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Report of a Blue Whale Sighting in Ecuadorian Waters

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ABSTRACT

A blue whale was recorded 36 km off Ecuador's central coast on 22 January 2023. Its size was estimated at 18 m by eye. Although whaling records demonstrate that the coast of Ecuador is part of its distribution range, there is only one previous report of the species in recent years. It is unclear if this is because of the low research effort on the species, little knowledge of the distribution and habitat use in coastal waters of Ecuador, that the species is slowly recovering, or a combination of them. Photographs of the body and dorsal fin, as well as a tissue sample taken during the encounter, would help to define population identity, among other aspects of its ecology. More research is needed to understand how important Ecuadorian coastal waters are for the species.

INTRODUCTION

Once abundant in almost all oceans, blue whales (*Balaenoptera musculus*) were driven near extinction in forty years during the XX Century. Despite more than fifty years of protection, some populations have experienced a modest increase while others remain stable, which is why the species is still listed as 'Endangered A1abd' on the IUCN Red List of Threatened Species (Cooke, 2018).

Blue whales range from the tropics to the periphery of drift ice in polar seas, with a preference for open waters. Their high energy requirements demand blue whales to feed throughout their range. Therefore, they tend to migrate and concentrate in upwelling areas characterized by cool water temperatures and high primary productivity (Reilly & Thayer 1990; Branch et al. 2007b). The Committee on Taxonomy of the Marine Mammalogy Society recognizes four subspecies, the northern blue whale *B. m. musculus* inhabiting the North Pacific and North Atlantic oceans; the Antarctic blue whale *B. m. intermedia*; the northern Indian Ocean blue whale *B. m. indica*; and the pygmy Blue whale distributed in the Indic and Southwest Pacific oceans (Committee on Taxonomy, 2022).

In the eastern Pacific, the species is widely distributed along the three Americas, but some controversy persists if more than two subspecies inhabit this area (LeDuc et al., 2017). It seems that both Northeast Pacific and Southeastern Pacific blue whales occupy the same areas in the Central Eastern Pacific as they are found year-round in the Costa Rica Dome, the Galapagos Islands, and northern Peru (Ramírez et al., 1983; Reilly & Thayer 1990; LeDuc et al., 2017; Denkinger et al., 2023). The connectivity between North Pacific blue whales and the Costa Rica Dome has been established by satellite tagging and genetic studies (Bailey et al., 2009; LeDuc et al., 2017) as well as with Southeast Pacific blue whales between south Chile, Galapagos Islands and the north coast of Peru (Torres-Florez et al., 2015; Hucke-Gaete et al., 2018). Initially thought to be Antarctic blue whales in lower latitudes as part of their migratory cycle (Brown 1962; Mackintosh 1965), the southeast Pacific blue whale, also referred to as the Chilean blue whale, is considered a separate population although some debate about whether should also be considered as a subpopulation from the North Pacific or a separate subspecies (Branch et al. 2007a; Branch *et al.* 2007b; Galletti et al. 2012; Buchan et al. 2015; Leduc et al. 2017; Pastene et al. 2020). This population feeds in Chilean Northern Patagonia and migrates to the Galapagos archipelago during the winter-spring, finally approaching Peruvian waters to continue their southward journey back to the feeding grounds (Hucke-Gaete *et al.* 2018). However, it is also possible that some of these whales go further north to the Costa Rica Dome as well (Leduc et al. 2017). The Southeastern Pacific population remains one of the least studied in the world (Hucke-Gaete et al. 2018). In the Eastern Pacific, blue whales occur in greater abundance in the northern regions (Baja California and the Costa Rica Dome) than in the south (Reilly & Thayer 1990).

The sighting

On 22 January 2023, as part of the cetacean monitoring program on the Ecuadorian coast carried out by a research team from the Pacific Whale Foundation, Museo de Ballenas de Salinas, Pontificia Universidad Católica del Ecuador, and WildAid, a blue whale was found 8 km south of La Plata Island in the province of Manabí (1.3599°S, 81.07916°W), 36 km off the central coast of Ecuador (Figure 1). Its size was estimated by the eye to be approximately 18 m in length. The sighting lasted 49 minutes. Photographs of both sides of the whale and the dorsal fin for future identification were taken (Figure 2) as well as videos[1]. A biopsy sample with a 150 lb crossbow was also taken for molecular studies.

Most of the time the whale would stick its head out quite a bit when coming to the surface, sometimes it looked like it was coming vertically. The tail was also observed before starting the dive on some occasions. When the whale rose the tail dozens of the epizoon *Xenobalanus globicipitis* were observed on both the trailing edge and surface (Figure 3).

[1] A video of the blue whale is available at (https://www.youtube.com/watch?v=ORm5-cTskxE).

On occasions, the whale swam on its side, showing the pectoral fins and half of the tail resembling surface feeding behavior, but its mouth was not open nor distended ventral folds were observed (Figure 4). It was presumed that the whale was resting and the turns were related to curiosity as the whale circled the boat most of the time. The whale had missed the tip of its left pectoral fin due to an orca bite as rake marks with parallel and similarly spaced black scars were seen (Figure 5). The dorsal fin had a deep cut in the middle and a small round depression at the top on its right side. More *Xenobalanu*s were also at the tip of the dorsal fin trailing edge and the pectoral fins.

The photos of this sighting were sent for comparison with the IWC catalog. The sample taken from the biopsy will be used to perform a genetic profile for stock identity and sex.

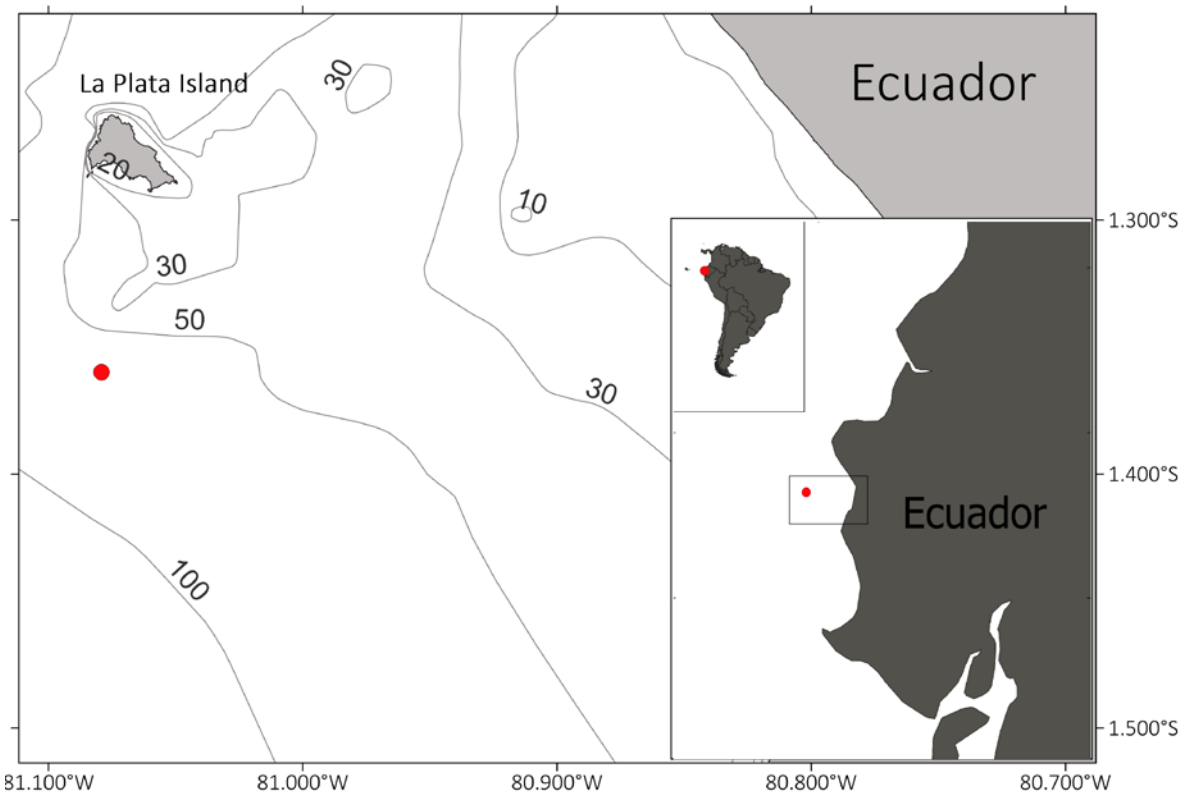

Figure 1: Map with the location of the blue whale sighting

Figure 2. Coloration pattern on both sides of the blue whale recorded in 2023 off Ecuador.

Figure 3. The tail of the blue whale tail with *Xenobalanus globicipitis*.

Figure 4. Blue whale swimming on its right side.

Figure 5. Left pectoral fin with missing tip and rake marks caused by an orca bite.

DISCUSSION

The presence of blue whales in the coastal waters of Ecuador has been known for at least 100 years from whaling activities conducted during the first decades of the XX century (Clarke, 1962). A report of a blue whale off mainland Ecuador in recent years was made on July 2007, 2nm west of the Santa Elena Peninsula (Félix et al. 2007), around 105 km south of the record reported here. The authors also reported that the whale was feeding. A stranded blue whale in 2019 was recorded in the database of the Ministry of Environment (Chocho et al. 2022). However, one of the authors (FF) reviewed the photographs from that record and concluded it did not correspond to a blue whale but another rorqual species. Thus, the sighting here reported is the second in recent times, making it relevant to understand the presence of the species in Ecuadorian coastal waters.

The last two records of blue whales off mainland Ecuador were made 16 years apart and in opposing seasons, austral winter in 2007 (July) and Austral summer in 2023 (January). which suggests they may belong to different populations if northeast Pacific and southeast Pacific are two different populations as previously proposed (Branch et al., 2007a,b). LeDuc et al (2017) also found more genetic similarities between North Pacific and Costa Rica Dome blue whales and between Galapagos and Peru with Southeast Pacific blue

whales. Unfortunately, a temporal sampling bias towards the austral winter in the samples collected in the central-eastern Pacific precludes understanding whether a temporal variability exists between the migratory movements of both populations. Since blue whales are more abundant off the north coast of Peru during the austral summer (Ramírez, 1983) it is also expected to occur the same off Ecuador. Our record was obtained during the austral summer in a place not surveyed normally by whalewatching boats used for whale research off Ecuador. Besides, whalewatching effort focuses on the humpback whale breeding season (July-October). Thus, we do not discard that the low number of records of blue whales off Ecuador is because of a low research effort during the season with larger abundance (January - April). A larger research effort during the austral summer months on the coast of Ecuador is needed to define if our record was casual or if blue whales are using regularly the coast of Ecuador in this season.

Another interesting aspect related to these two records on the coastal waters of Ecuador is their occurrence during the La Niña years. This is when the oceanic conditions are colder and more productive. To get a standardized measure of El Niño, the NOAA Climatic Prediction Center developed the Ocean Niño Index (ONI), a measure of the condition of the El Niño-Southern Oscillation (ENSO) and its warm (El Niño) and cold (La Niña) phases in the central equatorial Pacific. It is the three-month moving average of sea surface temperature anomalies estimated from the ERSST.v5 SST product in the Niño 3.4 region (5°N-5°S, 120°-170°W), based on periods base of 30 years and that is updated every 5 years[2]. The neutral condition threshold is ±0.5. The ONI during July 2007 was -0.6 and during January 2023 was -0.7, confirming both records were made in La Niña years. Blue whales are sensitive to sea surface temperature as changes in the distribution of blue and other whale species were noticed in the north of Peru during El Niño 1982-83 (Ramírez and Urquizo, 1985).

Finally, we do not discard that our record is related to the slow recovery of the species in the Eastern Central Pacific and the record is the result of reoccupying former distribution areas. However, there seems no certain information on an increase in the blue whale abundance in the Eastern Pacific in the last decade. In the case of the Northeast Pacific population, there is no evidence of a population size increase since the early 1990s, and no increase is expected because the population was around 97% of its carrying capacity in 2013 (Carretta et al., 2017). In the case of the Southeast Pacific population, the abundance was estimated recently between 570 and 760 individuals with a strong variation in abundance over time associated with seasonal habitat use in the sampling area (Galletti Vemazzani, et al., 2017). More sustainable monitoring in mainland Ecuador is necessary to determine if blue whale numbers are increasing or if our record just responds to particular oceanographic conditions.

[2] https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php

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