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Cover Photograph: *Mesoplodon bidens* (Sowerby's Beaked Whale) stranded in the Dominican Republic in 2022 © Robinson S. Jiménez-Cabreja, with permission.

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New Record of a Sowerby's Beaked Whale (*Mesoplodon bidens*) for the Caribbean

Antonio A. Mignucci-Giannoni[1,2,*], Susana Caballero[3], Diego A. Quiroga[3], Robinson S. Jiménez-Cabreja[4], Enrique Pugibet-Bobea[5], and Wojtek Bachara[6]

Abstract - Beaked whales in the genus *Mesoplodon* are among the world's rarest cetaceans. A sub-adult female *Mesoplodon bidens* (Sowerby's Beaked Whale) was found stranded on Isla Cabra, Monte Cristi, on the northwestern coast of the Dominican Republic in 2022, thousands of kilometers southwest of their natural home range. External and skull morphology and DNA analysis confirmed the species' identification as *M. bidens*. Only 11 extralimital records exist for this species, so every opportunity to document the life history of these elusive and cryptic whales is essential. We encourage local biologists to be on alert for stranding cases, tend to them expeditiously, and collect all tissues available for study to enhance our knowledge of this little-known cetacean and contribute to its conservation efforts.

Beaked whales of the family Ziphiidae, particularly those in the genus *Mesoplodon*, are among the world's rarest and least-known cetaceans (Ellis and Mead 2017). To date, 6 beaked whale species are known from the North Atlantic Ocean (Table 1), but of these, only 3 inhabit tropical and subtropical oceanic waters: *Ziphius cavirostris* G. Cuvier (Cuvier's Beaked Whale) and *Mesoplodon densirostris* (Blainville) (Blainville's Beaked Whale), which are found around the globe, and

Table 1. Beaked whale species from the North Atlantic and their usual oceanic habitat (based on Jefferson et al. 2008).

Species	Oceanic habitat
Hyperdoodon ampullatus (Northern Bottlenose Whale)	Polar, subpolar, temperate
Ziphius cavirostris (Cuvier's Beaked Whale)	Temperate, subtropical, tropical
Mesoplodon densirostris (Blainville's Beaked Whale)	Temperate, subtropical, tropical
Mesoplodon europaeus (Gervais' Beaked Whale)	Temperate, subtropical, tropical
Mesoplodon mirus (True's Beaked Whale)	Temperate, subtropical
Mesoplodon bidens (Sowerby's Beaked Whale)	Subpolar, temperate

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Mesoplodon europaeus (Gervais) (Gervais' Beaked Whale), which is endemic to the North and South Atlantic. *Hyperoodon ampullatus* (Forster) (Northern Bottlenose Whale) is also endemic to the North Atlantic, but inhabits polar, subpolar and temperate waters. The remaining 2 species, *Mesoplodon mirus* True (True's Beaked Whale) and *Mesoplodon bidens* (Sowerby) (Sowerby's Beaked Whale), are usually cold-water beaked whales in subtropical, temperate, and subpolar areas of the North Atlantic Ocean (Table 1).

Displacement or out-of-habitat sightings and strandings, sometimes termed extralimital records, although rare, do occur in cetaceans, with occasional records of some of these whale species in locations far away from their natural distribution (Bachara et al. 2014, Bittau et al. 2018, Bonde and O'Shea 1989, Brunelli and Fasella 1929, Díaz-Gamboa et al. 2022, Simões-Lopes and Ximenez 1993). Sowerby's Beaked Whales are one of these whales known to commonly strand in their natural home range (Jefferson et al. 2008). This species is endemic to the North Atlantic, inhabiting subpolar and temperate oceanic waters of the North and Norwegian seas in the Eastern North Atlantic, and to a lesser extent off shelf-edge water of the US eastern seaboard north of North Carolina to Canada's Nova Scotia and Newfoundland, in the Western North Atlantic (COSEWIC 2019, Jefferson et al. 2008, Mead 1989, NOAA Fisheries 2020; Fig. 1). Sowerby's Beaked Whales are Europe's most common stranded beaked whale (Bachara et al. 2014). While there are a few records of this beaked whale stranding in subtropical waters, only 2 records exist from tropical waters in the Caribbean (Bachara et al.

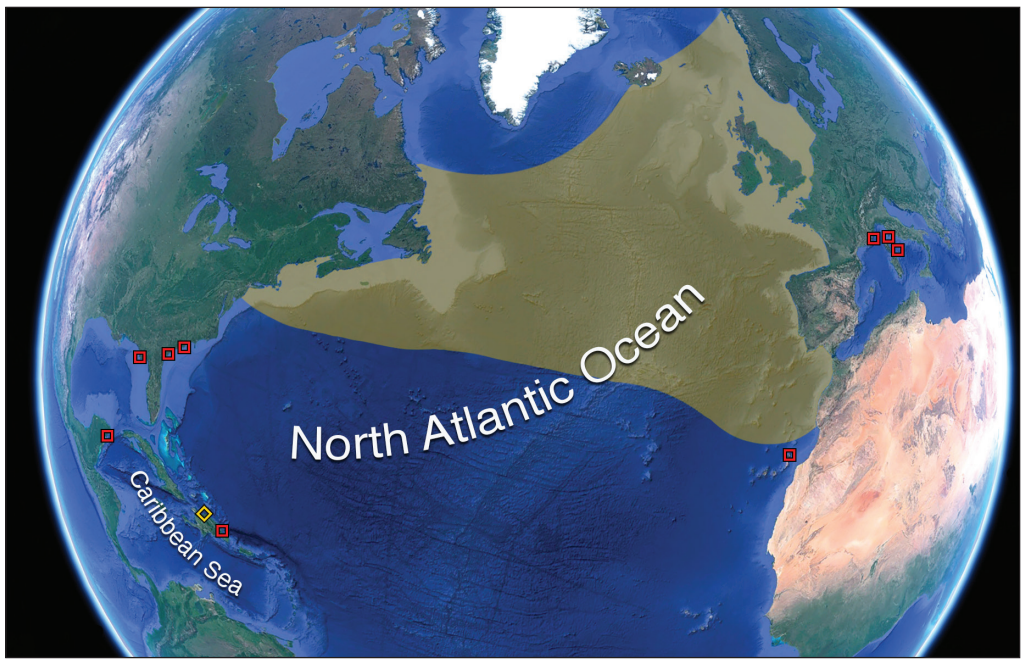

Figure 1. *Mesoplodon bidens* in the North Atlantic Ocean: shadowed area represents the normal temperate and subpolar distribution; red squares are extralimital records; yellow diamond is the stranding record in the Dominican Republic.

2014, Díaz-Gamboa et al. 2022). Here, we detail a new stranding record of a Sowerby's Beaked Whale in the Caribbean, some thousands of kilometers southwest of their natural home range.

On 16 January 2022, a 500-cm beaked whale stranded alive on Isla Cabra, Monte Cristi, on the northwestern coast of the Dominican Republic (19°53'14.35"N, 71°40'02.64"W; Fig. 2). The whale was twice pushed back to sea by bystanders (Figs. 3A, B) but stranded dead the next day at Playita, on the west side corridor connecting Monte Cristi and El Morro (19°52'57.73"N, 71°39'19.01"W; Figs. 2B, 3C). We externally examined the whale on-site on 18 January 2022 and found it to be a sub-adult female based on total length and urogenital external anatomy. Its morphological characteristics (long snout, small dorsal fin, pectoral flippers, crescent-shaped blowhole, and gular grooves) were consistent with that of a *Mesoplodon* whale (Fig. 3D). No teeth were found erupting in the gums of the mouth. No necropsy was conducted due to its state of decomposition at that time. We collected both a skin-tissue sample,which we placed in commercial vodka in the field and later transferred to 70% ethanol, and the head for future analysis and species identification.

We flensed and cleaned the head of the whale by maceration in salt water, the end product being an evident Sowerby's Beaked Whale specimen with 2 small unerupted teeth halfway in each ramus of the mandible. We used the skin tissue for DNA extraction and amplification (Qiagen DNeasy Blood & Tissue Kit, Düsseldorf, Germany) of a fragment of the mitochondrial control region (CR) using primers and amplification conditions from Baker et al. (1998). Successfully amplified PCR products were cleaned using magnetic beads and sequenced at Universidad de los Andes on an ABI 3500 Genetic Analyzer. We edited and manually aligned sequences using the software Geneious Prime v.2020 (https://www.geneious.com) and conducted a cluster analysis with 1000 replicas on "DNA Surveillance", a curated cetacean database from the University of Auckland (Baker et al. 2003), to

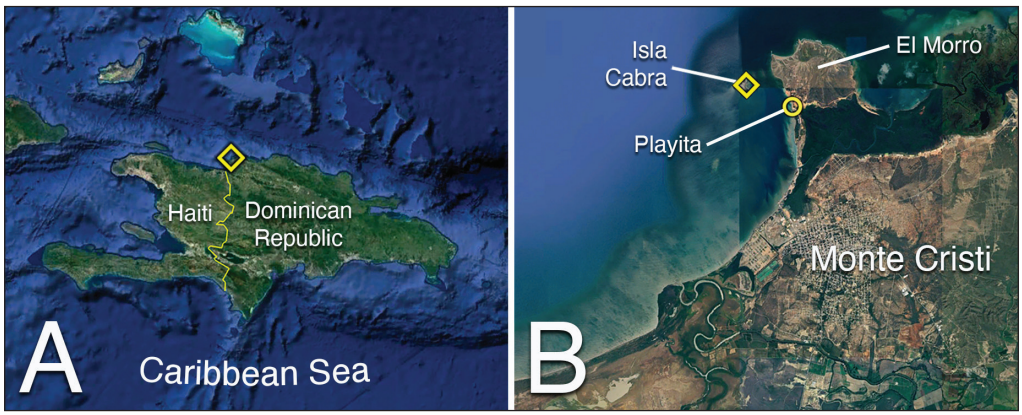

Figure 2. (A) Location of the stranding on the north side of the Dominican Republic, and (B) detailed locations of the first stranding event (16 January 2022, yellow diamond) and the second stranding event (17 January 2022, yellow circle) off Monte Cristi, Dominican Republic.

corroborate species identification as *M. bidens*. This analysis provided a species identification maximum likelihood tree indicating the species most closely related to our "query" sequence using phylogenetic algorithms to provide evolutionary distances between the "query" sequence and the reference sequences (Fig. 4). We identified the "query" sequence as *M. bidens* and submitted it to GenBank under accession number OR751332.

Sowerby's Beaked Whales are one of the most common beaked whales to strand on shore. Over 410 records exist from its natural range in the Western North Atlantic and Eastern North Atlantic (Bachara et al. 2014), including strandings in Belgium, Canada (COSEWIC 2019, Lien and Barry 1990), Denmark, France, Germany, Iceland, Netherlands, Norway, Poland, Portugal (mainland, Azores, and Madeira islands; Maul and Sergent 1977, Reiner 1986, Reiner et al. 1993), Spain, Sweden, and the United Kingdom (England, North Ireland, Scotland, Wales;). In the United States (US), only 8 strandings have been recorded between 1999 and 2021, including records in Maine (3), Massachusetts (2), New

Figure 3. Beaked whale beached at Monte Cristi, Dominican Republic, (A) upon stranding on Isla Cabra, (B) upon release back to sea on 16 January 2022, (C) upon re-stranding dead at Playita on 17 January 2022, and (D) upon examination on-site on 18 January 2022.

York (1), and Virginia (2) (data received from NOAA National Stranding Database; available from author upon request).

Extralimital records, whether strandings or sightings, occur when a species is found outside its natural distribution range. Sowerby's Beaked Whales are not the exception to stranding displaced off their normal distribution. On the Eastern North Atlantic, extralimital stranding records of Sowerby's Beaked Whales include a live stranding of 2 subadults in 1996 in Îles de Lérins, Cannes, in France's Ligurian Sea, part of the Mediterranean (Bachara et al. 2014, Bittau et al. 2018, Bompar 2000); in 2007 in Lanzarote, Canary Islands (Martin et al. 2011); and 2 sightings off Corsica and Sardenia in 2010 and 2012, respectively, both in the Tyrrhenian Sea in the Western Mediterranean (Bittau et al. 2018). As of 2021 in the southeastern US, 3 out-of-habitat strandings had occurred: 1 from St. Joseph Spit, Florida, within the Gulf of Mexico in 1984 (Bonde and O'Shea 1984); 1 on St.

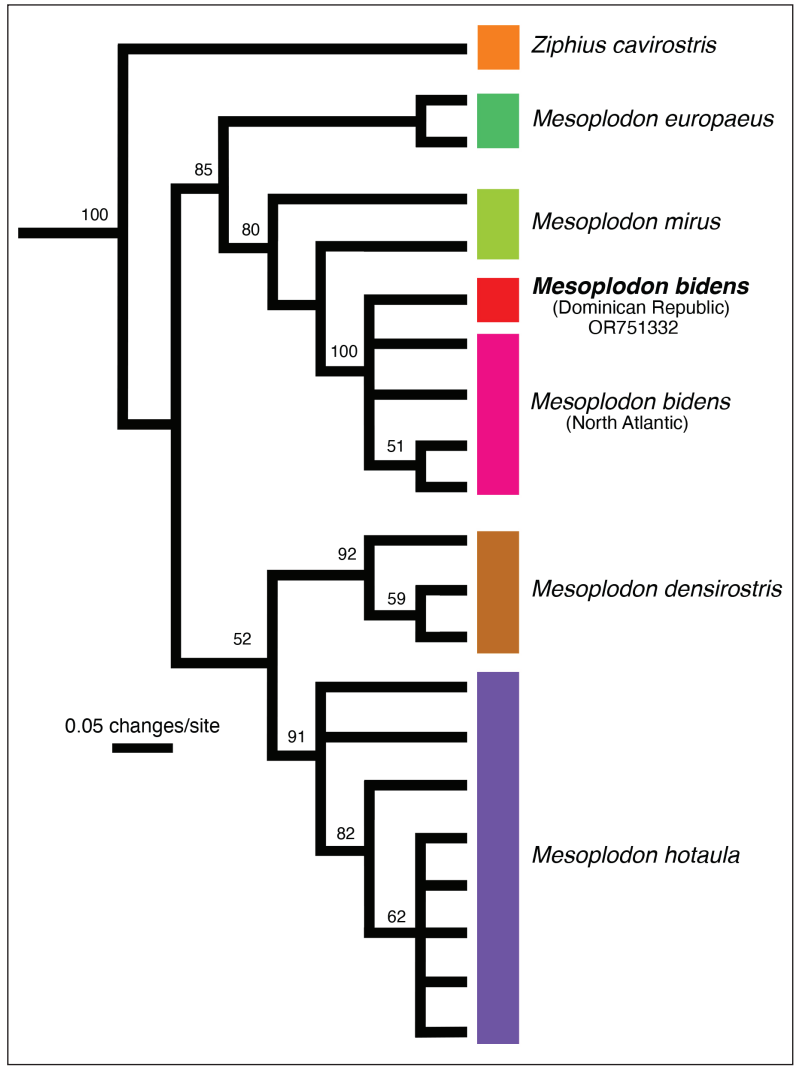

Figure 4. Maximum likelihood phylogenetic reconstruction showing the position of the query search for the control region mtDNA sequence generated for the 2022 Dominican Republic beaked whale sample. The scientific name in bold shows that this "user sequence" (query search) was identified as the species *Mesoplodon bidens*. Numbers by nodes indicate level of support for those particular branchings in the tree.

Catherines Island, Georgia, in 2004; and 1 on Georgetown, Sout Carolina, in 2011 (data received from NOAA National Stranding Database; available from author upon request).

Only 3 records exist in tropical waters of the Western North Atlantic: A 400-cm Sowerby's Beaked Whale was found dead at Bahía Rincón in Samaná, Dominican Republic, in 2007 (Fig. 5; Bachara et al. 2014); another Sowerby's Beaked Whale was reported stranded on Playa del Carmen, Quintana Roo, Mexico, in 2018 (Diaz-Gamboa et al. 2022); and our present case also from the Dominican Republic. However, the southernmost extralimital record of a Sowerby's Beaked Whale occurred in 1983 off Florianópolis, Santa Catarina, Brazil, a record of the Western South Atlantic (Simões-Lopes and Ximenez 1993) incorrectly identified first as a *Mesoplodon* cf. *densirostris*, but corrected as *M. bidens* by Bachara et al. (2014).

Understanding the elusive and cryptic Sowerby's Beaked Whale, and in fact, all species of beaked whales, requires taking advantage of all opportunities of sightings at sea and strandings to document as much as possible of the life history of these species. Therefore, we strongly recommend the collection of comprehensive biological documentation and samples, which should include the following: (a) genetics: obtain a skin sample from the animal and preserve it in 70% or higher ethanol for genetic analysis, which is essential for species identification, population studies, and understanding genetic diversity; (b) diet: collect frozen skin samples for stable isotope analysis, which will provide valuable insights into the animal's

Figure 5. *Mesoplodon bidens* from the 2007 stranding near Bahía Rincón, Samaná, Dominican Republic.

diet, trophic level, and ecological role within the ecosystem; (c) age: extract a tooth to determine the animal's age; tooth sectioning allows for the estimation of age based on growth layers, helping to understand the life history and population dynamics of the species; and (d) pathology and parasitology: conduct thorough post-mortem examinations and preserve internal tissues in 10% buffered formalin. Additionally, preserve any ecto- and endo-parasites found in the animal in 70% or higher ethanol. These samples will enable the investigation of pathological conditions, diseases, and parasite infestations, providing important insights into the health and well-being of the individual and the potential impacts on the population. Unfortunately, in this case, we were not notified of this stranding in time to obtain appropriate internal samples for such pathological analyses.

The International Union for the Conservation of Nature (IUCN) considers most of the ziphiids (beaked whales) to be data-deficient or of least concern, and their population numbers are unknown (Ellis and Mead 2017). Many suffer from anthropic survival threats, including low-frequency active sonar, or accidental entanglement in commercial fishing gear, such as driftnets and gillnets, off the US and Canadian Atlantic coasts (Ellis and Mead 2017, Jefferson et al. 2008, NOAA Fisheries 2020).

Some beaked whales strand alive, requiring urgent veterinary care to prevent suffering and ensure ethical treatment. Unfortunately, the majority of these whales do not survive the stranding process or perish shortly afterward. We strongly advocate for local marine biologists, veterinarians, and wildlife managers to remain vigilant and prepared to tend to live cetacean strandings. Immediate attention is crucial, focusing on the animal's welfare, medical status, and effective pain management. Subsequently, we encourage comprehensive scientific documentation of such cases, seizing the opportunity to enhance our understanding of these lesser-known cetaceans through the collection of tissues with government permission for life-history studies. These insights are essential in supporting conservation efforts on behalf of these rare cetaceans.

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