

SHORT-FINNED PILOT WHALE (*Globicephala macrorhynchus*) Puerto Rico and U.S. Virgin Islands Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The short-finned pilot whale is distributed worldwide in tropical to temperate waters (Leatherwood and Reeves 1983). Short-finned pilot whales were commercially hunted in the Caribbean Sea, including the waters surrounding Puerto Rico and the U.S. Virgin Islands, by New England whaling vessels during the eighteenth and nineteenth centuries (Price 1985; Reeves *et al.* 2001). Small-scale whaling of short-finned pilot whales, carried out by local fisherman, is still conducted in the eastern Caribbean (see Fisheries Information section; e.g., Rathjen and Sullivan 1970; Caldwell *et al.* 1971; Adams 1975; Caldwell and Caldwell 1975; Hoyt and Hvenegaard 2002; Mohammed *et al.* 2003; World Council of Whalers 2008).

In waters of the Caribbean Sea, the short-finned pilot whale is widely distributed. Sightings in Puerto Rico and the Virgin Islands area have been described by Caldwell and Erdman (1963), Erdman (1970), Erdman *et al.* (1973), Taruski and Winn (1976) and Mattila and Clapham (1989). Caldwell and Erdman (1963) also reported a sighting for Haiti, and Taruski and Winn (1976) reported a sighting for St. Vincent. Sightings have been reported for Dominican Republic (Mattila *et al.* 1994), Dominica (Gordon *et al.* 1998), Martinique (J r mie *et al.* 2006) and waters near Antigua, Guadeloupe and St. Vincent (Yoshida *et al.* 2010). Sightings and strandings have been reported for the Leeward Netherlands Antilles (Debrot *et al.* 1998), Venezuela (Romero *et al.* 2001) and Colombia (Casinos and Bou 1980; Pardo and Palacios 2006). A mass stranding of 16 short-finned pilot whales was reported on Nevis during 1969 (Caldwell *et al.* 1970). Catches from pilot whale fisheries have been reported from St. Vincent, St. Lucia, Dominica, Martinique and Cuba (e.g., Caldwell and Erdman 1963; Mitchell 1975; Price 1985; Mohammed *et al.* 2003).

Mignucci-Giannoni (1998) found 69 sighting records of short-finned pilot whales from published and unpublished data between 1958 and 1989 for waters of Puerto Rico, the U.S. Virgin Islands and the British Virgin Islands, and suggested that pilot whales occur year-round with more sightings during winter and spring. Mignucci-Giannoni (1998) documented sightings in both continental shelf and oceanic waters with about 45% of sightings in waters less than 183m deep. NMFS winter ship surveys indicated that short-finned pilot whales inhabit continental slope and oceanic waters, with sightings made in a wide range of water depths >500 m (Figure 1); however, most waters surveyed by NMFS were >200 m deep due to the bottom topography of the region and the size of the survey vessel (Roden and Mullin 2000; Swartz and Burks 2000; Swartz *et al.* 2002). Upon examination of stranding records from 1867 through 1995, short-finned pilot whales were reported to be one of the most common species to strand in waters of Puerto Rico and the U.S. and British Virgin Islands (Mignucci-Giannoni *et al.* 1999). All sources of information to date indicate short-finned pilot whales are common and widely distributed in the

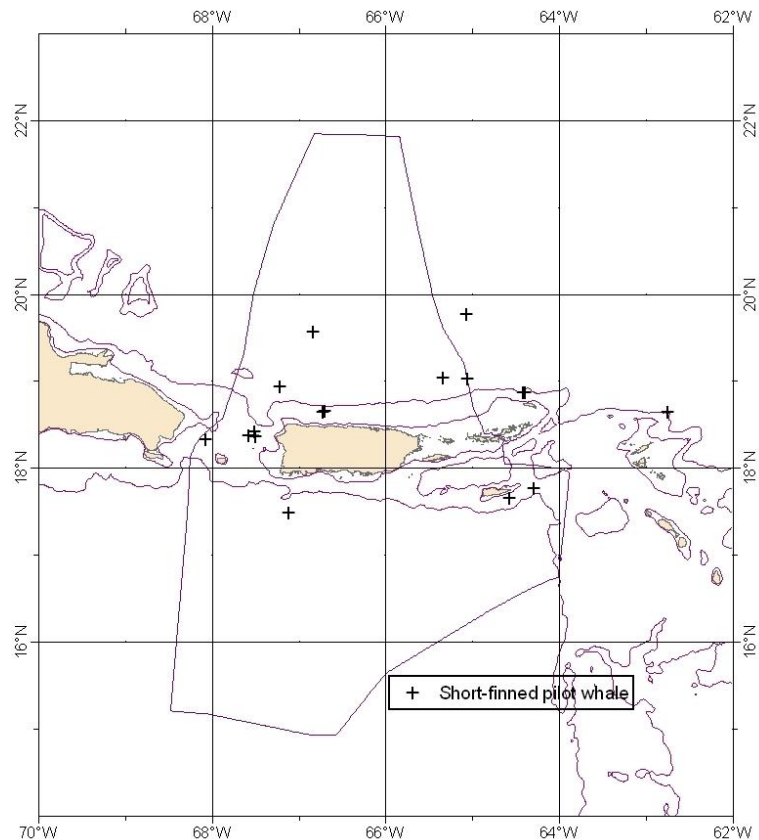


Figure 1. Distribution of short-finned pilot whale sightings from SEFSC vessel surveys during winters of 1995, 2000 and 2001. The solid lines indicate the 20-0m and 2,000-m isobaths and the boundary of the U.S. EEZ.

waters of Puerto Rico and the U.S. Virgin Islands.

Short-finned pilot whales have not been studied extensively in the waters around Puerto Rico and the U.S. Virgin Islands. Studies are currently being conducted at the Southeast Fisheries Science Center to evaluate genetic population structure in short-finned pilot whales in the western North Atlantic and Gulf of Mexico. The Puerto Rico and U.S. Virgin Islands short-finned pilot whale population is provisionally being considered a separate stock for management purposes, although there is currently no information to differentiate this stock from the western North Atlantic Ocean stock found off the U.S. East Coast or the northern Gulf of Mexico stock. Additional genetic samples from the U.S. Caribbean and surrounding areas are needed. Short-finned pilot whales of this stock are likely trans-boundary with, at a minimum, waters near adjacent Caribbean islands and are not likely to occur exclusively within the bounds of the U.S. EEZ.

POPULATION SIZE

The abundance of the Puerto Rico and U.S. Virgin Islands stock of short-finned pilot whales is unknown. A line-transect survey was conducted during January-March 1995 on NOAA Ship *Oregon II*, and was designed to cover a wide range of water depths surrounding Puerto Rico and the Virgin Islands. However, due to the bottom topography of the region and the size of the vessel, most waters surveyed were >200 m deep. Nine sightings of short-finned pilot whales were made, 8 of which occurred in and near U.S. waters (Roden and Mullin 2000). Sightings occurred in water depths ranging from 549 to 7503 m. Another line-transect survey for humpback whales was conducted during February-March 2000 aboard NOAA Ship *Gordon Gunter* in the eastern and southern Caribbean Sea. A portion of the survey effort occurred in U.S. waters during transit, and 7 sightings of short-finned pilot whales were made, 1 of which occurred in U.S. waters near St. Croix. Sightings occurred in water depths ranging from 1006 to 2835 m (Swartz and Burks 2000). During February-March 2001 a line-transect survey was conducted in waters of the eastern Bahamas, eastern Dominican Republic, Puerto Rico and Virgin Islands. Eight sightings of short-finned pilot whales were made near Puerto Rico and the Virgin Islands (in and near U.S. waters) in water depths ranging from 806 to 7041 m (Swartz *et al.* 2002). It was not possible to estimate abundance from these surveys using line-transect methods due to so few sightings.

Minimum Population Estimate

Present data are insufficient to calculate a minimum population estimate for this stock of short-finned pilot whales.

Current Population Trend

There are insufficient data to determine the population trends for this stock.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum net productivity rates are unknown for this stock. The maximum net productivity rate is assumed to be 0.04. This value is based on theoretical modeling showing that cetacean populations may not grow at rates much greater than 4% given the constraints of their reproductive life history (Barlow *et al.* 1995).

POTENTIAL BIOLOGICAL REMOVAL

Potential biological removal level (PBR) is the product of the minimum population size, one half the maximum net productivity rate and a recovery factor (MMPA Sec. 3.16 U.S.C. 1362; Wade and Angliss 1997). The minimum population size is unknown. The maximum productivity rate is 0.04, the default value for cetaceans. The “recovery” factor, which accounts for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP), is assumed to be 0.5 because the stock is of unknown status. PBR for this stock of short-finned pilot whales is unknown.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Estimates of annual human-caused mortality and serious injury are unknown for this stock.

Fisheries Information

The level of past or current, direct, human-caused mortality of short-finned pilot whales in Puerto Rico and the U.S. Virgin Islands is unknown. Pelagic swordfish, tunas and billfish are the targets of the longline fishery operating in the Caribbean Sea. There has been no reported fishing-related mortality of a short-finned pilot whale during recent years (2001-2009) in waters surrounding Puerto Rico or the U.S. Virgin Islands; however, interactions with pilot whales and the longline fishery have occurred in the Caribbean region off of Cuba (Garrison 2003; Garrison

and Richards 2004; Garrison 2005; Fairfield Walsh and Garrison 2006; Fairfield-Walsh and Garrison 2007; Fairfield and Garrison 2008; Garrison *et al.* 2009; Garrison and Stokes 2010). During 2004, 2 serious injuries were observed near Cuba, and estimated serious injuries attributable to the pelagic longline fishery in the Caribbean region during quarter 1 of 2004 were 19.3 short-finned pilot whales (CV=0.69; Garrison 2005). It is also important to note that for some recent years, 2006, 2008 and 2009, there has been no observer coverage of the pelagic longline fishery in the Caribbean region (Fairfield-Walsh and Garrison 2007; Garrison *et al.* 2009; Garrison and Stokes 2010).

A commercial fishery for short-finned pilot whales operated in the Caribbean Sea during the eighteenth and nineteenth centuries (Price 1985; Reeves *et al.* 2001). While no whaling occurs at present in the waters of Puerto Rico and the U.S. Virgin Islands, small-scale whaling, conducted by local whalers, is still carried out by the eastern Caribbean nations of Dominica, St. Lucia, and St. Vincent and the Grenadines (e.g., Rathjen and Sullivan 1970; Caldwell *et al.* 1971; Adams 1975; Caldwell and Caldwell 1975; Price 1985; Reeves 1988; Hoyt and Hvenegaard 2002; Romero *et al.* 2002; Mohammed *et al.* 2003; Vail 2005; World Council of Whalers 2008). Short-finned pilot whales are the most commonly hunted cetacean (e.g., Rathjen and Sullivan 1970; Caldwell *et al.* 1971; Adams 1975; Caldwell and Caldwell 1975; Reeves 1988; Hoyt and Hvenegaard 2002; Mohammed *et al.* 2003; Vail 2005; World Council of Whalers 2008), with a harvest averaging 300-450 annually (World Council of Whalers 2008).

Other Mortality

No short-finned pilot whales were found stranded in U.S. waters of the Caribbean Sea from 2005 through 2009 (NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 17 November 2010). Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured in fishery interactions wash ashore, not all that wash ashore are discovered, reported or investigated, nor will all of those that do wash ashore necessarily show signs of entanglement or other fishery interaction. Finally, the level of technical expertise among stranding network personnel varies widely as does the ability to recognize signs of fishery interactions.

The potential impact of coastal pollution may be an issue for this species in portions of its habitat. The U.S. Navy and the U.S. Marine Corps used the Atlantic Fleet Weapons Training Facility operated out of Vieques Island, Puerto Rico, from 1948 to 2003, including the training of pilots for live ordnance delivery and amphibious assault landings by the Marine Corps. The U.S. Environmental Protection Agency has designated parts of Vieques Island on the Superfund National Priorities List because various parts of the island and nearby waters have become contaminated by solid and/or hazardous waste resulting from decades of military activity (EPA 2009). Identified areas of concern include ship anchoring areas north of Vieques, waters impacted by target practice on eastern Vieques and waters near western Vieques. Remnants of exploded ordnance and large amounts of unexploded ordnance have been identified in the range areas of Vieques and in the surrounding waters. Hazardous substances associated with ordnance use may include lead, mercury, lithium, magnesium, copper, perchlorate, napalm, TNT, and depleted uranium, among others. At both the eastern and western ends of Vieques, hazardous materials present may also include an assortment of chemicals such as pesticides, solvents and PCBs (EPA 2009). The naval station at Roosevelt Roads in Puerto Rico operated from 1943 to 2004 (between 1943 and 1957 it was opened and closed multiple times). It operated as a major training site for fleet exercises, but potential impacts, if any, on short-finned pilot whales are unknown.

STATUS OF STOCK

The status of short-finned pilot whales, relative to OSP, in U.S. waters of the Caribbean Sea is unknown. The size of this stock or any population of short-finned pilot whales in the northeast Caribbean has never been assessed. The species is not listed as threatened or endangered under the Endangered Species Act. There are insufficient data to determine population trends for this stock. Total human-caused mortality and serious injury for this stock is not known. There is no systematic monitoring of all fisheries that may take this stock. There is insufficient information available to determine whether the total fishery-related mortality and serious injury for this stock is insignificant and approaching zero mortality and serious injury rate. For these reasons and because the stock size is currently unknown, PBR is undetermined, and there are documented interactions between short-finned pilot whales and the pelagic longline fishery in waters off Cuba, this stock is a strategic stock.

REFERENCES CITED

- Adams, J. E. 1975. Primitive whaling in the West Indies. *Sea Frontiers* 21: 303-313.
- Barlow, J., S. L. Swartz, T. C. Eagle and P. R. Wade. 1995. U.S. Marine mammal stock assessments: Guidelines for preparation, background, and a summary of the 1995 assessments. NOAA Tech. Memo. NMFS-OPR-6, 73 pp.

- Caldwell, D. K. and D. S. Erdman. 1963. The pilot whale in the West Indies. *J. Mammal.* 44: 113-115.
- Caldwell, D. K. and M. C. Caldwell. 1975. Dolphin and small whale fisheries of the Caribbean and West Indies: Occurrence, history, and catch statistics – with special reference to the Lesser Antillean island of St. Vincent. *J. Fish. Res. Bd. Can.* 32: 1105-1110.
- Caldwell, D. K., M. C. Caldwell, W. F. Rathjen and J. R. Sullivan. 1971. Cetaceans from the Lesser Antillean island of St. Vincent. *Fish. Bull.* 69: 303-312.
- Caldwell, D. K., W. F. Rathjen and M. C. Caldwell. 1970. Pilot whales mass stranded at Nevis, West Indies. *Quart. J. Florida Acad. Sci.* 33(4): 241-243.
- Casinos, A. and J. Bou. 1980. On a massive stranding of short-finned pilot whale, *Globicephala macrorhynchus* Gray, 1846, on Margarita Island (Venezuela). *Sci. Rep. Whales Res. Inst.* 32: 145-148.
- Debrot, A. O., J. A. De Meyer and P. J. E. Dezentjé. 1998. Additional records and a review of the cetacean fauna of the Leeward Dutch Antilles. *Carib. J. Sci.* 34: 204-210.
- Erdman, D. S. 1970. Marine mammals from Puerto Rico to Antigua. *J. Mammal.* 51: 636-639.
- Erdman, D. S., J. Harms and M. Marcial-Flores. 1973. Cetacean records from the northeastern Caribbean region. *Cetology* 17: 1-14.
- Fairfield Walsh, C. and L. P. Garrison. 2006. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2005. NOAA Tech. Memo. NMFS-SEFSC-539, 52 pp.
- Fairfield-Walsh, C. and L. P. Garrison. 2007. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2006. NOAA Tech. Memo. NMFS-SEFSC-560, 54 pp.
- Fairfield, C. P. and L. P. Garrison. 2008. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2007. NOAA Tech. Memo. NMFS-SEFSC-572, 62 pp.
- Garrison, L. P. 2003. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2001-2002. NOAA Tech. Memo. NMFS-SEFSC-515, 52 pp.
- Garrison, L. P. 2005. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2004. NOAA Tech. Memo. NMFS-SEFSC-531, 57 pp.
- Garrison, L. P. and P. M. Richards. 2004. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2003. NOAA Tech. Memo. NMFS-SEFSC-527, 57 pp.
- Garrison, L. P., L. Stokes and C. Fairfield. 2009. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2008. NOAA Tech. Memo. NMFS-SEFSC-591, 63 pp.
- Garrison, L. P. and L. Stokes. 2010. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2009. NOAA Tech. Memo. NMFS-SEFSC-607, 64 pp.
- Gordon, J., A. Moscrop, C. Carlson, S. Ingram, R. Leaper, J. Matthews and K. Young. 1998. Distribution, movements and residency of sperm whales off the Commonwealth of Dominica, eastern Caribbean: Implications for the development and regulation of the local whalewatching industry. *Rep. Int. Whal. Commn.* 48: 551-557.
- Hoyt, E. and G. T. Hvenegaard. 2002. A review of whale-watching and whaling with applications for the Caribbean. *Coast. Manage.* 30: 381-399.
- Jérémie, S., A. Gannier, S. Bourreau and J.-C. Nicolas. 2006. Cetaceans of Martinique Island (Lesser Antilles): Occurrence and distribution obtained from a small boat dedicated survey. Paper SC/58/SM23. 58th Annual Meeting of the International Whaling Commission, June 2006, St. Kitts and Nevis, West Indies.
- Leatherwood, S. and R. R. Reeves. 1983. *The Sierra Club handbook of whales and dolphins.* Sierra Club Books, San Francisco, CA. 302 pp.
- Mattila, D. K. and P. J. Clapham. 1989. Humpback whales, *Megaptera novaeangliae*, and other cetaceans on Virgin Bank and in the northern Leeward Islands, 1985 and 1986. *Can. J. Zool.* 67: 2201-2211.
- Mattila, D. K., P. J. Clapham, O. Vaxquez and R. S. Bowman. 1994. Occurrence, population composition, and habitat use of humpback whales in Samana Bay, Dominican Republic. *Can. J. Zool.* 72(11): 1898-1907.
- Mignucci-Giannoni, A. A. 1998. Zoogeography of cetaceans off Puerto Rico and the Virgin Islands. *Carib. J. Sci.* 34 (3-4): 173-190.
- Mignucci-Giannoni, A. A., B. Pinto-Rodríguez, R. A. Montoya-Ospina, N. M. Jiménez-Marrero, M. A. Rodríguez-López, E. H. Williams, Jr., and D. K. Odell. 1999. Cetacean strandings in Puerto Rico and the Virgin Islands. *J. Cetacean Res. Manage.* 1(2): 191-198.
- Mitchell, E. D. 1975. Porpoise, dolphin and small whale fisheries of the world. IUCN. Monograph No. 3 Morges, Switzerland: IUCN.
- Mohammed, E., L. E. Straker and C. Jardine. 2003. St. Vincent and the Grenadines: Reconstructed fisheries catches and fishing effort, 1942-2001. *Fisheries Centre Research Reports* 11(6): 95-116.

- Pardo, M. A. and D. M. Palacios. 2006. Cetacean occurrence in the Santa Marta region, Colombian Caribbean, 2004-2005. *Lat. Am. J. Aquat. Mamm.* 5(2): 129-134.
- Price, W. S. 1985. Whaling in the Caribbean: Historical perspective and update. *Rep. Int. Whal. Commn.* 35: 413-420.
- Rathjen, W. F. and J. R. Sullivan. 1970. West Indies Whaling. *Sea Frontiers* 16: 130-137.
- Reeves, R. 1988. Exploitation of cetaceans in St. Lucia, Lesser Antilles, January 1987. *Rep. Int. Whal. Commn.* 38: 445-447.
- Reeves, R. R., S. L. Swartz, S. E. Wetmore and P. J. Clapham. 2001. Historical occurrence and distribution of humpback whales in the eastern and southern Caribbean Sea, based on data from American whaling logbooks. *J. Cetacean Res. Manage.* 3(2): 117-129.
- Roden, C. L. and K. D. Mullin. 2000. Sightings of cetaceans in the northern Caribbean Sea and adjacent waters, winter 1995. *Carib. J. Sci.* 36(3-4): 280-288.
- Romero, A., A. I. Agudo, S. M. Green and G. Notarbartolo di Sciara. 2001. Cetaceans of Venezuela: Their distribution and conservation status. NOAA Tech. Rep. NMFS 151, 60 pp.
- Romero, A., R. Baker and J. E. Creswell. 2002. Environmental history of marine mammal exploitation in Trinidad and Tobago, W.I., and its ecological impact. *Environment and History* 8: 255-274.
- Swartz, S. L. and C. Burks. 2000. Cruise results: Windwards humpback survey. NOAA Tech. Memo. NMFS-SEFSC-438. 31 pp.
- Swartz, S. L., A. Martinez, J. Stamates, C. Burks and A. A. Mignucci-Giannoni. 2002. Acoustic and visual survey of cetaceans in the waters of Puerto Rico and the Virgin Islands: February-March 2001. NOAA Tech. Memo. NMFS-SEFSC-463. 62 pp.
- Taruski, A. G. and H. E. Winn. 1976. Winter sightings of odontocetes in the West Indies. *Cetology* 22: 1-12.
- Vail, C. 2005. Socio-economic assessment of marine mammal utilization in the wider Caribbean region: Captivity, viewing and hunting. Information paper presented at the United Nations Environment Programme Regional Workshop of Experts on the Development of the Marine Mammal Action Plan for the Wider Caribbean Region, Barbados, 18-21 July 2005. UNEP(DEC)/CAR WG.27/INF 6. Available at: <http://cep.unep.org/content/wg31-inf1en.pdf-1>.
- Wade, P. R. and R. P. Angliss. 1997. Guidelines for assessing marine mammal stocks: Report of the GAMMS Workshop April 3-5, 1996, Seattle, WA. NOAA Tech Memo. NMFS-OPR-12, 93 pp.
- World Council of Whalers. 2008. World whaling – Caribbean. http://www.worldwhalers.com/whaling_around_the_world/caribbean.htm.
- Yoshida, H., J. Compton, S. Punnett, T. Lovell, K. Draper, G. Franklin, N. Norris, P. Phillip, R. Wilkins and H. Kato. 2010. Cetacean sightings in the eastern Caribbean and adjacent waters, spring 2004. *Aquat. Mamm.* 36(2): 154-161.