

STRIPED DOLPHIN (*Stenella coeruleoalba*): Hawaiian Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Striped dolphins are found in tropical to warm-temperate waters throughout the world (Perrin et al. 2009). They have been documented in the Hawaiian Islands from 20 strandings (Nitta 1991, Maldini et al. 2005), although sightings have historically been infrequent (Shallenberger 1981, Mobley et al. 2000). A comprehensive shipboard survey of the Hawaiian Exclusive Economic Zone (EEZ), resulted in 15 sightings of striped dolphins (Figure 1; Barlow 2006).

Striped dolphins have been intensively exploited in the western North Pacific, where three migratory stocks are provisionally recognized (Kishiro and Kasuya 1993). In the eastern tropical Pacific all striped dolphins are provisionally considered to belong to a single stock (Dizon et al. 1994). For the Marine Mammal Protection Act (MMPA) stock assessment reports, striped dolphins within the Pacific U.S. EEZ are divided into two discrete, non-contiguous areas: 1) waters off California, Oregon and Washington, and 2) waters around Hawaii (this report), including animals found both within the Hawaiian Islands EEZ and in adjacent international waters. Because data on abundance, distribution, and human-caused impacts are largely lacking for international waters, the status of all stocks combined is evaluated based on data from U.S. EEZ waters of the Hawaiian Islands (NMFS 2005). Striped dolphins involved in eastern tropical Pacific tuna purse-seine fisheries are managed separately under the MMPA.

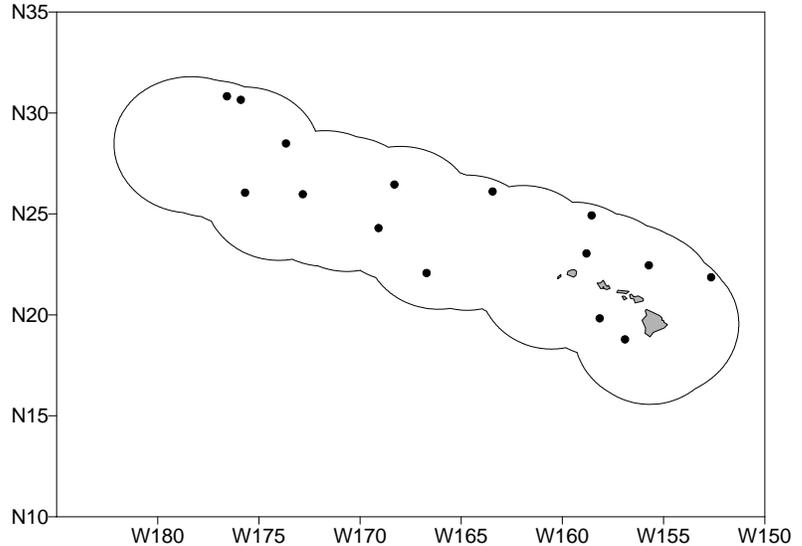


Figure 1. Striped dolphin sighting locations during the 2002 shipboard survey of U.S. EEZ waters surrounding the Hawaiian Islands (Barlow 2006; see Appendix 2 for details on timing and location of survey effort). Outer line represents approximate boundary of survey area and U.S. EEZ.

POPULATION SIZE

Population estimates are available for Japanese waters (Miyashita 1993) and the eastern tropical Pacific (Wade and Gerrodette 1993), but it is not known whether any of these animals are part of the same population that occurs around the Hawaiian Islands. A 2002 shipboard line-transect survey of the entire Hawaiian Islands EEZ resulted in an abundance estimate of 13,143 (CV=0.46) striped dolphins (Barlow 2006). This is currently the best available abundance estimate for this stock.

Minimum Population Estimate

The log-normal 20th percentile of the 2002 abundance estimate (Barlow 2006) is 9,088 striped dolphins.

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 this stock is calculated as the minimum population size within the U.S. EEZ of the Hawaiian Islands (9,088) times one half the default maximum net growth rate for

cetaceans (½ of 4%) times a recovery factor of 0.45 (for a stock of unknown status with a Hawaiian Islands EEZ fishery mortality and serious injury rate CV between 0.60 and 0.80; Wade and Angliss 1997), resulting in a PBR of 82 striped dolphins per year.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fishery Information

Information on fishery-related mortality and serious injury 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 cetaceans (Perrin et al. 1994).

Interactions with cetaceans have been reported for all Hawaiian pelagic fisheries (Nitta and Henderson 1993). 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 fishery (SSL) that targets swordfish. Both fisheries operate within U.S. waters and on the high seas. Between 2004 and 2008, one striped dolphin was seriously injured on the high seas in the SSL fishery (100% observer coverage), and one striped dolphin was killed within the Hawaiian Islands EEZ in the DSL fishery (20-28% observer coverage) (Figure 2, Forney 2009, McCracken & Forney 2010). Average 5-yr estimates of annual mortality and serious injury for 2004-2008 are zero dolphins outside of U.S. EEZs, and 0.9 (CV=0.6) within the Hawaiian Islands EEZ (Table 1).

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 that steal bait and catch are increasing. It is not known whether these interactions result in serious injury or mortality of dolphins, nor whether striped dolphins are involved.

STATUS OF STOCK

The status of striped dolphins 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. It is not listed as “threatened” or “endangered” under the Endangered Species Act (1973), nor as “depleted” under the MMPA. The Hawaiian stock of striped dolphins is not considered strategic under the 1994 amendments to the MMPA, because the estimated rate of fisheries related mortality and serious injury within the Hawaiian Islands EEZ (0.9 animals per year) is less than the PBR (82). Total fishery mortality and serious injury for striped dolphins can be considered insignificant and approaching zero, because the average annual takes are less than 10% of the PBR.

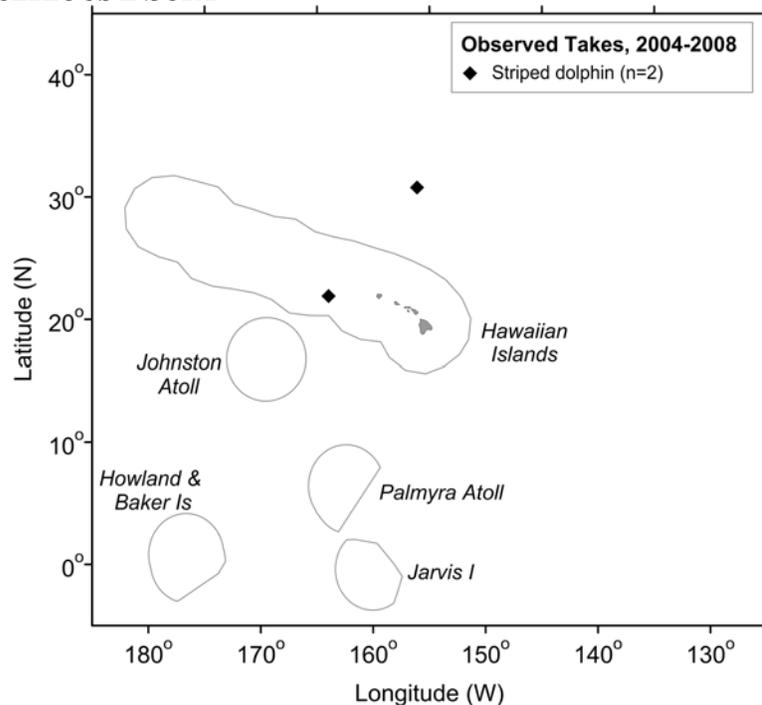


Figure 2. Locations of striped dolphin takes (filled diamonds) in Hawaii-based longline fisheries, 2004-2008. Solid lines represent the U.S. EEZs. Fishery descriptions are provided in Appendix 1.

Table 1. Summary of available information on incidental mortality and serious injury of striped dolphin (Hawaii stock) in commercial fisheries, within and outside of U.S. EEZs (McCracken & Forney 2010). Mean annual takes are based on 2004-2008 data unless otherwise indicated.

Fishery Name	Year	Data Type	Percent Observer Coverage	Mortality and Serious Injury outside of U.S. EEZ			Mortality and Serious Injury within Hawaiian Islands EEZ		
				Observed	Estimated	Mean Annual Takes (CV)	Observed	Estimated (CV)	Mean Annual Takes (CV)
Hawaii-based deep-set longline fishery	2004	observer data	25%	0	0 (-)	0 (-)	0	0 (-)	0.9 (0.6)
	2005		28%	0	0 (-)		0	0 (-)	
	2006		22%	0	0 (-)		1	5 (0.3)	
	2007		20%	0	0 (-)		0	0 (-)	
	2008		22%	0	0 (-)		0	0 (-)	
Hawaii-based shallow-set longline fishery	2004	observer data	100%	0	Same as observed	0.2	0	0	0
	2005		100%	0			0	0	
	2006		100%	0			0	0	
	2007		100%	0			0	0	
	2008		100%	1			0	0	
Minimum total annual takes within U.S. EEZ waters									0.9 (0.6)

REFERENCES

- Barlow, J. 2006. Cetacean abundance in Hawaiian waters estimated from a summer/fall survey in 2002. *Marine Mammal Science* 22(2): 446-464.
- Dizon, A. E., W. F. Perrin, and P. A. Akin. 1994. Stocks of dolphins (*Stenella* spp. and *Delphinus delphis*) in the eastern tropical Pacific: a phylogeographic classification. NOAA Tech. Rep. NMFS 119, 20 pp.
- Forney, K.A. 2009. Serious injury determinations for cetaceans caught in Hawaii longline fisheries during 1994-2008. Draft document PSRG-2009-09 presented to the Pacific Scientific Review Group, November 3-5, 2009, Del Mar, CA.
- Kishiro, T. and T. Kasuya. 1993. Review of Japanese dolphin drive fisheries and their status. *Rep. Int. Whal. Commn.* 43:439-452.
- Kobayashi, D. R. and K. E. Kawamoto. 1995. Evaluation of shark, dolphin, and monk seal interactions with Northwestern Hawaiian Island bottomfishing activity: a comparison of two time periods and an estimate of economic impacts. *Fisheries Research* 23: 11-22.
- McCracken M. and K.A. Forney 2010. Preliminary assessment of incidental interactions with marine mammals in the Hawaii longline deep and shallow set fisheries. NMFS, Pacific Islands Fisheries Science Center Working Paper WP-10-001. 27p.
- 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.
- Miyashita, T. 1993. Abundance of dolphin stocks in the western North Pacific taken by the Japanese drive fishery. *Rep. Int. Whal. Commn.* 43:417-437.
- 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.
- 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.
- Perrin, W.F., G. P. Donovan and J. Barlow. 1994. Gillnets and Cetaceans. *Rep. Int. Whal. Commn.*, Special Issue 15, 629 pp.
- Perrin, W.F., B. Würsig and J.G.M. Thewissen. 2009. *Encyclopedia of Marine Mammals*. Second Edition. Academic Press, Amsterdam.
- Shallenberger, E.W. 1981. The status of Hawaiian cetaceans. Final report to U.S. Marine Mammal Commission. MMC-77/23, 79pp.
- 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.

Wade, P. R. and T. Gerrodette. 1993. Estimates of cetacean abundance and distribution in the eastern tropical Pacific. Rep. Int. Whal. Commn. 43:477-493.