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Letter to Editor

Apparent Surface Feeding by Pygmy Sperm Whales (*Kogia breviceps*)

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Dwarf and pygmy sperm whales (*Kogia sima* and *Kogia breviceps*; Kogiidae) are considered to be deep divers, feeding at depths of up to 1,100 m, mostly on mesopelagic squid and also on fish (McAlpine et al., 1997; Dos Santos & Haimovici, 2001; West et al., 2009; McAlpine, 2014; see also the bibliography in Beatson, 2007). However, many of their prey species regularly occur above 100 m (Beatson, 2007), and some, such as the Argentine shortfin squid (*Ilex argentinus*), are harvested by surface squid fisheries (Dos Santos & Haimovici, 2001; Chiu et al., 2017). There appear to be no published observations of Kogiidae feeding near the surface. Such an observation is reported herein.

On 22 August 2019, observations were conducted opportunistically from the *Ogasawara-maru* ferry NNW of Muko-jima (Ogasawara Islands, Japan) at approximately 27° 48' N, 141° 47' E, using Celestron Trailseeker ED 8 × 42 binoculars and a Sony RX 10 IV photo camera. The weather was sunny with calm seas (swell < 1 m and almost no wind waves). Pygmy sperm whales are known to occur in the area: a breaching individual was recently photographed from the ferry (Tori, 2018), and I saw two single individuals in roughly the same area on 18 August 2019.

For 3 to 4 h prior to the observation, large numbers of wedge-tailed shearwaters (*Ardenna pacifica*) were observed flying and floating but not in flocks. About 40 min before sunset, a straight line (roughly in N-S direction) was noted on the sea surface, marked with floating Sargasso weed (*Sargassum* sp.) and foam, and by a difference in surface color E and W of the line, which is indicative of contact between two currents or water masses (Gade et al., 2015). The ferry sailed roughly parallel to the line for ~20 min at which point the line ended. At the end of the line, there was a large flock of wedge-tailed shearwaters (estimated to number over 100), flying low over the water or floating on the surface. The floating birds frequently dipped their heads in the water and moved their beaks as if catching and eating something. Numerous shearwaters were flying in from all directions, joining the flock, but none were seen diving, indicating that the food was just a few cm below the surface. Pygmy sperm whales (up to two seen simultaneously) were observed within 20 to 50 m of the shearwater flock and ~100 m from the ferry (Figure 1). They were identified by their size (estimated to be roughly similar in size to bottlenose dolphins [*Tursiops* spp.] and Risso's dolphin [*Grampus griseus*]), color (steel-grey), head shape (somewhat rectangular in profile with a protruding forehead and the mouth positioned too low to be seen), and relative size and position of the dorsal fin (very small and located caudally to the midpoint of the body, unlike in smaller dwarf sperm whales) (McAlpine, 2014; Jefferson et al., 2015).

It is worth noting that I have acquired extensive field experience with virtually all cetacean species of the North Pacific, including both *Kogia* species, as well as with pygmy killer whales (*Feresa attenuata*) and false killer whales (*Pseudorca crassidens*), which look most similar to *Kogia* whales at sea, while working on whale-watching boats and on book research (Dinets, 2015, 2021). While typically *Kogia* whales are relatively inactive at the surface, either floating motionlessly or quietly submerging when approached by a vessel (McAlpine, 2014; pers. obs., August 2013 and July and August 2019), these individuals were actively moving in circles, often submerging (without strongly arching the body or showing flukes) and reappearing after just a few seconds. They were observed for ~1 min, during which time they remained within an area ~50 m across. Assuming there were just two individuals, each of them made three to five dives during the time of

Figure 1. Pygmy sperm whale (*Kogia breviceps*) observed at the surface near a large number of wedge-tailed shearwaters (*Ardenna pacifica*) NNW of Muko-jima, Japan

observation. No size difference between individuals was noted.

Although feeding was not directly observed, there are strong indications that the whales were feeding near the surface. Their movements were different from typical *Kogia* behavior (see above) and consistent with feeding (as exhibited by other cetaceans when surface-feeding; Dinets & Rotshild, 1996; Jefferson et al., 2015). Even more telling was their location beside the only feeding aggregation of shearwaters seen in the area, in a place with mixing surface currents (Evans, 1982). They were not inside the shearwater flock, however, suggesting that they were hunting different prey. Wedge-tailed shearwaters feed primarily on small fish (particularly larval goatfishes; Mullidae) and squid (Whittow, 1997). One possibility is that the whales were hunting a larger squid or fish that were associated with the prey of the shearwaters.

As deep divers, kogiid whales are believed to be minimally affected by fisheries and are classified as "Least Concern" by the International Union for Conservation of Nature despite the rarity of observations (Kiszka & Braulik, 2020). If found to feed at shallow depths as well, they might be vulnerable to food depletion by fish and particularly squid fisheries in which case their distribution should be taken into account when planning marine protected areas. They might also be more susceptible to plastic pollution and vessel collisions than currently thought. However, surface-feeding behavior does not appear to be common (judging by the lack of previously published observations), and it might have been provoked in this case by exceptionally high prey concentration in a small area.

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