COMMON BOTTLENOSE DOLPHIN (*Tursiops truncatus truncatus*)
St. Andrew Bay Stock

NOTE – NMFS is in the process of writing individual stock assessment reports for each of the 31 bay, sound and estuary stocks of common bottlenose dolphins in the Gulf of Mexico.

STOCK DEFINITION AND GEOGRAPHIC RANGE

Common bottlenose dolphins are distributed throughout the bays, sounds and estuaries of the Gulf of Mexico (Mullin 1988). Long-term (year-round, multi-year) residency by at least some individuals has been reported from nearly every site where photographic identification (photo-ID) or tagging studies have been conducted in the Gulf of Mexico (e.g., Irvine and Wells 1972; Shane 1977; Gruber 1981; Irvine *et al.* 1981; Wells 1986; Wells *et al.* 1987; Scott *et al.* 1990; Shane 1990; Wells 1991; Bräger 1993; Bräger *et al.* 1994; Fertl 1994; Wells *et al.* 1996a,b; Wells *et al.* 1997; Weller 1998; Maze and Würsig 1999; Lynn and Würsig 2002; Wells 2003; Hubard *et al.* 2004; Irwin and Würsig 2004; Shane 2004; Balmer *et al.* 2008; Urian *et al.* 2009; Bassos-Hull *et al.* 2013; Wells *et al.* 2017; Balmer *et al.* 2018). In many cases, residents occur predominantly within estuarine waters, with limited movements through passes to the Gulf of Mexico (Shane 1977; Gruber 1981; Irvine *et al.* 1981; Shane 1990; Maze and Würsig 1999; Lynn and Würsig 2002; Fazioli *et al.* 2006; Bassos-Hull *et al.* 2013; Wells *et al.* 2017). Early studies indicating year-round residency in bays in both the eastern and western Gulf of Mexico led to the delineation of 33 bay, sound and estuary (BSE) stocks, including St. Andrew Bay, with the first stock assessment reports published in 1995.

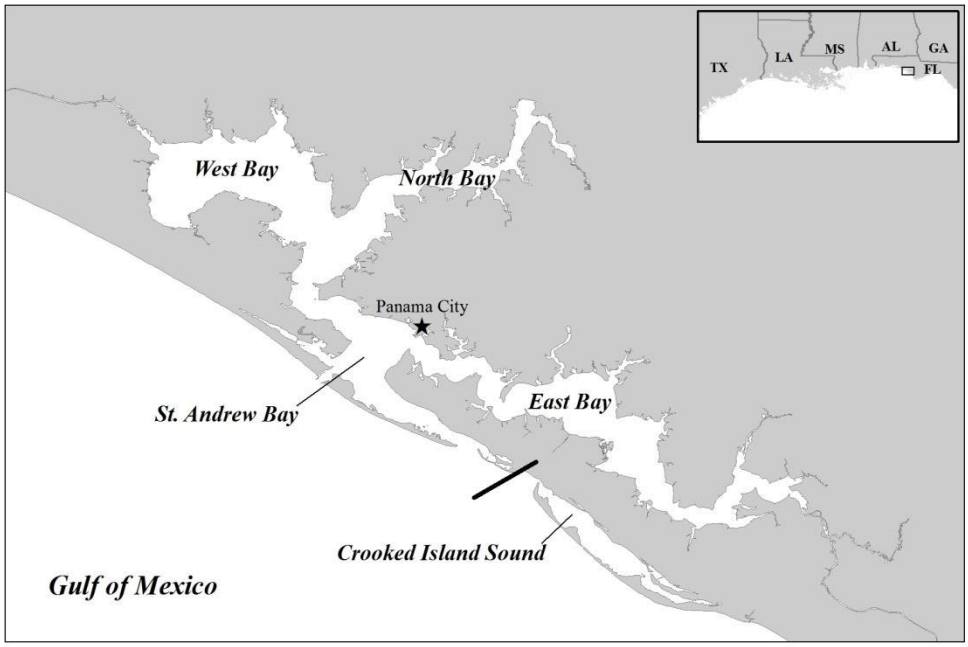

Figure 1. Geographic extent of the St. Andrew Bay Stock, located in the Florida panhandle. The stock includes West Bay, North Bay, East Bay, and St. Andrew Bay. The thick solid line indicates the southeastern boundary of St. Andrew Bay. Crooked Island Sound is part of the St. Joseph Bay Stock to the southeast.

More recently, genetic data also support the concept of discrete BSE stocks (Duffield and Wells 2002; Sellas *et al.* 2005). Sellas *et al.* (2005) examined population subdivision among dolphins sampled in Sarasota Bay, Tampa Bay, Charlotte Harbor, Matagorda Bay, Texas, and the coastal Gulf of Mexico (1–12 km offshore) from just outside Tampa Bay to the south end of Lemon Bay, and found evidence of significant population differentiation among all areas on the basis of both mitochondrial DNA control region sequence data and nine nuclear microsatellite loci. Genetic data also indicate restricted genetic exchange between and demographic independence of BSE populations and those occurring in adjacent Gulf coastal waters (Sellas *et al.* 2005; Rosel *et al.* 2017). Differences in reproductive seasonality from site to site also suggest genetic-based distinctions among areas (Urian *et al.* 1996). Photo-ID and genetic data from several inshore areas of the southeastern United States also support the existence of resident estuarine animals and a differentiation between animals biopsied along the Atlantic coast and those biopsied within estuarine systems at the same latitude (Caldwell 2001; Gubbins 2002;

Zolman 2002; Mazzoil *et al.* 2005; Litz 2007; Rosel *et al*. 2009).

St. Andrew Bay is located in the central panhandle of Florida adjacent to Panama City, and extends approximately 50 km along the coastline (Figure 1). The bay is approximately 243 km^2 in surface area (US EPA 1999). The St. Andrew Bay area is divided up into four smaller bays: West Bay, North Bay, St. Andrew Bay, and East Bay. On average the entire bay is 4 m in depth (US EPA 1999), but West Bay, North Bay, and East Bay are shallower than St. Andrew Bay. St. Andrew Bay is unique among Gulf of Mexico estuaries in that very little fresh water flows into the bay, resulting in high salinities and clear water due to the lack of sedimentation and turbidity (Brim and Handley 2002; Balmer *et al.* 2019). Average salinity is 31 ppt (US EPA 1999). High salinity and clear water facilitate seagrass growth throughout the bay (Brim and Handley 2002). In 1938 the U.S. Army Corps of Engineers excavated through a peninsula to create a rock-jettied inlet which is the main entrance channel (Brim and Handley 2002). St. Andrew Bay has been designated as an aquatic preserve by the state of Florida (Florida DEP 2018).

The St. Andrew Bay Stock boundaries includes all waters of West Bay, North Bay, St. Andrew Bay and East Bay (Figure 1). The boundaries are based on photo-ID studies conducted during 2015–2016 by Balmer *et al.* (2019) which found minimal overlap between animals sighted in BSE waters and those sighted in nearshore coastal waters. The boundaries are subject to change as additional research is conducted. There is strong support from the findings of Balmer *et al.* (2008) to include Crooked Island Sound (also known as St. Andrew Sound) within the St. Joseph Bay Stock, southeast of St. Andrew Bay. However, animals from St. Andrew Bay and surrounding Panama City have also been sighted in Crooked Island Sound, suggesting Crooked Island Sound is an area of overlap for dolphins inhabiting both St. Joseph Bay and St. Andrew Bay (Balmer *et al.* 2010; 2019). Overlap between these stocks primarily occurred at the entrance of Crooked Island Sound and to a lesser degree, at the entrance to St. Andrew Bay.

POPULATION SIZE

The best available abundance estimate for the St. Andrew Bay Stock of common bottlenose dolphins is 199 (95% CI:173–246; CV=0.09), based on an April 2016 vessel-based capture-recapture photo-ID survey (Balmer *et al.* 2019).

Earlier abundance estimates (>8 years old)

Vessel-based capture-recapture photo-ID surveys were conducted during 2004–2007 by Bouveroux *et al.* (2014). The surveys covered a portion of the stock area and included central St. Andrew Bay and nearshore coastal waters. West Bay, North Bay, and East Bay were not surveyed. Seasonal abundance estimates were calculated using robust design population models. Abundance varied seasonally, and ranged from 89 (95% CI=71–161) in March–May 2004 to 183 (95% CI=169–208) in June–July 2007. Because these surveys did not sample all of the estuarine waters where dolphins are known to occur, the estimates of abundance were negatively biased. Overall, the results of Bouveroux *et al.* (2014) indicated a small community of dolphins with high site fidelity utilized the St. Andrew Bay area as well as a large number of transient dolphins that frequently utilized the area.

Recent surveys and abundance estimates

Balmer *et al.* (2019) conducted vessel-based capture-recapture photo-ID surveys during July 2015, October 2015, April 2016, and October 2016 to estimate abundance of common bottlenose dolphins for St. Andrew Bay. Abundance estimates were generated using a robust-design capture-recapture random movement model. Estimates factored in the distinctiveness rate and included animals with distinctive and non-distinctive fins. Abundance ranged from 199 (95% CI=173–246) in April 2016 to 315 (95% CI=274–378) in October 2016. Given the observed seasonal variation in abundance and the possibility that transient animals may occur within estuarine waters (Bouveroux *et al.* 2014), the lowest seasonal abundance estimate (April 2016), 199 (CV=0.09), was used as the best estimate for the St. Andrew Bay Stock as this estimate most likely reflects primarily resident animals. This approach is consistent with that for other BSE stocks where multiple seasonal abundance estimates are available. Key uncertainties in this abundance estimate include movement patterns of individual dolphins between estuarine and coastal waters of St. Andrew Bay. Balmer *et al.* (2019) estimated abundance exclusively within the St. Andrew Bay Stock boundaries but also surveyed coastal waters adjacent to St. Andrew Bay. Although there was minimal crossover of individuals between estuarine and coastal waters (St. Andrew Bay photo-ID catalog: N = 25/353, 7%), and robust capture-recapture models should account for temporary immigration, the abundance estimates from a given sampling period may be biased.

Minimum Population Estimate

The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate. This is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by Wade and Angliss (1997). The best estimate for the St. Andrew Bay Stock is 199 (CV=0.09).

The resulting minimum population estimate is 185.

Current Population Trend

There are insufficient data to determine the population trends for this stock because only one estimate of population size is available for the entire stock area.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum net productivity rates are unknown for this stock. 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 the 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 of the St. Andrew Bay Stock of common bottlenose dolphins is 185. The maximum productivity rate is 0.04, the default value for cetaceans. The recovery factor is 0.4 because the CV of the shrimp trawl mortality estimate for Florida BSE stocks is greater than 0.8 (Wade and Angliss 1997). PBR for this stock of bottlenose dolphins is 1.5.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

The total annual human-caused mortality and serious injury to the St. Andrew Bay Stock of common bottlenose dolphins during 2013–2017 is unknown. The mean annual fishery-related mortality and serious injury during 2013–2017 for strandings and at-sea observations identified as fishery-related was 0.2 (see Shrimp Trawl section for additional fishery-related mortality). No additional mortality and serious injury was documented from other human-caused sources (e.g., fishery research) and therefore, the minimum total mean annual human-caused mortality and serious injury for this stock during 2013–2017 was 0.2 (Table 1). This is likely a biased estimate and represents several sources of uncertainty because: 1) not all fisheries that could interact with this stock are observed and/or observer coverage is very low, 2) stranding data are used as an indicator of fishery-related interactions and not all dead animals are recovered by the stranding network (Peltier *et al*. 2012; Wells *et al*. 2015), 3) cause of death is not (or cannot be) routinely determined for stranded carcasses, 4) the estimate of fishery-related interactions includes an actual count of verified fishery-caused deaths and serious injuries and should be considered a minimum (NMFS 2016), and 5) the estimate does not include shrimp trawl bycatch (see Shrimp Trawl section).

Fishery Information

There are five commercial fisheries that interact, or that potentially could interact, with this stock. These include three Category II fisheries (Southeastern U.S. Atlantic, Gulf of Mexico shrimp trawl; Gulf of Mexico menhaden purse seine; and Southeastern U.S. Atlantic, Gulf of Mexico stone crab trap/pot); and two Category III fisheries (Gulf of Mexico blue crab trap/pot; and Atlantic Ocean, Gulf of Mexico, Caribbean commercial passenger fishing vessel (hook and line)). Detailed fishery information is presented in Appendix III.

Shrimp Trawl

Between 1997 and 2014, seven common bottlenose dolphins and seven unidentified dolphins, which could have been either common bottlenose dolphins or Atlantic spotted dolphins, became entangled in the net, lazy line, turtle excluder device, or tickler chain gear in the commercial shrimp trawl fishery in the Gulf of Mexico (Soldevilla *et al.* 2016). All dolphin bycatch interactions resulted in mortalities except for one unidentified dolphin that was released alive without serious injury in 2009 (Maze-Foley and Garrison 2016). Soldevilla *et al.* (2015; 2016) provided mortality estimates calculated from analysis of shrimp fishery effort data and NMFS's Observer Program bycatch data. Although this fishery operates inside the estuaries of the northern Gulf of Mexico, observer program coverage did not extend into BSE waters; therefore time-area stratified bycatch rates were extrapolated into inshore waters to estimate a five-year unweighted mean mortality estimate for 2010–2014 based on inshore fishing effort (Soldevilla *et al.* 2016). Because the spatial resolution at which fishery effort is modeled is aggregated at the state level (e.g., Nance *et al.* 2008), the mortality estimate covers inshore waters of the Gulf Coast of Florida and thus aggregates all Florida BSE stocks on the west coast, not just the St. Andrew Bay Stock. The mean annual mortality estimate for Florida BSE stocks for the years 2010–2014 was 2.4 (CV=1.6; Soldevilla *et al.* 2016). Because bycatch for the St. Andrew Bay Stock alone cannot be quantified at this time, the shrimp trawl mortality estimate is not included in the annual human-caused mortality and serious injury total for this stock. Limitations and biases of annual bycatch mortality estimates

are described in detail in Soldevilla *et al.* (2015; 2016).

Menhaden Purse Seine

During 2013–2017 there were no documented interactions between menhaden purse seine gear and the St. Andrew Bay Stock. There are no recent observer program data for the Gulf of Mexico menhaden purse seine fishery. The menhaden fishing effort in this area (Bay County) that corresponds with the St. Andrew Bay Stock fluctuated annually in effort. Number of menhaden fishing trips/year for Bay County during 2013–2017 was as follows: 10 in 2013; 27 in 2014; 25 in 2015; 93 in 2016; and 1 in 2017 (Florida Fish and Wildlife Conservation Commission 2018).

Crab Trap/Pot

During 2013–2017 there were no documented interactions between commercial crab trap/pot gear and the St. Andrew Bay Stock. There is no systematic observer coverage of crab trap/pot fisheries in the Gulf of Mexico, so it is not possible to quantify total mortality.

Hook and Line (Rod and Reel)

During 2013–2017, two live common bottlenose dolphins were observed at-sea (in 2014 and 2015) entangled in hook and line fishing gear. In 2014, a dolphin was observed with a lure hooked to its upper and lower jaw, limiting its ability to open its rostrum. The lure may have come off on its own, and it could not be determined if the animal was seriously injured (Maze-Foley and Garrison 2018). In 2015, another dolphin was sighted with a lure with a treble hook on each end embedded in the upper and lower rostrum, limiting the animal's ability to open its rostrum. This animal could have belonged to either the St. Andrew Bay Stock or the Northern Coastal Stock, and it was considered seriously injured (Maze-Foley and Garrison 2018). The 2015 serious injury was included in the annual human-caused mortality and serious injury total for this stock (Table 1).

It should be noted that, in general, it cannot be determined if rod and reel hook and line gear originated from a commercial (i.e., charter boat and headboat) or recreational angler because the gear type used by both sources is typically the same. Also, it is not possible to estimate the total number of interactions with hook and line gear because there is no systematic observer program in the Gulf of Mexico. The documented interactions in this gear represents a minimum known count of interactions in the last five years.

Other Mortality

Illegal feeding/provisioning of common bottlenose dolphins has been well documented in the St. Andrew Bay/Panama City area. For many years within certain areas of St. Andrew Bay and adjacent coastal waters, it has been typical to see wild dolphins surrounded by multiple boats, multiple personal watercraft, and multiple swimmers. Studies by Samuels and Bejder (2004) in 1998 and more recently by Powell *et al.* (2018) in 2014 have documented a high rate of unregulated food provisioning and recorded many interactions with humans that put dolphins at risk of injury, illness, or death. In addition to the boaters who regularly feed wild dolphins, there are approximately 25 companies based in Panama City offering dolphin viewing and swim-with opportunities (Powell *et al.* 2018). Dolphins are illegally fed regularly in at least two different locations, one inside St. Andrew Bay at a bait barge, and the other just outside St. Andrew Bay along a coastal beach (Powell *et al.* 2018). Illegal feeding is often performed in conjunction with "swim-with" tourist activities that involve people entering the water to interact with free-ranging dolphins. Research by Powell *et al.* (2018) during 2014 indicated the number of conditioned individual dolphins (conditioned to human interaction by food reinforcement; animals that accepted food handouts from people on a regular basis) tripled (n=21) compared to those documented in 1998 by Samuels and Bejder (2004) (n=7), and that overall the problems of illegal feeding and harassment had increased. Powell *et al.* (2018) found that conditioned dolphins spent the majority of their time approaching boats to beg for food and patrolling among boats and swimmers looking for handouts, which in turn increases their risk of boat strike, entanglement in or hooking by fishing gear, or retaliation by angry fishermen (Wells and Scott 1997; Powell and Wells 2011; Adimey *et al.* 2014; Powell *et al.* 2018).

Depredation is also a growing problem in Gulf of Mexico coastal and estuarine waters and globally, and can lead to serious injury or mortality via ingestion of, hooking by, or entanglement in gear (e.g., Zollett and Read 2006; Read 2008; Powell and Wells 2011; Vail 2016), as well as to changes in dolphin activity patterns, such as decreases in natural foraging (Powell and Wells 2011). It has been suggested that the illegal feeding of wild common bottlenose dolphins may encourage depredation because provisioning conditions dolphins to approach humans and vessels, where they then may prey on bait and catches (Vail 2016). For example, in Panama City, two conditioned dolphins previously observed begging, were also sighted patrolling and attempting to depredate from recreational fishermen (Powell *et al.* 2018). There have been two recent cases of dolphins sighted within St. Andrew Bay with fishing lures embedded in

their rostrums, limiting the ability of the animals to open their rostrums (see Hook and Line section). These cases of gear entanglement may have been a result of dolphins depredating fishing gear.

All mortalities and serious injuries from known sources for the St. Andrew Bay Stock are summarized in Table 1.

Table 1. Summary of the incidental mortality and serious injury of common bottlenose dolphins (Tursiops truncatus) of the St. Andrew Bay Stock. For the shrimp trawl fishery, the bycatch mortality for the St. Andrew Bay Stock alone cannot be quantified at this time because mortality estimates encompass all estuarine waters of the Gulf coast of Florida, pooled. Therefore, the Gulf coast mortality estimate for Florida has not been included in the annual human-caused mortality and serious injury total for this stock (see Shrimp Trawl section). The remaining fisheries do not have an ongoing, systematic, federal observer program, so counts of mortality and serious injury were based on stranding data, at-sea observations, or fisherman self-reported takes via the Marine Mammal Authorization Program (MMAP). For stranding and at-sea counts, the number reported is a minimum because not all strandings or at-sea cases are detected. See the Annual Human-Caused Mortality and Serious Injury section for biases and limitations of mortality estimates. NA = not applicable.

Fishery	Years	Data Type	Mean Annual Estimated Mortality and Serious Injury Based on Observer Data	5-year Minimum Count Based on Stranding, At-Sea, and/or MMAP Data
Shrimp Trawl	2010–2014	Observer Data	Undetermined for this stock (see Shrimp Trawl section)	NA
Menhaden Purse Seine	2013–2017	MMAP fisherman self-reported takes	NA	0
Stone Crab Trap/Pot	2013–2017	Stranding Data and At-Sea Observations	NA	0
Blue Crab Trap/Pot	2013–2017	Stranding Data and At-Sea Observations	NA	0
Hook and Line	2013–2017	Stranding Data and At-Sea Observations	NA	1
Mean Annual Mortality due to commercial fisheries (2013–2017)			**0.2**	
Research Takes (5-year Count)			0	
Other Takes (gunshot wound; 5-year Count)			0	
Mean Annual Mortality due to research and other takes (2013–2017)			**0**	
Minimum Total Mean Annual Human-Caused Mortality and Serious Injury (2013–2017)			**0.2**	

Strandings

From 2013 to 2017, 19 common bottlenose dolphins were reported stranded within the St. Andrew Bay Stock area (Table 2; NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 13 June 2018). It could not be determined whether there was evidence of human interaction for 18 of these strandings, and for one stranding, signs of human interaction were detected. Stranding data underestimate the extent of human

and fishery-related mortality and serious injury because not all of the dolphins that die or are seriously injured in human interactions wash ashore, or, if they do, they are not all recovered (Peltier *et al*. 2012; Wells *et al*. 2015). Additionally, not all carcasses will show evidence of human interaction, entanglement or other fishery-related interaction due to decomposition, scavenger damage, etc. (Byrd *et al*. 2014). Finally, the level of technical expertise among stranding network personnel varies widely as does the ability to recognize signs of human interaction.

Table 2. Common bottlenose dolphin strandings occurring in the St Andrew Bay Stock area from 2013 to 2017, including the number of strandings for which evidence of human interaction (HI) was detected and number of strandings for which it could not be determined (CBD) if there was evidence of HI. Data are from the NOAA National Marine Mammal Health and Stranding Response Database (unpublished data, accessed 13 June 2018). Please note that HI does not necessarily mean the interaction caused the animal's death.

Stock	Category	2013	2014	2015	2016	2017	Total
St. Andrew Bay Stock	Total Stranded	6[a]	4[a]	5	2	2	19
	HI--Yes	0	0	1	0	0	1
	HI--No	0	0	0	0	0	0
	HI--CBD	6	4	4	2	2	18

[a] These strandings were part of the Northern Gulf of Mexico UME.

St. Andrew Bay has been affected by four recent unusual mortality events (UMEs). First, between August 1999 and May 2000, 150 common bottlenose dolphins died coincident with *K. brevis* harmful algal blooms and fish kills in the Florida Panhandle. This UME started in the eastern Bays, Apalachicola Bay and St. Joseph Bay, and spread west to St. Andrew Bay and Choctawhatchee Bay, and was concurrent spatially and temporally with a *K. brevis* bloom that spread east to west. There were nine common bottlenose dolphin strandings within the St. Andrew Bay Stock area during this event, and brevetoxin was determined to be the cause (Twiner *et al.* 2012; Litz *et al.* 2014). Second, in March and April 2004, in another Florida Panhandle UME attributed to *K. brevis* blooms, 105 common bottlenose dolphins and two unidentified dolphins stranded dead (Litz *et al.* 2014). This event started in St. Joseph Bay and spread westward. At least two common bottlenose dolphins stranded in the St. Andrew Bay Stock area. Although there was no indication of a *K. brevis* bloom at the time, high levels of brevetoxin were found in the stomach contents of the stranded dolphins (Flewelling *et al.* 2005; Twiner *et al.* 2012). Third, a separate UME was declared in the Florida Panhandle after elevated numbers of dolphin strandings occurred in association with a *K. brevis* bloom in September 2005. Dolphin strandings remained elevated through the spring of 2006 and brevetoxin was again detected in the tissues of most of the stranded dolphins. Between September 2005 and April 2006 when the event was officially declared over, a total of 88 common bottlenose dolphin strandings occurred (plus strandings of five unidentified dolphins), with nine (10%) occurring within the St. Andrew Bay Stock area. Brevetoxin was determined to be the cause of this event (Twiner *et al.* 2012; Litz *et al.* 2014). Finally, a UME was declared for cetaceans in the northern Gulf of Mexico beginning 1 March 2010 and ending 31 July 2014 (Litz *et al.* 2014; https://www.fisheries.noaa.gov/national/marine-life-distress/2010-2014-cetacean-unusual-mortality-event-northern-gulf-mexico). This UME included cetaceans that stranded prior to the *Deepwater Horizon* (DWH) oil spill (see Habitat Issues section), during the spill, and after. Exposure to the DWH oil spill was determined to be the primary underlying cause of the elevated stranding numbers in the northern Gulf of Mexico after the spill, although not for strandings in St. Andrew Bay (e.g., Schwacke *et al.* 2014; Venn-Watson *et al.* 2015; Colegrove *et al.* 2016; DWH NRDAT 2016; see Habitat Issues section). During 2013–2014, all 10 stranded dolphins from this stock were considered to be part of the UME (see Table 2).

HABITAT ISSUES

The *Deepwater Horizon* MC252 drilling platform, located approximately 80 km southeast of the Mississippi River Delta in waters about 1500 m deep, exploded on 20 April 2010. The rig sank, and over 87 days up to ~3.2 million barrels of oil were discharged from the wellhead until it was capped on 15 July 2010 (DWH NRDAT 2016). Some heavy to moderate oiling occurred on Alabama and Florida beaches, with the heaviest stretch occurring from Dauphin Island, Alabama, to Gulf Breeze, Florida. Light to trace oil was reported from Gulf Breeze to Panama City, Florida (OSAT-2 2011; Michel *et al.* 2013). The maximum shoreline oiling experienced by the St. Andrew Bay stock area was very light oiling in parts of the stock area (Michel *et al.* 2013) and no deaths in St. Andrew Bay during the spill time period were attributed to oil (DWH NRDAT 2016).

Environmental contaminants have been an issue of concern for common bottlenose dolphins throughout the

southeastern U.S. prior to the DWH oil spill (e.g., Kucklick *et al.* 2011), and due to the physical features of St. Andrew Bay, such as the depth, lack of freshwater inflow and resulting high salinity, minimal tidal flushing, and sediment composition, this bay is very vulnerable to contamination and pollution (Brim and Handley 2002). Contaminants cannot be easily flushed out and the sediments in the bay could become reservoirs for contaminants. The Environmental Protection Agency has identified one Superfund hazardous waste site at Tyndall Air Force Base, which borders St. Andrew Bay and East Bay. A Florida state-funded clean-up program includes two additional contaminated sites, and there are four hazardous waste producing facilities in the St. Andrew Bay watershed (Northwest Florida Water Management District 2017).

Storm water runoff and urbanization pose the greatest future threats to the quality of water and sediments in St. Andrew Bay (Brim and Handley 2002). Several common bottlenose dolphin UMEs in St. Andrew Bay (see Strandings section) have been attributed to harmful algal blooms (*K. brevis*), which are a result of eutrophication. For recent UMEs in the Florida Panhandle (1999–2000, 2004, 2005–2006), the site of bloom origin was not known for all, but it is likely none originated in St. Andrew Bay (Twiner *et al.* 2012). However, blooms can be transported by currents from adjacent bays and coastal waters, so eutrophication anywhere along the Florida Panhandle can impact St. Andrew Bay. Other habitat issues for this area include historic loss of seagrasses and damage to seagrasses due to propeller scarring, wetland loss and degradation, and a rapid increase in human population and associated coastal development in the area (Northwest Florida Water Management District 2017).

STATUS OF STOCK

Common bottlenose dolphins are not listed as threatened or endangered under the Endangered Species Act, and the St. Andrew Bay Stock is not a strategic stock under the MMPA. The documented mean annual human-caused mortality for this stock for 2013–2017 is 0.2. However, it is likely that the estimate of annual fishery-caused mortality and serious injury is biased low as indicated above (see Annual Human-Caused Mortality and Serious Injury section). 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. The status of this stock relative to OSP is unknown. There are insufficient data to determine population trends for this stock.

Although this stock does not meet the criteria to qualify as strategic (NMFS 2016), NMFS has concerns regarding this stock due to the small stock size, the high number of common bottlenose dolphin deaths associated with UMEs in the Florida panhandle since 1999, and the high rate of illegal feeding and human interactions.

REFERENCES CITED

Adimey, N.M., C.A. Hudak, J.R. Powell, K. Bassos-Hull, A. Foley, N.A. Farmer, L. White and K. Minch. 2014. Fishery gear interactions from stranded bottlenose dolphins, Florida manatees, and sea turtles in Florida, U.S.A. Mar. Pollut. Bull. 81:103–115.

Balmer, B.C., T. McDonald, F. Hornsby, J. Adams, J. Allen, A. Barleycorn, P. Clarke, C. Cush, A. Honaker, K. McHugh, T. Speakman, R. Wells and L. Schwacke. 2018. Long-term trends in a northern Gulf of Mexico common bottlenose dolphin (*Tursiops truncatus*) population in the wake of the *Deepwater Horizon* oil spill. J. Cetacean Res. Manage. 18:1–9.

Balmer, B.C., L.H. Schwacke and R.S. Wells. 2010. Linking dive behavior to satellite-linked tag condition for a bottlenose dolphin (*Tursiops truncatus*) along Florida's northern Gulf of Mexico coast. Aquat. Mamm. 36(1):1–8.

Balmer, B., S. Watwood, B. Quigley, T. Speakman, K. Barry, K. Mullin, P. Rosel, C. Sinclair, E. Zolman and L. Schwacke. 2019. Common bottlenose dolphin (*Tursiops truncatus*) abundance and distribution patterns in St. Andrew Bay, Florida, USA. Aquat. Conserv.: Mar. Freshw. Ecosyst. 2019:1–13.

Balmer, B.C., R.S. Wells, S.M. Nowacek, D.P. Nowacek, L.H. Schwacke, W.A. McLellan, F.S. Scharf, T.K. Rowles, L.J. Hansen, T.R. Spradlin and D.A. Pabst. 2008. Seasonal abundance and distribution patterns of common bottlenose dolphins (*Tursiops truncatus*) near St. Joseph Bay, Florida, USA. J. Cetacean Res. Manage. 10(2):157–167.

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.

Bassos-Hull, K., R.M. Perrtree, C.C. Shepard, S. Schilling, A.A. Barleycorn, J.B. Allen, B.C. Balmer, W.E. Pine and R.S. Wells. 2013. Long-term site fidelity and seasonal abundance estimates of common bottlenose dolphins (*Tursiops truncatus*) along the southwest coast of Florida and responses to natural perturbations. J. Cetacean Res. Manage. 13(1):19–30.

Bouveroux, T., R.B. Tyson and D.P. Nowacek. 2014. Abundance and site fidelity of bottlenose dolphins in coastal waters near Panama City, Florida. J. Cetacean Res. Manage. 14:37–42.

Bräger, S. 1993. Diurnal and seasonal behavior patterns of bottlenose dolphins (*Tursiops truncatus*). Mar. Mamm. Sci. 9:434–440.

Bräger, S., B. Würsig, A. Acevedo and T. Henningsen. 1994. Association patterns of bottlenose dolphins (*Tursiops truncatus*) in Galveston Bay, Texas. J. Mamm. 75(2):431–437.

Brim, M.S. and L.R. Handley. 2002. St. Andrew Bay. Seagrass status and trends in the northern Gulf of Mexico 1940-2002. Available from: https://pubs.usgs.gov/sir/2006/5287/pdf/St.AndrewBay.pdf.

Byrd, B.L., A.A. Hohn, G.N. Lovewell, K.M. Altman, S.G. Barco, A. Friedlaender, C.A. Harms, W.A. McLellan, K.T. Moore, P.E. Rosel and V.G. Thayer. 2014. Strandings illustrate marine mammal biodiversity and human impacts off the coast of North Carolina, USA. Fish. Bull. 112:1–23.

Caldwell, M. 2001. Social and genetic structure of bottlenose dolphin (*Tursiops truncatus*) in Jacksonville, Florida. Ph.D. dissertation from University of Miami. 143 pp.

Colegrove, K.M., S. Venn-Watson, J. Litz, M.J. Kinsel, K.A. Terio, E. Fougeres, R. Ewing, D.A. Pabst, W.A. McLellan, S. Raverty, J. Saliki, S. Fire, G. Rappucci, S. Bowen-Stevens, L. Noble, A. Costidis, M. Barbieri, C. Field, S. Smith, R.H. Carmichael, C. Chevis, W. Hatchett, D. Shannon, M. Tumlin, G. Lovewell, W. McFee and T.K. Rowles. 2016. Fetal distress and *in utero* pneumonia in perinatal dolphins during the Northern Gulf of Mexico unusual mortality event. Dis. Aquat. Org. 119(1):1–16.

Duffield, D.A. and R.S. Wells 2002. The molecular profile of a resident community of bottlenose dolphins, *Tursiops truncatus*. Pages 3–11 *in*: C. J. Pfeiffer, (ed.) Cell and Molecular Biology of Marine Mammals. Krieger Publishing, Melbourne, FL.

DWH NRDAT (*Deepwater Horizon* Natural Resource Damage Assessment Trustees). 2016. *Deepwater Horizon* oil spill: Final programmatic damage assessment and restoration plan and final programmatic environmental impact statement. Available from: http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan.

Fazioli, K.L., S. Hofmann and R.S. Wells 2006. Use of Gulf of Mexico coastal waters by distinct assemblages of bottlenose dolphins (*Tursiops truncatus*). Aquat. Mamm. 32(2):212–222.

Fertl, D.C. 1994. Occurrence patterns and behavior of bottlenose dolphins (*Tursiops truncatus*) in the Galveston ship channel. Texas J. Sci. 46:299–317.

Flewelling, L.J., J.P. Naar, J. P. Abbott, D.G. Baden, N.B. Barros, G.D. Bossart, M.D. Bottein, D.G. Hammond, E.M. Haubold, C.A. Heil, M.S. Henry, H.M. Jacocks, T.A. Leighfield, R.H. Pierce, T.D. Pitchford, S.A. Rommel, P.S. Scott, K.A. Steidinger, E.W. Truby, F.M.V. Dolah and J.H. Landsberg. 2005. Red tides and marine mammal mortalities: Unexpected brevetoxin vectors may account for deaths long after or remote from an algal bloom. Nature 435:755–756.

Florida Department of Environmental Protection (Florida DEP). Accessed 8 November 2018. Available from: http://www.dep.state.fl.us/coastal/sites/standrews/

Florida Fish and Wildlife Conservation Commission. 2018. Commercial fisheries landings in Florida. Available from: http://myfwc.com/research/saltwater/fishstats/commercial-fisheries/landings-in-florida/ Accessed 5 October 2018.

Gruber, J.A. 1981. Ecology of the Atlantic bottlenosed dolphin (*Tursiops truncatus*) in the Pass Cavallo area of Matagorda Bay, Texas. M. Sc. thesis from Texas A&M University, College Station. 182 pp.

Gubbins, C. 2002. Association patterns of resident bottlenose dolphins (*Tursiops truncatus*) in a South Carolina estuary. Aquat. Mamm. 28:24–31.

Hubard, C.W., K. Maze-Foley, K.D. Mullin and W.W. Schroeder 2004. Seasonal abundance and site fidelity of bottlenose dolphins (*Tursiops truncatus*) in Mississippi Sound. Aquat. Mamm. 30:299–310.

Irvine, B. and R.S. Wells 1972. Results of attempts to tag Atlantic bottlenose dolphins (*Tursiops truncatus*). Cetology 13(1–5).

Irvine, A.B., M.D. Scott, R.S. Wells and J.H. Kaufmann 1981. Movements and activities of the Atlantic bottlenose dolphin, *Tursiops truncatus*, near Sarasota, Florida. Fish. Bull. 79:671–688.

Irwin, L.J. and B. Würsig 2004. A small resident community of bottlenose dolphins, *Tursiops truncatus*, in Texas: Monitoring recommendations. G. Mex. Sci. 22(1):13–21.

Kucklick, J., L. Schwacke, R. Wells, A. Hohn, A. Guichard, J. Yordy, L. Hansen, E. Zolman, R. Wilson, J. Litz, D. Nowacek, T. Rowles, R. Pugh, B. Balmer, C. Sinclair and P. Rosel. 2011. Bottlenose dolphins as indicators of persistent organic pollutants in the western North Atlantic Ocean and northern Gulf of Mexico. Environ. Sci. Technol. 45(10):4270–4277.

Litz, J. A. 2007. Social structure, genetic structure, and persistent organohalogen pollutants in bottlenose dolphins (*Tursiops truncatus*) in Biscayne Bay, Florida. Ph.D. dissertation from University of Miami. 140 pp.

Litz, J.A., M.A. Baran, S.R. Bowen-Stevens, R.H. Carmichael, K.M. Colegrove, L.P. Garrison, S.E. Fire, E.M. Fougeres, R. Hardy, S. Holmes, W. Jones, B.E. Mase-Guthrie, D.K. Odell, P.E. Rosel, J.T. Saliki, D.K. Shannon, S.F. Shippee, S.M. Smith, E.M. Stratton, M.C. Tumlin, H.R. Whitehead, G.A.J. Worthy and T.K. Rowles. 2014. Review of historical unusual mortality events (UMEs) in the Gulf of Mexico (1990–2009): Providing context for the complex and long-lasting northern Gulf of Mexico cetacean UME. Dis. Aquat. Organ. 112:161–175.

Lynn, S.K. and B. Würsig 2002. Summer movement patterns of bottlenose dolphins in a Texas bay. G. Mex. Sci. 20(1):25–37.

Maze, K.S. and B. Würsig 1999. Bottlenose dolphins of San Luis Pass, Texas: Occurrence patterns, site fidelity, and habitat use. Aquat. Mamm. 25:91–103.

Maze-Foley, K. and L.P. Garrison. 2016. Serious injury determinations for small cetaceans off the southeast U.S. coast, 2007-2011. Southeast Fisheries Science Center, Protected Resources and Biodiversity Division, 75 Virginia Beach Dr., Miami, FL 33140. PRBD Contribution # PRBD-2016-04, 16 pp. Available from: https://repository.library.noaa.gov/view/noaa/12663

Maze-Foley, K. and L.P. Garrison. 2018. Serious injury determinations for small cetaceans off the southeast U.S. coast, 2012–2016. Southeast Fisheries Science Center, Protected Resources and Biodiversity Division, 75 Virginia Beach Dr., Miami, FL 33140. PRBD Contribution # PRBD-2018-04, 31 pp. Available from: https://grunt.sefsc.noaa.gov/P_QryLDS/download/PRB95_PRBD-2018-04_C.pdf?id=LDS

Mazzoil, M., S. D. McCulloch and R. H. Defran. 2005. Observations on the site fidelity of bottlenose dolphins (*Tursiops truncatus*) in the Indian River Lagoon, Florida. Fla. Sci. 68:217–226.

Michel, J., E.H. Owens, S. Zengel, A. Graham, Z. Nixon, T. Allard, W. Holton, P.D. Reimer, A. Lamarche, M. White, N. Rutherford, C. Childs, G. Mauseth, G. Challenger and E. Taylor. 2013. Extent and degree of shoreline oiling: *Deepwater Horizon* oil spill, Gulf of Mexico, USA. PLoS ONE 8(6):e65087.

Mullin, K.D. 1988. Comparative seasonal abundance and ecology of bottlenose dolphins (*Tursiops truncatus*) in three habitats of the north-central Gulf of Mexico. Ph.D. dissertation. Mississippi State University, Starkville. 135 pp.

Nance, J., W. Keithly, Jr., C. Caillouet, Jr., J. Cole, W. Gaidry, B. Gallaway, W. Griffin, R. Hart and M. Travis. 2008. Estimation of effort, maximum sustainable yield, and maximum economic yield in the shrimp fishery of the Gulf of Mexico. NOAA Tech. Memo. NMFS-SEFSC-570. 71 pp.

NMFS. 2016. Guidelines for preparing stock assessment reports pursuant to the 1994 amendments to the MMPA. NMFS Instruction 02-204-01, February 22, 2016. Available from: http://www.nmfs.noaa.gov/op/pds/index.html

Northwest Florida Water Management District. 2017. St. Andrew Bay watershed: Surface water improvement and management plan. Program Development Series 17-08. Available from: https://www.nwfwater.com/Water-Resources/Surface-Water-Improvement-and-Management/St.-Andrew-Bay

Operational Science Advisory Team (OSAT-2). 2011. Summary report for fate and effects of remnant oil remaining in the beach environment. Annex B: Spatial oil distribution. Available from: http://www.restorethegulf.gov/release/2011/03/01/osat-2-fate-and-effects-oil-beaches

Peltier, H., W. Dabin, P. Daniel, O. Van Canneyt, G. Dorémus, M. Huon and V. Ridoux. 2012. The significance of stranding data as indicators of cetacean populations at sea: modelling the drift of cetacean carcasses. Ecol. Indicators 18:278–290.

Powell, J.R. and R.S. Wells. 2011. Recreational fishing depredation and associated behaviors involving common bottlenose dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida. Mar. Mamm. Sci. 27(1):111–129.

Powell, J.R., A.F. Machernis, L.K. Engleby, N.A. Farmer and T.R. Spradlin. 2018. Sixteen year later: An updated evaluation of the impacts of chronic human interactions with bottlenose dolphins (*Tursiops truncatus*) in Panama City, Florida, USA. J. Cetacean Res. Manage. 19:79–93.

Read, A.J. 2008. The looming crisis: Interactions between marine mammals and fisheries. J. Mammal. 89(3):541–548.

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.

Rosel, P.E., L.A. Wilcox, C. Sinclair, T.R. Speakman, M.C. Tumlin, J.A. Litz and E.S. Zolman. 2017. Genetic assignment to stock of stranded bottlenose dolphins in southeastern Louisiana after the *Deepwater Horizon* oil spill. Endang. Species Res. 33:221–234.

Samuels, A. and L. Bejder. 2004. Chronic interactions between humans and free-ranging bottlenose dolphins near Panama City Beach, Florida, USA. J. Cetacean Res. Manage. 6:69–77.

Schwacke, L.H., C.R. Smith, F.I. Townsend, R.S. Wells, L.B. Hart, B.C. Balmer, T.K. Collier, S. De Guise, M.M. Fry, L.J. Guillette, S.V. Lamb, S.M. Lane, W.E. McFee, N.J. Place, M.C. Tumlin, G.M. Ylitalo, E.S. Zolman and T.K. Rowles. 2014. Health of bottlenose dolphins (*Tursiops truncatus*) in Barataria Bay, Louisiana following the *Deepwater Horizon* oil spill. Environ. Sci. Technol. 48(1):93–103.

Scott, M.D., R.S. Wells and A.B. Irvine 1990. A long-term study of bottlenose dolphins on the west coast of Florida. Pages 235-244 *in*: S. Leatherwood and R.R. Reeves, (eds.) The bottlenose dolphin. Academic Press, San Diego, CA.

Sellas, A.B., R.S. Wells and P.E. Rosel 2005. Mitochondrial and nuclear DNA analyses reveal fine scale geographic structure in bottlenose dolphins (*Tursiops truncatus*) in the Gulf of Mexico. Conserv. Genet. 6(5):715–728.

Shane, S.H. 1977. The population biology of the Atlantic bottlenose dolphin, *Tursiops truncatus*, in the Aransas Pass area of Texas. M. Sc. thesis from Texas A&M University, College Station. 238 pp.

Shane, S.H. 1990. Behavior and ecology of the bottlenose dolphin at Sanibel Island, Florida. Pages 245–265 *in*: S. Leatherwood and R.R. Reeves, (eds.) The bottlenose dolphin. Academic Press, San Diego, CA.

Shane, S.H. 2004. Residence patterns, group characteristics, and association patterns of bottlenose dolphins near Sanibel Island, Florida. G. Mex. Sci. 22(1):1–12.

Soldevilla, M.S., L.P. Garrison, E. Scott-Denton and J.M. Nance. 2015. Estimation of marine mammal bycatch mortality in the Gulf of Mexico shrimp otter trawl fishery. NOAA Tech. Memo. NMFS-SEFSC-672. 70 pp.

Soldevilla, M.S., L.P. Garrison, E. Scott-Denton and R.A. Hart. 2016. Estimated bycatch mortality of marine mammals in the Gulf of Mexico shrimp otter trawl fishery during 2012 to 2014. NOAA Tech. Memo. NMFS-SEFSC-697. 47 pp.

Twiner, M.J., L.J. Flewelling, S.E. Fire, S.R. Bowen-Stevens, J.K. Gaydos, C.K. Johnson, J.H. Landsberg, T.A. Leighfield, B. Mase-Guthrie, L. Schwacke, F.M. Van Dolah, Z. Wang and T.K. Rowles. 2012. Comparative analysis of three brevetoxin-associated bottlenose dolphin (*Tursiops truncatus*) mortality events in the Florida panhandle region (USA). PLOS ONE 7(8). 19 pp.

Urian, K.W., D.A. Duffield, A.J. Read, R.S. Wells and D.D. Shell 1996. Seasonality of reproduction in bottlenose dolphins, *Tursiops truncatus*. J. Mamm. 77:394–403.

Urian, K.W., S. Hofmann, R.S. Wells and A.J. Read. 2009. Fine-scale population structure of bottlenose dolphins (*Tursiops truncatus*) in Tampa Bay, Florida. Mar. Mamm. Sci. 25(9):619–638.

U.S. EPA. 1999. Ecological condition of estuaries in the Gulf of Mexico. EPA 620-R-98-004. U.S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Gulf Ecology Division, Gulf Breeze, Florida. 80pp. Available from: https://www.epa.gov/sites/production/files/2015-08/documents/ecocondestuariesgom_print.pdf

Vail, C.S. 2016. An overview of increasing incidents of bottlenose dolphin harassment in the Gulf of Mexico and possible solutions. Front. Mar. Sci. 3:110.

Venn-Watson, S., K.M. Colegrove, J. Litz, M. Kinsel, K. Terio, J. Saliki, S. Fire, R. Carmichael, C. Chevis, W. Hatchett, J. Pitchford, M. Tumlin, C. Field, S. Smith, R. Ewing, D. Fauquier, G. Lovewell, H. Whitehead, D. Rotstein, W. McFee, E. Fougeres and T. Rowles. 2015. Adrenal gland and lung lesions in Gulf of Mexico common bottlenose dolphins (*Tursiops truncatus*) found dead following the *Deepwater Horizon* Oil Spill. PLoS ONE 10(5):e0126538.

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. Available from: https://repository.library.noaa.gov/view/noaa/15963

Weller, D.W. 1998. Global and regional variation in the biology and behavior of bottlenose dolphins. Ph. D. thesis from Texas A&M University, College Station. 142 pp.

Wells, R.S. 1986. Population structure of bottlenose dolphins: Behavioral studies along the central west coast of Florida. Contract report to NMFS, SEFSC. Contract No. 45-WCNF-5-00366. Available from: NMFS, Southeast Fisheries Science Center, 75 Virginia Beach Dr., Miami, FL 33149. 58 pp.

Wells, R.S. 1991. The role of long-term study in understanding the social structure of a bottlenose dolphin community. Pages 199–225 *in*: K. Pryor and K. S. Norris, (eds.) Dolphin societies: Discoveries and puzzles. University of California Press, Berkeley.

Wells, R.S. 2003. Dolphin social complexity: Lessons from long-term study and life history. Pages 32-56 *in*: F. B. M. de Waal and P. L. Tyack, (eds.) Animal social complexity: Intelligence, culture, and individualized societies. Harvard University Press, Cambridge, MA.

Wells, R.S. and M.D. Scott. 1997. Seasonal incidence of boat strikes on bottlenose dolphins near Sarasota, Florida. Mar. Mamm. Sci. 13(3):475–480.

Wells, R.S., J.B. Allen, G. Lovewell, J. Gorzelany, R.E. Delynn, D.A. Fauquier and N.B. Barros. 2015. Carcass-recovery rates for resident bottlenose dolphins in Sarasota Bay, Florida. Mar. Mamm. Sci. 31(1):355–368.

Wells, R.S., M.K. Bassos, K.W. Urian, W.J. Carr and M.D. Scott 1996a. Low-level monitoring of bottlenose dolphins, *Tursiops truncatus*, in Charlotte Harbor, Florida: 1990-1994. NOAA Tech. Memo. NMFS-SEFSC-384. 36 pp.

Wells, R.S., M.K. Bassos, K.W. Urian, S.H. Shane, E.C.G. Owen, C.F. Weiss, W.J. Carr and M.D. Scott 1997. Low-level monitoring of bottlenose dolphins, *Tursiops truncatus*, in Pine Island Sound, Florida: 1996. Contract report to National Marine Fisheries Service, Southeast Fisheries Center Contribution No. 40-WCNF601958. Available from: NMFS, Southeast Fisheries Science Center, 75 Virginia Beach Dr., Miami, FL 33149.

Wells, R.S., L.H. Schwacke, T.K. Rowles, B.C. Balmer, E. Zolman, T. Speakman, F.I. Townsend, M.C. Tumlin, A. Barleycorn and K.A. Wilkinson. 2017. Ranging patterns of common bottlenose dolphins (*Tursiops truncatus*) in Barataria Bay, Louisiana, following the *Deepwater Horizon* oil spill. Endanger. Spec. Res. 33:159–180.

Wells, R.S., M.D. Scott and A.B. Irvine 1987. The social structure of free ranging bottlenose dolphins. Pages 247-305 *in*: H. Genoways, (ed.) Current Mammalogy, Vol. 1. Plenum Press, New York.

Wells, R.S., K.W. Urian, A.J. Read, M.K. Bassos, W.J. Carr and M.D. Scott 1996b. Low-level monitoring of bottlenose dolphins, *Tursiops truncatus*, in Tampa Bay, Florida: 1988-1993. NOAA Tech. Memo. NMFS-SEFSC-385. 25 pp.

Zollett, E.A. and A.J. Read. 2006. Depredation of catch by bottlenose dolphins (*Tursiops truncatus*) in the Florida king mackerel (*Scomberomorus cavalla*) troll fishery. Fish. Bull. 104(3):343–349.

Zolman, E. S. 2002. Residence patterns of bottlenose dolphins (*Tursiops truncatus*) in the Stono River estuary, Charleston County, South Carolina, U.S.A. Mar. Mamm. Sci. 18:879–892.