

## Short Note

# Indian Ocean Sighting of Shepherd's Beaked Whale (*Tasmacetus shepherdii*) Helps Confirm Circumpolar Distribution in Southern Hemisphere

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The Shepherd's beaked whale (*Tasmacetus shepherdii*) is among the least known cetacean species in the world (Mead, 2002). It was first described in 1937 based on a specimen found stranded in New Zealand in 1933 (Oliver, 1937). The specimen was unique among beaked whales in that it had full sets of interlocking teeth along both jaws and was subsequently placed in its own genus due to this and other unique skull characteristics (Oliver, 1937). Other specimens collected from New Zealand in 1933, 1951, and 1962 were identified as *T. shepherdii* based largely on skull and mandible morphology (Oliver, 1937; Sorensen, 1940; Smith, 1965; Gaskin, 1968). *T. shepherdii* specimens were also discovered in Chile in 1970 (Brownell et al., 1976) and in Argentina in 1973, 1977, and 1978 (Mead & Payne, 1975; Goodall, 1978), thus expanding the known range of this species from the western South Pacific to the eastern South Pacific and western South Atlantic, respectively.

The external physical characteristics of *T. shepherdii* were comparable between a few of the early specimens. Bodies of adults of both sexes are between 6 to 7 m in length (Oliver, 1937; Sorensen, 1940; Smith, 1965), relatively streamlined but heavy in appearance (Mead & Payne, 1975). They have small appendages, pointed rostrums of moderate length, and bulbous melons (Mead & Payne, 1975). Few details on the pigmentation patterns of *T. shepherdii* were available from any early stranding records. Descriptions and photographs from Oliver (1937) and Sorensen (1940) suggest specimens were counter-shaded with possibly some lateral striping, but Mead & Payne (1975) also mentioned lightly coloured patches above the flippers and on the head.

Throughout the 1970s, two possible sightings of *T. shepherdii* were reported off New Zealand

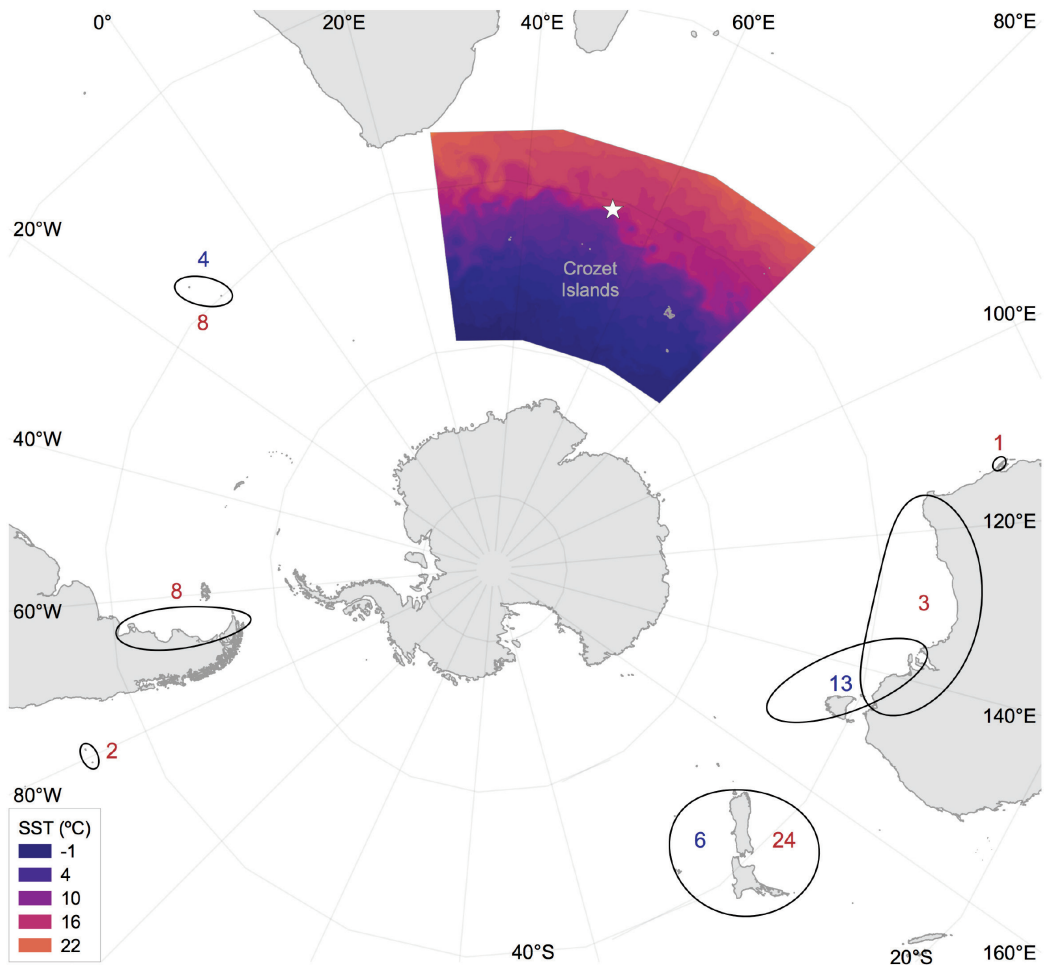
(Gaskin, 1972; Watkins, 1976) but lacked details necessary for positive identification (Pitman et al., 2006). Other reports of *T. shepherdii* from the Seychelles and Australia in the 1980s were dismissed by Pitman et al. (2006) based on the lack of features attributable to this species in the accompanying photographs and video. However, aerial photographs from two sightings in Tristan da Cunha in the South Atlantic in 1985 were confirmed to be *T. shepherdii* based on pigmentation patterns compared to freshly stranded specimens documented in the same region in the 1980s and in New Zealand in the 1990s (Pitman et al., 2006). These records confirmed that earlier reports of lateral striping were abrasions from stranding (see Oliver, 1937; Sorensen, 1940; Mead & Payne, 1975) and that this species is generally counter-shaded, with light patches of pigment above the flippers and on the melon. More specifically, Pitman et al. (2006) also described a dark beak, light patches on the throat, and posterior lower flanks offset by a distinctive grayish brown dorsal cape which terminates at the base of the dorsal fin. Posterior of the dorsal cape, the body colour is olive brown dorsally before darkening once again in the caudal peduncle. Pitman et al. verified this pigment pattern is unusual for a beaked whale in that it is monomorphic among both sexes and all age classes.

Several more recently confirmed live sightings of *T. shepherdii* off southeastern Australia, New Zealand (Gill et al., 2015; Donnelly et al., 2018), and Tristan da Cunha (Thompson et al., 2019) are primarily from waters less than 2,000 m in depth. They all occurred between 33° and 46° S (Donnelly et al., 2018), but the species has been observed as far as 48° S (Pitman et al., 2006), with species identification from a possible sighting at 53° S (Laughlin, 1996) doubted by Pitman

et al. (2006). All stranding records fall within a similar latitudinal range—33° to 50° S (Mead, 1989, 2002; Grandi et al., 2005; Pitman et al., 2006; Hevia et al., 2012; Best et al., 2014) with the exception of a moderately decomposed specimen recovered in 2008 off the west coast of Australia at 26° S (Holyoake et al., 2013). This was the first record indicating the presence of *T. shepherdii* well into the Indian Ocean, but Brownell et al. (1976) suggested that the species may have a circumpolar distribution in southern temperate oceans, and environmental suitability modelling supports this

range (see Thompson et al., 2019). Nevertheless, MacLeod et al. (2006) reported that records were sparse enough that the circumpolar distribution of this species should be treated as unconfirmed until verified with further records.

The following details, to the best of our knowledge, represent the first confirmed sighting record of *T. shepherdii* in the Indian Ocean that helps to substantiate its circumpolar distribution. At 1205 h on 3 December 2021, while en route from Crozet Islands to Reunion Island on the 55-m patrol ship *Osiris II*, I (JRT) spotted a small brown

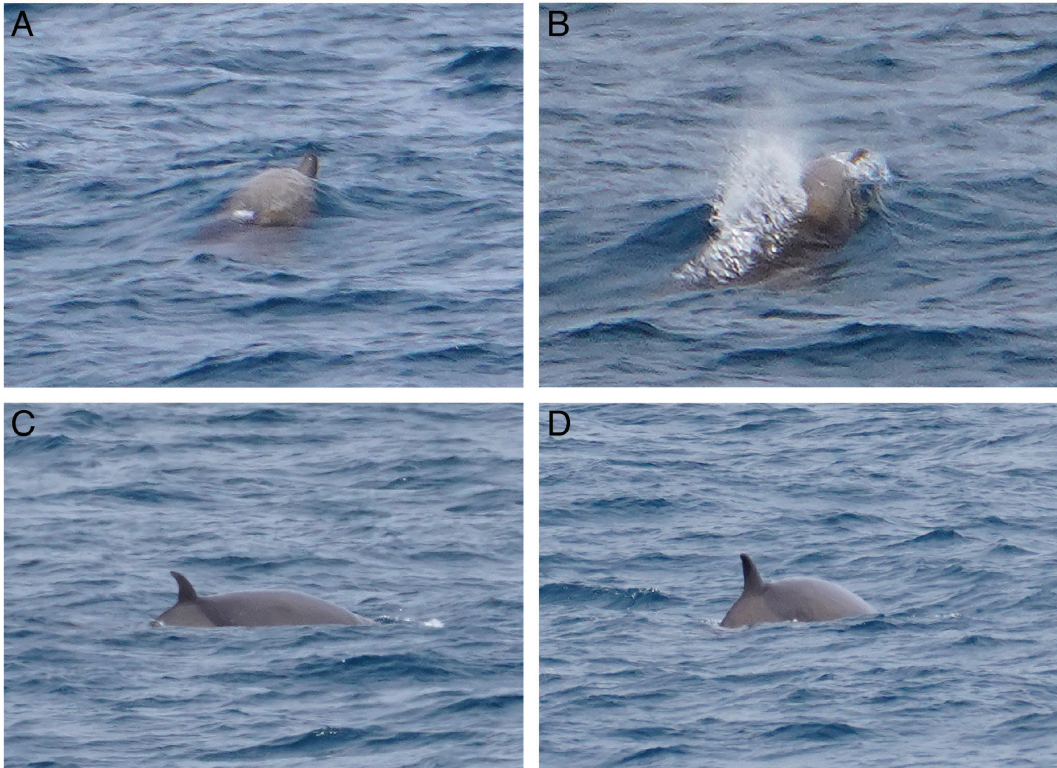


**Figure 1.** The white star indicates the location of the Shepherd's beaked whale (*Tasmacetus shepherdii*) sighting on 3 December 2021 (41° 12.7' S, 53° 20.9' E) in relation to the Crozet Islands along with sea surface temperatures surrounding the Crozet Front (Ocean temperature data for 3 December 2021 at 1200 h Crozet Time accessed from the National Centers for Environmental Information [www.ncei.noaa.gov]). Ellipses surround locations of previously published records of *T. shepherdii*, with red numbers representing total number of stranded individuals and blue numbers representing total number of live sighting records in each area (Pitman et al., 2006; Hevia et al., 2012; Holyoake et al., 2013; Best et al., 2014; Donnelly et al., 2018; Thompson et al., 2019).

whale with a falcate dorsal fin at 41° 12.7' S, 53° 20.9' E (Figure 1) using 15 × 80 Fujinon binoculars mounted on the bridge. The whale was at relatively close range for the level of magnification in the Fujinon binoculars, so I switched to 8.5 × 42 monopod-mounted Swarovski binoculars and resighted the whale approximately 400 m off the port bow. The sea state was 2 on the Beaufort scale, visibility to the horizon was good in all quadrants, and the sea surface temperature was 16°C. The ship was traveling north at 9 kts, so as the whale traveled consistently west at about 6 kts, we bisected the course it had been on and never got much closer to it than about 300 m. It was roughly the same length as a Cuvier's beaked whale (*Ziphius cavirostris*) (~6.5 m), although slightly less robust. Once in different lighting conditions abaft the ship's beam, very small blows became visible, and I could see that there were two individuals separated from each other by about 20 m. As their right sides became exposed at an angle to the ship, I took some photos using a Sony A7R4 camera with the 100-400 mm lens zoomed in to

the maximum focal length. The images are pixelated due to the distance from which they were taken, but one shows an individual with a pale melon and darker beak (Figure 2A) as well as a small but visible blow and the possibility of a light brown patch underwater above the right flipper (Figure 2B). The dorsal fin of this individual is falcate (Figure 2C), but the dorsal fin of the other appears more triangular despite being photographed from a slightly different angle (Figure 2D). The dark dorsal cape offset by a paler posterior flank can be seen on both individuals (Figure 2C & D), which helps rule out that this unusual colouration may have been due to partial diatom coverage.

Based on previously published reports (Pitman et al., 2006; Gill et al., 2015; Donnelly et al., 2018; Thompson et al., 2019), this sighting represents the 24th record of live *T. shepherdii* for which species identity has been confirmed with photographs, video, or a descriptive report of diagnostic features, including pigmentation. Unfortunately, the quality of the sighting was rather poor, but we feel



**Figure 2.** Photo montage of the Shepherd's beaked whales observed on 3 December 2021, showing the light melon and long, darker beak of one (A), as well as its small but visible blow (B). This whale has a falcate dorsal fin (C), and the dorsal fin on the other whale is more triangular (D). On both animals, the posterior border of the diagnostic dark dorsal cape drops from the base of the dorsal fin, contrasting with the paler flanks behind it. (Photo credits: Jared Towers)

confident in the species identification due to the physical details apparent in the obtained images. Specifically, the dorsal cape on both individuals stands out as diagnostic from any other beaked whale species (Donnelly et al., 2018), and identification is further supported by the dark beak, pale melon, visible blows, and estimated size of the animals.

The general location of this sighting was notable in that the sea surface temperature had risen from 9° to 16°C over the previous 21 nmi (Figure 1) indicating that the ship was crossing through the western section of the Crozet Front. This front occurs from 52° E north of the Crozet Plateau to 65° E north of the Kerguelen Plateau and is defined as one of the strongest in the world due to a broad temperature gradient resulting from its combination of the Agulhas Front, the Subantarctic Front, and the southern boundary of the Subtropical Front (Park et al., 1993; Belkin & Gordon, 1996; Kostianoy et al., 2004). The abundance and diversity of cetaceans and their prey are often positively correlated with oceanic conditions associated with frontal zones (Olson et al., 1994; Ballance et al., 2006). Indeed, the eastern section of this frontal zone has recently been suggested as a cetacean hotspot by Todd & Williamson (2022), and the same may be true for the western portion of the Crozet Front considering that I also observed a distant group of  $\geq 3$  unidentified dolphins (likely dusky dolphins [*Lagenorhynchus obscurus*]) and a close group of  $\geq 7$  large unidentified beaked whales (likely Arnoux's beaked whales [*Berardius arnuxii*]) westbound at 41° 16.0' S, 53° 20.7' E, 20 min prior to the *T. shepherdii* sighting.

Several records of *T. shepherdii*, including this sighting (Figure 1), occurred between the northern and southern boundaries of the Subtropical Front (< 30° to > 45° S as defined by salinity and temperature variables; Butler et al., 1992; Orsi et al., 1995; Belkin & Gordon, 1996; Piola et al., 2000), suggesting that the circumpolar range of this species may be roughly centered around this frontal zone. However, major gaps in *T. shepherdii* sightings distribution exist from New Zealand east to Tristan da Cunha as well as from Tristan da Cunha east to southeastern Australia. Stranding records on both sides of South America help fill one of these gaps, but no strandings are reported anywhere east of Tristan da Cunha to Australia, making the bulk of the Indian Ocean the largest region that lacks distribution data for this species. This sighting occurred roughly in the middle of that gap (Figure 1). It was about 5,200 km from the nearest sightings and strandings to the west (Tristan da Cunha) reported by Pitman et al.

(2006), Best et al. (2014), and Thompson et al. (2019), over 5,600 km from the nearest stranding record to the east (western Australia) reported by Holyoake et al. (2013), and about 6,900 km from the nearest sightings to the east (southeastern Australia) reported by Donnelly et al. (2018). This sighting thus extends the known range of *T. shepherdii* well into the south-central Indian Ocean and helps confirm its circumpolar range throughout the temperate waters of the Southern Hemisphere.

In the ninth decade since first being described, *T. shepherdii* still remains elusive and is classified as data deficient by the IUCN's *Red List of Threatened Species* (Braulik, 2018). Nevertheless, occasional stranding records (Pitman et al., 2006) and associated stomach content analyses (Best et al., 2014) in addition to a recent increase in confirmed sightings (Donnelly et al., 2018) and some associated analysis of vocalizations (Leunissen et al., 2018) do provide a broad overview of this species' biology, ecology, and behaviours. Further documentation will undoubtedly provide more insight into *T. shepherdii*, including whether it is rare or just documented relatively infrequently because of the remote oceanic habitats in which it lives.

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### Editor's Note

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