

## Short Note

# First Sightings of Antarctic Minke Whale (*Balaenoptera bonaerensis*) Mother–Calf Pairs in French Polynesia

Charlotte Esposito,<sup>1\*</sup> Orphé Bichet,<sup>1,2\*</sup> and Matthieu Petit<sup>3</sup>

<sup>1</sup>Association Oceania, BP 1636 Papetoai 98729, Moorea, French Polynesia

E-mail: charlotte.oceania@gmail.com

<sup>2</sup>ECHO, BP 71462 Taravao 98719, Tahiti, French Polynesia

<sup>3</sup>Moorea Ocean Adventures, BP 1671 Papetoai 98729, Moorea, French Polynesia

\*Co-first authors

Two species of minke whales migrate in the Southern Ocean from high latitude feeding grounds to lower latitude breeding areas: (1) the Antarctic minke whale (*Balaenoptera bonaerensis*) and (2) the dwarf minke whale (an unnamed subspecies of the common minke whale, *Balaenoptera acutorostrata*) (Perrin et al., 2018). Antarctic minke whales were recently listed as “Near Threatened” in the International Union for Conservation of Nature’s *Red List*, and imprecise population estimates show a 31% decline between 1993 and 2004 (Cooke et al., 2018). To date, dwarf minke whale population estimates and trends are not available, the species having only recently been recognised as a separate species from the Antarctic minke whale (Cooke, 2018). Moreover, information on the full geographic distribution of Southern Ocean minke whales is still scarce. Indeed, whereas Antarctic summer feeding grounds are relatively well documented, at least for *B. bonaerensis*, much uncertainty remains about Southern Hemisphere wintering grounds (Cooke, 2018; Cooke et al., 2018). Groups of Antarctic minke whales have been found to remain in the Antarctic (Risch et al., 2014), while others migrate to lower latitudes (Best, 1982) such as northern Brazil, central South Pacific Ocean, and eastern and southern Indian Ocean (Lee et al., 2017; Perrin et al., 2018). Very little is known about their migratory routes, and the location of breeding and calving grounds is believed to be broadly dispersed offshore (Kasamatsu et al., 1995).

Minke whales are known to frequent the French Polynesia (FP) marine mammal sanctuary (Articles A 121-3 to 121-7 Environmental Polynesian Code) during austral winter, but the rare encounters are seldom documented. Kasamatsu et al. (1995) reported relatively high densities of southern minke whales in the vicinity of FP in November between 1976 and 1987 (but with poor spatial precision), suggesting that FP could be a wintering ground for

Antarctic minke whales. No *Balaenoptera* species have been recorded in cetacean surveys conducted in the area between 1996 and 1999 (Gannier, 2000) and in 2011 (Mannocci et al., 2014), however. To our knowledge, no study has since investigated more deeply to accurately determine which minke whale species are repeatedly visiting FP waters and whether the FP marine mammal sanctuary is part of their migration route or a breeding/calving ground.

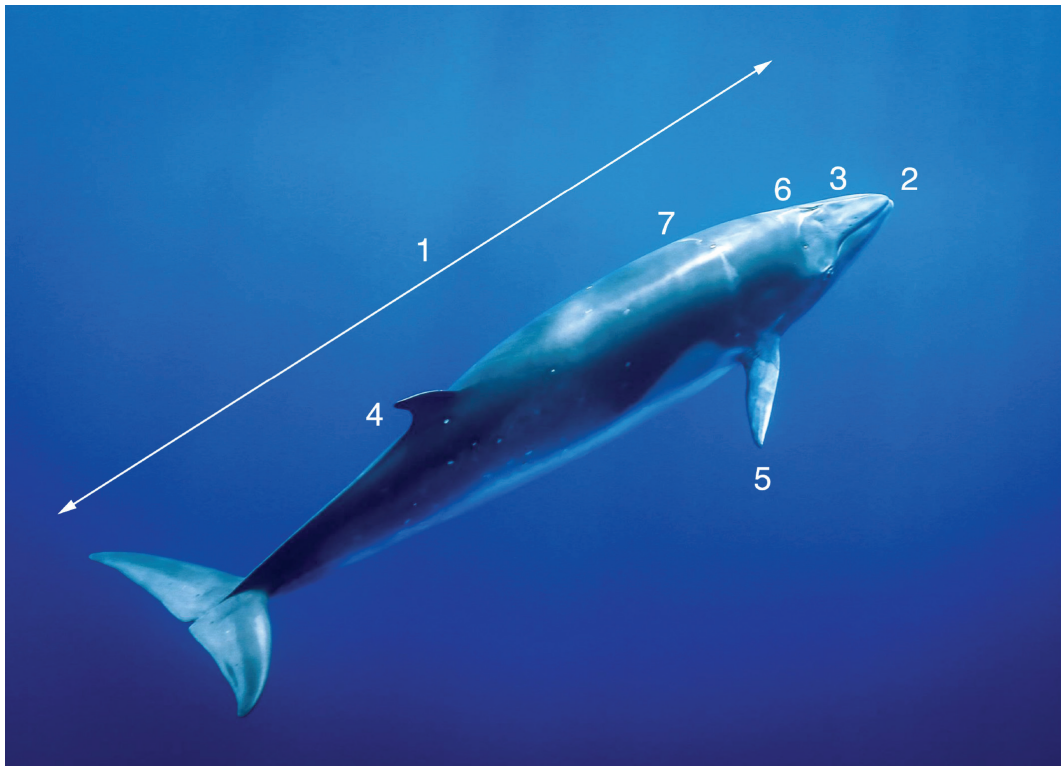
Herein, we describe five sightings of Antarctic minke whales that were reported in 2014 (one observation), 2019 (three observations), and 2020 (one observation) by whale-watching tour operators off Moorea Island, FP. All observations were first made with the naked eye from a boat. For each sighting event, videos were taken from the boat and underwater. Additionally, pictures were taken in 2014 with a Canon 5D Mark III and an EF 16-35mm f/2.8L II USM lens. In 2019 and 2020, above-surface videos were taken with a Sony AX700 camera, and underwater shots were taken using a GoPro Hero6. The same observer was present for all 2019 and 2020 sightings, and one to three experienced observers were present for each sighting. On site, the observers identified the species visually from the boat and underwater. The distance between the immersed observers and the whales was under 20 m. Species identification was based on distinctive characteristics, including body size; a very narrow and pointed rostrum; a single ridge on the head; a falcate dorsal fin (sickle-shaped) positioned relatively far forward on the posterior third of the body; and short, slim, and pointed pectoral fins with no white blaze on the upper surface (Jefferson et al., 2015; Figure 1). The three main traits used to confirm the species were the flipper coloration, the white blowhole streaks, and the nape streak (Arnold et al., 1987; Bierlich et al., 2020). Data such as date, time,

geographic location, group size, and behaviour were also noted. Body size was first estimated visually on site in relation to the length of the boat and crosschecking the different observers' evaluations. At a later stage, photos and videos were analysed to measure mother–calf length ratio on images showing different positioning of the animal in relation to one another and to the observer. Additionally, photos and videos were used to confirm species identification and age class (i.e., newborn, calf, juvenile, or adult) based on body length estimation, physical features (e.g., soft dorsal fin, scars, and/or markings), social association, and behaviour. Images were sent to cetacean and Antarctic minke whale experts for validation. The videos showing individuals and mother–calf pairs are available in the “Supplementary Material” section of the *Aquatic Mammals* website ([https://www.aquatic-mammalsjournal.org/index.php?option=com\\_content&view=article&id=10&Itemid=147](https://www.aquatic-mammalsjournal.org/index.php?option=com_content&view=article&id=10&Itemid=147)).

The first documented sighting of an Antarctic minke whale occurred on 2 July 2014, with a

group consisting of one juvenile (approximately 5 to 6 m long) and two adults (approximately 8 to 9 m long) observed 8 km (4 nmi) northwest of Moorea Island (Figure 2). Five years later, on 30 May 2019, a group of three adults (approximately 9 m long) was filmed in the same area, with a group of around 10 rough-toothed dolphins (*Steno bredanensis*) socialising in the vicinity.

Calves were reported for the first time in FP in 2019. The first mother–calf pair was sighted at 1530 h on 13 July 2019, 1 km (0.5 nmi) from the reef line (17° 30' 00.85" S, 149° 56' 14.06" W; Figure 2). The pair travelled at constant speed in a northwesterly direction. Observation ended at 1640 h, 4 km (2 nmi) northwest of Moorea (17° 29' 10.12" S, 149° 57' 46.26" W). Dive times ranged between 7 and 12 min for the adult female and were around 4 min for the calf. From underwater, observers were able to note marking patterns on the right flank of both individuals and to better estimate body size. The female was about 9 m long,



**Figure 1.** Antarctic minke whale (*Balaenoptera bonaerensis*) sighted in waters northwest of Moorea Island, French Polynesia, on 2 July 2014. All the criteria for identifying the species are clearly visible: (1) body size (ca. 9 m); (2) a very narrow and pointed rostrum; (3) a single ridge on the head; (4) a falcate dorsal fin positioned on the posterior third of the body; (5) short, slim, and pointed pectoral fins with no white blaze on the upper surface; (6) white blowhole streaks; and (7) a nape streak. (Photo credit: Gael Lagarrigue)

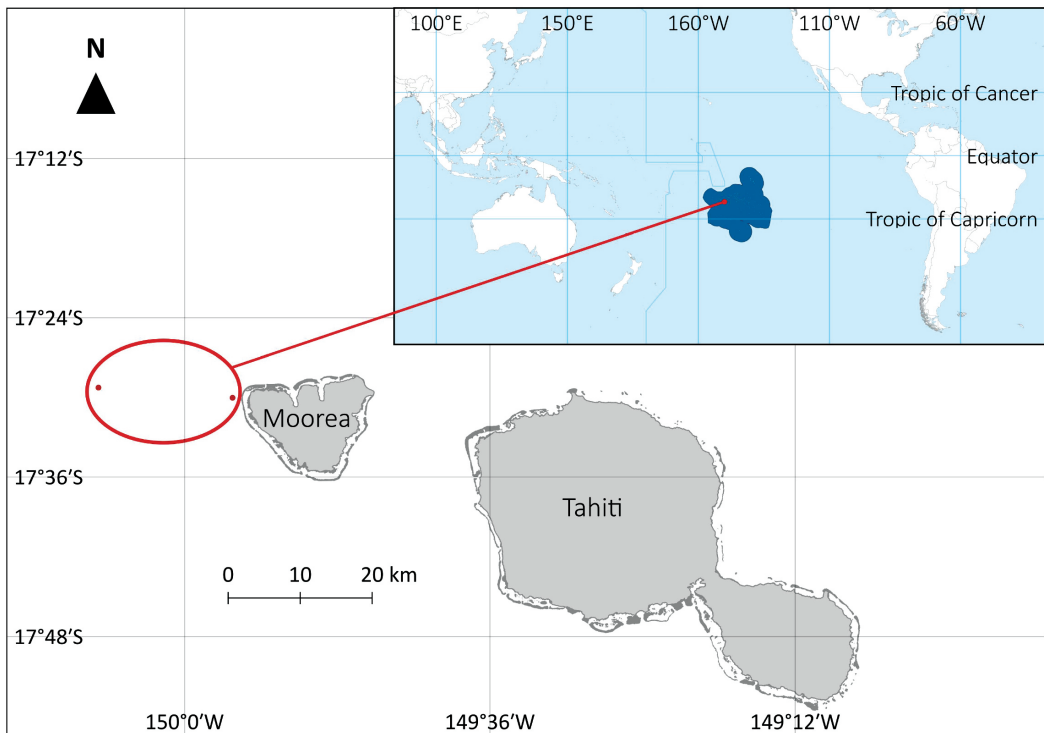
and the calf was approximately 3 m long. The calf was swimming in echelon position above or beside the mother, keeping a close distance (< 3 m) except when surfacing for breathing. Its dorsal fin was stiff, and no umbilical cord stripes could be seen. This sighting is the first confirmed visual detection of an Antarctic minke whale mother–calf pair in FP waters.

A second mother–calf pair was observed at 1000 h on 22 October 2019, 2 km (1 nmi) from the reef line, travelling south. The female body length was approximated at 9 m, and the calf was estimated to be 3 m long. The calf was swimming close (< 3 m) to the mother, in echelon position above or beside it. Observers noted from under-water that the calf was of similar size to the one observed on 13 July 2019, but the external marking patterns on the right flank of both the adult and calf were different from the July individuals. We, therefore, could conclude that the pair was different from the previous sighting.

A third mother–calf sighting occurred on 27 May 2020 at 1200 h, about 20 km (10 nmi) northwest of Moorea (17° 29' 15.00" S, 150° 06' 46.26" W;

Figure 2). The two individuals travelled at constant speed in a northwesterly direction. Observation ended at 1253 h. Body size estimations from under-water observations were of approximately 9 m for the female and 4.5 to 5 m for the calf. Mother and calf were swimming in parallel with > 5 m between the two.

These recent records in FP offer new insights on the distribution of southern minke whale wintering grounds in the central South Pacific. While Antarctic minke whales have been previously reported in FP waters (M. M. Poole, pers. comm., September 2014), the sightings described herein provide photographic evidence of the presence of *B. bonaerensis* in the FP marine mammal sanctuary. The observations of distinct adults from May to October confirm that this species either migrates through or winters in Polynesian waters. Uncertainty remains, however, on the proportion of the population coming to FP. Indeed, while all records are located in the same area, they only represent a small spatial and temporal window of a greater area. Moorea Island is one of the main tourist



**Figure 2.** Area off Moorea Island, French Polynesia (FP), where Antarctic minke whales were reported in winter 2014 and 2019. The red ellipse delimits the observation area, and the two red dots are the exact GPS locations of the mother–calf duos sighted on 13 July 2019 (eastern point) and 27 May 2020 (western point). The inset shows the FP marine mammal sanctuary (Mapping sources: Natural Earth; Andréfouët et al., 2005; Flanders Marine Institute, 2019).

destinations for humpback whale (*Megaptera novaeangliae*) observations, and the number of whale-watching tour operators has considerably increased over the last several years. Hence, there has been an increase in the number of boats on the water and in the distances travelled offshore in search of whales. As a consequence, the probability of encountering a species staying further from the reef line, like the Antarctic minke whale, will likely keep increasing in the future.

Despite the end of whaling in their Antarctic feeding grounds (Friedlaender et al., 2018), Antarctic minke whales still face a number of anthropogenic pressures (Risch et al., 2019). The cumulative effects and long-term consequences of such pressures on the survival and resilience of cetacean populations are extremely difficult to assess (Bejder et al., 2006; Christiansen et al., 2014; New et al., 2015; Côté et al., 2016). In FP, ship strikes, pollution, drifting fishing gears, and a growing whale-watching tourism industry challenge the integrity of the marine mammal sanctuary (Schaffar & Garrigue, 2007; Esposito et al., 2020). Additionally, abundance estimates and population trends are lacking for most, if not all, cetacean species in FP. Migration routes and the impact of anthropogenic pressures on baleen whales along their way to and from Antarctica are also largely undocumented. Addressing this general lack of data is critical for ensuring efficient and sustainable management of the marine mammal sanctuary.

Considering the geographic extent of whale distribution ranges, we believe that collaborative programs, including citizen science data and complementary research groups working in different habitats, would benefit conservation programs. The sightings of distinct mother–calf pairs described herein and acquired through community involvement give the first image-supported indication that FP waters could be a nursery ground for Antarctic minke whales. Best (1982) calculated that Antarctic minke whale calves measure 2.73 m on average at birth and grow at a rate of 1 cm per day. According to these estimations, the two calves observed in FP in 2019 would be between 1 and 2 mo of age. Thus, birth would have occurred in April–May for the first calf observed in July and in June–July for the second calf. This timing is in accordance with the species' described conception season from July to December and a 10-mo gestation period (Best, 1982; Perrin et al., 2018). Based on our records, Antarctic minke whales are already present in FP as early as May. Therefore, although we lack knowledge on the distance a newborn can swim during its first months, witnessing young calves suggests that FP could be a calving ground for the Antarctic minke whale.

Furthermore, according to Best's (1982) growth estimates, the noticeably larger calf sighted in May 2020 would be around 7 mo old. Thus, the birth would have occurred in late October of the previous year with conception in December 2018. Although late in the austral winter, these dates still fall within the species' described breeding season (Best, 1982; Perrin et al., 2018). Whereas no assumptions can be made about the birth location for this calf, the presence of older calves in FP waters conveys further indication of the nursery role of the marine mammal sanctuary for Antarctic minke whales. Longer-term studies involving individual identification are needed to determine site fidelity, residence, and return rates to the FP breeding/calving ground.

Up to now, the humpback whale is the only baleen whale species known to come to mate, give birth, and nurse in the FP marine mammal sanctuary (Poole, 2002; Olavarría et al., 2007). Herein, we reveal that Polynesian waters are also a likely wintering and nursing ground, and possibly a breeding/calving ground, for Antarctic minke whales. While this novel information supports the conservation value of the sanctuary, it also highlights the general lack of data on cetaceans in FP. To address the knowledge gap on Antarctic minke whales reflected by the IUCN listing, future research should focus on documenting wintering grounds and on refining the species distribution and abundance estimates. With the help of citizen science, long-term monitoring of whale populations and the pressures they are locally exposed to will allow the development of effective management policies in the FP marine mammal sanctuary and in other critical habitats.

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