

Stenella frontalis (G. Cuvier, 1829)

English: Atlantic spotted dolphin

German: Zügeldelphin

Spanish: Delfín pintado

French: Dauphin tacheté de l'Atlantique

Family Delphinidae

1. Description

Atlantic spotted dolphins have a moderately long, stocky beak, with a distinctive crease between the base of the beak and the melon. The dorsal fin is tall and falcate and the flippers are curved backwards. Juveniles are unspotted and look similar to bottlenose dolphins, with their dark cape, spinal blaze, light gray sides and white belly. As the animals age, spots on both ventral and dorsal surfaces develop and some individuals become so heavily spotted that the underlying colour pattern becomes obscured. However, adults in some offshore and temperate populations may remain unspotted (Jefferson et al. 2008). *S. frontalis* can be distinguished from *S. attenuata*, which also occurs in the tropical Atlantic, by its spinal blaze which sweeps up into the dorsal cape. In addition, the peduncle does not exhibit the dorsoventral division into darker upper and lighter lower halves observed in *S. attenuata*. Adult size ranges from 166 cm to 229 cm, and mass reaches 143 kg (Perrin, 2009).

There is a marked regional variation in the size and shape of the skull and in adult body size (Perrin et al. 1987, in Rice, 1998). The largest individuals inhabit the coastal waters of the southeastern United States; these are the animals that long went under the name *S. plagiodon* (Cope, 1866) (Rice, 1998). Genetic differentiation of Atlantic spotted dolphins in the western North Atlantic, including the Gulf of Mexico was recently tested by Adams and Rosel (2006) who presented evidence for 3 populations coupled to known biogeographic transition zones at Cape Hatteras, North Carolina and Cape Canaveral, Florida, USA. This also supports previously documented morphotypes of Atlantic spotted dolphins in coastal and offshore waters.

2. Distribution

<http://www.iucnredlist.org/apps/redlist/details/20732/0/rangemap>

Distribution of Stenella frontalis (Hammond et al. 2008; © IUCN). Warm, temperate, subtropical and tropical waters in the North and South Atlantic.

Stenella frontalis ranges in the tropical and warm-temperate Atlantic, north to the Gulf of Mexico, Cape Cod, the Azores, and the Canary Islands, and south to Rio Grande do Sul in Brazil, Saint Helena, and Gabon. A synonym is *Stenella froenata* (F. Cuvier, 1829) (Rice, 1998). The species is well documented from Equatorial Guinea and Côte d'Ivoire, with recent sightings at sea off Senegal (Van Waerebeek et al. 2000 and refs. therein) and Angola (Weir, 2008). The range extends to about 50°N to 25°S (Hammond et al. 2008; Jefferson et al. 2008).

3. Population size

In the US waters of the North Atlantic Ocean (EEZ) south of Maryland, the most abundant species in 1998 was the Atlantic spotted dolphin (14,438; CV = 0.63) (Mullin and Fulling, 2003). Subsequent abundance estimates are significantly higher: the best recent abundance estimate for Atlantic spotted dolphins stems from two 2004 western U.S. Atlantic surveys: Maryland to the Bay of Fundy (3,578; CV = 0.48) and Florida to Maryland (47,400; CV = 0.45) (Waring et al. 2008). The best available abundance estimate for the northern Gulf of Mexico is 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 is 37,611 (CV=0.28) (Waring et al. 2008).

There are no data on abundance available from West Africa (van Waerebeek et al. 2000) or for other populations in the Atlantic ocean (Hammond et al. 2008; Perrin, 2009).

4. Biology and Behaviour

Habitat: Atlantic spotted dolphins are encountered primarily in continental shelf (<200 m) and continental slope waters (200-2000 m) (Mullin and Fulling, 2003). The large, heavily spotted form of the Atlantic spotted dolphin along the south-eastern and Gulf coasts of the United States inhabits the continental shelf, usually being found inside or near the 100-fathom curve (within 250–350 km of the coast) but sometimes coming into very shallow water adjacent to the beach seasonally, perhaps in pursuit of migratory forage fish (Perrin et al. 1994 and refs. therein; Jefferson and Schiro, 1997). In the eastern Gulf of Mexico between Tampa Bay and Charlotte Harbor, Florida, *S. frontalis* was the most common shelf species at depths of 20-180 m. Although its habitat has elsewhere been described as broadly extending over the shelf, these data suggest that in the eastern Gulf of Mexico the species prefers midshelf habitat (Davis et al. 1996; Griffin and Griffin, 2003).

The smaller and less-spotted forms that inhabit more pelagic offshore waters and waters around oceanic islands are less well known in their habitat requirements. In the Bahamas, Atlantic spotted dolphins spend much time in shallow water (6–12 m) over sand flats (Perrin et al. 1994 and refs. therein; Jefferson and Schiro, 1997). Off the Azores Archipelago they were found around each group of islands, where they were also more abundant in offshore (9 to 28 km) as opposed to coastal areas (to 9 km from shore) (Silva et al. 2003).

Schooling: Small to moderate groups, generally of fewer than 50 individuals, are characteristic of the Atlantic spotted dolphin. Coastal groups usually consist of 5 to 15 animals (Jefferson et al. 1993). However, on both coasts of northern Florida, moving groups may consist of up to 100 individuals and may attract other, smaller groups that join the large group briefly. Segregated schools of subadults and adults, or of adults with calves have also been observed (Perrin et al. 1994 and refs. therein). In a report from the Canary Islands, maximum group size of *S. frontalis* is given as 650 animals (mean 40) in 321 sightings between 1994-2001 (Ritter, 2003). In the Gulf of Mexico Atlantic spotted dolphins feed in a co-ordinated manner and herd schools of clupeid fish into dense balls against the sea surface. While such feeding activity for other delphinid species has been well-described nearshore, co-ordinated feeding offshore is rarely reported (Fertl and Würsig 1995).

Herzing and Johnson (1997) observed interactions between free-ranging Atlantic spotted dolphins and bottlenose dolphins (*Tursiops truncatus*) in Bahamian waters. Mixed-sex,

mixed-species adult groups (including pregnant females) were seen foraging together and travelling together. In the central Azores, the presence of large concentrations of bait fish in the area each summer gives rise to mixed-species feeding aggregations, usually at dawn and dusk (Clua and Grosvalet, 2001). The encircling of prey initiated by common dolphins (*Delphinus delphis*), often mixed with spotted dolphins, results in the formation of a compact 'ball' of several thousand prey fish close to the surface. Other dolphins, in particular bottlenose dolphins, also eat the prey fish, whose high concentration makes them easy to capture. Large tunas (*Thunnus thynnus*, *Thunnus albacares*) some-times participate in the phenomenon. Seabirds (mainly Cory's shearwaters, *Calonectris diomedea borealis*) are always present throughout the few minutes during which the entire collective food hunt takes place. Clua and Grosvalet (2001) showed that it is the tunas that generate and benefit from the aggregation with dolphins, rather than the contrary. Finally, in the Bahamas, interspecific aggression with bottlenose dolphins was also observed (Herzing et al. 2003).

Food: A wide variety of fish and squid are taken by this species (Jefferson et al. 1993): The stomach of a specimen captured off northern Florida contained a large number of small cephalopod beaks, and *S. frontalis* have been observed to feed on small clupeoid and carangid fishes and large squid and to follow trawlers to eat discarded fish. Observers in the north-eastern Gulf of Mexico have reported that small squid have been regurgitated during captures of spotted dolphins (Perrin et al. 1994). Dives to 40–60m and lasting up to 7min have been recorded, but most time is spent at less than 10m (Davis et al. 1996).

Reproduction: Age at sexual maturity is estimated at 8-15 years in females (Herzing, 1997). The average calving interval is about 3 years, nursing lasting for up to 5 years (Perrin, 2009). In the Bahamas, genotypes of females and offspring revealed that more than two males were required to explain the progeny arrays, indicating promiscuous mating among females. Males mate within their social cluster or with females from the next-closest cluster (Green, 2008). In southeastern Brazil the oldest specimen was 23 y old, and the asymptotic length of 224.4 cm predicted by the growth curve occurred at about 20 y (Siciliano et al. 2007).

5. Migration

Davis et al. (1996) reported on the diving behaviour and daily movements of a rehabilitated Atlantic spotted dolphin that was tracked in the northwestern Gulf of Mexico for 24 d using satellite telemetry. During that time, the animal travelled a total of 1,711 km at a mean travelling speed of 0.8 m/s. The mean minimum distance travelled daily was 72 km. Although this single animal can hardly be considered representative of the species, it illustrates the habitat use and movements within the marine habitat. International borders (e.g. Between Texas and Mexico) are not limiting for wild populations.

Over the west-Florida continental shelf, monthly surveys conducted between 1998 and 2001 between the coast and the 180 m depth contour showed significant seasonal variation in Atlantic spotted dolphin densities. Lowest abundances were recorded during the warm season (June-October) and highest densities during the cool season (November-May). Densities significantly decreased during 2000 and 2001, suggesting a species response to short-term environmental variation (Griffin and Griffin, 2004).

Mignucci et al. (1999) assessed cetacean strandings (including Atlantic spotted dolphins) in Puerto Rico and the United States and British Virgin Islands. Between 1990 and 1995, the average number of cases per year increased from 2.1 to 8.2. There was a seasonal pattern of strandings, with a high number occurring in the winter and spring. The monthly temporal

distribution showed an overall bimodal pattern, with the highest number of cases reported for February, May and September.

6. Threats

Direct catches:

Atlantic spotted dolphins were taken in a direct fishery for small cetaceans in the Caribbean. Direct takes may also occur off the Azores and off West Africa (Jefferson et al. 1993; Perrin et al. 1994).

Incidental catches:

The total annual fishery-related mortality or serious injury to the US west Atlantic stock during 2001-2005 was estimated at 6 (CV=1) spotted dolphins (*S. frontalis* and *S. attenuata* combined). There was no reported fishing-related mortality of spotted dolphins in US Gulf of Mexico waters during 1998-2006 (Waring et al. 2008).

In Campeche Sound, Mexico, Atlantic spotted dolphins stay behind shrimping vessels and eat the discarded bycatch (mainly at night). Because dolphins respect trawl net position, the probability of incidental catch appears to be low (Delgado, 1997).

For Puerto Rico and the Virgin Islands, the most common human-related causes observed in strandings are entanglement and accidental captures, followed by animals being shot or speared (Mignucci et al. 1999). Atlantic spotted dolphins are also captured incidentally in gill nets in Brazil and Venezuela (e.g. Zerbini and Kotas, 2001). In Venezuela, the dolphin carcasses are utilised for shark bait and for human consumption (Perrin et al. 1994).

Some are probably taken incidentally in tuna purse seines off the West African coast. While there are no reliable estimates of the number of animals taken in these fisheries (Jefferson et al. 1993; Carwardine, 1995), but it may be considerable. Nieri et al. (1999) reported that in 1995, a large number of Atlantic spotted dolphins washed ashore on the sandy beaches north of Nouakchott, the capital of Mauritania, presumably due to fishery interaction.

Pollution: In specimens found stranded along the coastal waters of Florida, USA, during 1989 to 1994, PCBs were the most predominant contaminants followed by DDTs, chlordanes, tris(4-chlorophenyl)methane (TCPMe), tris(4-chlorophenyl) methanol (TCPMOH), hexachlorobenzene, and hexachlorocyclohexane isomers. Concentrations of TCPMe and TCPMOH were greater than those in the blubber of marine mammals of various other regions, suggesting the presence of sources for these chemicals along the Atlantic coast of Florida (Watanabe et al. 2000). In specimens from Brazilian coastal waters, concentrations of DDTs and PCBs were the highest, followed by CHLs, TCPMOH, dieldrin, TCPMe, heptachlor epoxide, HCB, and HCHs. Unexpectedly, the significant pollution of PCBs, DDTs, TCPMe, and TCPMOH implies the occurrence of local sources in the Southern Hemisphere comparable to those in the Northern Hemisphere, probably by high industrialization in Brazil (Kajiwara et al. 2004).

Red tide blooms: Between August 1999 and May 2000, 152 bottlenose dolphins died coincident with red tide (*K. brevis*) blooms and fish kills in the Florida Panhandle (Waring et al. 2008).

Noise pollution: Off Angola a dual-source airgun array used in oil field prospection resulted in overt response by Atlantic spotted dolphins; they were observed at a significantly greater

distance from the airgun array during full-array operations than during guns-off. However, there was no evidence for prolonged or large-scale displacement from the region during the 10-mo survey duration (Weir, 2008).

7. Remarks

Range states (Hammond et al. 2008) :

Antigua and Barbuda; Bahamas; Barbados; Brazil; Cameroon; Cape Verde; Cayman Islands; Colombia; Côte d'Ivoire; Cuba; Dominica; Gabon; Ghana; Guinea; Guinea-Bissau; Haiti; Honduras; Jamaica; Mauritania; Mexico; Morocco; Netherlands Antilles; Nicaragua; Panama; Portugal (Azores); Puerto Rico; Saint Helena; Saint Vincent and the Grenadines; Senegal; Spain (Canary Is.); United States; Venezuela; Western Sahara

The species is listed in Appendix II of CITES. Classified as "Data Deficient" by the IUCN. Not listed by CMS.

Atlantic spotted dolphins seem to prefer inshore waters on both sides of the tropical Atlantic and may venture even further. Satellite telemetry showed that the species is capable of moving considerable distances, and stranding data show seasonal peaks. These data show that movements and home range size are likely to stretch across international boundaries. Inclusion in Appendix II of CMS is therefore strongly suggested.

Atlantic spotted dolphins also occur in South America, so please see Hucke-Gaete (2000) in Appendix 1 for further recommendations. Range states in the Caribbean should be encouraged to investigate into and reduce accidental by-catch.

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