

the sympatric multifaceted cultures of killer whales, and the giant physical scales of the ocean-wide songs of humpback whales and clans of sperm whales. They represent an independent evolution of cultural faculties outside the primate line, and thus help us understand both how culture evolved and what its consequences may be. Cetacean cultures are a large part of what the cetaceans are themselves, and they drive how they interact with each other, their environment, and us.

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CUVIER'S BEAKED WHALE

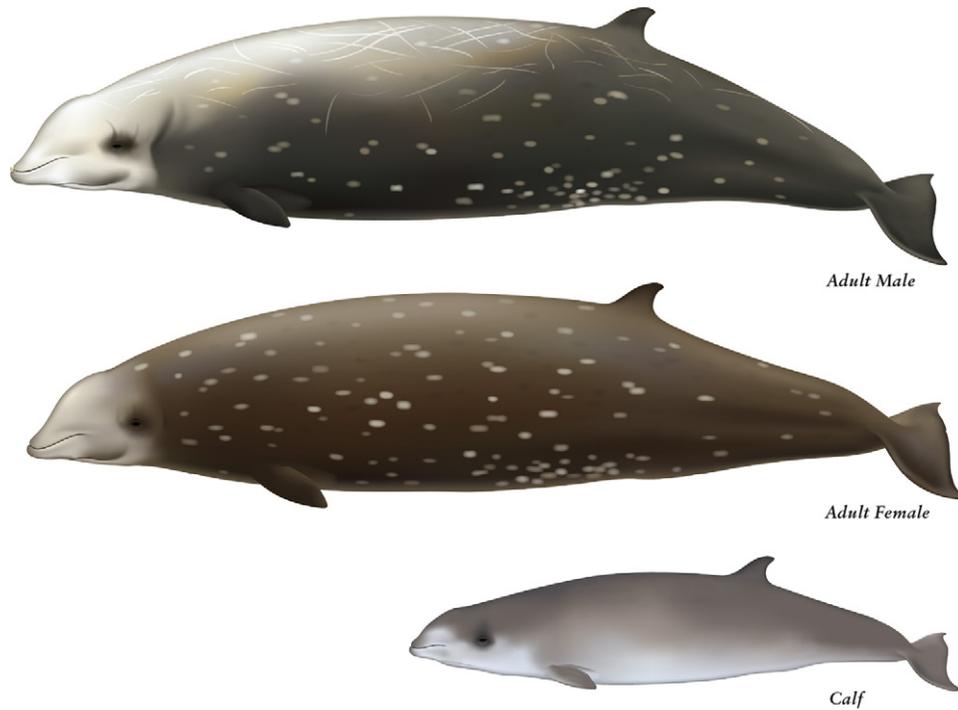
Ziphius cavirostris

ROBIN W. BAIRD

The Cuvier's beaked whale is one of the larger members of the family Ziphiidae. It was first described by Georges Cuvier in 1823 based on a partial skull found in France, and the second half of the species name, *cavirostris*, comes from a deep hollow at the base of the rostrum found in adult males. They are one of the most well-known species of beaked whales, having been the subject of intensive research efforts in Hawai'i, the Canary Islands, and the Mediterranean, as well as more recently off the west and east coasts of the United States.

I. Characteristics and Taxonomy

Cuvier's beaked whales are born at an average length of 2.7 m, and reach a maximum length of about 7 m. They have a robust cigar-shaped body and a cone-shaped head when viewed from the side, with only a slight demarcation of the short rostrum. They have a short upturned mouthline, and often show their head when surfacing (Figs 1 and 2). The dorsal fin is falcate, and like other beaked whales is relatively small and located about two-thirds of the way back on the body. Also like other beaked whales, Cuvier's have two throat grooves, relatively large flukes with no medial notch, relatively small



Adult Male

Adult Female

Calf

Figure 1 Cuvier's beaked whale, *Ziphius cavirostris* (Illustrations by Uko Gorter).



Figure 2 An adult male Cuvier's beaked whale lunging at the surface prior to a long dive. A single tooth is visible at the tip of the lower jaw, partially obscured by attached stalked barnacles. The white oval scars are from cookie-cutter shark (*Isistius* spp.) bites. This individual also has extensive linear scarring from fighting with other adult males (Photo by Dan J. McSweeney/Wild Whale Research Foundation).

flippers, and a shallow indentation (“flipper pockets”) where the flippers can recess. Looking at a Cuvier's beaked whale from behind or in front, the body is quite rounded. There are two teeth, commonly referred to as tusks, located at the tip of the left and right lower jaws, and some specimens examined have also had a number of peg-like vestigial teeth. The tusks erupt only in males, although in the tropics they are sometimes obscured by stalked barnacles (*Conchoderma* sp.). Cuvier's are generally dark gray in color on the back and side and lighter on the belly, with a dark patch around the eye. They often

appear brown due to a coating of diatoms. Older individuals of both sexes will have white pigmentation on the head, which appears to be more extensive and extend farther back on the body in older males. Adult males also acquire linear scarring on the head and back from fighting with other males (Coomber et al., 2016), and both sexes in tropical areas will have extensive white scarring from cookie-cutter shark (*Isistius* sp.) bites. Individual Cuvier's can be identified from these scar patterns as they remain visible for up to 20 years or more. The sexual dimorphism in adult skull morphology is so obvious that the sexes were originally thought to be different species, but there is no obvious difference in body size. No subspecies are recognized, but there is evidence of considerable population structure both between and within ocean basins.

II. Distribution and Abundance

Cuvier's beaked whales have the widest distribution of any of the beaked whales, being found in the Pacific, Atlantic, and Indian Oceans, as well as the Mediterranean Sea (Fig. 3). They are typically found in the open-ocean and on steep continental slopes. In a number of areas photoidentification studies have indicated relatively small populations exhibiting long-term site fidelity, and studies using satellite tags have demonstrated movements are limited, suggesting there is likely considerable unrecognized population structure (Baird, 2016). There are abundance estimates from a number of areas that suggest they are fairly abundant, although there is typically high uncertainty associated with the estimates. Population trend data from off the west coast of the United States has indicated a 30% decline in abundance between 1991 and 2008 (Moore and Barlow, 2013).

III. Ecology

Cuvier's beaked whales feed both during the day and at night deep in the water column. They are primarily thought to use suction feeding to capture prey. Studies using acoustic recording tags

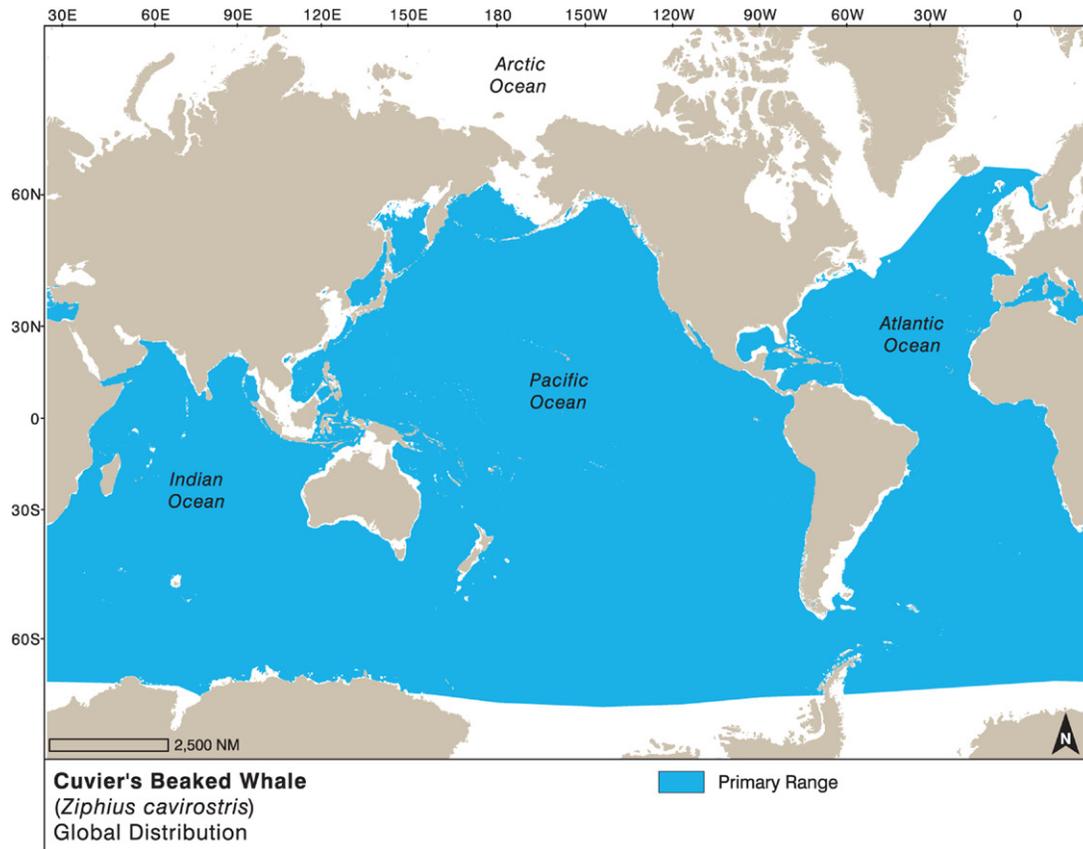


Figure 3 Cuvier's beaked whale distribution. Adapted by Nina Lisowski from Jefferson, T.A., Webber, M.A., and Pitman, R.L. (2015). "Marine Mammals of the World: A Comprehensive Guide to Their Identification," 2nd ed. Elsevier, San Diego, CA.



Figure 4 Two Cuvier's beaked whales breaching off the island of Hawai'i. The individual on the right is an adult female, identified off the island in eight different years between 2004 and 2014 (Photo by Annie B. Douglas)

indicate that echolocation, and thus foraging, typically does not begin until the whales reach more than 400 m depth. Prey include a wide diversity (at least 47 species from 15 families) of squid, and occasionally fish and crustaceans. Based on their known diet they appear to be opportunistic and feed on both schooling and solitary squid.

Based on wounds on freshly dead animals and scarring on living individuals, Cuvier's beaked whales are at least occasionally attacked by large sharks. Killer whales are also likely occasional predators.

IV. Behavior and Physiology

Cuvier's beaked whales will often lie motionless at the surface, particularly after long dives, although they may also breach completely clear of the water, perhaps more so than most other species of beaked whales (Fig. 4). They are typically found in relatively small groups, and lone animals are not uncommon. Based on analyses of association patterns, individuals do not have particularly strong or enduring associations. Larger groups, of four or five individuals, often have two males present that typically remain separated. Combined with the evidence of fighting between males, the extensive tooth rakes present on all adult males suggest that males compete over access to females.

Cuvier's beaked whales presently hold the mammalian dive record, of 2992 m and 137.5 min (Schorr et al., 2014), and dives over 1000 m and 60 min in duration are not unusual.

V. Life History

Virtually nothing is known about the life history of Cuvier's beaked whales, as few animals have been aged. Females are sexually mature at an average length of 580 cm, while males are sexually mature at 550 cm. The oldest aged individuals were a 30-year old female and a 36-year old male, although they likely live much longer. Calving interval of one photoidentified female in Hawai'i was over 6 years.

VI. Interactions With Humans

Small numbers of direct takes of Cuvier's beaked whales have been recorded off Japan and Indonesia, and indirect takes in drift

net fisheries have been documented in a variety of areas. Probably the greatest anthropogenic impact on Cuvier's beaked whales arises from their susceptibility to impacts from high-intensity sounds, in particular naval sonars (DeRuiter et al., 2013), which likely results from a physiological response to changes in diving behavior (Fahlman et al., 2014). Atypical mass strandings of Cuvier's associated with naval sonar exercises have been documented off Greece, the Canary Islands, the Bahamas, and Guam. It is unknown how many animals may die at sea in response to such events, and not be found. Given the evidence of population structure, it is possible that such impacts may affect local populations.

Cuvier's beaked whales usually avoid vessels and may react to ship noise at great distances, although there are cases of individuals appearing curious around small vessels that are motionless in the water.

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ENCYCLOPEDIA OF MARINE MAMMALS



THIRD EDITION



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