August 1997

BOTTLENOSE DOLPHIN (*Tursiops truncatus*): Western Gulf of Mexico Coastal Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The western Gulf of Mexico coastal bottlenose dolphin stock has been defined for management purposes as the bottlenose dolphins inhabiting the nearshore coastal waters in the U.S. Gulf of Mexico from the Texas border to the Mississippi River mouth, from shore or presumed bay boundaries to 9.3 km seaward of the 18.3 m isobath (Fig. 1). As a working hypothesis, it is assumed that the dolphins occupying habitats with dissimilar climactic, coastal, and oceanographic characteristics might be restricted in their movements between habitats and, thus, constitute separate stocks. The western coastal area is characterized by an arid to temperate climate, sand beaches, and low fresh water input. The northern coastal stock area which is characterized by a temperate climate, barrier islands, sand beaches, coastal marshes and marsh islands, and has a relatively high level of fresh water input from rivers and streams. The eastern coastal stock area is temperate to subtropical in climate, is bordered by a mixture of coastal marshes, sand beaches, marsh and mangrove islands, and has an intermediate level of freshwater input.

The stock occurs trans-boundary with Mexico; however, there is no information available for abundance estimation, nor for estimating fishery-related mortality in Mexican waters. The ratio of DDE to DDT was extraordinarily high in tissues of one bottlenose dolphin stranded on the Texas coast (Varanasi et al. 1992), suggesting recent exposure to DDT which is still in use in Mexico.

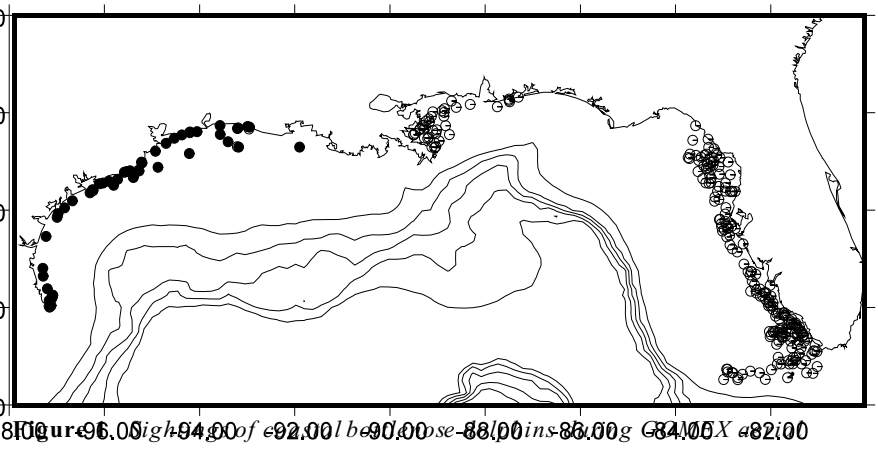

Figure 1. *Sightings of coastal bottlenose dolphins during GulfCET aerial surveys of the Gulf of Mexico in 1992-1994. Western Gulf of Mexico coastal bottlenose dolphin stock is shown with filled circles. Isobaths are in 183 m (100 fm) intervals.*

The Mississippi River outflow may constitute an effective ecological barrier to stock migration at the eastern boundary. This assumption has not been tested and interbreeding may, in fact, occur between this and the northern coastal stock at this boundary; therefore, the definition of this stock may be revised and the stock may be incorporated with the northern coastal stock when more data become available. There are data which suggest that there is considerable alongshore movement by some members of the western coastal stock (NMFS unpublished data), but the extent of this movement is unknown.

Some of this stock may co-occur with the resident bay, sound, and estuarine stocks, and breeding may occur among these stocks. For instance, two bottlenose dolphins previously seen in the South Padre Island area in Texas were seen in Matagorda Bay, 285 km north, in May 1992 and May 1993 (Lynn 1995). These sightings suggest that some bay stocks dolphins occasionally traverse the coastal stock area.

Portions of this stock may co-occur with the U.S. Gulf of Mexico outer continental shelf (OCS) stock. The seaward boundary for this stock corresponds to aerial survey strata (NMFS unpublished data) and thus, represents a management boundary rather than an ecological boundary. Anecdotal evidence suggests that both the coastal and OCS stocks consist of the shallow, warm water ecotype described by Hersh and Duffield (1990). Data are not currently available to determine genetically if the two stocks should be separated or, if so, where; and interbreeding may occur at the boundary interface.

POPULATION SIZE

Preliminary abundance estimates were derived using distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) with sighting data collected during aerial line-transect surveys in September-October 1992 (Blaylock and Hoggard 1994). Sampling transects extended orthogonally from shore out to approximately 9 km past the 18 m isobath. The 1992 coastal survey area extended from the U.S. -Mexican border to the Mississippi River mouth. Systematic transects were placed randomly with respect to bottlenose dolphin distribution and provided approximately 5% visual coverage of the survey area. Bottlenose dolphin abundance was estimated to be 3,499 dolphins (CV = 0.21) (Blaylock and Hoggard 1994).

Minimum Population Estimate

The minimum population estimate was based on the 1992 abundance estimate of 3,499 bottlenose dolphins (CV = 0.21) (Blaylock and Hoggard 1994). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normally distributed abundance estimate. This is equivalent to the 20th percentile of the log-normal distribution as specified by Wade and Angliss (1997). The minimum population estimate is 2,938 bottlenose dolphins.

Current Population Trend

Aerial surveys of this area conducted by NMFS in autumn 1983 resulted in an estimated bottlenose dolphin abundance of 4,718 (CV = 0.10). The data are not sufficient to conduct a statistical trend analysis, but the current population size estimate is significantly lower than the 1983 estimate (Student's t-test, $P < 0.001$) and suggests a decline in stock abundance.

This stock was subject to higher than usual mortality levels in 1990, 1992, and 1993-94, and the incidence of bottlenose dolphin strandings along the Texas coast in those years was significantly higher than the 1984-94 mean stranding rate (Southeast U.S. Marine Mammal Stranding Network unpublished data). Some of these mortalities may have been related to accumulation of anthropogenic hydrocarbon contaminants. A recent study indicated an inverse relationship between hydrocarbon contaminant levels and certain bacterial and viral antigen titers in bottlenose dolphins from Matagorda Bay, Texas (Reif et al., in review).

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 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 0.5 because this stock is of unknown status, because of an undetermined level of fishery-related mortality, and because of the recent occurrence of three anomalous mortality events. PBR for this stock is 29 dolphins.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

The level of direct human-caused mortality in this stock is unknown. An annual mean of 13 (CV = 0.46) bottlenose dolphins stranded on the Texas coast during the period 1988-1993, showing signs of fishery interactions such as net entanglement, mutilation, gunshot wounds, etc. (Southeast U.S. Marine Mammal Stranding Network unpublished data). This was 10.3% of the total bottlenose dolphin strandings reported for this area. There were 283 reported bottlenose dolphin strandings in Texas (1994), of these 7 (2%) showed signs of human interaction. Three had evidence of fishery entanglement, one of which was found in a shrimp trawl, three were mutilated and one was shot. In 1995 the total number of reported bottlenose dolphins in Texas for 1995 was 110 and 3 (3%) were human interactions. One was found in a shrimp trawl. The total bottlenose dolphin strandings from January through August 31, 1996 was 175 and 1 (0.5%) had evidence of human interaction (entanglement).

There are a number of difficulties associated with the interpretation of stranding data. It is possible that some or all of the stranded dolphins may have been from a bay, sound or estuarine stock; however, the proportion of the stranded dolphins belonging to another stock cannot be determined because of the difficulty of determining from where the stranded carcass originated. 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 in fishery interactions wash ashore, nor will all of those that do wash ashore necessarily show signs of entanglement or other fishery-interaction. Finally, the level of technical expertise among stranding network personnel varies widely as does the ability to recognize signs of fishery interaction.

Fisheries Information

Annual fishing effort for the shrimp trawl fishery in the western Gulf of Mexico coastal stock area during 1988-1993 averaged approximately 0.35 million hours of tows (CV = 0.16) (NMFS unpublished data). This fishery was monitored by NMFS observers in 1992 and 1993, but less than 1% of the fishing effort was observed (NMFS unpublished data). There have been no reports of incidental mortality or injury in the western Gulf of Mexico coastal bottlenose dolphin stock associated with the shrimp trawl fishery in this area.

The menhaden purse seine fishery targets the Gulf menhaden, *Brevoortia patronus*, in Gulf of Mexico coastal waters approximately 3-18 m in depth (NMFS 1991). Seventy-five menhaden vessels operate within 1.6 km of shore from Apalachicola, Florida to Freeport, Texas, from April-October. Lethal takes of bottlenose dolphins reported by the menhaden fishery during the period 1982-1988 ranged between 0-4 dolphins annually (NMFS unpublished data).

Gillnets are not used in Texas, and gillnets over 46 m^3 in area will not be allowed in Florida past July 1995, but fixed and runaround gillnets are currently in use in Louisiana, Mississippi, and Alabama. These fisheries, for the most part, operate year around. They are state-controlled and licensed, and vary widely in intensity and target species. No marine mammal mortalities associated with gillnet fisheries have been reported in these states, but stranding data suggest that gillnet and marine mammal interaction does occur, causing mortality and serious injury.

The fishery for blue crabs operates in estuarine areas throughout the Gulf coast employing traps attached to a buoy with rope. Bottlenose dolphins have been reported stranded in Mississippi with polypropylene rope around their flukes indicating the possibility of entanglement with crab pot lines (NMFS 1991); however, this fishery has not been monitored by observers.

Two bottlenose dolphins were entangled and died in a scientific research net fishery for sea turtles in Sabine Pass in 1993 (A. Landry, Texas A&M University, report to Texas Marine Mammal Stranding Network, August 1993). The nets used in this Endangered Species Act (ESA) permitted research activity were two 4.9 m deep x 91.5 m in length stationary entanglement nets adjacent to each other. They were fished in shallow water (0.9-2.5 m depth), monitored continuously throughout the day, and removed at night.

Other Mortality

The coast adjacent to the nearshore habitat occupied by this stock varies from agricultural to industrial and, in some places, such as Galveston Island, is dense in human population. Concentrations of chlorinated hydrocarbons and metals were relatively low in most of the bottlenose dolphins examined in conjunction with an anomalous mortality event in Texas bays in 1990; however, some had concentrations at levels of possible toxicological concern (Varanasi et al. 1992). Agricultural runoff following periods of high rainfall in 1992 was implicated in a high level of bottlenose dolphin mortalities in Matagorda Bay, which is adjacent to the western coastal stock area (NMFS unpublished data). A recent study of hydrocarbon contaminant levels was conducted in conjunction with a health assessment study of 35 live-captured bottlenose dolphins in Matagorda Bay which adjoins the coastal stock area. Alpha-HCB, p,p,DDE, and PCB concentrations were inversely related to the magnitude of the serum antibody titer to *Erysipelas* spp. and *Staphylococcus* spp. bacteria (Reif et al., in review.). A similar and more pronounced trend was seen in relationship to the pseudorabies virus; however, since pseudorabies virus is not known to infect bottlenose dolphins, the significance of this finding is not clear. Concentrations of contaminants were higher in dolphins having evidence of exposure to the cetacean morbillivirus. The reason for the difference in the relationship between antibody titers to bacteria and pseudorabies and antibody titers to cetacean morbillivirus is not understood.

STATUS OF STOCK

The status of this stock relative to OSP is unknown. A population trend analysis is not available due to insufficient information. This species is not listed as threatened or endangered under the ESA. The occurrence of three anomalous mortality events among bottlenose dolphins along the Texas coast since 1990 (NMFS unpublished data) is cause for concern and the available evidence suggests that bottlenose dolphin stocks in the northern and western portion of the U.S. Gulf of Mexico may have experienced a morbillivirus epidemic in 1993 (Lipscomb 1993); however, the effects of these events on stock abundance has yet to be determined. 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. This is not a strategic stock because the known level of fishery-related mortality or serious injury does not exceed PBR.

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