COMMON BOTTLENOSE DOLPHIN (*Tursiops truncatus truncatus*): Western North Atlantic Offshore Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

There are two morphologically and genetically distinct common bottlenose dolphin morphotypes (Duffield *et al.* 1983; Duffield 1986; Mead and Potter 1995; Rosel *et al.* 2009) described as the coastal and offshore forms in the western North Atlantic (Hersh and Duffield 1990; Mead and Potter 1995; Curry and Smith 1997; Rosel *et al.* 2009). The two morphotypes are genetically distinct based upon both mitochondrial and nuclear markers (Hoelzel *et al.* 1998; Rosel *et al.* 2009). The offshore form is distributed primarily along the outer continental shelf and continental slope in the Northwest Atlantic Ocean from Georges Bank (Figure 1; Kenney 1990) to the Florida Keys, where dolphins with characteristics of the offshore type have stranded. However, common bottlenose dolphins have occasionally been sighted in Canadian waters, on the Scotian Shelf, particularly in the Gully (Gowans and Whitehead 1995), and these animals are thought to be of the offshore form.

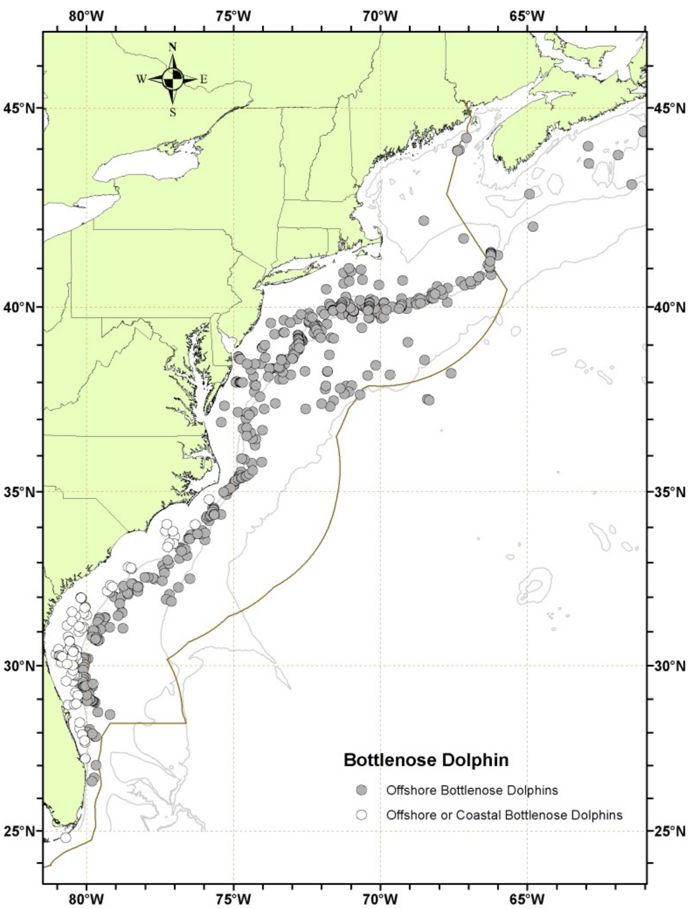

Figure 1. *Distribution of bottlenose dolphin sightings from NEFSC and SEFSC aerial surveys during summer in 1998, 1999, 2002, 2004, 2006 and 2011. Isobaths are the100-m, 1,000-m, and 4,000-m depth contours.*

North of Cape Hatteras, there is separation of the two morphotypes across bathymetry during summer months. Aerial surveys flown during 1979-1981 indicated a concentration of common bottlenose dolphins in waters < 25 m deep corresponding to the coastal morphotype, and an area of high abundance along the shelf break corresponding to the offshore stock (Kenney 1990). Biopsy tissue sampling and genetic analysis demonstrated that common bottlenose dolphins concentrated close to shore were of the coastal morphotype, while those in waters > 40 m depth were from the offshore morphotype (Garrison *et al.* 2003). However, south of Cape Hatteras, North Carolina, the ranges of the coastal and offshore morphotypes overlap to some degree. Torres *et al.* (2003) found a statistically significant break in the distribution of the morphotypes at 34 km from shore based upon the genetic analysis of tissue samples collected in nearshore and offshore waters from New York to central Florida. The offshore morphotype was found exclusively seaward of 34 km and in waters deeper than 34 m. Within 7.5 km of shore, all animals were of the coastal morphotype. More recently, offshore morphotype animals have been sampled as close as 7.3 km from shore in water depths of 13 m (Garrison *et al.* 2003). Systematic biopsy collection surveys were conducted coastwide during the summer and winter between 2001 and 2005 to evaluate the degree of spatial overlap between the two morphotypes. Over the continental shelf south of Cape Hatteras, North Carolina, the two morphotypes overlap spatially, and the probability of a sampled group being from the offshore morphotype increased with increasing depth based upon a logistic regression analysis (Garrison *et al*. 2003). Hersh and Duffield (1990) examined common bottlenose dolphins that stranded along the southeast coast of Florida and found four that had hemoglobin profiles matching that of the offshore morphotype. These strandings suggest the offshore form occurs as far south as southern Florida. The range of the offshore common bottlenose dolphin includes waters beyond the continental slope (Kenney 1990), and offshore common bottlenose dolphins may move between the Gulf of Mexico and the Atlantic (Wells *et al.* 1999).

The western North Atlantic Offshore Stock of common bottlenose dolphins is being considered separate from the Gulf of Mexico Oceanic Stock of common bottlenose dolphins for management purposes. One line of evidence to support this decision comes from Baron *et al.* (2008), who found that Gulf of Mexico common bottlenose dolphin whistles (collected from oceanic waters) were significantly different from those in the western North Atlantic Ocean (collected from continental shelf and oceanic waters) in duration, number of inflection points and number of steps.

POPULATION SIZE

The best available estimate for the offshore stock of common bottlenose dolphins in the western North Atlantic is 77,532 (CV=0.40; Table 1). This estimate is from summer 2011 surveys covering waters from central Florida to the lower Bay of Fundy.

Earlier abundance estimates

Please see Appendix IV for a summary of abundance estimates, including earlier estimates and survey descriptions. As recommended in the GAMMS II Workshop Report (Wade and Angliss 1997), estimates older than 8 years are deemed unreliable for the determination of the current PBR.

Recent surveys and abundance estimates

An abundance estimate of 26,766 (CV=0.52) offshore common bottlenose dolphins was generated from aerial and shipboard surveys conducted during June-August 2011 between central Virginia and the lower Bay of Fundy. The aerial portion covered 6,850 km of tracklines over waters north of New Jersey between the coastline and the 100-m depth contour through the U.S. and Canadian Gulf of Maine, and up to and including the lower Bay of Fundy. The shipboard portion covered 3,811 km of tracklines between central Virginia and Massachusetts in waters deeper than the 100-m depth contour out to beyond the U.S. EEZ. Both sighting platforms used a double-platform data-collection procedure, which allows estimation of abundance corrected for perception bias of the detected species (Laake and Borchers 2004). Estimation of the abundance was based on the independent observer approach assuming point independence (Laake and Borchers 2004) and calculated using the mark-recapture distance sampling option in the computer program Distance (version 6.0, release 2, Thomas *et al.* 2009).

An abundance estimate of 50,766 (CV=0.55) offshore common bottlenose dolphins was generated from a shipboard survey conducted concurrently (June-August 2011) in waters between central Virginia and central Florida. This shipboard survey included shelf-break and inner continental slope waters deeper than the 50-m depth contour within the U.S. EEZ. The survey employed two independent visual teams searching with 25x150 "bigeye" binoculars. A total of 4,445 km of tracklines was surveyed, yielding 290 cetacean sightings. The majority of sightings occurred along the continental shelf break with generally lower sighting rates over the continental slope. Estimation of the abundance was based on the independent observer approach assuming point independence (Laake and Borchers 2004) and calculated using the mark-recapture distance sampling option in the computer program Distance (version 6.0, release 2, Thomas *et al.* 2009).

Table 1. Summary of recent abundance estimates for western North Atlantic offshore stock of common bottlenose dolphins (*Tursiops truncatus truncatus*) by month, year, and area covered during each abundance survey, and resulting abundance estimate (N_{best}) and coefficient of variation (CV).

Month/Year	Area	N_{best}	CV
Jun-Aug 2011	central Virginia to lower Bay of Fundy	26,766	0.52
Jun-Aug 2011	central Florida to central Virginia	50,766	0.55
Jun-Aug 2011	central Florida to lower Bay of Fundy (COMBINED)	77,532	0.40

Minimum Population Estimate

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). The best abundance estimate is 77,532 (CV=0.40). The minimum population estimate for western North Atlantic offshore common bottlenose dolphin is 56,053.

Current Population Trend

A trend analysis has not been conducted for this stock. There are 3 abundance estimates from: 1) summer 1998 surveys (29,774; CV=0.25); 2) summer 2002/2004 surveys (81,588; CV=0.17); and 3) summer 2011 surveys (77,532; CV=0.40). Methodological differences between the estimates need to be evaluated before quantifying trends.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum net productivity rates are unknown for this stock. For purposes of this assessment, 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 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 for offshore common bottlenose dolphins is 56,053. The maximum productivity rate is 0.04, the default value for cetaceans. The “recovery” factoris 0.5, the default value for stocks of unknown status relative to OSP, and the CV of the average mortality estimate is less than 0.3 (Wade and Angliss 1997). PBR for the western North Atlantic offshore common bottlenose dolphin is therefore 561.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

The estimated mean annual fishery-related mortality and serious injury of offshore common bottlenose dolphins during 2009–2013 was 43.9 (CV=0.26; Table 2) due to interactions with the northeast sink gillnet, northeast bottom trawl, mid-Atlantic bottom trawl, and pelagic longline fisheries. The total annual fishery-related mortality and serious injury for this stock during 2009–2013 is unknown because in addition to observed takes, there was a self-reported take in the unobserved mid-Atlantic tuna hook and line fishery during 2010.

Fisheries Information

The commercial fisheries that interact, or that potentially could interact, with this stock in the Atlantic Ocean are the Category I Atlantic Ocean, Caribbean, Gulf of Mexico large pelagic longline; mid-Atlantic gillnet; and northeast sink gillnet fisheries; the Category II mid-Atlantic bottom trawl and northeast bottom trawl fisheries; and the Category III Gulf of Maine, U.S. mid-Atlantic tuna, shark, swordfish hook and line/harpoon fishery. Detailed fishery information is reported in Appendix III.

Earlier Interactions

Historically, US fishery interactions have been documented with common bottlenose dolphins in the pelagic drift gillnet fishery, pelagic pair trawl fishery, northeast and mid-Atlantic bottom trawl fisheries, and the northeast and mid-Atlantic gillnet fisheries. See Appendix V for more information on historical takes.

Pelagic Longline

The pelagic longline fishery operates in the U.S. Atlantic (including Caribbean) and Gulf of Mexico EEZ. The estimated annual average serious injury and mortality attributable to the Atlantic Ocean pelagic longline fishery for the 5-year period from 2009 to 2013 was 14.1 common bottlenose dolphins (CV=0.61; Table 2). During 2009–2013, 4 serious injuries to common bottlenose dolphins were observed. During 2012, 3 serious injuries were observed: 2 during quarter 1 in the South Atlantic Bight (SAB) region, and 1 during quarter 3 in the Northeast Coastal (NEC) region (Garrison and Stokes 2013). One serious injury of a common bottlenose dolphin was observed during quarter 4 of 2009 in the Mid-Atlantic Bight (MAB) region (Garrison and Stokes 2010; see also Fairfield and Garrison 2008; Garrison *et al*. 2009; Garrison and Stokes 2012a,b). During 2009 (1 animal), 2010 (1 animal), 2011 (2 animals), 2012 (2 animals), and 2013 (2 animals), 8 common bottlenose dolphins were observed entangled and released alive in the SAB, MAB and NEC regions (Garrison and Stokes 2010; 2012a,b; 2013; 2014). The animals were presumed to have no serious injuries. No common bottlenose dolphin mortalities or serious injuries were observed between 2002 and 2008 (Garrison 2003; Garrison and Richards 2004; Garrison 2005; Fairfield Walsh and Garrison 2006; Fairfield-Walsh and Garrison 2007; Fairfield and Garrison 2008; Garrison *et al.* 2009). However, one common bottlenose dolphin was observed entangled and released alive, presumed to have no serious injuries, in 2005 in the SAB region.

Table 2. Summary of the incidental mortality and serious injury of Atlantic Ocean offshore common bottlenose dolphins (*Tursiops truncatus truncatus*) by commercial fishery including the years sampled (Years), the type of data used (Data Type), the annual observer coverage (Observer Coverage), the observed mortalities and serious injuries recorded by on-board observers, the estimated annual mortality and serious injury, the combined annual estimates of mortality and serious injury (Estimated Combined Mortality), the estimated CV of the combined estimates (Estimated CVs) and the mean of the combined estimates (CV in parentheses).

Fishery	Years	Data Type[a]	Observer Coverage[b]	Observed Serious Injury	Observed Mortality	Estimated Serious Injury	Estimated Mortality	Estimated Combined Mortality	Est. CVs	Mean Annual Mortality
Northeast Sink Gillnet	09-13	Obs. Data Logbook	.04, .17, .19, .15, .11	0,0,0,0,0	0,0,0,0,1	0,0,0,0,0	0,0,0,0,26	0,0,0,0,26	.00,.00,.00,.00,.95	5.2 (.95)
Northeast Bottom Trawl [c]	09-13	Obs. Data Logbook	.09, .16, .26, .17, .15	0,0,0,0,0	4,1,0, 0, 0	0,0,0,0,0	18,4,10, 0, 0	18,4,10, 0, 0	.92,.53,.84, NA, NA	6.4 (.58)
Mid-Atlantic Bottom Trawl [c]	09-13	Obs. Data Logbook	.05, .06, .08, .05, .06	0,0,0,0,0	0,1,5,2, 1, 0	0,0,0,0,0	21,20,34, 16, 0	21,20,34, 16, 0	.45,.34,.31, 1.0, NA	18.2 (.25)
Pelagic Longline	09-13	Obs. Data Logbook	.10, .08, .09, .07, .09	1,0,0,3,0	0,0,0,0,0	8.8,0,0, 61.8,0	0,0,0,0,0	0,8.8,0,0, 61.8	1.00, NA, NA, 0.68, NA	14.1 (.61)
TOTAL										43.9 (.26)

[a] Observer data (Obs. Data) are used to measure bycatch rates, and the data are collected within the Northeast Fisheries Observer Program. Mandatory logbook data were used to measure total effort for the longline fishery. These data are collected at the Southeast Fisheries Science Center (SEFSC).
[b] Proportion of sets observed (for Pelagic Longline).
[c] Fishery related bycatch rates for 2012 were estimated using an annual stratified ratio-estimator using only data from 2012. The 2007-2011 estimates reported in the 2013 stock assessment report were generated using a different method, pooling observer data over the five year time period (2007-2011). Pooled stratified bycatch rates were applied to annual fishing effort data resulting in annual mortality estimates across the 2007-2011 time period.

Northeast Sink Gillnet

During 2009–2013, 1 mortality was observed in 2013 in the northeast sink gillnet fishery. No takes were observed from 2009-2012. New serious injury criteria were applied but there were no observed serious injuries of common bottlenose dolphins in the Northeast region during 2009–2013. See Table 2 for bycatch estimates and observed mortality and serious injury for the current 5-year period, and Appendix V for historical bycatch information.

Northeast Bottom Trawl

During 2009–2013, 5 mortalities were observed in the northeast bottom trawl fishery. New serious injury criteria were applied but there were no observed serious injuries of common bottlenose dolphins in the northeast region during 2009–2013. See Table 2 for bycatch estimates and observed mortality and serious injury for the current 5-year period, and Appendix V for historical bycatch information.

Mid-Atlantic Bottom Trawl

During 2009–2013, 9 mortalities were observed in the mid-Atlantic bottom trawl fishery. New serious injury criteria were applied but there were no observed serious injuries of common bottlenose dolphins in the mid-Atlantic region during 2009–2013. See Table 2 for bycatch estimates and observed mortality and serious injury for the current 5-year period, and Appendix V for historical bycatch information.

Through the Marine Mammal Authorization Program (MMAP), there were 2 self-reported incidental takes (mortalities) involving 3 common bottlenose dolphins in total during 2011 off Rhode Island and New Jersey by fishers trawling for *Loligo* squid.

U.S. Mid-Atlantic Tuna Hook and Line

Through the MMAP, there was 1 self-reported incidental take (serious-injury) of a common bottlenose dolphin during 2010 off North Carolina by a fisher using hook and line targeting tuna.

Other Mortality

Common bottlenose dolphins are among the most frequently stranded small cetaceans along the Atlantic coast. Many of the animals show signs of human interaction (*i.e.*, net marks, mutilation, etc.); however, it is unclear what proportion of these stranded animals is from the offshore stock because most strandings are not identified to morphotype, and when they are, animals of the offshore form are uncommon. For example, only 19 of 185 *Tursiops* strandings in North Carolina were genetically assigned to the offshore form (Byrd *et al.* 2014).

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, common bottlenose dolphins have been stranding at elevated rates. The total number of stranded common 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. It is also possible the offshore stock has been impacted. 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 common bottlenose dolphin stocks in the Atlantic.

STATUS OF STOCK

The common bottlenose dolphin in the western North Atlantic is not listed as threatened or endangered under the Endangered Species Act, and the offshore stock is not considered strategic under the MMPA. Total U.S. fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered to be insignificant and approaching the 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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