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

STOCK DEFINITION AND GEOGRAPHIC RANGE

There are two distinct bottlenose dolphin ecotypes (Duffield *et al.* 1983; Duffield 1986; Mead and Potter 1995; Walker *et al.* 1999); a shallow water ecotype and a deep water ecotype which correspond to nearshore and offshore forms, respectively. Both ecotypes have been shown to inhabit waters in the western North Atlantic Ocean (Hersh and Duffield 1990; Mead and Potter 1995; Hoelzel *et al.* 1998; Walker *et al.* 1999). The inshore and offshore forms, of all age classes, can be positively identified based on differences in morphometrics, parasite loads, and prey (Mead and Potter 1995). Hoelzel *et al.* (1998) found significant differentiation between the nearshore and offshore forms in both nuclear and mtDNA markers, and concluded the two forms were distinct. Curry (1997) concluded that, based on differences in mtDNA haplotypes, the nearshore animals in the northern Gulf of Mexico and the western North Atlantic were significantly different stocks. Bottlenose dolphins which had stranded alive in the western North Atlantic in areas with direct access to deep oceanic waters had hemoglobin profiles matching that of the deep, cold water ecotype (Hersh and Duffield 1990). Hersh and Duffield (1990) also described morphological differences between the deep, cold water ecotype dolphins and dolphins with hematological profiles matching the shallow, warm water ecotype which had stranded in the Indian/Banana River in Florida. Because of their occurrence in shallow, relatively warm waters along the USA Atlantic coast and because their morphological characteristics are similar to the shallow, warm water ecotype described by Hersh and Duffield (1990), the Atlantic coastal bottlenose dolphin stock is believed to consist of this ecotype or nearshore form. Furthermore, Hoelzel *et al.* (1998) genetically identified a sample of animals captured or incidentally caught in nearshore waters as the nearshore form. Currently, data are insufficient to allow separation of locally resident bottlenose dolphins found in bays, sounds and estuaries (such as those from the Indian/Banana River) from the coastal stock in the western North Atlantic; Hoelzel *et al.* (1998) found less variation in nuclear and mtDNA markers among their sample of nearshore animals, which likely included resident and coastal animals, than their sample of offshore animals.

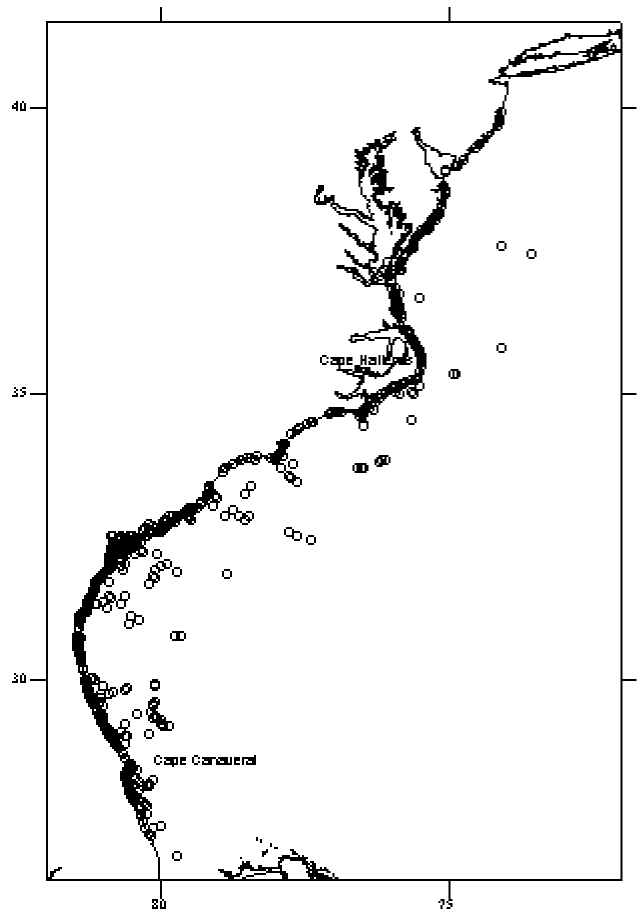

Figure 1. *Sightings of bottlenose dolphins during aerial surveys from shore to the 25 m isobath north of Cape Hatteras during summer 1994, shore to 9 km past the western Gulf Stream wall south of Cape Hatteras during winter 1992, three coastal surveys within one km of shore from New Jersey to mid-Florida during the summer in 1994, and during vessel surveys from about the 30 m isobath to the offshore extent of the USA EEZ in 1998.*

The structure of the coastal bottlenose dolphin stock in the western North Atlantic is uncertain, but what is known about it suggests that the structure is complex. Some portion of the coastal stock migrates north of Cape Hatteras, North Carolina, to New Jersey during the summer (Scott *et al.* 1988). It has been suggested that this stock is restricted to waters < 25 m in depth within the northern portion of its range (Kenney 1990) because there are two concentrations of animals north of Cape Hatteras, one inshore of the 25m isobath and the other offshore of the 25m isobath, which were observed during aerial surveys of the region (CETAP 1982) and vessel surveys (NMFS unpublished data). The lowest density of bottlenose dolphins was observed over the continental shelf, with higher densities along the coast and near the continental shelf edge. The coastal stock is believed to reside south of Cape Hatteras in the late winter (Mead 1975; Kenney 1990); however, the depth distribution of the stock south of Cape Hatteras is uncertain and the coastal and offshore stocks may overlap there. There was no apparent longitudinal discontinuity in bottlenose dolphin herd sightings during aerial surveys south of Cape Hatteras in the winter (Blaylock and Hoggard 1994).

Scott *et al.* (1988) hypothesized a single coastal migratory stock ranging seasonally from as far north as Long Island, NY, to as far south as central Florida, citing stranding patterns during a high mortality event in 1987-88 and observed density patterns along the USA Atlantic coast. Figure 1 illustrates the distribution of 696 bottlenose dolphin herd sightings during aerial and vessel surveys conducted during 1992-1998. The proportion of the sightings illustrated which might be of bottlenose dolphins from other than the coastal stock is unknown; however, it is reasonable to assume that the coastal surveys within one km of shore minimized inclusion of the offshore stock. Gathering information to distinguish between coastal and offshore ecotypes is currently an active area of research by NMFS Southeast Fisheries Science Center (SEFSC), as is research to determine the relationship between bottlenose dolphin that inhabit bays, sounds and estuaries and those that are believed to comprise the coastal stock (Hohn 1997).

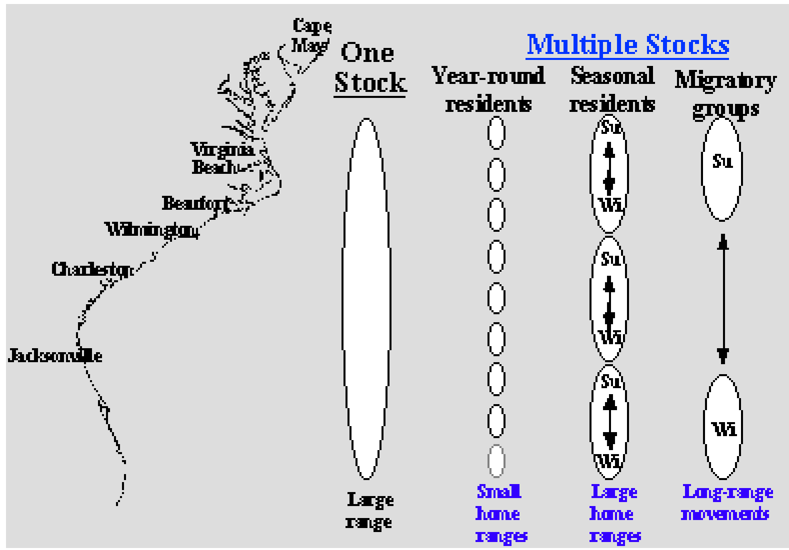

Figure 2. *Illustration of stock structure hypotheses of Atlantic coastal bottlenose dolphins: one stock ranging from New Jersey to Florida or multiple stocks which may include: 1) year-round residents with small home ranges; 2) multiple, contiguous, seasonally resident groups with relatively large home ranges; and 3) groups with long-range migratory pattern.*

A multi-disciplinary, multi-investigator research program to understand the stock structure of Atlantic coastal bottlenose dolphins was initiated in late 1996. Several different hypotheses about stock structure are being considered (Figure 2). The experimental design for the program is based on: 1) obtaining samples from live captures, photo-identification, projectile biopsy, and incidental take (strandings and observer programs); 2) conducting independent analyses including genetics, isotope ratios, contaminants, movement patterns, morphometrics, telemetry, and life history; and 3) merging of the disassociated results to describe stock structure (Hohn 1997). Based on current information, it is expected that multiple stocks exist and include year-round residents, seasonal residents, and migratory groups.

Site-specific, year-round residents have been reported only in the southern part of the range, from Charleston, South Carolina (Zolman 1996) and Georgia (Petricig 1995) to central Florida (Odell and Asper 1990); seasonal residents and migratory or transient animals also occur in these areas. In the northern part of the range the patterns reported include seasonal residency, year-round residency with large home range, and migratory or transient movements (Barco and Swingle 1996, Sayigh *et al.* 1997). Table I lists the locations

Table 1. *Residency and movement patterns of bottlenose dolphins documented from photo-identification (from Hohn 1997).*

<table>
<tr><th>Location</th><th>Year-round Residents</th><th>Seasonal Residents</th><th>Migratory/ Transient</th></tr>
<tr><td>Virginia Beach, VA</td><td>No</td><td>Jun-Sept</td><td>Jun-Sept</td></tr>
<tr><td>Beaufort, NC, “coastal”</td><td>No</td><td>Oct-Apr</td><td>?</td></tr>
<tr><td>Beaufort, NC, “estuarine”</td><td colspan="2" rowspan="2">Possible large home range</td><td></td></tr>
<tr><td>Wilmington, NC</td><td></td></tr>
<tr><td>Charleston, SC</td><td>Yes</td><td>fall-winter</td><td>spring, fall</td></tr>
<tr><td>Bull Creek, SC</td><td>Yes</td><td>Yes</td><td></td></tr>
</table>

and the patterns of residency and movement that have been documented through photo-identification of naturally-marked animals, and of 31 individuals animals that were live-captured and freeze-branded in Beaufort, NC in 1995 (Hansen and Wells 1996). Complex patterns of movement and residency were observed in a sample of 10 of the animals live-captured in Beaufort that were radio-tagged and tracked for up to 31 days: some left the area immediately, some were located up to 120 km distant within a few days of tagging, and others remained in the area (Read *et al.* 1996).

The observed patterns of year-round residency and seasonal residency, and migratory and transient movements likely represent a population that consists of a complex mosaic of biologically-meaningful stocks. The patterns are in some cases essentially identical or very similar to patterns observed in recognized stocks or communities identified in embayments and coastal areas in the northern Gulf of Mexico (e.g. Scott *et al.* 1990; Weller 1998; Wells *et al.* 1996). Sufficient information exists to identify year-round resident communities in several bay and estuarine areas; however, much of the suitable bay and estuarine habitats along the Atlantic coast have not yet been studied sufficiently. Although numerous research efforts are underway, it will require several years of photographic identification, genetic and radio-tracking research to provide sufficient information for interpretation. The entire range(s) and number of migratory and transient stocks are unknown, but much of the current research effort is directed towards determining stock structure, movements, and degree of mixing of these presumed stocks. As the research efforts are completed, it is likely that a number of stocks or communities will be identified, including year-round and resident stocks in embayments, and transient or migratory stocks. This will necessitate a revision of the stock assessment report of the western North Atlantic Coastal Stock of bottlenose dolphins to reflect the number of stocks described.

POPULATION SIZE

Mitchell (1975) estimated that the coastal bottlenose dolphin population which was exploited by a shore-based net fishery until 1925 (Mead 1975) numbered at least 13,748 bottlenose dolphins in the 1800s. Recent estimates of bottlenose dolphin abundance in the USA Atlantic coastal area were made from two types of aerial surveys. The first type was aerial survey using standard line transect sampling with perpendicular distance data analysis (Buckland *et al.* 1993) and the computer program DISTANCE (Laake *et al.* 1993). The alternate survey method consisted of a simple count of all bottlenose dolphins seen from aerial surveys within one km of shore.

An aerial line-transect survey was conducted during February-March 1992 in the coastal area south of Cape Hatteras. Sampling transects extended orthogonally from shore out to approximately 9 km past the western wall of the Gulf Stream into waters as deep as 140 m, and the area surveyed extended from Cape Hatteras to mid-Florida (Blaylock and Hoggard 1994). Systematic transects were placed randomly with respect to bottlenose dolphin distribution and approximately 3.3% of the total survey area of about 89,900 km^2 was visually searched. Survey transects, area, and dates were chosen utilizing the known winter distribution of the stocks in order to sample the entire coastal population; however, the offshore stock may represent some unknown proportion of the resulting population size estimates. Preliminary estimates of abundance were derived through the application of distance sampling analysis (Buckland *et al.* 1993) and the computer program DISTANCE (Laake *et al.* 1993) to the perpendicular distance sighting data. Bottlenose dolphin abundance was estimated to be 12,435 dolphins with coefficient of variation (CV) = 0.18 and the log-normal 95% confidence interval was 9,684-15,967 (Blaylock and Hoggard 1994).

An aerial survey was conducted during late January-early March 1995, following nearly the same design as the 1992 survey. Preliminary analysis (following the same procedures described above) resulted in an abundance estimate of 21,128 dolphins (CV=0.22) with a long-normal 95% confidence interval of 13,815-32,312.

Perpendicular sighting distance analysis (Buckland *et al.* 1983) of line transect data from an aerial survey throughout the northern portion of the range in July 1994, from Cape Hatteras to Sandy Hook, New Jersey, and from shore to the 25 m isobath, resulted in an abundance estimate of 25,841 bottlenose dolphins (CV=0.40) (Blaylock 1995) within the approximately 25,600 km^2 area. These data were collected during a pilot study for designing future surveys and are considered to be preliminary in nature.

An aerial survey of this area was conducted during mid July-mid August 1995. Data from the pilot study was used to design this survey; survey sampling was designed to produce an abundance estimate with a CV of 0.20 or less. Preliminary analysis (following the same procedures described above for the surveys south of Cape Hatteras) resulted in an abundance estimate of 12,570 dolphins (CV=0.19) with a log-normal 95% confidence interval of 8,695-18,173.

An aerial survey of the coastal waters within a one km strip along the shore from Sandy Hook to approximately Vero Beach, Florida, was also conducted during July 1994 (Blaylock 1995). Dolphins from the offshore stock are believed unlikely to occur in this area. Observers counted all bottlenose dolphins seen within the one km strip alongshore from

Cape Hatteras to Sandy Hook (northern area) and within the one km strip alongshore south of Cape Hatteras to approximately Vero Beach (southern area). The average of three counts of bottlenose dolphins in the northern area was 927 dolphins (range = 303-1,667) and the average of three counts of bottlenose dolphins in the southern area was 630 dolphins (range = 497-815). The sum of the highest counts in both areas was 2,482 dolphins.

A vessel survey to obtain abundance, distribution, and biopsy information from pelagic cetaceans in USA waters south of Delaware Bay was conducted during July and August 1998 (NMFS unpublished data). The survey included waters from approximately the 30 m isobath out to the offshore extent of the USA EEZ. A total of 56 herds or groups of bottlenose dolphins were sighted; an unknown number of these herds were likely the offshore bottlenose dolphin ecotype. One of the herds sighted was exceptionally large and was estimated to consist of 251 individuals. The data from the survey are currently being analyzed; abundance estimates should be available in late 1999.

It is not currently possible to distinguish the two bottlenose dolphin ecotypes with certainty during visual aerial and vessel surveys, as the distribution of the two ecotypes in USA Atlantic EEZ waters is uncertain. Because of this difficulty, the resulting abundance estimates may include dolphins from the offshore stock. Until additional research provides information to determine the range of habitat utilized by both ecotypes and their degree of mixing along the Atlantic coast, it will not be possible to assess the abundance of either type with any certainty. Determining the degree of geographic mixing of these two ecotypes is currently an active area of research by NMFS, SEFSC.

Minimum Population Estimate

Reasonable assurance of a minimum population estimate can not be provided by line transect surveys because the proportion of dolphins from the offshore stock which might have been observed is unknown. The risk averse approach is to assume that the minimum population size is the highest count of bottlenose dolphins within the one km strip from shore between Sandy Hook and Vero Beach obtained during the July 1994 survey. The maximum count within one km of shore between Sandy Hook and Cape Hatteras was 1,667 bottlenose dolphins and it was 815 bottlenose dolphins within one km of shore between Cape Hatteras and Vero Beach. The resulting minimum population size estimate for the western North Atlantic coastal bottlenose dolphin stock is 2,482 dolphins.

Current Population Trend

Kenney (1990) reported an estimated 400-700 bottlenose dolphins from the inshore strata of aerial surveys conducted along the USA Atlantic coast north of Cape Hatteras in the summer during 1979-1981. These estimates resulted from line transect analyses; thus, they can not be used in comparison with the direct count data collected in 1994 to assess population trends.

There was no significant difference in bottlenose dolphin abundance estimated from aerial line transect surveys conducted south of Cape Hatteras in the winter of 1983 and the winter of 1992 using comparable survey designs (NMFS unpublished data; Blaylock and Hoggard 1994) in spite of the 1987-88 mortality incident during which it was estimated that the coastal migratory population may have been reduced by up to 53% (Scott *et al.* 1988).

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum net productivity rates are not known 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 (Wade and Angliss 1997). The “recovery “ factor, which accounts for endangered, depleted, and threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP) is assumed to be 0.50 because this stock is listed as depleted under the Marine Mammal Protection Act. Therefore, PBR for the USA Atlantic coastal bottlenose dolphin stock is 25 dolphins.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Total annual estimated average fishery-related mortality or serious injury to this stock during 1994-1998 was 45.8 bottlenose dolphins (CV=0.67).

Fishery Information

Menhaden Purse Seine

The Atlantic menhaden purse seine fishery targets the Atlantic menhaden, *Brevortia tyrannus*, in Atlantic coastal waters approximately 3-18 m in depth. Twenty-two vessels operate off northern Florida to New England from April-January (NMFS 1991, pp. 5-73). Menhaden purse seiners have reported an annual incidental take of one to five bottlenose dolphins (NMFS 1991, pp. 5-73), although observer data are not available.

Mid-Atlantic Coastal Gillnet

Coastal gillnets operate in different seasons targeting different species in different states throughout the range of this stock. Most nets are anchored close to shore, but some are allowed to drift, and nets range in length from 91 m to 914 m. A gillnet fishery for American shad, *Alosa sapidissima*, operates seasonally from Connecticut to Georgia, with nets being moved from coastal ocean waters into fresh water with the shad spawning migration (Read 1994). It is considered likely that a few bottlenose dolphins are taken in this fishery each year (Read 1994). The portion of the fishery which operates along the South Carolina coast was sampled by observers during 1994 and 1995, and no fishery interactions were observed (McFee *et al.* 1996). The North Carolina sink gillnet fishery operates in October-May targeting weakfish, croaker, spot, bluefish, and dogfish. Another gillnet fishery along the North Carolina Outer Banks targets bluefish in January-March. Similar mixed-species gillnet fisheries, under state jurisdiction, operate seasonally along the coast from Florida to New Jersey, with the exclusion of Georgia.

The mid-Atlantic coastal gillnet fishery is actually a combination of small vessel fisheries that target a variety of fish species. Some of the fishery operates right off the beach. Although observer coverage of the fishery was initiated in July, 1993, there was no coverage in 1994 and bycatch estimates are available only for 1995-1998. Observer coverage of the fishery ranged from 3% in 1997 to 5% in 1995 and 1998. One take of a bottlenose dolphin was observed in 1995 and 1996, none in 1997, and three in 1998. The annual estimated mortalities with associated CVs in parentheses by year are as follows: 1995, 56 (1.66); 1996, 64 (0.83); 1997, 0; 1998, 63 (0.94); estimated 1995-1998 mean annual estimated take is 45.8, CV=0.67 (Table 2).

Shrimp Trawl

The shrimp trawl fishery operates from North Carolina through northern Florida virtually year around, moving seasonally up and down the coast. One bottlenose dolphin was recovered dead from a shrimp trawl in Georgia in 1995 (Southeast USA Marine Mammal Stranding Network unpublished data), but no bottlenose dolphin mortality or serious injury has been previously reported to NMFS.

Beach Seine

A beach seine fishery operates along northern North Carolina beaches during the spring and fall targeting mullet, spot, weakfish, sea trout, and bluefish. The North Carolina beach seine has been observed since April 7, 1998. The fishery, based on the Outer Banks of North Carolina, occurs primarily in the spring (April through June) and fall (October through December). This fishery has two types of setup systems: a “beach anchored gill net” and a “beach seine”. Both systems utilize a gill net anchored to the beach. The beach seine system also uses a bunt and wash net that are attached to the beach and are in the surf. This fishery was observed by patrolling the beaches on a daily basis. During April 1998, 12 hauls were observed: 9 were the gill net system and 3 were the beach seine system. During May 1998, 26 hauls were observed: 14 gill net and 12 beach seine hauls. During October 1998, 7 hauls were observed, all the gill net system. During November 1998, 1 gillnet system haul was observed. During December 1998, 14 hauls were observed: 12 gill net and 2 beach seine hauls. The only observed take was a freshly killed bottlenose dolphin during May 1998. The beach seine observer data is currently being audited and is unavailable for analysis. The beach seine fishery bycatch mortality estimate will be available for the 2001 stock assessment report.

Table 2. Summary of the incidental mortality of bottlenose dolphins (*Tursiops truncatus*) by commercial fishery including the years sampled (Years), the number of vessels active within the fishery (Vessels), the type of data used (Data Type), the annual observer coverage (Observer Coverage), the mortalities recorded by on-board observers (Observed Mortality), the estimated annual mortality (Estimated Mortality), the estimated CV of the annual mortality (Estimated CVs) and the mean annual mortality (CV in parentheses).

Fishery	Years	Vessels	Data Type [1]	Observer Coverage [2]	Observed Serious Injury	Observed Mortality	Estimated Mortality	Estimated CVs	Mean Annual Mortality
Mid-Atlantic Coastal Sink Gillnet	94-98	NA	Obs. Data Weighout	NA, .05, .04, .03, .05	NA, 0, 0, 0, 0	NA, 1, 1, 0, 3	NA, 56, 64, 0, 63	NA, 1.66, .83, 0, .94	45.8 (0.67)
TOTAL									45.8 (0.67)

1 Observer data (Obs. data) are used to measure bycatch rates; the USA data are collected within the Northeast Fisheries Science Center (NEFSC) Sea Sampling Program. The NEFSC collects weighout (Weighout) landings data that are used as a measure of total effort for the USA sink gillnet fisheries.

2 The observer coverage for the mid-Atlantic coastal sink gillnet fishery is measured in tons of fish landed.

Other Mortality

Bottlenose dolphins are known to interact with commercial fisheries and occasionally are taken in various kinds of fishing gear including gillnets, seines, long-lines, shrimp trawls, and crab pots (Read 1994, Wang *et al.* 1994) especially in near-shore areas where dolphin densities and fishery efforts are greatest. These interactions are due in part to the species' gregarious nature and habits of feeding on discarded bycatch and from baited gear (e.g., long-line and crab pots). However, stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the dolphins which die or are seriously injured may wash ashore, nor will all of those that do wash ashore necessarily show signs of entanglement or other fishery-interaction. In addition, the level of technical expertise among stranding network personnel varies widely as does the ability to recognize signs of fishery interaction. Due to the extent of decomposition and/or the level of experience of the examiner, a determination cannot always be made as to whether or not a stranding occurred due to human interaction

From 1993-1997, two hundred and eighty-eight bottlenose dolphins were reported stranded in waters north of Cape Hatteras (Virginia to Massachusetts, NE Region) (NMFS, unpublished data). The majority of the strandings within this northern area occurred in Virginia (n = 182, 63%). An unknown number of the animals reported stranded during 1993-1995 have shown signs of entanglement with fishing gear or interactions with fishing activities; however, limited information was available for 1993, and complete information was available for 1996- 1997. In 1993, eight bottlenose dolphins in Virginia and one in Maryland were reported as entangled in fishing gear, but the gear type was not reported (NMFS unpublished data). In 1996, seventy-four bottlenose dolphins were reported stranded in the NE Region. The cause of death could be determined for 44 animals and of these, 16 or 36% were reported due to human interactions (including 13 gear entanglements). In 1997, seventy-four bottlenose dolphins were also reported stranded in the NE Region. The cause of death could be determined for 54 animals and of these, 14 or 26% were reported due to human interactions. If the percentages are consistent for animals for which cause of death could not be determined, it is likely that during 1996 about 27 (36%), and during 1997 about 19 (26%), of the stranded animals in the NE Region died due to human interactions.

Table 3. *Bottlenose dolphin strandings in the USA Southeast Atlantic (North Carolina to Florida) from 1993 to 1998. Data from Southeast Marine Mammal Stranding Database (SEUS).*

State	1993	1994	1995	1996	1997	1998	Total
North Carolina							
No. Stranded	78	51	80	70	127	83	489
No. Human Interactions	18	14	18	14	36	20	120
% With Human Interactions	23%	27%	22%	20%	28%	24%	25%
South Carolina							
No. Stranded	33	19	32	29	41	37	191
No. Human Interactions	1	1	3	5	9	5	24
% With Human Interactions	3%	5%	9%	17%	22%	13%	13%
Georgia							
No. Stranded	29	13	17	17	18	28	122
No. Human Interactions	0	3	1	2	1	1	8
% With Human Interactions	0%	23%	6%	12%	6%	4%	7%
Florida							
No. Stranded	111	62	91	104	104	76	548
No. Human Interactions	6	6	2	1	7	3	25
% With Human Interactions	5%	10%	2%	1%	7%	4%	5%
Puerto Rico							
No. Stranded	0	1	1	1	0	NA	3
No. Human Interactions	0	0	0	1	0	NA	1
% With Human Interactions	0%	0%	0%	100%	0%	NA	33%
Totals							
No. Stranded	251	146	221	221	290		1353
No. Human Interactions	25	24	24	23	53		178

Evidence of interaction with fisheries (entanglement, net marks, mutilations, gun shots, etc.) were present in 178 of 1353 of the bottlenose dolphin strandings investigated in the USA Southeast Atlantic region (North Carolina to Florida) from 1993 to 1998 (Table 3) as determined from evidence of entanglement in fishing gear and/or other human related causes (e.g., net marks, entanglement, mutilations, boat strikes, gunshot wounds) (NMFS unpublished information). This does not take into account those animals for which cause of death could not be determined so the number of animals that stranded due to human interaction is likely greater.

North Carolina stranding records show the highest incidence of fishery interactions from the SE Atlantic Region. North Carolina data from 1993 through 1998 indicate that 120 of 489 animals, or 25% showed evidence of human interactions. In 1997, 127 bottlenose dolphin stranded in North Carolina. Cause of death could be determined for only 58 of these animals, and of these 36 or 62.1% exhibited positive signs of fisheries interactions. The results for 1998 were similar; of the 83 animals stranded , cause of death could be determined for only 35 and of these 19 or 54.3% exhibited positive signs of fishery interactions. If this percentage is consistent for all North Carolina stranded animals, it is possible that approximately 78 or 62% of the stranded animals died from fisheries interactions in 1997, and in 1998 approximately 45 or 54% died from fisheries interactions.

In recent years reports of strandings with evidence of interactions between bottlenose dolphins and both recreational and commercial crab-pot fisheries have been increasing in the Southeast Region (McFee and Brooks 1998).

The nearshore habitat occupied by this stock is adjacent to areas of high human population and in the northern portion of its range is highly industrialized. The blubber of stranded dolphins examined during the 1987-88 mortality event contained anthropogenic contaminants in levels among the highest recorded for a cetacean (Geraci 1989). There are no estimates of indirect human-caused mortality resulting from pollution or habitat degradation, but a recent assessment of the health of live-captured bottlenose dolphins from Matagorda Bay, Texas, associated high levels of certain chlorinated hydrocarbons with low health assessment scores (Reif *et al.* in review).

STATUS OF STOCK

This stock is considered to be depleted relative to OSP and it is listed as depleted under the Marine Mammal Protection Act (MMPA). There are data suggesting that the population was at an historically high level immediately prior to the 1987-88 mortality event (Keinath and Musick 1988); however, the 1987-88 anomalous mortality event was estimated to have decreased the population by as much as 53% (Scott *et al.* 1988). A comparison of historical and recent winter aerial survey data in the area south of Cape Hatteras found no statistically significant difference between population size estimates (Student's t-test, P > 0.10), but these estimates may have included an unknown proportion of the offshore stock. Population trends cannot be determined due to insufficient data.

Although there are limited observer data directly linking serious injury and mortality to fisheries (e.g., in the coastal gillnet fishery complex in the mid-Atlantic), the total number of bottlenose dolphin assumed from this stock which stranded showing signs of fishery or human-related mortality exceeded PBR in 1993, 1996, 1997, and by the end of October in 1998. In North Carolina alone, human-related mortality approached PBR in each of the intervening years. The total fishery-related mortality and serious injury for this stock is not less than 10% of the calculated PBR, and, therefore, cannot be considered to be insignificant and approaching zero mortality and serious injury rate.

The species is not listed as threatened or endangered under the Endangered Species Act, but because this stock is listed as depleted under the MMPA it is a strategic stock.

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