# COMMON BOTTLENOSE DOLPHIN (*Tursiops truncatus truncatus*)
# St. Joseph 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. Joseph Bay, with the first stock assessment reports published in 1995.

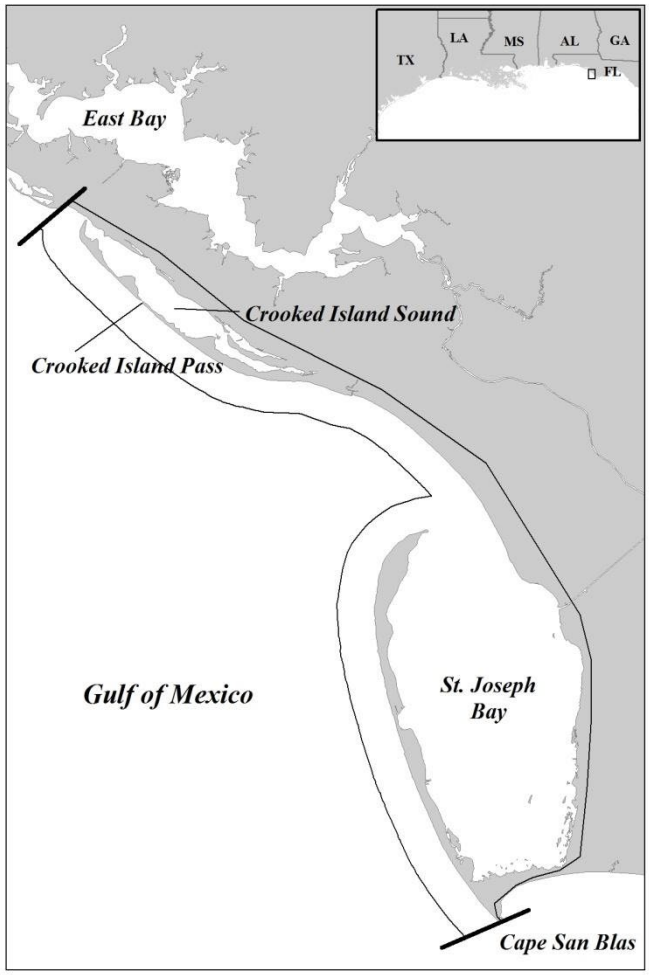


***Figure 1. Geographic extent of the St. Joseph Bay Stock, located in the Florida panhandle. The stock boundaries are denoted by solid lines, with the thicker lines denoting the northern and southern boundaries. The stock includes St. Joseph Bay, Crooked Island Sound, and adjacent coastal waters out to 2 km from shore. East Bay is part of the St. Andrew Bay stock to the northwest.***

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. Joseph Bay is a relatively small embayment of 170 $km^2$ in area, located just west of Apalachicola in the central panhandle of Florida (Figure 1). The bay is bounded in the south by Cape San Blas, in the west by the St. Joseph Peninsula and opens in the north to the Gulf of Mexico. St. Joseph Bay extends 21 km in length and 10 km in width at its widest point, and is characterized by extensive seagrass beds and salt marshes. The southern quarter of the bay is 1 m or less deep whereas the deepest portions are in the northwest region at approximately 10 m deep. Most of St. Joseph Bay has been designated as an aquatic preserve by the state of Florida. There is minimal freshwater inflow into the bay (U.S. EPA 1999; Balmer 2007; Moretzsohn *et al.* 2010). To the northwest of St. Joseph Bay, Crooked Island Sound (also known as St. Andrew Sound) extends 12 km in length and 2 km in width at its widest point. It varies in depth from 1 m around the margins of the sound to 6–7 m at the sound's entrance (Balmer 2007).

In response to three unusual mortality events along the Florida panhandle, which all impacted the St. Joseph Bay area, Balmer *et al.* (2008) conducted photo-ID surveys from April 2004 to July 2007 to examine seasonal abundance, distribution patterns and site fidelity of common bottlenose dolphins in St. Joseph Bay and along the coast northwest to and inside Crooked Island Sound. In addition, during April 2005 and July 2006, NOAA and the Sarasota Dolphin Research Program along with other partners, conducted health assessments of common bottlenose dolphins in the St. Joseph Bay area. Photo-ID data strongly suggested a movement of dolphins into the St. Joseph Bay region during spring and fall with lower abundance during winter and summer. Dolphins sighted in winter and summer displayed higher site fidelity, whereas the majority of dolphins sighted during spring and fall displayed the lowest site fidelity (Balmer *et al.* 2008). Radio-tracking results supported these findings, with animals tagged in spring 2005 (April) ranging the farthest of all dolphins tagged, extending outside the St. Joseph Bay Stock region. Overall, Balmer *et al.* (2008) found abundance to vary seasonally in the St. Joseph Bay area, and suggested the St. Joseph Bay area supports a resident community of common bottlenose dolphins as well as seasonal visitors during spring and fall seasons. Additional photo-ID surveys were conducted during 2010, 2011, and 2013 to examine abundance, density, and site fidelity during and after the *Deepwater Horizon* (DWH) oil spill (Balmer *et al.* 2018). Abundance was again found to vary seasonally, with the highest abundance during fall and the lowest during the winter. However, summer 2010 data appeared more similar to previous years' spring and fall results, with an increased number of dolphins displaying low site fidelity, higher abundance estimates, and an increase in density in coastal waters. Overall, the more recent data still supported a resident community sighted across seasons and years (Balmer *et al.* 2018).

The St. Joseph Bay Stock boundaries includes St. Joseph Bay, Crooked Island Sound and coastal waters out to 2 km from shore in between St. Joseph Bay and Crooked Island Sound, and coastal waters out to 2 km from shore from Cape San Blas along St. Joseph Peninsula and along Crooked Island (Figure 1). The boundaries of this stock are based on photo-ID and radio-tracking studies conducted during 2004–-2007, and photo-ID studies during 2010, 2011, and 2013 (Balmer 2007; Balmer *et al.* 2008; Balmer *et al.* 2018), which support the inclusion of nearshore coastal waters within the boundaries for this particular stock. 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 in the St. Joseph Bay Stock. However, animals from nearby St. Andrew Bay, located to the northwest of St. Joseph Bay (see Figure 1) 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. An example of overlap with St. Andrew Bay is given by Balmer *et al.* (2010), who show the sightings for a particular animal, tracked simultaneously via satellite-linked transmitter and VHF radio transmitter, sighted in both Crooked Island Sound and St. Andrew Bay as well as adjacent coastal waters. Balmer *et al.* (2019) compared St. Joseph Bay (N = 726) and St. Andrew Bay (N = 353) photo-ID catalogs to assess extended movement patterns and stock overlap between these adjacent study areas. A total of 27 matches were made between the St. Andrew Bay (8%) and St. Joseph Bay (4%) catalogs. Overlap between these stocks primarily occurred at the entrance of Crooked Island Sound and to a lesser degree, entrance to St. Andrew Bay.

## POPULATION SIZE

The best available abundance estimate for the St. Joseph Bay Stock of common bottlenose dolphins is 142 (95% CI: 92–190; CV=0.17), based on a February 2011 vessel-based capture-recapture photo-ID survey (Balmer *et al.* 2018).

### Earlier abundance estimates (>8 years old)

In order to estimate seasonal abundance, Balmer *et al.* (2008) conducted vessel-based capture-recapture photo-

ID surveys across multiple seasons from February 2005 through July 2007 in St. Joseph Bay and along the coast to the northwest including Crooked Island Sound (St. Andrew Sound). Line and contour transects were used to cover the study area, and each survey was only conducted if Beaufort Sea State was 3 or less. Balmer *et al.* (2008) also calculated a distinctiveness rate, which was the proportion of distinctive (marked) dolphins to non-distinctive (un-marked) dolphins, for each survey season. Mark-recapture estimates factored in the distinctiveness rate and included animals with distinctive and non-distinctive fins. Seasonal abundance estimates using the robust 'Markovian Emigration' model ranged from 122 dolphins (CV=0.09) for winter 2006 to 340 dolphins (CV=0.09) for fall 2006. Summer and winter estimates provide the best estimate of the resident population as spring and fall estimates also include transient animals. Therefore, the previous best available abundance estimate for the St. Joseph Bay Stock was the average of the estimates for winter 2005, summer 2005, winter 2006, and summer 2007, which was 146 dolphins (CV=0.18).

**Recent surveys and abundance estimates**

Using the same field methodology as in previous surveys (Balmer *et al.* 2008), Balmer *et al.* (2018) conducted vessel-based capture-recapture photo-ID surveys during June and August 2010, February 2011, and October 2013 and were able to estimate density and abundance of common bottlenose dolphins for St. Joseph Bay during and after the DWH oil spill. Abundance estimates were generated using a spatially explicit robust-design capture-recapture (SERDCR) model developed by McDonald *et al.* (2017). Estimates factored in the distinctiveness rate and included animals with distinctive and non-distinctive fins. Previously work indicated summer and winter estimates provide the best estimate of the resident population due to an increase in transient animals during spring and fall (Balmer *et al.* 2008). Balmer *et al.* (2018) reported that winter was the optimal season to estimate abundance for the most recent study, and therefore, the best estimate for the St. Joseph Bay Stock is from February 2011, and is 142 (95% CI: 92–190; CV=0.17). Key uncertainties in this abundance estimate include movement patterns of individual dolphins across the boundary between the St. Joseph and St. Andrew Bay Stocks. Balmer *et al.* (2008; 2018) estimated abundance exclusively within the St. Joseph Bay Stock boundaries but telemetry data and comparisons between the St. Joseph Bay and St. Andrew Bay photo-ID catalogs (Balmer *et al.* 2019) suggest some degree of crossover, specifically within Crooked Island Sound. Although robust capture-recapture models should account for temporary immigration, the abundance estimates from a given sampling period may be biased for this stock.

**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. Joseph Bay Stock is 142 (CV=0.17). The resulting minimum population estimate is 123.

**Current Population Trend**

There are three winter abundance estimates from February/March 2005 (212, 95% CI:134–292), February 2006 (150, 95% CI:84–209), and February 2011 (142, 95% CI: 92–190) with overlapping confidence intervals, providing no evidence for a trend in abundance (Balmer *et al.* 2018).

## 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. Joseph Bay Stock of common bottlenose dolphins is 123. 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 1.0.

## ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

The total annual human-caused mortality and serious injury to the St. Joseph Bay Stock of common bottlenose dolphins during 20132017 is unknown because this stock may interact with unobserved fisheries (see below), and also because the most current observer data for the shrimp trawl fishery are for 2010–2014 and mortality rates were calculated at the state level (see Shrimp Trawl section). Uncertainties related to human-caused mortality and serious

injury include: 1) the estimate does not include shrimp trawl bycatch (see Shrimp Trawl section), 2) not all fisheries that could interact with this stock are observed and/or observer coverage is very low, 3) 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), and 4) cause of death is not (or cannot be) routinely determined for stranded carcasses.

**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; 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 20102014 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, not just the St. Joseph 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. Joseph 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. Joseph 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 (Gulf County) that corresponds with the St. Joseph Bay Stock was limited during 2013–2017. Number of menhaden fishing trips/year for Gulf County was as follows: 23 in 2013; 9 in 2014; 17 in 2015; 33 in 2016; and 13 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. Joseph 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 and serious injury.

**Hook and Line (Rod and Reel)**

During 2013–2017, there were no documented interactions with hook and line gear and the St. Joseph Bay Stock. 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.

**Other Mortality**

Depredation is a growing problem in Gulf of Mexico coastal and estuarine waters and globally, and can lead to serious injury or mortality via ingestion of or entanglement in gear (e.g., Zollett and Read 2006; Read 2008; Powell and Wells 2011; Vail 2016), as well as changes in dolphin activity patterns, such as decreases in natural foraging (Powell and Wells 2011). It has been suggested that provisioning, or 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). Illegal feeding/provisioning has been documented in the literature in Florida and Texas (Bryant 1994; Samuels and Bejder 2004; Cunningham-Smith *et al.* 2006; Powell and Wells 2011; Powell *et al.* 2018). Dolphins within the boundaries of this stock, primarily within Crooked Island Sound,

have been observed to approach vessels in the area and beg for food (Balmer 2007). Begging behaviors are a result of being illegally fed. It is believed that the animals observed begging within Crooked Island Sound are members of the St. Andrew Bay Stock (the St. Andrew Bay Stock encompasses Panama City, an area where illegal feeding has been documented [Samuels and Bejder 2004; Powell *et al.* 2018]). Three dolphins, which were captured in Crooked Island Sound during the April 2005 health assessment, were observed begging during the three months of subsequent radio tracking (Balmer 2007). Two of these individuals, a mom/calf pair, were sighted exclusively within the boundaries of the St. Andrew Bay Stock during all radio tracking surveys. Both of these individuals were found stranded within two days of each other on 1 November and 3 November 2005 near Panama City and Panama City Beach. The other individual, an adult male, which was documented in Balmer *et al.* (2010), was sighted frequently in the waters from St. Andrew Bay to Crooked Island Sound and in association with individuals from both the St. Andrew Bay and St. Joseph Bay Stocks. Observation of focal common bottlenose dolphin 'X02', examined and freeze-branded during a NMFS 2005 health assessment project in nearby St. Joseph Bay, was documented by Powell *et al.* (2018) being fed repeatedly by the captain of a bait boat off a beach just outside St. Andrew Bay. Thus, the begging behaviors and overlap by individuals of the St. Andrew Bay Stock are likely affecting the behavior of individuals in the St. Joseph Bay Stock. Begging behaviors can be passed through a dolphin population via social learning, thus perpetuating and increasing the prevalence of the problem over time (Wells 2003; Whitehead *et al.* 2004).

All mortalities and serious injuries from known sources for the St. Joseph 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. Joseph Bay Stock. For the shrimp trawl fishery, the bycatch mortality for the St. Joseph Bay Stock alone cannot be quantified at this time because mortality estimates encompass all estuarine waters of the Gulf coast of Florida pooled. The state-wide 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 | 0 |
| **Mean Annual Mortality due to commercial fisheries (2013–2017)** | | | **Unknown** | |
| Research Takes (5-year Count) | | | 0 | |

| 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 |
|---|---|---|---|---|
| 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)** | | | **Unknown** | |

**Strandings**

From 2013 to 2017, 33 common bottlenose dolphins were reported stranded within the St. Joseph Bay Stock area (Table 2; NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 13 June 2018). This particular BSE stock includes nearshore coastal waters within its boundaries, and hence strandings that occurred along the coast within the bounds of this stock are also included in the total. However, because much of the stock area is contiguous, without physical barriers, with the Northern Coastal Stock of common bottlenose dolphins, the stock of origin for animals that strand within the St. Joseph Bay Stock area is uncertain. Nine of the strandings were also included in the stranding total for the Northern Coastal Stock. It could not be determined if there was evidence of human interaction for these strandings. 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 Joseph 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 HI does not necessarily mean the interaction caused the animal's death.***

| Stock | Category | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|
| St. Joseph Bay Stock | Total Stranded | 0 | 4[a] | 9 | 19 | 1 | 33 |
| | HI--Yes | - | 0 | 0 | 0 | 0 | 0 |
| | HI--No | - | 0 | 0 | 0 | 0 | 0 |
| | HI--CBD | - | 4 | 9 | 19 | 1 | 33 |

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

St. Joseph Bay has been affected by four recent unusual mortality events (UMEs) and was the geographic focus of a UME in 2004. First, between August 1999 and May 2000, 150 common bottlenose dolphins died coincident with *K. brevis* blooms and fish kills in the Florida Panhandle. This UME started in St. Joseph Bay and was concurrent spatially and temporally with a *K. brevis* bloom that spread east to west. There were 43 common bottlenose dolphin strandings within the St. Joseph Bay Stock area during this event, which accounted for about 29% of the total common bottlenose dolphin strandings for the 1999–2000 UME. Brevetoxin was determined to be the cause of this event (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 also started in St. Joseph Bay, and 81 (76%) common bottlenose dolphins stranded in the St. Joseph 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 12 (13%) occurring within the St. Joseph Bay Stock area. Brevetoxin was determined to be the cause of this event (Twiner *et al.* 2012; Litz *et al.* 2014). Health assessments of dolphins in the stock area found an eosinophilia syndrome, which could over the long-term produce organ damage and alter immunological status and thereby increase vulnerability to other challenges (Schwacke *et al.* 2010). However, the significance of the high prevalence of the syndrome to the observed mortality events in the St. Joseph Bay area is unclear. 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 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, but strandings in St. Joseph Bay during this time were not attributed to the oil spill (e.g., Schwacke *et al.* 2014; Venn-Watson *et al.* 2015; Colegrove *et al.* 2016; DWH NRDAT 2016; see Habitat Issues section).

**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. Joseph Bay stock area was very light oiling in parts of the stock area (Michel *et al.* 2013).

A suite of research efforts was conducted after the oil spill. Studies were initiated in Barataria Bay, Chandeleur Sound, Mississippi Sound, and St. Joseph Bay to assess potential injuries to dolphin stocks within the geographic range of the spill. However, after February 2011, NRDA studies in St. Joseph Bay were discontinued due to the minimal oiling in the St. Joseph Bay area (Mullin *et al.* 2017) and no deaths in St. Joseph 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., including St. Joseph Bay, prior to the DWH oil spill. Kucklick *et al.* (2011) examined POPs (PCBs, chlordanes, mirex, DDTs, HCB and dieldrin) and polybrominated diphenyl ether (PBDE) concentrations from common bottlenose dolphin blubber samples collected during 2000–2007 from 14 locations, including St. Joseph Bay, along the U.S. Atlantic and Gulf coasts and Bermuda. Dolphins from both rural and urban estuarine and coastal waters were sampled. Dolphins sampled from St. Joseph Bay had relatively lower concentrations of some pollutants, like PBDEs, mirex, chlordanes, and HCB, and more intermediate concentrations of DDT, dieldrin, and PCBs when compared to dolphins sampled from the other 13 locations (Kucklick *et al.* 2011). The more recent work of Balmer *et al.* (2015), which was in response to the DWH oil spill and involved collecting remote biopsy samples at six northern Gulf study sites with varying levels of oiling during 2010–2011, found similar or lower levels of POPs and PBDEs in St. Joseph Bay when compared to the results of Kucklick *et al.* (2011).

According to the Florida Department of Environmental Protection (FDEP 2008), the greatest habitat concerns for St. Joseph Bay are declining water quality (mainly due to eutrophication), coastal development, loss of seagrass and saltmarsh habitats, and beach erosion. Several common bottlenose dolphin UMEs in St. Joseph 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 two of the UMEs originated in the St. Joseph Bay area (Twiner *et al.* 2012). Blooms can be transported by currents from adjacent bays and coastal waters, so eutrophication anywhere along the Florida Panhandle can impact St. Joseph Bay, and events originating in St. Joseph Bay can impact the entire Panhandle. Loss of seagrass habitat within St. Joseph Bay has been attributed to eutrophication, storms, and an increase in propeller scar damage (FDEP 2008; Wren and Yarbro 2016). The Florida Fish and Wildlife Conservation Commission (FWC) found that seagrass cover, or density, appears to be declining in St. Joseph Bay, and reported propeller scarring to be "extensive" (Wren and Yarbro 2016). Salt marshes in the southeastern U.S. have experienced unparalleled die-offs in recent years (Silliman *et al.* 2005). The shoreline of St. Joseph Bay is bordered by salt marsh habitat, and in the 1990s the salt marsh began showing signs of stress and began dying off. Studies by FWC's Fish and Wildlife Research Institute suggested the die-off resulted from an unidentified pathogen, but also may have been linked to a drought (FDEP

2008). Beginning in 1995 with Hurricane Opal, repetitive damaging storms have eroded beaches of the St. Joseph Peninsula, with Cape San Blas being one of the most severely eroding areas in Florida (FDEP 2008). Coastal development (of residences) is steadily growing along the St. Joseph peninsula and around the bay, which will lead to additional pressure on the area's local natural resources (FDEP 2008).

**STATUS OF STOCK**

Common bottlenose dolphins are not listed as threatened or endangered under the Endangered Species Act, and the St. Joseph Bay Stock is not a strategic stock under the MMPA. The total human-caused mortality and serious injury for this stock is unknown and 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 was no evidence of a trend in population size 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 and the high number of common bottlenose dolphin deaths associated with UMEs in the Florida panhandle since 1999.

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