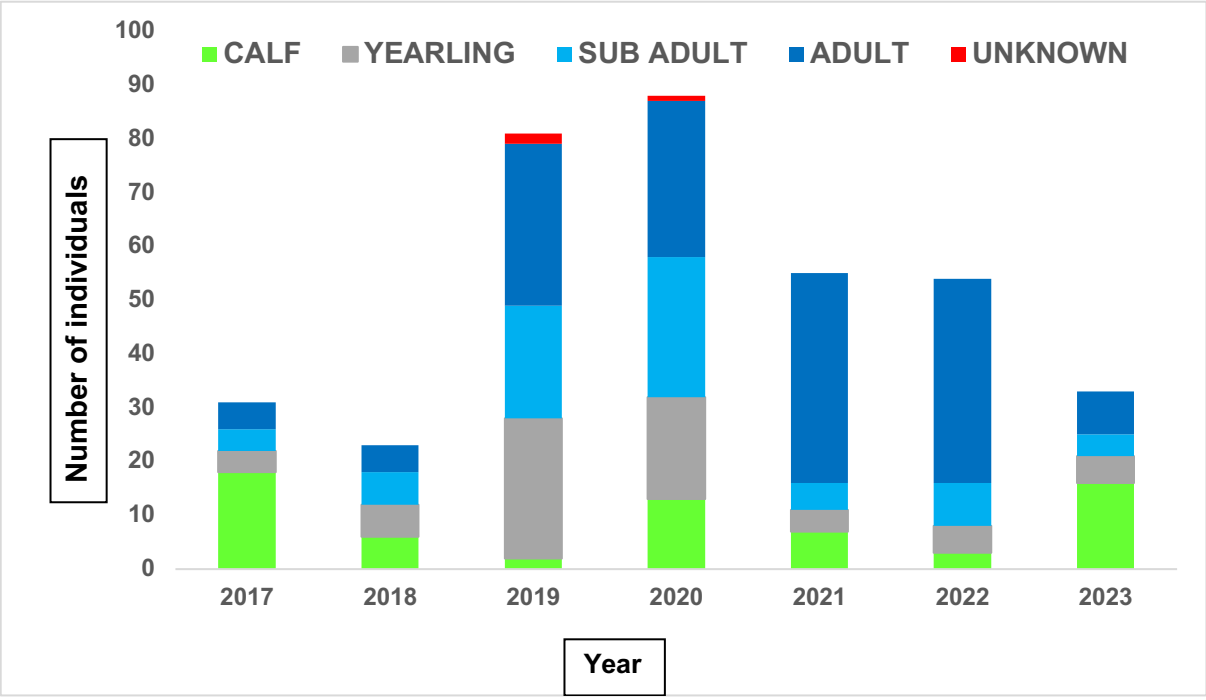

Figure 4. Total number of gray whales stranded in Mexico by age categories during non-UME years of 2017and 2018; UME years from 2019-2022 and 2023

Table 1. Data from gray whales stranded in México (Baja California and Baja California Sur) from January to April 2023. (Institution: ESSA/REBIVI are data collected by Exportadora de Sal S.A and Biosphere Reserve "El Vizcaíno"; PRIMMA/LSIESP are data collected by Marine Mammals Research Program and Laguna San Ignacio Ecosystem Science Program.

Date	Field ID	Sex	Age Class	Condition code	Locality	Latitude	Longitude	Institution
12-jan-23	LOL-001	Male	Calf	Moderated Decomposition	Boca de Laguna Guerrero Negro, BCS	28.13666	-114.10972	ESSA, CONANP
25-jan-23	LOL-002	Male	Calf	Advanced Decomposition	Isla alambre, Laguna Ojo de Liebre, BCS	27.88138	-114.28333	ESSA, CONANP
25-jan-23	LOL-003	Female	Calf	Advanced Decomposition	Isla alambre, Laguna Ojo de Liebre, BCS	27.84361	-114.21333	ESSA, CONANP
25-jan-23	LOL-004	Female	Yearling	Advanced Decomposition	Campo Las casitas, Laguna Ojo de Liebre, BCS	27.87888	-114.21138	ESSA, CONANP
29-jan-23	BMA-001	Female	Calf	Moderated Decomposition	Puerto López Mateos, BCS	25.29914	-112.10501	PRIMMA/LSIESP
31-jan-23	LOL-005	Female	Subadult	Advanced Decomposition	Muelle Inglés, Laguna Ojo de Liebre, BCS	27.79277	-114.04833	ESSA, CONANP
07-feb-23	LOL-006	Female	Calf	Advanced Decomposition	Las Águilas, Laguna Ojo de Liebre, BCS	27.82027	-114.21500	ESSA, CONANP
08-feb-23	LOL-007	Female	Calf	Advanced Decomposition	Isla arenas, Laguna Ojo de Liebre, BCS	28.18555	-114.18305	ESSA, CONANP
08-feb-23	LOL-008	Male	Calf	Advanced Decomposition	Isla arenas, Laguna Ojo de Liebre, BCS	28.07805	-114.29694	ESSA, CONANP
08-feb-23	LOL-009	Female	Calf	Advanced Decomposition	Isla arenas, Laguna Ojo de Liebre, BCS	28.11583	-114.19666	ESSA, CONANP
08-feb-23	LOL-010	Female	Calf	Advanced Decomposition	Isla arenas, Laguna Ojo de Liebre, BCS	28.03944	-114.25638	ESSA, CONANP
08-feb-23	LOL-011	Female	Calf	Moderated Decomposition	Isla arenas, Laguna Ojo de Liebre, BCS	28.03722	-114.24166	ESSA, CONANP
08-feb-23	LOL-012	Female	Yearling	Advanced Decomposition	Isla arenas, Laguna Ojo de Liebre, BCS	28.08861	-114.31916	ESSA, CONANP
08-feb-23	LOL-013	Female	Calf	Advanced Decomposition	Isla arenas, Laguna Ojo de Liebre, BCS	27.95111	-114.41527	ESSA, CONANP
08-feb-23	LOL-014	Female	Yearling	Moderated Decomposition	Isla arenas, Laguna Ojo de Liebre, BCS	28.13361	-114.22722	ESSA, CONANP
10-feb-23	LOL-015	Female	Calf	Advanced Decomposition	Campo de Nicho, Laguna Ojo de Liebre, BCS	27.93277	-114.20694	ESSA, CONANP
13-feb-23	LOL-016	Female	Calf	Advanced Decomposition	Playón de Manuela, laguna Guerrero Negro, BC	28.14805	-114.10083	ESSA, CONANP
17-feb-23	ENS-001	Female	Subadult	Fresh	Puerto El Sauzal, Bahía de Ensenda, BC	31.89722	-116.81360	ESSA, CONANP
21-feb-23	LSI-001	Male	Subadult	Moderated Decomposition	Boca de la Laguna San Ignacio, BCS	26.72587	-113.25735	PRIMMA/LSIESP
21-feb-23	LSI-002	Male	Subadult	Fresh	3 NM fuera de la Laguna San Ignacio, BCS	26.67924	-113.31500	PRIMMA/LSIESP
24-feb-23	LSI-003	Female	Adult	Moderated Decomposition	Isla Ana, laguna San Ignacio, BCS	26.73253	-113.23647	PRIMMA/LSIESP
28-feb-23	LOL-017	Male	Calf	Moderated Decomposition	las Casitas, Laguna Ojo de Liebre, BCS	27.86028	-114.14780	ESSA, CONANP
04-mar-23	LOL-018	Male	Calf	Moderated Decomposition	las Casitas, Laguna Ojo de Liebre, BCS	27.85194	-114.15670	ESSA, CONANP
15-mar-23	LOL-024	Male	Adult	Advanced Decomposition	Playón de Manuela, laguna Guerrero Negro, BC	28.14306	-114.09640	ESSA, CONANP

15-mar-23	LOL-025	Male	Adult	Advanced Decomposition	Playón de Manuela, laguna Guerrero Negro, BC	28.17139	-114.07920	ESSA, CONANP
16-mar-23	LOL-019	Female	Adult	Advanced Decomposition	Isla Arena, Laguna Ojo de Liebre, BCS	27.89167	-114.26920	ESSA, CONANP
16-mar-23	LOL-020	Male	Calf	Advanced Decomposition	Isla Arena, Laguna Ojo de Liebre, BCS	27.89306	-114.26940	ESSA, CONANP
21-mar-23	LOL-021	Female	Yearling	Advanced Decomposition	Isla de Piedra, laguna Ojo de Liebre, BCS	27.71028	-114.16750	ESSA, CONANP
21-mar-23	LOL-022	Female	Adult	Advanced Decomposition	Isla Arena, Laguna Ojo de Liebre, BCS	27.89167	-114.26920	ESSA, CONANP
21-mar-23	LOL-023	Male	Adult	Advanced Decomposition	Paredones, Laguna Ojo de Liebre, BCS	27.68111	-114.18110	ESSA, CONANP
24-mar-23	LSI-004	Male	Adult	Fresh	Al norte de La Freidera, laguna San Ignacio, BCS	26.83450	-113.16312	PRIMMA/LSIESP
11-apr-23	LOL-026	Male	Yearling	Advanced Decomposition	Isla arenas, Laguna Ojo de Liebre, BCS	27.99611	-114.20860	ESSA, CONANP
11-apr-23	LOL-027	Male	Adult	Advanced Decomposition	Isla arenas, Laguna Ojo de Liebre, BCS	28.02917	-114.18080	ESSA, CONANP