



Whales & Dolphins



<< back to CMS Homepage

Whales & Dolphins

Summary of the available knowledge on toothed whales distribution, behaviour, migration and threats compiled for CMS by Boris Culik. For details, please see "Home / Introduction". All comments and suggestions welcome.

HOME / INTRODUCTION
CONTENTS
COMMENTS / CONTACT
LINKS
WHALE DICTIONARY
DISCLAIMER

PAGE NAVIGATION:

- Description
- Distribution
- Population Size
- Biology and Behaviour
- Migration
- Threats
- Remarks
- Sources

Sotalia fluviatilis (Gervais and Deville, 1853)

PDF - Print version

English: Tucuxi; boto dolphin
German: Amazonas-Sotalia
Spanish: Delfín del Amazonas; boto, bufeo
French: Sotalia, dauphin de l'Amazon



Drawing of *S. fluviatilis* © Wurtz-Artescienza (see [links](#)).

1. Description

The appearance of the tucuxi resembles that of a smaller bottlenose dolphin. The tucuxi is light grey to blueish-grey, on the back and pinkish to light grey on the belly, with a distinct boundary between the mouth gape and the flipper's leading edge. On the sides, there is a lighter area between the flippers and the dorsal fin. The dorsal fin is triangular and may be slightly hooked at the tip. The beak is moderately slender and long. Body size reaches 210 - 220 cm in marine and 152 cm in riverine ecotypes (Flores, 2002).



2. Distribution

Sotalia fluviatilis is found in both salt and fresh water. The coastal range extends from Florianópolis, Brazil, north into the Caribbean Sea as far as Panama. In a recent paper Carr and Bonde (2000) extend the known range some 800 km to the northwest in northeastern Nicaragua, north of the mouth of the Layasiksa River, west side of Waunta Lagoon (13°40'N) where one individual was positively identified as *S. fluviatilis* using diagnostic keys (not shown on map). Riverine animals are found from river mouths to about 250 km up the Orinoco and 2,500 km up the Amazon, mainly in estuaries and bays, and in deep river channels or flood-plain lakes (Carwardine, 1995).

The freshwater Amazonian populations and the coastal marine populations are separable as subspecies; the population in Lago de Maracaibo, Venezuela, also differs somewhat from either (Rice, 1998 and references therein).

S. f. guianensis (P.-J. van Bénédén, 1864) is found in inshore coastal waters, estuaries, and the lower reaches of rivers, along the western Atlantic from eastern Panama south to Floreanópolis, Santa Catarina, Brazil, with a (disjunct?) population on the coast of Honduras and the Costa de Mosquitos of northern Nicaragua. This subspecies includes *Sotalia brasiliensis* E. van Bénédén, 1875 (Rice, 1998 and references therein).

S. f. fluviatilis is exclusively freshwater and lives in the Amazon River and most of its tributaries below an elevation of about 100 m. This subspecies includes *Sotalia pallida* (Gervais, 1855) and *S. tucuxi* (Gray, 1856) (Rice, 1998 and references therein).

The separation of *Sotalia fluviatilis* into two subspecies is supported by Furtado (1999). He examined the degree of genetic variation in marine and riverine *Sotalia* from Brazilian waters. A unique genotype found only in *Sotalia* from the Amazon River suggests that the freshwater form may be genetically distinct from the marine form. The species is genetically diverse in the marine environment, but the occurrence of a common genotype in all six coastal locations along the marine coast examined suggests that there is sufficient gene flow in the marine region to prevent local differentiation.



Distribution of Sotalia fluviatilis: shallow coastal waters and rivers of north-eastern South America and eastern Central America (mod. From Flores, 2002; © CMS / GROMS).
[Enlarge map](#)



3. Population size

There are no estimates of abundance for any population, although the species appears to be relatively abundant throughout its range. Numerous estimates exist of relative abundance in small areas, such as minimum number sighted, encounter rate, and estimates of minimum density (IWC, 2000).

The little information available on the abundance or status of *Sotalia* populations comes mainly from qualitative assessments in small geographical areas. Bossenecker (1978, in da Silva and Best, 1994) estimated 100-400 dolphins near the mouth of the Magdalena river in Colombia, and noted that they were abundant in the Gulf of Cispatá, near San Antero (Colombia). In Suriname, they were described as "rather common" in the mouths of the larger rivers, and in Guyana they were reported as "frequent" in the lower reaches and mouth of the Essequibo river. *Sotalia* were reported to be common in the Baía de Guanabara (Rio de Janeiro), by Geise (1991, in da Silva and Best, 1994) who estimated the population at 418 individuals in about 109 groups. However, more recent estimates using photo-identification only come to a number of 69-75 individuals for the same region (Pizzorno, 1999 in Flores, 2002). Geise (1989, in da Silva and Best, 1994) estimated the total number of individuals for the area around Cananéia Island to be 2829.

In the Amazon drainage area, an average density of approximately 1.1 dolphins per km of river was estimated between Manaus and Tefé in the Solimões river. In the Iquitos area, Kasuya and Kajihara (1974, in da Silva and Best, 1994) recorded 62 *Sotalia* during 36 hr of observations. Further upstream, *Sotalia* were frequently encountered in the Samiria river and its tributary the Santa Helena river. They are also common in Colombia in the Loretoyacu river, and the Tarapoto river at the El Correo Lake system and in the lower reaches of the Orinoco river (da Silva and Best, 1994 and references therein).

Vidal et al. (1997) conducted a boat survey in 1993 to estimate the abundance of the tucuxi along ca. 120 km of the Amazon River bordering Colombia, Peru, and Brazil. They estimate that there are 409 *Sotalia* in the study area. *Sotalia* density (dolphins per km²) was highest in lakes (8.6), followed by areas along main banks (2.8) and around islands (2.0). These are among the highest densities measured to date for any cetacean

Edwards and Schnell (2001) found that in the Cayos Miskito Reserve, Nicaragua, mean group size was 3.01. They estimate that 49 *Sotalia* inhabited the portions of the Reserve studied.



4. Biology and Behaviour



Photo: Paulo André Flores @ *Sotalia* Dolphin Project (see "[links](#)")

Habitat: Marine *Sotalia* show a preference for shallow protected estuarine waters or bays. In the Baía de Guanabara (Rio de Janeiro), *Sotalia* prefer the deeper channels (25 m depth) and avoid areas with less

than about 6 m of water. Where the rivers that feed such areas are large enough, dolphins may penetrate up to 130 km or more upriver. For the marine form the major restriction to the south seems to be low sea-surface temperature (Reyes, 1991 and refs. therein). Non-random clumping of sightings of *Sotalia* groups in the Cayos Miskito Reserve, Nicaragua indicates that some areas were preferred. In both Pahara inlet and Wauhta lagoon, sightings were more frequent after 1200 than in the morning. In coastal areas *Sotalia* were sighted most often within 100 m of shore and the animals were seldom observed in more than 5 m of water (Edwards and Schnell, 2001).

Riverine *Sotalia* inhabit all types of water ("whitewater", "clearwater", and "blackwater" rivers) of the Amazon region, so physical factors such as visibility and pH appear not to affect their distribution directly. Riverine *Sotalia* are found in the main channels of rivers as well as in larger lakes where access is not limited by a narrow or shallow channel. They generally do not enter the flooded forest. Rapids and fast-moving turbulent water are also avoided. *Sotalia* show a distinct preference for junctions of rivers and channels (da Silva and Best, 1994 and references therein).

Schooling: According to da Silva and Best (1994) the two forms of *Sotalia* have a similar social structure. The marine form is reported to occur in groups of as many as 30 individuals, with a mode of 2 per group in the Baía de Guanabara and Cananéia. Group size varies in these two areas according to the time of day and type of activity. Borobia (1984) and Geise (1984, 1989, both in da Silva and Best, 1994) reported that in the marine form, calves are usually observed in small groups of three (one calf and two adults) or four (two calves and two adults). The riverine form occurs in groups of one to six individuals in 55% of the observations. Groups of more than nine animals are seen on rare occasions. Group composition is unknown. Two groups that were captured consisted of a female with a male calf, and the third of a pregnant female with an immature female (da Silva and Best, 1994). Vidal et al. report overall mean group size of 3.9 individuals in the upper Amazon river.

Reproduction: In Brazil, calving in the riverine form apparently occurs primarily during the low water period, October to November. Little else is known of the species' reproduction (Jefferson et al. 1993).

Food: Marine *Sotalia* from south-east Brazil feed on a diet of pelagic clupeids (*Trichurus lepturus* and *Pellona barroweri*), demersal sciaenids (*Cynoscio* spp., *Porichthys porosissimus*, *Micropogonias furnieri*) and neritic cephalopods (*Loligo* spp. and *Lolliguncula brevis*). In Santa Catarina these dolphins are known to feed on the anchovies which are abundant in this area (da Silva and Best, 1994). In the Amazon region, *Sotalia* prey upon at least 28 species of fish belonging to 11 families. The characoid family Curimatidae was represented in 52%, Sciaenidae in 39% and siluriforms in 54% of the stomachs analysed (n = 29). In the dry season fish become concentrated in the main water bodies, and thus are more vulnerable to predation. During the flood period many of these fish enter the floodplain to feed, and *Sotalia* usually do not enter this habitat (da Silva and Best, 1994).



5. Migration

General patterns: Marine *Sotalia* may penetrate up to 130 km or more upriver. The marine form probably also has a defined home range, although the area covered may be large because of the distances between one estuary or protected bay and another (Reyes, 1991). Geise (1989) and Andrade et al. (1987) observed individuals identified by natural marks in the same area for over 1 year (both in da Silva and Best, 1994). The principle limiting factor in the Amazon is the presence of rapids and small channels, where manoeuvrability would be restricted. The large seasonal fluctuation in river levels (10 m) influences the distribution of *Sotalia*: they enter lake systems during periods of high water but will leave these as the waters recede, thus avoiding entrapment in lakes that are too small or shallow. Animals may occur during the whole year in the same area. Two tagged individuals in the Amazon were found within 5 km of the tagging site up to 1 year later (da Silva and Best, 1994 and references therein; Jefferson et al. 1993). Two types of travelling were observed: slow directional movement and faster swimming, including porpoising, usually in a single direction (Jefferson et al. 1993). It is possible that riverine tucuxis have a limited home range, but the area of such a range is unknown (Reyes, 1991).

Diurnal rhythms: An apparent diurnal behaviour rhythm has been observed in the two forms. Studies in the Amazon demonstrated that more *Sotalia* were seen between 0900 and 1000 h than at any other time (da Silva, unpublished data), and there was a marked movement into lakes from rivers in the early morning before about 0900 hr, and again in the late afternoon from about 1600 to 1800 hr. Other authors also reported a distinct diurnal rhythm whereby *Sotalia* entered the Bahía de Guanabara between 0600 and 0800 h and left between 1300 h and 1800 h, but were rarely seen entering and leaving the bay on the same day (12% of the observations). A similar behaviour was reported for *Sotalia* in the Cananéia region (da Silva and Best, 1994 and references therein; Geise et al. 1999). Seasonal movements may also occur, although they do not seem to be very extensive (Reyes, 1991 and ref. therein). At Enseada do Mucuripe in Fortaleza, Brazil the distribution of sightings and displacement routes of *Sotalia fluviatilis* suggested preferential uses of the sites Praia Mansa and Praia de Iracema on different timings, suggesting movement patterns from resting and feeding areas respectively. Largest and smallest frequencies of sightings at Praia de Iracema occurred respectively at the first and fourth quarters of the day. Largest frequencies happened at low tide (Oliveira et al. 1995).



6. Threats

Direct catches: There are no records of past or recent commercial fisheries for *Sotalia* (IWC, 2000). The freshwater dolphins have been protected by the superstitions of fishermen from Colombia to southern Brazil as well as in the Amazon. On the coast of Brazil *Sotalia* may occasionally be killed for use as bait for sharks

or shrimp traps or for human consumption, although the extent of this practice is unknown. There is also a small market for the eyes and genital organs, which are used as love charms when prepared in a special manner (Jefferson, 1993; da Silva and Best, 1994 and ref. therein).

Incidental catches: Modern fishing practices and the greatly increased intensity of fishing in both the marine and freshwater habitats of this dolphin are the greatest direct threats to the species. *Sotalia* is easily captured in monofilament gill nets as well as in shrimp and fish traps and seine nets. Analysis of the type of fishing gear associated with the mortality of 34 *Sotalia* from the central Amazon revealed that 74% were caught in gill nets and 15% in seine nets. *Sotalia* apparently do not steal fish from nets as do *Inia* in the Amazon but, as they consume 14 of the 30 species of fish most exploited by man in the Amazon, incidental captures during fishing are frequent. In Atafona (Rio de Janeiro State, Brazil) *Sotalia* are the dolphins most frequently caught incidentally in fisheries (da Silva and Best, 1994 and ref. therein; da Silva and Best, 1996).

Beltran (1998, in IWC, 2000) recorded 938 animals taken in drift nets from the port of Arapiranga during the summer of 1996 and a further 125 taken during the winter. These data were collected by interviewing fishermen in the port after trips and collecting carcasses. The animals were generally large and may therefore have been the marine form, but this has not yet been confirmed. The sub-committee expressed its concern about the magnitude of these catches.

Da Silva and Best (1996) found that competition between man and dolphin for commercial fish is still minimal in the Central Amazon. Dietary analysis has shown that only 43% of 53 identified prey-species are of commercial value and that the dolphins generally prey on size-classes of fish below those of commercial interest. Interviews with fishermen in the boats, in the fishmarket and in the shops supposedly selling dolphin products were conducted in an attempt to quantify the overall incidental kill attributed to commercial fisheries operations. The results showed that in the Central Amazon dolphin catches are incidental and only a very small number of these carcasses are used for commercial purposes.

Habitat degradation: Another potential threat to *Sotalia*, in both riverine and coastal environments, is the damming of rivers for hydroelectric projects, with future plans for up to 200 such dams in series along many of the main Amazon tributaries. At the very least, such dams would interrupt gene flow between *Sotalia* populations, creating isolated groups between dams. Furthermore, most of the migratory fish on which *Sotalia* feed would become extinct in the reservoirs, and the potential suitability of nonmigratory fish for the diet of *Sotalia* is unknown. Where such dams are built on rivers that empty directly into the sea, different problems arise. The altered flux of freshwater may affect both the primary and secondary productivity in the estuaries and reduce the feeding potential of these areas for *Sotalia* (da Silva and Best, 1994, Jefferson et al. 1993).

Pollution: Pollution from industrial and agricultural activities may be considered a threat both directly, through the destruction of habitat, or indirectly, through contamination of the food chain. Large harbours like the Baía de Guanabara (Rio de Janeiro) and Santos (São Paulo) are extremely polluted with effluent, including heavy metals, posing a serious potential threat. The continued use of insecticides containing substances banned elsewhere is common in South America. Mercury is used in the refining of fluvial gold and then, like the pesticides, probably enters the aquatic food chain of the rivers. Mercury and selenium were found in the livers of two *Sotalia* from Suriname. Exploration for oil in the offshore regions of Brazil, Venezuela and Colombia may not pose a direct threat to *Sotalia*. Nevertheless, the apparent dependence of this dolphin on estuaries means that an oil spill near such an area could contaminate the food chain and affect local populations (da Silva and Best, 1994 and ref. therein).



7. Remarks

According to Monteiro et al. (2000) the small number of individuals in conjunction with long gestation and nursing periods, suggest that an increased mortality due to dolphin-fisheries interactions could severely impact local populations. The IWC sub-committee (IWC, 2000) recognised that incidental catches of tucuxi are widespread.

Sotalia fluviatilis is listed in Appendices I&II of CITES and in Appendix II of CMS. The species is listed as "Data Deficient" by the IUCN (see "[links](#)").

The tucuxi is abundant and widely distributed in the central Amazon, but there are no estimates of total population size. It is vulnerable to the same threats that apply to *Inia*, including fisheries entanglement, habitat deterioration and fragmentation of populations by dam construction. The large numbers of animals taken as incidental catches in the Amazon estuary are a cause for concern, though it is not yet clear which form of *Sotalia* these represent. Little information exists regarding the marine form of this species, and in many areas, such as the Orinoco, it is not clear which form exists. At present the two forms of the tucuxi should be considered as separate populations for conservation purposes (IWC, 2000, and refs. therein).

The IWC sub-committee (2000) recommended:

- that research should be directed towards detecting trends in abundance by making repeatable and statistically rigorous estimates of density in a range of regions and habitats,
- that information be collected to allow evaluation of the relative levels of incidental mortality of the tucuxi associated with different fishing methods,
- that research be directed to determine which form of tucuxis occur in areas such as the Orinoco and Amazon estuaries.

Recent studies based on dolphins inhabiting rivers show how vulnerable these marine mammals are to human activities. The tucuxi is not an exception, and current efforts to protect river dolphins should include this species. National legislation specifically protects the tucuxi in Brazil, Peru, and Colombia. The species

is indirectly protected in Ecuador, Venezuela, Guyana, and French Guiana; specific information for Suriname is not available. However in the latter, as in the majority of countries within the range, nature reserves may protect the habitat (Reyes, 1991, and ref. therein).

The tucuxi is present in rivers of the Amazon region that cross territories of such countries as Brazil, Colombia, Ecuador and Peru. They definitely cross international boundaries in areas such as Leticia, as Amazon river dolphins do. On the Atlantic coast of South America, large rivers are geographical limits for countries along the coast. Because of the estuarine preference of tucuxis in the area, it is likely that the dolphins move between some of these countries (Reyes, 1991, and ref. Therein).

Range States are Brazil, Colombia, Ecuador, French Guiana, Guyana, Nicaragua, Panama, Peru, Suriname and Venezuela. Efforts should be made to address the stock identity, and to minimise the potential threats to this species resulting from increasing development in the region (Reyes, 1991, and ref. therein).



8. Sources

- Carr T, Bonde RK (2000) Tucuxi (*Sotalia fluviatilis*) occurs in Nicaragua, 800 km north of its previously known range. *Mar Mamm Sci* 16: 447-452
- Carwardine M (1995) *Whales, Dolphins and Porpoises*. Dorling Kindersley, London, UK, 257 pp.
- Edwards HH, Schnell GD (2001). Status and ecology of *Sotalia fluviatilis* in the Cayos Miskito Reserve, Nicaragua. *Mar Mamm Sci* 17: 445-472
- Flores PAC (2002) Tucuxi - *Sotalia fluviatilis*. . In: *Encyclopedia of marine mammals* (Perrin WF, Würsig B, Thewissen JGM, eds.) Academic Press, San Diego, 1267 - 1269.
- Furtado NM (1999) *Molecular Systematics and Population Genetics of Marine Vertebrates from Brazil*. Dissertation Abstracts International Part B: Science and Engineering 60 (2): 463:463
- Geise L , Gomes N, Cerqueira R (1999) Behavior, habitat use and population size of *Sotalia fluviatilis* (Gervais, 1853) (Cetacea, Delphinidae) in the Cananeia estuary region, Sao Paulo, Brazil. *Revista Brasileira de Biologia* 59 (2): 183-194
- IWC (2000) Annex K: Report of the Sub-Committee on small cetaceans. IWC, Cambridge, 2000
- Jefferson TA, Leatherwood S, Webber MA (1993) *FAO Species identification guide. Marine mammals of the world*. UNEP / FAO, Rome, 320 pp.
- Monteiro NC, Alves JTT, Avila FJC, Campos AA, Costa AF, Silva CPN, Furtado NMAA (2000) Impact of fisheries on the tucuxi (*Sotalia fluviatilis*) and rough-toothed dolphin (*Steno bredanensis*) populations off Ceara state, northeastern Brazil. *Aquatic Mammals* 26 (1): 49-56
- Oliveira JA, Avila FJC, Alves Junior TT, Furtado Neto MAA, Monteiro Neto C (1995) Monitoring of the gray dolphin, *Sotalia fluviatilis* (Cetacea: Delphinidae), off Fortaleza, Ceara State, Brazil. *Arq Cienc Mar* 29:28-35
- Reyes JC (1991) The conservation of small cetaceans: a review. Report prepared for the Secretariat of the Convention on the Conservation of Migratory Species of Wild Animals. UNEP / CMS Secretariat, Bonn.
- Rice DW (1998) *Marine mammals of the world: systematics and distribution*. Society for Marine Mammalogy, Special Publication Number 4 (Wartzok D, Ed.), Lawrence, KS. USA.
- da Silva VMF, Best RC (1996) Freshwater dolphin/fisheries interaction in the Central Amazon (Brazil). *Amazoniana* 14(1-2): 165-175
- da Silva VMF, Best RC (1994) Tucuxi - *Sotalia fluviatilis* (Gervais 1853) In: *Handbook of Marine Mammals* (Ridgway SH, Harrison SR eds.) Vol. 5: The first book of dolphins. Academic Pres, London, pp. 43-70.
- Vidal O, Barlow J, Hurtado L A, Torre J, Cendon P, Ojeda Z (1997) Distribution and abundance of the Amazon river dolphin (*Inia geoffrensis*) and the Tucuxi (*Sotalia fluviatilis*) in the Upper Amazon river. *Marine Mammal Science* 13(3): 427-445

© Boris Culik, Kiel, Germany, 2003

