

## Behavioral observations of the marine tucuxi dolphin (*Sotalia fluviatilis*) in São Paulo estuarine waters, Southeastern Brazil

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### Abstract

The marine tucuxi (*Sotalia fluviatilis*) is one of the lesser-known delphinids. Many aspects on this species' natural history and behavior remain unknown. Herein, we present some behavioral observations of tucuxis found in São Paulo State estuarine waters, Southeastern Brazil. Three observations took place at the Cananéia Estuary (25°00'S, 48°55'W), and the other one at the Santos estuarine and nearby coastal waters (23°58'S, 46°21'W). These observations were reported from 1995 until 1999 and lasted from 2 h to 24 months. Behavioral aspects were reported through the *ad libitum* (*sensu* Altmann, 1974) sampling method. At the Cananéia estuary, the marine tucuxi epimeletic or care-giving behavior was noticed in 1995. A dead calf was carried for about 2 h by an adult dolphin, probably its mother. This notification adds tucuxi to the list of cetacean species in which carrying dead calves in the wild has been described. In the same estuarine waters and in 1996, we reported an individual tucuxi that was hand-fed by local fishermen. Tourists noticed other observations and some photographs showed that more than one dolphin had been hand-fed in local estuarine waters. From 1996 to 1998, tucuxis were observed spontaneously swimming with 2 domestic dogs (*Canis familiaris*) at a local beach placed at the same estuarine connection with the sea. These interactions occurred because local tucuxis approach sand banks close to that beach to prey on fishes. A case of a lone and sociable tucuxi was reported at the Santos estuary from 1998 to 1999. A 160 cm long male interacted with boats and bathers for about 10 months, then it disappeared. This is the first known case of a lone and sociable marine tucuxi.

Key words: tucuxi, *Sotalia fluviatilis*, behavior, Brazil, epimeletic, social dolphin, hand-feeding.

### Introduction

The marine tucuxi (*Sotalia fluviatilis*) is one of the lesser-studied delphinids. It is listed as 'insufficiently known' by the 1994–1998 Action Plan for the Conservation of Cetaceans (Reeves & Leatherwood, 1994), despite its apparently continuous distribution along most of the eastern South and Central American coasts (Borobia *et al.*, 1991; Da Silva & Best, 1996; Carr & Bonde, 2000). Many aspects of this species' natural history and behavior remain unknown. The tucuxi's preference for coastal and estuarine brackish waters; avoidance response when approached by boats; absence of sexual dimorphism; and small body size are the main features that make this species difficult to study in its natural habitat. Two studies involved marine tucuxis behavioral aspects in the 1980s. Geise (1989) observed some aspects related to tucuxis' daily activities at the Guanabara Bay (24°S), Rio de Janeiro State, and at the Cananéia Estuary (25°S), São Paulo State, Brazil. Monteiro-Filho (1990) reported tucuxis' foraging and feeding activities at the Cananéia Estuary. Individual dolphins were not identified in both studies. Since then, the few observations gathered on this species' behavioral aspects remain unpublished. We present behavioral observations on the marine tucuxi in the estuaries of Cananéia (25°00'S, 48°55'W) and Santos (23°58'S, 46°21'W) in São Paulo State, Southeastern Brazil.

### Materials and Methods

The Cananéia Estuary, an Environmental Protected Area (EPA), is located within an intertidal mangrove area of 90 km<sup>2</sup> at São Paulo State Southern coast (Schaeffer-Novelli *et al.*, 1990) (Fig. 1). Marine tucuxi female-calf pairs can be found year round in local waters that represent an important

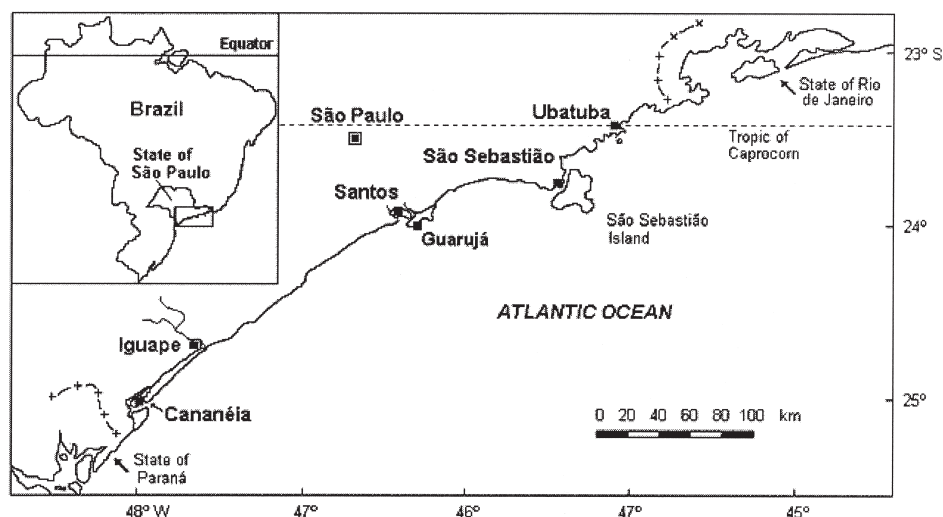


Figure 1. Map showing the exact positions of the Cananéia and Santos Estuaries where the behavioral observations of the marine tucuxi dolphin were reported.

nursing area for the species (Geise, 1989; Schmiegelow, 1990; Santos, 1999). Tucuxi often approaches local beaches in estuarine bays and beaches to prey on fishes (Monteiro-Filho, 1990; Santos, 1999). Local dolphins often stay approximately 4–10 m from shore, which makes land-based observations and photo-identification possible. From July 1996 until July 1998, a total of 42 individuals was identified (see Santos, 1999), based on recommendations quoted in Würsig & Jefferson (1990). A 35-mm Nikon 601 S camera with a 300-mm zoom lens and ASA-400 colored films were used to identify different individuals.

In contrast, the 20 km long Santos Estuary (Fig. 1) is located close to an overpopulated area that hosts the largest Latin American commercial harbor, Porto de Santos. Iron and steel manufacturing, as well as chemical industries occupy a large area in the vicinities of this heavily polluted estuary (CODESP, 1992), where tucuxi are rare.

From Cananéia estuarine waters, we reported a case of epimeletic behavior; observations of humans hand-feeding wild tucuxi; and interactions between tucuxi and two domestic dogs (*Canis familiaris*). Observations of a lone, sociable tucuxi at the Santos Estuary also are presented. All observations were opportunistic and collected using the *ad libitum* (*sensu* Altmann, 1974) sampling method.

The epimeletic behavior lasted about 2 h. A small outboard motor-powered boat was used for approaching. Photographs were taken with a 35-mm Nikon 601 S camera and a 210-mm zoom lens. In that occasion we used ASA-100 black and white films. The observation of humans feeding a

tucuxi female was made by land. Photographs were taken with a 35-mm Nikon 601 S camera and a 80-mm lens, using ASA-100 colored films. Their quality did not allow the identification of the observed dolphin as the observer was far enough to catch details with the 80-mm lens. A further observation of interest involved tucuxi in Cananéia estuarine waters, precisely at the Itacuruçá beach, at the estuary-ocean connection. From September 1996 to August 1998, two domestic dogs were observed swimming close to tucuxi dolphins on five different occasions. Group composition varied from 2 to 9 individuals. Interactions lasted from 13 min to 2 h. In four observations, the main author could not identify the observed dolphins. In three of them, photographs were not taken. In one observation, the poor quality of the photographs taken with a 35-mm Nikon 601 S camera and a 300-mm zoom lens did not allow individual identifications. The remaining observation involving six photo-identified dolphins is reported. The same camera with ASA-400 colored films were used. This observation was made by land. The last of the quoted behavioral observations occurred from May 1998 until February 1999. During this period, a male and social marine tucuxi was followed by land in 48 days. In three other occasions the authors followed the dolphin with an outboard motor powered boat.

## Results

### *Epimeletic behavior*

In Cananéia estuarine waters, early in the morning on 24 August 1995, an adult marine tucuxi dolphin



**Figure 2.** An adult marine tucuxi carries a dead calf in Cananéia estuarine waters, São Paulo.

was observed from land carrying a dead calf (Fig. 2). The calf's carcass tended to float even when not supported by the adult dolphin. Whenever any boat approached both dolphins, the adult would dive for up to 2 min, holding the calf in its mouth, and carrying it about 10 to 20 m away from the boats. In response to the boat approaching, tail slaps and breaches also were observed. On some occasions, the adult dolphin pulled the dead calf under water with its rostrum or the ventral part of its body. The adult dolphin slapped its fluke and breached on two different occasions when two local tucuxi subgroups composed of four and eight individuals approached the pair. After 2 h observing the encounter, three of the authors (MCOS, SS, and ANZ) retrieved the calf carcass. The adult dolphin kept a distance of approximately 5 to 10 m, and a few minutes later it left the area. The calf was a 127-cm long female weighing 32 kg. Fresh tooth marks attributed to *S. fluviatilis* were found on various parts of the calf's body. No external visible signs of trauma, cuts, or abrasions were evident. Its cause of death could not be determined. Analysis of stomach contents revealed only liquid remains.

#### *Feeding wild tucuxi*

In July 1996, a tucuxi female-calf pair was observed by one of the authors (MCOS) close to a local fisherman wooden-made trap ('cerco') to capture mullet (*Mugil* spp.). Only the adult female allowed tourists to touch its body, but not the calf. The female also accepted live mullet from the tourists (Fig. 3). In December 1996, April, May and June 1997, the main author joined the fisherman in four

trips to his 'cerco', but no dolphins were observed. Based on photographs taken by local people and individual dolphin identification through permanent tooth rakes scars, we concluded that more than one dolphin has been hand-fed by that fisherman.

#### *Dolphins and domestic dogs*

On 22 December 1997, nine dolphins approached the Itacuruçá beach at the Cananéia Estuary. Mothers 09, 10, 30, and 31 were with calves. Only calf 14 (mother 09) was previously cataloged. Dolphin 16 was an adult of unknown sex in the same group. It seemed to be a mother-calf group. When the group of dolphins was sighted, two domestic dogs that lived on that beach immediately entered the water. The dogs chased the dolphins, barking on most occasions, rarely touching the dolphins with their paws. Bottom-depth where dogs and dolphins interacted varied from 1–4 m. Dolphins often split in two subgroups; some dolphins surrounded the dogs, sometimes gently touching them with the rostrum or the bulk of their body, and then moving approximately about 5–10 m from the dogs. Meanwhile the other subgroup approached the beach to forage for fishes. Only the adult females and the unsexed adult dolphin approached the beach, leaving the calves in deeper water, approximately 4–10 m from the shore, where they all rejoined after foraging. Sometimes females left their calves with other adult dolphins in the group and approached the beach to forage alone. When the calves tried to approach the dogs, their mothers avoided bodily contacts



**Figure 3.** Female marine tucuxi receiving a fresh, live mullet (*Mugil* spp.) from the hand of a fisherman in the Cananéia estuary.



**Figure 4.** An adult female marine tucuxi trying to avoid closer encounters between its calf and a dog that often interacted with local dolphins at Itacuruçá beach, near the Cananéia Estuary entrance.

(Fig. 4). Adult dolphins would closely approach the dogs, sometimes stopping beside or underneath them. Breaches close to the dogs also were observed (Fig. 5). This interaction lasted approximately 2 h, after which the dolphins first left the area, then the dogs came out of the water. At the end of 1998, one of the dogs died from rabies. During the 1998–1999 summer, the other dog was removed from the Itacuruçá beach to avoid problems with tourists that came to see the dog-dolphin interactions

and subsequently attempted to hand-feed the dolphins. Since then, such interactions have not been observed.

#### *Lone social tucuxi*

In 1998, a lone social dolphin was reported at the Santos Estuary. It was identified as a 160-cm male tucuxi. This dolphin first came to our attention in May 1998, when two of us (MCOS and EZ) were conducted by a local citizen that was charging



**Figure 5.** Breaches were common during dog-dolphin interactions in the Cananéia Estuary.



**Figure 6.** The lone sociable tucuxi allowed to be petted, even when approached by small motor-powered boats.

tourists to swim with the dolphin. The dolphin was readily recognized by its distinct dorsal fin, a deep notch in its caudal peduncle, and some tooth rakes along its body. Local fishermen described that the dolphin was first sighted in November 1997 with a larger individual, most probably its mother. At the end of 1997, the larger tucuxi was harpooned and killed by a local fisherman. After that incident, the smaller dolphin began to approach local boats on a daily basis. This tucuxi had a special affinity for a

local fisherman's boat propeller and would lie side-by-side with the fisherman's paddle. This dolphin allowed people to touch its body (Fig. 6), but did not accept handheld fish. It was frequent to observe this dolphin foraging for fish, mainly mullets (*Mugil* spp.). This tucuxi dolphin traveled around Santos estuarine waters, covering a range of approximately 20 km<sup>2</sup> in nine months of dedicated observations. During its journey, crowds of people often surrounded it, but no accidents were reported. Local

people gave this sociable dolphin the nickname 'Viola', after a soccer player. In June 1998, the lead author established an educational campaign, with the help of a local newspaper, a local TV station and the state environmental agency support. The main objective was to avoid accidents previously reported in cases of other lone social dolphins (e.g. Dudzinski *et al.*, 1995; Santos, 1995). In February 1999, after an approximate 16-month period, 'Viola' was no longer sighted in the area.

### Discussion

This paper describes occasional observations on tucuxi dolphins behavior. It was not our intention to describe the common behavior of this species, as none of the authors develop research on cetacean behavior. We can not compare what we observed with *S. fluviatilis* common behavior because of the lack of consistent published data on this issue. We just gathered some observations that we considered uncommon and organized them to be documented.

The epimeletic behavior has been described to many cetacean species, mainly bottlenose dolphins (see some examples in Caldwell & Caldwell, 1966; Fertl & Shiro, 1994). The possible reasons of the mentioned behavior developed on mammals have been described elsewhere (Alexander & Borgia, 1978; Connor & Norris, 1982). Our notification adds tucuxi to the list of cetacean species in which carrying dead calves in the wild has been described. It was not possible to determine the sex of the observed supporter dolphin. We suspect that it was a mother-calf pair because those pairs are common year round in the Cananéia Estuary, an important breeding and calving area to the species. Besides that, similar cases reported in the wild showed that the epimeletic behavior is almost always directed towards young animals or calves, presumably by the mother (e.g. Caldwell & Caldwell, 1966; Pilleri, 1971; Connor & Smolker, 1990; Félix, 1994; Fertl & Schiro, 1994).

Since early 1995, when Projeto Atlantis started studies of cetaceans around the Cananéia Estuary, anecdotal reports about a fisherman that fed local tucuxi were often heard. The feeding sessions occurred near this fisherman's 'cerco'. Since the end of the 1980s, this fisherman carried 4–8 tourists in his 8-m wooden boat to watch, touch, and feed the dolphins with live mullets beside his fish trap. The main author intention was to stop those activities that could lead to incidents involving humans and local dolphins. In recent years, there has been a worldwide increase in reports of incidents caused by hand-feeding wild dolphins (e.g. Bryant, 1994). Changes in natural dolphin behavior, such as foraging and breaking social bonds; the loss of wariness of humans (placing the animals at risk); the

ingestion of inappropriate or contaminated food; and the increase in reported injuries to humans are the mainly cited problems (Bryant, 1994; IFAW *et al.*, 1995; Constantine, 1999). In places where this phenomenon already exists, local governments face difficulties to control or minimize the negative consequences for both dolphins and humans. The recent increase in tourism in the Cananéia EPA, added to the use of local estuarine waters by tucuxi as a calving and breeding area (Geise, 1989; Schmiegelow, 1990; Santos, 1999), pose hand-feeding as a new threat to local tucuxi. In 1997, an educational campaign focused on local residents was developed to increase their awareness of the potential hazards of feeding wild dolphins. After the campaign, the fisherman that was feeding wild tucuxi stopped conducting those activities in the beginning of 1998. However, as the number of tourists that come to Cananéia to observe local tucuxi grows, there are indications that other local fishermen would like to begin feeding tours. Hopefully, the implementation of specific regulations by the federal environmental agency, coupled with a local educational campaign, will control the feeding of free ranging tucuxi in the Cananéia EPA.

The same worries regarding humans hand-feeding local tucuxis were considered when observing local dolphins swimming with dogs. This phenomenon could attract a great number of tourists to this species breeding and calving area, that still do not have specific regulations to protect local tucuxi. We do not know exactly when these interactions began. In mid-1998, at the same time the news on this issue started to be spread in closer cities, one of the dogs died and the other was removed from the Itacuruçá beach. Two of the identified dolphins (females 10 and 30) still approach the Itacuruçá beach with their new calves (Santos, unpublished data). Although other dogs have been observed in the same beach, no interactions with dolphins have been reported.

Reported cases of lone and social dolphins described around the world usually involve bottlenose dolphins (*Tursiops* sp.), but also have been reported for Atlantic spotted dolphins (*Stenella frontalis*), spinner dolphins (*S. longirostris*), Risso's dolphins (*Grampus griseus*), common dolphins (*Delphinus delphis*), killer whales (*Orcinus orca*), dusky dolphins (*Lagenorhynchus obscurus*), and belugas (*Delphinapterus leucas*) (see Doak, 1988; Dobbs, 1990; Lockyer, 1990; Dudzinski *et al.*, 1995; Frohoff<sup>1</sup>, personal communication). In Brazil, a lone and social bottlenose dolphin was reported in 1994/5 at São Paulo State Northern coast (Santos,

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1995). On that occasion, a human fatality was reported as a result of unmanaged contacts between swimmers and the dolphin. The new reported case presented here is most likely the first account of a lone, social marine tucuxi, adding a new species to the known cases throughout the world. The observed dolphin followed the tendency reported to other described sociable dolphins. It first approached local small boats and, after some months, it began to swim with bathers. An interesting fact was that this sociable tucuxi traveled along a disturbed and polluted Estuary, where cetacean species are rare. Past publications refer to the common presence of dolphins in the mentioned Estuary, but they do not identify the observed species (e.g. Luederwaldt, 1919).

To better understand the presented aspects on tucuxi behavior it is necessary to develop long-term behavioral studies. Recent unpublished studies have been developed along this species range, but some of them lack the use of adequate sampling methods. Based on the revision on problems regarded to behavioral sampling methods for cetaceans made by Mann (1999), the presented observations can be classified in the 'anecdote' protocol and in the '*ad libitum*' (*sensu* Altmann, 1974) methodological category. As Mann (1999) pointed, *ad libitum* sampling is perfectly appropriate for anecdote protocols, as it can provide critical information and insights regarded to predation, birth and other rare events. Thus, the events documented in this paper have a valuable mean to better know the behavior of *S. fluviatilis*.

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