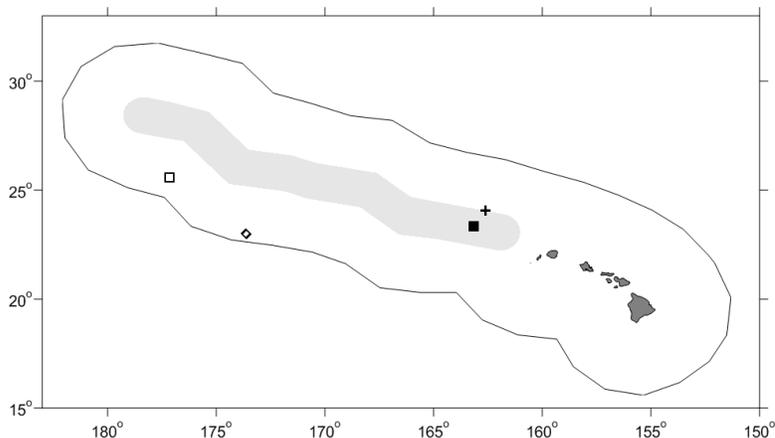


## PYGMY SPERM WHALE (*Kogia breviceps*): Hawaii Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

Pygmy sperm whales are found throughout the world in tropical and warm-temperate waters (Caldwell and Caldwell 1989). Pygmy sperm whales have been observed in nearshore waters off Oahu, Maui, Niihau, and Hawaii Island (Shallenberger 1981, Mobley et al. 2000, Baird 2005, Baird et al. 2013). Two sightings were made during a 2002 shipboard survey of waters within the U.S. Exclusive Economic Zone (EEZ) of the Hawaiian Islands (Figure 1; Barlow 2006). A freshly dead pygmy sperm whale was picked up approximately 100 nmi north of French Frigate Shoals on a similar 2010 survey (NMFS, unpublished data). Nothing is known about stock structure for this species.

For the Marine Mammal Protection Act (MMPA) stock assessment reports, pygmy sperm whales within the Pacific U.S. EEZ are divided into two discrete areas: 1) Hawaiian waters (this report), and 2) waters off California, Oregon and Washington. The Hawaii stock includes animals found both within the Hawaiian Islands EEZ and in adjacent high seas waters; however, because data on abundance, distribution, and human-caused impacts are largely lacking for high seas waters, the status of this stock is evaluated based on data from U.S. EEZ waters of the Hawaiian Islands (NMFS 2005).



**Figure 1.** Pygmy sperm whale (open diamond) and unidentified *Kogia* (open square) sighting locations during the 2002 shipboard survey and unidentified *Kogia* (filled square) during the 2010 shipboard cetacean surveys of U.S. EEZ waters surrounding the Hawaiian Islands (Barlow 2006, Bradford et al. 2013; see Appendix 2 for details on timing and location of survey effort). A freshly dead pygmy sperm whale was also retrieved during the 2010 survey (cross). Outer line indicates approximate boundary of survey area and U.S. EEZ. Gray shading indicates area of Papahānaumokuākea Marine National Monument.

### POPULATION SIZE

A 2002 shipboard line-transect survey of the entire Hawaiian Islands EEZ resulted in an abundance estimate of 7,138 (CV=1.12) pygmy sperm whales (Barlow 2006), including a correction factor for missed diving animals. This estimate for the Hawaiian EEZ is more than 8 years old and therefore will no longer be used based on NMFS Guidelines for Assessing Marine Mammal Stocks (NMFS 2005). A 2010 shipboard line-transect survey within the Hawaiian EEZ did not result in any sightings of pygmy sperm whales (Bradford et al. 2013).

### Minimum Population Estimate

No minimum estimate of abundance is available for pygmy sperm whales, as there were no on-effort sightings during a 2010 shipboard line-transect survey of the Hawaiian EEZ.

### Current Population Trend

No data are available on current population abundance or trend.

### CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

No data are available on current or maximum net productivity rate.

### POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for this stock is calculated as the minimum population size within the U.S. EEZ of the Hawaiian Islands times one half the default maximum net growth rate for cetaceans ( $\frac{1}{2}$  of

4%) times a recovery factor of 0.50 (for a stock of unknown status with no known fishery mortality or serious injury within the Hawaiian Islands EEZ; Wade and Angliss 1997). Because there is no minimum population size estimate for pygmy sperm whales in Hawaii, the PBR is undetermined.

## HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

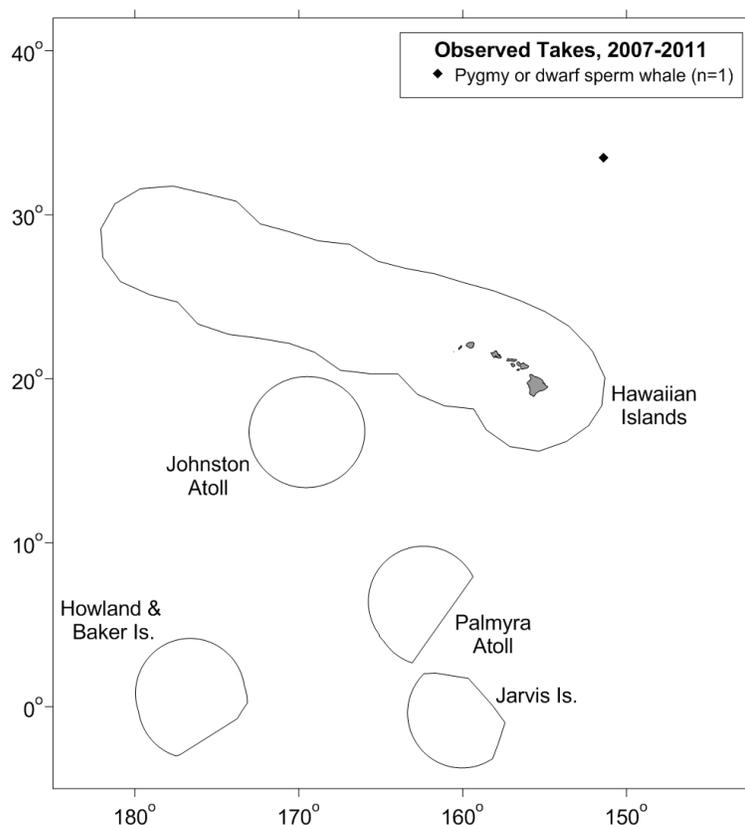
### New Serious Injury Guidelines

NMFS updated its serious injury designation and reporting process, which uses guidance from previous serious injury workshops, expert opinion, and analysis of historic injury cases to develop new criteria for distinguishing serious from non-serious injury (Angliss and DeMaster 1998, Andersen et al. 2008, NOAA 2012). NMFS defines serious injury as an “*injury that is more likely than not to result in mortality*”. Injury determinations for stock assessments revised in 2013 or later incorporate the new serious injury guidelines, based on the most recent 5-year period for which data are available.

### Fishery Information

Information on fishery-related mortality of cetaceans in Hawaiian waters is limited, but the gear types used in Hawaiian fisheries are responsible for marine mammal mortality and serious injury in other fisheries throughout U.S. waters. One pygmy sperm whale was found entangled in fishing gear off Oahu in 1994 (Bradford & Lyman 2013), but the gear was not described and the fishery not identified. No estimates of human-caused mortality or serious injury are currently available for nearshore hook and line fisheries because these fisheries are not observed or monitored for protected species bycatch.

There are currently two distinct longline fisheries based in Hawaii: a deep-set longline (DSL) fishery that targets primarily tunas, and a shallow-set longline (SSL) fishery that targets swordfish. Both fisheries operate within U.S. waters and on the high seas. Between 2007 and 2011, one pygmy or dwarf sperm whale was observed hooked in the SSL fishery (100% observer coverage) (Figure 2, Bradford & Forney 2013, McCracken 2013). Based on an evaluation of the observer’s description of the interaction and following the most recently developed criteria for assessing serious injury in marine mammals (NMFS 2012), this animal was considered not seriously injured (Bradford & Forney 2013). No pygmy sperm whales were observed hooked or entangled in the DSL fishery (20-22% observer coverage). Eight unidentified cetaceans were taken in the DSL fishery, and two unidentified cetaceans were taken in the SSL fishery, some of which may have been pygmy sperm whales.



**Figure 2.** Location of pygmy or dwarf sperm whale takes (filled diamond) in Hawaii-based longline fisheries, 2007-2011. Solid lines represent the U.S. EEZs. Fishery descriptions are provided in Appendix 1.

### STATUS OF STOCK

The Hawaii stock of pygmy sperm whales is not considered strategic under the 1994 amendments to the MMPA. The status of pygmy sperm whales in Hawaiian waters relative to OSP is unknown, and there are insufficient data to evaluate trends in abundance. Pygmy sperm whales are not listed as “threatened” or “endangered” under the Endangered Species Act (1973), nor designated as “depleted” under the MMPA. Given the

absence of recent recorded fishery-related mortality or serious injuries within the Hawaiian Islands EEZ, the total fishery mortality and serious injury can be considered to be insignificant and approaching zero. The increasing level of anthropogenic noise in the world's oceans has been suggested to be a habitat concern for whales (Richardson et al. 1995), particularly for deep-diving whales like pygmy sperm whales that feed in the oceans' "sound channel". One pygmy sperm whale found stranded in the main Hawaiian Islands tested positive for *Morbillivirus* (Jacob 2012). Although *morbillivirus* is known to trigger lethal disease in cetaceans (Van Bresse et al. 2009), its impact on the health of the stranded animal is unknown (Jacob 2012). The presence of *morbillivirus* in 10 species of cetacean in Hawaiian waters (Jacob 2012) raises concerns about the history and prevalence of this disease in Hawaii and the potential population impacts on Hawaiian cetaceans.

**Table 1.** Summary of available information on incidental mortality and serious injury of pygmy sperm whales (Hawaiian stock) in commercial longline fisheries within and outside of the Hawaiian Islands EEZ (McCracken 2013). Mean annual takes are based on 2007-2011 data unless otherwise indicated. Information on all observed takes (T) and combined mortality events & serious injuries (MSI) is included. Total takes were prorated to deaths, serious injuries, and non-serious injuries based on the observed proportions of each outcome.

Fishery Name	Year	Data Type	Percent Observer Coverage	Observed total interactions (T) and mortality events, and serious injuries (MSI), and total estimated mortality and serious injury (M&SI) of pygmy sperm whales			
				Outside U.S. EEZs		Inside Hawaiian EEZ	
				Obs. T/MSI	Estimated M&SI (CV)	Obs. T/MSI	Estimated M&SI (CV)
Hawaii-based deep-set longline fishery	2007	Observer data	20%	0	0 (-)	0	0 (-)
	2008		22%	0	0 (-)	0	0 (-)
	2009		21%	0	0 (-)	0	0 (-)
	2010		21%	0	0 (-)	0	0 (-)
	2011		20%	0	0 (-)	0	0 (-)
<b>Mean Estimated Annual Take (CV)</b>				<b>0 (-)</b>		<b>0 (-)</b>	
Hawaii-based shallow-set longline fishery	2007	Observer data	100%	0	0	0	0
	2008		100%	1*/0	0	0	0
	2009		100%	0	0	0	0
	2010		100%	0	0	0	0
	2011		100%	0	0	0	0
<b>Mean Annual Takes (100% coverage)</b>				<b>0</b>		<b>0</b>	
<b>Minimum total annual takes within U.S. EEZ</b>						<b>0 (-)</b>	

\*One animal was identified as either a pygmy sperm whale or a dwarf sperm whale.

## REFERENCES

- Anderson, M.S., K.A. Forney, T.V.N. Cole, T. Eagle, R.P. Angliss, K. Long, L. Barre, L. VanAtta, D. Borggaard, T. Rowles, B. Norberg, J. Whaley, L. Engleby. Differentiating serious and non-serious injury of marine mammals: Report of the Serious Injury Technical Workshop 10-13 September 2007, Seattle, WA. NOAA Tech Memo NMFS-OPR-39, 94 p.
- Angliss, R.P. and D.P. DeMaster. 1997. Differentiating serious and non-serious injury of marine mammals taken incidental to commercial fishing operations: Report of the Serious Injury Workshop 1-2 April. 1997, Silver Spring, MD. NOAA Tech Memo NMFS-OPR-13, 48 p.
- Baird, R.W. 2005. Sightings of dwarf (*Kogia sima*) and pygmy (*K. breviceps*) sperm whales from the main Hawaiian Islands. Pacific Science 59: 461-466..
- Baird, R.W., D.L. Webster, J.M. Aschettino, G.S. Schorr, D.J. McSweeney. 2013. Odontocete cetaceans around the main Hawaiian Islands: Habitat use and relative abundance from small-boat sighting surveys. Aquatic Mammals 39:253-269.
- Barlow, J. 2006. Cetacean abundance in Hawaiian waters estimated from a summer/fall survey in 2002. Marine Mammal Science 22: 446-464.
- Bradford, A.L. and K.A. Forney. 2013. Injury determinations for cetaceans observed interacting with Hawaii and American Samoa longline fisheries during 2007-2011. PIFSC Working Paper WP-13-002.
- Bradford, A.L., K.A. Forney, E.M. Oleson, and J. Barlow. 2013. Line-transect abundance estimates of cetaceans in the Hawaiian EEZ. PIFSC Working Paper WP-13-004.

- Bradford, A.L. and E. Lyman. 2013. Injury determinations for humpback whales and other cetaceans reported to the Hawaiian Islands Disentanglement and Pacific Islands Marine Mammal Response Networks during 2007-2011. PIFSC Working Paper WP-13-005.
- Caldwell, D. K. and M. C. Caldwell. 1989. Pygmy sperm whale *Kogia breviceps* (de Blainville, 1838): Dwarf sperm whale *Kogia simus* Owen, 1866. *In*: S. H. Ridgway and R. Harrison (eds.), Handbook of Marine Mammals, Vol. 4: The River Dolphins and Larger Toothed Whales, pp. 235-260. Academic Press, 442 pp.
- Jacob, J. M. 2012. Screening and characterization of morbillivirus in Hawaiian cetaceans. M.S. Marine Science Thesis. Hawaii Pacific University, Kaneohe, HI,
- Maldini, D., L. Mazzuca, and S. Atkinson. 2005. Odontocete stranding patterns in the Main Hawaiian Islands (1937-2002): How do they compare with live animal surveys? *Pacific Science* 59(1):55-67.
- McCracken, M. 2013. Preliminary assessment of incidental interactions with marine mammals in the Hawaii longline deep and shallow set fisheries from 2007 to 2011. PIFSC Working Paper WP-13.
- Mobley, J. R., Jr, S. S. Spitz, K. A. Forney, R. A. Grotefendt, and P. H. Forestall. 2000. Distribution and abundance of odontocete species in Hawaiian waters: preliminary results of 1993-98 aerial surveys Admin. Rep. LJ-00-14C. Southwest Fisheries Science Center, National Marine Fisheries Service, P.O. Box 271, La Jolla, CA 92038. 26 pp.
- NMFS Pacific Islands Regional Office Stranding Database. Available from NMFS-PIRO 1601 Kapiolani Blvd, Ste. 1110, Honolulu, HI 96814.
- NMFS. 2005. Revisions to Guidelines for Assessing Marine Mammal Stocks. 24 pp. Available at: <http://www.nmfs.noaa.gov/pr/pdfs/sars/gamms2005.pdf>
- NMFS. 2012. NOAA Fisheries Policy Directive 02-038-01 Process for Injury Determinations (01/27/12). Available at: [http://www.nmfs.noaa.gov/pr/pdfs/serious\\_injury\\_policy.pdf](http://www.nmfs.noaa.gov/pr/pdfs/serious_injury_policy.pdf)
- Nitta, E. 1991. The marine mammal stranding network for Hawaii: an overview. *In*: J.E. Reynolds III, D.K. Odell (eds.), Marine Mammal Strandings in the United States, pp.56-62. NOAA Tech. Rep. NMFS 98, 157 pp.
- Nitta, E. and J. R. Henderson. 1993. A review of interactions between Hawaii's fisheries and protected species. *Mar. Fish. Rev.* 55(2):83-92.
- Pryor, K. 1975. Lads Before the Wind: Adventures in Porpoise Training. Harper and Row, New York, 278 pp.
- 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.
- Shallenberger, E.W. 1981. The status of Hawaiian cetaceans. Final report to U.S. Marine Mammal Commission. MMC-77/23, 79pp.
- Tomich, P. Q. 1986. Mammals in Hawaii: A Synopsis and Notational Bibliography. Bishop Museum Press, Hawaii, 375 pp.
- Van Bresseem, M., J.A. Raga, G. Di Guardo, D.P. Jepson, P. J. Duignan, U. Siebert, T. Barrett, M. C. de Oliveira Santos, I.B. Moreno, S. Siciliano, A. Aguilar, K. Van Waerebeer. 2009. Emerging infectious diseases in cetaceans worldwide and the possible role of environmental stressors. *Diseases of Aquatic Organisms*. 85:143-157.
- 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.