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Occurrence of Lahille's Bottlenose Dolphin (Tursiops truncatus ssp. gephyreus) in Bahía Blanca Estuary (Buenos Aires, Argentina). Preliminary information.

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Abstract

Information about the presence of Lahille's Bottlenose dolphins (*Tursiops truncatus spp gephyreus*) at the Bahía Blanca estuary, Argentina, were gathered from opportunistic platforms such as recreational and patrol boats of the reserve wardens. The estuary comprised two provincial protected areas: "Bahía Blanca, Bahía Falsa y Bahía Verde" established in 1998 with 2600km^2 and " Islote de la Gaviota Cangrejera" recently ruled by law 15362 in 2022. Between October 2020 and April 2023, Bottlenose dolphins were recorded 30 times, totaling 190 specimens. The overall SPUE was 0.34 dolphin group/hour. Groups observed range from one to 20 individuals, but most of the groups observed contained between one to eight dolphins (76.6%). The results suggested that *"Ferones"*, as they are known locally, are year-round at PNRBBFBV. Using Soundtrap acoustic recordings enabled the detection of clicks consistent with records similar to those emitted by *Tursiops truncatus*. This paper responded to some of the recommendations of the IWC and highlights the importance of the PNRBBFBV in the conservation of this species/ subspecies, since it seems to be one of the few sites in Argentina where they can still be found.

Keywords: Group size, seasonality, Bottlenose dolphin, Bahía Blanca, Argentina

Introduction

Lahille's Bottlenose Dolphins (*Tursiops truncatus gephyreus*) is one of three subspecies recently recognized by the Society of Marine Mammalogy's Committee on Taxonomy (2018) for the genus Tursiops. In 2018, the International Whaling Commission's Scientific Committee validated the three subspecies following a re-assessment of the world-wide taxonomy of Tursiops (IWC 2018). Lahille´s Bottlenose dolphins are distributed along the east coast of South America in the southwest Atlantic Ocean, between the state of Parana, southern Brazil (approximately 25°S)(Wickert *et al*. 2016) to the province of Chubut, Argentina (approximately 46°S)(Coscarella *et al*. 2012), a distributional range of approximately 3,500 km of coastline. Despite being one of the most studied species in the world, there are few studies on *Tursiops truncatus* for the southwest Atlantic. So far, studies have shown that the species lives in relatively small

and adjacent communities along the coast of South Brazil, Uruguay and Argentina, with low genetic diversity among them (Fruet *et al*., 2014) and strong genetic distinction from the offshore ecotype (Fruet *et al*., 2017). In Argentina, data shows sightings decreased notably since the 1990s in the province of Buenos Aires and the province of Chubut, with the species having disappeared completely from the former region (Vermeulen et al., 2017). One of the sites in Argentina where the presence of Bottlenose Dolphins has been recorded since 1999 (Fidalgo, 2004) is the Provincial Nature Reserve Bahía Blanca, Bahía Falsa and Bahía Verde (PNRBBBFBV)(Fig. 1), located 700km southeast of Buenos Aires city. It is listed as *Vulnerable* by the IUCN Red List of threatened species (Vermeulen *et al.*, 2019a) as well as in the Red List of Argentina (Vermeulen *et al.*, 2019b).

The present study aims to preliminary investigate the occurrence of Bottlenose dolphins inhabiting the PNRBBBFBV. Furthermore, photo-identification effort was done and the results of this study will be submitted to SC69B.

Material and Methods

Study Area

Located at southwest of province of Buenos Aires, the Bahía Blanca estuary (Fig. 1) is one of the largest coastal systems in Atlantic South America, encompasses about 2300 km^2 of wide intertidal flats, salt marshes, and emerged islands, arranged to create intricate channels patterns (Fiori and Pratolongo, 2021). It belongs to a coastal oceanographic area called “El Rincón" that extends from 39°S to 41°S, up to a depth of 40m (Acha *et al,* 2004). This is a mesotidal estuary, their main input of fresh water comes from small currents, Sauce Chico and Naposta rivers (Piccolo *et al*, 2008). Besides these two permanent sources, there are intermittent streams that drain rainfall excess during wet periods. Main intermittent streams are those in the group named Saladillo, which encompasses three different streams (Saladillo or Dulce, Saladillo de Lazaga, and Saladillo de García) and Canal Maldonado, a channel, built in 1950 to manage excess rainfall on the Bahía Blanca city and overflows of the Napostá Grande River (Melo, 2021). The estuarine system comprises three major first-order channels, almost parallelly oriented northwest to southeast: Canal Principal, Bahía Falsa, and Bahía Verde. Canal Principal, the main navigation channel, extends along 120 km, naturally reaching around 10 m depth before dredging. Besides the main channels, the estuarine system is composed of more than 128,000 ha of tidal mud flats and salt marshes, dissected by countless tidal channels of smaller order and varying sizes (Perillo and Piccolo 1999). When a flash flood in either of both tributaries occurs, the plume of freshwater only remains within a few tens of kilometers from the mouth of the rivers. In those conditions, the water column shows a significant stratification that in places may reach a salt wedge structure. However, rarely are more than partly mixed conditions. These conditions are exceptional since most of the time, the estuary behaves as vertically homogeneous (Perillo *et al.* 2001). Mean annual (13° C), summer (21.6 °C), and winter (8.5 °C) surface water temperatures in Canal Principal are always slightly higher at the head of the estuary (Piccolo et al. 1987; Piccolo and Perillo 1990; Perillo et al. 2001) The Bahía Blanca estuary has been characterized as a particular estuarine environment, considering it is not associated to the outflow of a big river (Piccolo and Perillo, 1999). Consequently, the salinity distribution pattern does not present a sharp gradient along the estuary, which is one of the main characteristics

usually applied to describe traditional estuaries (Nguyen *et al*. 2012; Cloern *et al.* 2017; Bowman 2018). Nevertheless, a clear variation in salinity values could be observed at the inner estuary, with ranges from 17.9 PSU and up to 41.3 PSU opportunely recorded (Freije and Marcovecchio 2004), and allowing to characterize the Bahía Blanca estuary as an estuarine environment (Perillo *et al*. 2001). There are four ports in this area with recreational, commercial and industry activities: Puerto Cuatreros, Puerto Galván, Puerto Ingeniero White and Puerto Rosales; and the military port of Naval Base "Puerto Belgrano". There are two provincial protected areas: "Bahía Blanca, Bahía Falsa y Bahía Verde" established in 1998 with 2600km^2 and " Islote de la Gaviota Cangrejera" recently ruled by law 15362 in 2022.

Data Collection

Local common name

The local fishing community originates from immigrants from the Ponza region of Italy who settled in the area and, along with their traditions and culture, also brought different words for different things, including the name used locally for this species of dolphin: ferón or ferone.

Sightings

Information about the presence of Lahille's Bottlenose dolphins was compiled using *Ad Libitum* focal group sampling mode (Altmann, 1974; Mann, 1999) from opportunistic platforms such as recreational and patrol boats of the reserve wardens from 2020 to now. Since August 2022 the tracks were recorded by gps. For each sighting, a group of dolphins was defined as all individuals swimming in a coordinated manner within a 100 m radius of each other, interacting or engaged in similar activities (Irvine *et al*., 1981; Wells *et al.*, 1987; Wilson, 1995; Lusseau *et al*., 2005).

Additionally, during surveys, pictures of dorsal fins of all individuals sighted within the group were taken using a digital camera with 200-400mm lens for photo-identification. The results of these photographs are still being analyzed and are not presented in this paper.

The field effort, number of observations, number of dolphin groups and number of sightings per unit of effort (SPUE, number of dolphin groups observed per hour of survey) was estimated for six surveys where the tracks were recorded. To visualize the seasonal variability of sightings, this study considered summer (January, February and March), autumn (April, May and June), winter (July, August and September) and spring (October, November and December).

Acoustic

For the acoustic sampling, a Soundtrap ST300HF was manually submerged on one side of the vessel while it drifted. Acoustic recordings were captured at a sampling frequency of 576 kHz and a resolution of 16 bits. The depth of the hydrophone varied between 1 and 5 meters, depending on the effect of the current. A member of the group recorded the deployment and recovery time of the hydrophone, the initial and final GPS position of the vessel, the cetaceans sighted, and any other relevant information that could

facilitate the subsequent analysis of the recordings. In total, approximately 1 hour and 5 minutes of acoustic recordings were obtained, which were analyzed in search of cetacean signals. The acoustic recordings were subsequently inspected using Triton software, written in MATLAB. For each detection found, the filename, start and end times, GPS position, and possible emitting species were recorded.

Results

Between October 2020 and April 2023, Bottlenose dolphins were recorded 30 times, totaling 190 specimens (Table 1). A total of 20 days were dedicated to looking for Bottlenose dolphins in the study area. The overall SPUE was 0.34 dolphin group/hour. Groups observed range from one to 20 individuals, but most of the groups observed contained between one to eight dolphins (76.6%). Bottlenose dolphins were observed every month of the year except for May, when no surveys/sightings were made during the period under study. The months with the most sightings were October with nine sightings (29%) totalizing 62 individuals, followed by July with six (19%) and 39 dolphins (Fig 2). Spring was the season with the most records with 13 records, followed by winter (n=8), summer (n=7) and autumn (n=4). The presence of calves was recorded for the months of April and July.

Discussion

The observations made at PNRBBBFBV would indicate that T.t.g. are found year-round. The group size observed is consistent with that found for the species in the Rio Negro Estuary (Failla *et al*. 2016), Bahia San Antonio in Argentina (Vermeulen and Cammareri, 2009) and Patos Lagoon Estuary in Brazil (Mattos et al., 2007). The presence of calves would indicate that the Bahía Blanca estuary has the necessary characteristics to nurse their young. Unlike what was observed in Bahía San Antonio, where the presence of calves and neonates were observed during all seasons except winter (Vermeuler and Cammareri, 2009), the calves were recorded in autumn and winter.

Estuaries and river mouths are areas generally frequented by Bottlenose dolphins (Failla *et al.*, 2016, Scott *et al*., 1990, Berrow *et al*., 1996, Zolman, 2002) and are characterized as areas of high productivity and prey abundance (Acevedo, 1991). Although the results of the behavior recorded in dolphins are not presented in this study, the area under study is an important area for artisanal fisheries on “lenguado” (*Paralichthys orbignyanus*), the silverside (*Odontesthes argentinensis*), thestriped weakfish (*Cynoscion guatucupa*), the whitemouth croaker (*Micropogonias furnieri*), and the narrownose smooth-hound (*Mustelus schmitti*), which constitute the varied fishery, and also shellfishes, like the Argentine shrimp and prawn (*Pleoticus muelleri* and *Artemesia longinaris*)(Fiori and Pratolongo, 2021).

The results shown in the paper suggest that Lahille´s Bottlenose dolphins would use the entire estuary, however, we also believe that its distribution is biased by accessibility to boats and waterways which are the most frequented surveyed areas.

Acoustic survey

A preliminary analysis of the acoustic recordings enabled the detection of clicks consistent with records similar to those emitted by *Tursiops truncatus*. Figure 3 shows the spectrogram displaying the spectral composition of the sound corresponding to this species that was detected in the samples recorded during the period of work aboard the vessel.

Conclusions

The Bahía Blanca estuary has historically been underestimated in the in-depth study of many taxa, perhaps due to its large size and complex geomorphology. Recently, thanks to the joint work of different researchers and the staff of the PNRBBBFBV, decisive information has been generated for the knowledge and conservation of some species including Bottlenose dolphins. The "ferones" have been historically described by fishermen for the estuary and seem to have inhabited this area for at least 120 years, which is when the first fishermen from Italy settled here (Cinti, 2017). This undoubtedly obliges us to continue an integral work to evaluate the status and population trend, determine its threats and adopt all the necessary measures for the protection of the most endangered small cetacean species in Argentina. This work, although preliminary, tries to respond to some of the recommendations coming from the IWC on: 1.) an assessment of the conservation status of the Argentina population; 2.) continued monitoring throughout its range to increase knowledge of life history parameters, assessment of trends in abundance and documentation of the prevalence and aetiology of chronic skin disease and 3.) the conservation status of the subspecies be prioritized for assessment in the future. It is important to continue with studies in this area to understand the role of the PNRBBBFBV in the conservation of this species/ subspecies as well as to adopt all necessary conservation measures to protect this species in the Bahía Blanca estuary, since it seems to be one of the few sites in Argentina where they can still be found all year round.

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Tables and figures

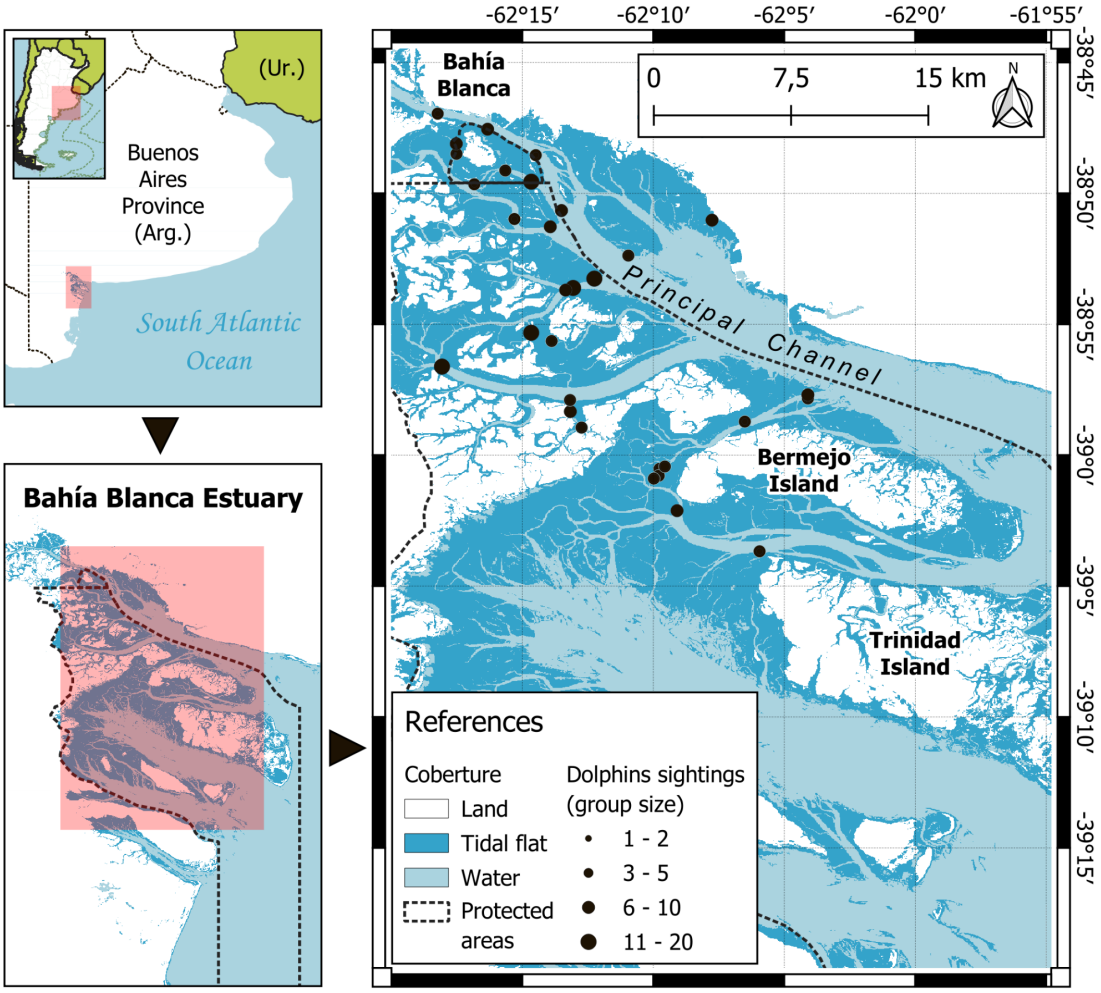

Fig 1. Study area and sighthings distribution.

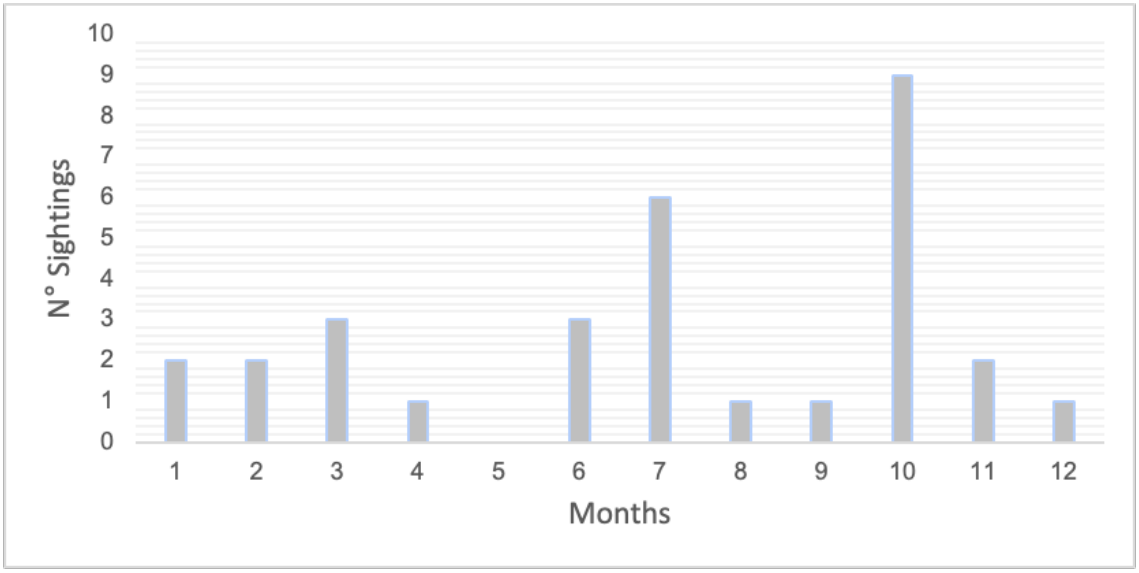

Fig 2. Number of sightings of Lahille´s Bottlenose Dolphins per month.

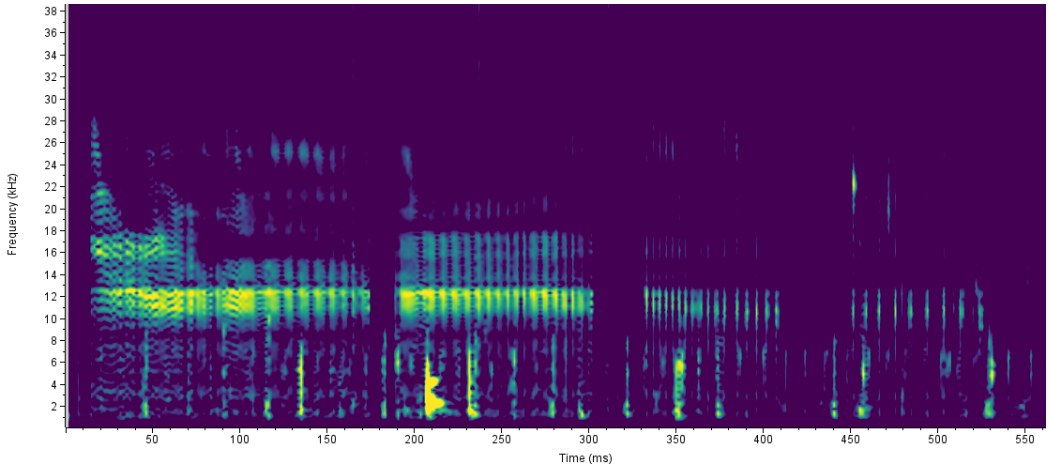

Fig. 3. Spectrogram showing clicks of *Tursiops truncatus.* (4096 FFT points, 90% overlap, Hanning window)

Table 1. Lahile´s bottlenose dolphin sightings in recent years

Month/Year	N° Sightings	N° dolphins	Total Effort (days)	Total Effort (miles)	Total Effort (hours)
October/ 2020	2	22	2	-	-
February/ 2021	1	10	1	-	-
June/ 2021	3	32	2	-	-
July/ 2021	1	4	1	-	-
October/ 2021	3	6	1	-	-
January/ 2022	2	7	1	-	-
July/ 2022	5	29	4	-	-
August/ 2022	1	8	1	46.9	4.16
September/ 2022	1	6	1	36.3	5.26
October/ 2022	4	34	2	53.9	8.07
November/ 2022	2	14	1	18.8	3.03
December/ 2022	1	4	1	53.2	7.43
March/ 2023	3	11	1	69.2	6.38
April/ 2023	1	3	1	-	-