May 2016

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

STOCK DEFINITION AND GEOGRAPHIC RANGE

In the western North Atlantic, the coastal morphotype of common bottlenose dolphins is continuously distributed in nearshore coastal and estuarine waters along the U.S. Atlantic coast south of Long Island, New York, around the Florida peninsula and into the Gulf of Mexico. Several lines of evidence support a distinction between dolphins inhabiting primarily coastal waters near the shore and those present primarily in the inshore waters of the bays, sounds and estuaries. Photo-identification (photo-ID) and genetic studies support the existence of resident estuarine animals in several areas (e.g., Caldwell 2001; Gubbins 2002; Zolman 2002; Gubbins *et al.* 2003; Mazzoil *et al.* 2005; Litz *et al.* 2012), and similar patterns have been observed in bays and estuaries along the Gulf of Mexico coast (e.g., Wells *et al.* 1987). Recent genetic analyses using both mitochondrial DNA and nuclear microsatellite markers found significant differentiation between animals biopsied in coastal and estuarine areas along the Atlantic coast (Rosel *et al.* 2009), and between those biopsied in coastal and estuarine waters at the same latitude (NMFS unpublished data). Similar results have been found off the west coast of Florida (Sellas *et al.* 2005; Balmer *et al.* 2008).

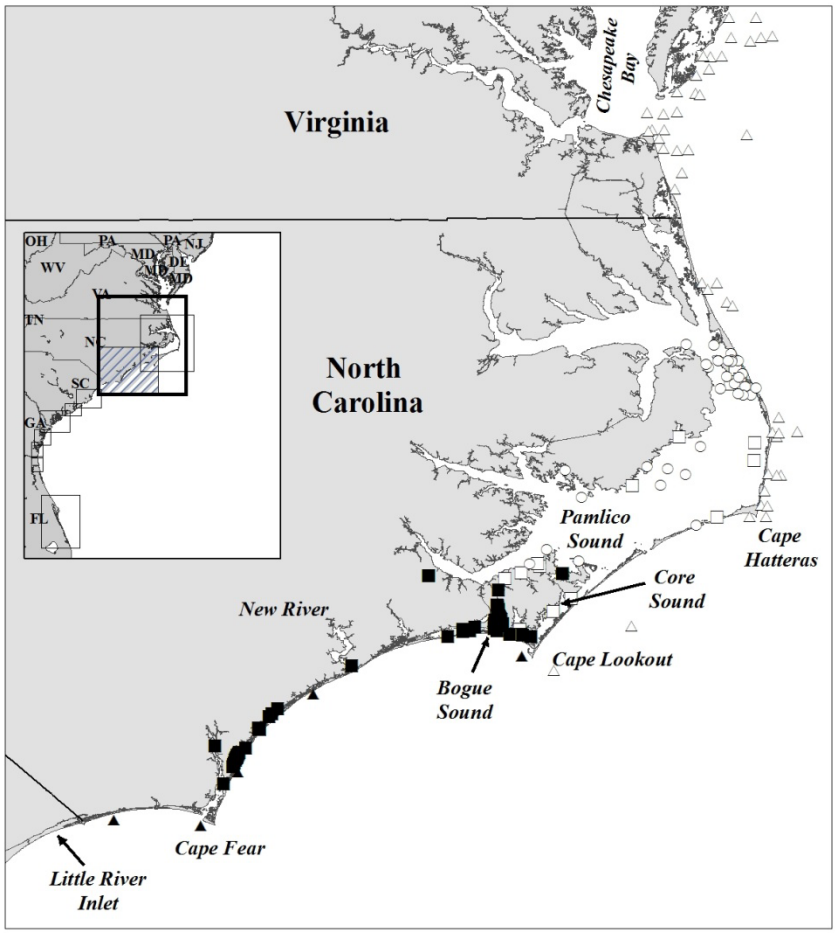

Figure 1. *The distribution of bottlenose dolphins occupying coastal and estuarine waters in North Carolina and Virginia during the period July-September. Locations are shown from aerial surveys (triangles), satellite telemetry (circles) and photo-identification studies (squares). Sightings assigned 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, inclusive of the estuary (near the North Carolina/South Carolina border), and the New River during cold water months. 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 possibly southern Pamlico Sound.

The movements and range of this stock have been inferred from a combination of photo-ID, tag telemetry and genetic data. Two animals were tagged at Holden Beach, just south of Cape Fear during November 2004, and they

remained within waters of southern and central North Carolina throughout the 9-month period when their tags were operational (NMFS unpublished data). Animals captured and released near Beaufort, North Carolina, were fitted with satellite-linked transmitters and/or freeze-branded during July 1995 (30 animals; Hansen and Wells 1996), November 1999 (11 animals), April 2000 (12 animals) and April 2006 (19 animals) (Hohn and Hansen, NMFS unpublished data). Long-term photo-ID studies conducted in waters of North Carolina include records of some of these animals (Read *et al.* 2003; NMFS 2001; Urian *et al*. unpublished manuscript; Duke University unpublished data; University of North Carolina at Wilmington unpublished data; NMFS unpublished data). Of these tagged or freeze-branded animals, at least 8 have been documented to have moved south and occupied estuarine and coastal waters near Cape Fear, south of the New River during cold water months. In addition, genetic analysis of samples from animals in waters of southern North Carolina (between Cape Lookout and the North Carolina/South Carolina border) demonstrate significant genetic differentiation from animals occupying waters from Virginia and further north, and waters of South Carolina (Rosel *et al.* 2009).

The movements of animals from the SNCES Stock are distinct from those of the Northern North Carolina Estuarine System Stock (NNCES). During warm water months, NNCES Stock animals occupy waters of central and northern Pamlico Sound and nearshore coastal waters (< 1 km from shore) perhaps as far north as the Chesapeake Bay. It is probable that there is spatial overlap between these two estuarine stocks during this time in the waters near Beaufort, North Carolina. However, SNCES Stock animals were not observed to move north of Cape Lookout in coastal waters nor into the main portion of Pamlico Sound during warm water months (NMFS unpublished data; Duke University unpublished data; University of North Carolina at Wilmington unpublished data). These movement patterns are consistent with resights of individual dolphins during a photo-ID study that sampled much of the estuarine waters of North Carolina (Read *et al.* 2003). Read *et al.* (2003) suggested that movement patterns, differences in group sizes, and habitats are consistent with 2 stocks of animals occupying estuarine waters of North Carolina.

In summary, during warm water months the SNCES Stock occupies estuarine and nearshore coastal waters (< 3 km from shore) between the Little River at the North Carolina/South Carolina border and Core Sound, including Bogue Sound and southern Pamlico Sound (Figure 1). In the northern portion of its range during these months, it likely overlaps with the NNCES Stock. During cold water months this stock is found only within the southern portion of this range, from the Little River Inlet estuary at the North Carolina/South Carolina border to the New River. In coastal waters (< 3 km from shore), it may overlap with the Southern Migratory Coastal Stock during this period. The timing of the seasonal contraction of the range (and expansion) likely occurs with some inter-annual variability related to seasonal changes in water temperatures and/or prey availability.

In prior stock assessment reports, the animals within this region were referred to as the "Southern North Carolina" coastal stock during summer months, and were part of the winter "mixed" North Carolina management unit of coastal bottlenose dolphins (Waring *et al.* 2009). However, they are now recognized as a distinct stock based upon these differences in seasonal ranging patterns and genetic analyses.

POPULATION SIZE

The current population size of the SNCES Stock is unknown because the survey data are more than 8 years old (Wade and Angliss 1997).

Abundance estimates

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 1km from shore. In order to estimate the abundance for the SNCES 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% confidence interval=118-257; Urian *et al*. 2013). Previously, this was the best available abundance estimate for the SNCES Stock, but was probably negatively biased as the survey covered waters only to 1 km from shore and did not include habitat in southern Pamlico Sound.

Read *et al.* (2003) provided the first abundance estimate for common bottlenose dolphins that occur 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% confidence interval=112-200). This estimate did not account for the portion of the stock that may have occurred in coastal

waters. Aerial survey data from 2002 (NMFS) 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). However, animals from the Southern Migratory Coastal Stock may occur within this 3-km strip during summer months. Therefore, the estimate of abundance within this strip likely included both SNCES animals and Southern Migratory Coastal animals and hence overestimated the abundance of the SNCES Stock.

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 2 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 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 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 this stock is of unknown status.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

The total annual human-caused mortality and serious injury for the SNCES Stock during 2009–2013 is unknown because this stock is known to interact with unobserved fisheries (see below). The mean annual fishery-related mortality and serious injury for observed fisheries and strandings identified as fishery-caused ranged between 0 and 0.4. No additional mortality or serious injury was documented from other human-caused actions. The minimum total mean annual human-caused mortality and serious injury for this stock during 2009–2013 ranged between 0 and 0.4. This range reflects the uncertainty in assigning observed or reported mortalities to a particular stock.

Fishery Information

The commercial fisheries that interact, or that potentially could interact, with this stock are the Category I mid-Atlantic gillnet fishery; the Category II 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. The magnitude of the interactions with these fisheries is unknown because of both uncertainty in the movement patterns of the stock and the spatial overlap between the SNCES Stock and other common bottlenose dolphin stocks in coastal waters. Observer coverage is also limited or non-existent for most of these fisheries, thus stranding data are used as an indicator of fishery-related interactions. There have been no documented interactions between common bottlenose dolphins of the SNCES Stock and the North Carolina long haul seine fishery, the North Carolina roe mullet stop net fishery, or hook and line fisheries during 2009–2013.

Mid-Atlantic Gillnet

Background

This fishery has the highest documented level of mortality of coastal morphotype common bottlenose dolphins, and sink gillnet gear in North Carolina is its largest component in terms of fishing effort and observed takes. Because the Northern Migratory Coastal, Southern Migratory Coastal, NNCES and SNCES Stocks of bottlenose dolphins all occur in waters off of North Carolina, it is not possible to definitively assign every observed mortality, or extrapolated bycatch estimate, to a specific stock. Between 1995 and 2000 a total of 14 takes occurred, 13 mortalities and 1 live release: 1 in 1995 (mixed finfish), 1 in 1996 (spanish mackerel), 3 in 1998 (1 smooth dogfish,

1 spiny dogfish and 1 in beach-anchored gillnet targeting weakfish), 5 in 1999 (2 spiny dogfish, 1 striped bass, 1 shark, and 1 live release from gear targeting spanish mackerel), 4 in 2000 (1 kingfish, 1 spiny dogfish, 1 bluefish/smooth dogfish, and 1 in beach-anchored gillnet targeting striped bass). The observed takes occurred in gear off North Carolina (n=10), Virginia (n=2) and New Jersey (n=2).

The Bottlenose Dolphin Take Reduction Team was convened in October 2001, in part, to reduce bycatch in gillnet gear. While the Bottlenose Dolphin Take Reduction Plan (BDTRP) was being developed and implemented, there were 7 additional bottlenose dolphin mortalities observed in the mid-Atlantic gillnet fishery from 2001-2006. Three mortalities were observed in 2001 with 1 occurring off of northern North Carolina during April (monkfish fishery) and 2 occurring off of Virginia during November (striped bass fishery). Four additional mortalities were observed along the North Carolina coast near Cape Hatteras: 1 in May 2003 (Spanish mackerel), 1 in September 2005 (Spanish mackerel), 1 in September 2006 (Spanish mackerel), and 1 in October 2006 (king mackerel). The BDTRP was implemented in May 2006 and resulted in changes to gillnet gear configurations and fishing practices.

During 2007-2011 only 1 take was observed by the Southeast Fisheries Observer Program off the coast of northern North Carolina during the month of October. There were no observed takes by the Northeast Fisheries Observer Program (NEFOP) during 2007-2011.

Pre-Take Reduction Plan Mortality Estimation (2002-2006)

All available data from 1995 to 2006 were used to estimate total mortality of common bottlenose dolphins in the mid-Atlantic gillnet fishery. Three alternative approaches were used to estimate a pre-BDTRP bycatch rate for the periods 2002-April 2006. First, a generalized linear model (GLM) approach was used similar to that described in Palka and Rossman (2001). The dataset used in the GLM approach included all observed trips and mortalities from 1995 to April 2006 filtered to include only trips that reflected fishing practices in effect during the period from 2002 to April 2006. Second, a simple ratio estimator of catch per unit effort (CPUE = observed catch / observed effort) was used based directly upon the observed data collected from 2002 to April 2006. Finally, a ratio estimator pooled across years 2002-April 2006 was used to estimate different CPUE values for the pre-BDTRP period. In each case, the annual reported fishery effort (represented as reported landings) was multiplied by the estimated bycatch rate to develop annual estimates of fishery-related mortality, again similar to the approach in Palka and Rossman (2001). To account for the uncertainty among the 3 alternative approaches, the average of the 3 model estimates (and the associated uncertainty) was used to estimate the mortality of bottlenose dolphins for this fishery (Table 1). It should be noted that the extrapolated estimates of total mortality include landings from North Carolina inshore waters (see North Carolina Inshore Gillnet section below) where the SNCES Stock is known to occur. The live release from 1999 and 2 takes from beach anchored gillnets reported in the background text were not included in this analysis. Only years 2002-April 2006 are reported here as a new analytical approach is described below for the most recent 5-year mortality analysis covering calendar years 2007-2011.

Table 1. Summary of the 2002-2006 incidental mortality of common bottlenose dolphins in the Southern North Carolina Estuarine System Stock in the commercial mid-Atlantic gillnet fisheries. The estimated annual and average mortality estimates are shown for the period prior to the implementation of the Bottlenose Dolphin Take Reduction Plan (pre-BDTRP) and after the implementation of the plan (post-BDTRP). Three alternative modeling approaches were used, and the average of the 3 was used to represent mortality estimates. The minimum and maximum estimates indicate the range of uncertainty in assigning observed bycatch to stock. Observer coverage is measured as a proportion of reported landings (tons of fish landed). Data are derived from the Northeast Observer program, NER dealer data and NCDMF dealer data. Values in parentheses indicate the CV of the estimate. GLM = generalized linear model.

Period	Year	Observer Coverage	Min Annual Ratio	Min Pooled Ratio	Min GLM	Max Annual Ratio	Max Pooled Ratio	Max GLM
pre-BDTRP	2002	0.01	0	0	1.77 (0.35)	0	0	4.36 (0.30)
	2003	0.01	0	0	3.12 (0.42)	0	0	4.71 (0.34)
	2004	0.02	0	0	2.77 (0.43)	0	0	6.51 (0.36)

	2005	0.03	0	0	1.43 (0.41)	0	0	2.34 (0.30)
	Jan-Apr 2006	0.03	0	0	0.01 (0.70)	0	0	0.32 (0.42)
Annual Avg. pre-BDTRP			Minimum: 0.61 (CV=0.22)			Maximum: 1.22 (CV=0.18)		

During 2002-2006 there were no observed mortalities in the mid-Atlantic gillnet fishery that could potentially be assigned to the SNCES Stock. Hence, both the annual and pooled ratio estimators of bycatch rate were equal to 0 in the pre-BDTRP period. Because the GLM approach included information from prior to 2002, bycatch mortality for the SNCES Stock was estimated from takes that could have possibly belonged to this stock (Table 1). Since observed mortalities (and effort) cannot be definitively assigned to a particular stock within certain regions and times of year, the minimum and maximum possible mortality of the SNCES Stock are presented for comparison to PBR (Table 1).

Based upon these analyses, the minimum and maximum mean mortality estimates for the SNCES Stock for the pre-BDTRP period (2002-Apr 2006) were 0.61 (CV=0.22) and 1.22 (CV=0.18) animals per year, respectively (Table 1).

Post-Take Reduction Plan Mortality Estimation (2007-2011)

During 2007-2011, no bottlenose dolphin takes that could be attributed to the SNCES Stock were observed by the Northeast or Southeast Fishery Observer Programs (NEFOP; SEFOP). The average percent federal observer coverage (measured in trips) for this fishery by the NEFOP and SEFOP during 2007-2011 was 2.95% in state waters (0-3 miles) and 8.59% in federal waters (3-200 miles). The low level of coverage in state waters where this stock can reside is likely insufficient to consistently detect rare bycatch events of common bottlenose dolphins in the mid-Atlantic commercial gillnet fishery. However, based on documented serious injury and mortality in this fishery from other sources (see Table 2), mean annual mortality estimates are likely not zero. Specifically, in 2011 the stranding network recovered a dead dolphin from a fisherman who had incidentally caught it in a small-mesh gillnet targeting spot in North Carolina. This animal could have belonged to the SNCES or Southern Migratory Coastal Stock.

North Carolina Inshore Gillnet

Information about interactions between common bottlenose dolphins and the North Carolina inshore gillnet fishery is based on stranding data. Historically, there was no systematic Federal observer coverage of this fishery. However, from May 2010 through March 2012, the NMFS allocated sea days and observed this fishery for the first time, but future NMFS coverage is uncertain due to funding. Average coverage from the NEFOP (measured in trips) was less than 1%, and no bycatch was recorded by federal observers during this period. However, 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.

Because of sea turtle bycatch in inshore gillnets, the North Carolina Division of Marine Fisheries (NCDMF) has been operating their own observer program of the inshore gillnet fishery. Since 2000, the NCDMF has operated systematic coverage of the fall (September-December) flounder gillnet fishery (> 5" mesh) in Pamlico Sound as a part of their Incidental Take Permit under the ESA (Byrd *et al.* 2011). In May 2010, NCDMF expanded the observer coverage to include gillnet effort using nets $\geq$ 4" mesh in most internal state waters and throughout the year, with a goal of 7-10% coverage. No bycatch of bottlenose dolphins has been recorded by state observers.

Atlantic Blue Crab Trap/Pot

During 2009–2013, there was 1 reported mortality, in 2009, of a common bottlenose dolphin entangled in commercial blue crab trap/pot gear that could have belonged to either the SNCES or Southern Migratory Coastal Stock. 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).

Other Mortality

Historically, there have been occasional mortalities of common bottlenose dolphins during research activities including directed live capture studies, turtle relocation trawls and fisheries surveys; however, none were documented during 2009–2013 (see Table 2).

Table 2. Summary of annual reported and estimated mortality of common bottlenose dolphins from the Southern North Carolina Estuarine System Stock during 2009–2013 from observer and stranding data. Where minimum and maximum values are reported in individual cells, there is uncertainty in the assignment of mortalities to this particular stock due to spatial overlap with other bottlenose dolphin stocks in certain areas and seasons. This is especially the case for strandings where the maximum number reported may truly be a minimum because not all strandings are detected. Therefore, to account for both scenarios, the maximum numbers under the total column are reported as the maximum greater than or equal to what was recovered.

Year	Mid-Atlantic Gillnet		NC Inshore Gillnet (strandings)	Blue Crab Pot (strandings)	Total [b]
	Min/Max estimate extrapolated from observer data (only through 2011)[a]	Interactions known from stranding data			
2009	Min = 0 Max = 0	0	0	Min = 0 Max = 1	Min = 0 Max ≥ 1
2010	Min = 0 Max = 0	0	0	0	0
2011	Min = 0 Max = 0	Min = 0 Max = 1	0	0	Min = 0 Max ≥ 1
2012	No estimate[c]	0	0	0	0
2013	No estimate[c]	0	0	0	0
Annual Average Mortality (2009–2013)			Minimum Estimated = 0 Maximum Estimated ≥ 0.4		

[a] Where given, these numbers are the average of the 2 minimum and 2 maximum mortality estimates for that year from Table 2.

[b] In years with bycatch estimates for the mid-Atlantic gillnet fishery, stranded animals recovered with gillnet gear attached would be accounted for in the estimate for that year. Therefore, stranded animals with attached gear are only included in the Total column when no bycatch estimate has been calculated for that year.

[c] Mortality analyses that use observer data are updated every three years. The next update is scheduled for 2015 and will include mortality estimates for years 2012-2014.

Strandings

Between 2009 and 2013, 78 common bottlenose dolphins stranded along coastal and estuarine waters of North Carolina that could be assigned to the SNCES Stock (Table 3; Northeast Regional Marine Mammal Stranding Network, Southeast Regional Marine Mammal Stranding Network; NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 17 June 2014 (NER) and 11 June 2014 (SER)). It could not be determined if there was evidence of human interaction for 28 of these strandings, and for 29 it was determined there was no evidence of human interaction. The remaining 21 showed evidence of human interactions, including 18 fisheries interactions (FIs). One FI was a 2009 mortality that was entangled in commercial blue crab trap/pot gear. Another FI was a 2011 mortality entangled in gillnet gear. The gillnet was targeting spot, and falls under the mid-Atlantic gillnet fishery. The remaining FIs could not be assigned to a specific fishery. It should be

recognized that evidence of human interaction does not 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. Also, 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 among stranding network personnel varies widely as does the ability to recognize signs of human interaction.

The assignment of animals to a particular stock is impossible in some seasons and regions. In particular, there is 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 between southern Pamlico Sound and Bogue Sound with the NNCES Stock during late summer and early fall. Therefore, it is likely that the counts in Table 3 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 definitively assigned to the SNCES Stock were also included in the counts for these other stocks as appropriate. Within estuarine waters of southern North Carolina, where the probability is very high that strandings are from the SNCES Stock, there were a total of 16 strandings in this 5 year period. In addition, stranded carcasses are not routinely identified to either the offshore or coastal morphotype of bottlenose dolphin, therefore it is possible that some of the reported strandings were of the offshore form, though that number is likely to be low (Byrd *et al*. 2014). .

An Unusual Mortality Event (UME) was declared in the summer of 2013 for the mid-Atlantic coast from New York to Brevard County, Florida. Beginning in July 2013, bottlenose dolphins have been stranding at elevated rates. The total number of stranded bottlenose dolphins from New York through North Florida (Brevard County) as of mid-October 2014 (1 July 2013 - 19 October 2014) was ~1546. Morbillivirus has been determined to be the cause of the event. Most strandings and morbillivirus positive animals have been recovered from the ocean side beaches rather than from within the estuaries, suggesting that at least so far coastal stocks have been more impacted by this UME than estuarine stocks. However, the UME is still ongoing as of December 2014 when this report was drafted, and work continues to determine the effect of this event on all bottlenose dolphin stocks in the Atlantic.

Table 3. Strandings of common bottlenose dolphins from North Carolina that can possibly be assigned to the Southern North Carolina Estuarine System Stock. 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 bottlenose dolphin stocks. HI = Evidence of Human Interaction, CBD = Cannot Be Determined whether an HI occurred or not. NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 11 June 2014.

State	**2009**			**2010**			**2011**			**2012**			**2013**		
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	3[a]	2	1	3[b]	3	2	5[c]	4	3	3[d]	2	4	3[e]	15	9
North Carolina - Estuary	0	0	2	2[f]	1	2	0	1	1	0	0	1	2[g]	1	3
Annual Total	8			13			14			10			33		

[a] Includes 3 fisheries interactions (FIs), 1 of which was an entanglement interaction with commercial blue crab trap/pot gear (mortality).
[b] Includes 1 FI.
[c] Includes 4 FIs, 1 of which was an entanglement interaction with gillnet gear (mortality, from the mid-Atlantic gillnet fishery).
[d] Includes 3 FIs, one of which had markings indicative of interactions with gillnet gear (mortality).
[e] Includes 3 FIs.
[f] Includes 2 FIs.
[g] Includes 2 FIs.

HABITAT ISSUES

This stock inhabits areas with significant drainage from agricultural, industrial and urban sources, and as such is exposed to contaminants in runoff from those sources. The blubber of 47 bottlenose dolphins captured and released in and around Beaufort, North Carolina, contained contaminants of some level, and 7 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 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. However, because the abundance of the SNCES Stock is currently unknown, but likely small and relatively few mortalities and serious injuries would exceed PBR, NMFS considers the SNCES Stock to be a strategic stock under the MMPA. The documented mean annual human-caused mortality for this stock for 2009–2013 ranged between 0 and 0.4. However, these estimates are biased low for the following reasons: 1) the total U.S. human-caused mortality and serious injury for this stock cannot be directly estimated because of the spatial overlap of several stocks of bottlenose dolphins in this area; 2) the mean annual fishery-related mortality from the mid-Atlantic gillnet fishery does not include estimates from the observer component for years 2012-2013; and 3) there are several commercial fisheries operating within this stock's boundaries and these fisheries have little to no observer coverage. Therefore, the documented mortalities must be considered minimum estimates of total fishery-related mortality. 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 status of this stock relative to OSP is unknown. There are insufficient data to determine the population trends for this stock.

REFERENCES CITED

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

Barlow, J., S.L. Swartz, T.C. Eagle and P.R. Wade. 1995. U.S. marine mammal stock assessments: Guidelines for preparation, background, and a summary of the 1995 assessments. NOAA Tech. Memo. NMFS-OPR-6. 73 pp.

Burdett, L.G. and W.E. McFee. 2004. Bycatch of bottlenose dolphins in South Carolina, USA, and an evaluation of the Atlantic blue crab fishery categorization. J. Cetacean Res. Manage. 6(3): 231-240.

Byrd, B.L., A.A. Hohn and M.H. Godfrey. 2011. Emerging fisheries, emerging fishery interactions with sea turtles: A case study of the large-mesh gillnet fishery for flounder in Pamlico Sound, North Carolina, USA. Mar. Policy 35(3): 271-285.

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

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

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

Gubbins, C.M., M. Caldwell, S.G. Barco, K. Rittmaster, N. Bowles and V. Thayer. 2003. Abundance and sighting patterns of bottlenose dolphins (*Tursiops truncatus*) at four northwest Atlantic coastal sites. J. Cetacean Res. Manage. 5(2): 141-147.

Hansen, L.J. and R.S. Wells. 1996. Bottlenose dolphin health assessment: Field report on sampling near Beaufort, North Carolina, during July, 1995. NOAA Tech. Memo. NMFS-SEFSC-382. 24 pp.

Hansen, L.J., L.H. Schwacke, G.B. Mitchum, A.A. Hohn, R.S. Wells, E.S. Zolman and P.A. Fair. 2004. Geographic variation in polychlorinated biphenyl and organochlorine pesticide concentrations in the blubber of bottlenose dolphins from the U.S. Atlantic coast. Sci. Total Environ. 319: 147-172.

Litz, J.A., C.R. Hughes, L.P. Garrison, L.A. Fieber and P.E. Rosel. 2012. Genetic structure of common bottlenose dolphins (*Tursiops truncatus*) inhabiting adjacent South Florida estuaries - Biscayne Bay and Florida Bay. J. Cetacean Res. Manage. 12(1): 107-117.

Mazzoil, M., S.D. McCulloch and R.H. Defran. 2005. Observations on the site fidelity of bottlenose dolphins (*Tursiops truncatus*) in the Indian River Lagoon, Florida. Fla. Sci. 68(4): 217-226.

NMFS. 2001. Preliminary stock structure of coastal bottlenose dolphins along the Atlantic coast of the US. NMFS/SEFSC Report prepared for the Bottlenose Dolphin Take Reduction Team. Available from: NMFS, Southeast Fisheries Science Center, 75 Virginia Beach Dr., Miami, FL 33149.

Noke, W.D. and D.K. Odell. 2002. Interactions between the Indian River Lagoon blue crab fishery and the bottlenose dolphin, *Tursiops truncatus*. Mar. Mamm. Sci 18(4): 819-832.

Palka, D.L. and M.C. Rossman. 2001. Bycatch estimates of coastal bottlenose dolphin (*Tursiops truncatus*) in the U.S. mid-Atlantic gillnet fisheries for 1996 to 2000. Northeast Fisheries Science Center Reference Document 01-15, 77 pp.

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

Read, A.J., K.W. Urian, B. Wilson and D.M. Waples 2003. Abundance of bottlenose dolphins in the bays, sounds, and estuaries of North Carolina. Mar. Mamm. Sci. 19(1): 59-73.

Rosel, P.E., L. Hansen and A.A. Hohn. 2009. Restricted dispersal in a continuously distributed marine species: Common bottlenose dolphins *Tursiops truncatus* in coastal waters of the western North Atlantic. Mol. Ecol. 18: 5030–5045.

Schwacke, L.H., E.O. Voit, L.J. Hansen, R.S. Wells, G.B. Mitchum, A.A. Hohn and P.A. Fair. 2002. Probabilistic risk assessment of reproductive effects of polychlorinated biphenyls on bottlenose dolphins (*Tursiops truncatus*) from the southeast United States coast. Environ. Toxicol. Chem. 21(12): 2752-2764.

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

Urian, K.W., D.M. Waples, R.B. Tyson, L.E. Willams Hodge and A.J. Read. 2013. Abundance of bottlenose dolphins (*Tursiops truncatus*) in estuarine and near-shore waters of North Carolina, USA. J. N. C. Acad. Sci. 129(4): 165-171.

Wade, P.R. and R.P. Angliss. 1997. Guidelines for assessing marine mammal stocks: Report of the GAMMS Workshop April 3-5, 1996, Seattle, Washington. NOAA Tech. Memo. NMFS-OPR-12. 93 pp.

Waring, G.T., E. Josephson, K. Maze-Foley and P.E. Rosel, eds. 2009. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments 2009. NOAA Tech. Memo. NMFS-NE-213. 528 pp.

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

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

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