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COMMON BOTTLENOSE DOLPHIN (*Tursiops truncatus truncatus*) Northern Georgia/Southern South 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, to the Florida peninsula. Several lines of evidence support a distinction between dolphins inhabiting coastal waters near the shore and those present 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 (Caldwell 2001; Gubbins 2002a; 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 (Wells *et al.* 1987; Balmer *et al.* 2008). 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coast (Rosel *et al.* 2009), and between those biopsied in coastal and estuarine waters at the same latitude (NMFS unpublished data).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).

Estuarine areas in southern South Carolina and northern Georgia are characterized by extensive tidal marshes, shallow lagoonal estuaries, and riverine input (Savannah, Coosawhatchie, Combahee Rivers). Estuarine circulation patterns are dominated mainly by freshwater inflow and tides in South Carolina and Georgia. This region includes the large population centers of Savannah, Georgia, and Hilton Head, South Carolina, which are also areas of significant tourism.

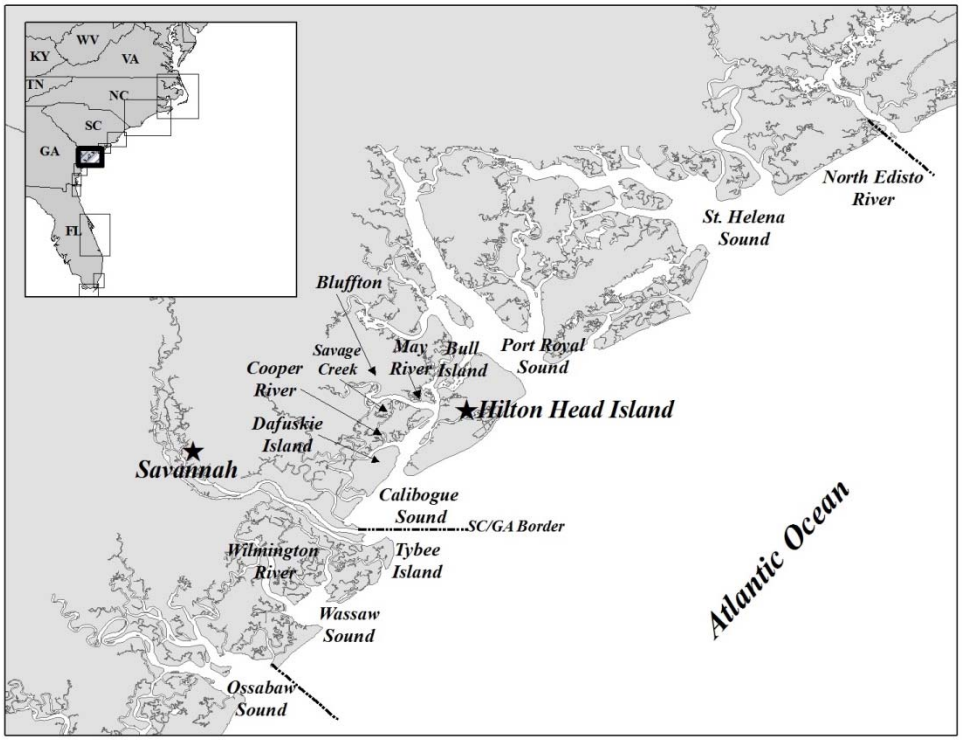

Figure 1. *Geographic extent of the Northern Georgia/Southern South Carolina Estuarine System (NGSSCES) Stock. The borders are denoted by dashed lines.*

From 1994 to 1998, Gubbins (2002a,b,c) surveyed an area around Hilton Head Island bordered on the north by the May River, on the south by the Calibogue Sound, on the west by Savage Creek and on the east by Hilton Head Island. Broad Creek, which bisects Hilton Head Island, and nearshore ocean waters out to 2 km at the mouth of Calibogue Sound were included and were regularly surveyed. Occasional surveys were made around the perimeter of Hilton Head Island. Gubbins (2002b) categorized each dolphin identified in the Hilton Head area as a year-round resident or a seasonal transient based on overall resighting patterns. Residents were seen in all 4 seasons whereas transients were seen only in 1 or 2 seasons. Resident dolphins were observed from 10 to 116 times, whereas transients were observed fewer than 9 times (Gubbins 2002b). Sixty-four percent of the dolphins photographically identified were resighted only once between 1994 and 1998. Both resident and transient dolphins occurred in the waters of Calibogue Sound (Gubbins 2002b,c; Gubbins *et al.* 2003), whereas in

the tidal creeks and rivers, primarily small, tight groups of resident dolphins were seen, with only an occasional transient dolphin. Two dolphins were resighted between Hilton Head and Jacksonville, which likely represent transients or seasonal residents (Gubbins 2002b). Gubbins *et al.* (2003) reported dolphin abundance in the Hilton Head area was lowest from February to April, with 2 peaks in abundance observed in May and July. Some dolphins were sighted for short periods in the summer, indicating transients or seasonal residents may move inshore to this area during the summer months.

The Northern Georgia/Southern South Carolina Estuarine System (NGSSCES) Stock is bounded to the north by the southern border of the Charleston Estuarine System Stock at the southern extent of the North Edisto River and extends southwestward to the northern extent of Ossabaw Sound. It includes St. Helena, Port Royal, Calibogue and Wassaw Sounds, as well as the estuarine waters of the rivers and creeks and 1 km of nearshore coastal waters that lie within this area (Figure 1). Photo-ID matches of estuarine animals from the NGSSCES region and the estuarine stocks to the north and south have not been made (Urian *et al.* 1999). The borders are based primarily on results of photo-ID studies conducted by Gubbins (2002a,b,c) in this region, and photo-ID and telemetry research carried out north of this region (Zolman 2002; Speakman *et al.* 2006), and are subject to change upon further study of dolphin residency patterns in estuarine waters of South Carolina and Georgia.

POPULATION SIZE

The total number of common bottlenose dolphins residing within the NGSSCES Stock is unknown. Data collected by Gubbins (2002b) were incorporated into a larger study that used mark-recapture analyses to calculate abundance in 4 estuarine areas along the eastern U.S. coast (Gubbins *et al.* 2003). Sighting records collected only from May through October were used. Based on photo-ID data from 1994 to 1998, 234 individually identified dolphins were observed (Gubbins *et al.* 2003), which included 52 year-round residents and an unspecified number of seasonal residents and transients. Mark-recapture analyses included all the 234 individually identifiable dolphins and the population size for the Hilton Head area was estimated to be 525 dolphins (CV=0.16; Gubbins *et al.* 2003). This was an overestimate of the resident stock abundance within the study area because it included non-resident and seasonally resident dolphins. In addition, the study area did not encompass the entire area occupied by the NGSSCES Stock and therefore this population size cannot be considered a reliable estimate of abundance for this stock. Finally, as recommended in the GAMMS Workshop Report (Wade and Angliss 1997), estimates greater than 8 years old are deemed unreliable to determine the current PBR.

Minimum Population Estimate

The minimum population estimate for this stock of common bottlenose dolphins is unknown. Present data are insufficient to calculate a minimum population estimate for the Northern Georgia/Southern South Carolina Estuarine System Stock of bottlenose dolphins.

Current Population Trend

No reliable abundance estimate is available for this stock, and therefore there are insufficient data to assess population 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 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 NGSSCES Stock 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. PBR for the NGSSCES Stock of common bottlenose dolphins is unknown.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

The total annual human-caused mortality and serious injury for the NGSSCES 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 strandings and at-sea observations identified as fishery-caused was 1.4. 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 was 1.4.

Fishery Information

The commercial fisheries that interact, or that potentially could interact, with this stock are the Category II Atlantic blue crab trap/pot fishery and the Category III Atlantic Ocean, Gulf of Mexico, Caribbean commercial passenger fishing vessel (hook and line) fishery (Appendix III).

Atlantic Blue Crab Trap/Pot

One of the largest commercial fisheries in South Carolina's coastal waters is the Atlantic blue crab (*Callinectes sapidus*) fishery, which operates year round with the predominant fishing occurring from August to November. Burdett and McFee (2004) reviewed common bottlenose dolphin strandings in South Carolina from 1992 to 2003 and found that 24% of the 42 entanglements of dolphins were associated with crab pots with an additional 19% of known entanglements deemed as probable interactions with crab pots.

Between 2009 and 2013, 5 bottlenose dolphin strandings were reported entangled in crab trap/pot gear in the NGSSCES (Table 1; NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 11 June 2014). Three of the 5 strandings were mortalities. Two of the 5 animals were released alive, 1 of which was without serious injury and the other was seriously injured (Maze-Foley and Garrison in prep a,b,c). For 2 cases the pot gear was identified as commercial blue crab, for 1 case it was identified as recreational, and the remaining 2 cases were unidentified as to pot gear type. In addition to animals included in the stranding database, in 2009 there was an at-sea observation of a dolphin entangled in a crab pot buoy and line, and this animal was considered seriously injured (Maze-Foley and Garrison in prep a). 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.

Hook and Line

During 2009–2013, 2 interactions (mortalities) with hook and line gear were documented within the NGSSCES area. During 2010, 1 dolphin was documented with monofilament line wrapped around its flukes, and 1 dolphin was documented with an ingested fishing lure. Both of these mortalities were included in the stranding database and are included in the stranding totals presented in Table 1. It should be noted that, in general, it cannot be determined if hook and line gear originated from a commercial (i.e., charter boat and headboat) or recreational angler because the gear type used by both sources is typically the same. Also, it is not possible to estimate the total number of interactions with hook and line gear because there is no systematic observer program.

Other Mortality

From 2009 to 2013, 105 common bottlenose dolphin strandings were documented within the NGSSCES area (Table 1; NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 11 June 2014). There was evidence of human interactions for 18 strandings in total, 11 of which were fisheries interactions including the 5 interactions with crab trap/pot gear and 2 interactions with hook and line gear discussed above. No evidence of human interactions was found for 27 strandings, and for the remaining 60 strandings, it could not be determined if there was evidence of human interactions. 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.

An Unusual Mortality Event (UME) was declared in South Carolina during February-May 2011. Twelve strandings assigned to the NGSSCES Stock were considered to be part of the UME. The cause of this UME was undetermined. A 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 1. Common bottlenose dolphin strandings occurring in the Northern Georgia/Southern South Carolina Estuarine System Stock area during 2009 to 2013, as well as number of strandings for which evidence of human interactions (HI) was detected and number of strandings for which it could not be determined (CBD) if there was evidence of human interactions. Data are from the NOAA National Marine Mammal Health and Stranding Response Database (unpublished data, accessed 11 June 2014). Please note human interaction does not necessarily mean the interaction caused the animal's death.

Stock	Category	2009	2010	2011	2012	2013	Total
Northern Georga/Southern South Carolina Estuarine System Stock	Total Stranded	9	21	27[a]	21	27	105
	Human Interaction						
	---Yes	3[b]	6[c]	3[d]	2[e]	4[f]	18
	---No	1	10	7	3	6	27
	---CBD	5	5	17	16	17	60

[a] This total includes 12 animals that were part of the 2011 UME event in South Carolina.
[b] This total includes 2 fisheries interactions (FIs), 1 of which was an animal partially disentangled from recreational trap/pot gear by a member of the public and released alive in unknown condition.
[c] This total includes 5 FIs. Two FIs were entanglement interactions in crab trap/pot gear (mortalities), and 2 FIs involved hook and line gear (mortalities).
[d] This total includes 1 FI that was as entanglement interaction in commercial blue crab trap/pot gear (mortality).
[e] This total includes 1 FI.
[f] This total includes 2 FIs, 1 of which was an entanglement interaction with commercial blue crab trap/pot gear (released alive, not seriously injured).

HABITAT ISSUES

This stock inhabits areas with significant drainage from urban and agricultural areas and as such is exposed to contaminants in runoff from those sources. In other estuarine areas where contaminant analyses have been conducted, it has been suggested that exposure to anthropogenic contaminants could potentially result in adverse effects on health or reproductive rates (Schwacke *et al.* 2002; Hansen *et al.* 2004). Analyses of contaminants has been conducted only in the southernmost portion of this stock's range comparing PCB concentrations between dolphins stranded in the Savannah area (Wassaw, Ossabaw and St. Catherine's Sounds) and dolphins using the Turtle/Brunswick River Estuary (TBRE; Pulster and Maryua 2008; Pulster *et al.* 2009). Total PCB concentrations were 10 times higher in dolphins from the TBRE compared to the stranded animals from the Savannah area. The signature of Aroclor 1268, a PCB used in roofing and caulking compounds, was distinct between the TBRE and Savannah area dolphins and closely resembled those of local prey fish species (Pulster and Maruya 2008; Pulster *et al.* 2009).

Illegal feeding or provisioning of wild bottlenose dolphins has been documented in Georgia, particularly near Brunswick and Savannah (Kovacs and Cox 2014; Perrtree *et al.* 2014; Wu 2013). Feeding wild dolphins is defined under the MMPA as a form of 'take' because it can alter the natural behavior and increase the risk of injury or death to wild dolphins. Dolphins in estuarine waters near Savannah recently showed the highest rate of begging behavior reported from any study site worldwide (Perrtree *et al.* 2014). There are emerging questions regarding potential linkages between provisioning wild dolphins, dolphin depredation of recreational fishing gear, and associated entanglement and ingestion of gear (Powell and Wells 2011).

High boat activity in the Hilton Head area could result in a change in movement patterns, alteration of behavior of both dolphins and their prey, disruption of echolocation and masking of communication, physical damage to ears, collisions with vessels and degradation of habitat quality (Richardson *et al.* 1995; Ketten 1998; Gubbins 2002b; Gubbins *et al.* 2003; Mattson *et al.* 2005). The effect of boat and jet ski activity was investigated by Mattson *et al.* (2005) during the summer of 1998 along Hilton Head Island. Dolphins changed behavior more often when boats were present, and group size was significantly larger in the presence of 1 boat and was largest when multiple boats were present. Jet skis elicited a strong and immediate reaction with dolphins remaining below the surface for long periods of time. Dolphins always changed behavior and direction of movement in the presence of shrimp boats, while ships and ferries elicited little to no obvious response. The long-term impacts of such repeated harassment and disturbance on survival and reproduction remain to be determined.

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 NGSSCES Stock is currently unknown, but likely small, and relatively few mortalities and serious injuries would exceed PBR, NMFS considers this to be a strategic stock under the MMPA. The documented mean annual human-caused mortality and serious injury for this stock for 2009 – 2013 was 1.4. However, there are commercial fisheries, including crab trap/pot fisheries, operating within this stock's boundaries and these fisheries have little to no observer coverage. The impact of crab trap/pot fisheries on estuarine bottlenose dolphins is currently unknown, but has been shown previously to be considerable in the similar Charleston Estuarine System Stock area (Burdett and McFee 2004). Therefore, the documented mortalities and serious injuries must be considered minimum estimates of total fishery-related mortality and serious injury. 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 in the U.S. Atlantic EEZ is unknown. There are insufficient data to determine the population trends for this stock.

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