

## ATLANTIC SPOTTED DOLPHIN (*Stenella frontalis*): Northern Gulf of Mexico Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

There are 2 species of spotted dolphin in the Atlantic Ocean, the Atlantic spotted dolphin (*Stenella frontalis*) and the pantropical spotted dolphin (*S. attenuata*) (Perrin *et al.* 1987). The Atlantic spotted dolphin occurs in 2 forms which may be distinct sub-species (Perrin *et al.* 1987, 1994; Rice 1998): the large, heavily spotted form which inhabits the continental shelf and is usually found inside or near the 200m isobath; and the smaller, less spotted island and offshore form which occurs in the Atlantic Ocean but is not known to occur in the Gulf of Mexico (Fulling *et al.* 2003; Mullin and Fulling 2003; Mullin and Fulling 2004). Where they co-occur, the offshore form of the Atlantic spotted dolphin and the pantropical spotted dolphin can be difficult to differentiate at sea.

The Atlantic spotted dolphin is endemic to the Atlantic Ocean in temperate to tropical waters (Perrin *et al.* 1987, 1994). In the Gulf of Mexico, Atlantic spotted dolphins occur primarily from continental shelf waters 10-200m deep to slope waters <500m deep (Figure 1; Fulling *et al.* 2003; Mullin and Fulling 2004; Maze-Foley and Mullin 2006). Atlantic spotted dolphins were seen in all seasons during GulfCet aerial surveys of the northern Gulf of Mexico (i.e., U.S. Gulf of Mexico) from 1992 to 1998 (Hansen *et al.* 1996; Mullin and Hoggard 2000). It has been suggested that this species may move inshore seasonally during spring, but data supporting this hypothesis are limited (Caldwell and Caldwell 1966; Fritts *et al.* 1983).

The Gulf of Mexico population is being considered a separate stock for management purposes. In a recent study, Adams and Rosel (2005) presented strong genetic support for differentiation between Gulf of Mexico and western North Atlantic management stocks using both mitochondrial and nuclear markers. However, this study did not test for further population subdivision within the Gulf of Mexico.

### POPULATION SIZE

The current population size for the Atlantic spotted dolphin in the northern Gulf of Mexico is unknown because the survey data are more than 8 years old (Wade and Angliss 1997).

### Abundance Estimates

All 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 line-transect survey data collected from ships in the northern Gulf of Mexico and are summarized in Appendix IV.

From 1991 through 1994, and from 1996 through 2001 (excluding 1998), annual surveys were conducted during spring in oceanic waters (i.e., 200m isobath to seaward extent of the U.S. EEZ) along a fixed plankton sampling trackline. Due to limited survey effort in any given year, the survey effort-weighted estimated average abundance of Atlantic spotted dolphins for all surveys combined was estimated. For 1991 to 1994, the estimate was 3,213 (CV=0.44) (Hansen *et al.* 1995), and for 1996 to 2001, 175 (CV=0.84) (Mullin and Fulling 2004).

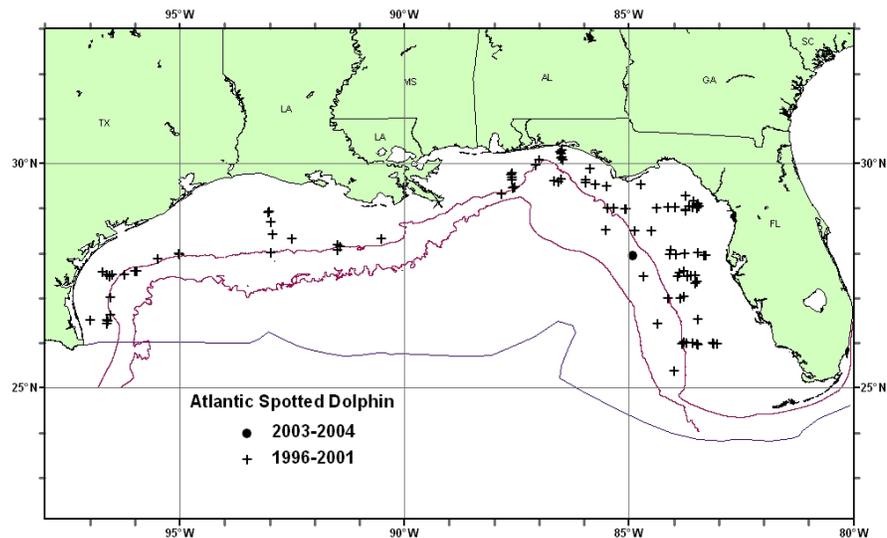


Figure 1. Distribution of Atlantic spotted dolphin sightings from SEFSC spring and fall vessel surveys during 1996-2001 and from summer 2003 and spring 2004 surveys. All the on-effort sightings are shown, though not all were used to estimate abundance. Solid lines indicate the 100m and 1,000m isobaths and the offshore extent of the U.S. EEZ.

These were underestimates because the continental shelf was not covered during these surveys.

Data were also collected from 1998 to 2001 during fall plankton surveys. Tracklines, which were perpendicular to the bathymetry, covered shelf waters from the 20m to the 200m isobaths. The estimated abundance of Atlantic spotted dolphins, pooled from 2000 through 2001, for the fall outer continental shelf surveys was 37,611 (CV=0.28) (Table 1; see Fulling *et al.* 2003).

During summer 2003 and spring 2004, surveys dedicated to estimating cetacean abundance were conducted in oceanic waters along a grid of uniformly-spaced transect lines from a random start. The abundance estimate for Atlantic spotted dolphins in oceanic waters, pooled from 2003 to 2004, was 0 (Mullin 2007).

The most recent best abundance estimate for the Atlantic spotted dolphin in the northern Gulf of Mexico was the combined estimate of abundance for both the outer continental shelf (fall surveys, 2000-2001) and oceanic waters (spring and summer surveys, 2003-2004), which was 37,611 (CV=0.28) (Table 1). Because these data are more than 8 years old, the current best population estimate is unknown.

Table 1. Most recent abundance estimates ( $N_{best}$ ) and coefficient of variation (CV) of Atlantic spotted dolphins in the northern Gulf of Mexico outer continental shelf (OCS) (waters 20-200m deep) during fall 2000-2001 and oceanic waters (200m to the offshore extent of the EEZ) during spring/summer 2003-2004.			
Month/Year	Area	$N_{best}$	CV
Fall 2000-2001	Outer Continental Shelf	37,611	0.28
Spring/Summer 2003-2004	Oceanic	0	-
<b>Fall &amp; Spring/Summer</b>	<b>OCS &amp; Oceanic</b>	<b>37,611</b>	<b>0.28</b>

#### Minimum Population Estimate

The current 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).

#### Current Population Trend

There are insufficient data to determine the population trend for this 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 currently 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 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

Annual human-caused mortality and serious injury is unknown for this stock. There has been no reported fishing-related mortality or serious injury of an Atlantic spotted dolphin during 1998-2010 (Yeung 1999; Yeung 2001; Garrison 2003; Garrison and Richards 2004; Garrison 2005; Fairfield Walsh and Garrison 2006; Fairfield-Walsh and Garrison 2007; Fairfield and Garrison 2008; Garrison *et al.* 2009; Garrison and Stokes 2010; 2011). One mortality occurred during 2006 off Ft. Myers, Florida, when a dolphin was captured during sea turtle relocation trawling activities. As part of its annual coastal dredging program, the Army Corps of Engineers conducts sea turtle relocation trawling during hopper dredging as a protective measure for marine turtles. This mortality was included in the stranding database and is included in Table 2.

### Fisheries Information

The commercial fisheries which potentially could interact with this stock in the Gulf of Mexico are the Atlantic Ocean, Caribbean, Gulf of Mexico large pelagic longline fishery and the Southeastern U.S. Atlantic/Gulf of Mexico shrimp trawl fishery (Appendix III).

Pelagic swordfish, tunas and billfish are the targets of the longline fishery operating in the northern Gulf of Mexico. There has been no reported mortality or serious injury of an Atlantic spotted dolphin in the pelagic longline fishery during 1998-2010 (Yeung 1999; Yeung 2001; Garrison 2003; Garrison and Richards 2004; Garrison 2005; Fairfield Walsh and Garrison 2006; Fairfield-Walsh and Garrison 2007; Fairfield and Garrison 2008; Garrison *et al.* 2009; Garrison and Stokes 2010; 2011).

A voluntary observer program for the shrimp trawl fishery began in 1992 and became mandatory in 2007. During 1992-2008 the shrimp trawl fishery observer program recorded 6 unidentified dolphins caught in a lazy line or turtle excluder device, and 1 or more of these animals may have been an Atlantic spotted dolphin. In 2 of the 6 cases, an observer report indicated the animal may have already been decomposed, but this could not be confirmed in the absence of a 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.

### Other Mortality

A total of 16 Atlantic spotted dolphins were reported stranded in the Gulf of Mexico during 2006–2010 (Table 2; NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 16 November 2011). Evidence of human interactions was detected for 2 stranded animals, no evidence of human interactions was detected for 2 animals, and for the remaining 12 animals, it could not be determined if there was evidence of human interactions. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured in fishery interactions wash ashore, not all that wash ashore are discovered, reported or investigated, 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 interactions.

Since 1990, there have been 12 bottlenose dolphin die-offs or Unusual Mortality Events (UMEs) in the northern Gulf of Mexico, and 3 of these included Atlantic spotted dolphins. 1) Between August 1999 and May 2000, 152 bottlenose dolphins died coincident with *Karenia brevis* blooms and fish kills in the Florida Panhandle. Additional strandings included 3 Atlantic spotted dolphins, 1 Risso's dolphin, *Grampus griseus*, 2 Blainville's beaked whales, *Mesoplodon densirostris*, and 4 unidentified dolphins. 2) In 2005, a particularly destructive red tide (*K. brevis*) bloom occurred off of central west Florida. Manatee, sea turtle, bird and fish mortalities were reported in the area in early 2005 and a manatee UME had been declared. Bottlenose dolphin mortalities began to rise above the historical averages by late July 2005, continued to increase through October 2005, and were then declared to be part of a multi-species UME. The multi-species UME extended into 2006, and ended in November 2006. A total of 190 dolphins were involved, primarily bottlenose dolphins plus strandings of 1 Atlantic spotted dolphin and 24 unidentified dolphins. The evidence suggests the effects of a red tide bloom contributed to the cause of this event. 3) 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, 3 animals from this stock were considered to be part of the UME.

Table 2. Atlantic spotted dolphin (*Stenella frontalis*) strandings along the northern Gulf of Mexico coast, 2006–2010.

STATE	2006	2007	2008	2009	2010	TOTAL
Alabama	0	1	0	0	0	1
Florida	1	7	0	4	3*	15
Louisiana	0	0	0	0	0	0

Mississippi	0	0	0	0	0	0
Texas	0	0	0	0	0	0
<b>TOTAL</b>	1	8	0	4	3	16
*These strandings are included in the Northern Gulf of Mexico UME						

## 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 Atlantic spotted 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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