

SHORT-FINNED PILOT WHALE (*Globicephala macrorhynchus*): Hawaiian Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Short-finned pilot whales are found in all oceans, primarily in tropical and warm-temperate waters. They are commonly observed around the main Hawaiian Islands and are also present around the Northwestern Hawaiian Islands (Shallenberger 1981; Barlow 2003). During a 2002 shipboard survey of waters within the U.S. Exclusive Economic Zone (EEZ) of the Hawaiian Islands, 25 sightings of short-finned pilot whales were made (Figure 1; Barlow 2003). Fourteen strandings of short-finned pilot whales have been documented from the main Hawaiian Islands, including five mass strandings (Tomich 1986; Nitta 1991; Maldini 2005). Stock structure of short-finned pilot whales has not been adequately studied in the North Pacific, except in Japanese waters, where two stocks have been identified based on pigmentation patterns and differences in the shape of the heads of adult males (Kasuya et al. 1988). The pilot whales in Hawaiian waters are similar morphologically to the Japanese "southern form." Preliminary photo-identification work with pilot whales in Hawaii indicated a high degree of site fidelity around the main island of Hawaii (Shane and McSweeney 1990). Additional photo-identification work around the Hawaiian Islands is being done to examine whale movements between islands (R.W. Baird, pers. comm.).

Genetic analyses of tissue samples collected near the main Hawaiian Islands indicate that Hawaiian short-finned pilot whales are reproductively isolated from short-finned pilot whales found in the eastern Pacific Ocean (S. Chivers, NMFS/SWFSC, unpublished data); however, the offshore range of this Hawaiian population is unknown. Fishery interactions with short-finned pilot whales demonstrate that this species also occurs in U.S. EEZ waters of Palmyra Island (Figure 2), but it is not known whether these animals are part of the Hawaiian stock or whether they represent a separate stock of short-finned pilot whales. Based on patterns of movement and population structure observed in other island-associated cetaceans (Norris and Dohl 1980; Norris et al. 1994; Baird et al. 2001, 2003; S. Chivers, pers. comm.), it is possible that the animals around Palmyra Island are a separate stock. Efforts are currently underway to obtain additional samples of short-finned pilot whales for further studies of population structure in the North Pacific Ocean. For the Marine Mammal Protection Act (MMPA) stock assessment reports, short-finned pilot 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. Information on short-finned pilot whales around Palmyra Island will provisionally be included with this stock assessment report, recognizing that separate stock status may be warranted for these animals in the future. Estimates of abundance, potential biological removals, and status determinations will be presented separately for U.S. waters of the Hawaiian Islands and Palmyra Island.

POPULATION SIZE

Estimates of short-finned pilot whale populations have been made off Japan (Miyashita 1993) and in the eastern tropical Pacific (Wade and Gerrodette 1993), but it is not known whether any of these animals are part of the

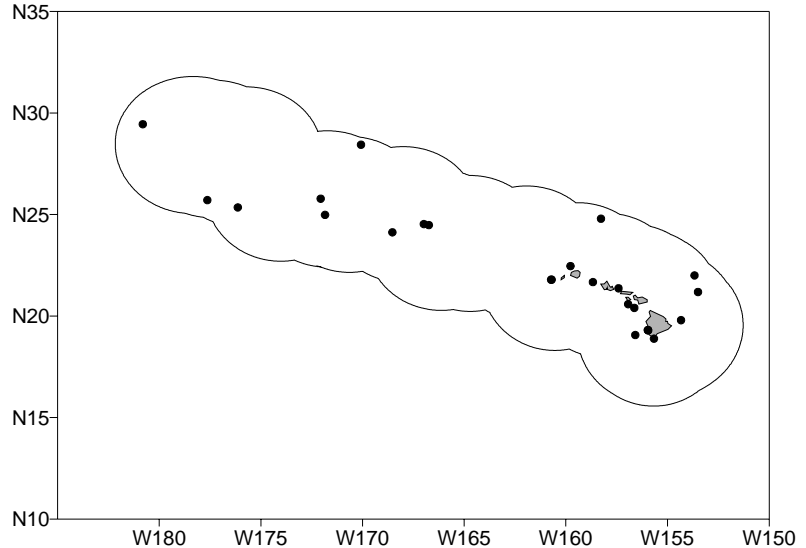


Figure 1. Short-finned pilot whale sighting locations during the 2002 shipboard survey of U.S. EEZ waters surrounding the Hawaiian Islands (Barlow 2003; see Appendix 2 for details on timing and location of survey effort). Outer line represents approximate boundary of survey area and U.S. EEZ.

same population that occurs around the Hawaiian Islands. As part of the Marine Mammal Research Program of the Acoustic Thermometry of Ocean Climate (ATOC) study, a total of twelve aerial surveys were conducted within about 25 nmi of the main Hawaiian Islands in 1993, 1995 and 1998. An abundance estimate of 1,708 (CV=0.32) short-finned pilot whales was calculated from the combined survey data (Mobley et al. 2000). This study underestimated the total number of short-finned pilot whales within the U.S. EEZ off Hawaii, because areas around the Northwestern Hawaiian Islands (NWHI) and beyond 25 nautical miles from the main islands were not surveyed. Furthermore, the data on which this estimate was based are now over 5 years old. A 2002 shipboard line-transect survey of the entire Hawaiian Islands EEZ resulted in an abundance estimate of 8,846 (CV=0.49) short-finned pilot whales (Barlow 2003). This is currently the best available abundance estimate for short-finned pilot whales within the Hawaiian Islands EEZ.

No abundance estimates are currently available for short-finned pilot whales in U.S. EEZ waters of Palmyra Island; however, density estimates for short-finned pilot whales in other Pacific regions can provide a range of likely abundance estimates in this unsurveyed region. Published estimates of short-finned pilot whale density (animals per km²) in the Pacific are: 0.0036 (CV=0.49) for the U.S. EEZ of the Hawaiian Islands (Barlow 2003); 0.0237 (CV=0.32) for nearshore waters surrounding the main Hawaiian Islands (Mobley et al. 2000), 0.0084 (CV=0.14) and 0.0040 (CV=0.23) for the eastern tropical Pacific Ocean (Wade and Gerrodette 1993; Ferguson and Barlow 2003), and 0.0025 (CV=0.29) for the eastern tropical Pacific Ocean west of 120°W and north of 5°N (Ferguson and Barlow 2003). Applying the lowest and highest of these density estimates to U.S. EEZ waters surrounding Palmyra Island (area size = 347,216 km²) yields a range of plausible abundance estimates of 877 - 8,229 short-finned pilot whales.

Minimum Population Estimate

The log-normal 20th percentile of the 2002 abundance estimate for the Hawaiian Islands EEZ (Barlow 2004) is 5,986 short-finned pilot whales. No minimum population estimate is currently available for waters surrounding Palmyra Island, but the short-finned pilot whale density estimates from other Pacific regions (Barlow 2003, Mobley et al. 2000, Wade and Gerrodette 1993, Ferguson and Barlow 2003; see above) can provide a range of likely values. The lognormal 20th percentiles of plausible abundance estimates for the Palmyra Island EEZ, based on the densities observed elsewhere, range from 690 - 6,327 short-finned pilot whales.

Current Population Trend

No data are available on current population 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 the Hawaiian short-finned pilot whale stock is calculated as the minimum population size (5,986) times one half the default maximum net growth rate for cetaceans (½ of 4%) times a recovery factor of 0.50 (for a species of unknown status with a no known fishery mortality and serious injury within the U.S. EEZ of the Hawaiian Islands; Wade and Angliss 1997), resulting in a PBR of 60 short-finned pilot whales per year. No separate PBR can presently be calculated for Palmyra Island waters, but based on the range of plausible minimum abundance estimates (690 - 6,327), a recovery factor of 0.40 (for a species of unknown status with a fishery mortality and serious injury rate CV >0.80 within the Palmyra Islands EEZ; Wade and Angliss 1997), and the default growth rate (½ of 4%), the PBR would likely fall between 5.5 and 51 short-finned pilot whales per year.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

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. Gillnets appear to capture marine mammals wherever they are used, and float lines from lobster traps and longlines can be expected to occasionally entangle whales (Perrin et al. 1994). Interactions with cetaceans have been reported for all Hawaiian pelagic fisheries (Nitta and Henderson 1993). Between 1994 and 2002, five short-finned pilot whales were observed hooked in the Hawaii-based longline fishery with approximately 4-25% of all effort observed (Table 1; Forney 2004). During the 905 observed trips with 11,014 sets, the average interaction rate of short-finned pilot whales was one animal per 181 fishing trips, or one animal per 2,203 sets. Two of the animals

caught were dead upon gear retrieval, and two additional animals were considered seriously injured (Forney 2004), based on an evaluation of the observer's description of the interaction and following established guidelines for assessing serious injury in marine mammals (Angliss and DeMaster 1998). Average 5-yr estimates of annual mortality and serious injury for 1998-2002 are 4.2 (CV = 0.78) short-finned pilot whales outside of the U.S. EEZs, and 0.8 (CV = 1.00) within the U.S. EEZ of Palmyra Island (Table 1). No short-finned pilot whales were observed taken within the Hawaiian Islands EEZ during 1998-2002. Six additional unidentified cetaceans, which may have been short-finned pilot whales, were also taken in this fishery. Two of these unidentified cetaceans were within the EEZ of Palmyra Island, and four were in international waters (Figure 2, Forney 2004). Since 2001, the Hawaii-based longline fishery has undergone a series of regulatory changes, primarily to protect sea turtles (NMFS 2001). Potential impacts of these regulatory changes on the rate of short-finned pilot whale interactions are unknown.

Interaction rates between dolphins and the NWHI bottomfish fishery have been estimated based on studies conducted in 1990-1993, indicating that an average of 2.67 dolphin interactions, most likely involving bottlenose and rough-toothed dolphins, occurred for every 1000 fish brought on board (Kobayashi and Kawamoto 1995). Fishermen claim interactions with dolphins who steal bait and catch are increasing. It is not known whether these interactions result in serious injury or mortality of dolphins, nor whether short-finned pilot whales are involved.

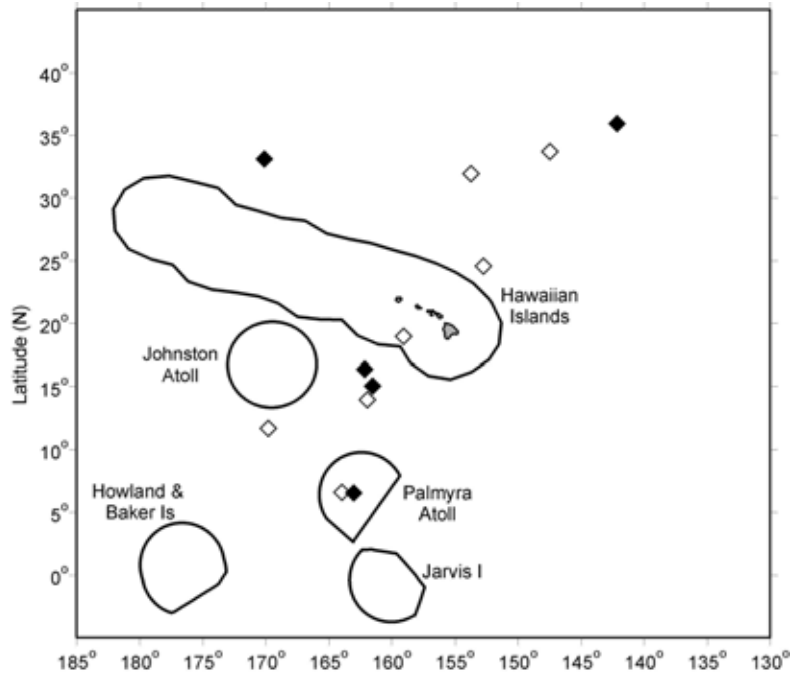


Figure 2. Locations of observed short-finned pilot whale takes (filled diamonds) and possible takes of this species (open diamonds) in the Hawaii-based longline fishery, 1994-2002. Solid lines represent the U.S. EEZ. Set locations in this fishery are summarized in Appendix 1.

Table 1. Summary of available information on incidental mortality and serious injury of short-finned pilot whales (Hawaiian stock) in commercial fisheries, within and outside of the U.S. EEZs (Forney 2004). Mean annual takes are based on 1998-2002 data unless otherwise indicated.

Fishery Name	Year	Data Type	Percent Observer Coverage	Observed and estimated mortality and serious injury of short-finned pilot whales, by EEZ region								
				Outside of U.S. EEZs			Hawaiian Islands EEZ			Palmyra Island EEZ		
				Obs.	Estimated (CV)	Mean Annual Takes (CV)	Obs.	Estimated (CV)	Mean Annual Takes (CV)	Obs.	Estimated (CV)	Mean Annual Takes (CV)
Hawaii-based longline fishery	1998	observer data	4.6%	0	0 (-)	4.2 (0.78)	0	0 (-)	0 (-)	0	0 (-)	0.8 (1.00)
	1999		3.5%	0	0 (-)		0	0 (-)		0	0 (-)	
	2000		11.8%	2	17 (0.71)		0	0 (-)		0	0 (-)	
	2001		22.7%	1	4 (1.00)		0	0 (-)		1	4 (1.00)	
	2002		24.9%	0	0 (-)		0	0 (-)		0	0 (-)	
Minimum total annual takes within U.S. EEZ waters						0.8 (1.00)						

Ship Strikes

Short-finned pilot whales with propeller scars have been seen around the Hawaiian islands (R.W. Baird, pers. comm.). It is unknown if any of these injuries were serious or resulted in mortalities.

STATUS OF STOCK

The status of short-finned pilot whales in Hawaiian waters relative to OSP is unknown, and there are insufficient data to evaluate trends in abundance. No habitat issues are known to be of concern for this species. They are not listed as “threatened” or “endangered” under the Endangered Species Act (1973), nor as “depleted” under the MMPA. The Hawaiian stock of short-finned pilot whales is not considered strategic under the 1994 amendments to the MMPA, because the estimated rate of mortality and serious injury within the Hawaiian Islands EEZ is zero. However, there is no systematic monitoring of gillnet fisheries that may take this species, and the potential effect of mortality in the Hawaii-based fishery in international waters is not known. Although no estimates of abundance or PBR are currently available for short-finned pilot whales around Palmyra Island, the average rate of mortality and serious injury within the Palmyra Island EEZ (0.8 animals per year) falls below the range of likely PBRs (5.5 - 51) for this region. Insufficient information is available to determine whether the total fishery mortality and serious injury for short-finned pilot whales is insignificant and approaching zero mortality and serious injury rate.

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