

Berardius bairdii Stejneger, 1883

English: Baird's beaked whale

German: Baird-Schnabelwal

Spanish: Zifio de Baird, ballena picuda de Baird

French: Baleine à bec de Baird

Family Ziphiidae

1. Description

There are few known differences between the two allopatric species in this genus, the most important being the substantially larger size of *B. bairdii* (Kasuya, 2009). The validity of the two species has long been questioned by some authors, but genetic analysis of mitochondrial DNA confirmed they are distinct (Dalebout et al. 2004).

As in *B. arnuxii*, the entire body is dark brown but the ventral side is paler and has irregular white patches. Tooth marks of conspecifics are numerous on the back, particularly in adult males. Adult size reaches from 9.1 to 11.1 m. The blowhole is crescent shaped, the melon is small and has an almost vertical frontal surface, from which a slender rostrum projects. A pair of large teeth erupt on the anterior end of the lower jaw at around sexual maturity (Kasuya, 2002, 2009).

2. Distribution

<http://www.iucnredlist.org/details/2763/0/rangemap>

Distribution of Berardius bairdii: across the northern Pacific from Japan, throughout the Aleutians, and southward along the coast to the southern tip of California (mod. from Kasuya, 2002, 2009; Taylor et al. 2008; © IUCN).

Baird's beaked whale is found in the temperate North Pacific, mainly in waters over the continental slope. Its range extends in the north from Cape Navarin (62°N) and the central Sea of Okhotsk (57°N), where they occur even in shallow waters to the Komandorskiye Ostrova, Olyutorskiy Zaliv, St. Matthew Island, and the Pribilof Islands in the Bering Sea, and the northern Gulf of Alaska (Rice, 1998; Kasuya 2002).

In the south, it ranges on the Asian side as far as 34°N, and to 36°N in the Sea of Japan. The species is not found in the East China Sea, Yellow Sea and western North Pacific (Kasuya and Miyashita, 1997). Alleged sightings of *B. bairdii* across the central Pacific south as far as 25°N have not been verified by examination of specimens (they might be *Hyperoodon* sp. or *Indopacetus* sp; Rice, 1998).

On the American side it ranges south as far as San Clemente Island (33°N), off Northern Baja California (Rice, 1998; Kasuya, 2002, 2009). It is vagrant to the southwestern Gulf of California: There have been two records of mass strandings in the Sea of Cortez near La Paz (24°N), Baja California (Balcomb, 1989; Reyes, 1991 and refs. therein; Urbán-Ramírez and Jaramillo-Legorreta, 1992).

There may be at least three stocks of Baird's beaked whales in the western North Pacific: a Sea of Japan stock that summers in the Sea of Japan and possibly remains isolated there year-round; an Okhotsk Sea stock distributed in waters near ice floes in that sea, and a Pacific coastal stock that probably inhabits continental slope waters between the fronts of the

Kuroshio and Oyashio Currents, north of about 34°N (Balcomb, 1989; Reyes, 1991 and refs. therein). According to Kasuya and Miyashita (1997) there is no evidence to alter this three stock hypothesis, which is also adopted by Taylor et al. (2008). Other possible stocks are found in the Bering Sea and the eastern North Pacific, in the latter ranging from Alaska and Vancouver Island possibly to the Sea of Cortez (Balcomb, 1989; Reyes, 1991 and refs. therein).

The stock hypothesis in the western Pacific is supported by recent chemical analyses of whale “products”. Haraguchi et al. (2006) found that Baird's beaked whale “products” from the Pacific Ocean contained significantly higher concentrations of Mixed halogenated dimethyl bipyroles (HDBPs) than those from the Sea of Japan. Furthermore, the geographical distribution of HDBPs did not resemble those of ubiquitous anthropogenic organochlorines, such as polychlorinated biphenyl (PCBs).

Furthermore, Kishiro (2007) compared 14 measurements of external body proportions of 172 Baird's beaked whales caught by small-type whaling operations off the Pacific coast of Japan, the Sea of Japan and the Sea of Okhotsk from 1988 to 2004. Canonical discriminant analysis allowed to discriminate between whales from the Pacific coast and the Sea of Japan for both males and females, although some overlap was observed. The flipper size (maximum width and straight length) of the Pacific coast whales was significantly larger (3.9-8.3%) than that of the Sea of Japan whales. The canonical variates of the Sea of Okhotsk whales were located in the middle area between the Pacific coast and the Sea of Japan and a significant difference was not observed (however this may have been caused by sampling errors). Ishiro (2007) concludes that morphological differences observed between the Pacific coast and the Sea of Japan whales suggest different stocks occur in these two waters.

3. Population size

There are no recent population estimates or information on trends in global abundance (Taylor et al. 2008). In the past, sighting surveys on the whaling grounds indicated a population of several thousand Baird's beaked whales available to the fishery (Reeves and Mitchell, 1994). For Japanese waters estimates were 5,029 for the Pacific coast, 1,260 for the eastern Sea of Japan and 660 for the southern Okhotsk Sea (IWC 1992). There are an estimated 1,100 Baird's beaked whales in the eastern North Pacific, including about 228 off the US west coast (Ferguson and Barlow, 2001; Barlow, 2003; both cited in Barlow et al. 2006).

4. Biology and Behaviour

Habitat: Though they may be seen close to shore where deep water approaches the coast, their primary habitat appear to be over or near the continental slope and oceanic seamounts (Jefferson et al. 1993). Baird's beaked whales are found in pelagic, temperate waters over 1,000 to 3,000 m deep, on the continental slope. Off the Pacific coast of Japan, these whales have been recorded in waters ranging between 23°C and 29°C, with a southern limit lying at the 15°C isotherm at a depth of 100 m. In the northern Okhotsk Sea the species has been recorded in waters less than 500 m deep, which could be explained by the availability of prey species in shallower waters at higher latitudes (Reyes, 1991 and refs. therein).

The prey species found in the stomachs of the whales were almost identical to those caught in bottom-trawl nets at depths greater than about 1000m in the western North Pacific, which suggests that whales reach these depths during foraging dives. Baird's beaked whales in the

western North Pacific migrate to waters of 1,000-3,000m deep, where demersal fish are abundant, which also reflects these feeding preferences (Ohizumi et al. 2003).

Minamikawa et al. (2007) confirmed this hypothesis using a depth and temperature data logger on an individual Baird's beaked whale off the Pacific coast of Japan. The retrieved data logger recorded 81 dives over approximately 29 h. The maximum recorded depth and the longest dive duration were 1777 m and 64.4 min, respectively.

Behaviour: They are deep divers, capable of staying down for up to 67 min, but 85% of dives are shorter than 30 min. During surface schooling, individuals blow continuously while swimming slowly and are easily identifiable from shipboard (Kasuya, 2002, 2009). From Japanese whaling data, it appears that males live longer than females and that females have no post-reproductive stage. There is a calving peak in March and April (Jefferson et al. 1993).

Schooling: Baird's beaked whales live in larger groups than any other species of beaked whale, with pods of 5 to 20 whales, although groups of up to 50 are occasionally seen. They often assemble in tight groups drifting along at the surface. At such times, snouts are often seen as animals slide over one another's backs (Jefferson et al. 1993). Dominance of adult males in the catches off Japan has been interpreted as an indication of segregation by sex and age. It was hypothesised that females and calves stay in offshore waters and that only adult males approach the coast. However, this is unlikely because of the lack of offshore sightings during summer fishing seasons. Other speculation referring to higher female mortality as well as to composition and behaviour of schools need to be verified with additional studies (Reyes, 1991 and refs. therein).

Food: Prey identification using fish otoliths and cephalopod beaks reveal that Baird's beaked whales feed primarily on deep-water gadiform fishes and cephalopods. Off the Pacific coast of Honshu the whales fed primarily on benthopelagic fishes (81.8%) and only 18.0% on cephalopods. Eight species of fish representing two families, the codlings (Moridae) and the grenadiers (Macrouridae), collectively made up 81.3% of the total. Thirty species of cephalopods representing 14 families made up 12.7%. In the southern Sea of Okhotsk, cephalopods accounted for 87.1% of stomach contents. The families Gonatidae and Cranchiidae were the predominant cephalopod prey, accounting for 86.7% of the diet. Gadiform fish accounted for only 12.9% of the diet. Longfin codling, *Laemonema longipes*, was the dominant fish prey in both regions (Walker et al. 2002).

This is supported by Ohizumi et al. (2003) who examined the stomach contents of Baird's beaked whales caught off the coast of Japan by small-type coastal whalers. The main prey for these whales was rat-tails and hakes in the western North Pacific. Pollock and squids were also important food in the whales collected from the southern Sea of Okhotsk.

5. Migration

Information gathered from sightings on both sides of the North Pacific indicate that Baird's beaked whale is present over the continental slope in summer and autumn months, when water temperatures are highest. The whales move out from these areas in winter (Reyes, 1991 and refs. therein).

Tomilin (1957); in Balcomb, 1989) reported that in the Sea of Okhotsk and the Bering sea, Baird's beaked whales arrive between April and May, and are particularly numerous in summer. He reported they are not averse to travelling among the ice floes, going as far north as Cape Navarin (63°N).

Along the Pacific coast of Japan, a migrating population appears near the Boso Peninsula in May, reaches Hokkaido some time between July and August, and comes back again to

Kinkazan offshore in the fall and then leaves Japan (Balcomb, 1989 and refs. therein). Kasuya (1986) noted that the Pacific coast population occurs predominantly from May to October along the continental slope north of 34°N in waters 1,000-3,000m deep. Ohsumi (1983) and Kasuya and Ohsumi (1984; both in Balcomb, 1989) concluded that there is an apparent migration away from coastal Japan in winter months. According to Kasuya and Miyashita (1997) they appear in May along the Pacific coast of Japan, increase in density during summer on the continental slope (1,000-3,000m depth) and north of 34°N and apparently leave in December, although there has been little sighting effort in December-April in their coastal summering ground. They are not confirmed in the deeper offshore waters in any season of the year and their wintering ground is still unknown.

In the eastern North Pacific, along the California coast, Baird's beaked whales apparently spend the winter and spring months far offshore, and move in June onto the continental slope off central and northern California, where peak numbers occur during the months of September and October. They have been seen or caught off Washington State between April and October and they were frequently seen by whalers operating off the west coast of Vancouver Island from May through October, with their peak occurrence being in August (Balcomb, 1989 and refs. therein).

6. Threats

Direct catches: Until the 1960s and 1970s, Baird's beaked whales in the eastern North Pacific were taken only by United States and Canadian whalers (in relatively small numbers). In the western North Pacific, there has been heavier exploitation by the Soviet Union and Japan. In the past, Japan's coastal whaling stations took up to 40 Baird's beaked whales per year. Some Baird's beaked whales have been caught in Japanese salmon driftnets (Jefferson et al. 1993). In 2001 the industry operated with a quota of 8 for the Sea of Japan, 2 for the southern Okhotsk Sea and 52 for the Pacific coasts (Kasuya 2002), and these numbers were slightly raised to 10, 4 and 52, respectively, in 2007 (Kasuya, 2009). Although the IWC does not control the annual quota of Baird's beaked whales, it is assumed that the present catch levels over a short period would not seriously affect the subpopulation, but research is needed to obtain information that will allow a full assessment of its status (Taylor et al. 2008).

Incidental catch: Incidental catches have been recorded, but are generally not common. Some Baird's beaked whales have been caught in Japanese salmon driftnets (Reeves and Mitchell 1993).

Deliberate culls: None reported (Reyes, 1991; Kasuya, 2009).

Habitat degradation: Heavy boat traffic to and from Tokyo Bay is said to disturb the migration of Baird's beaked whales off the Pacific coast of Japan (Reyes, 1991 and refs. therein).

Pollution: The values of PCB/DDE ratios in specimens from the western North Pacific were found to be relatively lower than in offshore cetaceans from the same area. Although this led to suggestions about the restriction of offshore migration in Baird's beaked whales, the low level of pollutants could be related to the feeding habits of this deep-diving whale (Subramanian et al. 1988; Reyes, 1991 and refs. therein).

Noise: US government scientists presented a paper at the 2004 IWC meeting that analysed mass strandings of Cuvier's beaked whale and Baird's beaked whale in Japan from the late 1950s until 2004 (Brownell et al., 2004). The paper reported that there were 11 mass strandings (a total of 51 animals) involving these species, all of which occurred in Suruga Bay

or Sagami Bay on the central Pacific coast of Honshu. Both of these bays are adjacent to the command base for operations of the US Navy's Pacific 7th Fleet (Brownell et al., 2004).

Overfishing: Some squid stocks have been overexploited off Japan, and fisheries for other squid species are expanding, which means that conflicts could arise in the future (Reyes, 1991 and refs. therein).

7. Remarks

Range states:

Canada; Japan; Korea, Democratic People's Republic of; Korea, Republic of; Mexico; Russian Federation; United States of America (Taylor et al. 2008).

Berardius bairdii is considered as Data Deficient by IUCN (Taylor et al. 2008). It is listed in Appendix II of the CMS (unfavourable conservation status, would benefit from international cooperation; 2009). It is also listed in appendix I&II of CITES.

Migration:

In particular, the migration between waters of Japan and Russia occurs in the southern Okhotsk Sea and in waters off the Pacific coast of Hokkaido and the Kuril Islands. Further studies on stock identity, distribution, abundance, school structure and behaviour are needed to resolve some aspects of life history and migrations (Reyes, 1991 and refs. therein).

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