

Steno bredanensis (G. Cuvier in Lesson, 1828)

English: Rough-toothed dolphin

German: Rauhzahndelphin

Spanish: Delfin de dientes rugosas

French: Sténo

Family Delphinidae

1. Description

The species derives its common name from the vertical ridges in the teeth, which give them a roughened appearance. *S. bredanensis* is the only long-beaked dolphin with a smoothly sloping melon that gently blends into the upper beak. The body is not very slender and the anterior portion may be stocky. The large flippers are set farther back on the body than in most other dolphins. The dorsal fin is tall and only slightly recurved. Some large males may have a hump posterior to the anus resembling a keel. Rough-toothed dolphins are countershaded with white bellies and black to dark grey backs. The sides are medium grey and separated from the a cape on the back. Size reaches 255 cm in females and 280 cm in males, and body mass may reach 155 kg (Jefferson, 2009).

2. Distribution

<http://www.iucnredlist.org/apps/redlist/details/20738/0/rangemap>

Distribution of Steno bredanensis: deep tropical, subtropical and warm temperate waters around the world (Hammond et al. 2008; © IUCN).

S. bredanensis is distributed in tropical and warm temperate waters around the world. It ranges north to the Gulf of Mexico, Virginia, Brittany on the French coast, Mediterranean Sea, Gulf of Aden, Arabian Sea, Bay of Bengal, East China Sea, Northern Japan, Hawaiian Islands, and California (Hammond et al. 2008). Its southern range extends to Rio Grande do Sul in Brazil, about 32°S in the eastern Atlantic, Natal, Timor Sea, Coral Sea, New Zealand, and Botija (24°30'S) in northern Chile (Rice, 1998). Monteiro et al. (2000) and Ott and Danilewicz (1996) confirm a few sightings and by-catches of *S. bredanensis* off Brazil.

Recently, the species has been observed in the US Exclusive Economic Zone (EEZ) waters of American Samoa (Johnston et al. 2008), off the Marquesas and Windward Islands in French Polynesia as well as around Tahiti and Moorea. (Gannier 2002; Gannier and West, 2005), off the Island of St Helena in the tropical south-eastern Atlantic (Macleod and Bennet 2007), and off northern Angola (Weir 2007).

Ocasionalmente vagrant north to Oregon and Washington in the eastern Pacific (Ferrero et al. 1994; Rice, 1998), but see abundance below; visitor to the Mediterranean Sea (Hammond et al. 2008).

The distribution of *S. bredanensis* remains poorly known, and distributional maps are based on relatively few sightings spread over a wide area. The species does not appear to be particularly numerous anywhere, although researchers have worked intensively mostly in the

eastern tropical Pacific and may simply have missed areas of high abundance elsewhere (Carwardine 1995).

3. Population size

There are few recent abundance estimates. *S. bredanensis* is one of the most common delphinids of the U.S. Exclusive Economic Zone (EEZ) around the Hawaiian Islands where its abundance was estimated at 8,709 (CV = 0.45) from a 2002 survey (Barlow, 2006). The best available abundance estimate for the species in the northern Gulf of Mexico is the combined estimate for both the outer continental shelf and oceanic waters obtained in 2003-2004 which is 2,653 (CV=0.42) (Waring et al. 2008). More to the north, however, abundance is unknown, as the species was no longer seen during surveys conducted off the eastern U.S. and Canadian Atlantic coast after 1999 (Waring et al. 2008).

Previous estimates indicate that 146,000 (CV = 0,32) rough-toothed dolphins inhabit the eastern tropical Pacific (Wade and Gerrodette, 1993). During a number of survey cruises conducted in the region over a period of approximately 20 years, 176 of 4,006 schools of small cetaceans seen were of rough-toothed dolphins; the species was encountered less often than *Stenella attenuata*, *S.longirostris*, *S.coeruleoalba*, *Delphinus delphis*, *Globicephala macrorhynchus*, *Grampus griseus*, and *Tursiops truncatus* but more often than *Peponocephala electra*, *Orcinus orca*, *Pseudorca crassidens*, *Feresa attenuata*, *Kogia* spp. and beaked whales. However, this ranking could be affected by relative sightability as well as by abundance (Miyazaki and Perrin, 1994 and refs. therein).

4. Biology and Behaviour

Habitat: Most often *S. bredanensis* is found in deep water far offshore, usually beyond the continental shelf (Maigret, 1995). Off the Canary Island of La Gomera, *S. bredanensis* was found in waters of 506 m mean depth, but mean distance from shore was only 4.4 km (Ritter, 2002). In the Pacific, around the main Hawaiian Islands, sighting rates were highest in waters of >1,500 m and associated with upwelling (Baird et al. 2008). Near the Windward Islands of French Polynesia rough-toothed dolphins were usually sighted 1.8 to 5.5 km from the barrier reef, in water depths between 1,000 and 2,000 m (Gannier and West, 2005). Ritter (2002) reported that the year-round abundance off La Gomera, Canary Islands, indicates that this species might endure temperatures well below 25°C.

Behaviour: *S. bredanensis* is a fast swimmer, sometimes porpoising with low, arc-shaped leaps. It may swim rapidly just under the surface, with dorsal fin and a small part of the back clearly visible. Sometimes it bow-rides, especially in front of fast-moving vessels, though not as readily as many other tropical dolphins. *Steno* may associate with bottlenose dolphins and pilot whales and, less frequently, with spinner dolphins and spotted dolphins. They also may occur with shoals of yellowfin tuna, *Thunnus albacares* (Carwardine, 1995; Miyazaki and Perrin, 1994).

Off La Gomera, Canary Islands, behavioural data collected for 26 sightings showed that the reaction of the animals to the observation vessel varied from no response to interaction. Predominant types of boat-related behaviours were approaching (46%), bowriding (21%), and scouting (20%) (Ritter, 2002). This is confirmed by observations off the coast of Utila, Honduras, where dolphins sometimes expressed interest in the research vessel and other boats

by approaching and on separate occasions examining a hydrophone and slow moving propeller visually and by echolocation (Kuczaj and Yeater, 2007).

Schooling: Schools of up to 50 animals have been reported in the eastern tropical Pacific and central Atlantic (Ritter, 2002), but smaller groups of 10–20 seem more usual (e.g. Gannier and West, 2005). Five schools in Japanese waters contained from 23 to 53 animals. However, these small schools may be parts of larger, dispersed aggregations; one such aggregation of "schools" observed from the air off Hawaii contained an estimated 300 dolphins, and another seen in the Mediterranean contained approximately 160 animals in eight groups of about 20 each (Miyazaki and Perrin, 1994 and references therein). Near Utila, Honduras, behavioural observations suggest synchronous behaviours and 'tight' groupings during travelling, tactile contact as an important aspect of social interactions, and cooperative behaviour during play (Kuczaj and Yeater, 2007). In the eastern tropical Pacific, they tend to associate with other cetaceans (especially pilot whales and Fraser's dolphins) (Miyazaki and Perrin 1994).

Reproduction: Males reach sexual maturity at about 14 years and females at about 10 years. Animals may reach 32-36 or more years of age (Miyazaki and Perrin, 1994).

Food: The diet in the wild includes fish and squid. Cephalopods reported from stomach contents include *Teuthowenia* sp. and *Tremoctopus violaceus*. The alga *Sargassum filipendula* was found in the stomachs of several stranded animals; the significance of this is unknown. The stomachs of animals stranded in Hawaii contained the atherinid *Pranesus insularum*, the scomberesocid *Cololabis adocetus*, the belonid *Tylosurus crocodilus*, all nearshore species, and squid. Other, larger fish may be taken in deeper water. Co-operative food gathering has been reported (Miyazaki and Perrin, 1994 and refs. therein). Pitman and Stinchcomb, 2002) reported on four separate observations of rough-toothed dolphins apparently preying on adult-sized (>1 m) mahimahi (*Coryphaena hippurus*) in the eastern Pacific. Maximum reported dive depth was 70m, but they may dive deeper. Maximum dive duration was 15 min (Jefferson, 2009).

5. Migration

The species is difficult to observe at sea; schools are extremely difficult to follow, staying submerged for as long as 15 min (Miyazaki and Perrin, 1994). Around Hawaii frequent within- and between-year resightings indicate a small local population with high site fidelity. Resighting rates were lower off Kaua'i-Ni'ihau, indicating a larger population size, but with some site fidelity. Two individuals were documented moving from Kaua'i to Hawai'i, a distance of 480 km, the largest travelling distance reported for the species (Baird et al. 2008).

6. Threats

Mass strandings: Miyazaki and Perrin (1994 and references therein) posited that mass stranding may reduce population size. A school of 17 stranded in Hawaii in 1976. Further mass strandings have been summarised by Maigret (1995). The reasons for such mass strandings are to date poorly understood. A possible cause is disorientation, caused by parasites affecting the inner ear, by damage due to military sonar or geological prospection, or by variability in the earth's magnetic field, coupled with altruistic behaviour (herd members not abandoning one another).

In the late 1990's, IMMRAC (the Israeli Marine Mammal Research and Assistance Center) examined 7 strandings of rough-toothed dolphins along the entire Mediterranean Israeli coastline. The species is considered rare in the Mediterranean, and this regional clustering seems rather unusual. It is interesting to notice that all the strandings occurred between the months of February and April: presumably during a seasonal migration (Aviad Scheinin, pers. comm.).

Directed fisheries: Small numbers were taken in drive fisheries at Okinawa in the Ryukyus and in the home islands of Japan, the Solomon Islands and Papua New Guinea. Some may still be taken by harpoon in Japan, Taiwan, at St Vincent in the Lesser Antilles and in West Africa. However, only 23 rough-toothed dolphins were captured in Japan (Okinawa) during the period 1976-81 (Miyazaki and Perrin, 1994 and refs. therein; Hammond et al. 2008).

By-catches: A few rough-toothed dolphins are killed incidentally in tuna purse seines in the eastern tropical Pacific: 21 were estimated killed during the period 1971–75, and 36 died in a single net haul in 1982. Small numbers are also taken as by-catch in gillnet and driftnet fisheries in Sri Lanka, Brazil, the Central North Pacific, Taiwan and probably elsewhere around the world in tropical and warm-temperate waters (Miyazaki and Perrin, 1994 and references therein; Hammond et al. 2008).

Monteiro et al. (2000) reported on fishery-related mortality along the coast of Ceara state, Northeast Brazil, commenting on the possible conservation implications for the local populations. From January 1992 to December 1998, a total of 13 strandings occurred along the coast, mostly during the austral spring (October–December). Most animals were recovered in areas where finfish fisheries and stranding survey efforts were highest.

There has been no reported fishing-related mortality or serious injury of rough-toothed dolphins during 1992-2006 in the Northern Gulf of Mexico (Waring et al. 2008).

Pollution: Polychlorinated biphenyls(PCBs) are persistent, long distant movable and highly bioaccumulative contaminants in the marine environment. Levels of PCBs and Dichlorodiphenyl-dichlor-ethen (DDE) in the blubber of two specimens collected in the western Pacific were lower by two orders of magnitude than those recorded in *Stenella coeruleoalba* and other delphinids (Miyazaki and Perrin, 1994 and refs. therein). However, a subsequent study showed that the levels of PCBs in marine mammals would reach peak levels between 2000 and 2030. Compared with toxicity equivalents in other dolphinids from around the world, the toxicity equivalent of PCBs in rough-toothed dolphin from Dapeng Bay, Gguangdong, China, was at relatively high levels (Huang et al. 2007). Similarly, Marsili and Focardi (1997) reported on chlorinated hydrocarbon concentrations in specimens from the Mediterranean Sea. Concentration of toxaphene and polybrominated diphenyl ethers from rough-toothed dolphins stranded on the coast of Massachussetts were 1.4 µg/g and 0.5 µg/g wet mass, approximately one order of magnitude lower than in *L. acutus* (Tuerk et al. 2005).

7. Remarks

Range states (Hammond et al. 2008):

Algeria; American Samoa; Anguilla; Antigua and Barbuda; Aruba; Australia; Bahamas; Bangladesh; Barbados; Belize; Benin; Bermuda; Brazil; British Indian Ocean Territory; Brunei Darussalam; Cambodia; Cameroon; Cape Verde; Cayman Islands; Chile; China; Cocos (Keeling) Islands; Colombia; Comoros; Congo; Congo, The Democratic Republic of the; Cook Islands; Costa Rica; Côte d'Ivoire; Cuba; Djibouti; Dominica; Dominican Republic;

Ecuador; El Salvador; Equatorial Guinea; Ethiopia; Fiji; France (Corse); French Guiana; French Polynesia; Gabon; Gambia; Ghana; Gibraltar; Greece (Kriti); Grenada; Guadeloupe; Guam; Guatemala; Guinea; Guinea-Bissau; Guyana; Haiti; Honduras; Hong Kong; India; Indonesia; Iran, Islamic Republic of; Israel; Italy (Sardegna, Sicilia); Jamaica; Japan; Kenya; Kiribati; Kuwait; Liberia; Libyan Arab Jamahiriya; Madagascar; Malaysia; Maldives; Marshall Islands; Martinique; Mauritania; Mexico; Micronesia, Federated States of; Morocco; Mozambique; Myanmar; Namibia; Nauru; Netherlands Antilles; New Caledonia; Nicaragua; Nigeria; Niue; Northern Mariana Islands; Oman; Pakistan; Palau; Panama; Papua New Guinea; Peru; Philippines; Pitcairn; Portugal; Puerto Rico; Qatar; Saint Helena; Saint Kitts and Nevis; Saint Lucia; Saint Pierre and Miquelon; Saint Vincent and the Grenadines; Samoa; Sao Tomé and Príncipe; Senegal; Sierra Leone; Singapore; Solomon Islands; Somalia; South Africa; Spain (Balears, Canary Is.); Sri Lanka; Suriname; Taiwan, Province of China; Tanzania, United Republic of; Thailand; Timor-Leste; Togo; Tonga; Trinidad and Tobago; Turks and Caicos Islands; United Arab Emirates; USA; Venezuela; Viet Nam; Virgin Islands, British; Virgin Islands, U.S.; Wallis and Futuna; Western Sahara; Yemen

IUCN Status: "Least Concern" (Hammond et al. 2008). Not listed by CMS but listed in Appendix II of CITES.

See also recommendations on South American stocks in Hucke-Gaete (2000) in Appendix 1 and recommendations on Southeast Asian stocks in Perrin et al. (1996) in Appendix 2.

8. Sources

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