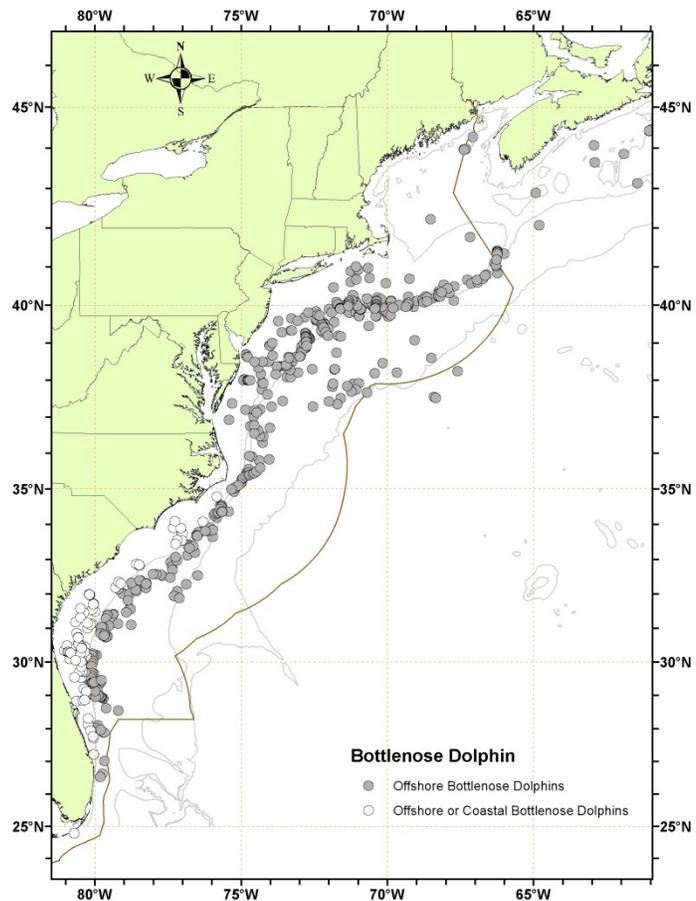# COMMON BOTTLENOSE DOLPHIN (*Tursiops truncatus truncatus*):
## Western North Atlantic Offshore Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

There are two morphologically and genetically distinct common bottlenose dolphin morphotypes (Duffield *et al.* 1983; 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 to the Florida Keys (Figure 1; CETAP 1982; Kenney 1990), 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 (e.g., Baird *et al.* 1993; Gowans and Whitehead 1995), and these animals are thought to be of the offshore form.

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 (CETAP 1982; 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*



**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.*

*al.* 2003). Systematic biopsy collection surveys were conducted coast-wide 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 also waters beyond the U.S. EEZ, and therefore the offshore stock is a transboundary stock (Figure 1). 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; Palka 2012; Garrison 2016). 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 (Palka 2012). The aerial portion covered 6,850 km of trackline 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 trackline 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 (Garrison 2016). 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 trackline 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" factor is 0.5 because the stock's status relative to optimum sustainable population (OSP) is unknown 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 2010–2014 was 39.4 (CV=0.29; 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 2010–2014 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 Highly Migratory Species longline; Atlantic Ocean, Caribbean, Gulf of Mexico large pelagics 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, U.S. 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.

**Longline**

The large pelagics longline fishery operates in the U.S. Atlantic (including Caribbean) and Gulf of Mexico EEZ, and pelagic swordfish, tunas and billfish are the target species. The estimated annual average mortality and serious injury attributable to the Atlantic Ocean pelagics longline fishery for the 5-year period from 2010 to 2014 was 12.4 common bottlenose dolphins (CV=0.68; Table 2). During 2010–2014, 3 serious injuries to common bottlenose dolphins were observed: 2 during quarter 1 of 2012 in the South Atlantic Bight (SAB) region, and 1 during quarter 3 of 2012 in the Northeast Coastal (NEC) region (Garrison and Stokes 2013; see also Garrison and Stokes 2012a,b; 2014; 2016). During 2010 (1 animal), 2011 (2 animals), 2012 (2 animals), and 2013 (2 animals), a total of 7 common bottlenose dolphins were observed entangled and released alive in the SAB, Mid-Atlantic Bight (MAB) and NEC regions (Garrison and Stokes 2012a,b; 2013; 2014; 2016). These animals were presumed to have no serious injuries.

Historically in the large pelagics longline fishery, 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, 1 common bottlenose dolphin serious injury was observed during quarter 4 of 2009 in the MAB region

(Garrison and Stokes 2010), and 1 common bottlenose dolphin was observed entangled and released alive, presumed to have no serious injuries, in 2005 in the SAB region (Fairfield Walsh and Garrison 2006).

The Atlantic Highly Migratory Species longline fishery operates outside the U.S. EEZ. No takes of common bottlenose dolphins within high seas waters of the Atlantic Ocean have been observed or reported thus far.

See Table 2 for bycatch estimates and observed mortality and serious injury for the current 5-year period, and Appendix V for historical estimates of annual mortality and serious injury.

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 | 10−14 | Obs. Data Logbook | .17, .19, .15, .11, 0.18 | 0,0,0,0,0 | 0,0,0,1,0 | 0,0,0,0,0 | 0,0,0,26,0 | 0,0,0,26,0 | .00, .00, .00, .95, .00 | 5.2 (0.95) |
| Northeast Bottom Trawl[c] | 10−14 | Obs. Data Logbook | .16, .26, .17, .15, .17 | 0,0,0,0,0 | 1,0,0,0,0 | 0,0,0,0,0 | 4,10,0,0,0 | 4,10,0,0,0 | .53, .84, NA, NA, NA | 2.8 (0.62) |
| Mid-Atlantic Bottom Trawl[c] | 10−14 | Obs. Data Logbook | .06, .08, .05, .06, .08 | 0,0,0,0,0 | 5,2,1,0,3 | 0,0,0,0,0 | 20,34, 16,0,25 | 20,34,16, 0,25 | .34, .31, 1.0, NA, .66 | 19 (0.28) |
| Pelagic Longline | 10−14 | Obs. Data Logbook | .08, .09, .07, .09, .10 | 0,0,3,0,0 | 0,0,0,0,0 | 0,0, 61.8,0,0 | 0,0,0,0,0 | 0,0, 61.8,0,0 | NA, NA, .68, NA, NA | 12.4 (0.68) |
| TOTAL | | | | | | | | | | 39.4 (0.29) |

[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 2010–2014 were estimated using an annual stratified ratio-estimator following the methodology described in Lyssikatos (2015).

**Northeast Sink Gillnet**

During 2010–2014, 1 mortality was observed (in 2013) in the northeast sink gillnet fishery (Orphanides 2013; Hatch and Orphanides 2014; 2015; 2016). No takes were observed during 2010–2012 and 2014. There were no observed injuries of common bottlenose dolphins in the Northeast region during 2010–2014 to assess using new serious injury criteria. 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 2010–2014, 5 mortalities were observed in the northeast bottom trawl fishery (Lyssikatos 2015). There were no observed injuries of common bottlenose dolphins in the northeast region during 2010–2014 to assess using new serious injury criteria. 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) of common bottlenose dolphins during 2014 off Rhode Island by fishers trawling for *Illex* squid.

**Mid-Atlantic Bottom Trawl**

During 2010–2014, 11 mortalities were observed in the mid-Atlantic bottom trawl fishery (Lyssikatos 2015). There were no observed injuries of common bottlenose dolphins in the mid-Atlantic region during 2010–2014 to assess using new serious injury criteria. 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 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).

An Unusual Mortality Event (UME) of bottlenose dolphins and other cetaceans occurred along the mid-Atlantic coast from New York to Brevard County, Florida, from 1 July 2013 to 1 March 2015. The total number of stranded bottlenose dolphins was ~1650. Morbillivirus has been determined to be a primary cause of the event. Post-UME monitoring of bottlenose dolphins will continue over the next few years, and work continues to determine the effect of this event on 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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