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

STOCK DEFINITION AND GEOGRAPHIC RANGE

There are two hematologically and morphologically distinct bottlenose dolphin ecotypes (Duffield *et al.* 1983; Duffield 1986) which correspond to a shallow water or nearshore/coastal ecotype and a deep water or offshore ecotype; both ecotypes have been shown to inhabit waters in the western North Atlantic Ocean (Hersh and Duffield 1990; Mead and Potter 1995; Curry and Smith 1997). The offshore and nearshore ecotypes are genetically distinct using both mitochondrial and nuclear markers (Hoelzel *et al.* 1998).

Bottlenose dolphins which stranded alive in the western North Atlantic in areas with direct access to deep oceanic waters had hemoglobin profiles which matched 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. Based on the distribution of sightings during ship-based surveys (Figure 1) and survey personnel observations (NMFS unpublished data), the western North Atlantic offshore stock is believed to consist of primarily of the offshore ecotype. However, the range of the coastal and offshore ecotypes overlap to some degree. Torres *et al.* (2003) found a statistically significant break in the distribution of the ecotypes at 34 km from shore. The offshore ecotype 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 ecotype.

Extensive aerial surveys in 1979-1981 indicated that the stock extended along the entire continental shelf break from Georges Bank to Cape Hatteras during spring and summer (CETAP 1982; Kenney 1990). The distribution of sightings contracted towards the south in the fall and the central portion of the survey area was almost devoid of sightings in the winter, although there were still sightings as far north as the southern edge of Georges Bank. The offshore stock is concentrated along the continental shelf break in waters of depths >25 m and extends beyond the continental shelf into continental slope waters in lower concentration (Figure 1) consistent with Kenney (1990). In Canadian waters, bottlenose dolphins have occasionally been sighted on the Scotian Shelf, particularly in the Gully (Gowans and Whitehead 1995; NMFS unpublished data). Recent information from Wells *et al.* (1999) indicates that the range of the offshore bottlenose dolphin may include waters beyond the continental slope and that offshore bottlenose dolphins may move between the Gulf of Mexico and the Atlantic. Dolphins with characteristics of the offshore type have been stranded as far south as the Florida Keys, but there are no abundance or distribution estimates available for this stock in U.S. Exclusive Economic Zone (EEZ) waters south of Cape Hatteras.

POPULATION SIZE

An abundance of 16,689 (CV=0.32) bottlenose dolphins was estimated from a line-transect sighting survey conducted during July 6 to September 6, 1998, by a ship and plane that surveyed 15,900 km of track line in waters north of Maryland (38° N) (Figure 1; Palka *et al.,* in review). Shipboard data were analyzed using the modified direct duplicate method (Palka 1995) that accounts for school size bias and *g(0)*, the probability of detecting a group on the track line. Aerial data were not corrected for *g(0)*.

An abundance of 13,085 (CV=0.40) bottlenose dolphins was estimated from a shipboard line-transect survey conducted between 8 July and 17 August 1998 that surveyed 4,163 km of track line in waters south of Maryland (38°N) (Fig. 1; Mullin and Fulling
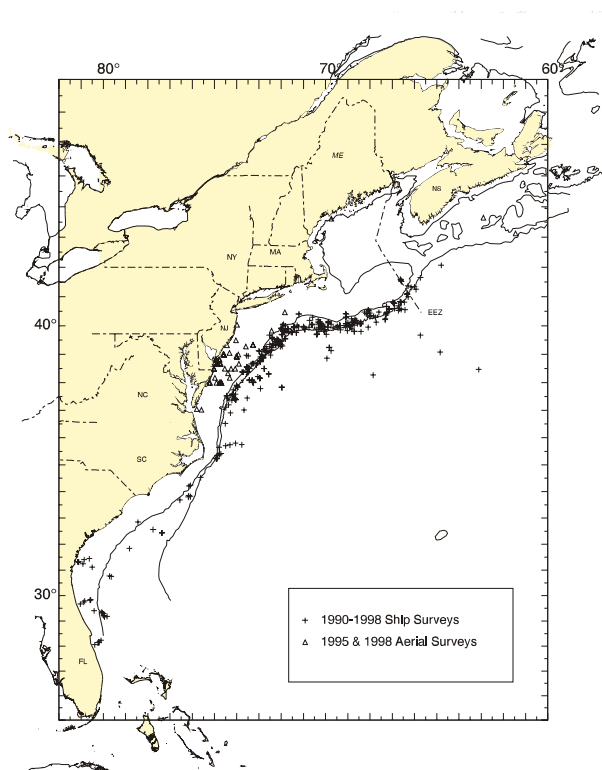

Figure 1. Distribution of bottlenose dolphin sightings from NEFSC and SEFSC vessel and aerial summer surveys during 1990-1998. Isobaths are at 100 m and 1,000 m.

2003). Abundance estimates were made using the program DISTANCE (Buckland *et al.* 2001; Thomas *et al.* 1998) where school size bias was accounted for.

The best available abundance estimate for bottlenose dolphins is the sum of the estimates from the two 1998 U.S. Atlantic surveys, 29,774 (CV=0.25), where the estimate from the northern U.S. Atlantic is 16,689 (CV=0.32) and from the southern U.S. Atlantic is 13,085 (CV=0.40). This joint estimate is considered best because together these two surveys have the most complete coverage of the species' habitat.

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 estimate of abundance for offshore bottlenose dolphins is 29,774 (CV=0.25). The minimum population estimate for the western North Atlantic offshore bottlenose dolphin is 24,199.

Current Population Trend

The data are insufficient to determine population trends. Previous estimates cannot be applied to this process because previous survey coverage of the species' habitat was incomplete.

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 bottlenose dolphins is 24,199. The maximum productivity rate is 0.04, the default value for cetaceans. The "recovery" factor, which accounts for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP) is assumed to be 0.5 because this stock is of unknown status. PBR for the western North Atlantic offshore bottlenose dolphin is 242.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Total estimated mean annual fishery-related mortality for this stock during 1996-2000 was 27 (CV=1.12) bottlenose dolphins.

Fisheries Information

Bycatch has been observed by NMFS Sea Samplers in the pelagic drift gillnet, pelagic pair trawl, New England multispecies sink gillnet, North Atlantic bottom trawl, and pelagic longline fisheries.

Pelagic Longline

The pelagic longline fishery operates in the U.S. Atlantic (including Caribbean) and Gulf of Mexico EEZ (SEFSC unpublished data). Interactions between the pelagic longline fishery and bottlenose dolphins have been reported; however, a vessel may fish in more than one statistical reporting area and it is not possible to separate estimates of fishing effort other than to subtract Gulf of Mexico effort from Atlantic fishing effort, which includes the Caribbean Sea. During 1993-1998, in waters not including the Gulf of Mexico, 1 bottlenose dolphin was caught and released alive during 1993, and 1 was caught and released alive during 1998.

Pelagic Drift Gillnet

Estimated bottlenose dolphin mortalities (CV in parentheses) extrapolated for each year were 72 in 1989 (0.18), 115 in 1990 (0.18), 26 in 1991 (0.15), 28 in 1992 (0.10), 22 in 1993 (0.13), 14 in 1994 (0.04), 5 in 1995 (0), 0 in 1996, and 3 in 1998 (0). Since this fishery no longer exists, it has been excluded from Table 1.

Pelagic Pair Trawl

Thirty-two bottlenose dolphin mortalities were observed between 1991 and 1995. Estimated annual fishery-related mortality (CV in parentheses) was 13 dolphins in 1991 (0.52), 73 in 1992 (0.49), 85 in 1993 (0.41), 4 in 1994 (0.40) and 17 in 1995 (0.26). Since this fishery no longer exists, it has been excluded from Table 1.

North Atlantic Bottom Trawl

One bottlenose dolphin mortality was documented in 1991 and the total estimated mortality in this fishery in 1991 was 91 (CV=0.97). Since 1992 there were no bottlenose dolphin mortalities observed in this fishery.

Squid, Mackerel and Butterfish

Although there were reports of bottlenose dolphin mortalities in the foreign fishery during 1977-1988, there were no fishery-related mortalities of bottlenose dolphins reported in the self-reported fisheries information from the mackerel trawl fishery during 1990-1992.

New England Multispecies Sink Gillnet
      In 2000, the first observed mortality of bottlenose dolphins was recorded. This was genetically identified as an offshore, deep-water ecotype. The estimated annual fishery-related serious injury and mortality attributable to this fishery (CV in parentheses) was 0 from 1996-1999, and 132 (CV=1.16) in 2000 (Table 1).
Mid-Atlantic Coastal Gillnet
      Bottlenose dolphins were only reported during the trips in 1998, when 1 mortality was observed as a result of this fishery. Though this dolphin was not genetically identified, it is being treated as an offshore, deep-water ecotype because it was caught in the offshore habitat and statistical analyses of all biopsied bottlenose dolphins caught in this offshore habitat indicate this animal has a high probability of being the offshore ecotype. Observed effort was concentrated off New Jersey and scattered between Delaware and North Carolina from 1 to 50 miles off the beach. All bycatches were documented during January to April. Using the observed takes, the estimated annual mortality attributed to this fishery was 0 in 1995 through 1997, 4 (CV=0.7) in 1998, and 0 from 1999 through 2000 (Table1).

Table 1. 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
New England Multisp. Sink Gillnet	96-00	301	Obs. Data Dealer Reports, Logbooks	.04, .06, .05, .06, .06	0, 0, 0, 0, 0	0, 0, 0, 0, 1	0, 0, 0, 0, 132	0, 0, 0, 0 1.16	26 (1.16)
mid-Atlantic Coastal Gillnet	96-00	Unk[3]	Obs. Data Dealer Reports	.04, .03, .05, .02, .02	0, 0, 0, 0, 0	0, 0, 1, 0, 0	0, 0, 4, 0, 0	0, 0, 0.7, 0, 0	1 (0.7)
TOTAL									27 (1.12)

[1]   Observer data (Obs. Data) are used to measure bycatch rates, and the data are collected within the Northeast Fisheries Science Center (NEFSC) Sea Sampling Program. Mandatory logbook (logbook) data collected by the Southeast Fisheries Science Center (SEFSC) are used to measure total effort for the pelagic drift gillnet fishery. The NEFSC collects landings data (Dealer Reports), and total landings are used as a measure of total effort for the gillnet fisheries. Mandatory vessel trip reports (Logbook) data are used to determine the spatial distribution of fishing effort in the Northeast multispecies sink gillnet fishery.

[2]   Observer coverage of the Northeast multispecies sink gillnet fishery is measured as the percentage of trips observed. Observer coverage of the mid-Atlantic coastal gillnet fishery is measured as the percentage of tons of fish landed.

[3]   Number of vessels is not known.

Other Mortality
      Bottlenose dolphins are one of 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.). The estimated number of animals that represent the offshore stock is presently under evaluation.

STATUS OF STOCK
      The status of this stock relative to OSP in the U.S. Atlantic EEZ is unknown. The western North Atlantic offshore bottlenose dolphin is not listed as threatened or endangered under the Endangered Species Act. There are insufficient data to determine the population trends for this species. Average 1996-2000 annual fishery-related mortality and serious injury does not exceed the PBR therefore this is not a strategic stock. However, 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.

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