

# New sighting of Arnoux's beaked whale (*Berardius arnuxii*) at the inshore locality of Paradise Bay, West Antarctic Peninsula

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## Introduction

Beaked whales constitute the second-largest cetacean family (Ziphiidae), and yet remain among the least understood large marine mammals (Jefferson et al., 2008; Barlow et al., 2021; 2023). These enigmatic species pose a challenge for visual identification owing to their reclusive nature and extended deep dives interspersed with brief surface appearances (Tyack et al., 2006).

Within the Southern Ocean waters, at least five beaked whale species have been recorded, namely the Cuvier's beaked whale (*Ziphius cavirostris*), Gray's beaked whale (*Mesoplodon grayi*) and strap-toothed whales (*Mesoplodon layardii*), southern bottlenose whale (*Hyperoodon planifrons*), and Arnoux's beaked whale (*Berardius arnuxii*) (MacLeod et al., 2023).

The Arnoux's beaked whale is one the largest within the family (Kasuya, 2009; Thewissen, 2018), and also one of the most threatened according to CITES (CITES, 2026). Moreover, beaked

whales are most vulnerable by the lack of information about baseline data (population size, distribution, life history, etc.), and by noise from anthropogenic sources such as geological and seismic surveying, military sonar, and naval traffic (Aguilar de Soto, 2006; Li & Rosso, 2021).

This species is frequently observed in waters below 34° S, has been visually recorded in Australia (Paterson & Parker, 1994), Gerlache Strait in the Antarctic Peninsula (Friedlaender et al., 2009), in the western Ross Sea, Antarctica (Ponganis et al., 1995), and there have been records of strandings in New Zealand, Australia, South Africa, Argentina, the Malvinas/Falkland Islands, South Georgia, and Chile (McCann, 1975; Lichter, 1986). Furthermore, one specimen of Arnoux's beaked whale was reported floating dead close to the coast of São Sebastião (23°49' S 45°24' W), São Paulo State, Brazil (Siciliano & de Oliveira Santos, 2003).

The occurrence of Arnoux's beaked whale in subantarctic and Antarctic regions has recently been reviewed in Feij et al. (2024). The Arnoux's beaked whale shows a regular, apparently year-round occurrence in the Southern Ocean (Van Waerebeek et al., 2010), and typically congregates in groups of less than 15 individuals and on average of eight individuals (Feij et al., 2024), with the largest reported assembly reaching 80 whales (Balcomb, 1989; Rogers & Brown, 1999; Friedlaender et al., 2009; Feij et al., 2024), shedding light on their social behavior and suggesting they are highly social organisms (Rogers & Brown, 1999).

The Arnoux's beaked whale feeds on squid and fish (Haast, 1869) through deep-diving bouts of 35-70 minutes (Hobson & Martin, 1996). The presence of adults and neonatal specimens from December to March in New Zealand suggest that Arnoux's beaked whales visit those waters in spring-early summer to breed (McCann, 1975). Given the species deep-diving capacity, our understanding of its ecology is limited to incidental encounters, examination of stranded specimens and, only recently, advances in acoustic detection have provided further knowledge (e.g., Barlow et al., 2021). Therefore, there is still much to be discovered

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about the Arnoux's beaked whale distribution patterns, migratory behavior, and habitat preferences.

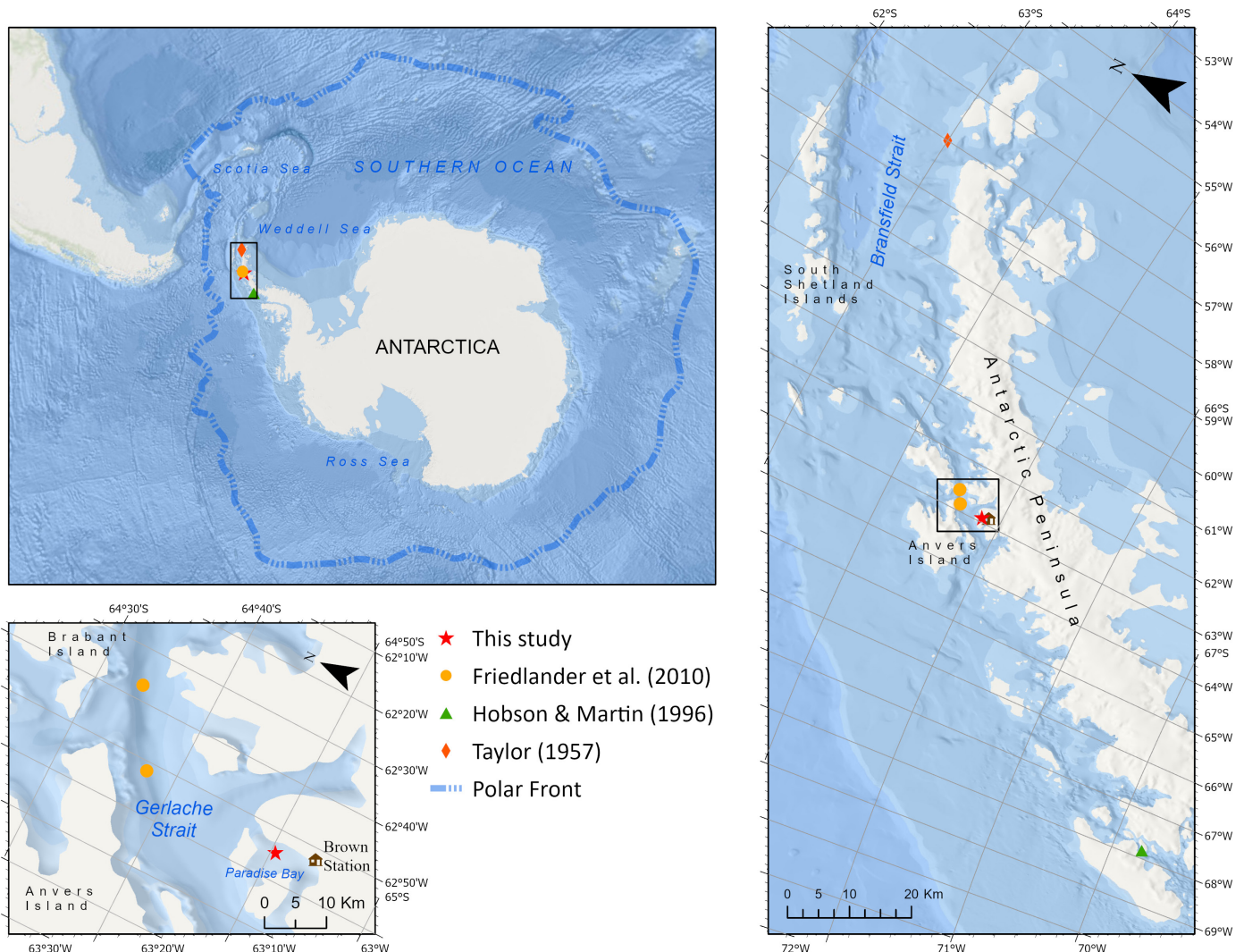
This work reports an additional sighting and provides video footage evidence at close range of a group of Arnoux's beaked whales (*Berardius arnuxii*) at the inshore locality of Paradise Bay, West Antarctic Peninsula (WAP).

## Results and Discussion

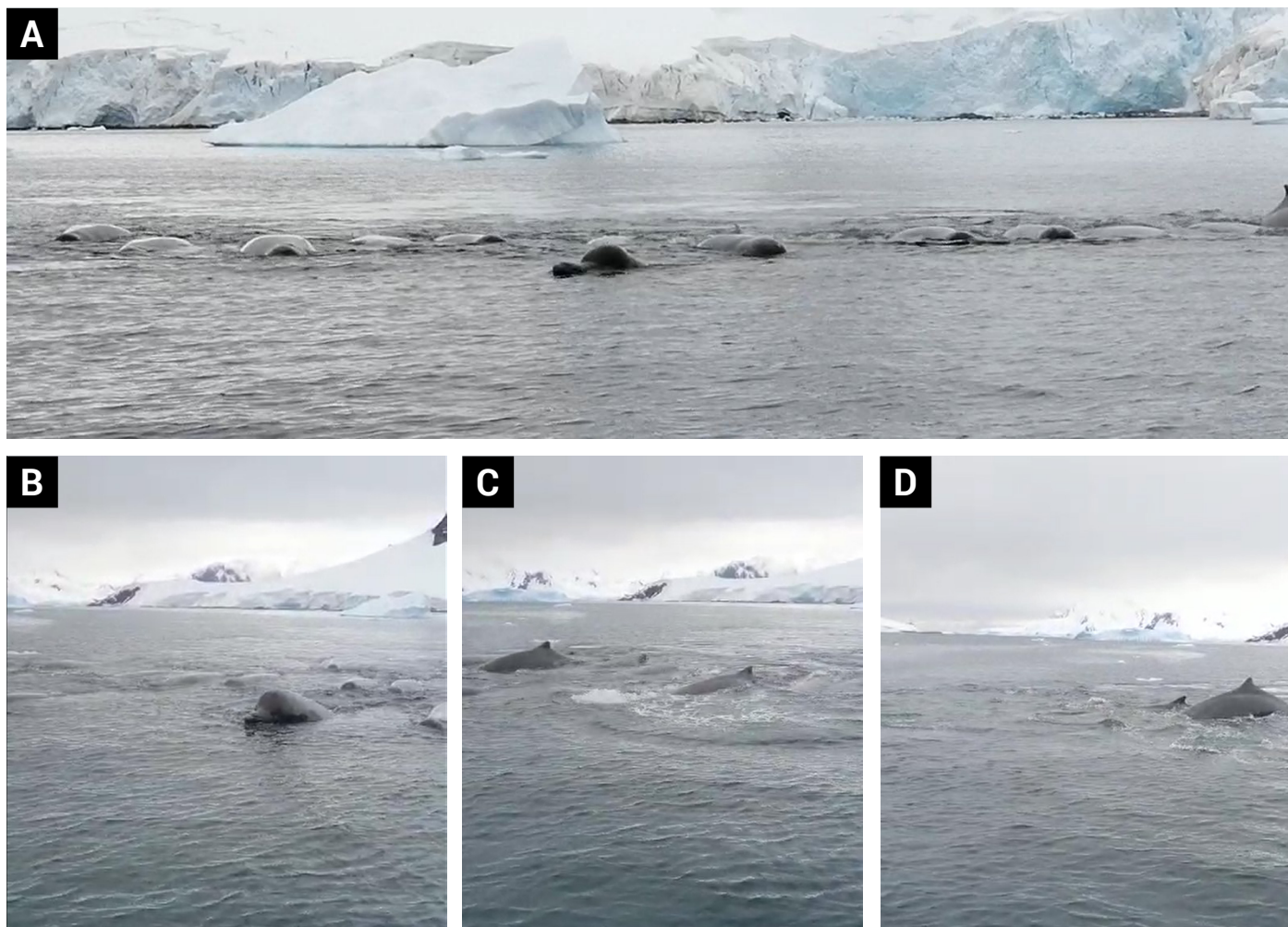
At 19:30h local time on 22 February 2023, a group of 15 Arnoux's beaked whales were observed from approximately 15 meters from a rubber boat at Paradise Bay (64°50'27.024" S, 62°51' 46.188" W, Fig. 1) close to the Argentinean Brown research station. The group was swimming slowly and maintained a cohesive swimming formation. After a sequence of brief blows, the whales emerged at the surface, allowing the species identification due to their coloration, size, and distinct features, such as their melon and rostrum shape (Fig. 2). Through video footage, the species was confirmed based on the animals' prominent melon, elongated

rostrum in which the lower mandible notably exceeded the upper, and a small dorsal fin, as described by Balcomb (1989). All individuals were of similar dimensions, measuring approximately 8 meters in length (estimated by visual assessment by the observers) and it was not possible to distinguish between males and females or age classes. Their coloration varied between brown and grey with lighter undersides. Additionally, the whales displayed extensive scarring on their dorsal surfaces, marked with light-colored, singular rake-like imprints.

The duration of the encounter with the pod of Arnoux's beaked whales was approximately one min, while whales were conducting breathing activity. A total of 15 blows were registered in the pod and the duration between two consecutive blows of the same specimen ranged from 3.10 to 16.26 sec ( $X \pm SD = 8.28 \pm 4.36$ ,  $n = 6$ ). The sighting location was around 700 m from the shoreline, corresponding to 20 m depth. The bay remained free from sea ice with some big icebergs spread separately in the area. The sea conditions were gentle, and the surface water temperature was 1.3°C.



**Figure 1.** Location of visual and acoustic detection of Arnoux's beaked whale *Berardius arnuxii* reported near in Antarctic and location of Arnoux's beaked whale at Paradise Bay (this study). The map was projected in the coordinate system WGS 1984 Antarctic Polar Stereographic, and illustrated with ArcGIS Pro 3.2.1 (2023 ESRI Inc.).



**Figure 2.** Arnoux's beaked whales *Berardius arnuxii*. A) sighted at Paradise Bay; B) one specimen showing the elongated rostrum where the lower mandible exceeds the upper; C) detail of the whale's small dorsal fins; D) curved shape previous to dive.

The compiled records of Arnoux's beaked whales in the Southern Ocean are summarized in Feij et al. (2024) and several of the observations were along sheltered waters of the WAP. This area contains bathymetric features such as submarine canyons, critical marine habitats (Santora et al., 2018) that are known to be hotspots for several cetaceans (Hooker et al., 1999), particularly deep-diving beaked whales (Whitehead, 2013; Moors-Murphy, 2014; Tepsich et al., 2014). The largest number of Arnoux's beaked whales in a group of 80 individual whales was recorded by IWC (2023) in the Ross Sea ( $71^{\circ}28'59.88''$  S,  $169^{\circ}58'0.12''$  E) and reported in Feij et al. (2024). The second largest group, of 60 individuals, was sighted in the southern-central region of the Gerlache Strait (Friedlaender et al., 2009) which is located approximately 25 km from the location of the present sighting (see Fig. 1), which constitutes one of the many bays associated with the Gerlache Strait. Further south, a group of 30 Arnoux's beaked whales was documented during early spring and summer residing amidst sea ice near Rothera Station, demonstrating the species' adaptability to sea ice conditions (Hobson & Martin, 1996). This adaptability was further registered during winter at Hope Bay, where a restricted pool in the sea ice was used for breathing by a single Arnoux's beaked whale together with several minke whales *Balaenoptera acutorostrata* and killer whales *Orcinus orca* (Taylor, 1957).

The available information on the Arnoux's beaked whale sightings in the Southern Ocean (Feij et al., 2024) suggest this species' habitat preference is deep oceanic waters as previously described (Brownell, 1974), although, in light of numerous reports in nearshore waters (e.g., Friedlaender et al., 2009) the Arnoux's beaked whale could be characterized as a coastal species (Rogers & Brown, 1999). In fact, the present sighting of Arnoux's beaked whales at 20 m depth in the inshore locality of Paradise Bay supports this hypothesis. However, this conclusion may be biased towards near shore sightings because that is where most human research stations and activities occur.

In conclusion, this new sighting of Arnoux's beaked whale adds to our understanding of this enigmatic species, but continued research is crucial to further unravel its habitat preference and benefits its conservation in the Southern Ocean. This sighting of a pod of 15 individuals in 20 m depth within the sheltered Paradise Bay significantly contributes to the incipient biological knowledge of the Arnoux's beaked whale. Documenting such a large group in an inshore environment provides support to the hypothesis that the species may utilize coastal habitats more frequently than previously assumed for deep-diving ziphiids. Furthermore, the visual and video evidence of cohesive group behavior and specific surface intervals offers rare baseline data necessary to address the current lack of information regarding their population

distribution and habitat preferences in the Southern Ocean. Continued research using both visual and acoustic methods remains crucial to unravelling the distribution and habitat use of this enigmatic species and ensuring its effective conservation.

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