

ROUGH-TOOTHED DOLPHIN (*Steno bredanensis*): Western North Atlantic Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The distribution of the rough-toothed dolphin (*Steno bredanensis*) is poorly understood worldwide. These dolphins are thought to be a tropical to warm-temperate species, and historically have been reported in deep oceanic waters in the Atlantic, Pacific, and Indian oceans and the Mediterranean and Caribbean seas (Perrin and Walker 1975; Leatherwood and Reeves 1983; Reeves *et al.* 2003; Gannier and West 2005). Rough-toothed dolphins have, however, been observed in both shelf and oceanic waters in the northern Gulf of Mexico, and off Japan, Brazil, and Mauritania (Maigret *et al.* 1976; Miyazaki 1980; Lodi and Hetzel 1999; Addink and Smeenk 2001; Fulling *et al.* 2003; Mullin and Fulling 2003; Gannier and West 2005). In French Polynesia, rough-toothed dolphins were observed in deep waters, but were more commonly distributed inshore than offshore (Gannier and West 2005). Ritter (2002) observed rough-toothed dolphins in the Canary Islands in waters from 20 m to 2,500 m, with the average depth reported as 506 m and surface water temperatures ranging from 17° to 24°C. Rough-toothed dolphins have been reported feeding in waters off Brazil ranging from 5 m to 39 m in depth, with surface temperatures between 22° to 24°C (Lodi and Hetzel 1999). Sightings of rough-toothed dolphins along the East Coast of the U.S. are much less common than in the Gulf of Mexico (CETAP 1982; NMFS 1999; Mullin and Fulling 2003).

In the western North Atlantic, tracking of five rough-toothed dolphins which were rehabilitated and released following a mass stranding on the east coast of Florida in 2005, demonstrated a variety of ranging patterns (Wells *et al.* In review). All tagged rough-toothed dolphins moved through a large range of water depths averaging greater than 100 m, though each of the five tagged dolphins transited through very shallow waters at some point, with most of the collective movements recorded over a gently sloping sea floor. These five rough-toothed dolphins moved through waters ranging from 17° to 31°C, with temperatures averaging 21° to 30°C. Recorded dives were rarely deeper than 50 m, with the tagged dolphins staying fairly close to the surface. Three rehabilitated rough-toothed dolphins released with tags near Ft. Pierce, Florida in March 2005 were tracked in waters averaging 1,100 m in depth with sea surface temperatures averaging 24°C during the first week of tracking, moving to waters of 19°C (Wells and Gannon 2005). Rehabilitated rough-toothed dolphins released and tracked in the northeast Gulf of Mexico in 1998 were recorded in waters with an average depth of 195 m and an average sea surface temperature of 25°C, typically over or near an escarpment (Wells *et al.* 1999). It is not known how representative of normal species patterns any of these movements are.

Although Miyazaki and Perrin (1994) describe these dolphins as a “diving species,” dives of more than 3 minutes duration were rare for the tagged dolphins (Wells *et al.* 1999; Wells and Gannon 2005; Wells *et al.* In review), similar to behavior reported for this species by Lodi and Hetzel (1999) and Ritter (2002).

These dolphins are typically seen in small groups of 10-20 animals (Wade and Gerrodette 1993; Jefferson 2002; Reeves *et al.* 2003; Waring *et al.* 2007). Larger groups have been recorded, namely groups of 45 animals in the Atlantic (CETAP 1982), over 50 animals in the eastern tropical Pacific, 99 animals in the Caribbean (Swartz *et al.* 2001), 160 animals in the Mediterranean, and 300 animals off Hawaii (Miyazaki and Perrin 1994).

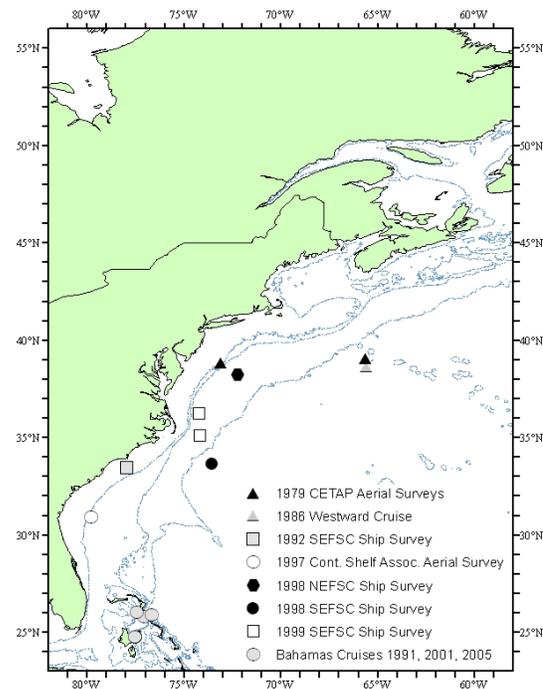


Figure 1. Distribution of rough-toothed dolphin sightings from 1979 - 2005. Isobaths are at 100 m, 1,000 m, and 4,000 m.

Tagging studies of rehabilitated and released rough-toothed dolphins, as well as field observations, indicate that social bonds between members of a group may be strong. Two rough-toothed dolphins tagged and released in the Gulf of Mexico in 1998 were observed together 157 after release (Wells *et al.* 1999). Three rough-toothed dolphins released together near Ft. Pierce, Florida in 2005 exhibited frequent social interactions including food sharing, epimeletic care-giving behavior and whistle exchanges and were seen together throughout the tracking period of at least 20 days (Wells and Gannon 2005). Similar complex social behaviors have also been reported for this species off the Canary Islands (Ritter 2002; 2007), Brazil (Lodi 1992; de Moura *et al.* 2008), and Honduras (Kuczaj II and Yeater 2007). Photo-identification techniques suggest resident populations may exist off the coast of Utila, Honduras (Kuczaj II and Yeater 2007), in the Mediterranean Sea near Sicily (Reeves *et al.* 2003), and off the Canary Islands (Ritter 2001; 2007).

For management purposes, rough-toothed dolphins observed off the eastern U.S. coast are provisionally considered a separate stock from dolphins recorded in the northern Gulf of Mexico, although there is currently no information to differentiate these stock(s). Additional morphological, genetic and/or behavioral data are needed to provide further information on stock delineation.

POPULATION SIZE

The number of rough-toothed dolphins off the eastern U.S. and Canadian Atlantic coast is unknown, and seasonal abundance estimates are not available for this stock, since it was rarely seen during surveys. With one exception, sightings were exclusively over or seaward of the continental slope north of the Bahamas (Figure 1). Though abundance estimates have been calculated in some cases, given the paucity of sightings as well as limited survey effort in deep, offshore areas, an accurate abundance estimate has not been made, and therefore the population size of rough-toothed dolphins in the western North Atlantic is presently considered unknown.

Rough-toothed dolphins were seen only twice during the Cetacean and Turtle Assessment Program (CETAP) surveys conducted from 1978 to 1982 in continental shelf and shelf edge waters between Cape Hatteras, North Carolina and Nova Scotia (CETAP 1982). Twenty probable rough-toothed dolphins were seen from the U.S. Coast Guard cutter *Cherokee* during the CETAP Platform of Opportunity Program (POP) in June 1979. In September 1979, 45 rough-toothed dolphins were observed from the Russian R/V *Belagorsk*. No abundance estimate was made based on these two sightings.

A sighting of 9 rough-toothed dolphins was made from the R/V *Westward* in June 1986 during an opportunistic cruise (Kenney pers. comm.). In January 1992, 6 rough-toothed dolphins were reported during a SEFSC aerial survey. Three rough-toothed dolphins were observed on 5 March 1997 during an aerial survey conducted by Continental Shelf Associates (Kenney pers. comm.).

Eight rough-toothed dolphins were seen on 28 July 1998 during a shipboard line-transect sighting survey conducted between 8 July and 17 August 1998 that surveyed 4,163 km of track line in waters south of Maryland (38°N) (Mullin and Fulling 2003). An abundance estimate of 274 (CV=1.03) was calculated based on this one sighting.

Three rough-toothed dolphins were observed from a ship in July 1998 during a line-transect sighting survey conducted from 6 July to 6 September 1998 by a ship and plane that surveyed 15,900 km of track line in waters north of Maryland (38°N) (Palka 2006). An abundance estimate of 30 (CV=0.86) was calculated based on this one sighting.

Two groups of rough-toothed dolphins were observed during a vessel survey of the western North Atlantic off Cape Hatteras, North Carolina in waters greater than 2,500 m deep (NMFS 1999). Four rough-toothed dolphins were seen in August 1999, and 20 rough-toothed dolphins were seen in September 1999. No abundance estimate was made based on these two sightings.

Recent surveys and abundance estimates

There have been no sightings of rough-toothed dolphins during shipboard or aerial surveys since 1999, except in the Caribbean, despite survey cruises conducted in areas where previous sightings of this species had been made. Survey effort in deep, offshore areas off the eastern U.S. coast and in the Caribbean, where this species may occur with more frequency, has, however, been limited.

Minimum Population Estimate

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

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. For purposes of this assessment, the maximum net productivity rate was 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 (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 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 this stock is of unknown status. PBR for the western North Atlantic stock of rough-toothed dolphins is unknown, due to an unknown minimum population size.

ANNUAL HUMAN-CAUSED MORTALITY

Fishery Information

Detailed fishery information is reported in Appendix III. No rough-toothed dolphins have been reported as bycatch in any of these fisheries (Garrison 2003; Garrison and Richards 2004; Garrison 2005; Fairfield Walsh and Garrison 2006; Palka, pers. com.; Fairfield Walsh and Garrison 2007). Total annual estimated average fishery-related mortality and serious injury to this stock during 2002-2006 was zero rough-toothed dolphins, as there were no reports of mortality or serious injury to this stock.

Rough-toothed dolphins have been taken incidentally in the tuna purse seine nets in the eastern tropical Pacific, and in gill-nets off Sri Lanka, Brazil and the offshore North Pacific (Jefferson 2002), though no incidental takes have been reported off the eastern U.S. coast. A small number of this species are taken in directed fisheries in the Caribbean countries of St. Vincent and the Lesser Antilles, as well as in countries in the Pacific and eastern north Atlantic Oceans (Northridge 1984; Argones 2001; Jefferson 2002; Reeves *et al.* 2003).

Other Mortality

From 2002 to 2006, 146 rough-toothed dolphins were reported stranded between Maine and Puerto Rico (Table 2). Human interaction was recorded for two dolphins that stranded in North Carolina in 2006, though specific details of the type of interaction were not recorded. Although rarely observed at sea in the southeastern U.S., this species accounts for 34% of the reported mass strandings involving 5 or more animals in the past 10 years. The majority of these occurred along the Atlantic coast of Florida and Georgia and the Gulf coast of Florida (NMFS 2008; Table 1).

Table 2. Rough-toothed dolphin (<i>Steno bredanensis</i>) strandings along the U.S. Atlantic coast (2002-2006).						
STATE	2002	2003	2004	2005	2006	TOTALS
Virginia	141	0	0	0	0	14
North Carolina	0	0	0	0	2	2
Georgia	0	172	0	0	0	17
Florida	1	2	373	704	1	111
Puerto Rico	0	2	0	0	0	2
TOTALS	15	21	37	70	3	146

¹Mass live stranding of 14 animals in Northampton, VA in July 2002.
²Mass live stranding of 17 animals in Glynn, GA in July 2003.
³Mass live stranding of 37 animals in St. Lucie, FL in August 2004.
⁴Mass live stranding of 69 animals in March 2005 in Marathon, FL.

At least thirty-six rough-toothed dolphins stranded on Hutchinson Island in St. Lucie County, Florida on 6 August 2004, and another one live-stranded on 8 August 2004. Due to severe weather, the animals were walked to chest-high water and released simultaneously. The dolphins re-stranded later the same evening 5.6 km to the north. Thirty dolphins were euthanized on site, and seven were taken to a rehabilitation facility. Four of the dolphins died in rehabilitation and three were released on 3 March 2005 with satellite transmitters 29 km east of Ft. Pierce, Florida. All three dolphins remained together and were last recorded off the Virginia/North Carolina coast. Two of the 37 dolphins showed signs of human interaction – one had a plastic bottle cap in its fore-stomach, while the second animal had black plastic in its fore-stomach.

On 2 March 2005, at least 69 rough-toothed dolphins mass-stranded alive on the Atlantic Ocean side of Marathon Island in the Florida Keys, though additional animals may have swam away or not been recovered. Fifty-six animals (41 females and 15 males) were evaluated for rehabilitation candidacy, 10 of which died naturally and 14 were euthanized on site. The remaining 32 dolphins were transferred to three rehabilitation facilities, though 12 of these dolphins died during rehabilitation. No evidence of human or fishery interaction was reported in any of the dolphins. A review of the potential causative factors for this mass stranding suggested that a transient environmental change, specifically a rapid change in near-shore water temperatures associated with a shift in wind direction, led an already nutritionally deficient group of dolphins into shallow water (NMFS 2008). Once in this habitat, the dolphins were presumably unable to navigate their way back out, resulting in the stranding. There was no indication of significant health effects due to toxins associated with harmful algal blooms, there was no evidence of acoustic trauma and only very limited potential exposure to Naval active acoustic activity, nor was there any evidence that an infectious agent such as a parasite, bacteria, or virus resulted in significant health effects and contributed to the stranding event.

Eleven rehabilitated dolphins from this stranding were tagged and released back into the Atlantic Ocean in continental slope waters, two on 20 April 2005 off Key Biscayne, Florida; seven on 3 May 2005 and two on 12 September 2005 off Key Largo, Florida. Ten dolphins were tagged with VHF or satellite-linked transmitters and were tracked for 12-49 days (Wells *et al.* In review). For the two releases involving multiple tagged dolphins, the individuals appeared to remain together through much, if not all, of the tracks (Lodi 1992; Miyazaki and Perrin 1994; Lodi and Hetzel 1999; Wells and Gannon 2005). Detailed information on this mass stranding is available in National Marine Fisheries Service (2008) and in the companion report on follow-up tracking (Wells *et al.* In review).

A potential human-caused source that may contribute to mortality for this species is from persistent organic pollutants (POPs), which were analyzed in 15 stranded rough-toothed dolphins from the Gulf of Mexico (Struntz *et al.* 2004). Although these dolphins exhibited lower concentrations of polychlorinated biphenyls (PCBs) than those observed in other species of dolphins including Risso's, striped and bottlenose dolphins sampled in Japan, the Mediterranean and the Gulf coast of Texas, respectively, the concentrations were above the toxic threshold for marine mammal blubber suggested by Kannan *et al.* 2000. Struntz *et al.* (2004) concluded it was "likely that PCBs pose a health risk for the population represented by this limited sample group." Plastic debris may also pose a threat to this, and other, species, as evidenced by a plastic bag found in the stomach of two stranded rough-toothed dolphins – one which stranded in 2004 in St. Lucie County Florida (see above), and one in northeastern Brazil (de Meirelles and Barros 2007), and a plastic bottle cap found in one of the dolphins which stranded in St. Lucie County, Florida in 2004 (see above).

Stranding data probably underestimate the extent of fishery-related mortality and serious injury because all of the marine mammals that die or are seriously injured may not wash ashore, 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 interaction.

STATUS OF STOCK

The status of rough-toothed dolphins relative to OSP in the U.S. Atlantic EEZ is unknown. The species is not listed as threatened or endangered under the Endangered Species Act. There are insufficient data to determine the population size or trends and PBR cannot be calculated for this stock. No fishery-related mortality and serious injury has been observed; therefore, total fishery-related mortality and serious injury can be considered insignificant and approaching zero mortality. This is not a strategic stock.

REFERENCES CITED

- Addink, M. J. and C. Smeenk 2001. Opportunistic feeding behavior of rough-toothed dolphins *Steno bredanensis* off Mauritania. *Zool. Verh. Leiden* 334: 37-48.
- Argones, L. V. 2001. The status and conservation of marine mammals in the Philippines. Final Report, Univ. of Los Banos, Laguna: 77.

- 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.
- CETAP 1982. A characterization of marine mammals and turtles in the mid- and north Atlantic areas of the U.S. outer continental shelf, final report. University of Rhode Island Cetacean and Turtle Assessment Program. Washington, DC, Bureau of Land Management. #AA551-CT8-48: 576.
- de Meirelles, A. C. O. and H. M. D. R. Barros 2007. Plastic debris ingested by a rough-toothed dolphin, *Steno bredanensis*, stranded alive in northeastern Brazil. *Biotemas* 20(1): 127-131.
- de Moura, J. F., E. S. Rodrigues and S. Siciliano 2008. Epimeletic behavior in rough-toothed dolphins (*Steno bredanensis*) on the east coast of Rio de Janeiro state, Brazil. *JMBA2 - Biodiversity Records* 6061: 1-3.
- 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. NOAA 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. NOAA NMFS-SEFSC-560. 54 pp.
- Fulling, G. L., K. D. Mullin and C. W. Hubard 2003. Abundance and distribution of cetaceans in outer continental shelf waters of the U.S. Gulf of Mexico. *Fish. Bull.* 101: 923-932.
- Gannier, A. and K. L. West 2005. Distribution of the rough-toothed dolphin (*Steno bredanensis*) around the Windward Islands (French Polynesia). *Pacific Sci.* 59(1): 17-24.
- 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.
- Jefferson, T. A. 2002. Rough-toothed dolphin *Steno bredanensis*. Pages 1055-1059 in: W. Perrin, B. Wursig and J. G. M. Thewissen, (eds.) *Encyclopedia of marine mammals*. Academic Press, New York.
- Kannan, K., A. L. Blankenship, P. D. Jones and J. P. Giesy 2000. Toxicity reference values for the toxic effects of polychlorinated biphenyls to aquatic mammals. *Human. Ecol. Risk Assess.* 6: 181-201.
- Kuczaj II, S. A. and D. B. Yeater 2007. Observations of rough-toothed dolphins (*Steno bredanensis*) off the coast of Utila, Honduras. *J. Mar. Biol. Ass. UK* 87: 141-148.
- Leatherwood, S. and R. R. Reeves 1983. *The Sierra Club handbook of whales and dolphins*. Sierra Club Books, San Francisco. 302 pp.
- Lodi, L. 1992. Epimeletic behavior of free-ranging rough-toothed dolphins, *Steno bredanensis*, from Brazil. *Mar. Mamm. Sci.* 8: 284-287.
- Lodi, L. and B. Hetzel 1999. Rough-toothed dolphin, *Steno bredanensis*, feeding behaviors in Ilha Grande Bay, Brazil. *Biociências*(7): 29-42.
- Maigret, J., J. Trotignon and R. Duguay 1976. Observations of cetaceans on the coast of Mauritania (1971-1975). I. *M. M. Comm. CM* 1976/N:4. 6 pp.
- Miyazaki, N. 1980. Preliminary note on age determination and growth of the rough-toothed dolphin, *Steno bredanensis*, off the Pacific coast of Japan. International Whaling Commission, Cambridge, England.
- Miyazaki, N. and W. F. Perrin 1994. Rough-toothed dolphin *Steno bredanensis* (Lesson, 1828). Pages 1-21 in: S. H. Ridgway and R. J. Harrison, (eds.) *Handbook of Marine Mammals, Vol. 5: The first book of dolphins*. Academic Press, London.
- Mullin, K. D. and G. L. Fulling 2003. Abundance of cetaceans in the southern U.S. North Atlantic Ocean during summer 1998. *Fish. Bull.* 101: 603-613.
- NMFS 1999. Cruise results. Summer Atlantic Ocean marine mammal survey. NOAA Ship Oregon II cruise 236 (99-05), 4 August - 30 September 1999. N. M. F. Service. Available from SEFSC, 3209 Frederic Street, Pascagoula, MS 39567.
- NMFS 2008. A mass stranding of rough-toothed dolphins in the Florida Keys on March 2, 2005: Potential causes, health assessment, rehabilitation, and release., National Marine Fisheries Service. NOAA Tech. Memo. NMFS-SEFSC-XXX. 141 pp.
- Northridge, S. P. 1984. World review of interactions between marine mammals and fisheries. *FAO Fish. Pap.* 251: 190.
- Palka, D. L. 2006. Summer abundance estimates of cetaceans in US North Atlantic Navy Operating Areas. *Northeast Fish. Sci. Cent. Ref. Doc.* 06-03. 41 pp.
<http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0603/crd0603.pdf>

- Perrin, W. F. and W. A. Walker 1975. The rough-toothed porpoise, *Steno bredanensis*, in the eastern tropical Pacific. *J. Mamm.* 56: 905-907.
- Reeves, R. R., B. D. Smith, E. A. Crespo and G. N. d. Sciara 2003. Dolphins, whales, and porpoises: 2002-2010 Conservation action plan for the world's cetaceans. I. IUCN/SSC Cetacean Specialist Group, Gland, Switzerland and Cambridge, UK. 43-47 pp.
- Ritter, F. 2001. 21 cetacean species off La Gomera (Canary Islands): Possible reasons for an extraordinary species diversity. *European Research on Cetaceans-15. Proceedings of the 15th Annual Conference of the European Cetacean Society*, 6-10 May 2001, Rome, Italy.
- Ritter, F. 2002. Behavioral observations of rough-toothed dolphins (*Steno bredanensis*) of La Gomera, Canary Islands (1995-2000), with special reference to their interactions with humans. *Aquatic Mammals* 28: 46-59.
- Ritter, F. 2007. Behavioral responses of rough-toothed dolphins to a dead newborn calf. *Mar. Mamm. Sci.* 23(2): 429-433.
- Struntz, W. D., J. R. Kucklick, M. M. Schantz, P. R. Becker, W. E. McFee and M. K. Stolen 2004. Persistent organic pollutants in rough toothed dolphins (*Steno bredanensis*) sampled during an unusual mass stranding event. *Mar. Poll. Bull.* 48(1-2): 164-173.
- Swartz, S. L., A. Martinex, T. Cole, P. J. Clapham, M. A. McDonald, J. A. Hildebrand, E. M. Oleson, C. Burks and J. Barlow 2001. Visual and acoustic survey of humpback whales (*Megaptera novaeangliae*) in the eastern and southern Caribbean Sea. NOAA Tech. Memo. NMFS-SEFSC-456. 37 pp.
- 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. 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. Comm.* 43: 477-493.
- Waring, G. T., E. Josephson, C. P. Fairfield and K. Maze-Foley, eds. 2007. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments – 2006. NOAA Tech. Memo. NMFS-NE-201.
- Wells, R. S., G. A. Early, J. G. Gannon, R. G. Lingens and P. Sweeney In review. Tagging and tracking of rough-toothed dolphins (*Steno bredanensis*) from the March 2005 mass stranding in the Florida Keys. Available from NMFS, 75 Virginia Beach Road, Miami, FL 33149. NOAA Tech. Memo. NMFS-SEFSC-574, 44 pp.
- Wells, R. S. and J. G. Gannon 2005. Release and follow-up monitoring of rehabilitated rough-toothed dolphins. Pp. 4-18 In: C.A. Manire and R.S. Wells, Rough-toothed Dolphin Rehabilitation and Post-release Monitoring. Mote Marine Laboratory Technical Report No. 1047, J.H. Prescott Marine Mammal Rescue Assistance Grant Program. Award No. (FL) #2005-0162-001.
- Wells, R. S., C. A. Manire, H. L. Rhinehart, D. Smith, A. J. Westgate, F. I. Townsend, T. Rowles, A. A. Hohn and L. J. Hansen 1999. Ranging patterns of rehabilitated rough-toothed dolphins, *Steno bredanensis*, released in the northeastern Gulf of Mexico. 13th Biennial Conference on the Biology of Marine Mammals, 28 Nov - 3 Dec, 1999, Maui, HI.