

## COMMON BOTTLENOSE DOLPHIN (*Tursiops truncatus truncatus*) Southern Georgia 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 inshore areas of the southeastern United States (Caldwell 2001; Gubbins 2002; Zolman 2002; 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coast (Rosel *et al.* 2009), and between those biopsied in coastal and estuarine waters at the same latitude (NMFS unpublished data).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).

Coastal southern Georgia contains an extensive estuarine tidal marsh system, punctuated with several river drainages. There is moderate development throughout the region, along with the larger industrialized area around Brunswick, Georgia. The Environmental Protection Agency has included 4 sites within the Brunswick area among the Superfund hazardous waste sites.

Balmer *et al.* (2011) conducted photo-ID studies between 2004 and 2009 in two field sites in south-central Georgia, one in the Turtle/Brunswick River estuary (TBRE) and the second north of the Altamaha River/Sound including the Sapelo Island National Estuarine Research Reserve and extending north to Sapelo Sound. Photo-ID data revealed strong site fidelity to the two regions and supported Altamaha Sound as an appropriate boundary between the two sites as 85.4% of animals identified did not cross Altamaha Sound (Balmer *et al.* 2013). Just over half the animals that did range across Altamaha Sound had low site fidelity and were believed to be members of the South Carolina/Georgia Coastal Stock.

Genetic analysis of mitochondrial DNA control region sequences and microsatellite markers of dolphins biopsied in southern Georgia showed significant genetic differentiation from animals biopsied in northern Georgia and southern South Carolina estuaries as well as from animals biopsied in coastal waters >1 km from shore at the same latitude (NMFS unpublished data). In addition, bottlenose dolphins in the TBRE exhibit contaminant burdens consistent with long-term fidelity to the TBRE (Pulster and Maruya 2008; Balmer *et al.* 2011; Kucklick *et al.* 2011).

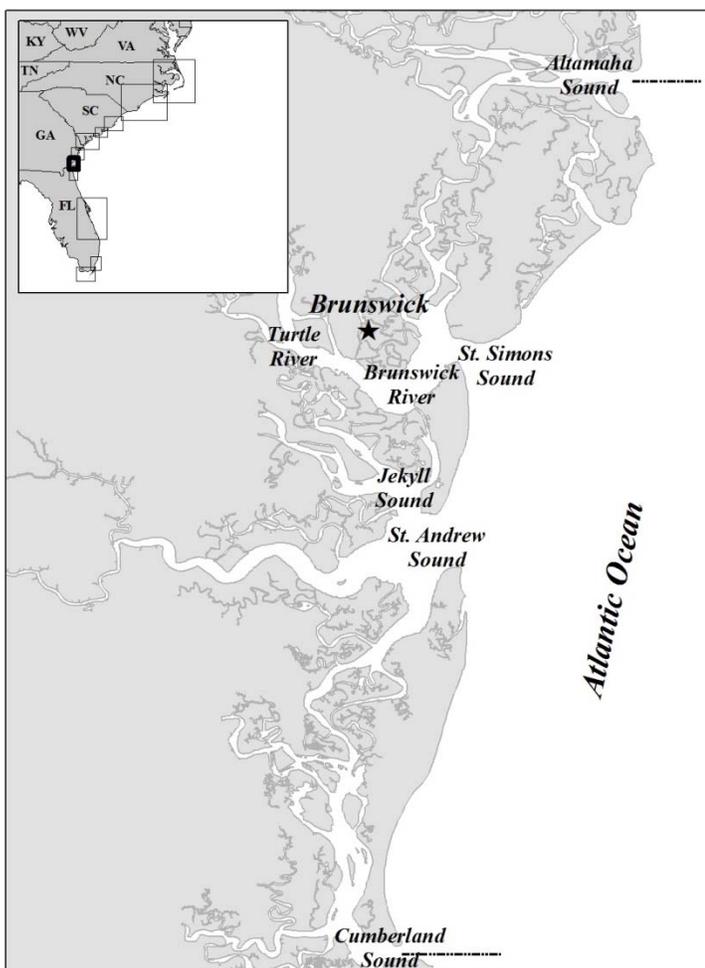


Figure 1. Geographic extent of the Southern Georgia Estuarine System (SGES) Stock. The borders are denoted by dashed lines.

In addition, bottlenose dolphins in the TBRE exhibit contaminant burdens consistent with long-term fidelity to the TBRE (Pulster and Maruya 2008; Balmer *et al.* 2011; Kucklick *et al.* 2011).

Therefore, the Southern Georgia Estuarine System Stock (SGES) is bounded in the south by the Georgia/Florida border at the Cumberland River out through Cumberland Sound and in the north by the Altamaha River out through Altamaha Sound inclusive, and encompasses all estuarine waters in between, including but not limited to the Intracoastal Waterway, Hampton River, St. Andrew and Jekyll Sounds and their tributaries, St. Simons Sound and tributaries, and the TBRE system (Figure 1). Although the majority of photo-ID survey effort by Balmer *et al.* (2013) was conducted within the estuaries, opportunistic surveys extending along the coast and satellite-linked telemetry of three individuals suggested that animals within the SGES had ranging patterns that extended into the coastal waters of the TBRE. Thus, the nearshore ( $\leq 1$  km from shore) coastal waters from Altamaha Sound to Cumberland Sound were included in the SGES Stock boundaries. The southern boundary abuts the northern boundary of the Jacksonville Estuarine System Stock, previously defined based on photo-ID and genetic data (Caldwell 2001). The northern boundary is defined based on continuity of estuarine habitat, evidence for significantly lower contaminant levels in dolphins from the Sapleo Island area (Balmer *et al.* 2011) and a genetic discontinuity between dolphins sampled in southern Georgia and those sampled in Charleston, South Carolina (Rosel *et al.* 2009). These boundaries are subject to change upon further study of dolphin residency patterns in estuarine waters of central and northern Georgia.

### **POPULATION SIZE**

During 2008-2009, seasonal, mark-recapture, photo-ID surveys were conducted by Balmer *et al.* (2013) to estimate abundance in a portion of the SGES including St. Simons Sound north to and inclusive of Altamaha Sound. Estimates from winter were chosen as the best representation of the portion of resident estuarine stock in the area surveyed, and a random emigration model was chosen as the best fit based on the lowest Akaike's Information Criterion value. The estimated average abundance estimate, based on winter 2008 and winter 2009 surveys, was 194 (CV=0.05; Balmer *et al.* 2013). It is important to note this estimate covered less than half of the entire range of the SGES Stock, and therefore, the abundance estimate is negatively biased.

### **Minimum Population Estimate**

The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate. This is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by Wade and Angliss (1997). Though negatively biased, the best estimate for the SGES Stock is 194 (CV=0.05). The resulting minimum population estimate is 185.

### **Current Population Trend**

One 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 SGES Stock of common bottlenose dolphins is 185. 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 this stock of common bottlenose dolphins is 1.9.

### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The total annual human-caused mortality and serious injury for the SGES Stock during 2009–2013 is unknown because this stock is known to interact with an unobserved fishery (see below). No mortality or serious injury was documented from human-caused actions during 2009–2013.

### **Fishery Information**

This stock has the potential to interact with the Category II commercial Atlantic blue crab trap/pot fishery (Appendix III).

### **Atlantic Blue Crab Trap/Pot**

During 2009–2013 there were no documented interactions with crab trap/pot gear in the SGES area. The most recent documented interaction is from 2005. Since there is no systematic observer program, it is not possible to estimate the total number of interactions or mortalities associated with crab traps/pots.

### **Other Mortality**

From 2009 to 2013, 31 common bottlenose dolphins were reported stranded within the SGES (NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 11 June 2014). It could not be determined if there was evidence of human interaction for 28 of these strandings. For the remaining 3 dolphins, no evidence of human interaction was detected. 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 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.

### **HABITAT ISSUES**

A portion of the stock's range is highly industrialized, and the Environmental Protection Agency has included 4 sites within the Brunswick area as Superfund hazardous waste sites. Specifically, the LCP Chemicals Site contaminated soils, groundwater and adjacent marsh with mercury and polychlorinated biphenyls (PCBs). Mean total polychlorinated biphenyl (PCB) concentrations from dolphins biopsied in the TBRE (Pulster and Maruya 2008; Sanger *et al.* 2008) were significantly higher than dolphins sampled in other areas of the world including other inshore estuarine waters along the Southeast coast of the United States, including the Gulf of Mexico (Schwacke *et al.* 2002; Hansen *et al.* 2004; Litz 2007; Balmer *et al.* 2011; Kucklick *et al.* 2011). PCB congeners measured in tissues of dolphins biopsied in the TBRE system were enriched in highly chlorinated homologs consistent with Aroclor 1268 (Pulster and Maruya 2008; Sanger *et al.* 2008, Balmer *et al.* 2011; Kucklick *et al.* 2011). The TBRE area is known to be contaminated with this specific PCB mixture in soil and sediments, and the transport of these contaminants into the food web through invertebrate and vertebrate fauna has been documented (Kannan *et al.* 1997; Kannan *et al.* 1998; Maruya and Lee 1998).

Studies have suggested an increased risk of detrimental effects on reproduction and endocrine and immune system function for marine mammals in relation to tissue concentrations of PCBs (De Swart *et al.* 1996; Kannan *et al.* 2000; Schwacke *et al.* 2002). PCB-related health effects on bottlenose dolphins along the Georgia coast were examined through a capture-release health assessment conducted during 2009 in the TBRE and in waters near Sapelo Island (Schwacke *et al.* 2012). Results from hematology and serum chemistry indicated abnormalities, most notably that 26% of sampled dolphins were anemic. Also, dolphins showed low levels of thyroid hormone, and thyroid hormones negatively correlated with PCB concentration measured in blubber. In addition, a reduction in innate and acquired immune response was found. T-lymphocyte proliferation and indices of innate immunity decreased with PCB concentration measured in blubber, indicating increased vulnerability to infectious disease. Overall, the results plainly showed that bottlenose dolphins are susceptible to PCB-related health effects (Schwacke *et al.* 2012). Thus, the high levels of PCBs recorded in dolphins from this stock, along with demonstrated PCB-related health effects, raise concern for the long-term health and viability of the stock. Studies of the distribution and health of bottlenose dolphins in this area are ongoing (Sanger *et al.* 2008; Schwacke, pers. comm.).

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.

## 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 SGES Stock is small and relatively few mortalities and serious injuries would exceed PBR, NMFS considers this to be a strategic stock under the Marine Mammal Protection Act. PBR for this stock is 1.9 and so the zero mortality rate goal, 10% of PBR, is 0.2. There have been no documented human-caused mortalities to this stock during 2009 – 2013. Entanglements in both commercial and recreational crab pot fisheries have been documented in prior years, and while the impact of crab trap/pot fisheries on estuarine bottlenose dolphins is currently unknown, it has been shown previously to be considerable in the similar Charleston Estuarine System Stock area (Burdett and McFee 2004). Therefore, documented mortalities must be considered minimum estimates of total fishery-related mortality. Detrimental impacts of high pollutant burdens may be a significant issue for this stock due to the high mean total polychlorinated biphenyl (PCB) concentrations found in the blubber of animals in this region. 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.

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