COMMON BOTTLENOSE DOLPHIN (*Tursiops truncatus truncatus*)
Terrebonne-Timbalier Bay Estuarine System 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 (BSE) 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 estuarine 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; 1990; 2004; Gruber 1981; Irvine *et al.* 1981; Wells 1986; 1991; 2003; Wells *et al.* 1987; 1996a,b; 1997; Scott *et al.* 1990; Bräger 1993; Bräger *et al.* 1994; Fertl 1994; Weller 1998; Maze and Würsig 1999; Lynn and Würsig 2002; Hubard *et al.* 2004; Irwin and Würsig 2004; Balmer *et al.* 2008; Urian *et al.* 2009; Bassos-Hull *et al.* 2013). In many cases, residents occur predominantly within estuarine waters, with limited movements through passes to the Gulf of Mexico (Shane 1977; 1990; Gruber 1981; Irvine *et al.* 1981; Maze and Würsig 1999; Lynn and Würsig 2002; Fazioli *et al.* 2006; Bassos-Hull *et al.* 2013; Wells *et al*. 2017). Genetic data also support the presence of relatively 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, and Charlotte Harbor, Florida; 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. The Sellas *et al.* (2005) findings support the identification of BSE populations distinct from those occurring in adjacent Gulf coastal waters. 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 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).

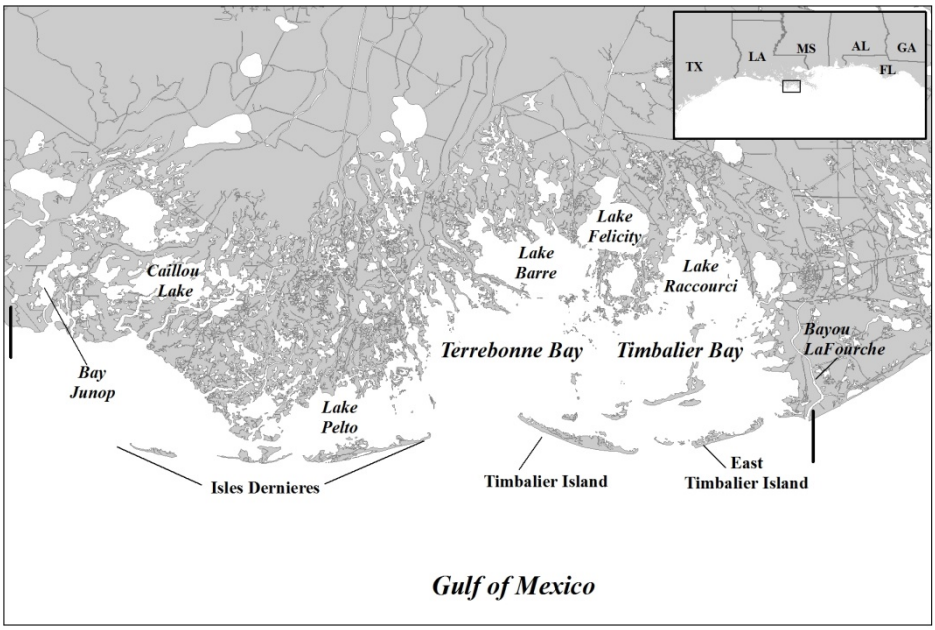

Figure 1. Geographic extent of the Terrebonne-Timbalier Bay Estuarine System Stock, located on the coast of Louisiana. The borders are denoted by solid lines.

The Terrebonne-Timbalier Bay Estuarine System (TTBES) is a shallow (mean depth = 2 m) estuarine system encompassing an area of approximately 1,761 km^2 in central Louisiana (U.S. EPA 1999; Figure 1). This estuarine system is connected to the Gulf of Mexico by a series of passes (Wine Island Pass, Cat Island Pass, and Whiskey Pass). Freshwater input comes from the Atchafalaya River and Bay via the Houma Ship Channel and Grand Bayou Canal (CWPPRA 2017). Timbalier-Terrebonne Bay, together with the Barataria Bay system, has been selected as an estuary of national significance by the Environmental Protection Agency National Estuary Program (see

http://www.btnep.org/BTNEP/home.aspx). Thus, a comprehensive conservation and management plan has been developed and is being implemented through a partnership of local, state, and federal representatives as well as community stakeholders, to restore and protect the estuary (Lester and Gonzalez 2011). The marshes supply breeding and nursery grounds for an assortment of commercial and recreational species of fish and invertebrates, and the region has been designated an Important Bird Area (BirdLife International 2018).

The TTBES Stock was delimited in the first stock assessment reports published in 1995 (Blaylock *et al.* 1995). The stock area includes estuarine waters from Bay Junop in the west to Bayou LaFourche in the east and includes Bay Junop, Caillou Lake, Lake Pelto, Terrebonne Bay, Lake Barre, Lake Felicity, Timbalier Bay, and Lake Raccourci, and extends out 1 km from the barrier islands (Isles Dernieres, Timbalier Island, East Timbalier Island) into Gulf of Mexico coastal waters (Figure 1). The western boundary of the stock is not well defined and is subject to revision upon further study. The habitat encompassed by the stock area is varied, with complex marsh habitat, large areas of open water, and barrier islands. These different habitat types are also present in the adjacent Barataria Bay, where photo-ID, telemetry and genetic data indicate dolphins partition the habitat of the bay, and that multiple demographically-independent populations of common bottlenose dolphins are plausible (McDonald *et al.* 2017; Rosel *et al.* 2017; Wells *et al.* 2017). Therefore, it is plausible the TTBES Stock contains multiple demographically-independent populations.

POPULATION SIZE

The best available abundance estimate for the TTBES Stock of common bottlenose dolphins is 3,870 (CV=0.15; 95% CI: 2934–5210), which is the result of vessel-based capture-recapture photo-ID surveys conducted during June 2016 (Litz *et al.* 2018).

Recent surveys and abundance estimates

Three photo-ID capture-recapture surveys were conducted in June 2016 (Sinclair *et al.* 2017). The study area included Terrebonne and Timbalier Bays, several small lakes and human-made canals, and tracklines in the coastal waters outside of TTBES (1 km from shore and 2 km from shore; Sinclair *et al.* 2017). A Poisson-log normal Mark-Resight model was used to estimate abundance (McClintock *et al.* 2009; Litz *et al.* 2018). Only 16% of the marked animals were sighted more than once and little is known about the use of the coastal waters by TTBES residents and transients. Studies of other BSE stocks in the northern Gulf of Mexico indicate that resident BSE stock dolphins utilize coastal waters within 1 km of shore (e.g., Mullin *et al.* 2017; Wells *et al*. 2017). Therefore, the TTBES Stock boundary also includes waters out to 1 km from shore. Sightings farther than 1 km from shore were excluded from the abundance analyses. The abundance estimate for June 2016 was 3870 dolphins (CV=0.15; 95% CI: 2934–5210) (Litz *et al.* 2018). Key uncertainties in this abundance estimate include low capture probabilities and the possibility that some coastal stock animals may have been included in the estimate, especially because only data from summer surveys were available. In addition, for some BSE stocks, winter estimates are thought to more accurately represent the resident dolphin abundance (e.g., Mullin *et al.* 2017). A winter survey was conducted in January 2017 (Sinclair *et al.* 2017), but photo analysis was not yet complete at the time this report was written. Until data from this winter survey are analyzed, it is not known whether this seasonality applies to the TTBES Stock. If it does, this summer estimate may be biased upwards by an unknown amount.

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 of abundance for this stock of common bottlenose dolphins is 3,870 (CV=0.15). The minimum population estimate for the TTBES Stock is 3,426 bottlenose dolphins.

Current Population Trend

There are insufficient data to assess population trends for this stock because only one estimate of population size is available.

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 likely do not grow at rates much greater than 4% given the constraints of their reproductive life history (Barlow *et al.* 1995). The current productivity rate may be compromised by the *Deepwater Horizon* (DWH) oil spill, as Lane *et al.* (2015) and Kellar *et al.* (2017) reported negative reproductive impacts for the adjacent Barataria Bay Estuarine System Stock.

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; Wade 1998). The minimum population size of the TTBES Stock of common bottlenose dolphins is 3426. 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 Louisiana BSE stocks is greater than 0.8 (Wade and Angliss 1997). PBR for this stock of common bottlenose dolphins is 27.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

The total annual human-caused mortality and serious injury for the TTBES Stock of common bottlenose dolphins during 2012–2016 is unknown. The mean annual fishery-related mortality and serious injury during 2012–2016 based on strandings and at-sea observations identified as fishery-related was 0 (however, see Shrimp Trawl section for additional fishery-related mortality). Additional mean annual mortality and serious injury during 2012–2016 due to other human-caused sources (gunshot wound) was 0.2. The minimum total mean annual human-caused mortality and serious injury for this stock during 2012–2016 was therefore 0.2 (Table 1). This is a biased estimate 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), 5) the estimate does not include shrimp trawl bycatch (see Shrimp Trawl section), and 6) the stock experienced increased numbers of mortalities during the DWH oil spill, but a damage assessment was not performed for this stock (see Other Mortality section).

Fishery Information

There are four commercial fisheries that interact, or that potentially could interact, with this stock. These include two Category II fisheries (Southeastern U.S. Atlantic, Gulf of Mexico shrimp trawl and Gulf of Mexico menhaden purse seine fisheries) 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] fisheries). 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 Louisiana from Sabine Lake east to Barataria Bay, not just the TTBES Stock. The mean annual mortality estimate for Louisiana BSE stocks for the years 2010–2014 was 61 (CV=1.4; Soldevilla *et al.* 2016). If all of the mortality occurred in TTBES, the mortality estimate would exceed PBR for this stock; however, because bycatch for the TTBES 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. It should also be noted that this mortality estimate does not include skimmer trawl effort, which accounts for >48% of shrimp fishery effort in Louisiana, Alabama, and Mississippi inshore waters, because Observer Program coverage of skimmer trawls is limited. Limitations and biases of annual bycatch mortality estimates are described in detail in Soldevilla *et al.* (2015; 2016).

Menhaden Purse Seine

During 2012–2016 there were no documented interactions between the menhaden purse seine fishery and the TTBES Stock. The menhaden purse seine fishery operates in Gulf of Mexico coastal waters just outside the barrier islands of Terrebonne and Timbalier bays (Smith *et al.* 2002). It has the potential to interact with dolphins of this stock that use nearshore coastal waters. Interactions have been reported for nearby coastal and estuarine stocks (Waring *et al.* 2015). Without a systematic observer program, it is not possible to obtain statistically reliable

information for this fishery on the number of sets annually, the incidental take and mortality rates, and the stocks from which bottlenose dolphins are being taken.

Blue Crab Trap/Pot

During 2012–2016 there were no documented interactions between commercial blue crab trap/pot gear and the TTBES Stock. There is no systematic observer coverage of crab trap/pot fisheries, so it is not possible to quantify total mortality.

Hook and Line (Rod and Reel)

During 2012–2016, there were no documented interactions with hook and line gear and the TTBES Stock. It is not possible to estimate the total number of interactions with hook and line gear because there is no systematic observer program.

Other Mortality

NOAA's Office of Law Enforcement has been investigating increased reports from along the northern Gulf of Mexico coast of violence against common bottlenose dolphins, including shootings via guns and bows and arrows, stabbings, and harassment using pipe bombs and cherry bombs (Vail 2016). During 2012–2016, one animal was shot with buckshot-like ammunition in a canal off Terrebonne Bay (in 2013). This animal was included in the stranding database (NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 28 April 2017) and in the totals presented in Table 2, as well as in the annual human-caused mortality and serious injury total for this stock (Table 1). From recent cases that have been prosecuted, it has been shown that fishermen become frustrated and retaliate against dolphins for removing bait or catch, or depredating, their fishing gear. However, it is unknown whether the 2013 shooting involved depredation.

Depredation is a growing problem in Gulf of Mexico coastal and estuary 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 to the dolphin's 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). 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). To date there are no records within the literature of provisioning for this stock area.

The Terrebonne-Timbalier Bay Stock had higher stranding rates compared to baseline in the spring and summer of 2010 after the DWH oil spill (Litz *et al.* 2014). Heavy persistent oiling was recorded on the barrier islands and heavy oiling was recorded in the marshes inside the bay (Michel *et al.* 2013; Nixon *et al.* 2016). It is highly likely, therefore, that the dolphins in this stock area were exposed to DWH oil. However, due to a combination of low numbers of carcasses recovered in the remote marshy habitat of Terrebonne and Timbalier bays after the spill, a lack of pre-spill data for this stock, and low power of the statistical model to distinguish mortalities due to oil exposure from mortalities due to cold weather for this stock, DWH injury quantification was not performed for this stock (DWH NRDAT 2016). Thus, mortality due to this spill is unquantified, but it is likely the spill impacted this stock (see Habitat Issues section).

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

Table 1. Summary of the incidental mortality and serious injury of common bottlenose dolphins (Tursiops truncatus) of the Terrebonne-Timbalier Bay Estuarine System (TTBES) Stock. For the shrimp trawl fishery, the bycatch mortality for the TTBES Stock alone cannot be quantified at this time and the state-wide mortality estimate for Louisiana 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)	0
Menhaden Purse Seine	2012–2016	MMAP fisherman self-reported takes	NA	0
Atlantic Blue Crab Trap/Pot	2012–2016	Stranding Data and At-Sea Observations	NA	0
Hook and Line	2012–2016	Stranding Data and At-Sea Observations	NA	0
Mean Annual Mortality due to commercial fisheries (2012–2016)			**0**	
Research Takes (5-year Count)			0	
Other Takes (gunshot wound; 5-year Count)			1	
Mortality due to DWH			Undetermined	
Mean Annual Mortality due to research takes, other takes, and DWH (2012–2016)			**0.2**	
Minimum Total Mean Annual Human-Caused Mortality and Serious Injury (2012–2016)			**0.2**	

Strandings

During 2012–2016, 61 common bottlenose dolphins were reported stranded within the TTBES (Table 2; NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 28 April 2017). It could not be determined whether there was evidence of human interaction for 56 of these strandings, and for one dolphin, no evidence of human interaction was detected. Evidence of human interactions was detected for the remaining four stranded dolphins, including one animal with gunshot wounds and one animal with evidence of a boat strike (Table 2). Stranding data probably 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). Furthermore, there is limited search effort for carcasses in the complex estuarine waters of the TTBES area. 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.

The TTBES Stock has been affected by two common bottlenose dolphin die-offs or Unusual Mortality Events (UME). 1) A UME occurred from January through May 1990, included 344 bottlenose dolphin strandings in the northern Gulf of Mexico (Litz *et al.* 2014), and may have affected the TTBES Stock because strandings were reported along the Gulf side of the barrier islands in this area during the time of the event. However, there is no information available on the impact of the event on the TTBES Stock. The cause of the 1990 mortality event could not be determined (Hansen 1992), however, morbillivirus may have contributed to this event (Litz *et al.* 2014). 2) 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; http://www.nmfs.noaa.gov/pr/health/mmume/cetacean_gulfofmexico.htm, accessed 1 June 2016). 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 (e.g., Schwacke *et al.* 2014; Venn-Watson *et al.* 2015a; Colegrove *et al.* 2016; DWH NRDAT 2016; see "Habitat Issues" below). During 2012–2014, all but two stranded dolphins from this stock were considered to be part of the UME (see Table 2).

Table 2. Common bottlenose dolphin strandings occurring in the Terrebonne-Timbalier Bay Estuarine System Stock area from 2012 to 2016, 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 28 April 2017). Please note HI does not necessarily mean the interaction caused the animal's death.

Category	2012	2013	2014	2015	2016	Total
Total Stranded	13[a]	19[a]	14[b]	8	7	61
HI--Yes	1	1[c]	1	1[d]	0	4
HI--No	0	1	0	0	0	1
HI--CBD	12	17	13	7	7	56

[a] All strandings were part of the Northern Gulf of Mexico UME in the northern Gulf of Mexico.
[b] Twelve of the 14 strandings were part of the Northern Gulf of Mexico UME.
[c] Includes 1 animal with a gunshot wound (mortality).
[d] Includes 1 animal with evidence of a boat strike (healed scars).

HABITAT ISSUES

Issues Related to the *Deepwater Horizon* (DWH) Oil Spill and Other Oil Spills

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). A substantial number of beaches and wetlands along the Louisiana coast experienced heavy or moderate oiling (OSAT-2 2011; Michel *et al.* 2013; Nixon *et al*. 2016). The heaviest oiling in Louisiana occurred on the tip of the Mississippi Delta; west of the Mississippi River in Barataria, Terrebonne and Timbalier Bays; and to the east of the river on the Chandeleur Islands (Michel *et al.* 2013; Nixon *et al*. 2016).

A suite of research efforts indicate the DWH oil spill negatively affected BSE stocks of common bottlenose dolphins in the northern Gulf of Mexico. Capture-release health assessments of dolphins in Barataria Bay and analysis of stranded dolphins from Louisiana, Mississippi, and Alabama during the oil spill both found evidence of moderate to severe lung disease and compromised adrenal function for bottlenose dolphins (Schwacke *et al.* 2014; Venn-Watson *et al.* 2015a). Pulmonary abnormalities and impaired stress response were still detected four years after the DWH oil spill (Smith *et al.* 2017). Reproductive success also was compromised after the oil spill (Kellar *et al.* 2017). The reproductive failure rates are also consistent with findings of Colegrove *et al.* (2016) who examined perinate strandings in Louisiana, Mississippi, and Alabama during 2010–2013 and found that common bottlenose dolphins were prone to late-term failed pregnancies and occurrence of *in utero* infections, including pneumonia and brucellosis. Congruent with evidence for compromised health and poor reproductive success, McDonald *et al.* (2017) reported survival rate estimates for dolphins in Barataria Bay which were lower than those reported previously for other southeastern U.S. estuarine areas that did not experience oiling, including Charleston, South Carolina (Speakman *et al.* 2010) and Sarasota Bay, Florida (Wells and Scott 1990). Although health assessment studies were not performed in the TTBES, both the barrier islands and marshes of Terrebonne and Timbalier Bays

experienced oiling levels similar to Barataria Bay (Nixon *et al.* 2016) and so it is reasonable to conclude that these dolphins also experienced negative health impacts from this spill.

Stranding rates in the northern Gulf of Mexico, including in the TTBES, were higher than previously recorded in the years following the oil spill (Litz *et al.* 2014; Venn-Watson *et al.* 2015b) and 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; http://www.nmfs.noaa.gov/pr/health/mmume/cetacean_gulfofmexico.htm, accessed 1 June 2016). Investigations to date have determined that the DWH oil spill was the primary underlying cause of the elevated stranding numbers in the northern Gulf of Mexico after the spill (e.g., Schwacke *et al.* 2014; Venn-Watson *et al.* 2015a; Colegrove *et al.* 2016). Balmer *et al.* (2015) suggested it is unlikely that persistent organic pollutants (POP) significantly contributed to the unusually high stranding rates following the DWH oil spill because POP concentrations from six northern Gulf sites were comparable to or lower than those previously measured by Kucklick *et al.* (2011) from southeastern U.S. sites; however, the authors cautioned that potential synergistic effects of oil exposure and POPs should be considered as the extra stress from oil exposure added to the background POP levels could have intensified toxicological effects. Morbillivirus infection, brucellosis, and biotoxins were also ruled out as a primary cause of the UME (Venn-Watson *et al.* 2015a).

In addition to offshore oil spills moving onshore and affecting the TTBES, the TTBES area is home to a significant portion of Louisiana's oil and gas exploration, production, and transportation industry, and hence oil spills have occurred in the area (BTNEP 2010). For example, 72,000–122,000 gallons of crude oil were released into Timbalier Bay in September 1992 when a well belonging to the Greenhill Petroleum Corporation blew out. Impacted resources included birds, fishes, intertidal marshes, and sediments (Burlington 1999). In 1997, 6,561 barrels of crude oil were discharged into Lake Barre from a ruptured Texaco pipeline (Penn and Tomasi 2002; Dickey 2012). Oiled birds as well as fish and shrimp kills occurred despite response efforts (oil skimming and oil booms). Another smaller incident occurred in 1997 involving a tank battery crude oil spill of 15–20 barrels into Timbalier Bay just north of East Timbalier Island. Beach surveys and flights failed to detect any oil in the water or on the beaches. The oil possibly moved offshore into the Gulf (NOAA 1997). A collision of a tank barge and tow vessel in 1999 resulted in ~51,406 gallons of diesel fuel being spilled into Bayou Lafourche just east of Timbalier Bay (Dickey 2012).

Other Habitat Issues

Like much of coastal southeastern Louisiana, the TTBES has experienced significant wetland and barrier island loss resulting in more open water and less marsh habitat (CPRA 2017). Subsidence, sea-level rise, storms, winds and tides, and human activities including levee construction and loss of sediment input, and channelization (navigational channels and oil and gas canals), all play a role in this habitat degradation (CPRA 2017). The impacts to common bottlenose dolphins from these changes to the habitat are unknown. The State of Louisiana has a wetland restoration master plan for the area to build and maintain land (CPRA 2017), which could result in additional changes to the habitat, including changes to the salinity within the TTBES. Common bottlenose dolphins are typically found in salinities ranging from 20 to 35 ppt and can experience significant health impacts and/or death due to low salinity exposure (e.g., Andersen 1973; Holyoake *et al.* 2010).

The marshes and waterways of the TTBES are heavily used by industry, and commercial and recreational fisheries. TTBES includes a major port just inland, the Port of Terrebonne, and the associated shipping traffic through the Houma Navigation Canal that runs from the port through Terrebonne Bay into the Gulf of Mexico. This port is important for the construction of oil and gas structures used offshore, the transport of oil and gas, and the construction and repair of marine vessels. Two and a half million tons of cargo pass through the Port of Terrebonne annually (Terrebonne Port Commission 2013). Commercial shrimp trawl and skimmer trawl fishing occurs within TTBES. In addition, over 85,000 recreational vessels are registered in the Barataria Bay-Terrebonne Bay System combined, and over 150,000 recreational fishing licenses have been sold annually (BTNEP 2010). While specific data on noise in the TTBES are lacking, considering the amount of recreational and commercial vessel traffic, it is likely there is a consistent level of anthropogenic ambient noise. In addition, there was a seismic survey for oil and gas during 2014 in lower Terrebonne Parish conducted by Castex Energy (Houma Today 2014).

Impacts of non-petroleum product contaminants and heavy metals to the dolphins in the TTBES are unknown. The herbicide atrazine is used extensively on corn and sugarcane fields in southeastern Louisiana, and runoff from treated cropland may reach the TTBES (BTNEP 2010), but impacts to dolphins are unknown. Polychlorinated contaminant levels have not been measured in the dolphins of this stock; however, the concentrations of these contaminants in common bottlenose dolphins in the adjacent Barataria Bay were relatively low compared to other estuarine sites in the southeastern United States (Balmer *et al.* 2015). Mercury levels in king mackerel in Louisiana waters are relatively high and the Louisiana Department of Environmental Quality has issued a coast-wide advisory

for consumption of large king mackerel (>39 inches) due to mercury contamination (Louisiana DEQ 2017).

STATUS OF STOCK

Common bottlenose dolphins are not listed as threatened or endangered under the Endangered Species Act, and the TTBES Stock is not a strategic stock under the MMPA. PBR for the TTBES Stock is 27, therefore the zero mortality rate goal, 10% of PBR, is 2.7. The documented mean annual human-caused mortality for this stock for 2012–2016 was 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). In particular, if even half of the shrimp trawl mortality estimated for Louisiana BSE stocks occurred in TTBES, the annual fishery-caused mortality for this stock would exceed PBR and the stock would be strategic. Because a UME of unprecedented size and duration (March 2010–July 2014) has impacted the northern Gulf of Mexico, including Terrebonne-Timbalier Bay, and because health and reproductive success of dolphins within Terrebonne-Timbalier Bay has likely been compromised as a result of the DWH oil spill, NMFS finds cause for concern about this stock. The status of this stock relative to OSP is unknown. There is insufficient information to determine whether or not the total fishery-related mortality and serious injury is approaching a zero mortality and serious injury rate. There are insufficient data to determine population trends for this stock.

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