

FALSE KILLER WHALE (*Pseudorca crassidens*): Pacific Islands Region Stock Complex - Hawaii & Palmyra Atoll

STOCK DEFINITIONS AND GEOGRAPHIC RANGES

False killer whales are found worldwide mainly in tropical and warm-temperate waters (Stacey et al. 1994). In the North Pacific, this species is well known from southern Japan, Hawaii, and the eastern tropical Pacific. There are six stranding records from Hawaiian waters (Nitta 1991; Maldini 2005). One on-effort sighting of false killer whales was made during a 2002 shipboard survey of waters within the U.S. Exclusive Economic Zone (EEZ) of the Hawaiian Islands (Figure 1; Barlow 2006). Smaller-scale surveys conducted around the Main Hawaiian Islands (Figure 2) show that false killer whales are also commonly encountered in nearshore waters (Baird et al. 2005, Mobley et al. 2000, Mobley 2001, 2002, 2003, 2004). This species also occurs in U.S. EEZ waters around Palmyra Atoll (Figure 1) and sightings of false killer whales have been recently confirmed within the Johnston Atoll EEZ (NMFS/PIR/PSD unpublished data) and the U.S. EEZ waters of American Samoa (NOS/HHWNMS unpublished data).

Genetic analyses of tissue samples collected within the Eastern North Pacific (ENP) indicate restricted gene flow between false killer whales sampled near the main Hawaiian Islands and false killer whales sampled in all other regions of the ENP (Chivers et al. 2007). False killer whales sampled at Palmyra Atoll appear more closely related to animals sampled in the waters of the pelagic ENP, Panama and Mexico (Chivers et al. 2007). Thus, false killer whales occurring near Palmyra Atoll may be part of a larger population inhabiting a broad geographic area within the central and eastern North Pacific.

Since 2003, observers of the Hawaii-based longline fishery have also been collecting tissue samples of caught cetaceans for genetic analysis whenever possible. Four false killer whale samples, two collected outside the Hawaiian EEZ and two collected more than 100 nautical miles from the main Hawaiian Islands (See Figure 3) were determined to have ENP-like haplotypes. This indicates that false killer whales within the Hawaiian EEZ belong to two different genetic populations, with a boundary somewhere within the Hawaiian EEZ. Both genetic types are provisionally included within a single Hawaiian stock for assessment purposes.

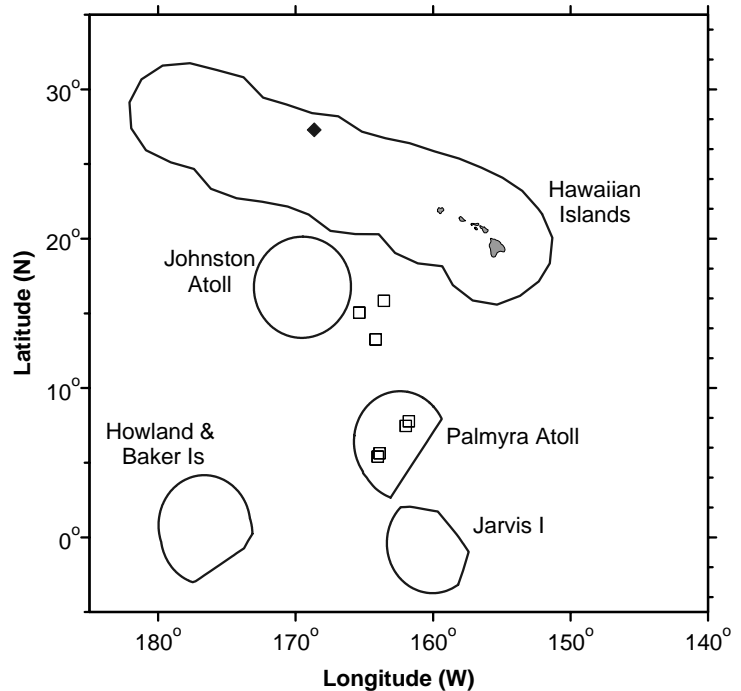


Figure 1. False killer whale sighting locations during standardized shipboard surveys of the Hawaiian U.S. EEZ (2002, black diamond, Barlow 2006), the Palmyra U.S. EEZ (2005, open squares, Barlow and Rankin 2007), and pelagic waters of the central Pacific south of the Hawaiian Islands (2005, open squares, Barlow and Rankin 2007). Outer lines represent approximate boundary of U.S. EEZs.

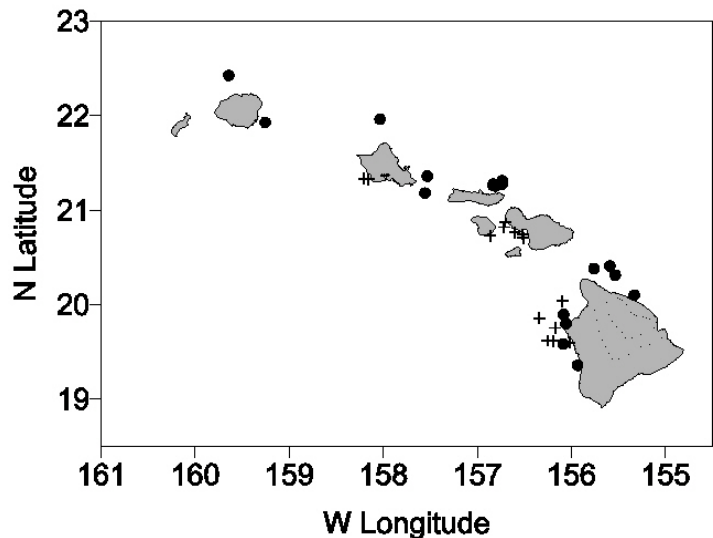


Figure 2. False killer whale sighting locations during 2000-2004 boat-based surveys (+) (Baird et al. 2005) and 1993-2003 aerial surveys (•) (Mobley et al. 2000, Mobley 2001, 2002, 2003, 2004) around the Main Hawaiian Islands. See Appendix 2 for details on timing and location of survey effort.

Efforts are currently underway to obtain and analyze additional tissue samples of false killer whales for further studies of population structure in the North Pacific Ocean.

For the Marine Mammal Protection Act (MMPA) stock assessment reports, there are currently two Pacific Islands Region management stocks: 1) the Hawaii stock, which includes animals found within the U.S. EEZ of the Hawaiian Islands, and 2) the Palmyra Stock, which includes false killer whales found with the U.S. EEZ of Palmyra Atoll. Estimates of abundance, potential biological removal, and status determinations will be presented separately for U.S. EEZ waters of the Hawaiian Islands and Palmyra Atoll.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fishery Information

Interactions with cetaceans have been reported for Hawaiian pelagic fisheries, and false killer whales have been identified in fishermen's logs and NMFS observer records as taking catches from pelagic longlines (Nitta and Henderson 1993, NMFS/PIR unpublished data). They have also been observed feeding on mahi mahi, *Coryphaena hippurus*, and yellowfin tuna, *Thunnus albacares*, and they have been reported to take large fish (up to 70 pounds) from the trolling lines of both commercial and recreational fishermen (Shallenberger 1981).

Between 1994 and 2005, 20 false killer whales were observed hooked or entangled in the Hawaii-based longline fishery, with approximately 4-34% of all effort observed (Table 1; Forney and Kobayashi 2007). Twelve additional unidentified cetaceans, which may have been false killer whales based on the observer's descriptions, were also taken (hooked or entangled) in this fishery, but were not included in this analysis (Figure 3; Forney and Kobayashi 2007). During 24,542 observed sets, the average interaction rate of false killer whales was 0.81 false killer whales per 1,000 sets. Two of the false killer whales were killed, and all others caught were considered seriously injured, based on an evaluation of the observer's description of the interaction (Forney and Kobayashi, in press) 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 2001-2005 are 7.7 (CV = 0.34) false killer whales outside of U.S. EEZs, 4.9 (CV = 0.41) within the Hawaiian Islands EEZ, and 1.9 (CV = 0.59) within the EEZ of Palmyra Atoll (Table 1). Total estimated annual mortality and serious injury for all U.S. EEZs combined averaged 6.8 (CV = 0.34) between 2001 and 2005. 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 false killer whale interactions are unknown.

Table 1. Summary of available information on incidental mortality and serious injury of false killer whales (Pacific Islands Stock Complex) in commercial fisheries, within and outside of selected U.S. EEZs (Forney and Kobayashi, in press). Mean annual takes are based on 2001-2005 data unless otherwise indicated.

Fishery Name	Year	Data Type	Percent Observer Coverage	Observed and estimated mortality and serious injury of false killer whales, by EEZ region								
				Outside of U.S. EEZs			Hawaiian Islands EEZ			Palmyra Atoll 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	2001	observer data	23.0%	2	11 (0.71)	7.7 (0.34)	0	0 (-)	4.9 (0.41)	1	4 (1.00)	1.9 (0.59)
	2002		24.8%	3	12 (0.58)		0	0 (-)		2	5 (0.71)	
	2003		21.9%	0	0 (-)		2	8 (0.68)		0	0 (-)	
	2004		25.4%	3	12 (0.58)		3	13 (0.58)		0	0 (-)	
	2005		34.2%	1	4 (1.00)		1	3 (1.00)		0	0 (-)	
Minimum total annual takes within U.S. EEZ waters						6.8 (0.34)						

HAWAII STOCK

POPULATION SIZE

A recent mark-recapture study of photo-identification data obtained during 2000-2004 around the main Hawaiian Islands produced an estimate of 123 (CV=0.72) false killer whales (Baird et al. 2005). Analyses of a 2002 shipboard line-transect survey of the entire Hawaiian Islands EEZ (HICEAS survey) resulted in an abundance estimate of 236 (CV=1.13) false killer whales (Barlow 2006). A recent re-analysis of the HICEAS data using improved methods and incorporating additional sighting information obtained on line-transect surveys south of the Hawaiian EEZ during 2005, resulted in a revised estimate of 484 (CV = 0.93) false killer whales within the Hawaiian Islands EEZ (Barlow & Rankin 2007). This is the best available abundance estimate for false killer whales within the Hawaiian Islands EEZ.

Minimum Population Estimate

The log-normal 20th percentile of the 2002 abundance estimate for the Hawaiian Islands EEZ (Barlow & Rankin 2007) is 249 false killer 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 for this species in Hawaiian waters.

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for the Hawaiian false killer whale stock is calculated as the minimum population size (249) times one half the default maximum net growth rate for cetaceans ($\frac{1}{2}$ of 4%) times a recovery factor of 0.48 (for a stock of unknown status with a Hawaiian Islands EEZ mortality and serious injury rate CV between 0.30 and 0.60; Wade and Angliss 1997), resulting in a PBR of 2.4 false killer whales per year.

STATUS OF STOCK

The status of false killer 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. Because the rate of mortality and serious injury to false killer whales within the Hawaiian Islands EEZ in the Hawaii-based longline fishery (4.9 animals per year) exceeds the PBR (2.4), this stock is considered a “strategic stock” under the 1994 amendments to the MMPA. The total fishery mortality and serious injury for Hawaiian false killer whales cannot be considered to be insignificant and approaching zero, because it exceeds the PBR. Furthermore, additional injury and mortality of false killer whales is known to occur in longline fishing operations in international waters, and the potential effect on the Hawaiian Islands EEZ stock is unknown.

PALMYRA STOCK

POPULATION SIZE

Recent line transect surveys in the U.S. EEZ waters of Palmyra Atoll produced an estimate of 1,329 (CV = 0.65) false killer whales (Barlow & Rankin 2007). This is the best available abundance estimate for false killer whales within the Palmyra Atoll EEZ.

Minimum Population Estimate

The log-normal 20th percentile of the 2002 abundance estimate for the Palmyra Atoll EEZ (Barlow & Rankin 2007) is 806 false killer whales.

Current Population Trend

No data are available on current population trend.

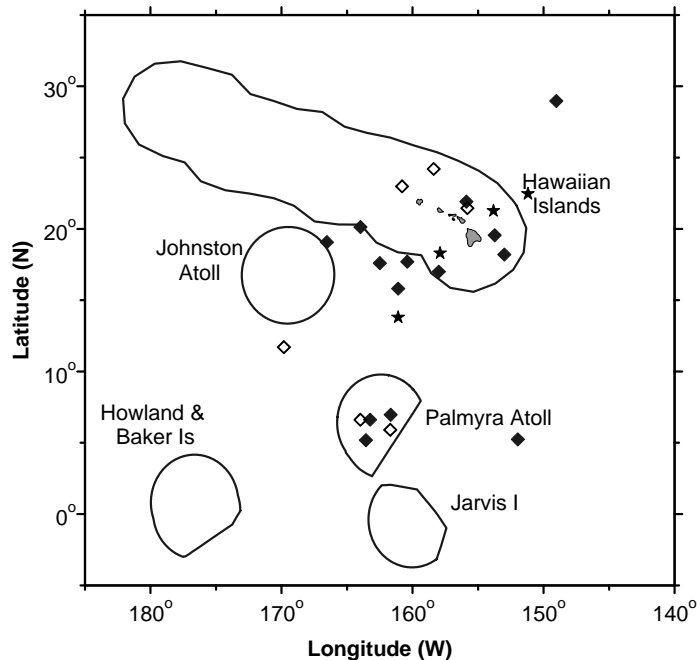


Figure 3. Locations of observed false killer whale takes (filled symbols) and possible takes of this species (open symbols) in the Hawaii-based longline fishery, 1994-2003. Stars are locations of genetic samples from fishery-caught false killer whales. Solid lines represent the U.S. EEZ. Set locations in this fishery are summarized in Appendix 1.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

No data are available on current or maximum net productivity rate for this species in Palmyra Atoll waters.

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for the Palmyra Atoll false killer whale stock is calculated as the minimum population size (806) times one half the default maximum net growth rate for cetaceans ($\frac{1}{2}$ of 4%) times a recovery factor of 0.48 (for a stock of unknown status with a mortality and serious injury rate CV between 0.30 and 0.60; Wade and Angliss 1997), resulting in a PBR of 7.7 false killer whales per year.

STATUS OF STOCK

The status of false killer whales in Palmyra Atoll EEZ 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 rate of mortality and serious injury to false killer whales within the Palmyra Atoll EEZ in the Hawaii-based longline fishery (1.9 animals per year) does not exceed the PBR (7.7) for this stock and thus, this stock is not considered “strategic” under the 1994 amendments to the MMPA. The total fishery mortality and serious injury for Palmyra Atoll false killer whales is greater than 10% of the PBR and, therefore, cannot be considered to be insignificant and approaching zero. Additional injury and mortality of false killer whales is known to occur in longline fishing operations in international waters, and the potential effect on the Palmyra stock is unknown.

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