

BOTTLENOSE DOLPHIN (*Tursiops truncatus truncatus*): Puerto Rico and U.S. Virgin Islands Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

In waters of Puerto Rico and the Virgin Islands in the northeastern Caribbean Sea, the bottlenose dolphin has been described as the most frequently sighted cetacean, especially for inshore waters (Erdman 1970; Erdman *et al.* 1973; Taruski and Winn 1976; Mignucci-Giannoni 1998), as well as the second most common species found stranded (Mignucci-Giannoni *et al.* 1999; Mignucci-Giannoni *et al.* 2009). Sightings have occurred throughout Puerto Rico and the Virgin Islands, primarily over the shelf or near shelf-edge habitats (Erdman 1970; Erdman *et al.* 1973; Taruski and Winn 1976; Mattila and Clapham 1989; Mignucci-Giannoni 1998). The bottlenose dolphin is widely distributed throughout other areas of the Caribbean as well. For example, it has been reported from Cuba (van Waerebeek *et al.* 2006), Dominican Republic (Mattila *et al.* 1994; Whaley *et al.* 2006; Parsons *et al.* 2010), St. Vincent and the Grenadines (Caldwell *et al.* 1971; Caldwell and Caldwell 1975; Yoshida *et al.* 2010), Martinique (J eremie *et al.* 2006), Guadeloupe, St. Lucia and Barbados (Yoshida *et al.* 2010), Trinidad (van Bree 1975), throughout Venezuela, particularly in the east (Romero *et al.* 2001; Romero *et al.* 2002; Oviedo *et al.* 2005), Leeward Netherlands Antilles (Debrot *et al.* 1998), Colombia (Romero *et al.* 2001; Pardo and Palacios 2006; Fraija *et al.* 2009; Pardo *et al.* 2009), Panama (Pardo *et al.* 2009), Belize (Jefferson and Lynn 1994; Grigg and Markowitz 1997; Campbell *et al.* 2002; Kerr *et al.* 2005) and the eastern Caribbean area generally (Guadeloupe to St. Vincent and the Grenadines; Watkins *et al.* 1985).

The Puerto Rico and U.S. Virgin Islands bottlenose dolphin population is provisionally being considered a separate stock for management purposes, although there is currently no information to differentiate this stock from the Atlantic Ocean and Gulf of Mexico stocks. This population potentially consists of multiple stocks. The “coastal/nearshore” and “offshore” ecotypes of bottlenose dolphins are genetically distinct, and both occur in the western North Atlantic Ocean including the Gulf of Mexico (Hersh and Duffield 1990; Hoelzel *et al.* 1998; LeDuc and Curry 1998; Rosel *et al.* 2009). In the northwestern Atlantic Ocean, Torres *et al.* (2003) reported that the offshore ecotype was found exclusively seaward of 34 km and in waters deeper than 34 m. Additional morphological, genetic and/or behavioral data are needed to provide further information on stock delineation. Bottlenose dolphins of the Puerto Rico and U.S. Virgin Islands 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.

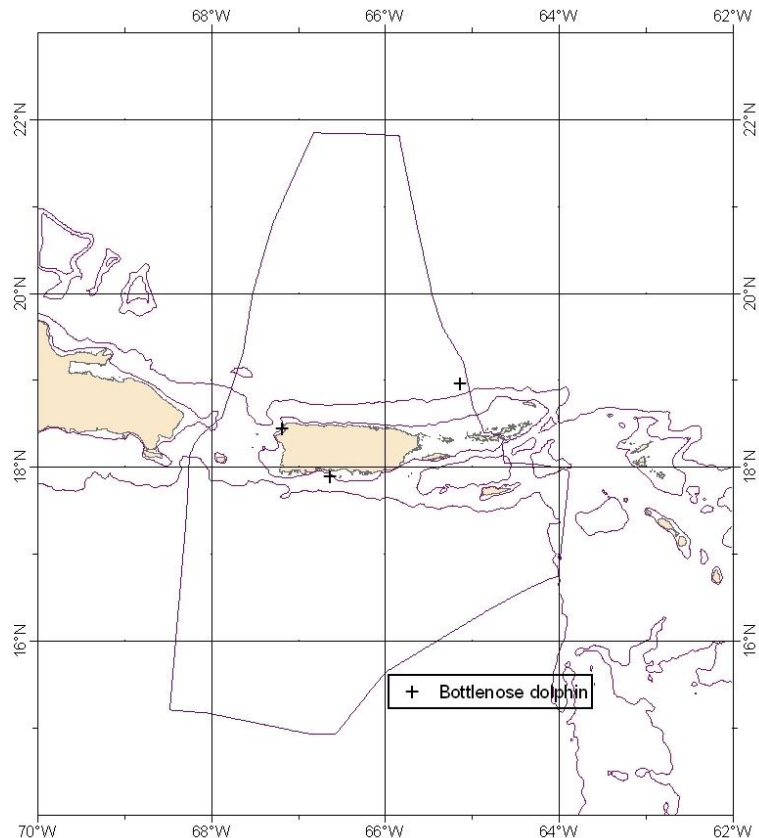


Figure 1. Distribution of bottlenose dolphin sightings from SEFSC shipboard surveys during winters of 1995 and 2001. Solid lines indicate the 200m and 2,000m isobaths and the boundary of the U.S. EEZ.

POPULATION SIZE

The abundance of the Puerto Rico and U.S. Virgin Islands stock of bottlenose dolphins 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, and only 1 sighting of bottlenose dolphins was made in U.S. waters (Roden and Mullin 2000). 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, but no bottlenose dolphins were sighted (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. Two sightings of bottlenose dolphins were made, both in U.S. waters (Swartz *et al.* 2002). It was not possible to estimate abundance from these surveys using line-transect methods due to so few sightings (Figure 1).

Minimum Population Estimate

Present data are insufficient to calculate a minimum population estimate for this stock of bottlenose dolphins.

Current Population Trend

There are insufficient data to determine 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 minimum population size, one-half the maximum productivity rate and a recovery factor (MMPA Sec. 3. 16 U.S.C. 1362; Wade and Angliss 1997). 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 bottlenose dolphins is unknown.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

The level of past or current, direct, human-caused mortality and serious injury of bottlenose dolphins in U.S. waters of the Caribbean Sea is unknown.

Fisheries Information

Spiny Lobster and Mixed Species Trap/Pot Fisheries

During 2008 one dolphin was reported by a local fisherman from Cabo Rojo, Puerto Rico, as dead and entangled in rope with 2 pots attached (fishery could not be confirmed; NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 17 November 2010). The dolphin was cut loose from the rope by the fisherman, and the carcass was not recovered. This mortality was included in the stranding database and is included in the stranding totals below. Since there is no systematic observer program, it is not possible to estimate the total number of interactions or mortalities associated with spiny lobster and mixed species trap/pot fisheries.

Pelagic Longline Fishery

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 bottlenose dolphin during recent years (2001-2009) in waters surrounding Puerto Rico or the U.S. Virgin Islands (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). However, it is 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).

Dolphin Fisheries and Live-Capture Fisheries in the Caribbean

While no whaling or dolphin fishery occurs at present in the waters of Puerto Rico and the U.S. Virgin Islands, small-scale whaling and dolphin fisheries, conducted by local whalers, are still carried out by the eastern Caribbean nations of Dominica, St. Lucia, and St. Vincent and the Grenadines (e.g., Caldwell *et al.* 1971; Caldwell and Caldwell 1975; Price 1985; Hoyt and Hvenegaard 2002; Romero *et al.* 2002; Mohammed *et al.* 2003; World Council of Whalers 2008), and by Venezuela (Romero *et al.* 1997; Romero *et al.* 2002). It is difficult to determine the extent that the bottlenose dolphin, or any other particular dolphin species, has been taken in the dolphin fisheries because the smaller cetacean species hunted have generally been lumped by weight under the heading “porpoise” and reported as such (Caldwell and Caldwell 1975; Price 1985). However, bottlenose dolphins have been and are still being taken in dolphin fisheries in the eastern and southern Caribbean Sea (e.g., Caldwell *et al.* 1971; Caldwell and Caldwell 1975; Romero *et al.* 1997; Romero *et al.* 2002; Mohammed *et al.* 2003; Vail 2005). Bottlenose dolphins have also been the subjects of live-capture fisheries in Cuba, Dominican Republic, Haiti and Honduras for use in dolphinarium locally and around the world (van Waerebeek *et al.* 2006; Parsons *et al.* 2010).

Other Mortality

Six bottlenose dolphins 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). Of these, 2 showed evidence of human interactions. One case of human interaction involved entanglement in pot gear and was mentioned above, and the second case involved healed marks from an interaction with fishing gear. For 3 of the animals, it could not be determined if there was evidence of human interactions, and for the remaining animal, no evidence of human interactions was found. 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 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; potential impacts, if any, on bottlenose dolphins are unknown.

STATUS OF STOCK

The status of bottlenose dolphins, relative to OSP, in U.S. waters of the Caribbean Sea is unknown. The size of this stock or any population of bottlenose dolphins 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 is a recent documented case of human-related mortality, this stock is a strategic stock.

REFERENCES CITED

- Barlow, J., S. L. Swartz, T. C. Eagle and P. R. Wade. 1995. U.S. marine mammal stock assessment: Guidelines for preparation, background, and a summary of the 1995 assessments. NOAA Tech. Memo. NMFS-OPR-6, 73 pp.
- 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.
- Campbell, G. S., B. A. Bilgre and R. H. Defran. 2002. Bottlenose dolphins (*Tursiops truncatus*) in Turneffe Atoll, Belize: Occurrence, site fidelity, group size, and abundance. Aquat. Mamm. 28: 170-180.
- Debrot, A. O., J. A. De Meyer and P. J. E. Dezentje. 1998. Additional records and a review of the cetacean fauna of the Leeward Dutch Antilles. Carib. J. Sci. 34: 204-210.
- Environmental Protection Agency. 2009. Atlantic Fleet Weapons Training Area – Vieques. Puerto Rico. EPA ID# PRN000204694. Available at: <http://www.epa.gov/region02/superfund/npl/0204694c.pdf>
- 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.
- Frajia, N., L. Flórez-González and A. Jáuregui. 2009. Cetacean occurrence in the Santa Marta Region, Colombian Caribbean, February-May 2007. Lat. Am. J. Aquat. Mamm. 7(1-2): 69-73.
- 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.
- Grigg, E. and H. Markowitz. 1997. Habitat use by bottlenose dolphins (*Tursiops truncatus*) at Turneffe Atoll, Belize. Aquat. Mamm. 23: 163-170.
- Hersh, S. L. and D. A. Duffield. 1990. Distinction between northwest Atlantic offshore and coastal bottlenose dolphins based on hemoglobin profile and morphometry. pp. 129-139. In: S. Leatherwood and R. R. Reeves (eds.) The bottlenose dolphin. Academic Press, San Diego, CA. 653 pp.
- Hoelzel, A. R., C. W. Potter and P. B. Best. 1998. Genetic differentiation between parapatric ‘nearshore’ and ‘offshore’ populations of the bottlenose dolphin. Proc. R. Soc. Lond. B 265: 1177-1183.
- Hoyt, E. and G. T. Hvenegaard. 2002. A review of whale-watching and whaling with applications for the Caribbean. Coast. Manage. 30: 381-399.
- Jefferson, T. A. and S. K. Lynn. 1994. Marine mammal sightings in the Caribbean Sea and Gulf of Mexico, summer 1991. Carib. J. Sci. 30(1-2): 83-89.
- 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.
- LeDuc, R. G. and B. E. Curry. 1996. Mitochondrial DNA sequence analysis indicates need for revision of the genus *Tursiops*. Paper SC/48/SM27 presented to IWC Scientific Committee, June 1996, Aberdeen. 12 pp. Available from: NMFS, Southeast Fisheries Science Center, 3209 Frederic St., Pascagoula, MS 39568.
- Kerr, K. A., R. H. Defran and G. S. Campbell. 2005. Bottlenose dolphins (*Tursiops truncatus*) in the Drowned Cayes, Belize: Group size, site fidelity and abundance. Carib. J. Sci. 41(1): 172-177.

- 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.
- Mignucci-Giannoni, A. A., R. J. Rosario-Delestre, M. M. Alsina-Guerrero, L. Falcon-Matos, L. Guzman-Ramirez, E. H. Williams, Jr., G. D. Bossart and J. S. Reidenberg. 2009. Asphyxiation in a bottlenose dolphin (*Tursiops truncatus*) from Puerto Rico due to choking on a black margate (*Anisotremus surinamensis*). *Aquat. Mamm.* 35(1): 48-54.
- 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.
- Oviedo, L., N. Silva, L. Bermudez and D. K. Odell. 2005. Distribution of bottlenose dolphins (*Tursiops truncatus*) on the east coast of Isla Margarita and the Los Frailes Archipelago, Venezuela. *Aquat. Mamm.* 31(4): 442-446.
- 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.
- Pardo, M. A., A. Mejía-Fajardo, S. Beltrán-Pedrerros, F. Trujillo, I. Kerr and D. M. Palacios. 2009. Odontocete sightings collected during offshore cruises in the western and southwestern Caribbean Sea. *Lat. Am. J. Aquat. Mamm.* 7(1-2): 57-62.
- Parsons, E. C. M., I Bonnelly de Calventi, A. Whaley, N. A. Rose and S. Sherwin. 2010. A note on illegal captures of wild bottlenose dolphins (*Tursiops truncatus*) from the coastal waters of the Dominican Republic. *J. Int. Wildl. Law Policy* 13(3): 240-244.
- Price, W. S. 1985. Whaling in the Caribbean: Historical perspective and update. *Rep. Int. Whal. Commn.* 35: 413-420.
- 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 and S. M. Green. 1997. Exploitation of cetaceans in Venezuela. *Rep. Int. Whal. Commn.* 47: 735-46.
- 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.
- Rosel, P. E., L. Hansen and A. A. Hohn. 2009. Restricted dispersal in a continuously distributed marine species: Common bottlenose dolphins *Tursiops truncatus* in coastal waters of the western North Atlantic. *Mol. Ecol.* 18: 5030-5045.
- 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.
- Torres, L. G., P. E. Rosel, C. D'Agrosa and A. J. Read. 2003. Improving management of overlapping bottlenose dolphin ecotypes through spatial analysis and genetics. *Mar. Mamm. Sci.* 19(3): 502-514.
- 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>.
- van Bree, P. J. H. 1975. Preliminary list of the cetaceans of the southern Caribbean. *Stud. Fauna Curacao Carib. Isl.* 16: 79-87.

- van Waerebeek, K., M. Sequeira, C. Williamson, G. P. Sanino, P. Gallego and P. Carmo. 2006. Live-captures of common bottlenose dolphins *Tursiops truncatus* and unassessed bycatch in Cuban waters: Evidence of sustainability found wanting. *Lat. Am. J. Aquat. Mamm.* 5(1): 39-48.
- 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.
- Watkins, W. A., K. E. Moore and P. Tyack. 1985. Sperm whale acoustic behavior in the southeast Caribbean. *Cetology* 49: 1-15.
- Whaley, A. R., E. C. M. Parsons, R. Sellares and I. de C. Bonnelly. 2006. Dolphin ecology and behavior in the southeastern waters of the Dominican Republic: Preliminary observations. SC/58/SM12. 58th Annual Meeting of the International Whaling Commission. St. Kitts and Nevis. Available at: http://iwcoffice.org/_documents/sci_com/SC58docs/SC-58-SM12.pdf.
- 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.