

DWARF SPERM WHALE (*Kogia sima*): Hawaii Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Dwarf sperm whales are found throughout the world in tropical to warm-temperate waters (Nagorsen 1985). At least eight strandings of dwarf sperm whales have been documented in Hawaii since 1985 (Tomich 1986; Nitta 1991; Maldini et al. 2005, NMFS PIR Marine Mammal Response Network database), including two since 2007. From 2002 and 2012, dwarf sperm whales have been seen near Niihau, Kauai, Oahu, Lanai, and Hawaii during small boat surveys (Baird et al 2005, Baird et al 2013). Summer/fall shipboard surveys of the waters within the U.S. Exclusive Economic Zone (EEZ) of the Hawaiian Islands resulted in five sightings of dwarf sperm whales during 2002 and one during 2010 (Figure 1; Barlow 2006, Bradford et al. 2013).

Small boat surveys within the main Hawaiian Islands (MHI) since 2002 have documented dwarf sperm whales on 73 occasions, most commonly in water depths between 500m and 1,000m (Baird et al. 2013). Long-term site-fidelity is evident off Hawaii Island, with one third of the distinctive individuals seen there encountered in more than one year. Resighting data from 25 individuals documented at Hawaii Island suggest an island-resident population with restricted range, with all encounters in less than 1,600m water depth and less than 20 km from shore (Baird et al 2013). Division of this population into a separate island-associated stock may be warranted in the future. For the Marine Mammal Protection Act (MMPA) stock assessment reports, dwarf sperm whales within the Pacific U.S. EEZ are divided into two discrete, non-contiguous areas: 1) Hawaiian waters (this report), and 2) waters off California, Oregon and Washington. The Hawaii stock includes animals found 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).

POPULATION SIZE

Wade and Gerrodette (1993) provided an estimate for the eastern tropical Pacific, but it is not known whether these animals are part of the same population that occurs in the central North Pacific. This species' small size, tendency to avoid vessels, and deep-diving habits, combined with the high proportion of *Kogia* sightings that are not identified to species, may result in negatively biased estimates of relative abundance in this region. A 2002 shipboard line-transect survey of the entire Hawaiian Islands EEZ resulted in an abundance estimate of 17,519 (CV=0.74) dwarf sperm whales (Barlow 2006), including a correction factor for missed diving animals. There were no on-effort sightings of dwarf sperm whales during the 2010 shipboard survey of the Hawaiian EEZ (Bradford et al 2013), such that there is no current abundance estimate for this stock.

Minimum Population Estimate

The log-normal 20th percentile of the 2002 abundance estimate (Barlow 2006) is 10,043 dwarf sperm whales within the Hawaiian Islands EEZ; however, the minimum abundance estimate for the entire Hawaiian EEZ is ≥ 8 years old and will no longer be used (NMFS 2005). No minimum estimate of abundance is available for this

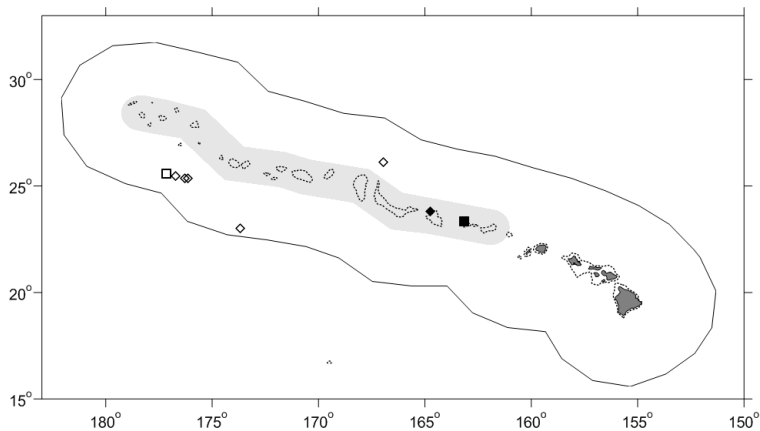


Figure 1. Dwarf sperm whale (diamonds) and unidentified *Kogia* (squares) sighting locations during the 2002 (open symbols) and 2010 (black symbols) shipboard cetacean surveys of U.S. waters surrounding the Hawaiian Islands (Barlow 2006, Bradford et al. 2013; see Appendix 2 for details on timing and location of survey effort). Outer line indicates approximate boundary of survey area and U.S. EEZ. Gray shading indicates area of Papahānaumokuākea Marine National Monument. Dotted line represents the 1000m isobath.

stock, as there were no sightings of dwarf sperm whales 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 Hawaii pelagic dwarf sperm whales, 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. No interactions between nearshore fisheries and dwarf sperm whales have been reported in Hawaiian waters. 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 (DSLL) fishery that targets primarily tunas, and a shallow-set longline fishery (SSLL) 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 SSLL fishery (100% observer coverage) (Figure 2, McCracken 2013, Bradford & Forney 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

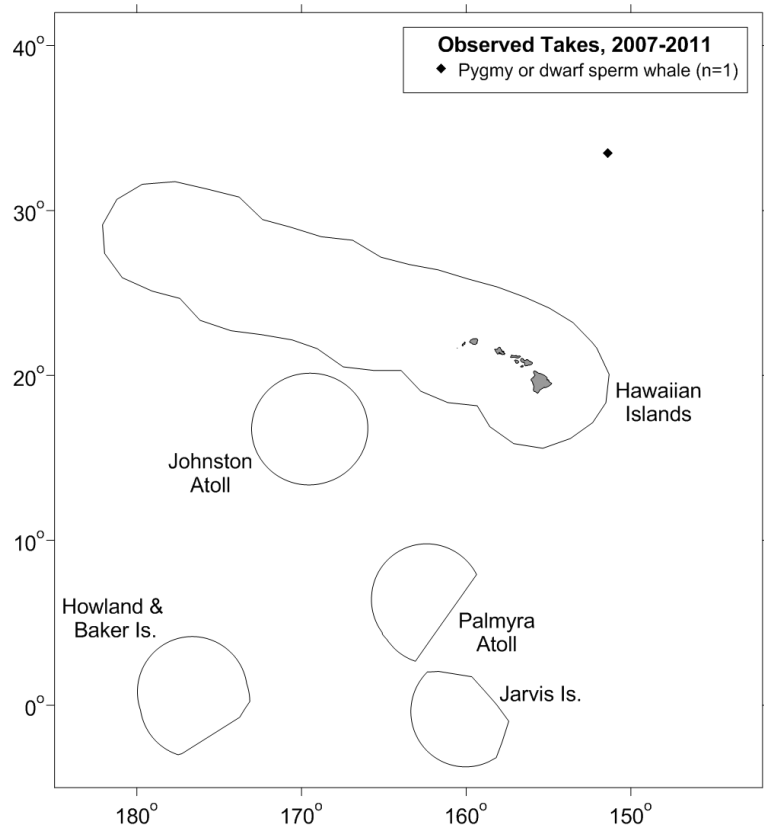


Figure 2. Location of pygmy or dwarf sperm whale take (filled diamond) in Hawaii-based longline fisheries, 2007-2011. Solid lines represent the U.S. EEZs. Fishery descriptions are provided in Appendix 1.

animal was considered not seriously injured (Bradford & Forney 2013). No dwarf sperm whales were observed hooked or entangled in the DSLL fishery (20-22% observer coverage). Eight unidentified cetaceans were taken in the DSLL fishery, and two unidentified cetaceans were taken in the SSLL fishery, some of which may have been dwarf sperm whales.

Table 1. Summary of available information on incidental mortality and serious injury of dwarf sperm whales (Hawaii 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 dwarf 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 (-)
Mean Estimated Annual Take (CV)					0 (-)		0 (-)
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
Mean Annual Takes (100% coverage)					0		0
Minimum total annual takes within U.S. EEZ							0 (-)

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

STATUS OF STOCK

The Hawaii stock of dwarf sperm whales is not considered strategic under the 1994 amendments to the MMPA. The status of dwarf sperm whales in Hawaiian waters relative to OSP is unknown, and there are insufficient data to evaluate trends in abundance. Dwarf sperm whales are not listed as “threatened” or “endangered” under the Endangered Species Act (1973), nor designated as “depleted” under the MMPA. There have been no reported fishery related mortality or injuries within the Hawaiian Islands EEZ, such that the total mortality and serious injury can be considered to be insignificant and approaching zero. The increasing levels 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 dwarf sperm whales that feed in the oceans’ “sound channel”.

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