COMMON BOTTLENOSE DOLPHIN (Tursiops truncatus truncatus)
Southern North Carolina Estuarine System Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Common bottlenose dolphins are found in estuarine, coastal, continental shelf, and oceanic waters of the western North Atlantic (wNA). Distinct morphological forms have been identified in offshore and coastal waters of the wNA off the U.S. East Coast: a smaller morphotype present in estuarine, coastal, and shelf waters from Florida to approximately Long Island, New York, and a larger, more robust morphotype present further offshore in deeper waters of the continental shelf and slope (Mead and Potter 1995) from Florida to Canada. The two morphotypes also differ in parasite load and prey preferences (Mead and Potter 1995), and show significant genetic divergence at both mitochondrial and nuclear DNA markers (Hoelzel *et al*. 1998; Kingston and Rosel 2004; Kingston *et al.* 2009; Rosel *et al*. 2009). The level of genetic divergence is greater than that seen between some other dolphin species (Kingston and Rosel 2004; Kingston *et al.* 2009) suggesting the two morphotypes in the wNA may represent different subspecies or species. The larger morphotype makes up the wNA Offshore Stock of common bottlenose dolphins. Spatial distribution data (Kenney 1990; Garrison *et al.* 2017a), tag-telemetry studies (Garrison *et al.* 2017b), photo-identification (photo-ID) studies (e.g., Zolman 2002; Speakman *et al.* 2006; Stolen *et al.* 2007; Mazzoil *et al.* 2008), and genetic studies (Caldwell 2001; Rosel *et al.* 2009; Litz *et al.* 2012) indicate that the coastal morphotype comprises multiple, demographically independent stocks distributed in coastal and estuarine waters of the wNA. The Southern North Carolina Estuarine System Stock is one such stock.

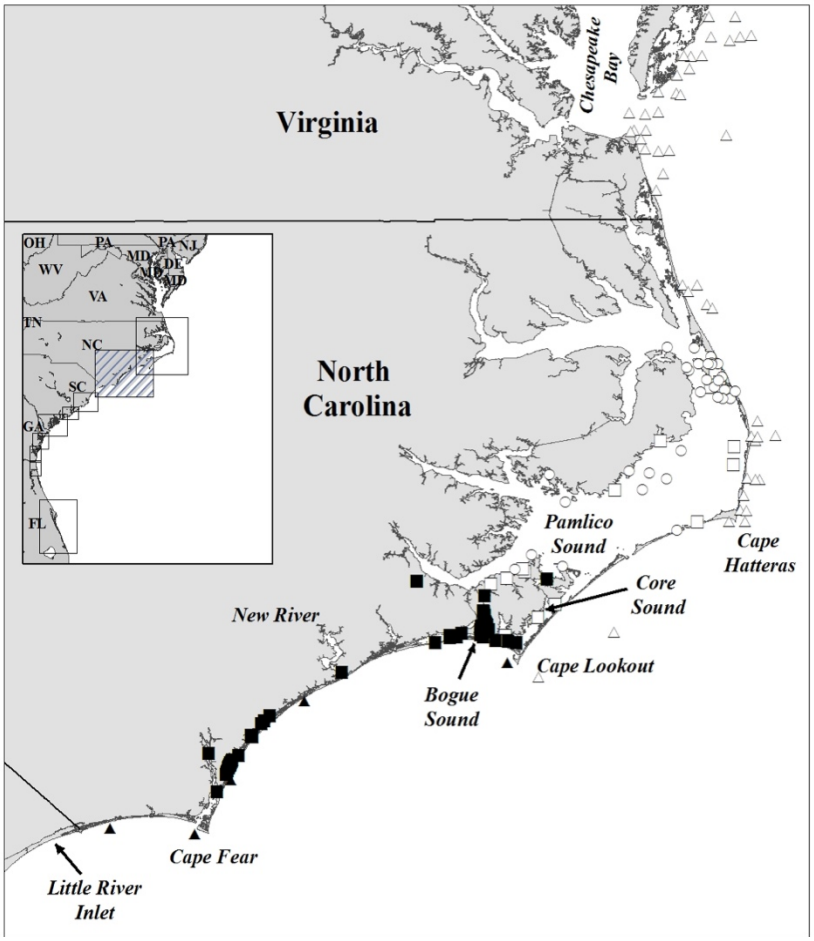

Figure 1. *The distribution of common bottlenose dolphins occupying coastal and estuarine waters in North Carolina and Virginia during the period July–September. Locations are shown from aerial surveys (triangles), satellite telemetry (circles) and photo-identification studies (squares). Sightings assigned to the Southern North Carolina Estuarine System stock are shown with filled symbols (all fall within hatched box in inset map). Photo-identification data are courtesy of Duke University and the University of North Carolina at Wilmington.*

The Southern North Carolina Estuarine System (SNCES) Stock is best defined as animals occupying estuarine and nearshore coastal waters (≤3 km from shore) between the Little River Inlet estuary (33.9°N), inclusive

of the estuary (near the North Carolina/South Carolina border), and the New River (34.5°N) during cold water months (best defined as January and February). Members of this stock do not undertake large-scale migratory movements. Instead, they expand their range only slightly northward during warmer months into estuarine waters and nearshore waters (≤3 km from shore) of southern North Carolina as far as central Core Sound and southern Pamlico Sound (Garrison *et al*. 2017b) (Figure 1). These movements and the range of this stock have been inferred from a combination of telemetry, photo-ID, and genetic data (Read *et al.* 2003; Rosel *et al.* 2009; Garrison *et al.* 2017b). Two animals tagged at Holden Beach, North Carolina, just south of Cape Fear during November 2004, remained within waters of southern and central North Carolina throughout the nine-month period their tags were operational (Garrison *et al.* 2017b). Eight animals tagged and/or freeze-branded near Beaufort, North Carolina, between 1995 and 2006 were documented, using long-term photo-ID studies, to have moved south and occupied estuarine and coastal waters near Cape Fear, south of the New River during cold water months (Garrison *et al.* 2017b). A photo-ID mark-recapture survey (Read *et al.* 2003) found little movement of marked animals between the northern portion of the survey area (northern Pamlico Sound, Roanoke Sound, Albemarle Sound, and Currituck Sound) and the southern portion (Southport, Cape Fear River, New River, and Bogue Sound). The authors suggested that movement patterns, differences in group sizes, and habitats are consistent with two stocks of animals occupying estuarine waters of North Carolina (Read *et al.* 2003). SNCES Stock animals have not been observed to move north of Cape Lookout in coastal waters nor into the main portion of Pamlico Sound during warm water months (Garrison *et al.* 2017b). Finally, genetic analysis of samples from animals in waters of southern North Carolina (including known SNCES animals based on live captures and strandings of unknown stock origin between Cape Lookout and the North Carolina/South Carolina border) demonstrated significant genetic differentiation from animals occupying waters from Virginia and further north and estuarine waters of South Carolina (Rosel *et al.* 2009).

The distribution of the SNCES Stock overlaps in certain seasons with several other common bottlenose dolphin stocks. During warm water months (best defined as July and August), this stock overlaps with the Northern North Carolina Estuarine System (NNCES) Stock in estuarine waters near Beaufort, North Carolina, and in southern Pamlico Sound (Garrison *et al.* 2017b). Because this stock also utilizes nearshore coastal waters along the coast of southern North Carolina, it also overlaps with the Southern Migratory Coastal Stock as this stock makes its seasonal migratory movements (Garrison *et al*. 2017b). The timing of the seasonal contraction (and expansion) of the range of the SNCES Stock, and therefore the degree of overlap with various stocks, likely occurs with some inter-annual variability related to seasonal changes in water temperatures and/or prey availability. Given the relatively small range of this stock and its seasonal movement, it is unlikely the stock contains multiple demographically independent populations; however, structure within this stock has not been investigated.

POPULATION SIZE

The current population size of the SNCES Stock is unknown because the survey data are more than eight years old (Wade and Angliss 1997).

Earlier abundance estimates (>8 years old)

Read *et al.* (2003) provided the first abundance estimate for common bottlenose dolphins occurring within the boundaries of the SNCES Stock. This estimate was based on a photo-ID mark-recapture survey of North Carolina waters inshore of the barrier islands, conducted during July 2000. Read *et al.* (2003) estimated the number of animals in the inshore waters of North Carolina occupied by the SNCES Stock at 141 (CV=0.15, 95% CI: 112–200). This estimate did not account for the portion of the stock that may have occurred in coastal waters. Summer aerial survey data from 2002 (Garrison *et al.* 2016) were therefore used to account for the portion of the stock in coastal waters. The abundance estimate for a 3-km strip from Cape Lookout to the North Carolina-South Carolina border was 2,454 (CV=0.53), yielding a total of 2,595 (CV=0.50). This estimate is likely positively biased as some animals in coastal waters may have belonged to a coastal stock.

A photo-ID mark-recapture study was conducted by Urian *et al.* (2013) in July 2006 using similar methods to those in Read *et al.* (2003) and included estuarine waters of North Carolina from, and including, the Little River Inlet estuary (near the North Carolina/South Carolina border) to, and including, Pamlico Sound. The 2006 survey also included coastal waters up to Cape Hatteras extending up to 1 km from shore. In order to estimate abundance for the SNCES Stock alone, only sightings south of 34°46' N in central Core Sound were used. The resulting abundance estimate included a correction for the proportion of dolphins with non-distinct fins in the population. The abundance estimate for the SNCES Stock based upon photo-ID mark-recapture surveys in 2006 was 188 animals (CV=0.19, 95% CI: 118–257; Urian *et al*. 2013). This estimate is probably negatively biased as the survey covered waters only to 1 km from shore and did not include habitat in southern Pamlico Sound.

Minimum Population Estimate

The current minimum population estimate is unknown. The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normally distributed best abundance estimate. This is equivalent to the 20th percentile of the log-normal distribution as specified by Wade and Angliss (1997).

Current Population Trend

A trend analysis has not been conducted for this stock. There are two abundance estimates from 2000/2002 and 2006. Methodological differences between the estimates need to be evaluated to quantify trends.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum net productivity rates are unknown for this stock. The maximum net productivity rate is assumed to be 0.04. This value is based on theoretical modeling showing that cetacean populations likely do 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 currently undetermined. 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 SNCES Stock of common bottlenose dolphins is unknown. The maximum productivity rate is 0.04, the default value for cetaceans. The recovery factor is 0.5 because the stock's status relative to optimum sustainable population (OSP) is unknown.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

The total annual human-caused mortality and serious injury for the SNCES Stock during 2011–2015 is unknown. The mean annual fishery-related mortality and serious injury estimated from observed fisheries and strandings identified as fishery-related ranged between 0.4 and 0.6. 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 2011–2015 ranged between 0.4 and 0.6 (Tables 1a, 1b and 1c). This range reflects several sources of uncertainty and is a minimum 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 includes an actual count of verified human-caused deaths and serious injuries and should be considered a minimum (NMFS 2016), and 5) the spatiotemporal overlap between the SNCES Stock and other common bottlenose dolphin stocks introduces uncertainty in assignment of mortalities to stock. In the sections below, dolphin mortalities were assigned to a stock or stocks by comparing the time and geographic location of the mortality to the stock boundaries and geographic range delimited for each stock.

Fishery Information

There are six commercial fisheries that interact, or that potentially could interact, with this stock. These include the Category I mid-Atlantic gillnet fishery, four Category II fisheries (North Carolina inshore gillnet, Atlantic blue crab trap/pot, North Carolina long-haul seine, and North Carolina roe mullet stop net fisheries), and the Category III Atlantic Ocean, Gulf of Mexico, Caribbean commercial passenger fishing vessel (hook and line) fishery. Detailed fishery information is presented in Appendix III.

Mid-Atlantic Gillnet

The mid-Atlantic gillnet fishery operates along the coast from North Carolina through New York (2016 List of Fisheries) and overlaps with the SNCES Stock. North Carolina is the largest component of the mid-Atlantic gillnet fishery in terms of fishing effort and observed marine mammal takes (Palka and Rossman 2001; Lyssikatos and Garrison 2018). This fishery is observed by the Northeast and Southeast Fisheries Observer Programs. The Bottlenose Dolphin Take Reduction Team was convened in October 2001, in part, to reduce bycatch in gillnet gear. The Bottlenose Dolphin Take Reduction Plan (BDTRP) was implemented in May 2006 and resulted in changes to gillnet gear configurations and fishing practices (50 CFR 24776, April 26, 2006, available at http://www.nmfs.noaa.gov/pr/pdfs/fr/fr71-24776.pdf). Mortality estimates for the period (2002–2006) immediately prior to implementation of the BDTRP and 2007–2011 are available in the 2015 stock assessment report for the SNCES Stock (Waring *et al.* 2015). The current report covers the most recent available five-year estimate (NMFS 2016) for 2011–2015.

Mortality estimation for this stock is difficult because 1) observed takes are rare events, 2) the Northern Migratory, Southern Migratory, NNCES, and SNCES common bottlenose dolphin stocks overlap in coastal waters

off North Carolina and Virginia at different times of the year, and therefore it is not always possible to definitively assign every observed mortality, or extrapolated bycatch estimate, to a specific stock, and 3) the low levels of federal observer coverage in state waters are likely insufficient to consistently detect rare bycatch events. To help address the first problem, two different analytical approaches were used to estimate common bottlenose dolphin bycatch rates during the period 2011–2015: 1) a simple annual ratio estimator of catch per unit effort (CPUE = observed catch/observed effort) per year based directly upon the observed data; and 2) a pooled CPUE approach (where all observer data from the most recent five years were combined into one sample to estimate CPUE) (Lyssikatos and Garrison 2018). In each case, the annual reported fishery effort (defined as a fishing trip) was multiplied by the estimated bycatch rate to develop annual estimates of fishery-related mortality. Next, the two model estimates (and the associated uncertainty) were averaged, in order to account for the uncertainty in the two approaches, to produce an estimate of the mean mortality of common bottlenose dolphins for this fishery (Lyssikatos and Garrison 2018). To help address the second problem, minimum and maximum mortality estimates were calculated per stock to indicate the range of uncertainty in assigning observed takes to stock (Lyssikatos and Garrison 2018). Uncertainties and potential biases are described in Lyssikatos and Garrison (2018).

During the most recent five-year reporting period, 2011–2015, the combined average Northeast (NEFOP) and Southeast (SEFOP) Fisheries Observer Program observer coverage (measured in trips) for this fishery was 2.67% in state waters (0–3 miles from shore) and 5.36% in federal waters (3–200 miles from shore), respectively (Lyssikatos and Garrison 2018). This low level of observer coverage may result in small-sample bias in the bycatch estimate because the stock is small and PBR may be less than four (NMFS 2016). During this timeframe, no common bottlenose dolphin mortalities or serious injuries that could be attributed to the SNCES Stock were observed by the NEFOP or SEFOP. The most recent five-year mean minimum and maximum mortality estimates (2011–2015) were, therefore, both zero (Table 1a; Lyssikatos and Garrison 2018).

However, based on documented serious injury and mortality in this fishery during 2011–2015 from other data sources (see Table 1a), the mean annual minimum mortality is likely not zero. In October 2011, the stranding network recovered a dead dolphin from a fisherman who had incidentally caught it in a small-mesh gillnet in southern North Carolina during an unobserved trip targeting spot. This animal was ascribed to the Southern Migratory Coastal and SNCES stocks. In 2015, a stranded carcass was recovered with markings indicative of interaction with gillnet gear, but no gear was attached to the carcass and it is unknown whether the interaction with the gear contributed to the death of this animal. This case was ascribed to the SNCES and Southern Migratory Coastal stocks. Also in July 2015, through the Marine Mammal Authorization Program (MMAP), a fisherman self-reported an animal released alive following entanglement in his small-mesh gillnet in southern North Carolina. This animal was considered seriously injured (Maze-Foley and Garrison 2017) and was ascribed to the SNCES Stock. The 2011 stranding mortality and 2015 MMAP serious injury are included in the annual human-caused mortality and serious injury total for this stock since bycatch estimates for this stock based on observer program data were zero (Table 1a). Overall, the low level of observer coverage, rarity of observed takes, and the inability to definitively assign each observed take to stock are sources of uncertainty in the bycatch estimates for this fishery.

North Carolina Inshore Gillnet

During 2011–2015, there were no documented mortalities or serious injuries in inshore gillnet gear of common bottlenose dolphins that could be ascribed to the SNCES Stock (Southeast Regional Marine Mammal Stranding Network; NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 18 May 2016). However, there were two cases documented in which a carcass stranded with markings indicative of interaction with gillnet gear but no gear was attached to the carcass and it is unknown whether the interactions with the gear contributed to the deaths of these animals. These cases occurred in 2012 and 2015, and both were ascribed to the SNCES and NNCES stocks. Neither of these mortalities are included in the annual human-caused mortality and serious injury total for this stock (Table 1b).

Current information about interactions between common bottlenose dolphins and the North Carolina inshore gillnet fishery is based solely on stranding data as no bycatch has been observed by state and federal observer programs. There was limited federal observer coverage (0.28%) of this fishery from May 2010 through March 2012, when the NMFS observed this fishery for the first time. No common bottlenose dolphin bycatch was recorded by federal observers. The low level of federal observer coverage in internal waters where the SNCES Stock resides is likely insufficient to detect bycatch events of common bottlenose dolphins if they were to occur in the inshore commercial gillnet fishery. The North Carolina Division of Marine Fisheries (NCDMF) has operated their own observer program since 2000 due to sea turtle bycatch in inshore gillnets. The NCDMF applied for and obtained an Incidental Take Permit (ITP) in September 2013 that covers gillnet fisheries in all internal state waters. This ITP

requires monitoring of gillnets statewide in internal waters with at least 7% observer coverage of large-mesh nets during spring, summer, and fall, and at least 1% observer coverage of small mesh nets during the same seasons (U.S. Dept. of Commerce 2013, Notice of permit issuance, Fed. Register 78: 57132–57133). No bycatch of common bottlenose dolphins has been recorded by state observers since they began monitoring in 2000.

Atlantic Blue Crab Trap/Pot

During 2011–2015, there were no documented mortalities or serious injuries in commercial blue crab trap/pot gear of common bottlenose dolphins that could be ascribed to the SNCES Stock (Southeast Regional Marine Mammal Stranding Network; NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 18 May 2016). The most recent documented interaction was a 2009 mortality within the stranding database in which a common bottlenose dolphin was entangled in commercial blue crab trap/pot gear. The 2009 mortality was ascribed to the SNCES and Southern Migratory Coastal stocks. Because there is no systematic observer program, it is not possible to estimate the total number of interactions or mortalities associated with crab traps/pots. However, stranding data indicate that interactions occur at some unknown level in North Carolina (Byrd *et al*. 2014) and other regions of the southeast U.S. (Noke and Odell 2002; Burdett and McFee 2004).

North Carolina Long Haul Seine Fishery

There have been no documented interactions between common bottlenose dolphins of the SNCES Stock and the North Carolina long haul seine fishery during 2011–2015. The fishery includes fishing with long haul seine gear to target any species in waters off North Carolina, including estuarine waters in Pamlico and Core Sounds and their tributaries. There has not been federal observer coverage of this fishery.

North Carolina Roe Mullet Stop Net

During 2011–2015, stranding data documented no dolphins entangled in stop net gear that could be ascribed to the SNCES Stock. However, a dead stranded dolphin with line markings indicative of interaction with stop net gear was recovered in October 2015 ~300 yards from a stop net, but it is unknown whether the interaction with gear contributed to the death of this animal, and this case was not included in the annual human-caused mortality and serious injury total for this stock (Table 1b). This animal was ascribed to multiple stocks: the SNCES, NNCES, and Southern Migratory Costal stocks. This mortality is included in the stranding database and in the stranding totals presented in Table 2 (Southeast Regional Marine Mammal Stranding Network; NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 18 May 2016). No estimate of bycatch mortality is available for the stop net fishery. This fishery has not had regular, ongoing federal or state observer coverage. However, the NMFS Beaufort laboratory observed this fishery in 2001–2002 (Byrd and Hohn 2010), and Duke University observed the fishery in 2005–2006 (Thayer *et al.* 2007). Entangled dolphins were not documented during these formal observations, but two mortalities of dolphins due to entanglement in stop nets occurred in 1993 and 1999 and were documented by the stranding network in North Carolina (Byrd and Hohn 2010).

Hook and Line (Rod and Reel)

During 2011–2015, one live dolphin was observed at-sea (in 2013) entangled by a lure and monofilament line around its rostrum, deforming the rostrum and maxilla (Maze-Foley and Garrison 2017). This animal was ascribed to the SNCES stock alone and determined to have been seriously injured (Maze-Foley and Garrison 2017). This serious injury was included in the annual human-caused mortality and serious injury total for this stock (Table 1b).

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., commercial fisherman, charter boat, or 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, so the documented interaction in this gear represents a minimum known count of interactions in the last five years.

Other Mortality

Historically, there have been occasional mortalities of common bottlenose dolphins during research activities (Waring *et al.* 2016); however, none were documented during 2011–2015 that were ascribed to the SNCES Stock.

In addition to animals included in the stranding database and the at-sea observation mentioned above (under Hook and Line), during 2011–2015, there was one at-sea observation of a live common bottlenose dolphin entangled in unidentified line (in 2014). It could not be determined if this animal was seriously injured or not (Maze-Foley and Garrison 2017). The animal was ascribed to the SNCES and NNCES stocks. All mortalities and serious injuries from known sources for the SNCES Stock are summarized in Tables 1a, 1b and 1c.

Table 1a. Summary of the incidental mortality and serious injury of common bottlenose dolphins of the Southern North Carolina Estuarine System Stock for the commercial mid-Atlantic gillnet fishery, which has an ongoing, systematic federal observer program. The years sampled (Years), the type of data used (Data Type), the annual percentage observer coverage (Observer Coverage), the observed serious injuries and mortalities recorded by on-board observers, and the mean annual estimate of mortality and serious injury (CV in parentheses) are provided. Counts of mortality and serious injury based on stranding data and fisherman self-reported takes via the Marine Mammal Authorization Program are also given for this fishery since bycatch estimates for this stock based on observer program data were zero. Minimum and maximum values are reported due to uncertainty in the assignment of mortalities to this particular stock because there is spatial overlap with other common bottlenose dolphin stocks in certain areas and seasons.

Fishery	Years	Data Type	Observer Coverage	Observed Serious Injury	Observed Mortality	Mean Annual Estimated Mortality and Serious Injury (CV) Based on Observer Data
Mid-Atlantic Gillnet	2011–2015	Obs. Data Logbook	2.0, 2.6, 3.1, 3.6, 5.6	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0
5-year Count Based on Stranding Data and Fisherman Self-Reported Takes via the Marine Mammal Authorization Program						Min=1 Max=2
Mean Annual Mortality due to the observed mid-Atlantic gillnet commercial fishery (2011–2015)						**Min=0.2** **Max=0.4**

Table 1b. Summary of the incidental mortality and serious injury of common bottlenose dolphins of the Southern North Carolina Estuarine System Stock during 2011–2015 from commercial fisheries that do not have ongoing, systematic federal observer programs. Counts of mortality and serious injury are based on stranding data. Minimum and maximum values are reported in individual cells when there is uncertainty in the assignment of mortalities to this particular stock due to spatial overlap with other common bottlenose dolphin stocks in certain areas and seasons. In addition, mortality due to research and other non-commercial fishery takes are included, as well as a total mean annual human caused mortality and serious injury summed from all sources.

Fishery	Years	Data Type	5-year Count Based on Stranding Data
North Carolina Inshore Gillnet[a]	2011–2015	Limited Federal Observer and Stranding Data	0
Atlantic Blue Crab Trap/Pot	2011–2015	Stranding Data	0

North Carolina Long Haul Seine	2011–2015	Stranding Data	0
North Carolina Roe Mullet Stop Net[b]	2011–2015	Stranding Data	0
Hook and Line[c]	2011–2015	Stranding Data and At-Sea Observation	1
Mean Annual Mortality due to unobserved commercial fisheries (2011–2015)			**0.2**

[a] North Carolina inshore gillnet interactions are included if the animal was found entangled in gillnet gear. Strandings with line markings indicative of interaction with gillnet gear are not included within the table. See "North Carolina Inshore Gillnet" text for more details.

[b] Stop net interactions are included if the animal was found entangled in stop net gear. Stranding with line markings indicative of interaction with stop net gear are not included within the table. See "North Carolina Roe Mullet Stop Net" text for more details.

[c] Hook and line interactions are counted here if the available evidence suggested the hook and line gear contributed to the cause of death. See "Hook and Line" text for more details.

Table 1c. Summary of the incidental mortality and serious injury of common bottlenose dolphins of the Southern North Carolina Estuarine System Stock during 2011–2015 from all sources, including observed commercial fisheries, unobserved commercial fisheries, and research and other takes. See the Annual Human-Caused Mortality and Serious Injury section for biases and limitations of mortality estimates.

Mean Annual Mortality due to the observed commercial mid-Atlantic gillnet fishery (2011–2015) (Table 2a)	**Min=0.2** **Max=0.4**
Mean Annual Mortality due to unobserved commercial fisheries (2011–2015) (Table 2b)	**0.2**
Research Takes (5-year Min/Max Count)	0
Other takes (5-year Min/Max Count)	0
Mean Annual Mortality due to research and other takes (2011–2015)	**0**
Minimum Total Mean Annual Human-Caused Mortality and Serious Injury (2011–2015)	**Min=0.4** **Max=0.6**

Strandings

Between 2011 and 2015, 80 common bottlenose dolphins stranded along coastal and estuarine waters of North Carolina that could be ascribed to the SNCES Stock (Table 2; Southeast Regional Marine Mammal Stranding Network; NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 18 May 2016). It could not be determined if there was evidence of human interaction for 26 of these strandings, and for 37 it was determined there was no evidence of human interaction. The remaining 17 showed evidence of human

interactions, including 16 fisheries interactions (FIs). One FI occurred in 2011 and involved a dolphin entangled in gillnet gear and reported to the stranding network, who recovered the carcass. The gillnet was targeting spot, and this take is included under the mid-Atlantic gillnet fishery (Table 1a). The remaining FIs could not be assigned to a specific fishery. It should be recognized that evidence of human interaction does not always indicate cause of death, but rather only that there was evidence of interaction with a fishery (e.g., line marks, net marks) or evidence of a boat strike, gunshot wound, mutilation, etc., at some point. 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). 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 to recognize signs of human interaction varies among stranding network personnel.

As described in the Stock Definition and Geographic Range section, there is spatiotemporal overlap between the SNCES Stock and the Southern Migratory Coastal Stock in coastal waters of southern North Carolina when the Southern Migratory Coastal Stock makes its seasonal migrations north and south. There is also overlap in waters from southern Pamlico Sound to Bogue Sound with the NNCES Stock during late summer and early fall. Therefore, assignment of animals to a single stock is impossible in some seasons and regions. Of the 80 strandings ascribed to the SNCES Stock, 12 were ascribed solely to this stock and two of those were identified as having evidence of fishery interaction. It is likely that the counts in Table 2 include some animals from the Southern Migratory Coastal and/or NNCES Stock and therefore overestimate the number of strandings for the SNCES Stock; those strandings that could not be solely ascribed to the SNCES Stock were also included in the counts for these other stocks as appropriate. In addition, stranded carcasses are not routinely identified to either the offshore or coastal morphotype of common bottlenose dolphin. Therefore, it is possible that some of the reported strandings recorded along the coast were of the offshore form, although that number is likely to be low (Byrd *et al*. 2014).

This stock has been impacted by two unusual mortality events (UMEs), one in 1987–1988 and one in 2013–2015, both of which have been attributed to morbillivirus epidemics (Lipscomb *et al.* 1994; Morris *et al.* 2015). Both UMEs included deaths of dolphins in spatiotemporal locations that apply to the SNCES Stock. When the impacts of the 1987–1988 UME were being assessed, only a single coastal stock of common bottlenose dolphin was thought to exist along the U.S. eastern seaboard from New York to Florida (Scott *et al.* 1988) and it was estimated that 10 to 50% of the coast-wide stock died as a result of this UME (Scott *et al.* 1988; Eguchi 2002). Impacts to the SNCES Stock alone are not known. However, Scott *et al.* (1988) indicated that the observed mortalities from this event affected primarily coastal rather than estuarine dolphins. The total number of stranded common bottlenose dolphins from New York through North Florida (Brevard County) during the 2013–2015 UME was ~1827 (http://www.nmfs.noaa.gov/pr/health/mmume/midatldolphins2013.html, accessed 8 November 2016). Most strandings and morbillivirus positive animals have been recovered from the ocean side beaches rather than from within the estuaries, suggesting that coastal stocks may have been more impacted by this UME than estuarine stocks (Morris *et al.* 2015). However, the habitat of the SNCES Stock includes more nearshore coastal waters than many estuarine stocks and so it may have been more heavily impacted by this UME than other estuarine stocks. An assessment of the impacts of the 2013–2015 UME to common bottlenose dolphin stocks in the wNA is ongoing.

Table 2. Strandings of common bottlenose dolphins during 2011–2015 from North Carolina that were ascribed to the Southern North Carolina Estuarine System (SNCES) Stock, 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. Strandings observed in North Carolina are separated into those occurring within estuaries vs. coastal waters. Assignments to stock were based upon the understanding of the seasonal movements of this stock. However, particularly in coastal waters, there is likely overlap between the SNCES Stock and other common bottlenose dolphin stocks. Data are from the NOAA National Marine Mammal Health and Stranding Response Database (unpublished data, accessed 18 May 2016). Please note HI does not necessarily mean the interaction caused the animal's death.

State	2011	2012	2013	2014	2015

Type	HI Yes	HI No	CBD	HI Yes	HI No	CBD	HI Yes	HI No	CBD	HI Yes	HI No	CBD	HI Yes	HI No	CBD
North Carolina - Coastal	5[a]	4	3	3[b]	2	4	3[c]	15	9	0	9	1	3[d]	4	1
North Carolina - Estuary	0	1	1	0	0	1	2[e]	1	3	0	1	3	1[f]	0	0
Annual Total	14			10			33			14			9		

[a] Includes 4 FIs, 1 of which was an entanglement interaction with commercial gillnet gear (mortality, mid-Atlantic gillnet fishery).

[b] Includes 3 FIs, 1 of which had markings indicative of interactions with gillnet gear (mortality).

[c] Includes 3 FIs.

[d] Includes 3 FIs, 1 of which had markings indicative of an entanglement in a stop net (mortality, North Carolina roe mullet stop net fishery), and 1 of which had markings indicative of interactions with gillnet gear (mortality).

[e] Includes 2 FIs.

[f] Includes 1 FI, in which animal had markings indicative of interactions with gillnet gear (mortality).

HABITAT ISSUES

This stock inhabits areas with significant drainage from agricultural, industrial, and urban sources (Lindsey *et al.* 2014), and as such is exposed to contaminants in runoff from those sources. The blubber of 47 common bottlenose dolphins captured and released near Beaufort, North Carolina, contained levels of organochlorine contaminants, including DDT and PCBs, sufficiently high to warrant concern for the health of dolphins, and seven had unusually high levels of the pesticide methoxychlor (Hansen *et al.* 2004). Schwacke *et al.* (2002) found that the levels of polychlorinated biphenyls (PCBs) observed in female common bottlenose dolphins near Beaufort, North Carolina, would likely impair reproductive success, especially of primiparous females.

STATUS OF STOCK

Common bottlenose dolphins in the western North Atlantic are not listed as threatened or endangered under the Endangered Species Act. NMFS considers the SNCES Stock to be a strategic stock under the MMPA. An unbiased abundance estimate for this stock is unavailable, but the stock size is likely less than 200 given the restricted range of the stock and the best available abundance estimate (Urian *et al.* 2013). An annual average of 3.2 carcasses showing evidence of fishery interaction (primarily gillnet interactions, Table 2) are recovered within this stock's range. This high number is of concern, particularly in light of Wells *et al.* (2015) who estimated that only one-third of common bottlenose dolphin carcasses in estuarine environments are recovered. This suggests that annual human-caused mortality could approach 16 animals per year. While it is likely that not every dolphin with evidence of fishery interaction died as a result of that interaction, only five mortalities per year would place the stock at or above PBR if the minimum abundance (Nmin) is anything less than 500. Therefore, given the likely small stock size and the probable negative bias in the estimated total human-caused mortality, this stock is listed as strategic. The status of this stock relative to OSP is unknown. There is insufficient information available to determine whether the total fishery-related mortality and serious injury for this stock is insignificant and approaching a zero mortality and serious injury rate. The abundance of this stock is currently unknown and there are insufficient data to determine

population trends for this stock. The impact of the 2013–2015 UME to the status of this stock is unknown.

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