

BOTTLENOSE DOLPHIN (*Tursiops truncatus truncatus*): Northern Gulf of Mexico Continental Shelf Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The northern Gulf of Mexico (i.e., U.S. Gulf of Mexico) Continental Shelf Stock of bottlenose dolphins inhabits waters from 20 to 200m deep in the northern Gulf from the U.S.-Mexican border to the Florida Keys (Figure 1). Both “coastal” and “offshore” ecotypes of bottlenose dolphins occur in the Gulf of Mexico (Hersh and Duffield 1990; LeDuc and Curry 1998). The Continental Shelf Stock probably consists of a mixture of both the coastal and offshore ecotypes. The offshore and coastal ecotypes are genetically distinct using both mitochondrial and nuclear markers (Hoelzel *et al.* 1998). In the northwestern Atlantic, 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 34km and in waters deeper than 34 m. Within 7.5km of shore, all animals were of the coastal ecotype. The continental shelf is much wider in the Gulf of Mexico so these results may not apply. The continental shelf stock range may extend into Mexican and Cuban territorial waters; however, there are no available estimates of either abundance or mortality from those countries. A stranded dolphin from the Florida Panhandle was rehabilitated and released over the shelf off western Florida, and traveled into the Atlantic Ocean (Wells *et al.* 1999).

The bottlenose dolphins inhabiting waters <20m deep in the northern Gulf are believed to constitute 36 inshore or coastal stocks. An oceanic stock is provisionally defined for bottlenose dolphins inhabiting waters >200 m. Both inshore and coastal stocks and the oceanic stock are separate from the continental shelf stock, but the continental shelf stock may overlap with coastal stocks and the oceanic stock in some areas and may be genetically indistinguishable from some of those stocks. However, studies have shown significant genetic differentiation between inshore stocks and coastal/continental shelf stocks along the central west coast of Florida (Sellas *et al.* 2005).

Based on research currently being conducted on bottlenose dolphins in the northern Gulf of Mexico, as well as the western North Atlantic Ocean, the structure of these stocks is uncertain, but appears to be complex. The multi-disciplinary research programs conducted over the last 41 years (e.g., Wells 1994) have begun to shed light on the structure of some of the stocks of bottlenose dolphins, though additional analyses are needed before stock structures can be elaborated on in the northern Gulf of Mexico. As research is completed, it may be necessary to revise stocks of bottlenose dolphins in the northern Gulf of Mexico.

POPULATION SIZE

The current population size for the bottlenose dolphin continental shelf stock in the northern Gulf of Mexico is unknown because the survey data are more than 8 years old. Estimates using data older than 8 years are deemed

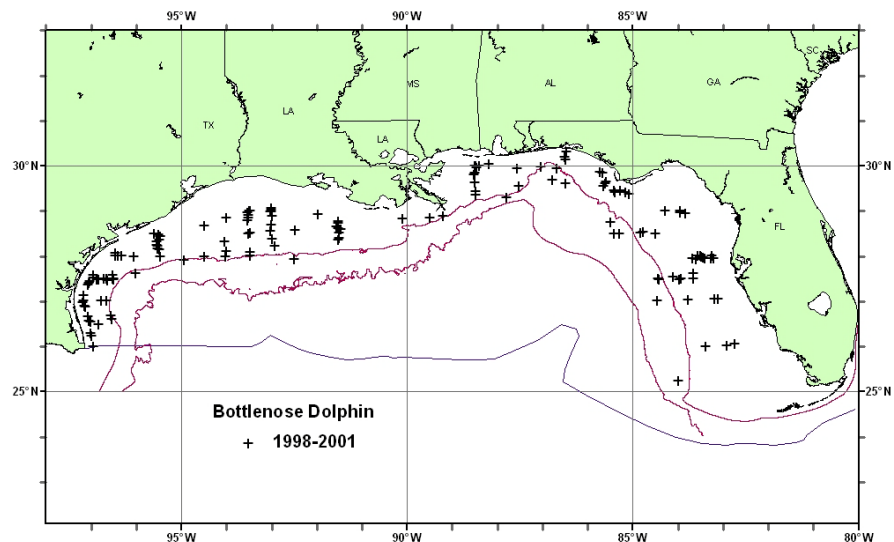


Figure 1. *Distribution of bottlenose dolphin sightings from SEFSC fall vessel surveys during 1998-2001. All the on-effort sightings are shown, though not all were used to estimate abundance. Solid lines indicate the 100m and 1,000m isobaths and the offshore extent of the U.S. EEZ.*

unreliable; and, therefore, should not be used for PBR determinations (Wade and Angliss 1997).

Estimates of abundance were derived through the application of distance sampling analysis (Buckland *et al.* 2001) and the computer program DISTANCE (Thomas *et al.* 1998) to sighting data. Data were collected from 1998 to 2001 during fall plankton surveys conducted from NOAA ships *Oregon II* (2000) and *Gordon Gunter* (1998, 1999, 2001). Tracklines, which were perpendicular to the bathymetry, covered shelf waters from the 20-m to the 200-m isobaths (Figure 1; Table 1; Fulling *et al.* 2003). Due to limited survey effort in any given year, survey effort was pooled to develop an average abundance estimate. The most recent abundance estimate of bottlenose dolphins from the Continental Shelf Stock was based on data pooled from 2000 through 2001 for continental shelf vessel surveys and was 17,777 (CV=0.32) (see Fulling *et al.* 2003).

Minimum Population Estimate

The minimum population estimate is unknown. The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate. This is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by Wade and Angliss (1997). The best estimate of abundance for bottlenose dolphins is unknown. The minimum population estimate for the northern Gulf of Mexico is unknown.

Current Population Trend

There are insufficient data to determine the population trends for this species. The pooled abundance estimate from the 2000-2001 ship survey of 17,777 (CV=0.32) and the previous abundance from a 1992-1994 aerial survey of 50,247 (CV=0.18) (Blaylock and Hoggard 1994) are significantly different ($P < 0.05$). However, there are a number of reasons the 2 estimates are different other than from a change in abundance. Blaylock and Hoggard (1994) estimated from aerial surveys that about 31% of the bottlenose dolphins in shelf waters west of Mobile Bay were in a rather small area from the Mississippi River Delta west to about 90.5°W. Vessel survey effort in this area was small and resulted in only 1 sighting of bottlenose dolphins. Therefore, vessel-based estimates may have underestimated the abundance of bottlenose dolphins in the western shelf. Aerial abundances were based on survey lines that extended from 9.3 km past the 18 m (10 fm) curve to 9.3 km past 183 m (100 fm) curve, so the area surveyed was somewhat different than from the study area (20-200m) for vessel surveys. Also, Atlantic spotted dolphins are very common in shelf waters and are similar in length and shape to bottlenose dolphins. Atlantic spotted dolphins are born without spots and become progressively more spotted with age, but young animals look very similar to bottlenose dolphins. Therefore, depending on the composition of the group, from a distance Atlantic spotted dolphins are not always easily distinguished from bottlenose dolphins, so it is possible that some groups were misidentified during aerial surveys leading to bias in the relative abundance of each species.

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 history (Barlow *et al.* 1995).

POTENTIAL BIOLOGICAL REMOVAL

Potential Biological Removal (PBR) is undetermined. PBR is the product of the minimum population size, one half the maximum net productivity rate and a recovery factor (MMPA Sec. 3.16 U.S.C. 1362; Wade and Angliss 1997). The minimum population size is unknown. 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 the stock is of unknown status.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

One serious injury occurred in the Southeastern U.S. Atlantic, Gulf of Mexico, Caribbean snapper-grouper and other reef fish fishery during 2010. One mortality occurred during 2010 incidental to oil rig platform removal operations when an animal became entangled in line and drowned. One mortality during 2008 in the shrimp trawl fishery may have come from the continental shelf stock.

Fisheries Information

The commercial fisheries which potentially could interact with this stock in the Gulf of Mexico are: Southeastern U.S. Atlantic, Gulf of Mexico shark bottom longline fishery; Southeastern U.S. Atlantic, Gulf of Mexico shrimp trawl fishery, Southeastern U.S. Atlantic, Gulf of Mexico, Caribbean snapper-grouper and other reef fish fishery; and the Gulf of Mexico butterfish trawl fishery (Appendix III). The level of past or current, direct, human-caused mortality of bottlenose dolphins in the northern Gulf of Mexico is unknown; however, interactions between bottlenose dolphins and fisheries have been observed in the northern Gulf of Mexico.

One serious injury occurred in the Southeastern U.S. Atlantic, Gulf of Mexico, Caribbean snapper-grouper and other reef fish fishery during 2010. A bottlenose dolphin was hooked in the rostrum and line was wrapped around the rostrum. The injured animal was likely from the Continental Shelf Stock.

The shark bottom longline fishery has been observed since 1994, and 3 interactions with bottlenose dolphins have been recorded. The incidents include 1 mortality (2003) and 2 hooked animals that escaped at the vessels (1999, 2002; Burgess and Morgan 2003a,b). Based on the water depths of the interactions (12m, 29m and 60m), they likely involved animals from the Eastern Coastal and Continental Shelf Stocks. No interactions were observed during 2004-2010 (Hale and Carlson 2007; Hale *et al.* 2007; Richards 2007; Hale *et al.* 2009; 2010; 2011). For the shark bottom longline fishery in the Gulf of Mexico, Richards (2007) estimated bottlenose dolphin mortalities of 58 (CV=0.99), 0 and 0 for 2003, 2004 and 2005, respectively.

A voluntary observer program for the shrimp trawl fishery began in 1992 and became mandatory in 2007. Four bottlenose dolphin mortalities were observed in the shrimp trawl fishery during 2003, 2007, 2008 and 2010. The 2008 mortality occurred off the Texas coast and could have belonged to the Western Coastal Stock or Continental Shelf Stock. During 2009, 1 bottlenose dolphin was released alive presumably with no serious injury after becoming entangled in the lazy line of a shrimp trawl. This animal could have belonged to the Continental Shelf Stock or the Western Coastal Stock. During 1992-2008 the observer program recorded an additional 6 unidentified dolphins caught in a lazy line or turtle excluder device, and 1 or more of these animals may have belonged to the Eastern or Northern Coastal stocks, and it is likely that 3-4 of the animals belonged to the Continental Shelf Stock or the Atlantic spotted dolphin (*Stenella frontalis*) stock. In 2 of the 6 cases, an observer report indicated the animal may have already been decomposed, but this could not be confirmed because there was no necropsy. In 2008, an additional dolphin carcass was caught on the tickler chain of a shrimp trawl; however, the animal's carcass was severely decomposed and may have been captured in this state. It is likely the unidentified carcass belonged to the bottlenose dolphin Western Coastal stock or Continental Shelf Stock, or possibly to the Atlantic spotted dolphin stock.

A trawl fishery for butterfish was monitored by NMFS observers for a short period in the 1980's with no records of incidental take of marine mammals (Burn and Scott 1988; NMFS unpublished data), although an experimental set by NMFS resulted in the death of 2 bottlenose dolphins (Burn and Scott 1988). There are no other data available.

Other Mortality

The use of explosives to remove oil rigs in portions of the continental shelf in the western Gulf of Mexico has the potential to cause serious injury or mortality to marine mammals. These activities have been closely monitored by NMFS observers since 1987 (Gitschlag and Herczeg 1994). There had been no reports of either serious injury or mortality to bottlenose dolphins until 2010 (NMFS unpublished data). One mortality occurred during 2010 when a bottlenose dolphin became entangled in a diver's guide line during platform removal operations. A diver discovered the dolphin at a depth of 25.9m and reported it to be motionless and unresponsive with both tail flukes caught in poly guide line, which was being used to transfer equipment to the sea floor. No explosives were involved in this incident.

A total of 1,340 bottlenose dolphins were found stranded in the northern Gulf of Mexico from 2006 through 2010 (NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 16 November 2011). Of these, 114 showed evidence of human interactions as the cause of death (e.g., gear entanglement, mutilation, gunshot wounds). Bottlenose dolphins are known to become entangled in, or ingest recreational and commercial fishing gear (Wells and Scott 1994; Wells *et al.* 1998; Gorzelany 1998), and some are struck by vessels (Wells and Scott 1997). The vast majority of stranded bottlenose dolphins are assumed to belong to one of the coastal or bay, sound and estuary stocks. Nevertheless, it is possible that some of the stranded bottlenose dolphins belonged to the Continental Shelf or Oceanic Stocks and that they were among those strandings with evidence of human interactions. (Strandings do occur for other cetacean species whose primary range in the Gulf of Mexico is outer continental shelf or oceanic waters.)

An Unusual Mortality Event (UME) was declared for cetaceans in the northern Gulf of Mexico beginning 1 February 2010; and, as of early 2012, the event is still ongoing. It includes cetaceans that stranded prior to the

Deepwater Horizon oil spill (see “Habitat Issues” below), during the spill, and after. During 2010, 221 bottlenose dolphins were considered to be part of the UME. The vast majority of stranded bottlenose dolphins are assumed to belong to one of the coastal stocks or to bay, sound and estuary stocks. Nevertheless, it is possible that some of the stranded bottlenose dolphins considered part of the UME belonged to the Continental Shelf Stock.

HABITAT ISSUES

The Deepwater Horizon (DWH) MC252 drilling platform, located approximately 50 miles southeast of the Mississippi River Delta in waters about 1500m deep, exploded on 20 April 2010. The rig sank, and for 87 days millions of barrels of oil and gas were discharged from the wellhead until it was capped on 15 July 2010. During the response effort dispersants were applied extensively at the seafloor and at the sea surface (Lehr *et al.* 2010; OSAT 2010). In-situ burning, or controlled burning of oil at the surface, was also used extensively as a response tool (Lehr *et al.* 2010). The oil, dispersant and burn residue compounds present ecological concerns. The magnitude of this oil spill was unprecedented in U.S. history, causing impacts to wildlife, natural habitats and human communities along coastal areas from western Louisiana to the Florida Panhandle (NOAA 2011). It could be years before the entire scope of damage is ascertained (NOAA 2011).

Shortly after the oil spill, the Natural Resource Damage Assessment (NRDA) process was initiated under the Oil Pollution Act of 1990. A variety of NRDA research studies are being conducted to determine potential impacts of the spill on marine mammals. These studies have focused on identifying the type, magnitude, severity, length and impact of oil exposure to oceanic, coastal and estuarine marine mammals. The research is ongoing and likely will continue for some time. For continental shelf and oceanic cetaceans, the NOAA-led efforts include: aerial surveys to document the distribution, abundance, species and exposure of marine mammals and turtles relative to oil from DWH spill; and ship surveys to evaluate exposure to oil and other chemicals and to assess changes in animal behavior and distribution relative to oil exposure through visual and acoustic surveys, deployment of passive acoustic monitoring systems, collection of tissue samples, and deployment of satellite tags on sperm and Bryde’s whales.

Aerial surveys have observed Risso’s dolphins, spinner dolphins, pantropical spotted dolphins, striped dolphins, bottlenose dolphins and sperm whales swimming in oil in offshore waters (NOAA 2010a). The effects of oil exposure on marine mammals depend on a number of factors including the type and mixture of chemicals involved, the amount, frequency and duration of exposure, the route of exposure (inhaled, ingested, absorbed, or external) and biomedical risk factors of the particular animal (Geraci 1990; NOAA 2010b). In general, direct external contact with petroleum compounds or dispersants with skin may cause skin irritation, chemical burns and infections. Inhalation of volatile petroleum compounds or dispersants may irritate or injure the respiratory tract, which could lead to pneumonia or inflammation. Ingestion of petroleum compounds may cause injury to the gastrointestinal tract, which could affect an animal’s ability to digest or absorb food. Absorption of petroleum compounds or dispersants may damage kidney, liver and brain function in addition to causing immune suppression and anemia. Long term chronic effects such as lowered reproductive success and decreased survival may occur (Geraci 1990; NOAA 2010b).

STATUS OF STOCK

The status of bottlenose dolphins in the northern Gulf of Mexico, relative to OSP, is unknown. The species is not listed as threatened or endangered under the Endangered Species Act. There are insufficient data to determine the population trends for this species. Total human-caused mortality and serious injury for this stock is not known. There is insufficient information available to determine whether the total fishery-related mortality and serious injury for this stock is insignificant and approaching zero mortality and serious injury rate. Despite an undetermined PBR and unknown population size, this is not a strategic stock because previous estimates of population size have been large compared to the number of cases of documented human-related mortality and serious injury.

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