

BAIRD'S BEAKED WHALE (*Berardius bairdii*): California/Oregon/Washington Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Baird's beaked whales are distributed throughout deep waters and along the continental slopes of the North Pacific Ocean (Balcomb 1989). They have been harvested and studied in Japanese waters, but little is known about this species elsewhere (Balcomb 1989). Along the U.S. west coast, Baird's beaked whales have been seen primarily along the continental slope (Figure 1) from late spring to early fall. They have been seen less frequently and are presumed to be farther offshore during the colder water months of November through April. For the Marine Mammal Protection Act (MMPA) stock assessment reports, Baird's beaked whales within the Pacific U.S. Exclusive Economic Zone are divided into two discrete, non-contiguous areas: 1) waters off California, Oregon and Washington (this report), and 2) Alaskan waters.

POPULATION SIZE

Two summer/fall shipboard surveys were conducted within 300 nmi of the coasts of California, Oregon and Washington 2005 (Forney 2007) and 2008 (Barlow 2010). Because the distribution of Baird's beaked whale varies and animals probably spend time outside the U.S. Exclusive Economic Zone, a multi-year average abundance estimate is the most appropriate for management within U.S. waters. The 2005-2008 geometric mean abundance estimate for California, Oregon and Washington waters based on the above two ship surveys is 907 (CV=0.49) Baird's beaked whales (Forney 2007, Barlow 2010). This abundance estimate includes correction factors for the proportion of animals missed, based on a model of their diving behavior, detection distances, and the searching behavior of observers (Barlow 1999). About 96% of all trackline groups are estimated to be seen.

Minimum Population Estimate

The log-normal 20th percentile of the 2005-2008 geometric mean abundance estimate is 615 Baird's beaked whales.

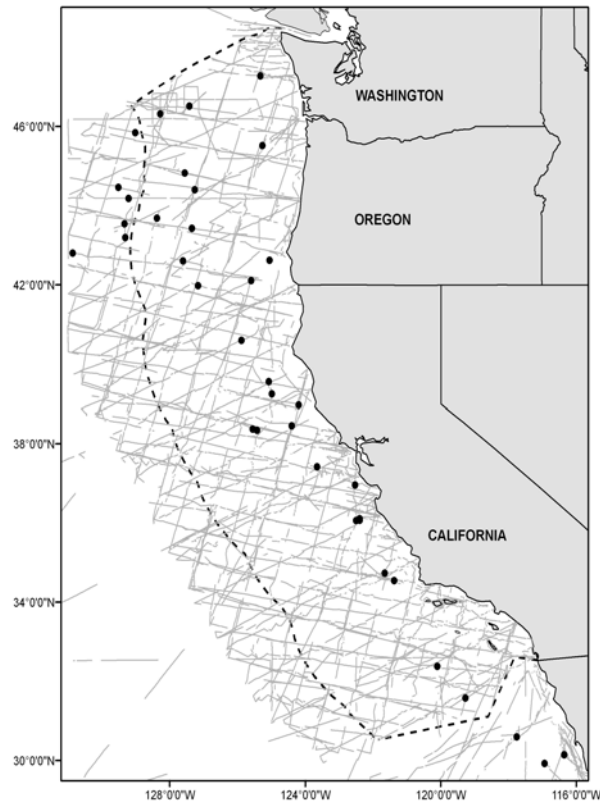


Figure 1. Baird's beaked whale sightings based on shipboard surveys off California, Oregon and Washington, 1991-2008 (see Appendix 2 for data sources and information on timing and location of survey effort). Dashed line represents the U.S. EEZ, thin lines indicate completed transect effort of all surveys combined.

Current Population Trend

Due to the rarity of sightings of this species on surveys along the U.S. West coast, no information exists regarding trends in abundance of this population. Future studies of trends must take the apparent seasonality of the distribution of Baird's beaked whales into account.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

No information on current or maximum net productivity rates is available for this species.

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for this stock is calculated as the minimum population size (615) times one half the default maximum net growth rate for cetaceans (1/2 of 4%) times a recovery factor of 0.50 (for a species of unknown status with no fishery mortality; Wade and Angliss 1997), resulting in a PBR of 6.2 Baird's beaked whales per year.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fishery Information

The California large mesh drift gillnet fishery has been the only fishery known to interact with this stock. One Baird's beaked whale was incidentally killed in this fishery in 1994 (Julian and Beeson 1998), before acoustic pingers were first used in the fishery in 1996 (Barlow and Cameron 2003). Since 1996, no beaked whale of *any* species have been observed entangled or killed in this fishery (Carretta et al. 2008, Carretta and Enriquez 2009a, 2009b). Mean annual takes in Table 1 are based on 2004-2008 data. This results in an average estimated annual mortality of zero Baird's beaked whales.

Table 1. Summary of available information on the incidental mortality and injury of Baird's beaked whales (California/Oregon/Washington Stock) in commercial fisheries that might take this species. The single observed entanglement resulted in the death of the animal. Coefficients of variation for mortality estimates are provided in parentheses. Mean annual takes are based on 2004-2008 data unless noted otherwise.

Fishery Name	Data Type	Year(s)	Percent Observer Coverage	Observed Mortality	Estimated Annual Mortality	Mean Annual Takes (CV in parentheses)
CA/OR thresher shark/swordfish drift gillnet fishery	observer data	2004	20.6%	0	0	0
		2005	20.9%	0	0	
		2006	18.5%	0	0	
		2007	16.4%	0	0	
		2008	13.5%	0	0	
Minimum total annual takes						0

Drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California, Mexico and may take animals from this population. Quantitative data are available only for the Mexican swordfish drift gillnet fishery, which uses vessels, gear, and operational procedures similar to those in the U.S. drift gillnet fishery, although nets may be up to 4.5 km long (Holts and Sosa-Nishizaki 1998). The fleet increased from two vessels in 1986 to 31 vessels in 1993 (Holts and Sosa-Nishizaki 1998). The total number of sets in this fishery in 1992 can be estimated from data provided by these authors to be approximately 2700, with an observed rate of marine mammal bycatch of 0.13 animals per set (10 marine mammals in 77 observed sets; Sosa-Nishizaki et al. 1993). This overall mortality rate is similar to that observed in California driftnet fisheries during 1990-95 (0.14 marine mammals per set; Julian and Beeson, 1998), but species-specific information is not available for the Mexican fisheries. Previous efforts to convert the Mexican swordfish driftnet fishery to a longline fishery have resulted in a mixed-fishery, with 20 vessels alternately using longlines or driftnets, 23 using driftnets only, 22 using longlines only, and seven with unknown gear type (Berdegué 2002).

Other mortality

California coastal whaling operations killed 15 Baird's beaked whales between 1956 and 1970, and 29 additional Baird's beaked whales were taken by whalers in British Columbian waters (Rice 1974). One Baird's beaked whale stranded in Washington state in 2003 and the cause of death was attributed to a ship strike. No other human-caused mortality has been reported for this stock for the period 2004-2008.

Additional, unknown levels of injury and mortality of Baird's beaked whales may occur as a result of anthropogenic sound, such as military sonars (U.S. Dept. of Commerce and Secretary of the Navy 2001) or other commercial and scientific activities involving the use of air guns. Such injury or mortality would rarely be documented, due to the remote nature of many of these activities and the low probability that an injured or dead beaked whale would strand.

STATUS OF STOCK

The status of Baird's beaked whales in California, Oregon and Washington waters relative to OSP is not known, and there are insufficient data to evaluate trends in abundance. No habitat issues are known to be of concern for this species, but in recent years questions have been raised regarding potential effects of human-made sounds on deep-diving cetacean species, such as Baird's beaked whales (Richardson et al. 1995). In particular, active sonar has been implicated in the mass stranding of beaked whales in the Mediterranean Sea (Frantzis 1998) and more recently in the Caribbean (U.S. Dept. of Commerce and Secretary of the Navy 2001). They are not listed as "threatened" or "endangered" under the Endangered Species Act nor as "depleted" under the MMPA. The average annual human-caused mortality during 2004-2008 is zero animals/year. Because recent fishery and human-caused mortality is less than the PBR (6.2), Baird's beaked whales are not classified as a "strategic" stock under the MMPA. The total fishery mortality and serious injury for this stock is zero and can be considered to be insignificant and approaching zero.

REFERENCES

- Balcomb, K. C., III. 1989. Baird's beaked whale *Berardius bairdii* Stejneger, 1883: Arnoux's beaked whale *Berardius arnuxii* Duvernoy, 1851. In: Ridgway, S. H. and Harrison, R. (eds.), Handbook of Marine Mammals, Vol. 4., p. 261-288. Academic Press Limited.
- Barlow, J. 2010. Cetacean abundance in the California Current from a 2008 ship-based line-transect survey. NOAA Technical Memorandum, NMFS, NOAA-TM-NMFS-SWFSC-456. 19 p.
- Barlow, J. and T. Gerrodette. 1996. Abundance of cetaceans in California waters based on 1991 and 1993 ship surveys. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SWFSC-233. Barlow, J. 1999. Trackline detection probability for long-diving whales. p. 209-224 In: G. W. Garner, S. C. Amstrup, J. L. Laake, B. F. J. Manly, L. L. McDonald, and D. G. Robertson (eds.) Marine Mammal Survey and Assessment Methods. A. A. Balkema, Rotterdam. 287 pp.
- Barlow, J. and G.A. Cameron. 2003. Field experiments show that acoustic pingers reduce marine mammal bycatch in the California drift gillnet fishery. Marine Mammal Science 19(2):265-283.
- Barlow, J. and K.A. Forney. 2007. Abundance and population density of cetaceans in the California Current ecosystem. Fishery Bulletin 105:509-526.
- Berdegúe, J. 2002. Depredación de las especies pelágicas reservadas a la pesca deportiva y especies en peligro de extinción con uso indiscriminado de artes de pesca no selectivas (palangres, FAD's, trampas para peces y redes de agallar fijas y a la deriva) por la flota palangrera Mexicana. Fundación para la conservación de los picudos. A.C. Mazatlán, Sinaloa, 21 de septiembre.
- Carretta, J.V. and L. Enriquez. 2009a. Marine mammal and seabird bycatch observed in California commercial fisheries in 2007. Administrative Report LJ-09-01, available from Southwest Fisheries Science Center, 3333 North Torrey Pines Rd., La Jolla, CA 92037. 12 p.
- Carretta, J.V. and L. Enriquez. 2009b. Marine mammal bycatch observed in the California/Oregon swordfish and thresher shark drift gillnet fishery in 2008. Administrative Report LJ-09-03, available from Southwest Fisheries Science Center, 3333 North Torrey Pines Rd., La Jolla, CA 92037. 10 p.
- Carretta, J.V., J. Barlow, and L. Enriquez. 2008. Acoustic pingers eliminate beaked whale bycatch in a gill net fishery. Marine Mammal Science 24(4):956-961.
- Frantzis, A. 1998. Does acoustic testing strand whales? Nature 392(5):29.

- Forney, K.A. 2007. Preliminary estimates of cetacean abundance along the U.S. west coast and within four National Marine Sanctuaries during 2005. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-406. 27p.
- Holts, D. and O. Sosa-Nishizaki. 1998. Swordfish, *Xiphias gladius*, fisheries of the eastern North Pacific Ocean. *In*: I. Barrett, O. Sosa-Nishizaki and N. Bartoo (eds.). Biology and fisheries of swordfish, *Xiphias gladius*. Papers from the International Symposium on Pacific Swordfish, Ensenada Mexico, 11-14 December 1994. U.S. Dep. Commer., NOAA Tech. Rep. NMFS 142, 276 p.
- Julian, F. and M. Beeson. 1998. Estimates of mammal, turtle and bird mortality for two California gillnet fisheries: 1990-1995. *Fish. Bull.* 96:271-284.
- Rice, D. W. 1974. Whales and whale research in eastern North Pacific. p. 170-195 *In*: W. E. Schevill (ed.), *The Whale Problem - A Status Report*. Harvard University Press, Cambridge, MA.
- Richardson, W. J., C. R. Greene, Jr., C. I. Malme, and D. H. Thompson. 1995. *Marine Mammals and Noise*. Academic Press, San Diego. 576 p.
- Sosa-Nishizaki, O., R. De la Rosa-Pacheco, R. Castro-Longoria, M. Grijalva Chon, and J. De la Rosa Velez. 1993. Estudio biologico pesquero del pez (*Xiphias gladius*) y otras especies de picudos (marlins y pez vela). Rep. Int. CICESE, CTECT9306.
- U.S. Department of Commerce and Secretary of the Navy. 2001. Joint Interim Report, Bahamas Marine Mammal Stranding Event of 15_16 March 2000. Available from NOAA, NMFS, Office of Protected Resources, Silver Spring, MD.
- Wade, P. R. and R. P. Angliss. 1997. Guidelines for Assessing Marine Mammal Stocks: Report of the GAMMS Workshop April 3-5, 1996, Seattle, Washington. U. S. Dep. Commer., NOAA Tech. Memo. NMFS-OPR-12. 93 pp.