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*. in press); a shallow, warm water ecotype and a deep, cold 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*. in press). 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.

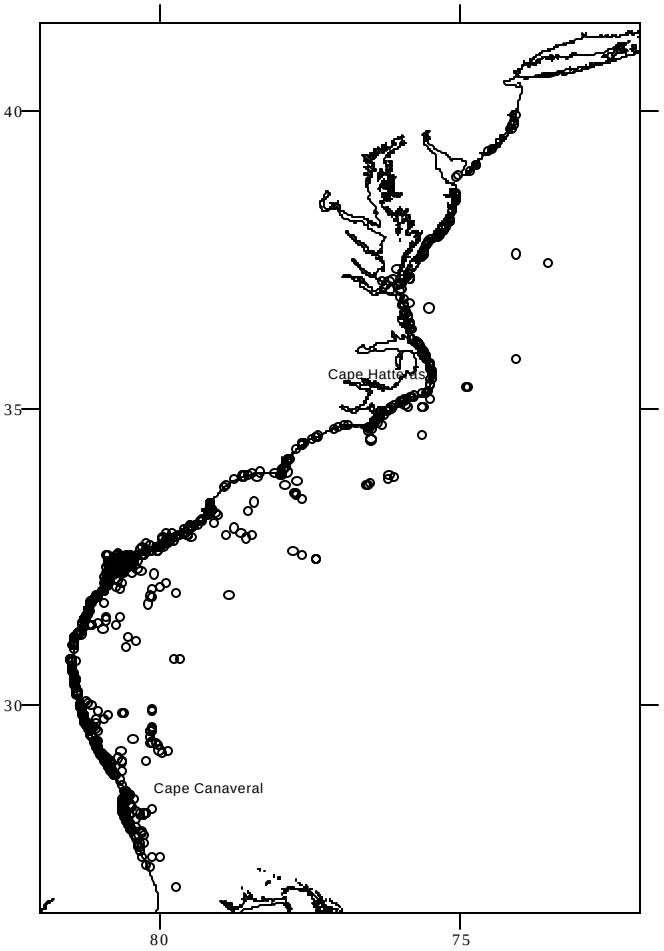

Figure 1. *Sightings of bottlenose dolphins during aerial surveys from shore to the 25 m isobath north of Cape Hatteras during summer 1994, shore to 9 km past the western Gulf Stream wall south of Cape Hatteras during winter 1992, three coastal surveys within one km of shore from New Jersey to mid-Florida during the summer in 1994, and during vessel surveys from about the 30 m isobath to the offshore extent of the US 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 of an apparent concentration of bottlenose dolphins centered on the 25 m isobath which was 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 surveys from shore to approximately 9 km past the Gulf Stream edge south of Cape Hatteras in the winter in 1992 (Blaylock and Hoggard 1994), from shore seaward to the 25 m isobath during the summer north of Cape Hatteras in 1994 (Blaylock 1995), within one km of the shore from New Jersey to mid-Florida during three replicate coastal surveys conducted during the summer in 1994 (Blaylock 1995), and from about the 30 m isobath to the offshore extent of the USA Exclusive Economic Zone (EEZ) during a vessel survey for pelagic cetaceans in 1998 (NMFS unpublished data). 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 the 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).

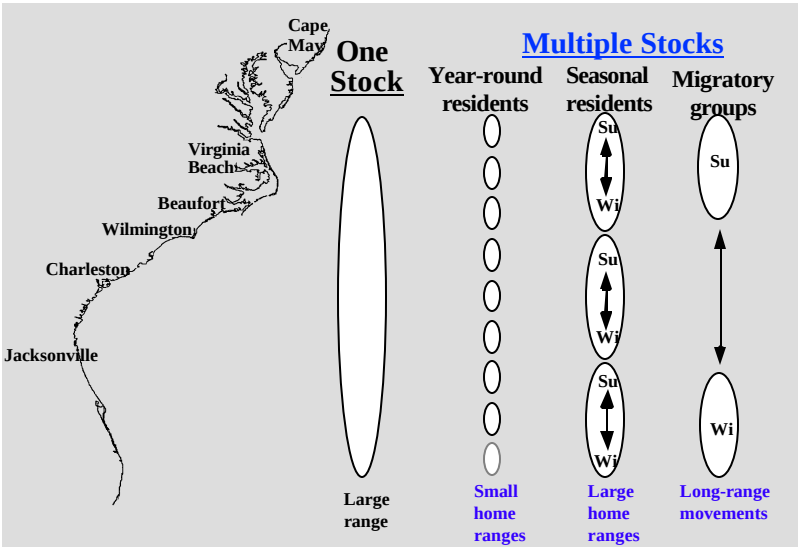

Figure 2. *Illustration of stock structure hypotheses of Atlantic coastal bottlenose dolphins: one stock ranging from New Jersey to Florida or multiple stocks which may include: 1) year-round residents with small home ranges; 2) multiple, contiguous, seasonally resident groups with relatively large home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

A multi-disciplinary, multi-investigator research program to determine the stock structure of Atlantic coastal bottlenose dolphins was initiated in late 1996. Figure 2 illustrates the stock structure hypotheses that are being considered. 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, SC (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 and the patterns of residency and movement that have been documented

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

Location	Year-round Residents	Seasonal Residents	Migratory/ Transient
Virginia Beach, VA	No	Jun-Sept	Jun-Sept
Beaufort, NC, "coastal"	No	Oct-Apr	?
Beaufort, NC, "estuarine"	Possible large home range		
Wilmington, NC			
Charleston, SC	Yes	fall-winter	spring, fall

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 report of 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 the 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 cannot 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

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 II. *Bottlenose dolphin strandings in the U.S. Southeast Atlantic (North Carolina to Florida) from 1993 to 1997. Data from Southeast Marine Mammal Stranding Database (SEUS).*

State	1993	1994	1995	1996	1997	Total
North Carolina						
No. Stranded	78	51	80	70	127	406
No. Human Interactions	18	14	18	14	36	100
% With Human Interactions	23%	27%	22%	20%	28%	25%
South Carolina						
No. Stranded	33	19	32	29	41	154
No. Human Interactions	1	1	3	5	9	19
% With Human Interactions	3%	5%	9%	17%	22%	12%
Georgia						
No. Stranded	29	13	17	17	18	94
No. Human Interactions	0	3	1	2	1	7
% With Human Interactions	0%	23%	6%	12%	6%	7%
Florida						
No. Stranded	111	62	91	104	104	472
No. Human Interactions	6	6	2	1	7	22
% With Human Interactions	5%	10%	2%	1%	7%	5%
Puerto Rico						
No. Stranded	0	1	1	1	0	3
No. Human Interactions	0	0	0	1	0	1

Evidence of interaction with fisheries (entanglement, net marks, mutilations, gun shots, etc.) were present in 149 of 1,129 (13%) of the bottlenose dolphin strandings investigated in the USA Southeast Atlantic region (North Carolina to Florida) from 1993 to 1997 (Table II) 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 1997 indicate that 100 of 406 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. 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 human interactions in 1997.

Fishery Information

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.

Coastal gillnets operate in different seasons targeting different species in different states throughout the range of this stock. Most nets are

Table III. *Roughly estimated average annual fishing effort (number deployed) by gear type for U.S. Atlantic coastal fisheries from New Jersey to Key West, Florida, in 1992-1993, having the potential for causing serious injury or mortality to bottlenose dolphins (NMFS unpublished data).*

Gear Type	Effort
Haul seines	222
Purse seines	11,962
Otter trawls, bottom	22,550
Otter trawls, midwater	70
Gillnets, anchored or staked	22,252
Gillnets, drift and runaround	11,792

staked 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. There are no estimates of bottlenose dolphin mortality or serious injury available for these fisheries. A rough estimate of the average total annual coastal gillnet fishing effort is given in Table III.

Observer coverage of the USA Atlantic coastal gillnet fisheries for monkfish and dogfish, primarily, was initiated by the NEFSC Sea Sampling program in July, 1993. From July to December 1993, 20 trips were observed. By 1996, 350 trips were observed, representing about less than 5% coverage. This coastal gillnet fishery, which extends from North Carolina to New York, is actually a combination of small vessel fisheries that target a variety of fish species, some of which operate right off the beach. The number of vessels in this fishery is unknown, because records are held by both state and federal agencies, and have not, as of yet, been centralized and standardized. Still, only one bottlenose dolphins has been taken in the observed trips, despite large numbers of stranded dolphins with signs of fishery interactions indicative of gillnets.

Because this observer program was not covering those components of the coastal gillnet complex believed to be responsible for most of the interactions with coastal bottlenose dolphins, the NMFS initiated an observer program in 1997 to better define the various components of the coastal gillnet fisheries and place observers on representative fishing vessels to obtain statistically reliable information on takes of bottlenose dolphin. Although no takes of bottlenose dolphin were observed in 1997, three dolphins were observed taken in fisheries operating off Virginia and North Carolina in 1998 (NMFS unpublished data).

The shrimp trawl fishery operates from North Carolina through northern Florida virtually year around, moving seasonally up and down the coast. Estimated total fishing effort is given in Table III. 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.

A haul seine fishery operates along northern North Carolina beaches during the spring and fall targeting mullet, spot, sea trout, and bluefish. No by-catch of marine mammals has been reported to NMFS. In recent years reports of strandings with evidence of interactions between bottlenose dolphin and both recreational and commercial crab-pot fisheries have been increasing in the Southeast region (McFee and Brooks 1998).

Other Mortality

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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