

# Strandings of pygmy sperm whales (*Kogia breviceps*) in the Mexican Central Pacific

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The pygmy sperm whale (*Kogia breviceps*) is a small cetacean of the family Kogiidae that reaches a maximum size of 4.3 m and a maximum weight of 515 kg (McAlpine, 2018). This species has been described as having a similar appearance to a porpoise and/or shark, due to the shape of its blunt, square, or conical head (Wall, 1851; Ross, 1979; Wynne and Schwartz, 1999). Observations of pygmy sperm whales are challenging to obtain in the wild because they are inconspicuous when on the water surface; they undertake long dives and prefer the deep-water niche. Additionally, they are usually found as single individuals or in small aggregations (2-3 individuals), displaying evasive behaviors in response to approaching boats (Jefferson *et al.*, 1993; Willis and Baird, 1998; Baird, 2005).

Despite the limitations of at-sea observations, there are reports of this species in the Eastern Pacific Ocean, from the United States to Chile (Scheffer and Slipp, 1948; Hubbs, 1951; Brownell, 1969), including some observations near Tortuga Island in Baja California Sur (Vidal *et al.*, 1993; Mangels and Gerrodette, 1994; Guerrero *et al.*, 2006) and Jalisco, in Mexico (Salinas, 2005). Therefore, the assumed general distribution habitat of pygmy sperm whales is temperate and tropical waters worldwide (Handley, 1966; Leatherwood *et al.*, 1983; McAlpine, 2018),

particularly mesopelagic regions of the continental slope between 600 and 1200 m depth (West *et al.*, 2009; Moura *et al.*, 2016).

Stranding events of individuals from the family Kogiidae have occurred in several parts of the world (Baird *et al.*, 1996; Ortega-Argueta *et al.*, 2005; Moura *et al.*, 2016), but these events often occur in remote locations, where specimens are rarely recorded or studied (Jefferson *et al.*, 1993). Moreover, to date, most of the information has been collected on dwarf sperm whales (*Kogia sima*) in central and South America (Muñoz-Hincapié *et al.*, 1998; Jefferson *et al.*, 2015; Moura *et al.*, 2016; Mutis-Martinezguerra and Polanco, 2019; Ramos *et al.*, 2019). A few pygmy sperm whale stranding events have been reported on Hawaiian Islands, the southwestern Gulf of Mexico, and eastern French Guiana (Baird *et al.*, 1996; Ortega-Argueta *et al.*, 2005; Bordin *et al.*, 2019). In Mexico, stranding events have occurred only in the Gulf of California (Vidal *et al.*, 1993) and Banderas Bay (Arroyo, 2017). No strandings have been formally documented for other regions such as the Mexican Pacific coast (Bloodworth and Odell, 2008; Heckel *et al.*, 2018). In this regard, because of the lack of information about this species, it is currently cataloged as Data Deficient by the International Union for Conservation of Nature (Kiszka and Braulik, 2020). Therefore, any pygmy sperm whale stranding event represents a valuable opportunity to increase the ecological knowledge on this species (Geraci and Lounsbury, 2005).

We present evidence on the first reported stranding events of pygmy sperm whales in the Mexican Central Pacific (MCP), a region that encompasses the states of Jalisco, Colima, and Michoacán. This is the first scientific document regarding individuals of the family Kogiidae stranded along the Mexican Pacific coast.

From 2010 to 2020, stranded cetaceans in the MCP were indirectly monitored and recorded through announcements, brochures, talks with regional fishermen and tour operators, the general public, researchers, and conservationists. All this joint effort provided valuable information regarding these events. For each stranding, the following data were recorded: date, time, site, animal decomposition state (*i.e.* live, fresh, early decomposition, advanced decomposition, or mummified), species, size class (calf/juvenile or adult), sex, morphometric data, and evidence of human interactions (*i.e.* net marks, wounds from ship strikes, knife cuts, or gunshot wounds), following the guidelines for

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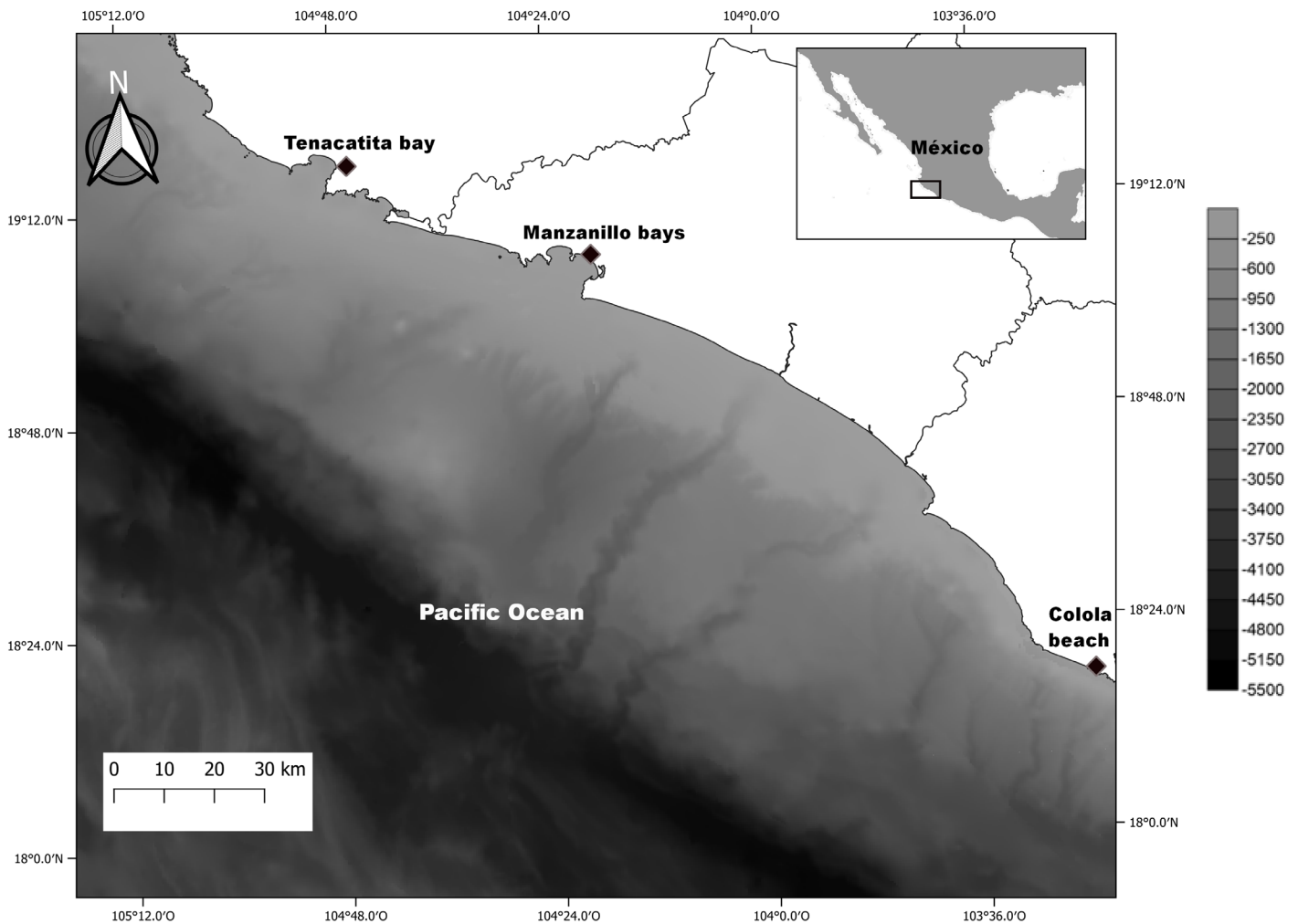
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**Figure 1:** Geographic position of the pigmy sperm whale (*Kogia breviceps*) stranding events during the period 2017-2020 on beaches of the Mexican Central Pacific.

cetacean stranding monitoring provided in [www.accobams.org/guidelines](http://www.accobams.org/guidelines).

Three pygmy sperm whale strandings occurred in the region over a four-year period (2017-2020). The first stranding occurred on 25 July 2017 at Palmitos Beach, inside Tenacatita Bay (Jalisco, Mexico; Fig. 1). This mummified organism measured approximately 330 cm total length. It was identified as a pygmy sperm whale based on the absence of maxillary teeth, the dental configuration, and the number of mandibular teeth, which varies from 10 to 16 pairs (Handley, 1966; Ross, 1979; Baird *et al.*, 1996; Willis and Baird, 1998). Teeth were collected by VLJ and EMM (Fig. 2).

The second stranding occurred on 19 April 2020 at Azul Beach, inside the Manzanillo bays (Colima, Mexico; Fig. 1). This specimen was a 340 cm adult male; it was identified as a pygmy sperm whale based on its morphology, coloration pattern of the forepart of the body, and the shape of its dorsal fin (Fig. 3). The individual live-stranded and had superficial injuries on its rostrum and flippers, probably associated with rubbing against the sand; however, tourists that were present at the site noticed that it was not weak, and they returned it to the sea. The event was monitored during the following days in case it stranded again, but this did not occur.

The third stranding occurred on 31 August 2020 at Colola Beach (Michoacán, Mexico; Fig. 1). The individual was identified as a pygmy sperm whale by comparing photographs and video

**Table 1:** Information of the pigmy sperm whales (*Kogia breviceps*) stranded on beaches of the Mexican Central Pacific during the period 2017-2020.

No	Date	Geographic position	Sex	Total length (cm)	Stranded state
1	25Jul2017	19°17'2" N, 104°47'18" E	Unknown	Unknown	Advanced Decomposition
2	19Apr2020	19°06'9" N, 104°20'5" E	Male	340	Live-Stranded
3	31Aug2020	18°17'43" N, 103°24'40" E	Female	~300	Live-Stranded

showing the coloration pattern of the forepart of the body and the shape of its dorsal fin with illustrative images by Yamada (1954). The organism was a ~300 cm adult female, which was returned to the sea by turtle camp staff coordinated by CDT (Fig. 4). The area was surveyed in case it stranded again; two days later the individual was observed dead on the beach; however, it was not possible to collect tissue samples or bone material.

We consider that strandings of pygmy sperm whales on beaches in the MCP region are uncommon because there were no stranding events during the first seven years of our marine mammals stranding monitoring program. These recent strandings have involved single individuals, which coincides with most of the events recorded for the family Kogiidae (Baird *et al.*, 1996). Members of this species typically establish small social groups,

and therefore social cohesion might not be a major factor in stranding (O'Brien, 2008). Considering the spatial scale, all strandings occurred on beaches in front of a regional submarine trench (Fig. 1), where other cetacean species with oceanic habits have been recorded and linked to feeding activities (Ortega-Ortiz *et al.*, 2014a; 2021). On the other hand, two of the recorded strandings occurred during the summer, which coincides with the research by O'Brien (2008) in Southeast United States, suggesting a potential seasonal trend in the strandings of *Kogia* sp. in the MCP region; however, we acknowledge we have a small sample size to date and curiously the last few events occurred in 2020.

Cetacean stranding events (massive or single individuals) may be associated with natural factors (*i.e.* lifespan, sickness, and/or predation) or anthropogenic activities (*i.e.* fishery interactions,

ship collisions, and/or marine debris ingestion) (Geraci and Lounsbury, 2005; Stamper *et al.*, 2006; Jacobsen *et al.*, 2010; Allen *et al.*, 2012; Arbelo *et al.*, 2013; McAlpine, 2018) and in many cases there is no conclusive cause of death for the stranded organism(s) because of an advanced state of decomposition that makes it difficult to collect evidence. This was the case of our first pygmy sperm whale stranding event.

However, the last two events recorded in this study involved pygmy sperm whales live-stranded in 2020, when the World Health Organization declared the COVID-19 pandemic, giving as a result closures and social isolation in some countries, leading to an unprecedented decline in maritime traffic around the world (Millefiori *et al.*, 2020). Due to this scenario, fewer ships and boats sailed the seas, reducing the number of effectors of pollution and underwater noise (Liu *et al.*, 2020; Thomson and Barclay, 2020). Therefore, we hypothesize that these two individuals came too close to the coast, where marine noise from boats arriving to two important commercial ports usually prevails: Manzanillo, Colima and Lázaro Cárdenas, Michoacán. Similar events of the presence of cetacean species in uncommon regions have been recorded during 2020, such as the sighting of a beluga whale (*Delphinapterus leucas*) off the San Diego coast (California,



**Figure 2:** The pygmy sperm whale (*Kogia breviceps*) in an advanced state of decomposition (A); and teeth (B) collected during its stranding on 25 July 2017 at Palmitos beach, inside Tenacatita bay (Jalisco, Mexico).



**Figure 3:** The pygmy sperm whale (*Kogia breviceps*) live-stranded on 19 April 2017 at Azul beach, inside Manzanillo bays (Colima, Mexico).



**Figure 4:** The pygmy sperm whale (*Kogia breviceps*) live-stranded on 31 August 2020 at Colola beach (Michoacán, Mexico).

USA; <https://www.smithsonianmag.com/smart-news/wayward-beluga-spotted-san-diego-180975322/>), killer whales (*Orcinus orca*) off the Spain-Portugal coast (<https://www.bbc.com/news/uk-scotland-54292317>), and baleen whales in European waters (<https://www.theolivepress.es/spain-news/2020/08/25/sighting-of-two-whales-off-los-alamos-beach-in-spains-torremolinos/>).

We were not able to conclude on the causes of stranding of these pygmy sperm whales; we can only provide some hypotheses and confirm the presence of this species in the MCP. Nevertheless, this information, in conjunction with recent sightings and strandings of beaked whales (Ortega-Ortiz *et al.*, 2021) and other cetaceans with oceanic habits (Ortega-Ortiz *et al.*, 2014a, b), highlights the biodiversity of cetaceans in the MCP. We therefore encourage subsequent research to continue increasing our ecological knowledge of the species that are found in this region.

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