

SATO'S BEAKED WHALE (*Berardius minimus*)

STOCK DEFINITION AND GEOGRAPHIC RANGE

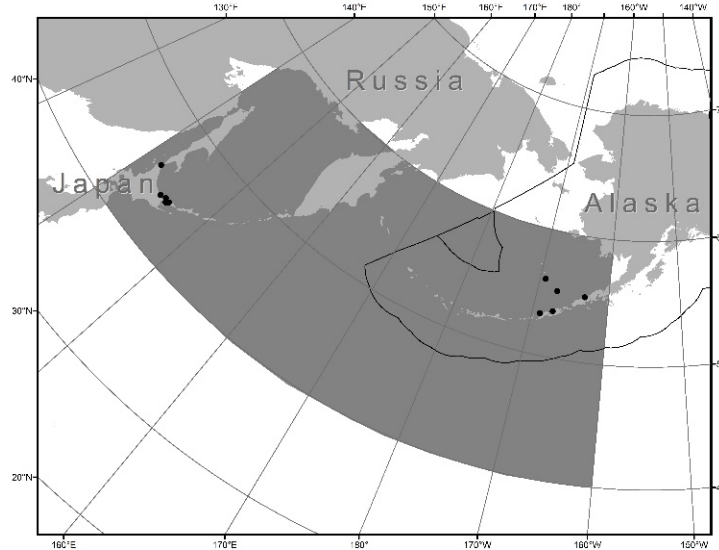


Figure 1. Approximate distribution of Sato's beaked whales in the western and central North Pacific (shaded area). Strandings (black dots) are also depicted (Kitamura et al. 2013, Morin et al. 2017, Yamada et al. 2019). This stock assessment considers only the portion of the stock occurring in U.S. waters (i.e., the U.S. Exclusive Economic Zone delineated by a black line).

Sato's beaked whale, or black beaked whale, is a newly described species which inhabits the western and central North Pacific (Fig. 1; Morin et al. 2017, Yamada et al. 2019, Brownell 2020, Fedutin et al. 2020). Reports from Japanese whalers of a "black" beaked whale smaller than the more common Baird's beaked whale and measurements from stranded animals suggested the existence of a separate species (Yamada et al. 2019). Strong genetic differences confirmed it to be distinct from the partly sympatric Baird's beaked whale (Kitamura et al. 2013, Morin et al. 2017, Yamada et al. 2019, Fedutin et al. 2020).

Although the existence of a smaller form of beaked whale off Japan has been suggested for years (Brownell and Kasuya 2021), the first confirmed observation of living Sato's beaked whales was made in 2021 (Fedutin et al. 2022). Twenty-three encounters were made off the west coast of Kunashir Island (the southernmost Kuril Island) from May to June 2021. The species identification was confirmed from one biopsy sample, and fourteen individuals in groups of 4-5 animals were identified from photographs. In 2023, three groups consisting of at least nine total Sato's beaked whales were documented by photographs collected by unmanned aerial vehicles in the Abashiri Submarine Canyon, Hokkaido, Japan (Kobayashi et al. 2023).

Our current information on geographic range comes from relatively few stranded or incidentally caught animals. From skull characteristics and genetics, specimens have been identified in northern Hokkaido, Japan; Sakhalin and Kunshir Islands, Russia; Unalaska Island, Bering Sea; and the Alaska Peninsula, U.S. (Morin et al. 2017, Fedutin et al. 2020). Because our knowledge of distribution is based on relatively few strandings, distribution is uncertain but appears to include waters between 40°N and 60°N, and 140°E and 160°W (Yamada et al. 2019).

This transboundary stock is defined as the *Berardius minimus* species.

POPULATION SIZE

Reliable estimates of population abundance are not available for this stock.

Minimum Population Estimate

It is not possible to produce a reliable minimum population estimate (N_{MIN}) for this stock, as estimates of abundance are not available.

Current Population Trend

There are no data on trends in population abundance for the Sato's beaked whale stock or for the portion of the stock within U.S. waters.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

A reliable estimate of the maximum net productivity rate (R_{MAX}) is not available for the Sato's beaked whale stock or for any portion of the stock within U.S. waters. Until additional data become available, the default cetacean maximum theoretical net productivity rate of 4% will be used for this stock (NMFS 2023).

POTENTIAL BIOLOGICAL REMOVAL

PBR is defined as the product of the minimum population estimate, one-half the maximum theoretical net productivity rate, and a recovery factor: $PBR = N_{MIN} \times 0.5R_{MAX} \times F_R$. The recovery factor (F_R) for this stock is 0.5, the value for cetacean stocks with unknown population status (NMFS 2023). However, in the absence of a reliable estimate of minimum abundance, the PBR for this stock is unknown.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Information for each human-caused mortality, serious injury, and non-serious injury reported for NMFS-managed Alaska marine mammals between 2017 and 2021 is listed, by marine mammal stock, in Freed et al. (2023); however, only the mortality and serious injury data are included in the Stock Assessment Reports. No human-caused mortality or serious injury of Sato's beaked whales was reported between 2017 and 2021. Potential threats most likely to result in direct human-caused mortality or serious injury of this stock include vessel strikes and interactions with fisheries.

Fisheries Information

Information for federally-managed and state-managed U.S. commercial fisheries in Alaska waters is available in Appendix 3 of the Alaska Stock Assessment Reports (observer coverage) and in the NMFS List of Fisheries (LOF) and the fact sheets linked to fishery names in the LOF (observer coverage and reported incidental takes of marine mammals: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries>, accessed May 2024).

Between 2017 and 2021, no fisheries-related mortality or serious injury of Sato's beaked whales was reported in U.S. waters.

Alaska Native Subsistence/Harvest Information

There is no known subsistence harvest of Sato's beaked whales by Alaska Natives.

Other Mortality

In Japanese waters, Sato's beaked whales are sometimes killed in the small-type whaling operations that occur in the southern Okhotsk Sea off the northern coast of Hokkaido (Brownell and Kasuya 2021). In this same region the species is also occasionally taken as bycatch (Yamada et al 2019, Brownell 2020, Brownell and Kasuya 2021).

STATUS OF STOCK

Sato's beaked whales are not designated as depleted under the Marine Mammal Protection Act or listed as threatened or endangered under the Endangered Species Act. However, *Berardius* spp., including Sato's beaked whales, are included in Appendix I under the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Reliable estimates of the minimum population, population trends, PBR, and status of the stock relative to its Optimum Sustainable Population size are not available. Because the PBR is unknown, the mean annual U.S. commercial fishery-related mortality and serious injury that can be considered insignificant and approaching a zero mortality and serious injury rate is unknown. However, because human-caused mortality and serious injury is thought to be minimal, this stock is presumed to be non-strategic.

There are key uncertainties in the assessment of Sato's beaked whales. There is very little information available on the species' range, population structure, and habitat use. Therefore, reliable estimates of the minimum population size, population trends, and PBR are not available.

CITATIONS

- Aguilar de Soto, N., M. Johnson, P. T. Madsen, P. L. Tyack, A. Bocconcelli, and J. Fabrizio Borsani. 2006. Does intense ship noise disrupt foraging in deep diving Cuvier's beaked whales (*Ziphius cavirostris*)? *Mar. Mammal Sci.* 22 (3):690-699. DOI: [dx.doi.org/10.1111/j.1748-7692.2006.00044.x](https://doi.org/10.1111/j.1748-7692.2006.00044.x)
- Anezaki, K., A. Matsuda, and T. Matsuishi. 2016. Concentration and congener pattern of polychlorinated biphenyls in blubber and liver of Hubbs' beaked whale (*Mesoplodon carlhubbsi*), using a sulfoxide and an Ag-ION solid phase extraction cartridge as a simplified cleanup technique for biological samples. *Mar. Pollut. Bull.* 113:282-286
- Bachman, M. J., J. M. Keller, K. L. West, and B. A. Jensen. 2014. Persistent organic pollutant concentrations in blubber of 16 species of cetaceans stranded in the Pacific Islands from 1997 through 2011. *Sci. Total Environ.* 488: 115-123.
- Bernaldo de Quirós, Y., A. Fernandez, R. W. Baird, R. L. Brownell, Jr., N. Aguilar de Soto, D. Allen, M. Arbelo, M. Arregui, A. Costidis, A. Fahlman, A. Frantzis, F. M. D. Gulland, M. Iñiguez, M. Johnson, A. Komnenou, H. Koopman, D. A. Pabst, W. D. Roe, E. Sierra, M. Tejedor, and G. Schorr. 2019. Advances in research on the impacts of anti-submarine sonar on beaked whales. *Proc. Royal Soc. B.* 286(1895):20182533. DOI: [dx.doi.org/10.1098/rspb.2018.2533](https://doi.org/10.1098/rspb.2018.2533)
- Brownell, Jr., R. L. 2020. *Berardius minimus*, Sato's beaked whale. The IUCN Red List of Threatened Species 2020:e.T178756893A178756918. DOI: [dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T178756893A178756918.en](https://doi.org/10.2305/IUCN.UK.2020-3.RLTS.T178756893A178756918.en)
- Brownell, Jr., R. L., and T. Kasuya. 2021. Sato's beaked whale: A new cetacean species discovered around Japan. *Mar. Mammal Sci.* 37:768-771. DOI: [dx.doi.org/10.1111/mms.12810](https://doi.org/10.1111/mms.12810)
- Cockcroft, V. G. 1999. Organochlorine levels in cetaceans from South Africa: A review. *J. Cetacean Res. Manag. Special Issue 1*:169-176.
- Fedutin, I. D., I. G. Meschersky, O. A. Filatova, O. V. Titova, I. G. Bobyr, A. M. Burdin, and E. Hoyt. 2020. Records of a new cetacean species of the genus *Berardius* from Russian Waters. *Russian Journal of Marine Biology* 46(3):199-206. DOI: [dx.doi.org/10.1134/S1063074020030050](https://doi.org/10.1134/S1063074020030050)
- Fedutin, I.D., O.A. Filatova, I.G. Meschersky, and E. Hoyt. 2022. First confirmed observations of living Sato's beaked whales *Berardius minimus*. *Marine Mammal Science* 38(4):1676–1681. DOI: [dx.doi.org/10.1111/mms.12936](https://doi.org/10.1111/mms.12936)
- Fernández, A., J. F. Edwards, F. Rodríguez, A. Espinosa de los Monteros, P. Herraéz, P. Castro, J. R. Jaber, V. Martin, and M. Arebelo. 2005. "Gas and fat embolic syndrome" involving a mass stranding of beaked whales (family *Ziphiidae*) exposed to anthropogenic sonar signals. *Vet. Pathol.* 42(4):446-457.
- Freed, J. C., N. C. Young, A. A. Brower, B. J. Delean, M. M. Muto, K. L. Raum-Suryan, K. M. Savage, S. S. Teerlink, L. A. Jemison, K. M. Wilkinson, J. E. Jannot, and K. A. Somers. 2023. Human-caused mortality and injury of NMFS-managed Alaska marine mammal stocks, 2017-2021. AFSC Processed Report 2023-05, 6 p. + Supporting file.
- Haraguchi K, Y. Hisamichi, and T. Endo. 2006. Bioaccumulation of naturally occurring mixed halogenated dimethylbipyrroles in whale and dolphin products on the Japanese market. *Arch Environ Contam Toxicol.* 51(1):135-41. [Dx.doi.org/10.1007/s00244-005-1140-2](https://doi.org/10.1007/s00244-005-1140-2)
- Honma, Y., T. Ushiki, M. Takeda, E. Naito, K. Dewa, and H. Yamanouchi. 1999. Identification by histological and microsatellite analyses of a stranded beaked whale as that struck previously by a jetfoil operating in the Sea of Japan. *Fish. Sci.* 65:547-552.
- Kitamura, S., T. Matsuishi, T. K. Yamada, Y. Tajima, H. Ishikawa, S. Tanabe, H. Nakagawa, Y. Uni, and S. Abe. 2013. Two genetically distinct stocks in Baird's beaked whale (Cetacea: Ziphiidae). *Mar. Mammal Sci.* 29(4):755-766. DOI: [dx.doi.org/10.1111/j.1748-7692.2012.00607.x](https://doi.org/10.1111/j.1748-7692.2012.00607.x)
- Kobayashi, H., S. Ikuta, and M. Kobayashi. 2023. First aerial observation of Sato's beaked whales (*Berardius minimus*) above the Abashiri Submarine Canyon, Hokkaido, Japan. *Mar. Mammal. Sci.* 40(2):e13099. DOI: [dx.doi.org/10.1111/mms.13099](https://doi.org/10.1111/mms.13099)
- McCarthy, E., D. Moretti, L. Thomas, N. DiMarzio, R. Morrissey, S. Jarvis, J. Ward, A. Izzi, and A. Dilley. 2011. Changes in spatial and temporal distribution and vocal behavior of Blainville's beaked whales (*Mesoplodon densirostris*) during multiship exercises with mid-frequency sonar. *Mar. Mammal Sci.* 27(3):E206-E226. DOI: [dx.doi.org/10.1111/j.1748-7692.2010.00457.x](https://doi.org/10.1111/j.1748-7692.2010.00457.x)
- Miyazaki, N., I. Nakamura, S. Tanabe, and R. Tatsukawa. 1987. A stranding of *Mesoplodon stejnegeri* in the Maizuru Bay, Sea of Japan. *Sci. Rep. Whales Res. Inst.* 38:91-105.

- Morin, P. A., C. S. Baker, R. S. Brewer, A. M. Burdin, M. L. Dalebout, J. P. Dines, I. D. Fedutin, O. A. Filatova, E. Hoyt, J.-L. Jung, M. Lauf, C. W. Potter, G. Richard, M. Ridgway, K. M. Robertson, and P. R. Wade. 2017. Genetic structure of the beaked whale genus *Berardius* in the North Pacific, with genetic evidence for a new species. *Mar. Mammal Sci.* 33(1):96-111. DOI: [dx.doi.org/10.1111/mms.12345](https://doi.org/10.1111/mms.12345)
- National Marine Fisheries Service (NMFS). 2023. Guidelines for preparing stock assessment reports pursuant to the Marine Mammal Protection Act. Protected Resources Policy 02-238-01. Available online: https://www.fisheries.noaa.gov/s3/2023-02/02-238-01%20Final%20SI%20Revisions%20clean_kdr.pdf. Accessed May 2024.
- O'Shea, T. J., R. L. Brownell, Jr., D. R. Clark, Jr., W. A. Walker, M. L. Cay, and T. G. Lamont. 1980. Organochlorine pollutants in small cetaceans from the Pacific and South Atlantic Oceans, November 1968-June 1976. *Pestic. Monit. J.* 14:35-46.
- Reijnders, P. J. H., A. Borrell, J. A. van Franeker, and A. Aguilar. 2017. Pollution, p. 746-753. *In* B. Wursig, J. G. M. Thewissen, and K. M. Kovacs (eds.), *Encyclopedia of Marine Mammals*, 3rd edition. Academic Press, London.
- Savage, K. N., K. Burek-Huntington, S. K. Wright, A. L. Bryan, G. Sheffield, M. Webber, R. Stimmelmayer, P. Tuomi, M. A. Delaney, and W. Walker. 2021. Stejneger's beaked whale strandings in Alaska, 1995-2020. *Mar. Mammal Sci.* 37(3):843-869. DOI: [dx.doi.org/10.1111/mms.12780](https://doi.org/10.1111/mms.12780)
- Secchi, E. R. and S. Zarzur. 1999. Plastic debris ingested by a Blainville's beaked whale, *Mesoplodon densirostris*, washed ashore in Brazil. *Aquati.Mamm.* 25(1):21-24.
- Tyack, P. L., W. M. X. Zimmer, D. Moretti, B. L. Southall, D. E. Claridge, J. W. Durban, C. W. Clark, A. D'Amico, N. DiMarzio, S. Jarvis, E. McCarthy, R. Morrissey, J. Ward, and I. L. Boyd. 2011. Beaked whales respond to simulated and actual Navy sonar. *PLoS ONE* 6(3):e17009. DOI: [dx.doi.org/10.1371/journal.pone.0017009](https://doi.org/10.1371/journal.pone.0017009)
- Waring, G. T., E. Josephson, K. Maze-Foley, and P. E. Rosel (eds.). 2009. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments-2009. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-NE-213, 528 p.
- Yamada, T. K., S. Kitamura, S. Abe, Y. Tajima, A. Matsuda, J. G. Mead, and T. F. Matsuishi. 2019. Description of a new species of beaked whale (*Berardius*) found in the North Pacific. *Scientific Reports* 9, 12723. DOI: [dx.doi.org/10.1038/s41598-019-46703-w](https://doi.org/10.1038/s41598-019-46703-w)